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How are risks and opportunities managed in digital transformation in SMEs?

A case study from the energy sector in Norway.

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Forord

EMBA studiet ved UiS har vært utrolig en spennende, interessant og ikke minst en lærerik reise som kanskje ble tilføyd en ekstra dimensjon med potensielle utfordringer da vi som ektepar skulle skrive denne oppgaven sammen. Et av spørsmålene vi stilte oss var om vi begge ville klare fullføre dette i en så hektisk hverdag som vi begge hadde. Og når vi i tillegg fikk en «Corona» baby midt i studiet, så reduserte ikke akkurat dette aktivitetsnivå, men begge har en personlighet og karakter som tilsa at dette får vi til. Nå valgte vi ikke akkurat et «enkelt» tema for oppgaven. Vi kunne sikkert funnet andre spennende og kanskje enklere oppgaver ettersom spennvidden i studiet var omfattende og dermed ga mange muligheter til å finne et interessant tema. Tittelen for oppgaven ble valgt på bakgrunn av egen erfaring i kombinasjon med de teorier som ble gjennomgått i studiet og treffer to «store» områder som berører de fleste virksomheter i dag; digital transformasjon samt håndtering av risiko og muligheter. Vår oppfatning av sammenhengen mellom disse temaene ble tydeligere jo lenger ut i studiet vi kom og dermed klarheten i hva selve master oppgaven skulle handle om når den tid kom. Og selv om vi begge syntes det er utrolig deilig å sitte her å skrive de siste avsluttende ordene i denne oppgaven, som har vært ganske krevende å besvare, så har det inspirert oss til å ta resultatene med for videre bearbeiding.

En stor takk fra oss til Jan Erik Karlsen som veileder i master oppgaven, og som ved flere anledninger hindret oss å ta for lange sidespor i skrivingen, noe som ikke var vanskelig i det hele tatt, gitt kompleksiteten i oppgaven.

Og ikke minst en stor takk til våre svigermødre som har stilt opp som barnevakt i de mest hektiske periodene av skrivearbeidet. Og en takk til de større barna for sin tålmodighet og forståelse med den tidvis manglende mentale tilstedeværelse av foreldrene i perioden. Uten den ekstra hjelpen hadde vi ikke sittet her og skrevet forordene til en master oppgave.

Abstract

This study aims to understand how risk and opportunities are managed in digital transformations in an SME. We have conducted a qualitative single case study of an SME using semi-structured interviews to accomplish the task. Due to the limited availability of existing research and empirical data on the topic, our research approach has been abductive. The context of the study is the energy sector in Norway. Recent research implies that the lack of holistic focus on risk and opportunity management may be one reason for digital transformation failing to meet its objectives. Our study provides a gap analysis in which an ideal model confronts empirical findings. The ideal model comprises existing theoretical sub-models to provide a holistic view of the practices applied by the chosen SME versus theoretical perspectives. The study's main findings reveal that a company may be perceived as successful in their digital transformation without using recognized models, methods, and recommended practices based on the theoretical perspectives for its digital transformation processes. The research points to a possible gap in the validity of existing theories and models versus how SMEs in practice manage Digital Transformations, particularly management of risks and opportunities.

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List of Abbreviations

BoD	Board of Directors
CRM	Client Relations Management
DIM	Digital Initiative Matrix
DIS	Digital Information Security
DM	Digital Maturity
DS	Digital Strategy
DSe	Digital Security
DT	Digital Transformation
ERM	Enterprise Risk Management
HOT	Humans – Organizations – Technology
HSE	Health Safety and Environment
ISP	Information Security Policy
KPI	Key Performance Indicator
LE	Large Enterprises
MoM	Minutes of Meeting
OECD	Organisation for Economic Collaboration and Development
ROM	Risk and Opportunity Management
SME	Small Medium Enterprises
STD	Socio-Technical Dimensions
STI	Socio-Technical Interactions
STS	Socio-Technical System

ROM in Digital Transformation

1 Introduction

Digital challenges in SMEs

The rapid change in businesses' competitive environment is, to a large extent, accelerated by megatrends[I] within technologies and ICT. Companies deal with new and unknown challenges that they must face to stay competitive and secure their business's survival. Companies' business models are disrupted by constant innovation, driven mainly by new technologies, representing risks and new business opportunities. In addition, other global events are becoming more frequent (Pandemics and Politics). As digital technologies have become the most significant enabler for change and pursuing new opportunities, the phrase "digital transformation" or "DT" has been one of the most used buzzwords when companies' leadership talks about what is and will be the most significant influencer of future success for their business. SMEs represent more than 99 % of total enterprises and 72% of total employment. In the global context, SMEs stand for more than 50% of the total value (GDP) and provides more than 55 % of export. This makes SME's an essential contributor to the global economy, and thereby it is also vital that they succeed in their efforts to manage the challenges mentioned above. In the context of SMEs, OECD has published a study: "The Digital Transformation of SMEs", which points to additional issues being a core challenge for most SMEs (OECD,2021).

SMEs tend to rely on external systems, support, and advice to manage their business. This partly compensates for weak internal capacities and influences their cost base. For example, digital platforms (e.g., social networks, e-commerce marketplaces etc.) provide significant scope to optimize certain operations at a low cost (e.g., business intelligence and data analytics services) versus in-house capacity and competence. Similarly, SMEs use external consultants or the security-by-design features of digital products and services to manage digital security risks. The gap between SMEs and larger firms is even more transparent when it comes to adopting more sophisticated technologies (e.g., data analytics) or where volume matters for implementation (e.g., enterprise resource planning for back-office integration, supply chain and customer relationship management software for front office and production process integration). The entry point for the digital transition for most SMEs is within general

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I- https://www.pwc.nl/en/topics/megatrends/technology.html

administration or marketing functions, where the digital gaps between SMEs and larger firms in online interactions with the government, electronic invoicing, use of social media, and e-commerce are smaller. The analysis performed by OECD describes a need for increased focus on digital security as companies are becoming more digitally exposed (OECD, 2021). This is one of several areas that SMEs need to manage in their digital transformation journey. One well-documented and major weakness of SMEs is their limited resources.

"Fast forwarding" into the digital abyss

In the context of the above, most SMEs embark on a digital transformation journey, seldom supported by deliberate and carefully evaluated choices and considerations by the companies' owners and leadership. They do it more often as decisions without any in-depth evaluation of the fundamentals required to create a sustainable and successful business. SMEs' competitors also focus on DT to be successful. So, they often follow each other closely without knowing why and are driven by often unspecific digital expectations from customers. They do so without knowing what it will entail or how they will execute it. A parallel can be drawn to where you observe a flock of sheep's running around without specific meaning or direction. But all the sheep follow the leader in the pack, even if it means going off a cliff. The authors argue that most SMEs are struggling to keep up with these rapid changes in their business environment and the complexity DT represents. Understanding and grasping the implications of DT when developing their strategies, plans, and subsequent execution becomes an overwhelming task for SMEs. Navigating and making the right decisions in such rough waters is like steering a ship in the middle of the knight without a compass or radar. Thereby steering the company into the digital abyss becomes a likely outcome unless the correct measures are implemented.

1.1 The rationale of this thesis

Firms before 2019 spent more than 1.3 trillion USD annually on digital transformation programs to improve efficiency because digital leaders are perceived to outperform their peers in nearly every industry. It was estimated that $900 billion of this cost went to waste[II]. By 2023, the digital transformation market is expected to reach $6.8 trillion, according to the research firm IDC. 75% of organisations will have a comprehensive digital transformation roadmap in place, up from 27% of companies today, according to IDC in Oct. 2020[III]. Provided that the mentioned prognoses represent the reality and companies' digital transformations continues to be an area of more failures than success, the waste could mean more than $4,5 trillion if failures continue at the same level. A recent survey of directors, CEOs, and senior executives found that digital transformation (DT) risk was their #1 concern in 2019 [IV].

It then becomes interesting to investigate to what extent any new theories and methods have been developed or matured to prevent unsuccessful digital transformations of companies, given the current high failure rate and subsequent implications. As the starting point for diving into the subject, the following "How to" question is illustrated by a simple google search that resulted in 375 million hits when searching on "how to conduct a digital transformation process". Equally, there are 1,3 million hits in Google scholar using the same search phrase. For example, digital technologies provide possibilities for efficiency gains and customer intimacy. But if people lack the right mindset to change and the current organizational practices are flawed, DT will simply magnify those inherent flaws. If you do not know how and what to do and subsequently measure the effects through organisational involvement, you will not be able to take advantage of the possibilities. HBR explains this in their article from 2022; "The 4 pillars of successful Digital Transformations"[V]. DT takes time and is a series of evolutionary and occasionally disruptive, steps for an organisation. Like in any journey, you need to decide where to go first. This corresponds with the author's opinion and working experience. A review of the latest research and research reviews discussing digital transformation failures refers to "company culture issues" as being one key contributor to the high volume of failures. More specifically for SMEs, the article: Where Digital Transformations Go Wrong in Small and Midsize Companies by Conway & Codkind (2021)

II: https://www.forbes.com/sites/forbestechcouncil/2018/03/13/why-digital-transformations-fail-closing-the-900-billion-hole-in-enterprise-strategy
III: https://www.idc.com/getdoc.jsp?containerId=prUS46967420
IV: https://hbr.org/2019/03/digital-transformation-is-not-about-technology
V: https://hbr.org/2022/01/the-4-pillars-of-successful-digital-transformations

provides further insight and opinions on why DT in SMEs fails. Middborg (2021) also points to competence gaps/knowledge about digital transformation and what it entails among company BoDs / Management. According to Menzefricke et.al. (2021) in their research, they allude to a lack of holistic risk management as a significant threat to successful digital transformations. They claim that there is a need to establish a holistic model that incorporates humans, organisation, and technology dimensions (HOT) as described in the Socio-technical theory, which they perceive to be critical to DT success. They claim that the interactions between technical, organisational, and human dimensions represent a breeding ground for risks that could endanger the successful digital transformation and thus should be managed pre-emptively. (Menzefricke et al., 2021b). Lack of holistic risk and opportunity management can significantly impact company value, reputation, budgets, and funding and ultimately create organisation fatigue. The many facets of the challenges mentioned coincide with our own experience in the field of DT and ROM.

The case SME context

The SME is an established Norwegian company that has been through a Digital Transformation and who recognizes that DT is the future. The company we have chosen to study is a major player in the energy sector within its segment, while the administration is small and the margins, they operate with are low. The company has chosen to remain anonymous in this study.

The SME have grown steadily over the past 10-15 years, thru both organic growth and acquisitions. We considered the SME to be a viable case candidate to provide sufficient data to answer the research question. The SME have implemented different technologies to enhance customer experience, improve efficiencies and changed their business model by use of new technologies, which is the core definition of DT. There was also a recognition from the CEO of the company that they were not conducting their business in a Digital context as well as they could or should have. This was the main reason for the company accepting to be the case study company. They had historically experienced large investments in "wrong" solutions, which to them was costly exercises and waste of their resources.

The company demonstrates a solid growth and economic development. We extracted the financial performance information from a public source[VI].

VI : https://proff.no

ROM in Digital Transformation

liquidity	profitability	solidity
Tilfredsst. (1,09) 2019: Tilfredsst. (1,03)	Meget god (19%) 2019: Meget god (24,1%)	God (20,6%) 2019: God (21,5%)

,

Sales revenue

Equity development

Annual Results (Mil.)
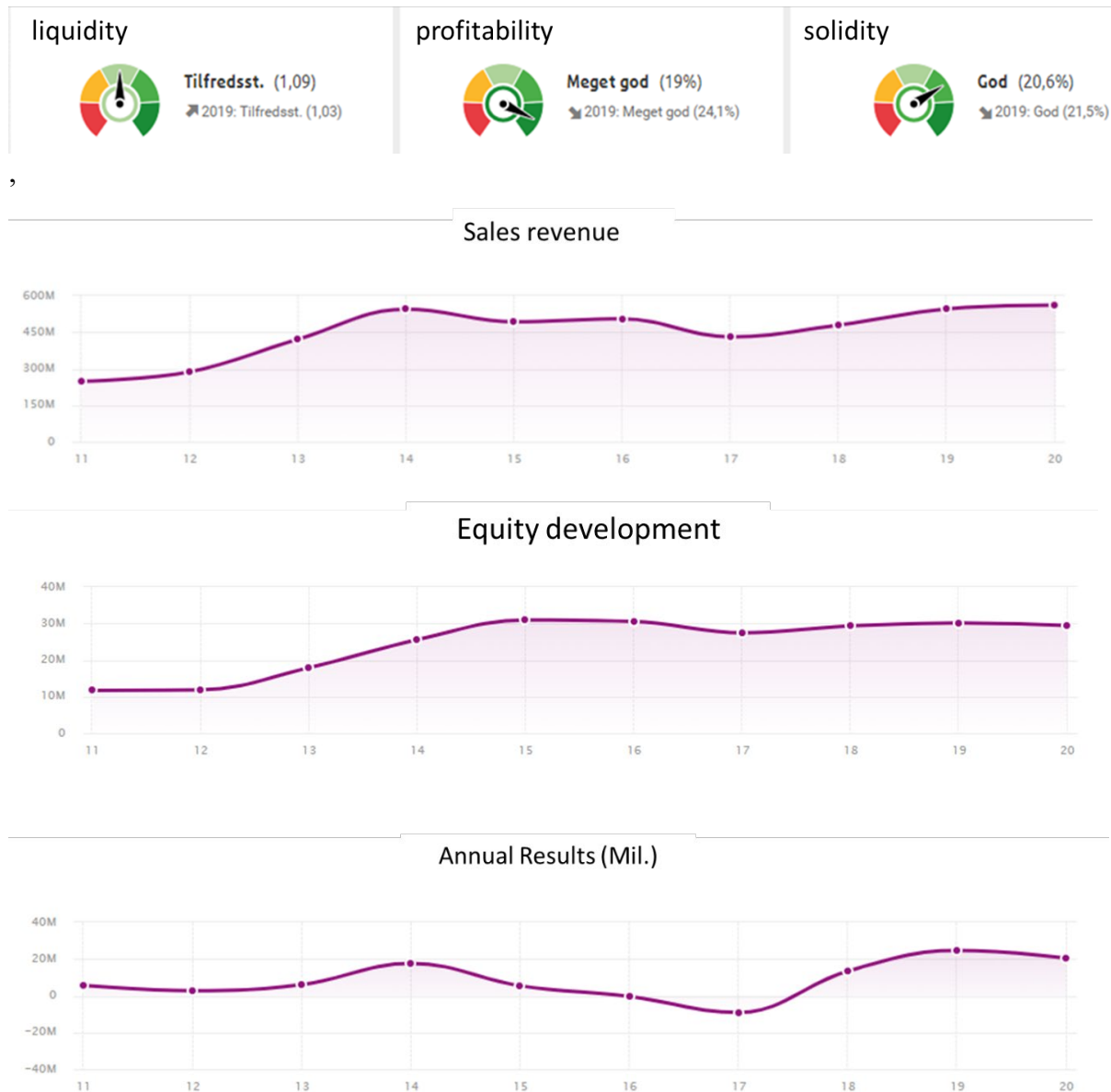
If this study could contribute with insight on how they could improve their DT processes and subsequent results, it would be welcomed by the company. This information then brings us to the genesis of this thesis.

1.2 Research question

Based on the level of available research, global focus, the volume of investments in DT, we are curious to observe and understand how risk and opportunities management in DT is conducted in SMEs when DT is a known area of a high failure rate according to empirical data. The reasons as outlined in section 1.1, also coincides with our experience as both

participants and practitioners of digital transformation programs and initiatives, including technology development. We then ask the question:

«How is risk and opportunity (ROM) managed in Digital Transformation in SMEs".

The main research question was conceived based on own experience in digital transformations programs and initiatives on industry level and risk and opportunity management in large development projects within the oil & gas business in Norway.

1.3 Purpose of the thesis

The main purpose of this thesis is to understand if lack of ROM methods and processes are one of the contributors to why so many digital transformations fail to deliver on their objectives. To the authors knowledge and experience there is limited research within this area. We believe that this forms a distinct reason to conduct a study of how ROM is incorporated and used in an SMEs DT process. Both empirical data and own experience are pointing to a connection, although from different perspectives (empirical data gathered versus own experience). We argue that there is a connection between unsuccessful digital transformations and lack of a holistic and fully integrated ROM process in DT. We expect the answer to the research question will confirm how the SME conducts their ROM process in DT and when measured against an ideal model ROM in DT will reveal any potential gaps that will shed light on the issue. We consider there to be two main reasons for such connections:

1. The share complexity of DT and the impact DT has on a company its organization and business model
2. The same level of complexity is facing companies when it comes to corporate governance which includes ROM in general, both at corporate level (enterprise level) and business unit / department, use case / digital initiative level.

We have in this research chosen to illustrate a consolidated view of this complexity by describing the author's view of company's governance model (Figure 1) in a context of Digital transformation. The purpose of this model is to highlight the many interactions within governance processes incorporating ROM. The study will be limited to the "Transformation" part of the model in Figure 1.
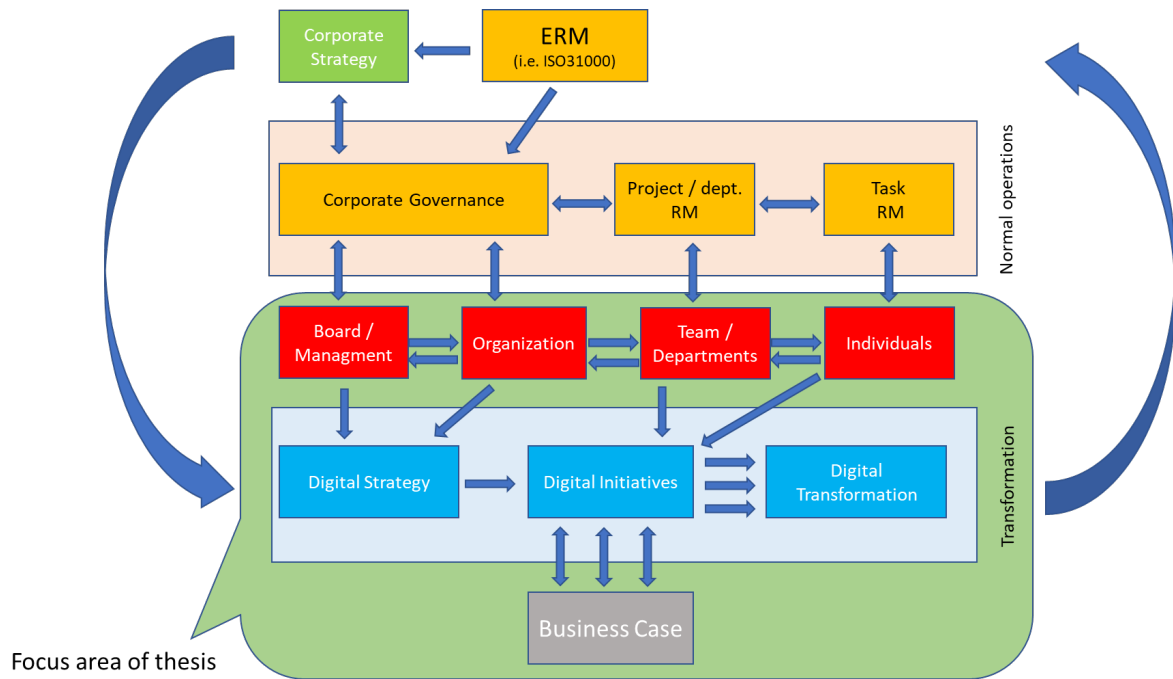
Figure 1. Governance model and ROM – Digital Transformation

The blue arrows (to be considered as a representative samples) shown in Figure 1. are processes that involve risk and opportunities that needs to be managed, to achieve acceptable risk levels and manage the risk appetite that drives value and results for the organisation. The governance requirements from enterprise level to the implementation of initiatives is comprehensive and complex and may cause fatigue in organizations caused by a lack of motivation, competence, and clarity on what is expected and required to create success for SMEs as they by nature have limited capacity in these areas versus large cooperation's with dedicated resources to manage these processes. Because of the usually low equity ratio of SMEs, they are relatively vulnerable to external events compared to larger enterprises (Altman et al., 2010) In addition, empirical data and research is pointing to socio-technical dimensions (HOT) which are perceived critical to achieving success in digital transformations which are explained in section 2.1.3. In our research we will use the HOT model developed by Gabriel et al. (2021) based on a fundamental assumption: Risk is the most powerful driver and issue in industrial activities. Management by risk is a high-level management approach integrating all other company preoccupations (Gabriel et al.2021) . This will form a part of the ideal model that will be composed for analysis purposes. The holistic and often segregated views of how to gain success and avoid pitfalls (I.e., what to do or not) will not provide an answer to gaps between procedures and applied processes and organizations adherence. When

there is a good understanding of how processes are developed, incorporated, executed, and adhered to, it will become clear if there is a distance between theoretical perspectives versus practices in ROM + DT. This will then serve as the basis for determining if recommended theories and frameworks are designed to resolve the challenges or Opposite, an observed gap between prescribed theories (including the ideal model) and documented practice will indicate a low level of embedded ROM/DT management.

1.4 Research structure

We will through qualitative research combined with an abductive approach and semi-structured interviews seek to obtain data that will shed light on why some companies succeed and more companies fail in obtaining the expected value of their digital transformation. In section 1.1, a brief literature review was conducted to provide a theoretical foundation for digital transformation, digital strategy, digital maturity, risk and opportunity management and enterprise risk and opportunity management, and socio-technical theories to serve as the basis for the research presented. Figure 1. is the representation of the research structure.

Research Question
How are risks & opportunities managed in SME's digital transformation projects?

