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End-Users Leading, Capturing, And Mitigating Risk In A DSDM Project.

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My key drive sits with God. Philippians 1:6 says, "being confident of this, that he who began a good work in me will carry it on to completion..." This has been a perfect journey, and I am grateful for the exposure and opportunities I have encountered.

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Abstract

The study aimed to assess the suitability of Dynamic System Development Methodology (DSDM) for managing strategic risk and incorporating the end user's perspective in developing a Business Risk Strategy. Additionally, it sought to outline the elements and processes of the DSDM risk strategy, devise an end-user-cantered DSDM risk strategy, and evaluate the effectiveness of the model in capturing the end user's voice.

It was discovered that the DSDM serves as an agile software development tool aimed at enhancing the efficiency and productivity of software development projects. Traditionally, project teams have relied on conventional methods for assessing and mitigating risks in software development. However, the agile approach has emerged as a solution to common challenges encountered in these projects. While it can enhance project workflow and productivity, agile processes may not always effectively address customers' needs and involve them in the development process. To address this gap, it is essential to align customers' requirements with the technical capabilities and skills of the project team, particularly as team structures evolve.

To facilitate this alignment, researchers have developed various techniques, tools, and processes to aid subject matter experts, end-users, and developers in making informed decisions. This approach simplifies the complex process of integrating customers' perspectives into software development, ultimately enhancing the overall success of the project.

In this study theories of compliance and stakeholder are foundational in extracting associated element for the development of further strategy. Both theories offer valuable insights for examining the research questions, thereby enhancing the research motivation and contribution. By leveraging compliance theory, the study can analyse how regulatory requirements and standards influence risk management strategies. Stakeholder theory, on the other hand, provides a framework for understanding the diverse interests and perspectives of stakeholders involved in the project, which is crucial for effective risk management. Integrating these theories into the research methodology can enrich the analysis and contribute to more comprehensive and insightful findings.

The study adopts a qualitative approach, integrating a case study with qualitative interviews conducted in two organizations within the United Kingdom. It combines secondary data from the organizations, such as risk management records and lessons learned, with primary data collected through in-depth interviews and focused group discussions. Through a detailed analysis of the empirical evidence, the study identifies the central phenomenon of responsiveness as fundamental for mitigating risks and uncertainties in a DSDM project environment.

Furthermore, the research uncovers a gap between the potential impact of end-user involvement in risk management and their current capabilities, including skills, knowledge, tools, and approaches. This realization leads to the development of the End User Framework (ERF), which stands as the primary contribution of the study. The ERF is formulated by synthesising key elements from interviews and case studies to bolster risk management in DSDM projects. Drawing on principles from stakeholder theory and compliance theory, which advocate for end-user involvement in the process, the ERF emphasis continuous collaboration between project development managers and product owners. Additionally, it

leverages the Organizational Project Management (OPM) structure to establish a hierarchical framework for risk management.

Overall, the study underscores the significance of both primary and secondary data sources in informing the development of the ERF and advancing understanding of risk management in DSDM projects.
A total of 26 in-depth interview questions were posed to focus group interviewees from various project contexts. The focus group comprised 14 individuals from different levels of project management. Data collection was distributed as follows: 50% through interviews, 20% through archival data, and 30% through focus groups. Structured interviews, including a pilot interview with five participants, were conducted with 20 key figures within the software development community (refer to Table 5 for details regarding their roles, years in the organization, and employment status, whether full-time, contractor, or line manager). Before conducting the interviews, NVivo was employed for data analysis. The raw data was transformed into transcriptions, each representing an interview session alongside corresponding rationales for the new model. The resulting End User Framework (ERF) comprises three key steps.

The thesis makes a multifaceted contribution. Firstly, it offers a solution to mitigate the inherent uncertainty in DSDM projects by emphasizing responsiveness to end-users' voices. Secondly, it introduces the End User Framework (ERF) to capture the end user's perspective throughout the project lifecycle. This framework integrates Soft Systems Methodology (SSM) and Customer, Actor, Transformation, Worldview, Owner, and Environment (CATWOE) approaches in the Environment step, Process step focusing on three levels of organizational view, technical view, and risk analysis, and Product step consisting of iterative cycles of 2-4 weeks. By following these steps, ERF ensures end-user involvement across risk analysis, compliance, and planning and control stages. The significance of ERF lies in its ability to replace existing measures of capabilities (such as skills, knowledge, tools, and approaches) with the end-user voice. However, further testing of ERF's impact in live projects is necessary to validate its effectiveness.

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List of Acronyms

ERF: End-user Risk Framework
DSDM: Dynamic System Development Method
IT: Information Technology
OPM: Organisation Project Management
SSM: Soft Systems Methodology
CATWOE: Customer, Actor, Transformation, Worldview, Owner, and Environment.
TDD: Test-driven development
DAD: Disciplined agile delivery
SEI: Software Engineering Institute's
SRE: Risk Evaluation
DSRM-Concept: Distributed Software Risk Management
DSS: Decision Support Systems
SDLC: Software Development Life
ICT: Information and Communication Technology
ERF: End-User Risk Framework

CHAPTER ONE: INTRODUCTION

1.1 Overview

The Information technology (IT) has gathered considerable attention over the years, particularly concerning the failure of projects. This failure stems from various factors, including the significant investment in Information Technology and the inherent risks associated with such projects (Rohajawati et al., 2020). Since the 1960s, research on IT failure has been a burgeoning topic, highlighting technological and engineering challenges where systems fail to meet requirements or exhibit hardware and software deficiencies. In subsequent years, new issues emerged, such as a lack of user involvement, user resistance, inadequate managerial oversight, and organizational challenges. These factors compounded the complexities of IT projects, leading to increased scrutiny and debate within the field.

Over time, the discourse around IT failure has evolved, with discussions shifting towards identifying key success factors. Ultimately, the success or failure of IT projects hinges on individual perspectives, highlighting the subjective nature of evaluating system effectiveness. Perceptions of success or failure are influenced by various factors, including stakeholder expectations, organizational culture, and the overall impact of the system on operations. IT and its associated challenges, particularly IT project failures, is a multifaceted endeavour. It requires a nuanced understanding of technological, organizational, and human factors, as well as a recognition of the diverse methodologies employed in research. By acknowledging these complexities, researchers and practitioners can work towards mitigating risks and enhancing the success of future IT projects.

Addressing and responding to risks within Agile Dynamic Systems Development Methodology (DSDM) environments is paramount for project success. Effective risk management serves as a barricade against cost overruns and delays (Dias and Tenera, 2023). In the realm of Information Technology (IT), the application of risk management is indispensable for mitigating both known and unknown risks (Shrivastava, 2017). Despite its potential benefits, historical success rates have been dull Sándor, & Gubán, (2022). Maqsood (2022) highlights a modest improvement, yet the latest Standish Group's report in ("CHAOS 2020: Beyond Infinity,") 2020 reveals alarming figures: a staggering 83.9% of IT projects either partially or completely fail. Only 16.2% of projects achieve success, meeting deadlines, budgets, and promised functionality. The majority, accounting for 52.7% of projects, grapple with cost overruns, delays, or functionality deficits, while 31.1% face outright failure, being abandoned or cancelled. (Standish Group, 2020).

Randell et al., (2013) explain that approximately 70% of software project failures stem from poor requirements management, incurring significant rework costs of up to $45 billion annually. This underscores the imperative of robust risk management practices within IT projects. In today's society, the pervasive influence of technology permeates every aspect of human existence, engendering profound metamorphoses in individual behaviour, professional realms, and societal structures (Wińska and Dąbrowski, 2020). With society teetering on the brink of maximum evolutionary development, the reliance on information and knowledge as organizational cornerstones is unequivocal. The economic landscape has witnessed substantial investments in information infrastructure, catalysing intensified research in information technology and telecommunications, thereby amplifying technology's impact on human society. Trier et al., 2021). Agility emerges as a requirement for economic success, manifesting as flexibility in methodologies, techniques, and tools embedded in software products tailored for modern business needs (Khalid et al., 2020).

The adoption of Information Technology (IT) by organizations yields multifaceted impacts, spanning efficiency improvements, communication enhancements, modifications to competitive landscapes, and the exploitation of new business models (Al-Saqqa, et al., 2020). However, navigating the diverse array of IT options and their potential impacts poses challenges for organizations, often necessitating Information Systems Development (ISD) or digital transformation projects.

Agile models have emerged as a solution for the limitations of classical software development methodologies, boasting advantages such as enhanced responsiveness to customer needs and increased team autonomy. Wińska, E., & Dąbrowski, W. (2020). Nonetheless, the full integration of agile models into end-user risk management domains remains incomplete, warranting further research and development (Meneses & Varajão, 2022). Agile methodologies advocate risk reduction through frequent feedback loops, shorter development cycles, and improved cost prediction. Effective risk management within Agile necessitates a comprehensive understanding of the product, meticulous attention to detail, data analysis, communication, and stakeholder management skills, all within a well-defined process framework. Wińska, E., & Dąbrowski, W. (2020).

Positioning DSDM within the agile framework, it stands as a methodological approach that encompasses agile principles and practices while maintaining adaptability for a broader range of project types. Concepts such as timeboxing and iterative development align DSDM more closely with modern agile methodologies. This makes DSDM a pivotal player in ensuring successful project delivery amidst the evolving technological landscape.

The thesis aims to delve into the significance of addressing and responding to risks within Agile DSDM environments. It seeks to highlight the importance of robust risk management practices in mitigating project failures and enhancing success rates. Furthermore, the thesis endeavours to develop a framework empowering end-user to identify, assess, and monitor risks within an Agile DSDM project environment, thereby contributing to improved project outcomes and organizational success.

1.2 Traditional and Agile Software Development Processes

The landscape of software development underwent significant changes in the mid-1990s due to technological advancements, leading to the emergence of two primary categories of methodologies: traditional and Agile (Vijayasarathy and Turk, 2008; Williams, 2010; Breno et al., 2020). Traditional methods are characterized by their systematic approach, predictability, and reliance on extensive planning (Breno et al., 2020). In contrast, Agile methods are based on the belief that high-quality software can adapt to changing conditions if developed by small teams with continuous improvement (Caetano and Amaral, 2011). These methodologies have distinct characteristics and approaches, impacting software development practices worldwide (Najihi et al., 2022).

Traditional methods typically involve clear project goals controlling day-to-day activities based on explicit knowledge. They are often employed by large, bureaucratic organizations with formal communication structures (Hossain et al., 2009). Traditional software development methodologies include Waterfall, Spiral, VModel, Rational Unified Process (RUP), and Rapid Application Development Sekgweleo (2015) with planning done at the beginning and testing postponed until the end of the cycle (Maamzi and Tawfik, 2022). This sequential process involves stages such as analysis, design, build, test, and delivery, providing a structured framework for development (Chaumun et al., 2000; Hossain et al., 2009; Maamzi and Tawfik, 2022).

On the other hand, agile methods emphasise frequent testing to provide rapid feedback, enabling early adjustments (Maamzi and Tawfik, 2022). Organizational structures in agile environments are less rigid and favour natural leadership and collaboration Abdullahi, S., & Bagiwa, L. I. (2019). Agile work is divided into small groups with informal communication, flexible internal organization, and participatory team members. Agile product life cycles are typically evolutionary, involving requirements management and continuous testing (Chaumun et al., 2000; Sani et al., 2013).