Supporting research questions

| How Is the company's organization capable to assess risk and opportunities (capacity and competence) in a digital transformation? | Are the company objectives clearly defined and controlled in terms of accomplishment related to their digital transformation process? | Have the company established a digital strategy and how is this anchored in the organization? | Have clients, suppliers/consultants' knowledge about the company's digital strategy and what has been defined as risk and opportunities by the company? |

Research Area

| Oil & Gas industry | Small-Medium Enterprises (SME) |

Reasearch strategy & metodhs

| Research Strategy: Case study | Qualitative Method |

Theoretical Framework
Selection of theoretical reference framework & analysis units

Data collection & analysis
Interview guide

Discoveries
Discoveries in relation to the main and supporting research questions

Discussion
Discussion of findings

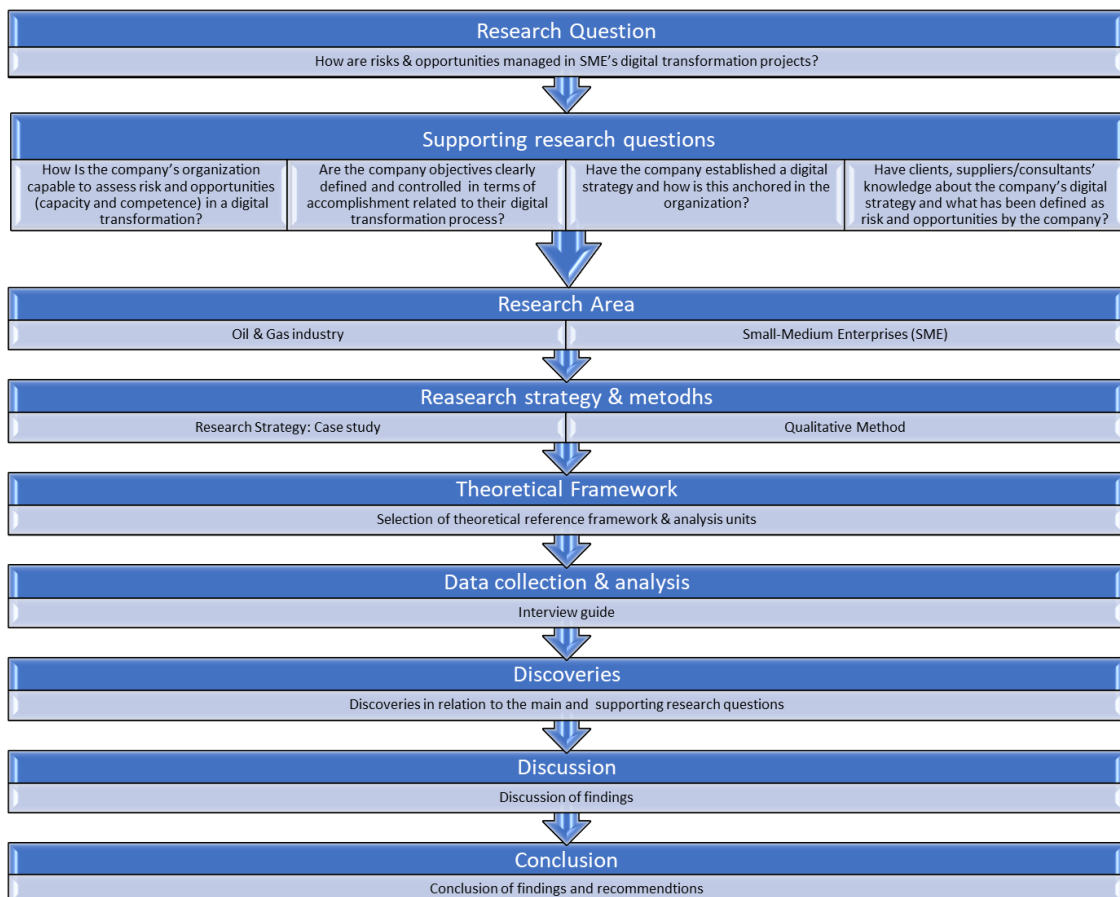**Conclusion**
Conclusion of findings and recommendtions

Figure 2. Research structure

2 Theory

This chapter discusses various theoretical perspectives that are used to answer the research question: "How are risks and opportunities managed in digital transformation projects?"

The theoretical perspectives will each represent essential parts of a holistic process for how risks and opportunities should be managed in Digital Transformations. We choose a two-part approach to how the theoretical perspectives are presented.

First, we focus on describing the different theoretical perspectives. Then we show how these theoretical perspectives are interrelated and why they constitute the ideal model for a holistic process for how risks and opportunities should be managed in Digital Transformations for SMEs. The theoretical perspectives include interdisciplinary areas such as Digital Strategy, Digital and ROM Maturity, Digital Security, Sociotechnical System Theory and Risk and Opportunity Management (ROM). The chapter begins with the theory of Digital Transformation to clarify definitions and concepts. Together with theories regarding Digital maturity and Digital Security and Project Management in the context of Digital Transformation. Next, main theory perspective is Risk and Opportunity Management, Enterprise Risk Management frameworks and standards related to the ROM process are presented. Next, we go through a model based on Socio-Technical System Theory. The model sheds light on various dimensions that ROM must consider when deciding on and implementing a Digital Transformation. Furthermore, Digital Strategy theory and frameworks are presented. Lastly theory concerning Digital Initiatives. Finally, the theories are summarized concerning how the different approaches together form the essential elements for an ideal and holistic ROM process during a Digital Transformation.

2.1 Theory – Main perspectives

In this section, the different theoretical perspectives used as the foundation for this research are divided into seven parts representing relevant perspectives related to the research question and are considered necessary to answer this question. Other theoretical perspectives may be appropriate but are not regarded as critical to the phenomenon we are studying. The number of theoretical perspectives illustrates that it is a broad and complex theme and that no theory on its own will cover the subject. To assist in obtaining relevant literature to establish our theoretical perspective we performed searches for "Digital" in combination with known and perceived relevant themes such as "Strategy", "Maturity", "Initiatives", "Risk", "Risk and Opportunity (ROM)", "Transformation" and different combinations of these words for

literature and literature reviews with the word combinations as shown in Table 1. The authors reviewed more than one hundred research papers, books, and articles to identify the most relevant theories for this study. The literature identified by us and by other researchers in literature reviews all have in frequently used words like models, framework, complex, areas for future research etc. The latter phrase appeared to be very important as many theories seemed fragmented and no theory covers a holistic picture of how to conduct "DT" and "ROM in DT", besides an EU funded program (CIRP) in Germany which have been focused on Industry 4.0 (Menzefricke et al., 2021b) DT and ROM individually, are broadly debated in the global research community, but limited in terms of connectivity. We will seek to obtain and use the most recent and research to shed light on this evidently massive challenge. Table 1 represents in the authors collection of the key research reviews that used in this study, in addition to the single research papers and empirical data.

Table 1. Literature reviews of Digital the "themes"

Authors	Digital Maturity	Digital Strategy	Digital Initiatives	ROM in SMEs	Digital Transformation
(Lipsmeier et al., 2020)		X			
(Schallmo et al., 2018)		X			
(Ferreira de Araújo Lima et al., 2020)				X	
(Garengo et al., 2005)		X			
(Zaoui and Souissi, 2020)					X
(Falkner and Hiebl, 2015)				X	
(Reis et al., 2018)					X
(Williams et al., 2019)	X				
(Teichert, 2019)	X				
(Obwegeser et al., n.d.)			X		
(Gong and Ribiere, 2021)					X
(Gersch and Sundermeier, 2019)					X

2.1.1 Digital Transformation

A typical representation of digital transformation in the literature is to apply digital technologies to enable significant improvements in a business and to become and remain competitive(Westerman et al., 2014). The improvements may be related to the company's operations, its work processes and value creation. With digital technologies, researchers often refer to modern technologies, such as cloud solutions, social media, ai, smartphones, big data, and the Internet of Things. Furthermore, there is a distinction between digital upgrade and digital transformation in literature. The digital upgrade involves using digital technology to increase efficiency in work processes. In contrast, DT involves using digital technology to make significant changes in work processes or value creation or, in some cases, to offer new digital products (Nwankpa and Roumani, 2016). However, the literature does not provide an

unambiguous definition of what DT is – the phenomenon is conceptualized and characterized in different ways by different authors. An attempt to create a unified definition based on a literature review is performed by Gong and Ribiere (2021): "A fundamental change process, enabled by the innovative use of digital technologies accompanied by the strategic leverage of key resources and capabilities, aiming to radically improve an entity[VII] and redefine its value proposition for its stakeholders." (Gong & Ribiere, 2021)

To provide a context to relevant success criteria of DT, the article by HBR (2019) share some experience data on why certain companies succeed with their DT. Harvard Business Review asks the question; "Why do some DT efforts succeed, and most others fail?". Their summary, based on interviews with companies that have been successful in DT, is that companies that succeed have in common five key lessons learned. The authors experience and comments to each of the lessons are made in column 3 in Table 2.

Table 2. Five key lessons from successful DT with authors comments

Lessons Learned	How	Author's comments
Figure out your business strategy before you invest in anything	Digital transformation should be guided by the broader business strategy.	Our experience is that this is a crucial step and a generic and well-known thinking and practice for DT. If not managed at corporate level any strategic objectives and synergy effects will be missed.
Leverage insiders	Organizations that seek transformations (digital and otherwise) frequently bring in an army of outside consultants who tend to apply one-size-fits-all solutions in the name of "best practices." Our approach to transforming our respective organizations is to rely instead on insiders' staff, who have intimate knowledge about what works and what does not in their daily operations.	Our experience is that utilization of inhouse resources is necessary, but often they need coaching as they are often stuck in the departmental culture and behaviours. They have intimate knowledge of internal processes but will always think how it will impact their own position. This behaviour is related to traditional organisations with a history and not so much to young companies.
Design customer experience from the outside in	If the goal of DT is to improve customer satisfaction and intimacy, then any effort must be preceded by a diagnostic phase with in-depth input from customers.	Our experience is that this is a key step and a generic and well-known thinking and practice for DT.
Recognize employees' fear of	When employees perceive that DT	We are fully aligned and have the

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[VII] : (An entity could be either: an organisation, a business network, an industry, or a society).

being replaced	could threaten their jobs, they may consciously or unconsciously resist the changes.	same experience. That is also why this needs management anchoring and placing responsibilities at lowest level and monitor behaviour towards objectives.
Bring Silicon Valley start-up culture inside	Silicon Valley start-ups are known for their agile decision making, rapid prototyping and flat structures.	Most new-tech companies can adapt a "modern" culture. Our belief and experience are that typical SMEs are companies were the founder still play a key role and change of culture may not happen overnight or at all. It may or may not be correct. Depends on where you are in the world. Culture plays a significant role in DT.

Transforming a business to take advantage of digital technologies is not a question if needed, to be competitive. It's a question of when and how to execute it and how fast it is needed relative to your marketplace and competitive conditions. Only 8% of today's companies believe that their current business model will be viable for the future without taking digital action (Bughin et al., 2018). This is also debated among researchers such as Müller et al. (2019). In our view, the best attempt of defining DT is using the recommendation by Gong et.al. (2021) "A fundamental change process, enabled by the innovative use of digital technologies accompanied by the strategic leverage of key resources and capabilities, aiming to radically improve an entity and redefine its value proposition for its stakeholders" (Gong & Ribiere, 2021). This is the definition we have chosen to apply in our research work. Furthermore, the duration of DT is an issue discussed among various researchers arguing for one or the other definition of whether a DT is a continuous process. We are referring to the most recent literature review of a unified definition and empirical data when providing samples of arguments supporting one or the other opinion. In the context of the above discussion, the authors have chosen to define the extension of DT definition to capture the duration element: "It is a continues transformation process for a business that needs to be supported by a DT program with clearly defined initiatives and activities with clearly defined "start and stop points".

2.1.1.1 Digital Transformation and SMEs

There are many samples from empirical data regarding how well SMEs are adopting DT. In a sample by provided by OECD (2021), the general administration and marketing functions of SMEs versus Large enterprises (LE) are compared. This is visualized using the diffusion rate (median in OECD), based on country average percentages of enterprises using the technology over 2015-18 for Small, Medium and Large Enterprises (OECD, 2021). The numbers marked

with yellow in Table 3 randomly illustrates the gaps between SMEs and Large Enterprises in terms of % adaptation of DT within administration and marketing functions.

Table 3. Digital transformation in SMEs (OECD, 2021)

	Small	Medium	Large
B2G interactions	85,00	93,82	95,33
Enterprise Resource Planning	30,12	58,19	78,62
Social media	43,26	53,78	69,78
Customer Relationship Management	26,63	43,26	60,39
Electronic invoicing	34,54	42,67	51,33
Cloud computing	20,03	34,11	50,00
Radio Frequency Identification	8,92	22,96	43,44
E-commerce	18,74	29,44	41,73
High-speed broadband	13,72	24,00	41,37
Supplier-customer management	12,71	23,84	41,23
Big data	8,80	17,00	30,48
E-booking and orders	18,20	23,47	28,57

The purpose of the table is to illustrate that SMEs to some extents are capable of matching larger firms in terms of adopting and take advantage of new technologies and in most other areas they are digital laggers, and as pointed out by research, is often linked to SMEs scares resources and competence. The data in table 3. Underpins the fact that SMEs to a large extent are struggling to implement and use new technologies in areas that will enable data analysis and hence reduce the ability to reduce risk and pursue opportunities. Being able to conduct a holistic ROM process would provide the company with better insight and data to enable a better decision. This is pointing to the area of SMEs limitations and thereby their ability to successfully execute DT processes.

2.1.1.2 Digital Maturity

Digital Maturity is defined as a "measure of an organization's ability to create value through digital". BCG characterizes it as a "critical predictor of success for companies launching a Digital Transformation"[VIII] . Fraser defines maturity as "The literal meaning of the word maturity is 'ripeness', conveying the notion of development from some initial state to some more advanced state" (Fraser et al., 2002). Assessing Digital Maturity is a good starting point before developing a company's digital strategy or for adjusting an already existing digital strategy[IX]. Schallmo states that "Companies can effectively determine the status quo of a company's state of digitalization with the application of digital maturity

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VIII - https://www.bcg.com/capabilities/digital-technology-data/digital-maturity
IX - https://link.springer.com/article/10.1007/s11740-021-01044-4

models" (Schallmo, 2018). One of Kane and co-authors key finding from digital business global executive study and research report was that the main characteristics of digital mature companies' digital culture, includes: "an expanded appetite for risk, rapid experimentation, heavy investment in talent, and recruiting and developing leaders who excel at "soft" skills" (Kane et al., 2016). Leading a digital company does not require technologists at the helm[X]. The same authors found also in survey published in 2015[XI] that digitally mature organizations are more comfortable taking risks than their less digitally mature peers. They also accept a higher exposure to a negative outcome as the opportunity value precedes danger. And they have leaders that promote a culture where employees feel safe to try and fail.

Before conceptualizing digital initiatives such as digital business models, new innovative products and services or digital business processes, companies should first assess their current capabilities and future requirements. Maturity models have become a popular tool because they help determine the baseline level of a company's digital maturity.

Based on the literature, SMEs have also expressed interest in utilizing maturity models, but often, these models do not fit the SMEs' specific interests or requirements. Research provides evidence that the lack of expertise and understanding about DT is increasingly recognized as a significant hurdle for DT within SMEs. Without this knowledge, which often does not exist within SMEs, it is difficult to evaluate the current situation correctly and, more importantly, the future requirements for DT. This is based on a literature review by Williams which states that it is apparent that very few maturity models have been validated in research (Williams et al., 2019). One model that has been recently applied to an SME context, is the maturity model InAsPro, developed by Siedler. This model was developed as a result of trying to close the gaps discovered when conducting an extensive literature review of existing Maturity models (Siedler et al., 2021). The developed maturity model although designed for manufacturing companies, compared to existing digitalization maturity models, is that it includes a holistic approach by considering multiple aspects of a company, including Social, Technology, and Organization dimensions. This model gives a good example of how Digital Maturity can help assess a company's current DM state and help them move to a desired future state. Although existing DM models can be perceived as a quick way of achieving answers about a company's current state, before choosing a DMM, one should know which requirements the instrument must specifically address for their company. Being digital mature will affect the

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X - https://www2.deloitte.com/us/en/insights/topics/emerging-technologies/mit-smr-deloitte-digital-transformation-strategy.html
XI - Strategy, not Technology, Drives Digital Transformation (mit.edu)

risk level during all phases of the company's DT Journey, as the risk appetite increases with digital maturity.

2.1.1.3 Digital Security

According to empirical data, Digital Security is a big challenge for SMEs. The nature of an SME dictates that inhouse capacity and competence will be one of their many shortcomings when SMEs are discussing and planning DT initiatives. This then alludes to the research question. OECD (2021) has performed a thorough research on SMEs and DT. SMEs with robust digital security and privacy practices may have a competitive edge in setting their business partnerships compared to larger corporations. SMEs' ability to include digital security risk management in their operational protocols will become increasingly important for their integration into the global economy. SMEs exposure to digital security increases the risks and likelihood of being victims of cybercrime by making them more exposed to digital security incidents and more reliant on digital technology. The Internet of Things increases digital connectivity, the number of vulnerabilities to exploit and thereby the potential frequency or probability of attacks. Cloud computing is resulting in increased migration of sensitive data to external parties to the companies in question, which mean that an external party technically manages the security and protection of their data. Artificial intelligence can enhance the capacity of digital security teams but also be undermined by data poisoning and leveraged by cybercriminal organizations. SMEs tend to have less comprehensive and sophisticated digital security risk management practices. They often do not have a dedicated person in-house; they tend to seek less information from external sources and do not have formal procedures to detect intrusions. They also tend to invest less in digital security due partly to their lower relative size by revenue, although this varies between sectors and countries (OECD, 2021). This coincides with the authors own experience from working with SMEs.

2.1.1.4 Digital Information Security

The Digital Information Security (DIS) is a separate theme in digital security and relates to the internal policy of how information shall be managed and adhered to. The more digital a company becomes the bigger the threat and vulnerability becomes to what is normally perceived as their most valuable asset, the company's core business information. In a British study it was concluded that 58 percent of "cyber" attacks in British organizations are due to insider threats. According to Ali (2021), thirty-three per cent of these attacks are due to noncompliance with an organization's information security policies (ISP's) and regulations

(Ali et al., 2021). To mitigate organizational information security threats, most organizations have adopted standard guidelines provided by the National Institute of Standard and Technology (NIST) in UK. Other standards are used in global context. For extenuating security risks, organizations consider establishing information security standards (ISO/IEC 27001 and ISO/IEC 27002) for best practices. These guidelines and policies provide the best direction for information security. A detailed policy document contains behavioral checks, recovery processes, and technical controls to deal with a successful security breaches. These type of questions are standard when conducting ROM within a company. Researchers have suggested many ways to adopt these standards, but there are behavioral issues in adapting the standards (cultural issues). On the other hand, organizations do not focus on their internal problems while designing an information security policy (ISP). Information security in organizations incorporates a complicated process that involves many factors, such as education, human factors, and technology, which it is necessary to manage under one security model. Organizations need to monitor employees' behaviors and evaluate the factors which influence employees 'work performance. This is further described in section 2.1.3.1.

2.1.1.5 Digital Project Management

As outlined in section 1.1 SME's play a key role in the global economy and hence their ability execute projects successfully is just as important as it is for large enterprises to avoid project derails and subsequent train wrecks. The nature of SME's implies limitations to their ability to adopt systematic project management methodologies. In addition, a project execution methodology for SMEs is an essential factor that needs to be combined with ROM, as the selection method or lack of methods inherently increases the companies' risk of failure to execute and successfully implement DT initiatives. According to PMI, executives know what they should be doing – 88% say that strategy implementation is important to their organizations – 61% acknowledge that their firms often struggle to bridge the gap between strategy formulation and its day-to-day implementation (Intelligence Unit & by PMI, 2013). This gap demonstrates a lack of understanding among organization executives that all strategic change happens through projects and programs. Most C-suites fail to realize this simple truth (Mangement Institute, 2014). PMI believes that all strategic change in organizations is delivered through programs and projects. "Successful organizations lead change by managing their projects and programs effectively" (Intelligence Unit & by PMI, 2013). The management community in general and the project management community in particular do little to provide SMEs with guidance on managing projects (Diab, 2010; Project

Management Institute, 2010). Garg (2010) implies that there are no standards for the development of information systems in SMEs, and the Project Management Institute (2010) has indicated that further research is required to tailor to the PMI® PMBoK® for SMEs although requirements management is the most important practice, and that this was in fact incorporated the latest edition (Garg et al., 2010). In our research we have not been able to reveal that the recommendation by PMI has been undertaken by any institutions, although smaller and younger companies will be less likely to employ resolute project managers, and less likely to adopt identifiable project management practices based on our experience. Medium-sized and large companies need more formal project management approaches to coordinate the work of teams of specialists. But medium-sized companies, as presented in the case study, still apply simpler forms of project management than large companies. According to Turner, several project management "Light" versions have been developed in the recent years that do help SMEs in organising their (DT) projects, we still claim that this will not provide sufficient support as competence, resource scarcity and capacity to manage the projects needs to be in place prior to selecting a project management tool. "Some of the tools of project management, such as earned value management and agile methods, while very powerful, are presented in ways that are very bureaucratic" (Turner et al., 2012). We will not recommend a specific project execution methodology, but we will use "PRINCE2" XII, an internationally recognised project execution methodology, as a reference point when discussing this theme as it provides a good fit with DT execution but may constitute as a to complex methodology for SMEs in its current form. A high-level view of the seven phases in PRINCE" is shown in figure 3.

XII https://www.prince2.com/eur/prince2-methodology

Figure 3. PRINCE2 overview of phases

The PRINCE2 methodology is particularly good at controlling and reporting change, an essential part of risk and opportunity management based on author's own experience. Menzefricke have in their research review uncovered that the control dimension of ROM is missing from most literature (Menzefricke et al., 2021b). Thereby the combination of a recognized project methodology that focus on the control dimension is then well suited to build the ideal model the authors are compiling.

2.1.2 Risk and Opportunity Management (ROM)

The purpose of risk management is the creation and protection of value. It improves performance, encourages innovation, and supports the achievement of objectives. Risk management as a formal part of the decision-making processes within companies is traceable to the late 1940s and early 1950s. Two earlier strands of risk management practice have more recently been integrated under the broader concept of enterprise risk management. One of these strands relates to the management of insurance risks and financial risks (Dickinson, 2001). Organizations face an increase in various disruptions that could occur individually or simultaneously. "Each disruption might have different effects on organisational resources. Traditionally, Business Continuity Planning (BCP) and Disaster Recovery Planning (DRP) as the main contingency plans are conducted separately in different time horizons within organizations" (Sahebjamnia et al., 2018). BCP aims to develop appropriate strategies in pre-disaster to resume critical business operations to a minimum acceptable predefined level (i.e., Minimum Business Continuity Objective (MBCO) immediately after a disruptive event within the so-called Maximum Tolerable Period of Disruption (MTPD) through invoking appropriate BC plan(s). On the other hand, DRP strives to ensure the full recovery (restoration) of all disrupted operations to their everyday business state post-disaster (ISO:22310, 2012).

The intention of referring to BCP and DRP is relevant in the context of ROM in DT, as the DT process may imply changes to the business model, the way work processes are managed within the company and the inherent risk introduction of modern technologies imposes on a company. "Organizations are increasingly realizing the importance of taking proactive approaches such as Integrated Business Continuity and Disaster Recovery Planning (IBCDRP) for protecting personnel lives, preserving reputation/brand, reducing financial losses, and continuous serving of products/services" (Musgrave etal., 2013). Consequently,

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there will be a natural discrepancy between plans and real situations most of the time. "Risks are present in nearly all firms 'financial and economic activities. The risk identification, assessment, and management process are part of companies' strategic development; it must be designed and planned at the highest level, namely, the board of directors. An integrated risk management approach must evaluate, control, and monitor all risks and their dependences to which the company is exposed. In general, a pure risk is a combination of the probability or frequency of an event and its consequences, which is usually negative" (Dionne, 2013).

Often, where there is risk there is also an opportunity. The risks associated with any opportunity should be assessed to determine if the opportunity really is favourable. There are several relationships between risks identified in an enterprise and the opportunities that are generated. The higher the risk, the less impact of the opportunity in the enterprise, this results in an inverse proportionality. Another important relationship between risk and opportunity, results from the maturity of the processes. This is described in section 2.1.1.2. in relation to DT. Mature processes present fewer risks and more opportunities to a program. Success in the enterprise risk management approach depends on the correct and actual identification of responses to risk and opportunity. Managing the opportunities involves creating a fertile climate for innovation. Opportunity Risk Management is a process in which the benefits are tangible. "Opportunity Management helps eliminate poor ideas before they consume substantial resources and allows at the same time the development of powerful ideas that support the continued development of the enterprise" (Ivascu et al., 2022). Systematization of responses to risk and opportunity which are considered key to successful in ROM is illustrated in table 5. As discussed in section 2.1.1.2 about the importance of knowing the digital maturity of the company, the equally important subject to understand is the company's own ROM maturity. To enable an organisation to perform a quality ROM process, the organisation and its resources will need to possess certain competences and cultural behaviour. The model proposed by Tegeltija et al., (2018) was initially in the context of risk maturity in design processes. Although the thinking around the model was applied to the design of products, this can be perceived as a generic model based on the lack of research in this field as both ISO31000 and socio-technical theories are embedded and aligned in this model (Figure 4).
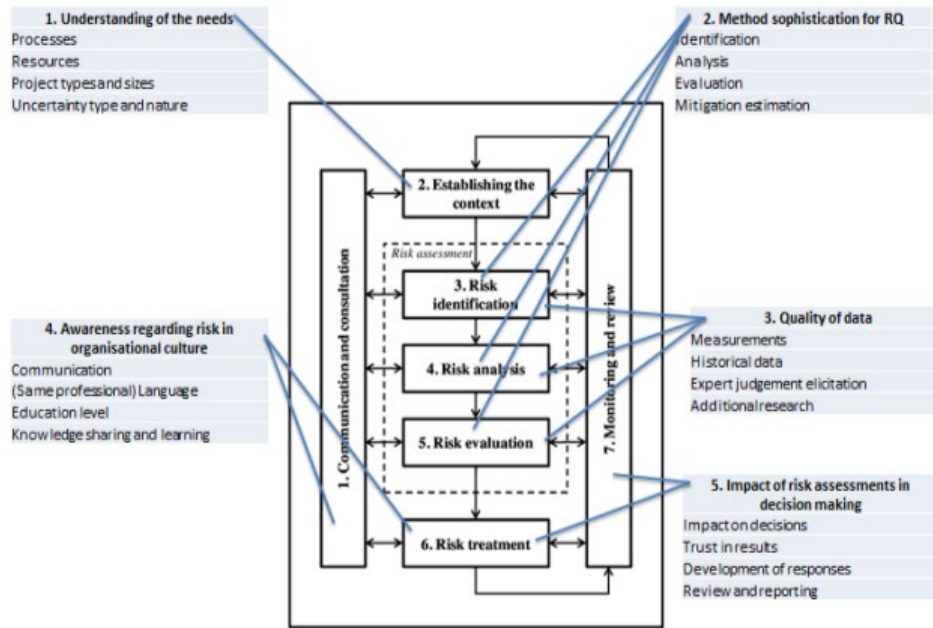
Figure 4. Risk Management Maturity model (Tegeltija et al., 2018)

As outlined in figure 4. A company will need consider and respond to each of the 5 steps described in table 4 to determine their ROM maturity which is a combination of competence and cultural needs.

Table 4. ROM maturity model (Tegeltija et al., 2018)

Step no.	Name of the step	Description of the step
1	Understanding the needs	To approach risk and uncertainty professionally, an organisation should be able to understand its needs and its stakeholders. The integral approach will depend on the company's organisational structure, the applicable processes and the types and sizes of projects. Understanding the concepts of risk and uncertainty is essential for managing risk. The nature and type of uncertainty determine what of applicable approaches, and thereby a better understanding of uncertainty enables more mature ROM.
2	Method sophistication for risk quantification	High quality and accuracy in estimates enable better decision-making support from the ROM perspective. Pending on challenges, some organizations may only need approaches that allow the identification of risks. Some may face challenges that require in-depth analysis. The level of sophistication of analysis will substantially depend on the method chosen for the study. Any limitations of the approach should be reported and communicated to decision-makers in the organisation. To improve their quantification, besides

		choosing a more sophisticated method, practices also need to synchronize advancements with other categories of risks and opportunities to ensure the highest benefits of their ROM process.
3	Quality of data	The data quality and availability will always impact the results and the number of assumptions supporting the analysis. In some cases, it is feasible to spend resources on acquiring high-quality data. Companies need to proceed with their business process (often due to time pressures) and be aware of the arbitrariness in the quality of data used and the number of assumptions made before the choice analysis. Major pitfalls may be overlooked in the absence of transparency (achieved through visualization tools). The quality of data should correspond to the method, as using a more sophisticated method on the low-quality data will not add desired value.
4	Awareness regarding risk in organisational culture	As pointed out in several theoretical references, Company culture is of great importance to building awareness of the ROM processes, activities, value creation and impact for all employees across different levels of an organisation's hierarchy. To properly support decision making, decision-makers need to be aware of its value. Other employees need to be informed why it is essential to provide certain information and attend associated meetings and why the whole process deserves attention. Communication and (professional) language can vary even inside the same organizations. While some employees may have an educational background that corresponds to ROM needs, the way they inform and interact with others in the company needs to be adapted to communicate to their knowledge base. To SMEs, which may have limited maturity and organisational competence.
5	Impact of risk assessments in decision-making	There is also the risk that a company faces a lack of trust in the results to base the decisions on it, and even a lack of appreciation of the analysis may occur, in this context, some of the complex mathematical calculations may be challenging for managers to comprehend completely, leading to their neglect. Furthermore, how the responses are planned and handled must be synchronised with the overall business process.

As described in the table, the proposed approach consists of the iteration of the following steps: Identifying and articulating the needs and then analyzing the current state of the RM in the organisation and identifying existing levels of maturity. The re-evaluation of the needs follows requirements to match the desired levels of maturity. Finally, individual recommendations are developed to achieve the desired practice according to specific cases.

According to Hausman, SMEs with a growth focus in general chooses to lower their risk by creating incremental (as opposed to radical) innovations, as these smaller companies have

fewer capacities and less product diversification than their larger competitors (Hausman, 2005). However, many SMEs do not, or not adequately, apply ROM practices, mostly because they cannot afford to rededicate resources because of their constraints (Marcelino-Sádaba et al., 2014).

According to McKinsey&Co (2021), in their article "De-risking digital and analytics transformations"[XIII], they confirm our perception that Risk Management methods and processes have not kept pace with the proliferation of digital and analytics transformations. This gap can only be closed by conducting risk innovation at scale. The COVID-19 pandemic environment has exacerbated the disparity between ROM demands and existing capabilities. Most companies are unsure how to manage digital risks; leading organizations in DT have defined organisational accountabilities and established a range of effective practices and tools. We believe that SMEs may see this as a barrier, given SMEs' nature with normally limited resources and competence. But ROM, although a sensitive and current subject, is poorly defined in literature in terms good procedures and processes, which cause difficulties to companies, specifically SMEs.

McKinsey&Co (2021) has developed a model to enable agile risk management, which provides a holistic picture of what is needed for a DT. The holistic view presented by the model also confirms the level of competence and capacity required by SMEs to enable a transparent and effective process as their digital maturity grows.

But model does not explain how to do this in practice. The authors are unable to see how just increased competence and capacity will enable agile risk management. As for several of the models presented in this thesis, this model also lacks the "how to do it" recipe. An SME are also dependent on a practical guideline to understand how to execute DT. The authors argue that it can be compared to giving 10 people an assignment build a specific house with Lego's. Without having the assembly instructions, you will have 10 different houses as people have different perceptions of what is a house, regardless of backgrounds and competence. The analogy with Lego's is that approach will differ and so will the results if a practical guideline is not available. Each Lego house may fulfill the basic requirements of building a house but not the objectives.

XIII- https://www.mckinsey.com/business-functions/risk-and-resilience/our-insights/derisking-digital-and-analytics-transformations

2.1.2.1 *Enterprise Risk Management*

"Enterprise Risk Management (ERM) is a strategic risk management discipline that aims to maximize a company value through efficient and comprehensive management of the company's overall risk portfolio" (Dickinson, 2001). An ERM framework has been established by both ISO[XIV] (ISO31000) and COSO. The ERM framework sets frameworks and guidelines for how the company carries out its risk management work and ensures that risk management is an integral part of its overall organisational structure. What characterizes ERM is that it removes the focus from the traditional silo-based risk management, where risk is categorized into various silos such as operational risk, financial risk, accident risk and more. ERM attempts to bring together all the risk silos by taking a holistic approach to risk management, assessing aspects such as interdependencies between different types of risk and portfolios. The principles are the foundation for managing risk and should be considered when establishing the organization's risk management framework and processes. These principles should enable an organisation to manage the effects of uncertainty related to its objectives (ISO31000:2018). As a guideline, ISO31000 (figure 17) provides the basis for what an organisation needs to consider managing risks in a business life cycle. It is also adaptable across industries.

XIV : https://www.iso.org/home.html
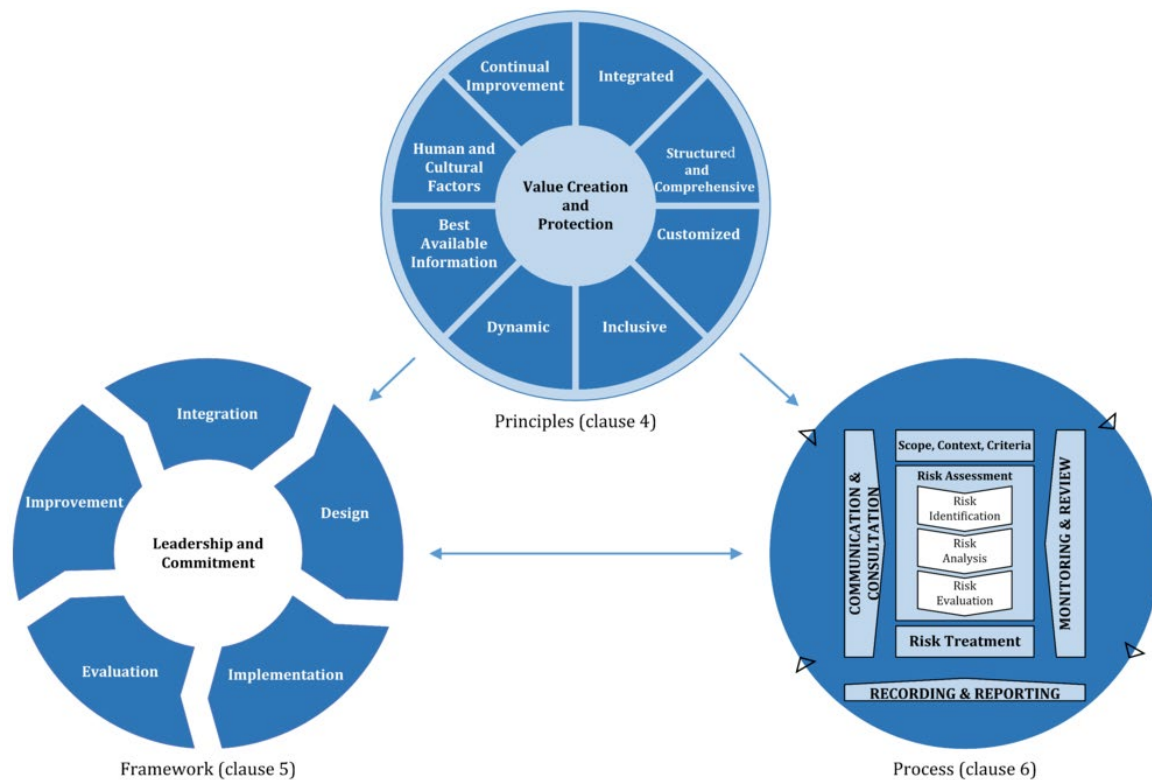
Figure 5. ISO31000 guideline model

A similar approach is also developed by The Committee of Sponsoring Organizations of the Treadway Commission (COSO), which focuses on financial risk management.

2.1.3 Socio-technical theory

DT affects all the elements of the dimensions Human, Technology and Organization (HOT); therefore, we include Socio Technical theory as a theoretical perspective in our study. "Technical changes have a direct impact on the organization and the people and must therefore not be viewed in a separate light" (Hobscheidt et al., 2020, p.832)

Socio technical theory was developed early 1950 in conjunction with industrial research in Great Britain. The researcher's focus was to study coal mining companies that where mining coal using machines, people's interactions with the machines and organizations as the study object (Winter et al., 2014). Baxter claim that "Even though many managers realize that socio-technical issues are important, socio-technical design methods are rarely used»(Baxter & Sommerville, 2010). The rationale for adopting socio-technical approaches to systems design is that failure to do so can increase the risk that systems will not make their expected contribution to the goals of the organisation. Systems often meet their technical

'requirements' but are considered a 'failure' because they do not deliver the expected support for the actual work in the organisation. The importance of the social technical theories is clearly defined by Menzfricke et.al. (2021) in their research related industry 4.0 (Menzefricke et al., 2021a, 2021b).

2.1.3.1 Socio-technical Risk management process in the context of digital transformation of SMEs

Despite technological developments, a cohesive socio-technical systems theory (STS) perspective of risk has not been developed; therefore, our current understanding of risk is simplistic; risk is believed to originate from an inanimate, non-human world whose consequences are exacerbated by human actions. This inability to manage systems risks in integrated socio-technical systems presents a real threat to global and local socio-economic stability (Organ and Stapleton, 2016). According to Menzefricke et.al. the elements of HOT and their interactions (Figure 15) represents a breeding ground for risk, hence ROM processes during DT needs to consider them (Menzefricke et al., 2021a).

Menzefricke et.al. states that an appropriate manner to approach the risks of DT is to consider risks during all phases of the risk management process from analysis to evaluation, treatment, and monitoring. At the same time also consider all socio-technical dimensions and their interactions during all phases of ROM. The researchers conclude their study with the finding that at the time of their study there exist no holistic process for ROM fit for DT(Menzefricke et al., 2021a). Gabriel et.al. (2021) later developed a holistic framework that enables risk management which are considering the three socio-technical dimensions: human, organization, and technology as well as their interactions. They assigned the identified risk fields found during their literature review to the dimensions human, organization, or technology within the socio-technical system as showed in Figure 6 (Gabriel et al., 2021).

Figure 6. ROM and HOT

Although their research is limited to the early stages of the ROM process, risk identification and risk analysis. Gabriel et. al argues that "risks" that have not been identified or sufficiently analyzed cannot be adequately assessed or controlled in further phases of the risk management process" (Gabriel et.al 2021.p242). Their developed procedure model for the application of the risk framework, hence, focuses on these early stages of the ROM process and lacks the steps for how to assess and control identified risk holistically.

2.1.4 Digital Strategy

The type of strategy directly linked to DT is often named *digital strategy* or *digital transformation strategy* in the literature. There are several definitions of digital strategy, we choose to use the definition from Feichtinger (2018) research, that consist of different elements from several different researchers' definition of digital strategi: "A digital strategy defines the goal, ambition and direction of a company with regard to the major changes induced by digital technologies, in combination with defining the relevant measures, resources and priorities to achieve these goals" (Feichtinger, 2018.p.19).

Research confirms that there exists ambiguity concerning the difference between IT strategy and Digital strategy, many thinking that it is the same thing. Accenture[XV] among several differentiates between them, describing the digital strategy as "a strategy that looks for ways to use technology to transform activity, and therefore business". On the other side, as Gobles states: "IT strategy aims to transform technology in isolation from the rest of the business". Further, they exemplify it by writing: "just as innovation is no longer an R&D function, digitalization is not an IT project or a marketing initiative. It's a whole-company transformation that needs a corporate strategy" (Gobble, 2018, p.66).

Before initiating DT initiatives or programs, during a company's DT journey, some researchers emphasize that a digital strategy should come first. One key finding Gerald Kane and coauthors of the MIT Sloan Management Review and Deloitte's 2015 global study of digital business did was: "What separates digital leaders from the rest is a clear digital strategy combined with a culture and leadership poised to drive the transformation[XVI]. The study also found that not having a digital strategi, is a barrier towards digital maturity. As stated in section 2.1.2, digital maturity has been identified as a critical predictor of success for a company's DT. This further suggest how Digital strategy is closely linked to a company's DT success. On the other side, some researchers claims that a "digital strategy may lead the conversation in the wrong direction, focusing too much on technology. The focus during planning should be on transformation" (Didier Bonnet & Westerman, 2014). There are several researchers sharing the view that one should not focus too much on technology and that one should focus on the right technology during Digital Strategy: "Technology doesn't provide value to a business, but doing business differently, because technology makes it possible."[XVII] . A successful Digital strategy "incorporate the right technologies for the right jobs". And it "uses high tech where those capabilities are important and low tech where a simple solution can do the job"[XVIII]. This thinking and approach coincide with the authors own view and experience.

Since DT strategies cut across various strategies simultaneously, complex coordination efforts might be needed. Research should provide guidelines for firms to help structure the processes to achieve shared goals, the alignment of different strategies, and cooperation between various people and entities throughout a firm (Matt et al., 2015).

XV - https://www.accenture.com/ca-en/case-studies/strategy/energy-digital-strategy
XVI- https://sloanreview.mit.edu/projects/strategy-drives-digital-transformation/
XVII- https://hbr.org/2019/03/digital-transformation-is-not-about-technology
XVIII- https://sloanreview.mit.edu/article/your-company-doesnt-need-a-digital-strategy/
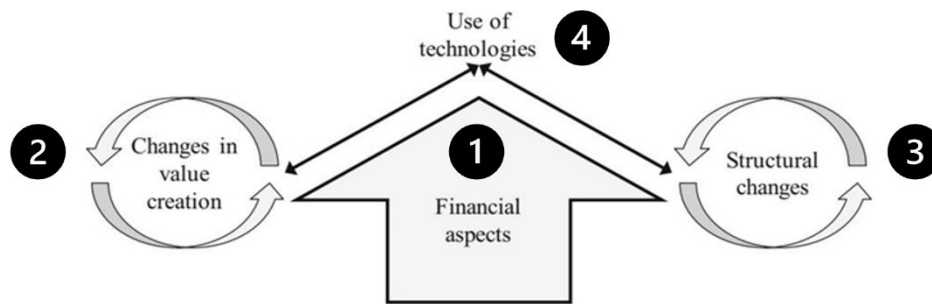
Figure 7. Digital transformation framework, according to Matt et al. (2015)

The DT framework model (Figure 7.) shows the balancing between 4 transformational dimensions. 1) Any activities within DT will have an impact of financial nature. 2) DT will influence how the value is created in the company.3) Organisations will need to be restructured. 4) Technologies will either impact 2 and/or 3 in the framework or the selection technologies will be impacted by 2 and/or 3. Although the research was conducted in 2015 and some newly published research explores the subject of digital strategies, the empirical data and research review conducted by the author's has not revealed any significant evidence of change of the understanding of what is impacted by DT. The DT framework represents the core of what DT process includes, as the authors view it.

According to research published by Becker et.al. most SMEs do not have digital strategies. Arguably they need such a strategy for a holistic and successful DT (Becker and Schmid, 2020.p.1002). The study also found that one of the reasons why SME don't have digital strategies is due to capacity and time reason (Becker and Schmid, 2020, p.996). Another study performed by Kaufmann and Tödtling (2002) found that when engaged in innovation activities, SMEs lack of financial resources, too few resources or insufficiently qualified resources, key persons in the organization experience: "lack of time" to be involved in other things as they are preoccupied with day-to-day work, difficulties in adopting high technology, a lack of advanced technical know-how"(Kaufmann & Tödtling, 2002, p.149)

Another reason for why many SMEs might not have a Digital strategy is because they may struggle to develop one due to lack of suitable approaches and methods. In a literature review conducted by Lipsmeier et.al. (2020), the researchers found that there is a lack of practical approaches in current research, and as a result they developed a process for *Developing a*

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Digital Strategy. The tools they developed support companies to conduct their DT holistically and strategically (Lipsmeier et al., 2020, p.174).

One of the challenges the authors identified during our research was regarding the positioning of the digital strategy. They found that research confirms that there is still no consensus as to "whether a digital strategy should be integrated into the existing strategies (e.g., in corporate or business strategy) or whether a separate strategy is needed to coordinate the DT". The author's view of the positioning of the Digital Strategy is that "digitalization has to be specified in general as a strategic direction at corporate level so that all major digitalization initiatives of business units have to be aligned with one overarching and common direction" (Lipsmeier et al., 2020, p.176). Lipsmeier explains that the positioning of the Digital strategy is linked to how the process of developing a Digital Strategy should be conducted. Companies should not use a Top-down or Bottom-Up approach, but a combination the researchers have called Down-up approach. The Down-up approach is based on that the process needs input from several levels in the organisation at the different steps of the process. This involves both Functional levels of the organisation, business level as well as the corporate level. Use cases must be identified at a business level early in the process, but at the end of the process the overall Digital use cases/program for all business units must be prioritized at a corporate level to capture synergy effects or resolving any conflicting issues (Lipsmeier et al., 2020, p.177).
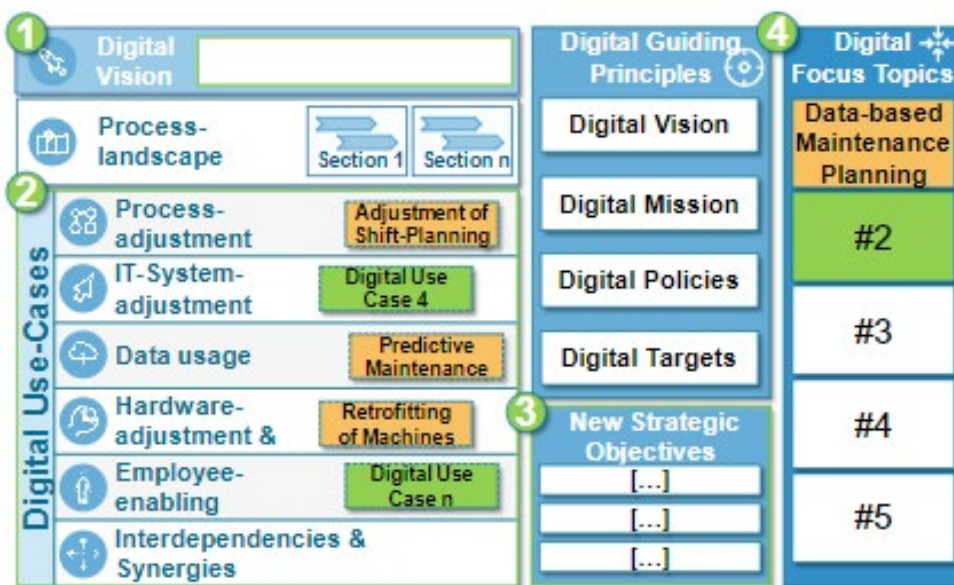

Figure 8. Digital Target Picture

With help of the tool "**Digital Target Picture**" in figure 8, the company can see the use cases coming from the different business units, make sure that they are aligned with the corporate strategy and be able to achieve synergy effects across the digital use-cases. It also provides the decision makers at corporate level a good overview so it will be easier to prioritize use cases and the sequence of when they will go live. The outcome from the process *Developing a Digital Strategy* is a selection of digital programs/projects, and an implementation roadmap at business level specified with a chronological sequence for the realization of the digital projects/projects (Lipsmeier et al., 2020, p.178). Digital use cases as will in our model represent the Digital Initiatives as outlined in section 2.1.5, when moving from an approved strategy and into DT programs or as single initiatives.