Agile methodologies have significantly impacted global software development, particularly in terms of productivity and quality (Ktata & Levesque, 2009. They are particularly effective for small and medium-sized projects due to their flexibility and adaptability. (Chaumun et al., 2000; Goldin and Rudahl, 2009; Firdaus et al., 2013). However, challenges arise when applying Agile methodologies to large and complex projects, requiring careful adaptation and scaling strategies (Ismail et al., 2006).

The central tenets of Agile methodologies are summarized in the Agile Manifesto, which emphasizes individuals and interactions, working software, customer collaboration, and responding to change over following a plan (Lumeng et al., 2020; PMI, 2017). This manifesto guides agile development practices, fostering a customer-centric and iterative approach to software development.

Examples of Agile methodologies include SCRUM, Lean, XP, and KANBAN, each offering unique frameworks and practices for agile development. These methodologies prioritize collaboration, flexibility, and adaptability, enabling teams to respond effectively to changing requirements and market dynamics (Sekgweleo, 2015).

Overall, the differences between traditional and agile methods lie in their approach to software development, organizational structure, communication, and adaptability. While traditional methods provide a structured and predictable framework, agile methodologies offer flexibility and responsiveness to changing conditions. Choosing the appropriate approach depends on project goals, requirements, and organizational culture, highlighting the importance of understanding and selecting the most suitable methodology for each context.

1.3: The Emergence of the Dynamic Systems Development Method (DSDM)

Agile Development Methods represent a contemporary set of software development methodologies founded on common principles, which emphasize the rapid evolution of systems and the adaptability of developers to various changes (Muharom Zaef et al., 2018). These methods are integral to software development, embody agility, speed, flexibility, and responsiveness. Consequently, employing Agile development methodologies demands innovation and a robust partnership between development teams and clients to ensure both high-quality software and team agility (Listiyoko et al., 2017). DSDM, is one of the Agile models, utilizes a framework for constructing and managing a system within a constrained timeframe through incremental prototypes within a controlled environment (Rusdiana, 2018). It encompasses five stages for designing and building a system, including the feasibility stage, business studies, functional model iteration, design and build iteration, and implementation phase (Cockburn, 2002).

DSDM stands out as a people-oriented approach, prioritizing human elements over rigid processes (Sugianto and Tjandra 2016). Unlike the unwavering belief in process-oriented methodologies, DSDM places significant emphasis on customer involvement, integrating them as active participants within the development team throughout the entire project

lifecycle (Cockburn, 2002). Notably, research by the Standish Group highlights user involvement as the second most crucial factor for project success, according to IT executive managers' opinions (Standish Group, 2020). DSDM, thrive when customers engage with the development team in a dedicated mode, leveraging their tacit knowledge to span the entire application development process (Abrahamsson et al., 2017) However, any deficiency in customer knowledge can potentially lead to a product falling below expectations. In cases where a customer's participation falls short of the desired standard, the likelihood of achieving a unified set of requirements diminishes Alqahtani, (2019). Conversely, when customers are fully engaged, risks can be identified and mitigated in plan-driven methods Kommera, (2019) through meticulous documentation and planning (Boehm, 2002).

The challenges encountered in crafting an effective risk strategy within the context of DSDM, exploring both the driving forces behind risk and its potential benefits. Furthermore, it comprehensively examines all aspects of risk strategy processes from the perspective of the insightful project team. This exploration aims to not only elucidate the underlying principles but also establish the intricacies and depth of the risk strategy process Rusdiana, (2018). In light of these considerations, this study concludes by offering recommendations for enhancing the risk management process and optimizing the application of risk principles. DSDM promotes lean thinking (Roy et al., 2018) and emphasizes the reduction of overhead, particularly in documentation (Highsmith, 2003). In DSDM development, a significant portion of knowledge is tacit, residing within the minds of the development team members. This reliance on tacit knowledge can make organizations heavily dependent on development teams, potentially shifting the balance of power from management to these teams. While this scenario may not align with the preferences of many organizations, it is essential to determine which knowledge should be codified and which can remain tacit to bridge this impasse.

Agile development thrives on teamwork (Roy et al. 2018), in contrast to individual role assignments typical of traditional development. Consequently, performance measurement and reward systems must be appropriately designed to foster a collaborative environment. In a DSDM setting, the development team comprises software developers (Gottschlich and Hinz, 2014), with the customer primarily responsible for decision-making (Roy et al. 2018). This setup creates a pluralistic decision-making environment due to the diverse backgrounds, attitudes, goals, and cognitive dispositions of team members (Cavaleri and Obloj, 1993; Rusdiana, 2018; Sever, 2019). Making decisions in this environment becomes more intricate compared to the traditional approach, where the project manager assumes responsibility for most decisions (Lin et al., 2011). Building a culture of trust and respect among employees is often a time-consuming and challenging endeavour essential for facilitating collaborative decision-making.

However, success of DSDM development hinges on identifying customers who are willing to actively participate in the development process (Jackson and Pascual, 2008; Sever, 2019). Furthermore, these customers are expected to embody qualities such as being Collaborative, Representative, Authorised, Committed, and Knowledgeable (Boehm and Turner, 2004). Finding such customers, especially in complex environments, presents a significant challenge. Despite DSDM's endorsement as a suitable process for rapid software development, it is erroneous to assume it as a panacea with automatically enforced standards (Vey and Voigt, 2004). Such views overlook the fact that project teams are often composed of diverse individuals with varying knowledge and skills (Abdullahi, et al., 2019). While they may function harmoniously as a team, their distinct cultural backgrounds can influence their approach to risk management, potentially misaligning with agile principles. Existing research has assumed that DSDM is the solution to quick and rapid software development

(Abrahamsson, et al., 2017). While risk may be controllable when procedures are followed (Muhammad et al., 2017), criticism has been levelled at the current competence level of project teams (Abrahamsson, et al., 2003), suggesting that their judgments are sometimes clouded by the pace of the DSDM process. Despite encouraging signs of progress, the issue of capturing and mitigating risk remains unresolved and from the researcher's perspective when face-to-face communication breaks down, the task of effectively managing risk becomes more intricate and challenging for the project team. The debate about whether agile methodologies necessitate creative and skilled individuals to be effective introduces an additional layer of complexity, leading to arguments that the right people justify the outcome, regardless of the methodology (Muhammad et al., 2017). Cockburn (2002) aligns with this argument, asserting that capable individuals can utilize almost any process to accomplish their tasks, while inadequate individuals cannot be remedied by any process a testament to the primacy of people over processes (Abrahamsson, et al., 2017; Cockburn, 2002; Highsmith et al., 2001).

1.4: Problem Statement

Industries across all sectors are undergoing a significant digital transformation, wherein software is becoming the cornerstone of their operations. In response to constantly evolving user demands and dynamic market conditions, companies must establish resilient workflows that enable them to enhance their agility and stay competitive. Therefore, the number of software projects has been on the rise, accompanied by a growing adoption of agile methods (Elkhatib et al., 2022). Consequently, agile methodologies are garnering heightened interest within the broader domain of project management (Prenner et al., 2020; Stettina and Heorz, 2015). In addition, risk management, which plays a crucial role in mitigating uncertainty and enhancing the likelihood of success in software projects (Wu, 2020), remains the least mature and practiced knowledge area in this domain (Tavare et al., 2017). Without explicit risk management, there is a significant likelihood of overlooking important risks (Prenner et al., 2020). Some authors argue that agile projects often lack specific risk management practices (Prenner et al., 2020; Stettina and Heorz, 2015; Elkhatib et al., 2022). As such, a robust risk management process must be implemented to attain project success (Gren, 2022). Furthermore, failures in agile projects can often be attributed to ineffective risk management, indicating that Agile methods do not adequately address risks proactively (Victor et al., 2019).

Software risk management consists of two fundamental steps: Risk Assessment and Risk Control (Rao, 2016). Risk Assessment involves three subsidiary phases: Risk Identification, Risk Analysis, and Prioritization. Although Boehm's six-step model has been well-established and can be integrated into the software development process (Boehm, 1991), its adoption has encountered challenges within the software development community. Many organizations have been reluctant to fully embrace risk management due to perceived additional efforts, time, and costs involved (Kontio et al., 1998; Odzaly et al., 2009; Kajko-Mattsson, 2009; Victor Muntés-Mulero et al., 2019). Despite the extensive body of research on risk management aimed at strengthening its practice and emphasizing its importance, these studies have often yielded generalized results primarily focused on larger organizations. This generalization overlooks the need for more specific results that categorize risk management approaches based on factors such as project size, cost, and organizational context.

Numerous risk assessment methodologies incorporate quantitative metrics, such as the probability of occurrence, the effort required for implementing control measures, or associated costs. Conversely, others incorporate qualitative metrics, such as evaluating

project staff motivation. Various quantitative risk methodologies and tools exist, including RiskWatch (McKendrick, 2018) and the Information Security Risk Analysis Method (ISRAM) (Karabacak, 2005). Similarly, numerous qualitative risk methodologies include Operationally Critical Threat, Asset, and Vulnerability Evaluation (OCTAVE) (Alberts, 2002; Lund et al., 2010; Pasha et al., 2018). One widely recognized approach in the hosted software domain is STRIDE (Spoofing, Tampering, Repudiation, Information Disclosure, Denial of Service, and Elevation of Privilege) (STRIDE, 2024). The Open Web Application Security Project (OWASP) is an open standard striving to delineate risk-aware software development, thereby empowering organizations to make informed decisions about software security. DREAD (Howard et al., 2006) is a framework associated with OWASP.

Kontio et al. (1998) introduced the RISKIT approach, emphasizing qualitative risk understanding before quantification. While reporting positive outcomes from case studies, their research was confined to large-sized organizations, raising doubts about its applicability in smaller or medium-sized entities. Similarly, Gotterbarn and Rogerson (2005) introduced the SoDIS risk management approach without specifying the applicable contexts. The necessity for tailored risk management approaches based on project-specific factors becomes increasingly evident (Elkhatib et al., 2022). Although some research has delved into alternative risk management perspectives, such as implementing relevant metrics programs (Riehle, 2007) or decision-making frameworks in complex, multi-agent environments (Elkhatib et al., 2022), these studies often lack concrete evidence of their effectiveness. Moreover, Dey et al. (2007) proposed an integrated risk management framework from a developer's viewpoint, yet its alignment with various software development processes remains unclear. Kwak and Stoddard (2004) addressed cultural changes necessary for effective risk management but left unanswered questions regarding the time and costs involved in achieving these changes.

While numerous risk management frameworks have been introduced, they have often failed to adequately address the necessity for context-specific approaches tailored to various project sizes, costs, and organizational structures. This research endeavours to bridge this gap by developing a risk management framework within the Agile Dynamic Systems Development Method (DSDM) framework, which empowers end-users (customers) to actively participate in risk management, considering all facets of the risk management process. This approach is designed to address the evolving market conditions and changing end-user behaviours resulting from digitalization, as well as the growing desire of end-users to be involved in project delivery. Consequently, this study tackles the urgent need for tailored risk management approaches and offers a pragmatic solution by enabling end-users to play a central role in software development risk management.