2.1.5 Digital Initiatives

To govern DT and subsequent initiatives, the seven fundamental principles by (Obwegeser 2020 et al., n.d.) is considered a valuable guide and will become the reference point in recommending and presenting a holistic model of how risk and opportunities should be managed in DT. There are different framework models suggested in the literature, but we have chosen the seven principles outlined by Obwegeser in table 4. which is the consideration of initiatives that should follow the establishment of the use cases (Step 2) at corporate / business unit level outlined in section 2.1.6. The initiatives then become a part of the DT Program / portfolio and each initiative shall be linked to the strategic objectives (Figure 17, step 3) following the development of a business case for each initiative which shall be subject to a stage gate review and approval process including ROM process prior to be allowed to move to the next step.

Table 5. Digital Initiatives-seven fundamental principles by (Obwegeser et. al., 2020)

No.		Principle	Reason
1.		Centralize information about digital initiatives rather than the initiatives themselves	This principle aims to gain information about digital initiatives in the company and develop a portfolio.
2.		Move from centralized to decentralized governance of digital initiatives as digital maturity grows.	This principle recognizes that it will be natural to empower business units and departments when everybody acknowledges the value of digital transformation, embracing it, and making it happen.
3.		Decentralize ideation but	This principle is based on

		centralize idea evaluation and prioritization.	experience from successful Companies that usually keeps ideation decentralized and the evaluation and prioritization process centrally driven. To take advantage of the creativity of the entire organisation, companies need a systematic approach to funnel ideas into an efficient and transparent process for evaluation and prioritization.
4.		Ensure that KPIs measure the real impact you want to achieve with each initiative.	This principle aims to ensure that establishing required key performance indicators (KPIs) is a critical exercise for digital initiatives that are highly dependent on having strategic priorities anchored in the company's future vision, success, and implementation objectives.
5.		Avoid siloed solutions by ensuring data compatibility, technical consistency, and continuous integration of new initiatives with existing systems.	DT is an end-to-end process closely intertwined with the back-end business processes and systems of a company. Successful transformation cases are often built around a standardized approach to infrastructure instead of a patchwork of not well-integrated or siloed legacy systems.
6.		Implement a "fit-for-purpose" mapping system that recognizes each initiative's value potential and degree of feasibility.	The purpose is to establish a portfolio of digital initiatives and have a subsequent governance structure. Organizations will need to map the initiatives to relevant categories. Research suggests that this mapping and assessment should be along two dimensions; Value creation and degree of feasibility, again leading to 4 types of digital initiatives (Figure 19).
7.		Evaluate different scenarios to proactively steward digital initiatives toward full-scale impact.	These principle aims to understand what the critical enabler is; Remove potential obstacles by making sure there are no organisational or technological barriers and create a pull effect from the organisation by focusing on generating first results and demonstrating the value of the initiative (ROM process).

ROM in Digital Transformation

The reasoning behind this "extended" definition is that the ability to control and measure the

effectiveness of the DT programs, projects and initiatives will diminish and cause programs, projects, and processes to lose momentum, access to funding, organisational focus, and finally the involvement of the organisation and the high probability of organisational fatigue if there are no clearly stated start and endpoints defined and in place. The author's argue that this definition is supported by the research review by (Menzefricke et al., 2021b). The digital initiative matrix (Figure.9) by Obwegeser wt.al. (2020) called "DIM" categorizes DT initiatives in terms of feasibility and

Figure 9. Digital Initiative Matrix

value potential in four dimensions which are explained in Table 5.

The authors consider this an excellent foundation when providing context to an ideal model for how ROM should be conducted in DTs. The rationale for this view is that each initiative must be identified across two dimensions which will ensure that risk assessment becomes more transparent. Determining the probability versus impact (standard ROM dimensions) against value potential and ability to execute and implement initiatives will become apparent in terms of prioritizing the initiatives. As outlined in Table 6., the responsibility framework provides the organisational anchoring for the different digital initiative types.

Table 6. Understanding the Digital Initiative Matrix in Figure 9

Quadrant	Category	Description
1.	Quick Wins	These are initiatives with a high probability with low value impact — for example, applying a simple digital tool to a known business challenge in a specific business area (replace an excel spreadsheet with a web form).
2.	Kill Zone	These initiatives with low probability and low value as they are difficult to implement for a company. They should be aborted and not initiated. Research points to these initiatives are very often activated as they sound attractive, but a lack of competence to assess the actual value and complexity of implementation (i.e., ROM) prevents them from being stopped. I.e., blockchain and AI, which are prevalent types of initiatives, may not be required for a particular company.
3.	Moonshots	These are initiatives that have low probability but high-value potential. These are called Moonshots. Initiatives of this type seek to explore radically new, trending, and potentially disruptive innovations and technologies.
4.	Enterprise Actions / Ventures	These are initiatives with high probability and high value and is the most attractive quadrant and comprises initiatives that have both high feasibility and high value potential. This quadrant is divided into two parts based on how they are implemented. The first part is referred to as Enterprise Anchors. These initiatives seek to create change to the current business at scale. An example might be a new digital platform to transform B2Bcustomer service and sales. These initiatives typically require significant cross-enterprise collaboration. The second part of Quadrant 4 is Ventures. The goal of this initiative type is to leverage digital technologies or business models outside the existing organization. Ventures often use new channels and partners, and rarely function well within the current structure of the organization. dimensions of value potential and degree of feasibility.

The digital governance framework places the recommended ownership, decision-makers, and control function (as pointed out as the ROM white spot in research by (Menzefricke et al., 2021b) on the different categories of initiatives and this is explained in table 7.

Table 7. Fit for purpose Digital Governance Framework (Obwegeser 2021)

	Quick Wins	**Moonshots**	**Enterprise Anchors**	**Ventures**
Organizational Anchoring	BU - function	Internal with separat digital / innovation lead	Led by Centralized MT	External unit
Decisions rights	BU – function lead	CDO or equal	Led by Centralized CDO or equal	Originates from parent company, operational scope lies within venture entity
Control Mechanisms	BU - function	Dedicated innvation budget achored with CDO or equal	Centralized cross function committee	
Technology Architecture	Coherent with existing information architecture	No limitations to wrt. Existing architecture. Integrations may be required	Renewal or expansion of existing architecture	No limitations to wrt. Existing architecture. Integrations may be required

BU= Business Unit	CDO= Chief Digital Officer
CIO= Chief Innovation Officer	CTO= Chief Transformation Officer
TM= Top Manangement	

2.1.6 Ideal model for conducting ROM in DT for SMEs

The ideal holistic ROM model presented in Figure.10 are the author's opinion and view, based on the sum of theoretical perspectives. outlined in this section and includes DT theories, Socio-technical theories and ROM theories which are procedure models that describes the processes related to the main phases of DT, identified risk fields within the socio-technical system, risk management frameworks and through consolidation of the practical experiences of the researchers. The authors argue that the ideal model, if followed, should contribute to a successful ROM in DT and subsequently as we view it, more successful DT. Isolated, there is limited references in research to risk and opportunity management as embedded part of DT. In figure 1. we defined the focus area of the research, shown as a part of a company's generic governance model and how ROM was identified as processes that influenced the DT processes. In our view, this represents the key steps for an ideal ROM in DT model (Figure 10).
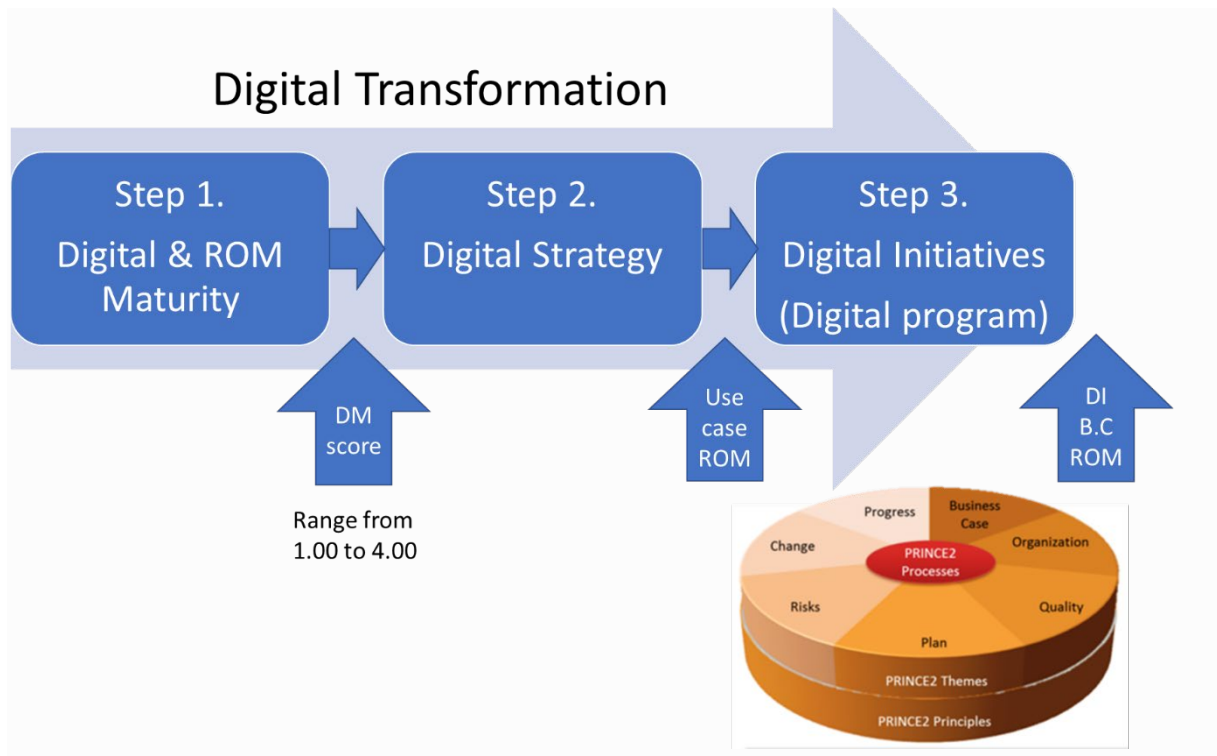
Figure 10. Ideal ROM model for DT

The ideal model in Figure 10. will, as the authors view it, consolidate the theoretical principles outlined in this section (2). and thereby provide an organisation to take a systemic approach to manage ROM in DT, provided that the elements outlined in the theoretical principles are established and embedded within an organization.

2.1.6.1 Step 1. Assessing the Digital and ROM maturity

Prior to starting a DT process in a company, we argue that the digital maturity of the company needs to be assessed together with the company's ROM maturity. Although some researchers claim that you need a digital strategy first before starting on a company's DT journey, a maturity assessment of DM and ROM maturity we argue is a pre-requisite for enabling a sound DS and DT process. Based on the results from the maturity assessment it will be determined if the company is a digital lagger with little or no understanding as defining the low of the maturity scale end or if you possess digital excellence which will put you as a front runner and top of the maturity scale. In addition, the ROM maturity will determine the company's ability to assess the company's risk and opportunities and be able to quantify them. The method for determining the digital maturity consist of several qualifying questions that the company needs to answer. These answers then provides a summary score of their digital maturity based on a specific formula.

The score obtained will then be a factor used in the determining risk and opportunities levels when developing the digital strategy as Step 2. in our process. In our thesis we have used The Digital maturity assessment model "InAsPro" was developed by Siedler et.al (2021) to exemplify our model (Siedler et al., 2021). The Rom maturity assessment shall undertake the same process as DM assessment, using the ROM maturity model by Tegeltija as shown in table.4 (Tegeltija et al., 2018). We recommend that company applies a scoring range from 1 to 4 on ROM maturity based on a self-assessment of the themes described in table.4. The score will imply if the organisation requires training in assessing / quantification of risk and opportunities, is a cultural change required etc. The score will act as guide to areas needing strengthening within the organisation and will not be a factor in calculating each use case, by applying a combined DM and ROM maturity score as shown in step 1-3 below. One could of course argue that not knowing how to conduct ROM represents a risk in itself. This is which is why we recommend performing a ROM maturity assessment together with the DM assessment. The contribution from the authors is to include these models a part of an ideal model for ROM in DT.

The Score obtained helps the SME to understand their current situation. The SME can then consider what Digital Maturity level they want to achieve or more important where they should be, to succeed with their planned DT. This gap from their current state to a desired state involves elements of ROM. First, this is based on existing research stating that less mature companies are more risk adverse. After identifying the gap between the existing state and future state, the SME should assess what their current risk appetite is versus how it should be to not block new initiatives that will move them to the right direction in their DT journey.

We do not consider ROM as a key factor to be considered when determining a company's digital maturity. In this study we have not considered to what extent a low score on digital maturity should be the criteria for improving their digital maturity prior to starting work on their Digital Strategy. The authors argue that a strengthening a company's Digital Maturity before developing a Digital Strategy would improve the outcome of the company's Digital Strategy development, as the company culture is central part of the digital maturity assessment. If a company with a low score on digital maturity starts developing a digital strategy, they will most likely not establish the best strategy for the company, as their limited skill set will not enable them to perform the correct assessments of the Strategy elements such as digital use cases, socio-technical dimensions and interactions and the ROM itself, which we consider core to DT processes. The more digital mature a company is, the less risk adverse they are. A low score would imply that the company will be more risk adverse than a

company with a high score. This will provide the company with an indicator that implies a need for change in their current risk appetite and subsequent impacts. The calculated score from the DMM is represented with a scale from 1 to 4, where 1 = No maturity and 4 = Very mature).

2.1.6.2 Step 2. Establishing the digital strategy

The development of the digital strategy will consist of the enablers that will be required to achieve the vision of the DT, by identifying use cases in a down-up approach that will be key to executing the overall digital strategy. Reference is made to Lipsmeyer digital picture in Figure 8. Simplified, each of these use cases identified will be subject to the ROM process, including the utilization of the digital maturity factor calculated from Step 1. As a sample when this factor is low, it will in the ROM process for a use case, increase the probability of occurrence for a negative outcome and reduce the probability for a positive outcome. A high score will reduce the probability of negative outcome and increase the probability of positive outcome for opportunities for the use cases.

Digital security is another element which is determined in the digital strategy development. When stablishing a DS policy and the use cases, the incremental digitalization of the company subsequently rises the information leakage risk and provides opportunities. A sample could be a company that considers changing their business model and go "digital" with their production. They will have to increase their volume of digital information content which is then are more open for cyber-attacks and leakage of proprietary company information that previously was contained in vault. At the same time this creates an opportunity for the company to use additive manufacturing in their production, which could be outsourced to a third party by having an integration between their own design system and the third-party AM system. The company should have a digital security philosophy established based on the criticality and vulnerability of the company's assets and CRM processes. In this phase it is important to conduct a systematic ROM with regards to the use case implications of the planned DT. This will then serve as the criteria when evaluating the respective digital initiatives identified and are subject for selection and approval. The information security policy (ISP) is a part of enterprise governance and the subsequent ROM processes as outlined in section 2.1.1.3. See section 2.1.1.4. for details.

In the digital strategy you also should determine the project execution methodology to be applied. There are several methodologies available, and we are not recommending any specific method, but have selected PRINCE2 based on own experience to be well suited to

manage digital projects and many of key elements of ROM in DT. The final activity in strategy development is to perform a ROM process on the entire strategy in accordance with principles for enterprise risk management as outlined in section 2.1.2.1. The result will serve as part of the decision support documentation for the digital strategy. When completed then the Digital Strategy is ready for BoD approval as a part of company's ERM process.

2.1.6.3 Step 3. Establish and execute the digital initiatives

The final step in the ideal ROM in DT process is to identify digital initiatives based on the use cases established in the Digital Strategy. This is then recommended to be completed in line with the seven fundamental principles of digital initiatives developed by Obwegeser et.al. (2020). Once these principles are embedded within the organization, the foundation for developing a DT Program is in place. This will then allow the organisation to apply the DIM model explained in section 2.1.5. to assess the initiatives and their implications. The company will apply a detailed ROM process for each of the initiatives which then is an integral part of a business case document. A business case (B.C.) should be established for each initiative as changes to the assumptions most likely will occur during the different phases (stages) from ide to implementation of an initiative. Once the initiatives has been classified in terms of feasibility and value creation, i.e risks and opportunities individually, a company should also recognize that one initiative could also increase or decrease the risk and opportunity for another initiative within the same portfolio or program of initiatives. When evaluation is performed you will have holistic risk register that have forced the company to evaluate all relevant risk and opportunities that can be managed and controlled systematically. The authors argue that ROM, in generic context, should be considered a continuous chain of possible events as mitigating one risk or opportunity may affect other initiatives, departments or even the entire company's business processes.

2.1.6.4 Summary of the ideal ROM model in DT

The 3 steps outlined above is summarized in Figure 10. Using our proposed model as benchmark, we will attempt to identify gaps by comparing research results with the proposed ideal model. Any gaps between the ideal model and the data we collect will be analyzed and discussed in section 5. Beginning and end of DT is by the authors in this case study limited to Digital Maturity, Digital Strategy and Digital Initiatives. We assume that a company's corporate strategy already exists and that signals intercepted from customers/markets changing needs have already been captured by the company or is captured during the analysis

in the strategy work. We define the end of DT as the end of the Digital initiatives/projects, including the agreed timing for achieving the expected value creation / profit realization. This does not necessarily happen during or right after a Digital Initiative project has been deemed completed. It might take time after the use case implementations for value generation to take place.

The socio-technical dimensions and interaction's which is considered a breeding ground for risks according to (Gabriel et al., 2021) , are embedded within each of the three main steps outlined in Figure 10. The authors has developed a practical overview in terms of how to systematically organize each ROM object to provide the holistic picture. The proposal for a holistic ROM model for DT is using a combination of models. The model implies that ROM is a part of all combinations of "digital" and HOT as defined in the theoretical perspectives in section 2. This translates into specific risk and opportunity assessments to be conducted across socio technical dimensions and the interactions between that will follow the sequence of the main digital steps in a DT: DM, DS and DI. This means that for each of the steps 1-3, the model suggest that you perform a risk evaluation process in context of the three socio-technical elements (HOT).

Step		1 Humans	2 Organisation	3 Technology
1	**D**igital **M**aturity*	ROM	ROM	ROM
2	**D**igital **S**trategy	ROM	ROM	ROM
3	**D**igital **I**nitiatives	ROM	ROM	ROM

*The assessment of Digital Maturity does not constitute a ROM process until the end of the digital maturity assessment according to our recommendation. Once a direction is set in the maturity assessment it would be subject to ROM. To condense the appearance of the model we use the abbreviation "IAATC" to explain the generic model and elements of ROM that will take place in ROM process as described in Figure 5.

I	Identification of risks and opportunities
A	Analysis of risks and opportunities
A	Assessment of risks and opportunities
T	Treatment of risks and opportunities
C	Control of risk and opportunities

To ensure that each identified risk and opportunity object in the model and the subsequent analysis can be traced and controlled throughout the DT process, a unique identification needs

to be established as outlined in steps 1 to 3 below. This is a practical approach to enable the establishment of a complete risk register for the DT process and enable inclusion in corporate enterprise risk register. Examples of values that can be used is shown in Figure 11. and is meant as an illustration of defining a risk and opportunity scoring model. The consideration of impacts should be defined when establishing the company's governance and enterprise risk model. One common denominator in ROM is the financial impact which is a part of Matt-et-al (2015) DT framework in figure 7. The financial impacts asessment is perceived as mandatory in ROM processes.

Risk Score			
Impact Financial and/or Reputational	**Score**	**Likelihood**	**Score**
Greater than $50 million **OR** Extreme reputational impact	5	Almost certain; expected to occur	5
$25 million to $50 million **OR** High reputational impact	4	Likely; probably will occur	4
$5 million to $25 million **OR** Medium to low reputational impact	3	Possible; might occur at some time	3
$100,000 to $5 million **OR** Low to no reputational impact	2	Unlikely; could occur at some time	2
Less than $100,000 **OR** No reputational impact	1	Rare; may occur	1

Figure 11. Sample of risk scoring model

To incorporate the digital maturity level of company in the ROM in DT process, the risk score is divided with the DMM score for risk and multiplied with the DMM score for opportunities. This will increase risk levels for use cases assessed as the uncertainties increases with low maturity and reduce risk levels with a high maturity level score. This will subsequently visualize the DMM impact on ROM and then provide management with decision support information to consider improvement in digital maturity prior engaging in the full DT process. There are several factors that will also influence the mitigation and risk appetite which we do not consider in detail such as losing momentum versus competition etc. For each of the steps and sub-steps, the interactions between the dimensions H-O-T, may influence and create risks or opportunities across each other. This one of the key areas and breeding ground for risks as pointed out by Menzefricke et.al. (2021).

Step 1 is the DM versus HOT.