1.5 Research Aims, Objectives, and Research Questions

The aims, objectives, and research questions are as follows:

1.5.1 Research Aims

1. To explore the suitability of DSDM for managing strategic risks

2. To identify the factors and processes that reduce risk impact in agile DSDM environments.

3. To build the end-user-cantered DSDM risk strategy to establish control over the project.

4. To evaluate the developed framework for its effectiveness as compared to the effectiveness of DSDM.

1.5.2 Research Objectives

Explore the possibility of using DSDM in capturing the end user's voice for developing a Business Risk Strategy

1. Explore the possibility of using DSDM in capturing the end user's voice for developing a Business Risk Strategy
2. Explore the possibility of using DSDM in capturing the end user's voice for developing a Business Risk Strategy
3. Identify the elements of the DSDM risk strategy.
4. Identify the process for the DSDM strategy.
5. Build the end-user-centred DSDM risk strategy.
6. Evaluate the extent to which this model is effective in capturing the end user's voice.

1.5.3 Research Questions

1. To what extent, if possible, can DSDM capture the end user's voice for developing a Business Risk Strategy?
2. Can traditional risk factors be used to capture end-user-led risk strategy?
3. How can the DSDM process be customized to capture risk strategy using end-user voice?
4. How can the risk management framework and DSDM framework be combined?
5. How effective is this model in capturing the end user's voice?

1.6 Research Methodology

The research employs a qualitative approach to examine traditional risk management processes by reviewing existing literature. Additionally, a case-based approach is adopted, integrating ontological and epistemological philosophies. The study utilizes both inductive reasoning and theory development to ensure reliability and credibility. This combined approach aids in creating a new conceptual model for risk strategy, catering to project management researchers and software project managers.

1.7 Thesis Structure

This thesis is organized and presented as follows:

Chapter 1 serves as an introduction, offering an initial overview of the Dynamic Systems Development Method (DSDM). It covers the aim, application, potential outcomes, and various critical areas of ongoing discussion and inquiry related to DSDM, particularly its utilization in risk strategy. Furthermore, this chapter introduces, describes, and justifies the research reported in the thesis. It outlines the rationale behind the study, its purpose, and objectives, as well as the research questions being investigated. Additionally, it outlines the overall approach employed in the study and discusses the planned outcomes and implications thereof.

Chapter 2, the Literature Review on DSDM and Risk Strategy, offers a comprehensive examination of existing and relevant literature concerning the theory and practice of Dynamic Systems Development Method (DSDM). Through a literature review approach, it delves into the origins, purposes, rationales, and evolving theoretical perspectives of DSDM, exploring its objectives, applications, and demonstrated outcomes. Additionally, it analyses past research to uncover DSDM's observed and potential role in capturing and mitigating risks within project teams.

The first part of the literature review scrutinizes the DSDM literature, discussing previous discussions on its utilization in managing risks and its implications for current practice. This segment aims to evaluate the relevance and implications of existing and evolving DSDM theory and research for the focus of this study, contextualizing the research within the broader scope of DSDM.

The second part of the literature review shifts focus to risk strategy, specifically examining how end-users navigate the entire process. It identifies and reviews existing theories and previous research pertaining to the motivations, deterrents, enablers, impediments, and potential outcomes of risk strategies. The objective is to investigate and evaluate their relevance and implications for the research topic, objectives, and questions addressed in this study.

Chapter 3, The Theoretical Framework, builds upon the insights gained from the literature review in Chapter 2. It serves as an initial framework for Dynamic Systems Development Method (DSDM) and risk strategy, aimed at enhancing risk management practices and identifying the key factors required to embed them effectively. This chapter forms a crucial link in paving the way to address the research design outlined in subsequent chapters. It synthesizes the theoretical underpinnings derived from the literature review, providing a structured framework to guide the research design and methodology. By establishing this theoretical foundation, Chapter 3 lays the groundwork for empirical investigation and analysis conducted in the following chapters**.**

Chapter 4, titled "Approach and Methods," provides a comprehensive overview of the research approach and methods employed in planning and conducting the study. It begins with a restatement of the study's purpose, reaffirming its objectives and intended outcomes. Following this, the chapter outlines the overall approach utilized, emphasizing its qualitative, inductive, and exploratory nature. It elucidates the rationale behind this approach, considering its alignment with the study's key characteristics, objectives, and intended outcomes. Subsequently, the chapter delves into a detailed description of the data collection methods employed. This includes elucidating the rationale behind the selection and size of the research sample, as well as the design, execution, recording, and reporting of the interviews conducted as part of the study.

Finally, the chapter concludes with a discussion of the approach and techniques employed for data analysis and interpretation, providing insights into how the collected data was processed and interpreted to address the research objectives effectively.

Chapter 5: Findings**,** in this chapter, the key results of the research are presented, stemming from the data collection, analysis, and interpretation processes detailed earlier. These findings are organized and summarized according to the research questions and associated themes that served as the focal points of the study. Additionally, other insights into Dynamic Systems Development Method (DSDM) that emerged from the data are also highlighted and discussed.

Chapter 6: Triangulation of Results and Development of ERF. This chapter delves into the synthesis of insights gleaned from both the literature review and interviews, leading to the refinement and expansion of the End-user Risk Framework (ERF). The process involves triangulating findings from various sources to enhance the initial theoretical model, transforming it into a more comprehensive and robust prototype tailored for the Agile community. The early version of the framework undergoes iterative development and review,

with input from interviewees contributing to its refinement and evolution throughout this chapter.

Chapter 7: Discussion, this chapter presents and examines the main findings and key outcomes of the study. It begins by discussing the overall findings concerning the various considerations and determinants of Dynamic Systems Development Method (DSDM) use, highlighting their presence and influence across different contexts.

Furthermore, the discussion evaluates these research results in conjunction with relevant aspects of the literature reviewed in Chapter 2, focusing on DSDM and risk strategy. Through this analysis, the chapter identifies and underscores the contributions of new knowledge generated by the exploratory study.

Particular emphasis is placed on comparing the research outcomes with current theoretical perspectives regarding the purpose, function, and outcomes of DSDM, as outlined in Chapter 2. This comparison facilitates a deeper understanding of the implications and significance of the study's findings within the broader context of DSDM theory and practice.

Chapter 8: Conclusion. The conclusion of this thesis encapsulates several key components. Firstly, it offers recommendations based on the findings of the study, outlining actionable steps for practitioners and stakeholders involved in Dynamic Systems Development Method (DSDM) projects. Secondly, the chapter addresses the limitations of the study, acknowledging any constraints or shortcomings encountered during the research process and suggesting avenues for future improvement. Additionally, it identifies areas for further research, highlighting potential directions for future studies to explore and expand upon the insights gained in this thesis. Most importantly, the conclusion underscores the key implications of the research for theory, methodology, policy, and practice within the realm of DSDM. It discusses how the findings contribute to advancing knowledge and understanding in these areas, ultimately shaping, and informing future endeavours in DSDM implementation and risk management.

1.8 Summary

This chapter serves as a vital alignment between the thesis and the Agile and project management community. Drawing upon the researcher's first-hand experience within the sector, it provides a valuable contribution to the orientation of the thesis's structure and approach. By incorporating this experience, the chapter establishes an evidence trail aimed at addressing the research question and its objective effectively. Furthermore, the chapter bridges the gap between theoretical concepts and practical application within the Agile and project management domain. It demonstrates how the research findings and methodologies are relevant and applicable to real-world scenarios, thus enhancing their value and impact within the community. Overall, this alignment with the Agile and project management community reinforces the relevance and significance of the thesis's contributions, ensuring that they resonate with practitioners, stakeholders, and researchers operating within this field.

2.0 Introduction

This chapter aims to comprehensively review existing research within the field to establish a solid foundation for the study area and significantly contribute to its development. Utilizing the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) checklist as a guide, this literature review examines the crucial aspect of integrating end-users into leading risk management practices in the context of DSDM projects. Presented here are the initial findings extracted from the reviewed literature, along with an explanation of how these findings will support the research framework. The primary objective of this chapter is to outline various theoretical positions and construct a robust theoretical framework to strengthen the overarching research question, thereby enriching our comprehension of this critical area.

The integration of end-users in risk management practices within DSDM projects is a complex and multifaceted subject that has received considerable attention in recent years. Scholars have acknowledged the pivotal role of end-users in the success of software development projects (Smith et al., 2020; Johnson and Brown, 2019), and the adoption of agile methodologies, such as DSDM, has further underscored the importance of involving end-users throughout the project lifecycle (Jones and Williams, 2018). However, despite this recognized significance, there remains a lack of insufficient studies which specifically addressed the integration of end-users in leading risk management practices within the DSDM context. The existing literature offers valuable insights into both risk management in software development (Turner and Smith, 2017) and the principles of DSDM (Dennis et al., 2016). Nevertheless, there exists a critical gap in understanding how these two crucial aspects intersect and influence project outcomes. This research endeavours to bridge this gap by synthesizing existing knowledge and developing a theoretical framework that elucidates best practices for integrating end-users into risk management within DSDM projects. Through this endeavour, this study seeks to contribute to the ongoing discourse on software development methodologies and enhance project success rates in the ever-evolving landscape of technology-driven endeavours.

2.1 Agile Overview

A robust agile strategy places a significant emphasis on the end-user, making it a challenging endeavour to replicate another organization's Agile strategy entirely (Dyba and Dingsoyr, 2008). This challenge arises due to the need to consider various factors, such as company culture, employee dynamics, and the competitive business environment, among others (Ghani et al., 2015). Fundamentally, Agile aims for perfection, and this research aims to introduce a novel dimension to the DSDM project (Nishijima, 2013). The goal here is to systematize the knowledge required by all project stakeholders and instil a new mind-set within an ever-evolving environment (Breno et al., 2020). This exploration prompts an examination of the suitability of DSDM in effectively managing strategic risks.

The true value of the results generated from this research hinges on the assumption that enhancing both practice and team dynamics will yield improvements in project outcomes. Organizations well-versed in IT understand that IT can enhance efficiency and effectiveness, but it necessitates employees possessing the requisite skills and knowledge. Moreover, it requires granting individuals the autonomy to make decisions that ultimately benefit the organization's success. The recent surge in interest in agile methodologies is a testament to its track record of successfully delivering software projects. Agile' s overarching aim is to elevate team performance, harness the unique strengths of individual team members, and

foster a culture of continuous skill development and robust team collaboration. Research indicates that several factors can impede the successful integration of agile methodologies within frameworks like DSDM (Rusdiana, 2018). These challenges include the need to reshape organizational culture (Valente et al., 2016), encountering resistance to change, and the challenge of fitting agile principles into a non-Agile structure. Among these obstacles, a lack of prior experience with agile methodologies within IT organizations ranks as the least pervasive.

It's worth noting that the optimal team size for Agile approaches typically ranges from 6 to 10 members to maximize performance (Forbrig, 2016). Furthermore, this ideal is most achievable with team members possessing a deep understanding of agile principles. Consequently, a major hindrance to adopting Agile practices, capturing and mitigating risks could stem from the end-users' lack of comprehension of Agile methods and their benefits. Nevertheless, this knowledge gap could serve as an opportunity for end-users to approach projects from a fresh perspective, shedding new light on processes and procedures, thereby potentially improving them.