DM vs. HOT	Risk	Opportunities	Typical R and O to be considered acc. Socio-technical system
1.1 DM vs. H	IAATC reference will become 1.1-1R,(2R, 3R etc.)	IAATC reference will become 1.1-1O,(2O, 3O etc.)	The company's current competence vs. required Digital Litterate vs. digital illiterate resources
1.2 DM vs. O	IAATC reference will become 1.2-1R,(2R, 3R etc.)	IAATC reference will become 1.2-1O,(2O, 3O etc.)	Risk Appetite
1.3 DM vs. T	IAATC reference will become 1.3-1R,(2R, 3R etc.)	IAATC reference will become 1.3-1O,(2O, 3O etc.)	Legacy systems and processes vs. new
The results from step 1 will be channeled to step 2 pending level of probability versus impact assessment score			

To ensure that the interactions in the dimensions are managed, each of identified risks and opportunities that are labeled according to step 1.1, 1.2 and 1.3 above shall be reviewed against the two other dimensions. As an example, to illustrate the methodology in the model:

1.1-1R is a "human" risk identified in the DM process. This risk may impact step 1.2 or 1.3. I.e., a Human risk may impact the organisation or the technology dimension in HOT. If 1.1-1R impacts 1.2 after the IAATC analysis, this should then be a new item in 1.2. I.e., there is then a new risk in DM and organization with label 1.2-1R which is caused by 1.1-1R which needs to be analyzed and mitigated. This process needs to be repeated for all established risk and opportunities until a complete cross section analysis has been conducted. Any new risk or opportunity in one of the dimension needs to be assessed and mitigated against the two other dimensions. This may appear complicated and a challenging task, but the authors argue that this may be the only way to capture the cross dimension (interactions) which, as pointed out by Meinzfricke et.al (2021), as a breeding ground for risk.

Step 2 is DS versus HOT using Lipsmeyer's digital picture (Figure 8)

DS vs. HOT	Risk	Opportunities	Typical R and O to be considered acc. To STM
2.1 DS vs. H	IAATC reference will become 2.1-1R,(2R, 3R etc.)	IAATC reference will become 2.1-1O,(2O, 3O etc.)	HRM strategy may be impacted based on use case assessment
2.2 DS vs. O	IAATC reference will become 2.2-1R,(2R, 3R etc.)	IAATC reference will become 2.2-1O,(2O, 3O etc.)	Org capacity and competence
2.3 DS vs. T	IAATC reference will become 2.3-1R,(2R, 3R etc.)	IAATC reference will become 2.3-1O,(2O, 3O etc.)	Cyber and Information security
The results from step 2 will be channeled to step 3 pending level of probability versus impact assessment score of use cases ++++. This is then an approved digital strategy			

Step 3 is DI versus HOT using the DI modell, (Figure.

DI vs. HOT	Risk	Opportunities	Typical R and O to be considered acc. To STS / STM
3.1 DI vs. H	IAATC reference will become 3.1-1R,(2R, 3R etc.)	IAATC reference will become 3.1-1O,(2O, 3O etc.)	HRM strategy
3.2 DI vs. O	IAATC reference will become 3.2-1R,(2R, 3R etc.)	IAATC reference will become 3.2-1O,(2O, 3O etc.)	Org. capacity and competence
3.3 DI vs. T	IAATC reference will become 3.3-1R,(2R, 3R etc.)	IAATC reference will become 3.3-1O,(2O, 3O etc.)	Cyber and Information security
The results from step 3 will be channeled back to step 2 pending level of probability versus impact assessment score of the initiatives as the initiatives may influence the probability and impact on use cases in the strategy			

Using our ideal model illustrates how the socio-technical dimensions and interactions are forming a practical part of the ROM process in DT. We call this Use case "1". It is a simplified visualization of risk register for a use case by introducing the ideal model for ROM in DT. It should be recognized that this model will include the fact that a use case may have an impact on f.i. an organizations collective competence and f.i. lack of organizational competence may have an impact on the use case. The dimensions that needs to be handled as a part of the ROM process in the use case is identified by the capital letter (H, O or T) according to Gabriel s model (Figure 6). It should also be noted that Gabriel et.al (2021) model do not mention opportunities when discussion risk. We have included opportunities as

a part of the ROM process as most risks also represents opportunities. The risk register for a particular use case in the DS as shown Table 7 will have 19 areas in which a use case should be assessed against. For simplification, we have not included weighting as factor as each risk and opportunities could be weighted relative to the importance for the company, which is a standard exercise for more complex businesses with a more extensive risk & opportunity portfolio. P-score = Probability score (Likelihood of occurrence), I-score = Impact score (Severity of occurrence).

Table 8. Risk register – use case "1" - condensed

Risk ID	Risk areas in STD to be assessed	Interaction (H,O,T)	Risk	Opportunity		Comments	P-score	I - score	DM	Total score
2.1-1R	Competence impact on use case		Not sufficient competence with employees to manage new technologies			IAATC assessment performed	4	4	1,5	24
2.1-1O	Competence impact on use case			Recruit employees of the future to beat comptetion		IAATC assessment performed	2	5	1,5	15
2.1.2R	Leadership risk					IAATC assessment performed				
2.1-2O	Leadership risk					IAATC assessment performed				
2.1.3R	Health Risk	T				IAATC assessment performed				
2.1.3O	Health Risk									
2.1.4	Culture									
2.1.5	Legal	HOT								
2.1.6	Market and competition	HOT								
2.1.7	Procurement and sales	OT								
2.1.8	Digital security	HOT								
2.1.9	Digital Information Security	HOT								
2.1.10	IT									
2.1.11	Production									
2.1.12	Process									
2.1.13	Financial									

2.1.14	Reputation										
2.1.15	Digital Vision alignment	HO									
2.1.16	Digital Mission alignment	HO									
2.1.17	Digital policies alignment	HOT									
2.1.18	Digital Targets alignment	HOT									
2.1.19	Impact on other uses cases	HOT									

The result of the assessment is a complete and comprehensive and holistic risk register for one use case from the company's DS that will live during DT program. To illustrate how the example from use case "1" would look on a typical heat map using the what we have defined as the 5 by 5 model, it can be easily visualized and communicated (Figure 12 – risks and Figure 13 - opportunities). If the company have several use cases, a prefix should added to the ID. II.e.,the risk illustrated in figure 12 would have a prefix ABC-2.1-1R to enable identification across risks identified in the use cases.
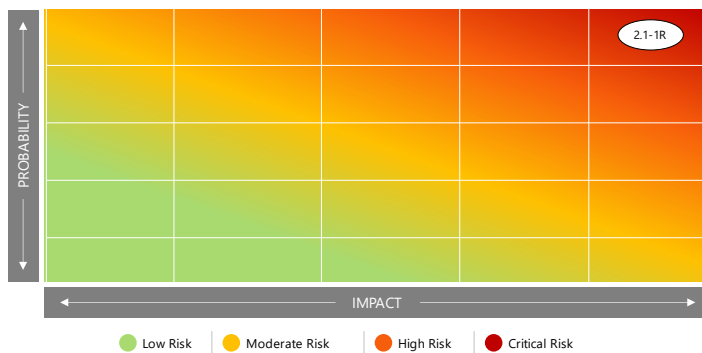
Heat map – Risks (5 by 5 model)

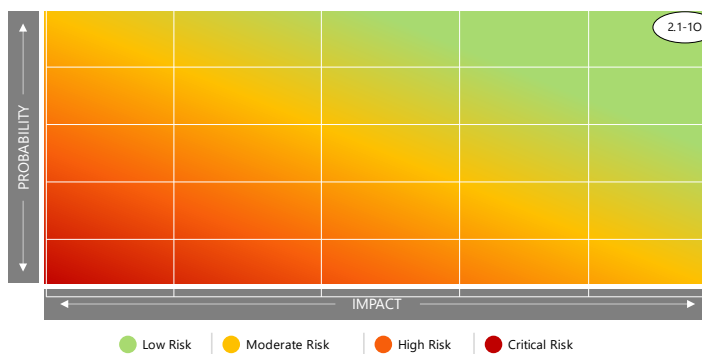

Figure 12. Heat Map - RISK

Heat Map - Opportunities

Figure 13. Heat map - Opportunities

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Once the use case ROM in DT has been performed and the strategy has been approved by the BoD, the use case (or if several are identified we call it a program) will transform into one or more initiatives per use case that each will be identified in a business case. A ROM process will be conducted for each initiative itself and then to verify P versus I across initiatives and use cases while ensuring that any risks and opportunities classified in the moderate to high probability and impact is carried into the company's overall (enterprise) risk register, via the digital strategy P and I and subject to a holistic view of the company's aggregated exposure (R and O). The risks and opportunities identified in the use case from the Strategy will need to be included and act as control against impact on the Strategy. We would then use the DIM model by Obwegeser (2019) to first assess any suggested initiatives against this model before each initiative is subject to the full ROM process (IAACT). Any initiative that qualifies for the "Kill Zone" will not be pursued further. Our contribution in this context is consolidation and visualization of the process (Figure 14.).

Step 3 – Use of DIM to assess ROM in DT using 5 by 5

PROBABILITY	IMPACT				
	Trivial	Minor	Moderate	Major	Extreme
Very likely	1.Quick Wins	1.Quick Wins	1.Quick Wins	4. Enterprise / ventures	4. Enterprise / ventures
Likely	1.Quick Wins	1.Quick Wins	1.Quick Wins	4. Enterprise / ventures	4. Enterprise / ventures
Moderate	2. Kill Zone	2. Kill Zone	2. Kill Zone	3. Moonshoots	3. Moonshoots
Unlikely	2. Kill Zone	2. Kill Zone	2. Kill Zone	3. Moonshoots	3. Moonshoots
Rare	2. Kill Zone	2. Kill Zone	2. Kill Zone	3. Moonshoots	3. Moonshoots

Figure 14. ROM of DI in DT as defined by author's

An equally important element is the assignment of ownership to each of risks and opportunities and should follow the structure as outline in table 6.

2.2 White SPOT's in Theory

According to the Governance Model described in Figure 1, the focus areas selected for the thesis were Digital Strategy, Digital Initiatives and Digital Transformation, together with business cases, all viewed in ROM context.

DT often fail, caused by several different reasons and we argue that they will continue to do so if companies are not considering the theoretical perspectives as out outlined in section 2.1. The researchers biggest challenge was to find the best theoretical foundation to provide the grounds for answering the research question. DT and ROM are respectively to large and complex areas to understand and manage. It is not just the DT and the many facets it entails that is complex and which to many people and organizations are overwhelming to handle. ROM is also complex process that demands distinct and dedicated organizational competence and capacity to be managed properly and holistically across an organization. In many cases it is not the highest priority in terms of organizations involvement and execution, for SMEs as described in section 2.1.2.

The concepts of Digital Transformation (DT) and Risk and Opportunity Management (ROM) describes two different phenomena that are closely intertwined, and our assumptions is that lack of ROM in DTs projects in SMEs may be a source to why many fails. Individually they do not represent a new phenomenon in research. The focus on DT in combination with ROM after 2021 has increased, but mainly that they are connected but not in context that DT could fail if not ROM is viewed in a socio-technical and holistic context and conducted as an integral part of DT. The recent research focuses on the need for ROM in DT, but very limited describing a practical approach on how to do it (with a holistic perspective). The research that describes a practical approach though, only talk about ROM in digital use cases not following the all the phases of DT, maturity, digital strategy, and Digital Initiatives. Even though they provide a practical approach, this research is fragmented when considering that all phases of DT, should be subject to ROM. When preparing and conduction the interviews, the questions were based on limited empirical data, besides the research provided by Menzefricke et al., (2021a, 2021b), Gabriel et al., (2021) which we perceived to be relevant research data supporting the main research question of "How risk and opportunities are managed in digital transformation". A thorough review of literature has been performed by the authors in structuring and writing this thesis. Both Digital Transformation (DT) and Risk and Opportunity management (ROM) are two complex themes where the authors have tried to determine a theoretical foundation to be able to answer the research question. Our experience from reviewing research and empirical data is that there are no single model developed or made publicly available for practical application to answer the research question, this is to the author's knowledge. To create an ideal model that holistically collected all relevant themes

for ROM in DT the authors had to combine several models from different theories into one, to our perception, an ideal model.

We have chosen to distinguish our arguments for the choices made by following our 3-step model for ROM in DT. We argue that these 3 steps; Digital Maturity, Digital Strategy and Digital Initiatives are the core of DT as outlined in our theoretical perspectives and in terms of being able to conduct a holistic ROM process. By combining the theories in the 3 steps you will have an overarching ROM in DT model. There are limitations in terms of validity as the thesis is based on a single case study and experience from the authors.

By following our 3-step model we argue that a company needs to 1) perform a digital and ROM maturity assessment 2) They need to have a digital strategy and 3) They need to have a systemic thinking and model for identifying and pursuing digital initiatives / programs. The approach to answering the research question through this proposed ideal model will reveal if the combination of models as we have suggested, will provide a good foundation for a practical approach towards ROM in DT for SMEs, which is lacking in current theories. This will then provide the necessary grounds for discussion and need for future research to optimize the model and its utilization potential. Due to the rapid evolvement of business models, competition, and customer requirements, we believe it will be an overwhelming task for SMEs to move from digital laggers to digital experts without having a holistic ROM for DT model which is designed as a guideline and practical approach.

Once we had gone through the theory that tries to explain what this phenomenon might entail, we have encountered issues that we have elected to define as white spots, which we summarize here.

1. A holistic and practical process for Risk Management for SME's in identified relevant phases of DT.

2.3 Research questions

The theories discussed in section 2.1 has provided the ability for further exploration and subsequently led to the following research questions:

Organizational capability DT and ROM

Is the company's organization capable to assess risk and opportunities (capacity and competence) in a digital transformation?

Objectives controlled in DT

Are the company objectives clearly defined and controlled in terms of accomplishment related to their DT process?

Digital Strategy and anchoring

Have the company established a digital strategy and how is this anchored in the organization?

External knowledge of company DT and ROM

Have external suppliers / consultants' knowledge about the company's digital strategy and what have been defined as risk and opportunities by the company?

3 Research Design og methods

3.1 Research design

In this chapter we present the research design of the study. To answer the research question in the best possible way, we had to distinguish and make several choices regarding the final research design.

First, since the purpose of our research is to understand how the process of ROM is conducted in a specific SME company, we have chosen a qualitative approach based on semi-structured interviews, this is a recommended method to study a phenomenon in depth.

Second, we chose a case study methodology to gain an in-depth understanding of how Risks and Opportunities are handled in a SME company during their DT journey. Another element important to consider when designing the research is the time perspective of the research. Sanders et.al distinguish between two types of time horizon, Cross-sectional studies, and Longitudinal studies. (Saunders et. al, 2019. p.467). The researchers in this study have chosen to use cross-sectional case study as a research strategy.

 Third, due to the absence of studies addressing the process of a Holistic approach to ROM during DT in context of SMEs, we suggest an explorative approach. Based on limited research on the phenomenon, we expect that there will be elements relevant for the research that we haven't considered in advance. We believe that an exploratory research design will provide a deep understanding of the research question, as well as enough flexibility to make the necessary changes during the study

Next, due to the limited amount of research on the topic we adapted an abductive research approach. According to Saunders, there are various research approaches one can use to answer a research question, deductive, inductive, and abductive. We found the abductive approach must suitable as it opens for the possibility to move back and forth between "an inductive approach (from theory to data) and a deductive approach (data collected to theory)" (Saunders et al., 2019,p.351).

Our study started with a research design and purpose, which was based on a combination of the researcher's knowledge and experience with the Risk Management process and DT projects. We wanted to investigate how ROM is conducted/implemented during a DT and understood that due to little research on the topic we would probably have to adjust our theory chapter as the study progressed. We were open to the possibility that these theoretical frameworks that we initially considered relevant, were not necessarily relevant, and that the data we collected could direct us to a different direction than first anticipated. Dubois and Gadde (2002) explains this theory adjustment by referring to the research of Straus and Corbin, that states that is not possible to identify 'all the literature' since the empirical fieldwork parallels the theoretical conceptualization. Hence, the 'need' for theory is created in the process (Dubois & Gadde, 2002, p559). The data collected during the empirical fieldwork, were constantly checked against existing theory to see if the observation we made could be explained by existing theory. This approach fits well with the abductive method described as "a process by which a researcher moves between induction and deduction while practicing the constant comparative method" (Suddaby, 2006). The initial theory chapter was successively modified after the data collection, as the data pointed us to a different direction. Another reason for modifying the theoretical framework is as Dubois and Gadde explains due to the "theoretical insights gained during the process" (Dubois & Gadde, 2002, p559). As our study progressed new insights on the phenomenon we are studying matured into new thoughts and that further lead to new theory was added/removed, to/ from, our theorical framework. The theoretical framework, empirical fieldwork and data collection thus progressed simultaneously "through systematic combining" (Dubois and Gadde, 2002, p.554).

3.1.1 Scientific Anchoring

As human beings we are exposed to situations in where we by nature consider risks and opportunities every day, both in our personal and professional life. Our appetite for risk is linked to our personality, how we were raised and are influenced by peers and family. How

we were trained to distinguish right from wrong. Learning to avoid dangers from the things that are not. In the context of the philosophical perception the expectation is that all companies recognizes that risk and opportunity management capabilities are essential to ensure that the business thrives and succeeds. In context of the above it also illustrates the level of expectation one should have explored and conducting research within this topic.

It would be easy to be bias towards reasoning and conclusion of this study based on more than 30 years of combined experience in the field of project management, risk management, digitization, digitalization, and transformation on an industry level. But to ensure trustworthiness in the research this knowledge and experience will not be used until writing the conclusion of this study. The experience and knowledge led to shaping the research question. Our intuition (and experience) was telling us that the interaction between DT and ROM was an area that caused evasive looks from others when discussed in a professional context. Was this caused lack of understanding the purpose, meaning or simply the challenge of viewing these theme from a holistic perspective. Or was it a famous and general perception that I don't' believe this will happen to me (our company). It became clear early in the master program that this theme would be an excellent master thesis title.

There has been a quantum leap in the global understanding of the importance of performing ROM in DT initiatives and subsequent programs the past year. Numerous research papers and articles has been written in the period 2021-2022 describing the importance. Based on this we expect to gain improved understanding of focus, best practices, and relevant models to support our research.

Combining the empirical data, recent research, and theoretical models in conjunction with own knowledge we expect to conduct a trustworthy and non-bias thesis.

3.1.2 Criteria for credibility

Different criteria are set for assessing the trustworthiness of the research findings. Lincoln and Cuba developed four criteria that they claim better reflect trustworthiness in qualitative studies. These are credibility, transferability, dependability, and confirmability (Lincoln & Guba, 1985), P. 300

Credibility refers to researchers making sure that their findings match reality. Different techniques are recommended to establish credibility in findings (Sanders.et al .2019,479). In

our study we collected a large amount of data from different employees in the organization, systems, and documents. Creditability was ensured by triangulation of the data collected by using different data sources to "help reveal the reality in the data" (Saunders et al., 2019,479) In addition, we made sure that we checked our interpretations with the interviewees by asking follow-up questions (not presented in the interview guide) during the collection of the data. Another technique used was, to use our professor as an external person to discuss the thesis. We met several times with our professor during our study, in these meetings we got a chance to reflect about our ideas and get feedback from him. To have someone external to discuss our ideas and findings helped us to see things in a different way and helped us improve our ideas. And it was also contributing to credibility of our study by couching us on how to use the methods for data collection correctly. Based on the techniques used in our study, we believe that our findings reflect high credibility.

Transferability refers to the researchers providing the reader with the opportunity to judge the transferability of the findings to other contexts. (Sanders et.al.2019, p.479).
We have conducted a single case study of a Norwegian SME company in the Oil and Gas sector. Transferability means that our findings concerning "How are risks and opportunities managed in DT projects in SMEs?" are applicable for other companies and in different context then our original research. Our findings are influenced of the mentioned contexts, specially by the context SME size of the company. Based on the assumption that many companies DT initiatives fails, the goal for us researchers was to conduct a qualitative single case study to gain in depth knowledge on how the process is conducted in the mentioned context. We cannot confirm that our finding is transferable to other companies.
On the other side we believe that our case study can be used to further investigate how the process is conducted in other companies in the same or different contexts. Findings in other companies in the same context and different context, can identify which gaps exists in the companies compared to the ideal model of a Holistic Risk Management process for DT.

"Dependability is the qualitative approach's parallel criterion for reliability, which refers to that the findings are confirmable if the research was to be repeated by someone else or in a different context" (Saunders et.al 2019). According to Guba et.al. (1985) it is not possible to replicate a qualitative study and arrive to the exact same findings. One argument is that one cannot replicate the findings are that: *«Reality" changes occur because of changes in the entity being studied".* (Lincoln and Guba, 1985, p.299). A way to a achieve dependability the

researchers must make sure that other researchers can replicate the study. The researchers must describe their work and methods in a transparent, consistent, and detailed manner, so that the study is practically possible to replicate. As our study progressed the focus of our study changed, this was due to the abductive nature of study. These changes caused by applying an abductive method was important for us researcher to make sure that the changes were included and described. We have included a detailed description about how the data was collected and how the data was analyzed in the method chapter for this thesis in section 3.2.

Confirmability:
To ensure confirmability, that is the naturalist`s equivalents for the term objectivity (Lincoln and Guba, 1985, p. 300). We conducted several interviews, with different employees belonging to different interview groups. The data from the interviews was triangulated firstly between the different interview groups, next documents collected, and lastly against data found in the Quality/Management system. We planned one interview round, but after the first interview round, the data we collected indicated that we needed to conduct one round more with some of the interviewees. This gave us also the possibility to clarify questions about the data collected during the first round of interviews.

3.2 Research methodology

In this chapter, we will present the choice of methodology for this research project. Furthermore, we will explain how the data was collected and how we performed the data analysis. Lastly, we will present our ethical considerations to this project, including that we are partially researching "our own" profession.

There exist two different approaches a scientist can choose between when conducting a research project, quantitative or a qualitative approach. One can also use both approaches. Since the purpose of the research project is to investigate how Risk and Opportunity Management is conducted in SME's company DT journey, we chose a qualitative approach. By applying a qualitative approach, we will be able to collect and analyse a broad scope of data of an emergent phenomenon from the point of view of the participants and achieve a deep understanding of the phenomenon we are studying (Saunders et al., 2019).

Context

The oil and gas industry were chosen because both researchers know the industry well and we considered this to be an advantage when investigating such a complex business process area. We thought it would be interesting to study the phenomenon in a medium-sized small business (SME), as SMEs are known for having less resources internally to handle different processes. At the same time based on our experience we know that our case study company is required to be a certified to be able to deliver services/products to various players in the oil and gas industry. Based on the mentioned requirement we expect that SMEs in the energy sector conduct ROM processes based on the requirements from the customer as a minimum.