2.2 Dynamic Systems Development Method (DSDM)

DSDM often associated with Martin Fowler, one of the contributors to the Agile Manifesto, is noteworthy for its unique blend of infrastructure reminiscent of more traditional methodologies (Abrahamsson et al., 2017). DSDM adheres to the principles of agile methods while also offering a structured approach (Rusdiana 2018). The core concept behind DSDM is to establish fixed time and resource constraints, as suggested by Nazir et al. (2018), and then adapt the level of functionality accordingly. In contrast to fixing the scope of functionality and adjusting time and resources to meet it, DSDM prioritizes flexibility in terms of functionality. One of the key strengths of DSDM lies in its ability to foster collaboration among all stakeholders involved in a project (Hidalgo, et al,. 2020), with a strong focus on active user involvement, team empowerment in decision-making, recurrent project delivery, iterative development, and accommodating changes (Nazir, et al., 2018).

The DSDM Consortium was established by a group of vendors and software engineering experts committed to promoting DSDM as a viable Rapid Application Development (RAD) alternative (Sugianto and Tjandra 2016). Additionally, they undertook the responsibility of formulating and disseminating best practice recommendations for this emerging methodology (Aston, 2019). The DSDM Consortium maintains that, owing to the unique nature of each organization, its practices are not overly prescriptive. It's essential to recognize that each Agile method stands independently, serving distinct purposes and differing from others (Hidalgo, et al,. 2020). However, all of them are assumed to adhere to the core principles and practices outlined in the Agile Alliance manifesto (Sugianto and Tjandra 2016).

The DSDM process is structured into several phases, including the pre-project, feasibility study, business study, functional model iteration, design and build iteration, implementation, and post-project phases (Nazir, et al., 2018; Sugianto and Tjandra 2016). Unlike traditional project management, which typically involves comprehensive contracts detailing the full scope of work, costs, and timelines (Maamzi and Tawfik, 2022), DSDM project managers opt for a collaborative approach in their relationships with customers, making it align with agile values (Sani and Firdaus 2013).

While DSDM shares similarities with methodologies like Scrum and XP, its primary differentiator is its emphasis on fixed time constraints (Lumeng et al., 2020). This sets it apart from other agile frameworks. Sometimes referred to as DSDM Atern, it operates on an iterative basis. DSDM's foundational principles, as detailed in Table 1, make it the first agile framework to incorporate project management aspects. In contrast, methodologies like Scrum

primarily focus on product delivery during an iteration Sekgweleo, 2015; Lumeng et al., 2020; Maamzi and Tawfik, 2022; Najihi et al., 2022). DSDM's incorporation of project management capabilities make it adaptable not only to software and product development projects (Buehring, 2021) but also to delivering business value early in the product development lifecycle (Breno et al., 2020).

8 Principles of DSDM

The 8 principles of DSDM	
Focus on the Business Need	Deliver what the business needs to be delivered, when it needs to be delivered.
Deliver on Time	Delivering a solution on time is a very desirable outcome for a project and is quite often the single most important success factor.
Collaborate	Collaboration encourages increased understanding, greater speed and shared ownership, which enable teams to perform at a level that exceeds the sum of their parts.
Never Compromise Quality	All work should aim to achieve that level of quality – no more and no less.
Build Incrementally from Firm Foundations	Understanding the scope of the business problem to be solved and the proposed solution first, but not in such detail that the project becomes paralysed by overly detailed analysis of requirements.
Develop Iteratively	DSDM uses a combination of Iterative and Incremental Development, frequent demonstrations and comprehensive review to encourage timely feedback. Embracing change as part of this evolutionary process allows the team to converge on an accurate business solution.
Communicate Continuously and Clearly	DSDM practices are specifically designed to improve communication effectiveness for both teams and individuals.
Demonstrate Control	The use of well-defined Timeboxes, with constant review points, and the preparation of the Management Foundations and Timebox Plans, are designed to assist the Project Manager and the rest of the project team to follow this principle

Table 2: illustrations the 8 DSDM principles as per the agile business (Source: Buehring, 2021)

The principles of the Agile Manifesto significantly influence the eight core principles of the DSDM. This alignment places a strong emphasis on iterative delivery, effective communication, and collaboration, and continuous delivery, core views of the agile philosophy (Lumeng et al., 2020). DSDM also shares several characteristics, including its

process model and specific team roles, with other agile methodologies. Notable techniques advocated by DSDM, such as modelling, prototyping, workshops, timeboxing, and the MoSCoW prioritization method, find common ground with other Agile approaches (Buehring, 2021). The primary reason for selecting DSDM as the foundation for this research lies in its adaptability. DSDM is designed to be easily tailored to conventional methods like PRINCE2 and can seamlessly complement other Agile approaches like Scrum (Jim and Julien, 2013; Koi-Akrofi et al., 2019). This flexibility positions DSDM as a welcome addition within the agile community, especially when introducing features like end-user involvement in risk management, which enhances existing processes. Furthermore, as Koi-Akrofi et al. (2019) suggest, DSDM enforces a collaborative approach where both the client and the project team share the responsibility for preparing requirements and specifications. This resonates with the research's scope, emphasizing the formation of a robust collaboration between the end user and the project team. Based on the researcher's personal experiences, building upon an established end user-team relationship often proves to be more prudent than initiating a new approach that requires substantial training and knowledge transfer.

However, it's worth noting that in some traditional practices, the roles may differ. Koi-Akrofi et al. (2019) point out that, in conventional methods, project managers or teams may take the lead in requirements preparation. Nevertheless, successful Agile implementation necessitates a high level of collaboration between the project team and the client (Zafar et al., 2017), ensuring comprehensive understanding and effective integration of requirements throughout the project lifecycle. Research in the field (Sani and Firdaus, 2013; Tripp, 2012) have examined the impact of Agile methods, including DSDM, on project success across various sectors and nations. Findings consistently indicate positive effects on two dimensions of project success: effectiveness and general stakeholder satisfaction (end-users) with organizational objectives (business strategy). Additional research has reinforced these outcomes, highlighting the favourable influence of the Agile DSDM approach on various knowledge areas, including scope, time, cost, quality, human resources, and risk.

The widespread adoption of agile methodologies can be attributed to their numerous benefits, which include enhanced teamwork, goal-oriented focus, frequent reporting, active collaboration with end-users, rapid requirement adaptation, and informed decision-making (Ajith and Rajamohana, 2020; Maamzi and Tawfik, 2022). Ultimately, the objective is to empower end-users to lead risk management collaboratively with the project team, with a concurrent organizational recognition of this approach. However, it's crucial to recognize that the question "Why do we want end-users to lead risk management in a DSDM environment" delves beyond the benefits of Agile or established client relationships. It critically addresses organizational culture, decision-making processes, and the long-term benefits of pre-emptively addressing risk before it escalates into a major issue (Ghimire and Charters, 2022). DSDM sets itself apart from conventional techniques by embracing a project-oriented approach, encouraging early project initiation to align organizations and clients with their business needs. This approach promotes iterative development, a core focus of agile methodologies. The impact of agile development methodology on project success, viewed through a contingency lens, has been explored in research. Results consistently suggest that Agile methods, including DSDM, have a positive impact on project success, with the most significant benefits observed in environments characterized by low structural complexity and high dynamism.

2.3 Technology Road Mapping (TRM)

Technology roadmapping (TRM) constitutes a crucial yet complex strategic process that

entails interdisciplinary knowledge and necessitates the active involvement of key decision-makers (Yuskevich et al., 2024). The roots of technology roadmapping can be traced back to Motorola's pioneering efforts (Park, 2005). This method, aimed at facilitating technology management and strategic planning (Golkar and Garzaniti, 2020), functions as a powerful tool for elucidating and communicating the intricate relationships among technological resources (Knoll et al., 2018), organizational objectives, and the evolving external landscape (Oliveira and Rozenfeld, 2010). Moreover, it equips organizations with a means to chart the course toward mainstream technology products and services.

From the researcher's viewpoint, this technique proves exceptionally valuable for well-established technology-driven companies embarking on new ventures, particularly those striving to prioritize end-users in capturing project risks. Within an organization, Technology Road Mapping functions as an integrative framework, harmonizing various levels to bolster initiatives and strategic decision-making (Campo et al., 2022). It's crucial to acknowledge that TRM transcends being a mere tool; rather, it represents a knowledge-based approach (Caetano and Amaral, 2011). This attribute derives from its focus on the organization's collective knowledge. Thus, treating technology as a form of knowledge is pivotal, enabling the application of knowledge management principles to elevate technology management.

In the researcher's viewpoint, technological knowledge encompasses both explicit and tacit components. Explicit knowledge comprises documented information, such as reports, procedures, user guides, and tangible outcomes (equipment). On the other hand, tacit knowledge, which is challenging to articulate, heavily relies on training and experiential learning. In this context, explicit knowledge plays a pivotal role in the research, primarily when integrating end-users into project teams or reshaping their roles. The involvement of end-users should be seamlessly aligned with the organization's activities, ensuring sustainability and a competitive edge (Caetano and Amaral, 2011).

Furthermore, it's important to underscore that the integration of end-users into project teams should not be pursued in isolation. Instead, it should be intricately woven into the fabric of overall business planning. The key premise here is that end-user participation should be regarded as an integral component of the broader strategic landscape.

2.4 Business Structure

In the ever-evolving landscape of business environments, characterized by intensified global competition, shortened product life cycles, rapid technological advancements, and evolving customer demands (Kennerley and Neely, 2003), one critical imperative for companies to remain competitive is the development of effective performance measurement systems. Knowledge has long been recognized as a pivotal element of business success and an undeniable cornerstone of competitive advantage.

On this note, Porter's seminal works (1980, 1985, 1996), argued that to achieve strategic purity, which entails a clear selection of one generic competitive strategy (be it low cost, differentiation, or focus), significantly contributes to improved performance (Amaratunga, Baldry, and Sarshar, 2001; Tangen, 2004; Valiris and Chytas, 2005). Each of these three generic competitive strategies represents a distinct approach to establishing sustainable competitive advantage (Yildiz, Hotamisli, and Eleren, 2011). Consequently, the primary objective of any organization is to enhance quality, reduce costs, and innovate processes to navigate challenges and achieve their objectives.

Traditional performance measurement methodologies, which predominantly rely on financial indicators, have faced criticism from various researchers. These financial metrics tend to be

short-term and lagging indicators, often failing to proactively reflect the present and future state of affairs (Mirabeau and Maguire, 2014). Therefore, effective team performance evaluation must encompass a process that can assess both individual and organizational performance, serving as a valuable source of insights into critical business operations, including planning, directing, and controlling.

For well-established organizations, the challenge lies in fully exploring existing opportunities, recognizing that today's success does not guarantee tomorrow's prosperity. Balancing the exploitation of current strengths with the cultivation of new competitive advantages becomes a strategic imperative. Decision-makers must take deliberate actions to create a new strategic position, one that places end-users at the forefront of risk capture, thereby opening doors to fresh business opportunities.

However, adopting this approach requires the project team to adapt to each other's capabilities and, either directly or indirectly, acknowledge the significance of cultural diversity. Successful implementation hinges on the organization's ability to manage this adaptability effectively.

2.5 Risk Management

Traditionally, risk management has relied on a blend of quantitative techniques and expert judgments within accounting and planning (Boehm, 1991; Ye Tao, 2008). This facet of company management plays a crucial role in mitigating an organization's exposure to risk (Lechner and Gatzert 2018; Anton 2018; Silva et al., 2019; Zou et al., 2019). The primary objective of risk management is to proactively identify potential issues (Elkhatib et al., 2022) before they manifest, enabling the planning and execution of risk-handling strategies throughout the entire lifecycle of a software development project (Prenner et al., 2020). Risk, in this context, can be defined as an uncertain event or condition that can adversely affect the outcome of a project.

The profitability and overall success of a business are profoundly intertwined with the effectiveness of its risk management strategies (Wu, 2020). In essence, risk management encompasses factors (Agranoff, and Kolpakov, 2020) that significantly influence project success. It entails assessing the likelihood that a software development project might encounter adverse and unacceptable events Muayad, (2021), such as premature termination, schedule delays, or resource overruns (Mas et al., 2020). These risks are associated with various aspects of a project, including scope creep, common system development pitfalls, and issues of poor quality, increased costs, or project delays (Ahmed and Manab 2016; Soltanizadeh et al., 2016). Organizational structure, non-functional considerations, and the composition of the project team further contribute to the risk landscape (Muayad, 2021).

A well-considered risk management strategy can be a source of competitive advantage, bolstering a company's growth trajectory (Blanco-Mesa et al., 2019). This approach can substantially enhance organisational performance (Lechner and Gatzert, 2018; Anton, 2018; Silva et al., 2019; Zou et al., 2019).

As the number of software projects continues to rise, many organizations are adopting Agile methods. Consequently, agile methodologies are gaining increased recognition within the broader field of project management. From the researcher's standpoint, the evolution of Agile methodologies has given rise to practices such as extreme programming, Scrum, test-driven development (TDD), dynamic software development method (DSDM), Kanban, and disciplined agile delivery (DAD). Tavares et al. (2019) note that while these agile methods provide an environment conducive to risk reduction through multiple iterations or sprints and feedback mechanisms, there are limited guidelines on how these mechanisms can be

optimally implemented. Furthermore, it's worth mentioning that these guidelines might not always align seamlessly with the principles of the Agile Manifesto.
This research selects the DSDM method over other agile approaches primarily due to its comprehensive focus. Unlike many other Agile methodologies that primarily concentrate on the development and delivery of a product (typically software), DSDM encompasses a broader perspective. This perspective includes projects in the context of the broader business requirements, emphasizing business strategy and end-user involvement. DSDM boasts a strong track record of successfully delivering Agile projects across various corporate environments, demonstrating its scalability and effectiveness in small, simple businesses, large, complex organizations, and highly regulated sectors. Moreover, DSDM has demonstrated its effectiveness in both IT and non-IT projects, such as business change initiatives (Elkhatib et al., 2022; Agile business, 2022).
Notably, risk management remains one of the least mature and practiced knowledge areas in software projects. Given the change-driven nature of DSDM, risks can emerge at any stage of the project. New requirements, for instance, may introduce novel risks. For instance, a customer's request for changes to registration features post-project initiation might lead to potential issues, such as delays, security concerns, or financial implications. In DSDM, project teams are collocated, with each member expected to possess a high level of knowledge and ownership. Therefore, maintaining growth and agility to respond to risks efficiently necessitates a flat organizational structure. The subsequent section delves into an analysis of different types of risks and how this project aims to address them.

2.6 Fundamentals of the Traditional Risk Management Process

The traditional risk management process comprises several well-defined steps, each crucial for effective risk management (Cockburn, 2002; Abrahamsson et al., 2008; Abrahamsson et al., 2017; Rusdiana, 2018). These steps are depicted in Figure 1 - the Traditional Risk Management Process. In traditional risk management, each process is diligently followed to ensure project success.

1. Risk Identification:

Before risks can be effectively managed, they must first be identified. This initial step is critical to prevent risks from adversely affecting the project. Encouraging an environment where team members are comfortable raising concerns and issues is essential. Additionally, conducting quality reviews throughout all project phases is a common technique for identifying potential risks (Kajko-Mattsson, and Nyfjord, 2008; Radhika et al,. 2013; Arnuphaptrairong, 2014).

2. Risk Analysis:

Analysis is the process of transforming raw risk data into actionable decision-making information. It involves a comprehensive review of identified risks, prioritization of risks based on their significance, and the selection of the most critical risks to address. Each identified risk is rigorously analysed, considering its potential consequences on project cost, schedule, performance, and product quality risks (Kajko-Mattsson, and Nyfjord, 2008; Radhika et al,. 2013; Arnuphaptrairong, 2014).

3. Risk Planning:

Risk planning is the phase where risk information is translated into concrete decisions and actions, both for the present and the future. This step encompasses developing specific actions to address individual risks, prioritizing these risk actions based on their importance, and crafting a comprehensive Risk Management Plan. A key aspect of risk action planning is

the consideration of the long-term consequences of decisions made in the present risks (Kajko-Mattsson, and Nyfjord, 2008; Radhika et al,. 2013; Arnuphaptrairong, 2014).

4. Risk Tracking:

Tracking is an ongoing process that involves monitoring the status of identified risks and the actions taken to mitigate them. It's essential for ensuring that risk management stays on course and that necessary adjustments can be made promptly in response to changing circumstances. All risk control activities are meticulously documented within the Risk Management Plan risks (Kajko-Mattsson, and Nyfjord, 2008; Radhika et al,. 2013; Arnuphaptrairong, 2014).

5. Risk Control:

Risk control relies on established project management processes to execute risk action plans, rectify deviations from the original plans, respond to triggering events, and enhance overall risk management processes. These risk control activities are systematically documented within the Risk Management Plan risks (Kajko-Mattsson, and Nyfjord, 2008; Radhika et al,. 2013; Arnuphaptrairong, 2014).

6. Continuous Tracking:

Effective tracking is a thread that runs through all functions of risk management. Without consistent and rigorous tracking, no risk management approach can be considered viable. It is an integral and ongoing part of all other risk management activities risks (Kajko-Mattsson, and Nyfjord, 2008; Radhika et al,. 2013; Arnuphaptrairong, 2014).

Traditional risk management is a structured process that involves identifying, analysing, planning, tracking, and controlling risks throughout a project's lifecycle. Each step plays a vital role in ensuring that potential risks are identified early and managed effectively to minimize their impact on project success.

Traditional risk management process

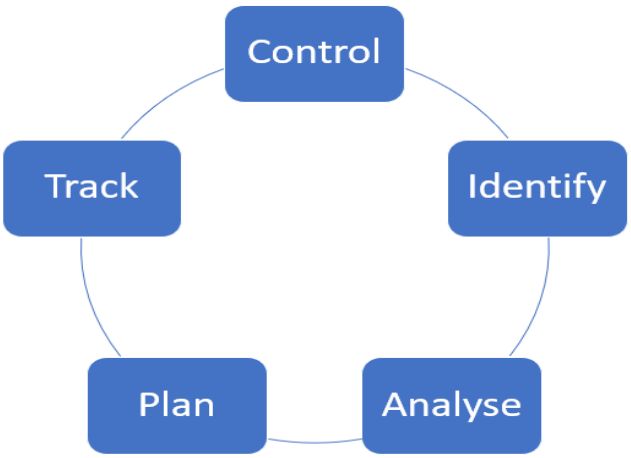

Figure 1: *traditional* risk management process (Source: Chowdhury and Arefeen, 2011; Radhika et al, 2013)

Traditional risk management approaches often struggle to adapt to the dynamic and

rapidly evolving nature of today's world (Arnuphaptrairong, 2014). Researchers and institutions have recognized this challenge (Chaoucha et al., 2019) leading to the development of numerous risk management models, each focusing on different aspects of risk. However, from the researcher's perspective, none of these models adequately emphasize the role of end-users as the primary leaders in risk management, instead relying on project managers or other team members.

To address this gap, the researcher has undertaken a comprehensive examination of various risk management methods. The goal is to assess their strengths and weaknesses and identify characteristics that can be adapted to suit an ever-changing environment. For instance, Muntés-Mulerom et al., (2019) delved into the challenges of managing risk in agile software development. Drawing from the extensive experience of over 20 agile coaches working continuously for 15 years across diverse sectors, they proposed a risk management framework that not only identifies risks but also supports collaboration, agility, and continuous development.

Organizations across industries acknowledge that they are evolving into technology and data-driven entities. They also recognize that their business models are being reshaped, either partially or entirely, by software. Key drivers of this transformation include paradigms like cloud computing. These organizations can only achieve privacy and security by design if risk management is integrated from the inception of the software development cycle. Continuous and agile risk management processes are particularly valuable in cloud computing environments, given their complex and distributed network of services, which expand the attack surface.

The increasing demand for software-driven businesses and the need for rapid innovation are prompting organizations to replace conventional software development techniques with more agile alternatives. These alternatives must reinforce continuous development and delivery models to thrive in aggressively evolving markets. Agile methodologies, guided by principles of transparency and collaboration between teams, can effectively mitigate risks in applications and eliminate inconsistencies in risk management approaches. However, it's important to note that the agile manifesto emphasizes delivering code that meets client needs and follows incremental and iterative techniques to deliver individual software capabilities.

Several risk management models and methodologies have emerged to address these challenges:

1. **Software Engineering Institute's (SEI) Taxonomy-Based Risk Identification Questionnaire and Software Risk Evaluation (SRE):** This model is designed around documenting and using historical risk data, with a focus on top risks to streamline risk management efforts and time (Carr et al., 1993; Williams, et al., 1999; Rabbi and Mannan 2008; Keshlaf and Hashim, 2000; Smith, Bohner, and McCricard, 2000).

2. **Distributed Software Risk Management (DSRM-Concept):** This approach emphasizes communication and continuous risk assessment. It incorporates three key concepts: reviews for risk identification, snapshots for analysis, and reports for assessment. Additionally, it features a distributed storage mechanism for managing reputation information (Hu et al., 2008).

3. **EBIOS Methodology:** Introduced by the Central Directorate of Security of Information Systems (DCSSI) in the French government, EBIOS embraces a strategy for managing digital risks. It starts by examining potential risk scenarios from the highest levels and progressively drills down to business and technical functions. This methodology focuses on Information Systems Security (ISS) risks and includes five phases: Context Study, Security Requirements Checklist, Threats Study, Identification

of Security Objectives, and Determination of Security Requirements (Romero et al,. 2009).

4. **ProRisk:** An open system that allows users to develop and calibrate risk models based on templates or custom models to suit their project needs. It serves as a risk management framework for both small and large software projects, emphasizing detailed project risk analysis (Roy, 2004).

These diverse risk management approaches offer organizations a range of options to tailor their risk management strategies to their specific needs and the evolving nature of their projects.

2.7 Evolution of Modern Techniques in project development and risk assessment

Industries have recently undergone a profound transformation due to the integration of technology, particularly in data-centric companies. Simultaneously, businesses are revaluating their models, either partially or entirely, through software-driven initiatives. A primary catalyst for this transformation is cloud computing, which, though powerful, introduces risks such as cyberattacks and unauthorized network access. In such organizations, security and privacy can only be effectively achieved when integrated into the software development lifecycle from the outset.

Ghani and Babar's study (2019) underscores the constant need for security and privacy considerations in agile project development and risk management, especially in the realms of cloud computing and the Internet of Things (IoT). These environments feature complex, multi-layered, and distributed networks that are susceptible to various forms of attacks.