Research strategy

In this study, we choose a case study methodology to gain an in-depth understanding of how Risks and Opportunities are handled in a SME company during their DT journey. The researchers in this study have chosen to use cross-sectional case study as a research strategy, which fits well when one wants to gain in-depth understanding of a phenomenon. According to Flyvbjerg (2006): "Some researchers argue that the case study methodology may be well suited for pilot studies but not for full-fledged research schemes. Others again that the case study is subjective, including too much of the researcher's own interpretations. Thus, affecting the validity of case studies in negative way". Flyvbjerg also refers to Ragin (1992) which calls this a "special feature of small-N research" and explains that criticizing single-case studies for being inferior to multiple case studies is misguided, because even single-case studies "are multiple in most research efforts because ideas and evidence may be linked in many different ways". Flyvbjerg also states:"Good social science is problem driven and not methodology driven in the sense that it employs those methods that for a given problematic, best help answer the research questions at hand. More often than not, a combination of qualitative and quantitative methods will do the task best"(Flyvbjerg, 2006).

The case study is well suited for empirical studies of a phenomenon in a specific context (Yin, 2003). This phenomenon deals with a complex process. The process affects several employees in the business at different levels. The phenomenon we want to shed light on here is linked to the context of SME. Through a case study we want to answer the question of how the process has been carried out within the enterprise. We describe the actors' perception of a particular process, we do this by benchmarking ideals against reality, at the same time as we want to explore the different participants' interpretations of the process.

Timeline

When designing the research is important to consider the time perspective of the research. Sanders et.al distinguish between two types of time horizon, cross-sectional studies, and Longitudinal studies. (Saunders et. al, 2016. p.467). Due to the time limitation of our thesis, limited to two school semesters, our research program will apply a cross-sectional time horizon and can be viewed as a cross-sectional study.

Though it would be very interesting to do a Longitudinal study, studying a SME`s DT from "Start" to "Finish" and be able to map how the ROM process is conducted in the different phases of DT. In addition, it would also be interesting because it would be based on actual observations and events happening during our study.

3.2.1 Data analysis and challenges

In the following, we will explain the analysis work, and how we have handled the challenges along the way. To analyze the results from the interview process. The interviews first had to be translated from Norwegian to English. Then a coding structure was developed to group the interview results. Level 1consists of 10 different main codes (Figure 15) which each has number of sub-codes. The main codes coincides with grouping questions as outlined in the interview guideline. There are 83 different codes in total. The distributed across 3 levels in total that was used to group the different answers to enable the information to be put in the correct context and to enable to cross reference information to detect any patterns in the answers provided. An information relationship map (attachment 8.3) was developed to establish the areas and cross section of the information.

Codes			
Name	∞	Files	References
Digital Transformation		9	42
Information Technology & Information Management		12	85
Knowledge of Company Values		3	3
Knowledge of Company Vision		10	12
Market		12	57
Observations		9	25
Risk & opportunity		11	66
Sociotechnical Dimensions		4	14
Strategy		10	56
TQM system knowledge		9	37

Figure 15. Level 1 coding structure of interviews

Challenges in the data analysis

As the analysis of interview data displayed several "non-compliance" responses, i.e the answers confirmed that ROM in DT was not carried out according to the "ideal model" for ROM in DT as presented by the authors. Thereby an in-depth re-interpretation of data and establishment of aggregated codes and new sub codes was conducted to improve the understanding and useability of data collected.

3.2.2 Data Collection

To understand how the process of ROM is conducted during the company's DT Journey, we collected a broad range of data from the case company during the fall and winter of 2021-2022. The data collected during this study consists of both primary and secondary data

Primary data
The main source of data collected for the purpose of our research where *Primary data* (Jacobsen, 2015.p.139) collected through semi-structured interviews of different persons in the organisation. The case company was very cooperative in terms of providing us researchers access to their organization. In the initial call with the CEO/owner the intended research topic was presented together with a plan for how we wanted to approach the data collection. We agreed to meet face to face at their office to further discuss our data collection approach and to discuss who/which role in the organization would be relevant for us to interview.

The day we met the CEO/owner face to face at the company's office, we briefly repeated the purpose of our research and informed about our plan to conduct semi structured interviews with employees working in the different levels of the organization. To gain deep knowledge about the phenomenon we were studying we thought it was important to get the perspectives on the phenomenon from different angles. In addition, we thought that this would be helpful for the reliability of the data, as we could triangulate the data from different perspectives. We were presented the organization chart and we pointed out which roles in the organisation would be relevant to interview. After the meeting the CEO introduced us to the interviewees by email, so we were able to schedule the interviews.

Secondary data

is the type of data we used in our research for our literature review that was collected by other researchers for other purposes (Jacobsen, 2015.p.140). The authors collected and analyzed many consultancy reports on DT, digital strategy, and risk management. The reports were

published between 2018 and 2021. We collected and analyzed data from an event that we attended during the fall of 2021, where new insights on risk management and DT were presented and discussed. The purpose was to identify important phases during DT, that were linked to a company's success with DT. In the following sub-chapters, the methods for data collection are described in more detail.

Semi-structured interviews

Due to our study`s explorative nature we choose to use semi-structured interviews to gather the information we needed to understand how the process is conducted (Saunders.et al.,2019, p.920). We started the data collection with face-to-face interviews so we could establish personal contact with our interview objects, this took place during November and December 2021. Most of the interviews were conducted with both researchers present physically during the first round of interviews. However, due to COVID restrictions, one of us participated via Microsoft Teams during some of the interviews. After the first round of data gathering was completed, we conducted an analysis of the data and then triangulated our findings against the information stored in their management system.

To gather information on how the process of ROM is conducted at the chosen SME, during their DT Journey, we choose to interview informants in different positions and working in different levels of the organization. We were allowed to interview a cross section of the company's organisation, with representatives from Board of Directors, C-level management, and selected categories of employees.

By interviewing employees working with daily operations, we could understand better their knowledge and involvement in the process. The interview was recorded using an audio recording, to help us conduct an effective interview, as it would be more time consuming to take notes during the interview and there is also a risk that we would miss some information during the process. One author had the main responsibility for presenting the interview questions and arranging the audio recording. The other author a responsibility to take notes and ask follow-up questions when needed. After the first round of data gathering was completed, the authors conducted an analysis of the data and then triangulated our findings against the information stored in their management system.

The second interview round was conducted with four of the C-level interviewees based on a set of new detailed questions that was developed to further investigate and obtain clarity to some of the uncertainties raised after the first round of interviews.

Interview guide

In this case study we have conducted eight semi-structured interviews based on the attached Interview guides (attachment 1.) The formulation of the interview questions was designed to extract knowledge of the individuals in relation to the research question. Each question was tagged with multiple combinations of BoD, Management, or employees, pending if they were considered common across the organisational levels of the case company or designed to be answered by one group in the organisation which were expected to have more knowledge than others.

The interview questions were grouped in four main categories represented by the supporting questions to the research question; How are risks and opportunities managed in DT projects in SMEs?

1. How Is the company's organization capable to assess risk and opportunities (capacity and competence) in a digital transformation?
2. Are the company objectives clearly defined and controlled in terms of accomplishment related to their digital transformation process?
3. Have the company established a digital strategy and how is this anchored in the organization?
4. Have clients, suppliers / consultants' knowledge about the company's digital strategy and what have been defined as risk and opportunities by the company?

The interviews were conducted among 9 interview objects (8 internal to company + 1 strategic supplier). 4 of the C-level Interviewees was interview a second round to obtain more information following the results of the first interview process.

The categories in the interview guide was grouped by selecting interviewees from three levels of the organization: Board of Directors (BoDs), C-level management and employees. They were all assigned several questions that were generic of nature. I.e., the questions were formulated to allow a cross organization view on specific topics. Other questions were designed to extract information from certain levels of the organization.

Archive/system data

In qualitative studies, documents analysis is a common method to use (Jacobsen, 2015,p.145)In our research various qualitative documents: *internet pages, business systems* were analyzed. The company's internet pages were used to collect information about which services they are delivering and the different IT solutions they offer related to their services. The company also have nice and informative brochures, but we could not find any value of using the data from them in our research as they did not describe any specific process.

We were granted access to the company's Business Management system where we could find data related to the process we are studying. The Business Management system consists of different modules. The modules we were primary interested in was Risk Management, Strategy, and the business process descriptions. We found data recorded in the system that partially described the different business processes, KPIs that was linked to the company's "old" strategy and registered operational risks. The data we found helped us better understand how the business in practice had carried out the different steps of the process we are studying/investigating.

Triangulation

Triangulation can give increased knowledge of a phenomenon when comparing the data from different data collection methods. It al so increases the quality of the research through validation of the data and thereby checking if the data from the different data sources are consistent. (Saunders et al., 2019).

First, we triangulated our data through semi-structured interviews of different employees within different levels of the organization: *representatives from Board of Directors, C-level management, and selected categories of employees*. At this stage we first compared the data collected from the different levels of the organization, as there were descriptions from the different levels of the organization describing the other levels of the organization. Secondly, we compared it with the data collected from the archived data from the company's Business Management System.

Data analysis

The analysis and coding of the transcribed interviews was performed using NVIVO and provided the following key findings structured according to the four supporting questions as

outlined in section 1.2 The primary data set was collected through the interviews and grouped according to the code book as shown in attachment 8.3.

In addition to identify key areas of DT process where ROM should ideally be conducted. The *Secondary data* we collected related to these key areas resulted in a "holistic framework for ROM". The focus of our analysis has been to uncover the practices the company applies today and benchmark them against "The holistic ideal framework/model" to identify where there exist gaps and further analyse these gaps. Our analysis work has consisted of capturing the interviews descriptions of how the process is conducted and then benchmarking the data against the "holistic framework.

3.2.3 Ethical dimensions of the research

When conducting a research there are several guidelines available. The National Committee for Research Ethics has prepared key principles and guidelines for how a research should be conducted. Research is perceived as being of great importance for individuals, society at large and to promote innovation and development (National Research Ethics Committees, 2014). Through our study, we have used guidelines both in working with data, preparing the research report. Through participation in seminars, in conversations with the thesis supervisor and with outsiders relevant to the research. The research project was approved by the Norwegian Centre for Research Data. Prior to the interviews, we submitted an information letter by e-mail describing the purpose of the research paper and how we were going to use the data collected. Prior to conducting the actual interviews, the information letter was repeated back to them. At the same time, we informed them that the study was going to be anonymous and that it was voluntary for them to participate in our study. In addition, they were given a consent form describing the informants' rights in relation to the Privacy Act. We also informed them that the interview would be recorded, but that the identity of the informants would be anonymized by us using object numbers instead of names, during the interview and the finding would not be able to trace back to a specific respondent.

After the interviews, the data material was transcribed and anonymized in accordance with NSD's guidelines. All participants were promised anonymity, and informed that the research data has been stored and analyzed according to the guidelines of the Centre for Research Data approval.

4 Results

4.1 Introduction

In this chapter we present and describe the most important findings from the data collected through the semi-structured interviews and subsequent triangulation towards data in accessible documents, intranet pages, and management system to verify its authenticity. The transcribed data was coded and analyzed using NVIVO. The results are grouped according to the research questions in section 2.3 and consistency between as shown in Table 9.

Table 9. Consistency in data

	Main research question: How is risk and opportunities managed in digital transformation projects?	To what extent does interview data collected provide a clear and distinct answer to the supporting questions – High/Medium/Low	Other data sources used for triangulation of interview data	Is the interview data confirmed by triangulation of data (yes/no)
1.	How is the company's organization capable to assess risk and opportunities (capacity and competence) in a digital transformation?	High	Business management system documentation	Yes, to some extent
2.	Are the company objectives clearly defined and controlled in terms of accomplishment related to their digital transformation process?	High	Business management system documentation	Yes
3.	Have the company established a digital strategy and how is this anchored in the organization?	High	Business management system documentation, Company Intranet	Yes
4.	Have clients, suppliers / consultants' knowledge about the company's digital strategy and what have been defined as risk and opportunities by the company?	Medium	Business management system documentation, Brochures	Yes, to some extent

4.2 Summary of results

To further provide context of the analysis, the interview information in combination with triangulated documentation, system and web information is categorized in the four supporting questions linked to the main research question.

4.2.1 ROM capacity and competence

How is the company's organization capable to assess risk and opportunities (capacity and competence) in a digital transformation?

The summary of responses for this supporting question is that the company is not conducting a systematically and documented ROM processes for investments they make or initiatives the execute and nor are they conducting a systematic ROM approach in what they perceive to be their own DT initiatives. They are performing operation risks. Interviewees are referring to minutes of meetings (bi-weekly/monthly) which we did not get access to, in which they claim to discuss ROM when needed. The following statement from a C-level interviewee in essence summarizes the organizations view when we consider the responses to the research question:

> "*When it comes to new opportunities, we have not gone into this in terms of strategy in analysis and risk assessments. Then you are into the theoretical part and then it is the same as becoming a professor of economics. He doesn't run a business on his own, he never becomes a founder, and he will never start a business because the numbers never add up". We know our business and market and have built it stone by stone as the market knowledge is our force. When we are providing offers to clients, we know we will lose money on our core deliverables with the prices we offer because the clients have squeezed the prices for the core services. Because we know the market and our clients, we are able to offer additional services we know they will need, and these are the ones we make money on.*

BoDs and C-level interviewees are all confirming that they perform a "light" and not usually documented risk analysis prior to making decisions on opportunities that will have a positive economic impact on the company. They do not mention risks that could have a negative outcome and seriously damaging the company. They are operational "hands on" according to a C-level interviewee which support the agility and operational focus that recognizes the leadership team from the authors observations.

> "*We are a company that does short analysis and makes a quick decision and then get started. We are a large leadership group, but we are 4- 5 men who make the heavy choices. Many of us are very practical and hands on.*"

They perform operational risk systematically as they are obligated to do so to keep their ISO-9001 certification. The type of risks are all connected to their day-to-day operations and HSE performance. They do not talk about opportunities in the context risks. They are also preparing to be ISO-14000 certified based on customer requirements. Their review process is currently performed on an annual basis and only followed up on annual basis for a set of defined measures (KPIs), even though their own procedure states that the regular reviews (within in cycle of a year) and controls shall be performed. This may or may not be conducted, but we did not find any documented

evidence that confirmed this. One of the follow up questions to the C-level Interviewees when triangulating the interview responses with data in their quality and management system was to what degree their "change management process" also included digital initiatives as the risk and opportunities in context of DT was something the responded they did not do. The response to this was also no. A response from one of the C-level Interviewees was:

> *"When it is explained in this context, it seems very clear that this is something we should actually have done".*

4.2.2 Company objectives and digital transformation

Are the company objectives clearly defined and controlled in terms of accomplishment related to their digital transformation process?

The summary of the analysis in relation to the company's ability to define required measures of a DT initiatives and then initiate appropriate controls to ensure that these are delivered can be summarized by one of statements from an employee:

> *"Overall, it's diffuse what we want and where we're going to. Many of us develop their own KPIs including myself. I put KPIs in on the things I want to achieve. And I measure myself. I am all by myself in my field of expertise".*

Another sample statement from a C-level interviewee that underpins the above statement:

> *"I must be honest and say that we haven't been very good at following up on this, you might say. The idea is that KPIs should be reviewed monthly at management meetings. We think about working in this way so that any gaps will be identified. But then we're not quite as good at doing this in practice".*

They do not have clearly defined objectives with regards to DT that are documented or known by the any of Interviewees which represents a cross section of the company's own resources. There is one KPIs referred to in the management system (without a measurable target) which discussed among interviewees and to what degree they obtain customer satisfaction. They use an annual quantitative survey to obtain information customer satisfaction versus their competition. This relevant to the question as their main operational system has been tailored to meet customer requirements. We have not been able to detect any other KPI's or references to historical documents or live dashboards which can be linked to already conducted DTs or ongoing digital initiatives

that may fall into this category. The annual management review meetings where KPI's for the coming year are established and documented do not hold any KPI's for DT initiatives. The QA, Management and Leadership system was used to triangulate the responses from the interviewees. A statement from a C-level interviewee also describes the relation to the companies KPIs in general:

> *"But we don't know what to do tomorrow morning that's our problem. That's what makes it challenging to make KPIs when we don't have a budget. It's a little bit special, but we don't have a budget to be approved by a Board of Directors".*

A supplementary statement in the KPI context from the same C-level interviewee was:

> *"If we had a board of directors consisting of economists and all this, with famous names, they would most likely have said no to this way of doing business". During the pandemics we have actually increased our revenue because we knew what the customers would need."*

4.2.3 Digital Strategy

Have the company established a digital strategy and how is this anchored in the organization?

The summary of responses to the question if a digital strategy has been established and how it is anchored in the organization: The company do not have an updated corporate strategy, nor a digital strategy or an IT strategy. Our interview questions started by clarifying to what extent the company had an IT strategy followed by the question "Do you think your company need a digital strategy and why". None of the interviewees understood the difference between Digital Strategy and IT Strategy as several interviewees responded with a clarification question to the interviewers: "What is a Digital Strategy?". This is supported by a statement from a C-level interviewee stating that:

> *"90% of our organization should be considered IT illiterates"*

The interviewees all claimed that the company had an IT strategy but had not seen it or did not know what it entailed. They all pointed to the IT manager which confirmed that they did not have an IT strategy but had recently started the work of establishing one (Same day as the interviews were conducted). One statement from an interviewee was:

> *"The IT strategy is to operate as cheaply as possible and as efficiently as possible."*

4.2.4 ROM, clients, and suppliers' knowledge

Have clients, suppliers / consultants' knowledge about the company's digital strategy and what have been defined as risk and opportunities by the company?

When answering this question, we were not allowed to approach any of their customers as this could be perceived as leakage of confidential and business critical information and reveal any deficiencies in their business model. We were allowed access to their key system supplier which have worked closely with the company for 10 years +. The key supplier's characterization of the company is that they are eager to try out new technologies that could improve customer value and improve efficiencies, but they are extremely focused on cost, and this is leading to discussions where a consequence is that project management resources are not being dedicated or limited to a minimum. This has an impact on how the process is managed and thereby controlled. The key IT supplier stated the following:

> *"They normally have an idea of what technology should be able to solve of problems. I don't think it's specified in dollars and cents."*

> *"It is often the case that the proposal they make is not good enough and that together we discuss and perhaps conclude that this is not justifiable to implement when comparing cost with their verbally communicated expectation of value to be achieved. Often it is we who sit with the cost elements and they who sit with value expectation elements. Risks and opportunities are not formalized and used in these processes".*

> *"The company's biggest challenge is that their main system was developed in 2010 and is tailor made for their business over the years. This is a significant undertaking to move to f.i. to a cloud solution and will at the earliest take place in 2023. This represents a high risk to them".*

4.3 Summary of Observations

Some of overarching observations from the interview analysis in this case study are:

- All Interviewees responds equally to their knowledge of the company's vision and core values and when triangulated against available documents and web pages. They all know very well the company vision and value statement which is very customer centric. Using the correct vision and value statements would reveal their identity hence this would be in breach of their anonymity requirement.

- All interviewees are pointing to DT as the key enabler to future success for the company and something they all claim they must do without further interpretation of what it means to them.

- None of the interviewees has a clear understanding what DT entails. One typical and representative response to the following question: «Has the company, in your opinion, carried out a DT and when did this take place? », was provided by C-level management:

    "That depends on what you mean by digital transformation?".

- The company's BoDs should be considered working board members as they meet almost daily (physically or by virtual meetings) to discuss and make decisions required to operate the company. They are very "Hands On" relative to the daily operations.

- All interviewees claimed to have a good to very good understanding of market trends, clients, their competition, and the company's high focus of controlling costs, as they operate in a low margin segment where volumes of sales provides the grounds for profit.

- None of the Interviewees could answer if the company have an IT/IM budget. The IT management responded with following to the question of the size of the companies IT budget:

    "That is a very good question. I have no idea. I have never seen an IT budget in this company. We get funds if needed. I would like to have seen a budget ".

    One C-level interviewee complained that the company IT cost was too high and had no control of what kind of technology they spent money on. The statement was:

    "No, I can only state that we spend a lot. Help me find the key to this. I think it's an unimaginably high cost. I should have known, but I don't know."

- All interviewees responded unified to which systems are critical to their business and they all confirm that 2-3 days without their core order/operating system means they will be out of business as they will lose the ability to view and respond to customer requests and orders. Even a couple of hours downtime could severely damage their business. The company receive and handle approx. 3000 customer orders per week. The interviewees are equally unknown in terms of how to manage a situation of unavailability and how to mitigate such a disruptive event or being subject to external

disruptions such as long terms power failure (more than 2-3 hours), cyber-attacks etc. Their key system is hosted on local servers and their back up servers are connected to the same power grid. They did not, as we understood it, have a UPS installed to mitigate power supply disruptions.

- The Digital maturity in their view of the company can be summed up by a C-level management statement:

    "Of the 130- 140 users we have of our solutions, 90% are digital illiterate. They hate change. that's our challenge.".

- The quality, management and leadership systems are all integrated into one software "X" which they use to stay compliant with EN-ISO-9001 certification held by the company. The training provided to employees in utilization of the system is considered limited as many interviewees uses the following phrases:

    "I have Limited training"

    "We have long way to go when it comes to training".

- All Interviewees stated one or more times during the interviews that lack off the interviewees own capacity was the main reason to why many activities / processes had not been performed when asked interview questions related ROM and DT. The phase of their day-to-day activities did not allow for involvement or engagement on other topics outside their specific day to day duties. On the other hand, a summary of C-level comments is on culture and how they have been promoting and encouraging employee's involvement in company improvement initiatives and that several actions had been made in this to promote employee involvement. One example was the internal "Facebook" solution they had developed that allowed for employees to discuss specific topics on improvement of business processes. According to several interviewees the system was to not being used as intended.

    "It is used as a" new" Facebook, i.e., they congratulate each other on birthdays and talks about other irrelevant things such as weekend trips".

Another sample mentioned was the internal "competition" to which team that performed best, measured by specific KPIs in terms of contribution. There were no incentives other than appealing to the teams' competitive instincts and the visibility on dashboard that published the best performing team.

5 Discussion

The background of the authors is a combined experience of more than 30 years in managing DT initiatives from conceptual ideas to fully operational collaboration solutions on an industry level. Most of them considered successful, as they transformed complex industry processes from manual and digitized work processes to fully digital collaboration processes. But from the author's view and consideration, we argue not as successful as they could have been. If the risk and opportunity processes had been managed more holistically (both on industry level and company level, which would have allowed for the ability to arguably harvesting of the value propositions as outlined in the different business cases that were developed prior making the investment and development decisions (Menzfricke et.al., 2021), (Matt et.al. 2015). When looking at the achievements in hindsight we would argue the success rate to be 100 % for these historical DTs in terms of being able to transform the specific part of an industry (from digitization to digitalization to digital transformation) but unsuccessful in terms of capturing the defined value, which was an area beyond our control. The access to internal implementation process was limited and the loyalty to complete the efforts was down to single companies and priorities by within their own management. A short description of these results, from a bird's eye perspective, is that a transparent and holistic risk management process performed in context of the socio-technical dimensions and interactions would arguably have improved the harvesting of value as defined in the different business cases developed. The experience of the authors combined the theoretical perspectives in section 2 should provide a holistic and sound capability to argue for the discussions to follow in this section.