The growing demand for software-based models within businesses necessitates rapid innovation and the integration of software development methodologies and alternatives (Habeh et al., 2021). These methods must align with the agile methodology and other continuously evolving models in the emerging market. Agile-driven approaches prioritize privacy and foster communication among teams and members, collectively working to minimize risks and uncertainties inherent in various risk management methods. The evolving landscape of technology integration, software-driven business models, and the dynamic nature of modern risk management demand a proactive and agile approach to ensure the security, privacy, and success of projects in this ever-changing environment.

2.7.1 Softrisk Model

As introduced earlier in this study, the rapid advancement of technology and sophisticated information systems has necessitated the development of security systems that can effectively address modern risks. In the realm of software development and monitoring, end-user risk management has gained substantial importance, leading to the emergence of various models. There is heightened competition among organizations and risk management researchers to create competitive and supportive tools that enhance traditional risk management practices.

A study conducted by Sirshar, Shahid, and Alam (2019) compared several risk assessment models, including Softrisk, Riskit, and CMMI frameworks. According to the researchers, Softrisk stands out as a critical risk assessment tool due to its efficiency and applicability to a wide range of information systems and software projects. The Softrisk model initiates with risk documentation and emphasizes that efficiently mitigating high-risk factors can yield cost and time savings. The continuous risk management process spans eight stages, starting with the identification of generic and specific risks. These risks are then estimated based on magnitude and probability, followed by comprehensive risk documentation. Subsequently,

risks are calculated by analysing the product of probability and magnitude, and they are prioritized accordingly. The output of this process is utilized for risk mitigation.

While Sirshar et al. (2019) explored various risk assessment models, Chandani and Gupta (2022) identified risk mitigation techniques and highlighted the utility of the Softrisk model. Researchers considered Softrisk as a tool for prototyping as a strategy to manage identified risks. Keshlaf and Hashim (2000) presented a study that addressed the inadequacies in software risk management strategies by developing the Softrisk model. This model focuses on calculating and prioritizing risks, emphasizing that mitigating high-magnitude risks first can save time and effort in development. Importantly, this model is developed using the Java language and employs quantitative data for risk evaluation to enhance user-friendliness.

The study by Albert et al. (2005) suggests that training users to use the Softrisk tool effectively can positively impact risk assessment and mitigation. Additional advantages of the Softrisk tool are enumerated in Keshlaf et al. (2000), with one notable feature being its proposal of strategies for risk mitigation and resolution to ensure efficient risk management. Meanwhile, Sadiq et al. (2010) focused on risk assessment models and regarded Softrisk as a valuable prototyping tool for managing risk in software development. The study also highlighted the benefits of SERIM (Software Engineering Risk Model) in comparison to Softrisk, as SERIM is well-suited for identifying and mitigating technical, schedule, and cost-related risks.

On a different note, Keshlaf and Riddle (2010) discussed the weaknesses of the Softrisk prototyping tool, noting its insufficiency in identifying the costs required to mitigate risks and management strategies. Additionally, the researchers highlighted that the model had not been recently tested for real-life projects. Smith, Bohner, and McCrickard (2005) observed that there are no tools that have been developed to fully automate the risk identification, assessment, and mitigation processes. However, Softrisk has emerged as a valuable tool for managing risks through an integrated approach. This approach efficiently identifies, prioritizes, and monitors risks throughout the software development cycle, with a particular emphasis on continuous monitoring to prevent risks from resurfacing. Softrisk has proven to be compatible with projects of various sizes, both big and small, in modern software risk assessment approaches**.**

2.7.2 OCTAVE Methodology

The term "OCTAVE" stands for Operational, Critical, Threat, Asset, and Vulnerability Evaluation, and it plays a crucial role in managing risk by addressing these elements. It finds application in the information systems of medium and small organizations, assisting them in mitigating the risks associated with cyberattacks (Pasha et al., 2018). It aids executives in comprehending and prioritizing the intricate risks impacting their organization. Furthermore, it assists risk managers in crafting a compelling business case to secure the resources necessary for the development, enhancement, and operation of the organization's program (Tucker, 2020).

In a study by Haji, Tan, and Costa (2019), two OCTAVE frameworks were proposed. One was designed to mitigate cyber risks in large organizations, while the other provided a simpler version to assess risks in smaller firms. The OCTAVE Allegro framework, the first approach, comprised multiple interrelated phases and processes for risk mitigation. However, due to increasing complexities in systems and emerging risks, the researchers recommended a hybrid model. This hybrid model amalgamates critical procedures related to threats, vulnerabilities, and assets to assess Information Security risks effectively. Another study

explored the application of the OCTAVE model in organizations with multi-layered hierarchies and the capability to evaluate vulnerabilities. It found that the OCTAVE methodology can be utilized to identify risks within unique project management environments. The study outlined three phases of project management by the OCTAVE method: asset identification, analysis of current security strategies, information structure analysis, and risk mitigation task execution by the risk management team.

In a study by Sara (2019), various methods for risk assessment during the software development lifecycle were proposed. However, it concluded that there is no one-size-fits-all standardized method for every software development project. Different frameworks should be chosen based on the type of security risk. The OCTAVE approach, which focuses on asset security, was emphasized as significant for organizations. It is viewed as a risk evaluation activity rather than a continuous risk mitigation process (Lund et al., 2010). Additionally, another perspective behind the OCTAVE framework is to enhance decision-making to safeguard company assets (Hom et al., 2020). The framework revolves around maintaining security, confidentiality, availability of critical information, and integrity (Pandey, 2012; Hom et al., 2020). It is an organizational and strategic approach to evaluating security risks in information systems using various methods. Importantly, it promotes self-direction, enabling end-users to learn and enhance security systems independently, reducing reliance on vendors and consultants.

However, the OCTAVE framework has its weaknesses. It may not directly impact threats like technical errors, network failures, or human errors and negligence (Tucker, 2020). Nonetheless, it offers preventive measures against risks arising from unorganized data processing, unauthorized access, and lack of resource control. It emphasizes the significance of training users to recognize threats and technical errors that could lead to negative consequences.

The OCTAVE methodology offers a comprehensive approach to risk management, particularly in the context of information systems. It provides flexibility through its hybrid model, adapts to various organizational structures, and encourages end-user empowerment and training to enhance security awareness and decision-making.

2.8 Risk Management in DSDM

In the context of DSDM, risk management plays a critical role in ensuring the success of projects (Zaitsev et al., 2020). DSDM is characterized by its focus on rapid development over extensive documentation (Roy, et al., 2018), which presents unique challenges in terms of risk management (Suryaatmaja et al., 2019). While it prioritizes speed and agility, DSDM projects inherently involve risks as they explore new territories to achieve new capabilities and competitive advantages in the market.

One of the key principles of risk management in DSDM is the recognition that risk can emerge at any stage of the project due to its change-driven nature (Trzeciak, 2020). New requirements and changes introduced during the project's lifecycle can lead to new risks Tetyana, et al., (2023). For instance, a customer might request changes to registration features during the post-project stage, potentially causing delays, security concerns, or financial implications. Therefore, risk management in DSDM should be viewed as an investment in preventing costly consequences, both financially and in terms of the organization's reputation.

The fundamental objective of risk management in DSDM is to identify, analyse, and mitigate potential problems before they materialize. The rapid development approach of DSDM emphasizes the importance of managing risks proactively throughout the entire project lifecycle. This proactive approach aligns with the agile philosophy of iterative development, where changes can be accommodated swiftly, and risks can be addressed in real-time.

2.9 DSDM Risks during Sprint Planning

Sprint planning is a crucial phase in the DSDM approach, as it involves project teams engaging in meetings to discuss project tasks that are vital for achieving project goals. In DSDM, sprint planning must occur before project implementation and during subsequent sprint iterations. Since DSDM operates within the agile methodology, requirements can change after each deployment and feedback cycle. Therefore, it's essential that sprint planning involves a thorough analysis of risks and the development of mitigation strategies before implementing sprint activities (Li Ng et al,. 2022).

Several core strategies should be considered during sprint planning phases or meetings, as outlined in a study by (Al-Saqqa et al., 2020). This study compares traditional planning with sprint planning in agile-DSDM environments. (Hanslo, et al., 2020) also highlight the importance of sprint planning in DSDM. They emphasize that sprint planning should not be a one-time analysis of the project; instead, it should occur at every iteration to account for changing requirements and risks.

Singh et al., (2019) argue that team members' ability to choose risk management strategies in DSDM can be more effective than other conventional methods. This emphasises the importance of active participation and collaboration among team members. Chovanova et al. (2020) stress that DSDM projects must have strategic goals that deliver business advantages. Incremental planning is considered necessary as it allows projects to move seamlessly into the next iteration. This approach involves the use of time-boxes, active user participation, frequent meetings, and integration and testing to ensure the success of sprint planning (Zahedi et al., 2023).

Several core strategies should be considered during sprint planning in the DSDM approach:

1. **Incremental Planning**: Sprint planning should be incremental, addressing the specific tasks and objectives for each iteration. This allows for flexibility and adaptability in response to changing requirements.

2. **Time-Boxes**: DSDM emphasises the use of time-boxes, which are predefined time periods for specific activities. Sprint planning should adhere to these time-boxes to ensure that work is completed within the allocated time.

3. **Active User Participation**: Involving end-users and stakeholders in sprint planning is crucial for aligning project goals with user needs and expectations.

4. **Constant Meetings**: Regular meetings and communication within the project team are essential for keeping everyone on the same page and addressing emerging issues promptly (Dam et al.,2019)

2.9.1 Shorter Sprints Reduce Risks

Shorter sprints aid in risk reduction during project management, in the recent project management approaches sprint training was highlighted in the study by (Ketelhut et al., 2022), the researchers stated that shorter sprints reduce stress on the team members regarding the DSDM project risks and uncertainties. Further, the study by (Dam, et al., 2019), focuses on AI implementation in project management, in which the study highlights various aspects that can lead to uncertainties specifically regarding human aspects. Moreover, it is suggested in the study by (Morandini, et al., 2021) that shorter sprint cycles shall be more detailed to achieve the project goals while the requirements planned in the sprint shall be immediately transformed into the product. In a nutshell, shorter sprints must have an enhanced and

collaborative communication plan to reduce risks during project management. Consistent with this assertion, (Lalmi, Fernandes, and Souad, 2021), suggest that by shortening project schedules, it may enhance the successful implementation of a project. However, for this to be effective, the project managers must ensure daily meetings with project associated team to avoid the inconvenience of changed requirements. Moreover, the entire project cycle must be adequately monitored to identify the accomplished tasks and what needs to be improved according to changed requirements.

2.10 Adoption of End-User Risk Assessment in DSDM Projects

In contemporary software development methodologies, DSDM stands out as an effective software management tool, with the software produced serving as a vital component for organizations, whether it is used directly or indirectly by a large workforce (Li Ng et al,. 2022). Consequently, it is imperative to meticulously assess risk factors associated with DSDM projects from various dimensions, including economic, security, financial, and functional aspects. While the project development phase often involves continuous risk assessment during sprint cycles, (Mohammad et al., 2023) it is noteworthy that risks may emerge from the end-users' perspective. Such risks typically manifest when changes in user requirements during the development phase are inadequately analysed or not mitigated (Ketelhut et al., 2022) These risks can encompass cost overruns, scheduling disruptions, communication breakdowns, coordination issues, as well as technical, human, environmental, and network-related failures (Morandini, et al., 2021).

In light of the significance of capturing end-user risks, research conducted by Dam,(2019) underscores the critical role of addressing these risks, which are often intertwined with human errors. This research further contends that such risks can yield both adverse and favourable impacts on the final product. However, another study conducted by Salve et al., (2018) suggests that while risk mitigation strategies and planning are crucial, solely relying on risk avoidance may not constitute a sustainable long-term approach.

The above-mentioned risk impacts pose significant challenges for project managers. As a response, project managers must devise comprehensive risk assessment and treatment strategies (Dam, et al., 2019; Morandini, et al., 2021). Equally, end-users must also play a pivotal role in risk planning when project requirements undergo changes. In the context of DSDM projects, the likelihood of encountering risks is notably high, making it imperative for agile project development teams and end-users to collaborate and determine the granularity and scope of risks. Moreover, Abdel-Basset et al. (2019) recommends an approach that includes external risk identification and assessment as essential components for response planning, particularly in an incremental development environment.

2.11 Decision-Making in Project Management and Risk Assessment

Effective decision-making is a cornerstone of successful project management and risk assessment. In the intricate project management and development cycle, decisions must be made at a high level, carefully considering various aspects of project risk factors. A common trend among project management researchers is the discussion and recommendation of decision-making tools. However, there is a noticeable gap in identifying such tools for decision-making in the context of strategic risk management.

Moreover, the study conducted by Balta, Dikmen, and Birgonul (2021) has raised concerns about the use of decision-making tools in small-scale projects, suggesting that their implementation could potentially lead to cost overruns. Consequently, this approach has not gained broad adoption by project managers in small-scale projects.

Schwartz et al. (2018) delved into this area by critically analysing five decision-supporting frameworks that can be widely utilized within organizations to facilitate effective decision-

making during project development and planning phases. Their research aims to provide valuable insights into decision-making processes.

Another perspective on decision-making comes from Omotayo, Bankole, and Olubunmi Olanipekun (2020), who contend that traditional decision-making processes have not been effective in cost-saving. They propose a shift towards utilizing artificial intelligence software systems for decision-making, leveraging historical data and monitoring cost-related factors to make informed choices.

Furthermore, Galli and Battiloro (2019) differentiate decision-makers into two categories: internal and external decision-makers. Internal decision-makers focus on aspects related to product deployment and firm operations, considering factors such as costs and schedules. In contrast, external decision-makers are less concerned about financial aspects.

In the realm of agile methodology-based projects, Chaouch, Mejri, and Ghannouchi (2019) put forward a decision-making framework. Their model combines the Project Management Body of Knowledge (PMBOK) and Scrum as guides for project risk management. In this integrated model, the researchers suggest that a risk plan should be collaboratively developed by team members. This plan includes risk classification, defining roles and responsibilities, and scheduling for risk mitigation. However, a drawback identified in their model is the lack of practical implementation, especially in Information Systems projects based on Scrum and agile methodologies.

Although decision-making tools are extensively discussed in project management research, there is a notable gap in the literature regarding their application in the context of strategic risk management. Various studies offer insights into different facets of decision-making, including its impact on project costs, the integration of artificial intelligence, and the differentiation of decision-makers. Additionally, decision-making frameworks for agile methodologies show promise but require further refinement for practical implementation in IS projects.

2.12 Challenges in Decision-Making

Decision-making is a critical component of project management, necessitating access to sufficient information to make informed choices. Challenges can arise when resources and information are limited, and decision-makers must consider various factors that can lead to risks, including cost, schedule, quality, and external vulnerabilities. Decision-making problems can also be exacerbated by internal and external uncertainties, such as conflicts related to project objectives and goals. Notably, some decisions made by project managers in the initial phases of a project are irreversible, encompassing aspects like design, consumer requirements, and resource limitations with time constraints. However, in DSDM projects, certain decisions can be altered if they do not significantly impact project planning and execution (Driscoll et al., 2022). In their book, Driscoll et al., (2022) emphasize that decision-making for the project life cycle involves detailed planning that supports the project team throughout the project's duration.

In response to these constraints, researchers in agile project development have turned their attention to Decision Support Systems (DSS) as a means to enhance the decision-making process. Aversa, et al., (2018) define DSS as information system tools that employ models to address unstructured issues. Their research highlights the use of DSS models to bolster quantitative methods and communication infrastructure within project management teams. By doing so, they aim to facilitate problem resolution through enhanced and automated decision-making.

2.13 Results and Discussion of Literature Review

Based on your research objectives, it appears that none of the mentioned concepts and

methodologies directly align with Agile DSDM and its suitability for managing strategic risk. The researcher may need to consider exploring or developing a customised risk management approach that specifically addresses the unique characteristics of DSDM and their strategic risk management needs. This may involve integrating elements from existing methodologies while tailoring them to your specific context.

Exploring the suitability of DSDM for managing strategic risk in DSDM environments. Here's a summary of the assessment for each approach:

1. **DS-RM Concept:**
    - Strengths: Targeting distributed software, communication focus, supports risk database.
    - Weaknesses: Lacks consideration of some aspects, lacks risk control, doesn't link risk management to development processes.
    - Critical Review: Effective for project risk management but limited regarding environmental and cultural risks.
    - Validity to the Research: Does not meet the criteria for the research. (Does not specifically address strategic risk management in agile DSDM)
2. **EBIOS Methodology:**
    - Strengths: Supported with an open-source tool, considers technical and non-technical entities, complies with some standards.
    - Weaknesses: Limited to Information Systems Security (ISS) risks, can't consider some software development environments.
    - Critical Review: Open-source but lacks immediate security for IS.
    - Validity to the Research: Does not meet the criteria for the research. (Focused on ISS risks)
3. **ProRisk Framework:**
    - Strengths: Applicable to small and complex projects, open system, links the business domain to risk management.
    - Weaknesses: Requires detailed risk analysis, depends on other models.
    - Critical Review: Can implement a wide range of models but has complexity issues.
    - Validity to the Research: Does not meet the criteria for the research. (Not specifically tailored to DSDM and strategic risk management)
4. **Riskit Method:**
    - Strengths: Provides conceptual and graphical tools, defines project goals.
    - Weaknesses: Not supported by risk communication channels, lacks consideration for certain aspects.
    - Critical Review: Does not meet criteria for cultural and environmental risks, lacks quantitative analysis.

- Validity to the Research: Does not meet the criteria for the research. (Not tailored to strategic risk management in agile DSDM)

5. **SoftRisk:**
    - Strengths: Supports risk documentation, switches between qualitative and quantitative data, provides a checklist.
    - Weaknesses: Doesn't support risk communication, doesn't provide management from a product perspective.
    - Critical Review: Effective for analysis but costly for small-scale firms.
    - Validity to the Research: Does not meet the criteria for the research. (Not specific to DSDM and strategic risk management)
6. **CMMI-RSKM:**
    - Strengths: Supports standardizations in risk management, provides guidelines.
    - Weaknesses: Supports heavy risk management, project manager's play a significant role.
    - Critical Review: Useful for assessing risks in small firms but may not work in other contexts.
    - Validity to the Research: Does not meet the criteria for the research. (Not focused on strategic risk management in agile DSDM)
7. **PMBOK RM Process:**
    - Strengths: Considers software development processes, includes risk management in project management.
    - Weaknesses: Generic, project managers play a significant role.
    - Critical Review: Enhances impact of positive risks but has constraints.
    - Validity to the Research: Does not meet the criteria for the research. (Not specifically tailored to DSDM and strategic risk management)
8. **GDPS RM Framework:**
    - Strengths: Considers geographically dispersed risks, categorizes risk areas and factors.
    - Weaknesses: Uses predefined lists, lacks integration with project plans, doesn't consider process and product perspectives.
    - Critical Review: Effective for SMEs but generic for different types of management.
    - Validity to the Research: Does not meet the criteria for the research. (Not specific to DSDM and strategic risk management)
9. **Risk and Performance Model:**
    - Strengths: Includes six dimensions of software risks, addresses the relationship between risk and performance.

- Weaknesses: Lacks risk management guidelines, considers only internal risks.
- Critical Review: Effective for limited organizations for internal risk analysis.
- Validity to the Research: Does not meet the criteria for the research. (Not tailored to strategic risk management in agile DSDM)

Research criteria are the standards or benchmarks that researchers use to evaluate the validity and suitability of different approaches or methodologies for their research. The research objectives and questions can aid in defining some criteria based on those objectives and questions. Here are the criteria for evaluating different approaches/methodologies for this research:

1. **Alignment with Research Objectives:** Does the approach align with the stated research objectives and aims?
2. **Suitability for Strategic Risk Management:** Can the approach be effectively applied to manage strategic risks, particularly in Agile DSDM environments?
3. **Incorporation of End User Input:** Does the approach allow for the capture of the end user's voice in developing a Business Risk Strategy?
4. **Identification of Risk Factors and Processes:** Does the approach facilitate the identification of factors and processes to reduce risk impact?
5. **Customization for Agile DSDM:** Can the approach be customized or adapted to Agile DSDM environments?
6. **Effectiveness Evaluation:** Can the effectiveness of the approach in capturing the end user's perspective and managing strategic risks be assessed?
7. **Integration with DSDM Framework:** Is it feasible to integrate the approach with the DSDM framework?

The table below evaluate the approaches/methodologies mentioned earlier against these criteria:

	Alignment with Research Objectives	**Suitability for Strategic Risk Management**	**Incorporation of End User Input**	**Identification of Risk Factors and Processes**	**Customization for Agile DSDM**	**Effectiveness Evaluation**	**Integration with DSDM Framework**
	Partially (1)	Partially (2)	No (3)	Partially (4)	No (5)	No (6)	No (7)
EBIOS Methodology	No (1)	**Approach**	No (3)	No (4)	No (5)	No (6)	No (7)
ProRisk Framework	Partially (1)	DS-RM Concept	No (3)	Partially (4)	No (5)	No (6)	No (7)
Riskit Method	Partially (1)	Partially (2)	No (3)	Partially (4)	No (5)	No (6)	No (7)
SoftRisk	Partially (1)	No (2)	No (3)	No (4)	No (5)	No (6)	No (7)

CMMI-RSKM	No (1)	No (2)	No (3)	No (4)	No (5)	No (6)	No (7)
PMBOK RM Process	No (1)	Partially (2)	No (3)	Partially (4)	Partially (5)	No (6)	Partially (7)
GDPS RM Framework	No (1)	No (2)	No (3)	No (4)	No (5)	No (6)	No (7)
Risk and Performance Model	Partially (1)	Partially (2)	No (3)	Partially (4)	No (5)	No (6)	No (7)

Table 2: Research Management Framework and how they align to the research (Source: Author, 2021)

"Partial" or "No" entries indicate the extent to which each approach meets the respective criteria. In addition, the "Partial" entries suggest that some aspects of the approach may align with the research objectives, but they may require further customization or adaptation to fully meet your criteria.