5.1 Digital Transformation – results vs. theoretical perspectives

As defined by Gong et.al. (2021): "DT should be understood as "A fundamental change process, enabled by the innovative use of digital technologies accompanied by the strategic leverage of key resources and capabilities, aiming to radically improve an entity and redefine its value proposition for its stakeholders" (Gong & Ribiere, 2021).

The case study company both have and are executing DT projects, without perceiving or categorizing them to be DT initiatives or projects. Our impression through analyzing the data, is that they have not considered this as a DT process nor as digital initiatives. They basically have limited understanding of what DT is all about. Nevertheless, a unified result from the interviewees is that DT is critical to the future success of the business. And they do not

perform any kind of risk and opportunity management in these "no-named" initiatives, systematically or not. Is this to be expected from an SME and Leading company firm their industry? As previously stated in section 4, they have executed and failed in some of their previous DT projects, which is to be expected when more DT fails than are successful. "DT's that are intended to improve efficiency (e.g., ERP, CRM, Analytics, etc.) have a high failure rate (up to 90%) resulting in adverse impact to firms' operations and intent and capability to further innovate and while extant research talks about the importance of vision, management, and culture as critical success factors, even DTs within the same firm often fail to achieve similar results" (Nagish, 2019). To further explain any gaps versus the theoretical perspectives we have created a section for each of the theories and applied the recommended model to explain the gaps.

5.1.1 Digital and ROM Maturity – results vs. theoretical perspectives

According to the definition of digital mature companies, the company's maturity is considered limited by a subjective score according to the ideal model described in section 2.1.6, which are based on interviews and observations would put the company on a low score. This is only the authors opinion as a more detailed assessment involving the company's resources may result in a different score. Hence this should be considered an illustration.

The company's ROM maturity we argue is at the bottom of maturity scale in terms of digital assessment capabilities. They have not, according to the interviewees performed any ROM in their DT processes.

On the other hand, a summary of C-level comments is on culture and how they have been promoting and encouraging employee's involvement in improvement initiatives and that several actions had been made in this respect. One example was the internal "communication" solution they had developed that allowed for employees to discuss specific topics on improvement of the company's business processes. According to several interviewees the system was to not used as intended. *"It is used as a "new" Facebook, i.e., they congratulate each other on birthdays and talks about other irrelevant things"*. Another sample was the internal "competition" on which team performed best measured by specific KPIs in terms of contribution. It did come across that this was not well thought through exercises whereby they could measure the effects of initiatives and thereby came in contradiction with their first statement. The external sources was limited to one key IT supplier. According to the supplier the case study company were to some extent considered mature in that they were eager to apply new technologies to improve efficiencies and reduce costs. The suppliers also informed

that company did not want spend money on the ROM process. This was offered as part of project management and execution methods made available by the supplier. As the supplier is a single source of information, the credibility and reliability of the information provided could be questionable in a research context as the supplier would fear jeopardizing the relationship with the case company as its long-term customer. In this view, access to more suppliers may have provided a more balanced response to the view of the case study company's DM.

5.1.2 Digital Security - results vs. theoretical perspectives

We did not find any documents describing the company's policy regarding cyber security in the business management system. The only information retrieved through the interviews was that their outsourced IT service desk forced some generic security through password settings and user administration. The relied entirely on the capacity of their service provider to manage this their digital security. This coincides with the findings of the OECD (2021) study that confirms that SMBs rely on third parties for the provisions of these type of services. We argue that this approach may work to a certain level, but that the company should have internal competence and capacity to manage this at a strategic level as the DM and focus DT increases.

5.1.3 Digital Information Security - results vs. theoretical perspectives

We were not able to identify if the company had developed an ISP. We would have expected this to be a part of the governing documents stored in the company's business management system. When approaching the case study company, we were told that certain business critical information would not be made available to us. We considered this to be a result of their ISP and did not pursue this theme through the interview questions to reveal if an ISP was established or not.

5.1.4 Digital Project Management - results vs. theoretical perspectives

We did not find any reference to known project execution methods or documents describing how to execute digital projects or projects in general in their management system. We would have expected this to be a part of the governing documents stored in the company's management system. We considered this to be a part of their governance process and did not pursue this topic through the interview questions to reveal if a generic project execution method for DI was established or not. We argue that a fit for purpose and recognized project execution methodology should be applied. Lack of such methods when executing Digital projects increases the probability unsuccessful execution. Awareness that project risk

management is a key success factor is well established in project management practice (e. g. DIN IEC 62198, 2002; Project Management Institute, 2017, pp. 395–457; 2019)

5.2 Digital Strategy– results vs. theoretical perspectives

The results from the interviews confirmed that the company did not have a digital strategy. The term IT strategy was referred to several times during the interviews but only as confirmation that an IT strategy did not exist within the company. As pointed out in the theoretical perspectives on DS, research confirms that there exists ambiguity concerning the difference between IT strategy and Digital strategy, many thinking that it is the same thing (Gobble, 2018, p.66). The authors argue that a DS should be a prerequisite prior to embarking on DT journey. How should a company (SME) be able to determine their rate of success for DT processes without defining the objectives and how to get there. Control becomes impossible as undefined risks will increase exponentially and opportunities will be lost.

5.3 Digital Initiatives– results vs. theoretical perspectives

We did not find any documents describing the company's thinking or management of DI in the management system. In some of the interviews the word "initiative" was used in context of improvements, but not in combination with digital. To provide required governance of DT and subsequent initiatives, we recommended that a company should embrace the seven fundamental principles by Obwegeser et.al. (2020) as a guideline for how a company should prepare itself and build a culture that would support their DT journey.

5.4 Main Challenges

Our expectation prior to conducting the interviews was that our findings would most likely reveal certain deficiencies based on the initial conversation with CEO and owner, when being allowed to use their company as a case study. The same expectations were also since one of the researchers has a long background from the same industry and know to a large extent the players in this market segment where this company operates and conduct their business. What we did not expect was in essence total lack of ROM process in DT in a company with an annual revenue moving towards 100 million euro that are very clear that their future will be heavily influenced by digital technologies and that this is focus area. The responses, as we view it, also a testament to the risk appetite of this firm. They are willing to take extensive risks to create new business or reduce costs through digital initiatives without conducting a

holistic and systematic risk and opportunity management process. The company has a strong focus on managing operational risk (HSE) but appears to be lacking the same focus on ROM for the DT processes or other initiatives that can severely influence their business. It became obvious that comparing an ideal model for ROM in DT with the company's own practices, would basically imply that we would not be able to extract any detailed responses / deviations towards an ideal model. The interview guide was structured to get a confirmation of how they performed ROM in DT. The interviews responses made very clear that ROM in DT was not actually performed structured, at all. Several supporting questions (not part of the original interview guideline and questions) were asked to obtain an understanding that maybe different phrases or perceptions were used by the company with regards to how ROM and DT was understood by the interviewees.

5.5 Implications

The company is a leading firm in its market segment and has become one, without having determined their digital maturity, having established a clear and documented digital strategy and use cases. This is based on the interviews results and the triangulation of data against the company's management system. Digital initiatives have been executed and implemented although KPIs and measurements of success are not visible or known.

We are then forced to ask the question: Is it pure luck that this company has not gone off track and derailed? Can a company thrive and succeed without applying the well-known methods and practices? This is a finding that goes beyond the research question but contributes to the understanding of the responses from the Interviewees in terms of their knowledge and competence. They express no fear of the unknown and they move fast towards pursuing any opportunity that they perceive will grow their revenue. They have experienced costly failure in investments. Examples of business opportunities which has been pursued by the company are the acquisitioning of companies in other segments, as the BoDs and owner of company viewed them as great opportunities based on what they perceive to be a future business model and that this is a way to put them ahead of their competition according to information provided by the Interviewees. Although a few of these acquisitions had been costly and something they had regret doing after the fact.

We recognize that a single case study with its inherent limitations and its findings will not be representative to qualify if the findings are generic of nature amongst SMEs. We would have liked to conduct quantitative survey of SMEs, which would share light to the possible

commonality of the findings, but time did not allow us to perform such survey, hence this will be recommended as subject future research. We also would like to point out that lack of practical and easily available models for SMEs will represent a possible shortcoming in terms of how they should go about the practical execution of DT. There are several consultancy companies that offer to help companies by using their own "inhouse" developed models for DT. This implies that there are practical models developed, but they form a part of the consultancy companies' business model and only available at a high cost, which an SME may not afford to use, or their suggested models might not be fit for purpose as many consultancy models are resource intensive (authors experience).

6 Conclusion

We started of this thesis with the ambition to gain further understanding if lack of ROM methods and processes are one of the contributors to why so many DTs fail to deliver on their objectives. There are extensive research and empirical data on the subjects individually. But limited research and empirical data when looking at the combination of ROM and DT which forms the genesis of our research question. Throughout the study work it became evident that there did not exist a holistic and ideal model we could use to measure the SMEs practice of ROM in DT versus an ideal model. Hence, we assembled a model we perceived to be fit for purpose to obtain answers by combining existing models within each of the theoretical perspectives and by of use own experience. The simple answer "ROM in DT is not conducted by the case study company" which essentially is the result of the interviews, does not answer the question of why it is not done, which then becomes a natural next question. The interview results is pointing to this as an area they should have focused more on according to themselves, as the interview results revealed, the struggle with capacity and competence, a common denominator for SMEs. Then the next questions becomes how they should carry out ROM in DT? This is where the authors argue that an SME would struggle to perform both ROM and DT as separate issues, and in particular managing the combination of ROM and DT without having a practical model that tells them where to start, how to execute and measure and control the results. Although, it appears that the combination of DT and ROM are getting increased attention among researchers, public transformation programs (Industry 4.0) and consultancy companies. This fact also made it challenging to find relevant research to help answering the research question and we focused on research reviews to obtain commonality in definitions and models.

The main result of the study reveals that one company may be able to execute DT without applying ROM methods. If their DT projects can be defined as "successful" without having any KPIs and control mechanisms in place, the auhtors argue is difficult if not impossible. Although DT is also about trial and error to promote innovation, there are certain limiting factors which are subject to ROM processes. You cannot continue to explore and innovate until the company reaches bankruptcy. As discussed in section 5, without applying recognized ROM methods and recommended practices, based on the theoretical perspectives in a company's DT, is it a random result when DT in this SME over a period has not experienced a sever negative impact on the company, when their digital initiatives has been implemented? This research is pointing to a possible gap in the validity of existing theories and models versus how SMEs in practice manage DT and how risk and opportunities are managed when embarking on a process which will have cross company influence and impact. This is then a paradox that we did not foresee and would require further research to reach conclusion. As the pace of DT increases exponentially, it is imperative, the authors argue, that the research question is answered and that organizations can take advantage and use the study results to potentially improve the success rate of the DT processes or conduct further research.

6.1 Valuation and hypothesis /research question

The case study company have and are conducting DT initiatives, although without following recognized methods and the theoretical perspectives described in section 2.1 and specifically ROM. The summary of the results and the subsequent discussion is that an SME may embark on DT journey and benefit from implementing new technologies with low digital maturity, without a digital strategy and without clearly defined uses cases and initiatives and ROM not considered. BoDs and C-level interviewees are all confirming that they perform a "light" and not a documented risk analysis prior to making decisions on opportunities that will have a positive economic impact on the company. They do not mention risks that could have a negative outcome and seriously damaging the company. As the authors did not explore and describe in detail how humans in general perceive and manage risk and opportunities, we would argue that to some extent that any decision maker in these processes deliberate or not, performs mental and calculated ROM consideration, which is linked to the risk appetite of the person and the attractiveness of the opportunity that the company face.

6.2 Compliance with existing research

The case study has revealed that this company did not match the theoretical perspective and models in any areas related to the research question. During the literature study performed by the authors, it became evident that the theoretical perspectives and the many facets of Digital also leads to confusions with the interviewees when discussing the different terms with them. What we did find was very interesting and lead us to ask the following question: How has the case study company been able to reach a status of a leading firm in their market segment through a decade of annual growth in revenue and geographical spread and with an expanding diversified service portfolio, without having:

a) An updated business strategy?

b) Applied ROM for new initiatives and investments for growth, including business cases, were only an operational ROM process has been conducted?

c) A defined Project execution methodology?

d) A good score on digital maturity?

e) An IT or digital strategy, although the enabler of future success is DT according to the owners, management, and employees?

f) A dedicated budget for IT / DT

In terms of SME's, several of the interviewee's statements and described behaviors fits well with research reviews and analysis of theoretical perspectives outlined in this thesis.

In ROM context the probability vs impact factor for this company would, if all the theoretical perspectives as outlined in section 2 were applied, place this company in the high impact / high probability category with most likely outcome as becoming extinct / bankrupt if only a minor incident or an unscheduled event would occur. But then again this has been the status quo as reference point for over a decade for this company. How have they managed to "dodge the bullet" through oil price crack 2014-2017, and increased their revenue through the pandemics 2019-2022 (see graphs in section 1.1), which included stop in China trade and thereby large Supply Chain impacts across the globe? The authors will not attempt to answer these questions as this is a subject for future research. As showcased by Falkner et.al. (2015) "implementing mission-critical software may pose a considerable risk to SMEs because software implementations require higher relative levels of resource commitment in SMEs than in large firms, making the potential impact of implementation failure relatively higher, especially if SMEs opt for open-source software vendors and not for large for-profit software vendors". The case study SME are strongly committed to making sure that their main

business system is operational, although the impact and risk of losing access has not been assessed and mitigated other than the awareness of the challenge which all interviewees mentioned. They do not have an alternative in place due to limited resources. The results of the study by Gilmore et.al. (2004) showed that SME managers frequently use their personal networks to manage risky situations. Therefore, close relationships with key suppliers may be regarded as another technique to manage risks successfully. Gilmore showed that, in addition to personal networks, SMEs often maintain similarly close relationships with existing clients in the hope of gaining more repeat business (Gilmore et al., 2004) . This is also the case for the case study company. The BoDs discuss among peers and clients and build large networks that includes individuals that possesses different expertise that may be relevant to the company. Thun et al. (2011), suggest that, as the total purchase volume SMEs is not divided between several suppliers, SMEs hope to gain a better bargaining position with their suppliers and, thus, a price advantage. However, this strategy also entails a strong dependence on single suppliers. Any difficulties with the supplier may lead to production interruptions, which presents another significant supply chain risk for SMEs. This is also the situation with the case study company. The relay on one key supplier for their IT services and have done so for the past 10 years. This the becomes both limitation and a risk as the company may not understand how or if the supplier can keep up with technology developments, as an example. According to the SME managers interviewed by Gilmore et al. (2004), the risk arises with the selection and management of employees to whom the responsibility is transferred. "The SME managers, in this study, indicated that they, therefore, tried to learn about the personal qualities, skills and ambitions of employees by internal networking, which helped them to select suitable candidates who are unlikely to leave the company, and thus to avoid negative consequences" (Gilmore et al., 2004). Brustbauer (2016) argue that there is multiple evidence that the individual characteristics of SME owners and SME ownership structure have a significant impact on the business direction of an organization as well as on risk management practices (Brustbauer, 2016, p.70–85) . However, the steps of risk identification and risk analysis in SMEs also offer ample opportunity for further research, which is not only useful for academia but also for SME practice. For instance, from the extant literature, it is not known at what time interval (frequency) risk identification is carried out or how exactly risk analysis is performed effectively in SMEs. "Furthermore, it is not yet clear who contributes to the risk identification and analysis in SMEs; is it only the SME owners/managers, or do they also seek outside advice – and if so, what is the impact of external advice on the risk management practices in SMEs?" (Falkner and Hiebl, 2015).

6.3 Limitations and opportunities

The study was limited to one SME in the energy sector of Norway. The research question we argue would have benefitted from a quantitative survey as this would reveal any commonalities in our findings across SMEs in the sector or even on a national / international scale given the research focus that now appears around SMEs and DT. The reasoning and rational behind this thinking is that most registered companies in Norway and internationally are SMEs. SMEs are critical to any country's GDP, and they constitute many employees. They are more vulnerable to f.i. politics and the recent pandemic. We argue the most SMEs did not have pandemic as potential high risk and opportunity for their business, although some companies have flourished and others went bankrupt during the pandemic period, even with national emergency funding offered. We cannot claim that companies would not have changed their business models as new opportunities became evident. We can only accept that certain changes that were viewed as part of the future was accelerated because of the pandemics (i.e use of online meeting software). The case study company were also influenced and forced by clients to invest in online meeting software and equipment because of the recent pandemics (Covid-19). The limitations of study have thus pointed to several other areas that creates opportunities for further studies of ROM in terms of its usability for SMEs and development of practical approaches as SMEs appear to be depended on "usable" methods to conduct DT and ensuring that their exposure, both risk and opportunities are managed holistically.   Considering the generic perception of limitations of a case study, the author would like to refer to Flyvbjerg (2006) which describes what he refers to as the "misconception" of case study has a research method. He argues that the case study forces on the researcher the type of falsifications described such as: "researchers who have conducted intensive, in-depth case studies typically report that their preconceived views, assumptions, concepts, and hypotheses were wrong and that the case material has compelled them to revise their hypotheses on essential points". Flyvbjerg also refers to Ragin (1992) which calls this a "special feature of small-N research" and explains that criticizing single-case studies for being inferior to multiple case studies is misguided, because even single-case studies "are multiple in most research efforts because ideas and evidence may be linked in many different ways". Flyvbjerg also states:" Good social science is problem driven and not methodology driven in the sense that it employs those methods that for a given problematic, best help answer the research questions at hand. More often than not, a combination of qualitative and quantitative methods will do the task best". The authors argue that the results from the research has provided several samples and a paradox which represents areas for future research, given the

authors previously mentioned limitations such as time, available research etc. It could be argued that the authors own experience could be conceived bias towards using their experience in interpretation of the data. Then again, the authors would use Flyvebjerg research as the counter response. The in-depth understanding of a research area (from a practical standpoints) provides even further substantiation to the findings as it allows to as more detailed and specific questions with less degree of uncertainties. (I.e., ROM in practice). The authors do recognize from own experience the complexity of ROM and its ability to "frustrate" organisations due to its inherent complexity, but also the potential impacts if not executed properly. The example used in section 2.1.6.1, we argue, describes the potential key to why ROM may not have been considered a critical component of DT until recently. The overall complexity in assessing, organizing, and controlling risk and opportunities is a demanding task and requires a holistic approach through an organization.

The authors also argue the that the opportunity that arises from this study is that SMEs, by having access a potentially ideal and practical model for ROM in DT, will have an opportunity to reduce risk and enhance its probability for capturing opportunities. The model may be further enhanced to reduce practical, complexity as the authors do recognize that the model has potential for further simplifications. The study timeline did not allow for maturing the model further. The authors also recognize the limitations of an abductive approach and with more time available further in-depth questions would have been possible to raise towards the interviewees resulting from potentially revised theoretical perspectives.

6.4 From head to tail

In this study our ambition was to gain an understanding of how ROM was conducted in DT as so many DTs fail to reach their objectives. A combination of empirical data and own experience alluded to that lack of holistic and systematic ROM would be one of several reasons. We then conducted a semi-structured interview with a leading SME in the energy sector in Norway using an abductive approach. The hypothesis of limited or lack ROM in DTs was steadily growing as the results and own participation in DT in several projects were concluded as failures as expected values where not achieved. The industrial projects were executed flawless as projects using recognized methodologies, but some of the projects organizations members failed to implement the solutions as recommended through the business cases and subsequent guidelines for implementations. We developed a model (figure 10) that we argue can be perceived as an ideal model for ROM in DT. The research focus on DT in combination with ROM after 2021 has increased, but mainly that they are connected

but not in context that DT could fail if not ROM is viewed in a socio-technical and holistic context and conducted as an integral part of DT. The recent research focuses on the need for ROM in DT, but very limited describing a practical approach on how to do it (with a holistic perspective). The research identified by the authors that describes a practical approach though, only talk about ROM in digital use cases not following the all the phases of DT, maturity, digital strategy, and Digital Initiatives. Even though they provide a practical approach, this research is fragmented when considering that all phases of DT that should be subject to ROM processes. The reasoning for choosing the abductive approach, the authors argue that the need to explore other and new research was required following the original approach and interviews. This led to new insight on other researchers work that would coincide, supplement, and increase the understanding of the already collected information.

As discussed in section 5, without applying recognized ROM methods and recommended practices based on the theoretical perspectives in a company's DT, is it a random result when DT in this company, over a period has not experienced a sever negative impact on the company when their digital initiatives has been implemented? This research is pointing to a possible gap in the validity of existing theories and models versus how SMEs in practice manage DT and how risk and opportunities are managed when embarking on a process which will have cross company influence and impact. This is then a paradox that we did not foresee and would require further research to reach a conclusion.

6.5 Need for future research?

This study will not have statistical generalizability but may nevertheless contribute to the field of research by indicating underlying contextual mechanisms involved in human actions and which will be recognisable to other actors (Jarzabkowski and Whittington, 2008).

The research is pointing to potential white spots in the current literature regarding the implications of social-technical dimensions and ROM in development of digital strategies and DTs. It is also pointing to the paradox of an SME that is executing DI without using recognized practices as outlined in the theoretical perspectives and not experiencing any negative impacts or being aware of potential opportunities that they have missed. In this study the focus has been to investigate how the process is conducted.

For future research it would be interesting to investigate the extent of this phenomenon through a quantitative analysis of several SMEs in the same sector, using our proposed ideal model. It could also be extended to include SMEs in general in Norway. Is this phenomenon

more common in SME companies where the owner is deeply involved in the day-to-day business?

Research reviews performed by other researchers, our own research, and dedicated efforts to gain a holistic view was a cumbersome exercise as most empirical data, research papers, articles and professional institutions were mostly fragmented and discussed only parts of processes and did not provide the desired holistic picture that we expected. Both themes; DT and ROM, are by nature complex issues to manage for a company. Both as distinct topics, but when there is a need to view DT and ROM as a whole and integrated processes for reasons as outlined in section 7.1. The study has revealed that future research is required obtain a holistic view that is supported by a unified terminology, methods, processes, procedures, and practical models. If one concurs with our compilation of theoretical perspectives and evidence in the research results provided in the study, this may also lead to rethinking of current methods applied within ROM. A unified process guide for SMEs for managing DT should assembled for the purpose of answering the research question.

Garg et al. (2010) suggest that there are no standards for the development of information systems in SMEs, and the Project Management Institute (2010) has indicated that further research is required to tailor to the PMIw and PMBoKw (Project Management Institute, 2008) for SMEs. The steps of risk identification and risk analysis in SMEs also offer ample opportunity for further research, which is not only useful for academia but also for SMEs practice. For instance, from the extant literature, it is not known at what time interval (frequency) risk identification is carried out or how exactly risk analysis is performed effectively in SMEs. As pointed out by Falkner et.al.(2015) it is not yet clear who contributes to the risk identification and analysis in SMEs; is it only the SME owners/managers, or do they also seek outside advice – and if so, what is the impact of external advice on the risk management practices in SMEs. The authors are of the opinion that this still is a relevant topic based on the experience from this study and external work the authors have been involved in.

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8 Attachments

8.1 Interview guide

Innledning
I innledningen av intervjuet er det viktig å skape trygghet og sørge for at den som intervjues forstår formålet med intervjuet.

Innledning:
Takke respondenten for at de stiller opp

Hvorfor? – Fortelle hva formålet med intervjuet er:

> Formålet med forskningen er å få innsikt og forståelse for hvordan prosessene for styring av risiko- og muligheter innlemmet og brukes i selskapets digitale strategi og digitale transformasjonsprosesser, Risikostyring er prosessen for å redusere usikkerhet, øke verdien ved å sikre at risiko og muligheter identifiseres, vurderes, reduseres og kontrolleres på tvers av alle faser og nivåer i prosessene, og dermed en integrert del av selskapets styring og beslutningsprosesser

Anonymitet? – Fortelle hvordan dataene blir behandlet.

> Resultatene fra forskningen (som er anonymisert iht. ønske fra selskapet) skal danne grunnlag for videre forskning og kan brukes i utdanningsøyemed hvis formålstjenlig eller relevant for å avdekke om resultater er av generisk art eller vurderes som et isolerte tilfeller.

> Det er planlagt å ta lydopptak av samt notater fra intervjuet for å sikre rett forståelse av besvarelser på spørsmålene som er stilt. Disse blir slettet ved oppgavens ferdigstillelse som vist til i kapittel om personvern

Innhold – Kort gjennomgang av hva intervjuet skal handle om.

> Det er utarbeidet et sett med intervjuspørsmål som skal bidra til å besvare forskningsspørsmålet som beskrevet over

Tid – Hvor lang tid kan respondenten regne med at intervjuet tar?

> Det vil ta deg ca. 45-60 minutter. Spørreskjemaet inneholder spørsmål om hvordan den enkelte person fra styret, ledelse og ansatte oppfatter og vurderer en del sentrale elementer som er nødvendig for å kunne besvare studentenes forskningsspørsmål

Kan vi kontakte deg igjen hvis det blir aktuelt? (teste ideer)

Tusen takk for at du stilte opp!

8.2 Research questions

Master – Semi structured interview guide
"How is risk & opportunities managed in digital transformation projects?"
Spørsmål som må stilles for å kunne besvare forskningsspørsmålet over
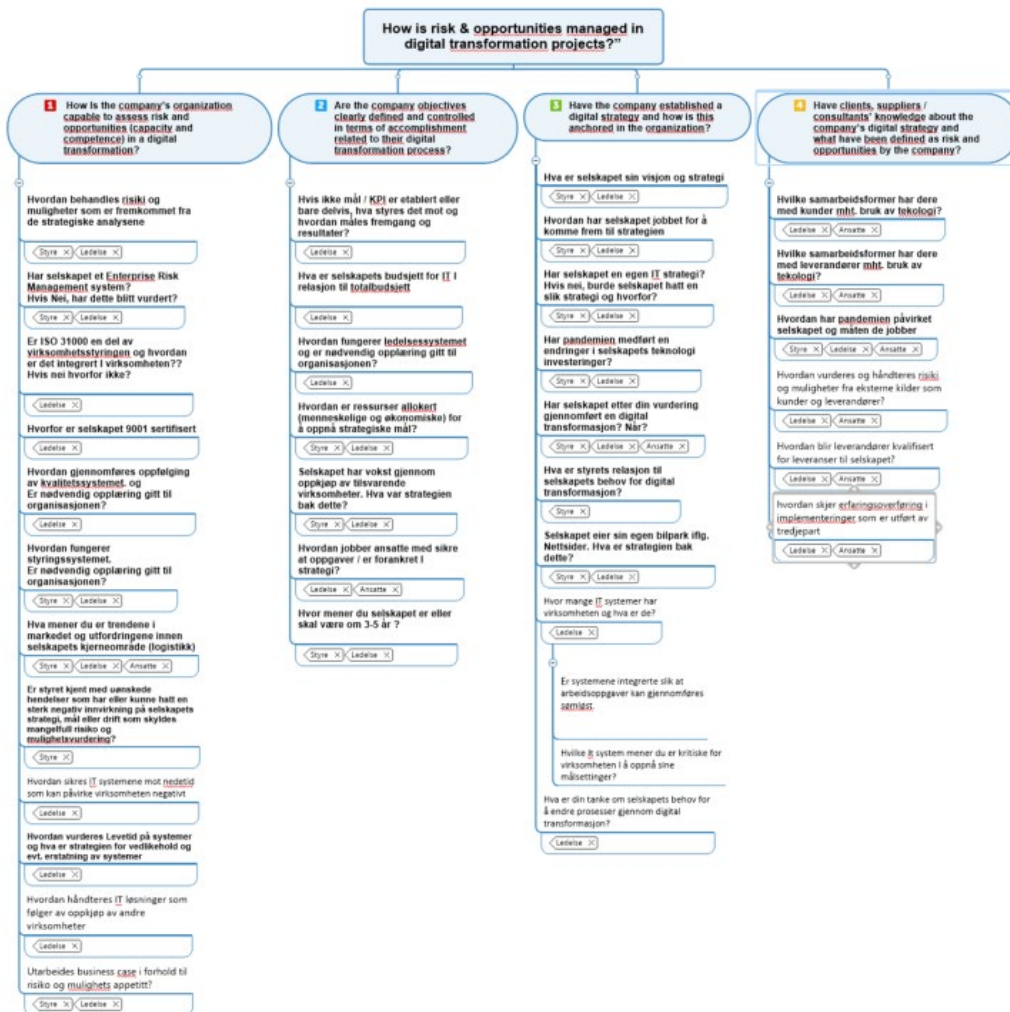
Styre

Nr.	Respondent	Spørsmål	Bakgrunn for spørsmål	Pensum	Teori
1	Styret (alle)	Hva er "SR-Group" sin visjon og strategi	Hvis ikke etablert, hva styres det mot?	Strategi	
2	Styret (alle)	Hvordan har selskapet jobbet for å komme frem til strategien	Forstå metode & analyse for resultatet	Strategi	
3	Styret (alle)	Hvordan behandles risiki og muligheter som er fremkommet fra de strategiske analysene	Hvis ikke analysert, hvordan vet selskapet hva som er riktig veivalg for selskapet	Strategi	
4	Styret (alle)	Hvordan følges strategien opp (Mål, KPI,)		Strategi	
5	Styret (alle)	Hvis ikke mål / KPI er etablert eller bare delvis, hva styres det mot og hvordan måles fremgang og resultater?		Strategi	
6	Styret (alle)	Har selskapet en egen IT strategi? Hvis nei, mener du at selskapet burde hatt en slik strategi og hvorfor og hva burde vært inkludert i denne?	Hvis ikke etablert, hva styres det mot?	Strategi	
7	Styret (alle)	Hva er selskapets budsjett for IT I relasjon til totalbudsjett		Økonomi	
8	Styret (alle)	Har selskapet et Enteprise Risk Management system? Hvis Nei, har dette blitt vurdert?	Rammeverk for risikostyring	Ledelse	
9	Styret (alle)	Hvorfor er selskapet 9001 sertifisert	Styring	Ledelse	
10	Styret (alle)	Er ISO 31000 en del av vikrsomhetsstyringen? Hvis nei hvorfor ikke?	Rammeverk for risikostyring	Ledelse	

11	Styret (alle)	Hvis ja til ISO 31000, hvordan er det integrert I virksomheten?	Rammeverk for risikostyring	Ledelse	
12	Styret (alle)	Hvordan gjennomføres oppfølging av kvalitetssystemet og hvordan er opplæring gitt til organisasjonen?	Styring	Ledelse	
13	Styret (alle)	Hvordan fungerer styringssystemet og hvordan er opplæring gitt til organisasjonen?	Styring	Ledelse	
14	Styret (alle)	Hvordan fungerer ledelsessystemet og hvordan er opplæring gitt til organisasjonen?	Styring	Ledelse	
15	Styret (alle)	Hvordan er ressurser allokert (menneskelige og økonomiske) for å oppnå strategiske mål?	Styring	Ledelse	
16	Styret (alle)	Hva mener du er trendene i markedet og utfordringene innen selskapets kjerneområde (logistikk)	Disruptive and global events	Strategi	
17	Styret (alle)	Hvor mener du selskapet er eller skal være om 3-5 år?	Disruptive and global events	Strategi	
18	Styret (alle)	Hvordan har pandemien påvirket selskapet og måten dere jobber på	Disruptive and global events	Ledelse	
19	Styret (alle)	Har pandemien medført en økning i selskapets teknologiinvesteringer og hvorfor?	Disruptive and global events	Ledelse	
20	Styret (alle)	Er styret kjent med uønskede hendelser som har eller kunne hatt en sterk negativ innvirkning	Hensikt å avdekke konsekvenser av mangelfull risikostyringsprosess	Ledelse	

		på selskapets strategi, mål eller drift som skyldes mangelfull risiko og mulighetsvurdering?			
21	Styret (alle)	Har selskapet etter din vurdering gjennomført en digital transformasjon og Når skjedde dette?	Digital strategi	Strategi	
22	Styret (alle)	Hva er din relasjon til selskapets behov for digital transformasjon?	Disruptive and global events	Strategi	
23	Styret (alle)	Selskapet eier sin egen bilpark iflg. Nettsider. Hva er strategien bak dette?	Hensikt å avdekke konsekvenser av mangelfull risikostyringsprosess	Strategi	
24	Styret (alle)	Selskapet har vokst gjennom oppkjøp av tilsvarende virksomheter. Hva var strategien bak dette?	Hensikt å avdekke konsekvenser av mangelfull risikostyringsprosess	Strategi	

Ledelse

Nr.	Respondent	Spørsmål	Bakgrunn for spørsmål	Hovedteori
1	Ledelse (Alle)	Hva er "SR-Group" sin visjon og strategi	Forankring og triangulering mellom styret og ledelsen's oppfatning	Strategi
2	Ledelsen (Alle)	Er risiki og muligheter som er fremkommet fra de strategiske analysene kjent for deg og hva kan du si om disse?		Strategi
3	Ledelsen (Alle)	Hvordan følges strategien opp (Mål, KPI)		Strategi
4	Styret (alle)	Hva mener du er trendene i markedet og utfordringene innen selskapets kjerneområde (logistikk)	Disruptive and global events	Strategi
5	Ledelsen (Alle)	Har selskapet en egen IT strategi og kan denne beskrives? Hvis nei, burde selskapet hatt en slik strategi og hvorfor?		Strategi
6	Styret (alle)	Har selskapet etter din vurdering gjennomført en digital transformasjon og Når skjedde dette?	Disruptive and global events	Strategi
7	Styret (alle)	Hva er din relasjon til selskapets behov for digital transformasjon?	Disruptive and global events	Strategi
8	Ledelsen (Alle)	Hvordan vurderes anskaffelser og bruk av It systemer (krav / nytteeffekt)? Er disse knyttet til selskapets strategi?	Hensikt å avdekke konsekvenser av mangelfull risikostyringsprosess	Ledelse
9	Ledelsen (Alle)	Hvordan gjennomføres oppfølging av kvalitetssystemet og hvordan opplæring gitt til organisasjonen?	Hensikt å avdekke konsekvenser av mangelfull risikostyringsprosess	Ledelse

10	Ledelsen (Alle)	Hvordan fungerer styringssystemet og hvordan opplæring gitt til organisasjonen?	Hensikt å avdekke konsekvenser av mangelfull risikostyringspros ess	Ledelse
11	Ledelsen (Alle)	Hvordan fungerer ledelsessystem og hvordan opplæring gitt til organisasjonen?	Hensikt å avdekke konsekvenser av mangelfull risikostyringspros ess	Ledelse
12	Ledelsen (Alle)	Hvor mange IT systemer har virksomheten og hvordan brukes de?		Strategi
13	Ledelsen (Alle)	Hvilke av disse er kritiske for virksomheten I å oppnå sine målsettinger?	Hensikt å avdekke konsekvenser av mangelfull risikostyringspros ess	Strategi
14	Ledelsen (Alle)	Hvordan sikres systemene mot nedetid som kan påvirke virksomheten negativt		IT
15	Ansatte (Alle)	Er IT systemene integrerte slik at arbeidsoppgaver kan gjennomføres sømløst.		IT
16	Ledelsen (IT)	Hvordan vurderes Levetid på systemer og hva er strategien for vedlikehold og evt. erstatning av systemer		IT
17	Ledelsen (IT)	Hvordan håndteres IT løsninger som følger av oppkjøp av andre virksomheter		IT

+ ØKONOMIANSVARLIG

| 1	Økonomi	Hvor mange faktura sendes ut pr. Måned?		Økonomi
2	Økonomi	Hvor stor andel av faktura betales av kunde iht.	Risikohåndterin g	Økonomi

		betalingsbetingelser?		
3	Økonomi	Hvordan håndteres risiko mht. likviditet	Risikohåndtering	Økonomi
4	Økonomi	Har Pandemien påvirket leverandør/ kundebetalinger negativt og hvordan	Risikohåndtering	Økonomi
5	Økonomi	Hva er selskapets budsjett for IT I relasjon til totalbudsjett	Risikohåndtering	Økonomi
6.	Økonomi	Har kostnadene for IT investeringer vært høyere enn budsjettert og med hvor mye (%)	Styring	Økonomi

Ansatte

Nr.	Respondent	Spørsmål	Bakgrunn for spørsmål	Hovedteori
1	Ansatte (Alle)	Hva er "SR-Group" sin visjon og strategi	Forankring og triangulering mellom styret og ledelsen's og ansattes oppfatning	Strategi
2	Ansatte (Alle)	Er strategien og målene kjent for den ansatte (Mål, KPI)		Strategi
3	Ansatte (Alle)	Hvordan jobber ansatte med sikre at de jobber med oppgaver / mål som er forankret I strategi?		Ledelse
16	Styret (alle)	Hva mener du er trendene i markedet og utfordringene innen selskapets kjerneområde (logistikk)		Strategi
4	Ansatte (Alle)	Er du kjent med kvalitetssystemet I virksomheten og hvordan virker dette?		Ledelse
5	Ansatte (Alle)	Hvordan brukes kvalitetssystemet og hvordan er opplæring gitt til organisasjonen?		Ledelse

6	Ansatte (Alle)	Hvordan brukes styringssystemet. Og hvordan opplæring gitt til organisasjonen?		Ledelse
7	Ansatte (Alle)	Hvilke It system mener du er kritiske for virksomheten I å oppnå sine målsettinger?		Ledelse
8	Ansatte (Alle)	Er IT systemene integrerte slik at arbeidsoppgaver kan gjennomføres sømløst.		IT
9	Ansatte (Alle)	Hva er din tanke om selskapets behov for å endre prosesser gjennom digital transformasjon?		Ledelse

8.3 Information relation analysis map
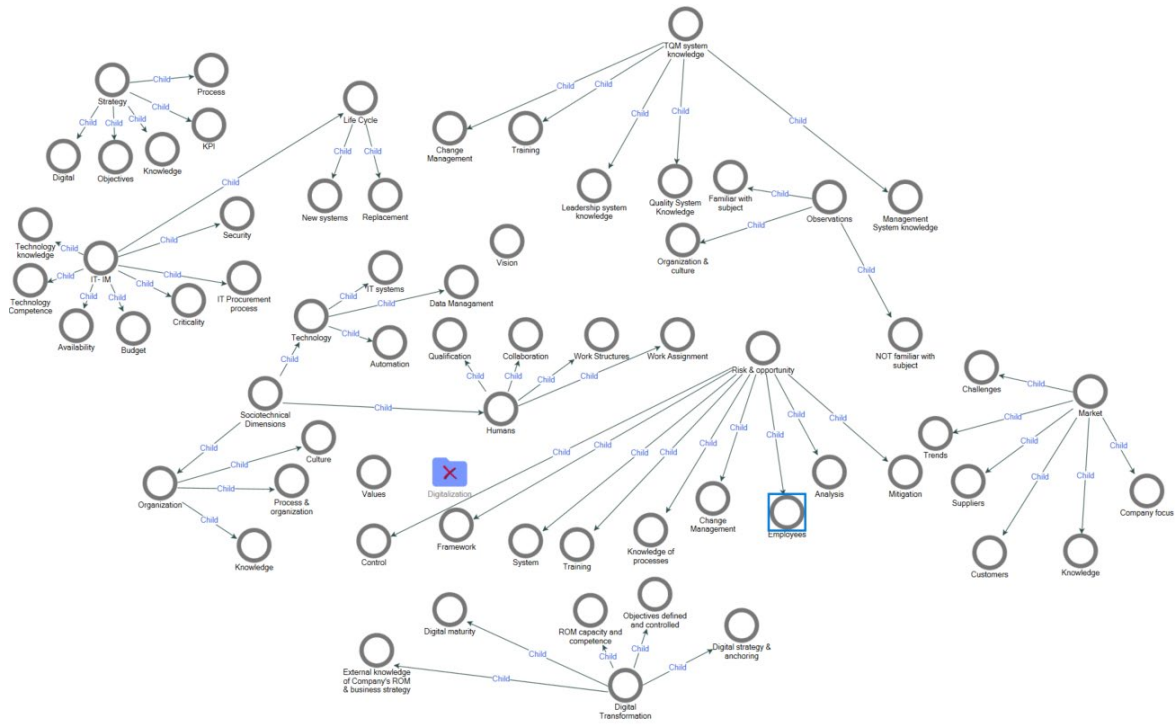
8.4 Code book – analysis

Codes

Name	Description
Digital Transformation	
Challenges	
Digital maturity	
Objectives defined and controlled	
Information Technology & Information Management	Information Technology and management themes
Availability	

Name	Description
Budget	
Capacity	
Criticality	
IT Procurement process	
IT Strategy	
Good knowledge	
Poor knowledge	
Life Cycle	
New systems	
Replacement	
Security	
Technology Competence	
Technology knowledge	
Knowledge of Company Values	Company's value attributes
Good	
Medium	
Poor	
Knowledge of Company Vision	
Good	
Medium	
Poor	
Market	
Challenges	

Name	Description
Company focus	
Customers	
Knowledge	
Suppliers	
Lack of trust	There appear to be lack og trust on external aprties like suppliers
Trends	
Observations	Interviewers' observations
Familiar with subject	Does the inteview object understand or have knowlledge of themes included in the interviews
NOT familiar with subject	
Organization & culture	
Organisational capacity problem	
Organizational culture challenges	
Risk & opportunity	
Analysis	
Change Management	
Control	
Employees	
External knowledge of Company's ROM & business strategy	
Knowledge of processes	Knowledge of ISO 31000 as risk management framework and risk management process in general
Framework	
Training	

Name	Description
Mitigation	
ROM capacity and competence	
System	
Sociotechnical Dimensions	
Humans	
Collaboration	
Qualification	
Work Assignment	
Work Structures	
Interactions - Human & Technology	
Interactions - Humans & Organization	
Interactions - Organization & Technology	
Organization	
Culture	
Knowledge	
Process & organization	
Technology	
Automation	
Data Managament	
IT systems	
Strategy	

ROM in Digital Transformation

| Name	Description
Digital	
Digital strategy & anchoring	
Knowledge	
KPI	
Objectives	
Process	
TQM system knowledge	Total quality management
Change Management	
Leadership system knowledge	
Management System knowledge	
Quality System Knowledge	
Training	

8.5 Execution plan

Gjennomføringsplan – Forskningsprosjekt
Masteroppgave 2021-22
Selskap X

Tidsplan

Tidsplanen som er foreslått sammenfaller med den totale tiden som er til disposisjon for å fullføre masteroppgaven. Tidsrammen er et estimat som vi håper lar seg gjennomføre mht. tilgang på de ressurser som det vil være nødvendig å gjennomføre intervjuer med. Det er derfor viktig at
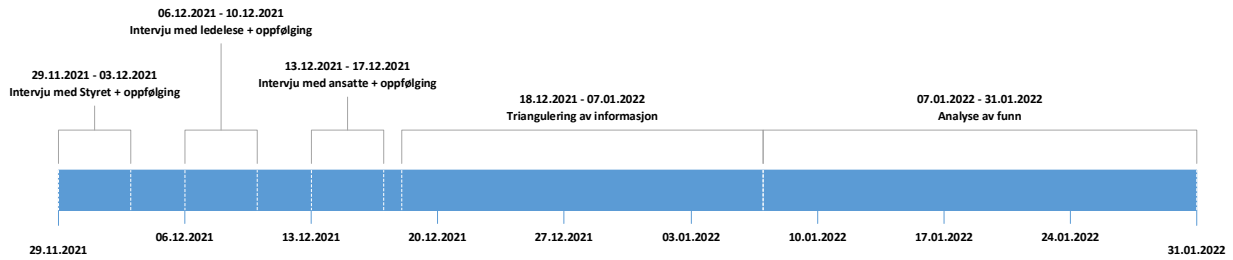
Hvem ønskes involvert i prosjektet / informasjonsinnsamling

Styret:
Intervju i perioden 29 nov til 3 des. 2021
Antall personer: 2
Ledelse:
Intervju i perioden 6 des. til 10 des. 2021
Antall personer:
Ansatte:
Intervju i perioden 13 des. til 17 des. 2021
Antall personer: 2

Intervju prosessen

Der er estimert at hver person må beregne ca. 1 time av sin tid til gjennomføring av intervjuene. For at dette skal kunne gjøres på en smidig måte, så foreslår vi at styret og ledelse setter av tid i sin kalender og kommuniserer dette til studentene som da tilpasser sin tid ift. intervjuobjektets tilgjengelig. Ettersom vi er to studenter så kan vi også håndtere parallelle intervjuer (samme dag / tid) for å gjøre prosessen effektiv.

Spørsmål blir ikke tilgjengeliggjort i forkant da oppgaven er det som kalles semi-strukturert intervju der personer kan snakke fritt rundt åpne spørsmål.

I alle tidsperioder kan det være nødvendig å gå tilbake til intervju objekter for å gjøre eventuelle avklaringer ift. spørsmålene som er besvart.

Det er viktig å påpeke at prosessen dreier seg om å samle faktainformasjon i forskningsøyemed og ikke påpeke hva som er bra og ikke bra ved virksomhetens prosesser. Se også eget skriv mht. konfidensialitet. Resultatene fra analysen vil kunne fungere en veileder ift. om noe ved virksomhetens bør endres uten at den vil være konkluderende.

8.6 Coding chart