2.13.2 Thematic Analysis

Agile: Within the realm of project management methodologies, our research focused primarily on agile project development frameworks to gain a comprehensive understanding, particularly within the DSDM framework. Seven articles were selected to explore various aspects of Agile and DSDM and their underlying structures.

In essence, agility signifies the ability to move swiftly and adeptly, a concept widely applied in project management. Agile methodologies accommodate the ever-changing landscape of project development, allowing for continuous improvements to meet evolving consumer requirements and industry trends. Numerous studies underscore that the agile framework is an incremental process that necessitates close collaboration, self-organized teams, and a commitment to ongoing enhancements.

The agile process involves:

- **Collaborative Team Interaction**: Individuals within a team work together productively to implement the project plan.
- **Comprehensive Documentation**: Thorough collaboration is maintained for documentation purposes.
- **Adaptability to Changing Requirements**: Agility's flexibility ensures responsiveness to shifting project requirements.
- **Continuous Delivery**: Accomplished project tasks are delivered continuously to satisfy customers.
- **Regular Monitoring**: Project progress is closely monitored by project team members and business owners to ensure timely project completion.

The agile umbrella encompasses various methodologies, including DSDM and Scrum. This research, however, centres on the DSDM approach within the agile paradigm, with a focus on knowledge areas that contribute to effective project cycles and reduced risks.

Risk Management: In this study, six articles were utilized to delve into the design and alignment of risk management frameworks within organizations. The literature emphasizes

the importance of risk assessment and management, highlighting the necessity of a robust risk management framework for an organization's future success.
The risk management process encompasses several stages:

- **Risk Identification**: Recognizing potential risks.
- **Analysis and Evaluation**: Assessing the identified risks.
- **Risk Treatment**: Developing strategies to address and mitigate risks.
- **Monitoring**: Continuously overseeing risk management processes.

It is imperative for project managers and their teams to acquire the skills and knowledge required to implement effective risk management frameworks. Given the increasing reliance on software-based and web-based technologies in digitally transforming companies, risks can manifest in various forms, including technical, human, temporal, financial, and environmental.
While numerous risk management frameworks exist, researchers are actively engaged in developing frameworks tailored to agile-based business projects to ensure successful outcomes.
Decision Making: Our analysis incorporates five articles that shed light on decision-making and its potential benefits for organizations. In agile environments characterized by dynamically changing client requirements, the establishment of self-organized teams is essential. Decision-making assumes a pivotal role in project development and risk management, both during and after project deployment.
Specifically, decision-making related to risk management involves the prioritization of risks and the selection of alternative strategies that yield the most positive impact. The integration of risk management tools, often powered by artificial intelligence and based on Multi-Criteria Decision Making (MCDM) principles, has influenced project managers and decision-makers.
Within this research, a framework is developed to empower team members, managers, and end-users to make decisions when risks are identified. These decisions are contingent on individual skills and knowledge, ultimately contributing to the achievement of project-specific goals.

2.14 Research Gap

In the domain of project management research, countless solutions have been proposed for the assessment and management of risks. However, a discernible research gap emerges concerning risk management strategies specifically tailored for DSDM projects. Agile project management, particularly within the DSDM framework, is characterized by the potential for user requirements to evolve both before and after deployment. Consequently, decision-making and project planning for each iteration demand meticulous attention, drawing upon the skills and knowledge of project managers and the collaborative efforts of their teams. Nevertheless, the ever-evolving nature of internal and external uncertainties can limit the knowledge of project managers and team members, presenting a substantial knowledge gap.
Although researchers in project lifecycle management have explored psychological frameworks, they often fall short in addressing contemporary software development trends. Additionally, scholars have explored the integration of artificial intelligence and machine learning into models to develop automated decision-making tools. While these tools have gained prominence in recent project management practices, they do pose the risk of cost overruns and budgetary challenges when applied to small-scale projects.
This research undertakes an extensive review of past studies to evaluate existing models for project risk management. Articles not grounded in risk management research within the context of agile methodologies or Software Development Life Cycle (SDLC) were excluded.

Furthermore, the advent of modern communication technology, especially Information and Communication Technology (ICT), has significantly impacted the success of project management. Hence, articles with minimal focus on ICT and agile risk assessment techniques were also excluded. The aim of this research is to identify existing gaps in project risk management academia, providing a foundation for future research endeavours.

The study narrows its focus to a specific project development framework employed within organizations. Consequently, this research centres on agile methodology while leveraging pre-existing information and data. As depicted in Figure 2, a research gap has been identified, considering the essential elements driving project success within organizations. While generic risk management seeks to optimize costs, time, and product capabilities for organizational success, inputs from employees, customers, stakeholders, and researchers also play an integral role in shaping project outcomes.

Recent studies highlight a digital transition in agile decision-making and risk assessment. The benefits encompass improved productivity, increased revenue, heightened efficiency, and enhanced user experiences. The research gap is most notable in the domain of capturing and addressing end-user risks, prompting the need for innovative ideas tailored to the unique characteristics of agile development environments.

Agile development techniques in business underscore the importance of risk management, cultural values, training, and quantitative and qualitative data for the efficiency and success of DSDM. This gap in agile-based research inspires the creation of a framework that transcends traditional boundaries in risk management and decision-making within agile-based projects. Thus, the study seeks to develop an analytical framework known as the End-User Risk Framework (ERF) to examine the relationship between risk management and decision-making.

A critical analysis is imperative for assessing current models to identify modifications that influence learning, ultimately leading to positive success outcomes. Additionally, this research aims to empirically validate the compliance theory and stakeholder theory, substantiating the relevance of multiple-bounded and contemporary-bounded systems. To this end, data were collected from multiple sources to facilitate qualitative evaluations, resulting in the identification of key themes and descriptions.

Furthermore, the research gap necessitates an evaluation of end-user motives, including individual aspirations and desires, and their alignment with risk management strategies to benefit organizational success. End-user collaboration and input can be effectively incorporated through techniques such as technology road mapping (TRM), Multi-Criteria Decision Making (MCDM), and risk structuring approaches. However, the decisions made should have minimal impact on the final product. Addressing the issue of insufficient interpretation, as highlighted by Wanner et al. (2019), involves reviewing factors, relevant data, and processes based on end-user perceptions of measurement accuracy and alignment with organizational goals.

By analysing past research papers on project risk management and decision-making, a significant research gap emerged, particularly regarding the application of risk management strategies to the DSDM project management method. Existing literature suggests a relationship between project teams and end-users, but this study identifies an unexplored link between risk management and end-users. While previous studies have theoretically and critically analysed risk assessment and treatment within project methodologies, this research aims to bridge the gap by improving communication and coordination between project management teams and clients (end-users). Enhanced knowledge in these areas is expected to boost team performance and enable the selection of suitable risk reduction strategies.

Equally, this study strives to fill the gap in evidence-based literature regarding the association between end-users and DSDM, with a particular focus on business projects that emphasize

project cycle regulation and enhanced contractual terms between companies and clients. The identified gap further pertains to the absence of tools, processes, or theoretical frameworks that support the concept of end-users collaborating with risk management teams. As noted in Zhang et al., (2018) study, project management research has traditionally concentrated on risks, satisfaction, and negative relationships within project development teams. Therefore, this research addresses knowledge gaps by proposing a framework—End-User Risk Framework (ERF)—to enhance collaboration between clients (end-users) and project risk management teams. Additionally, the framework seeks to address the shortage of evidence related to agile projects in both small and large firms with stringent time and budget constraints. While past researchers have sought to enhance traditional project management steps, this study focuses on augmenting the knowledge of project managers and end-users. The proposed framework aims to enhance decision-making in project development and among end-users, reducing the impact of risks on with a project lifecycle. Through the development of the framework, based on the researcher's observations and work experience, this study aims to bridge gaps in less well-established theories. Nevertheless, it is essential to note that the research scope is limited to businesses implementing ICT and software-based technologies to improve organizational performance.

The Research Gap,

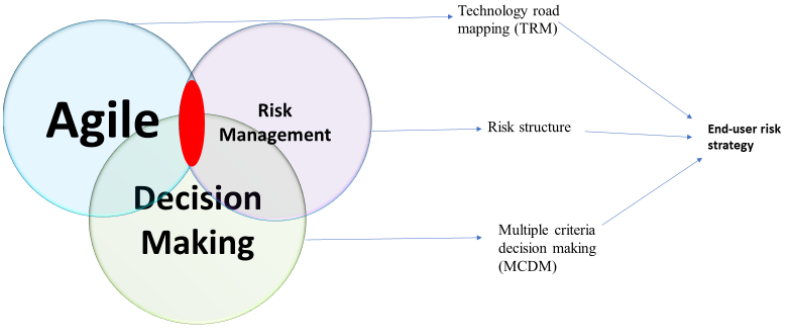

Figure 3: The research gap (Source: Author, 2021)

2.15 Summary

This chapter has offered a historical perspective on various risk management approaches, agile methods, and provided a fundamental understanding of project failures. The literature has been instrumental in highlighting the intricate and multifaceted processes involved in managing risks. It is worth noting that many of these approaches share similar process models and often involve heavyweight procedures. In contrast, agile methodologies advocate for a more lightweight approach, rooted in the belief that their inherent nature reduces risks without necessitating explicit risk management. While this implicit risk reduction is beneficial, it is important to acknowledge that not all risks are addressed. Overlooking certain risks may, at best, be uncomfortable and, at worst, expose projects to unforeseen threats.

The review of existing literature has consistently underscored the need to make research more accessible and relevant to the agile community. This study has identified a distinctive role for end-users within the DSDM framework. It is suggested that enhancing the knowledge base within the project team may contribute to improving the relationship with end-users and enhance the quality of decisions made during the project's lifecycle. This chapter has laid the foundation by presenting an evidence-based framework that outlines contextual issues and provides propositions for structuring subsequent research and empirical data collection.

3. CHAPTER THREE: THEORETICAL FRAMEWORK

3.1 Introduction

This chapter introduces the theoretical framework, which serves as the foundation for the case study. It delineates the key concepts pivotal to the analysis, elucidates their utilization in prior research, and posits interrelationships among them. Initially, it elucidates how Stakeholder Theory, as articulated by Donaldson and Preston (1995), shaped the adoption of the end-user-led risk approach in the study. Subsequently, it presents the primary theory underpinning the thesis: the project organizational structure outlined by Müller, Drouin, and Sankaran (2019a), proposing a layered model of Organizational Project Management (OPM). This framework facilitates the systematic assessment of the DSDM concept from both strategic and project-oriented perspectives. Furthermore, the chapter delves into an examination of compliance theory (Johnson, 2002). These theories collectively underpin the proposed framework (developed in Chapter 7), termed the End-user Risk Framework (ERF).

3.2 Theoretical Lens

The reviewed literature within Chapter 2 indicates the shortage of any coherent, consistent, and integrated theoretical framework for examining end-users participating in risk management. Given this, this chapter shall propose and discuss a theoretical framework for this study. This framework shall provide empirical and theoretical evidence on the significance of this approach between DSDM, end-users, and risk management. Evidence in the literature shows that DSDM is team-orientated skills an essential ingredient required by end-users to achieve product sustainability. The literature further recognized the significance of meticulous support to identify, manage, and monitor risk within a project. However, the

literature, acknowledged that End-users lack the mandatory competencies required to manage, monitor, and mitigate risk. Furthermore, the literature recognized that the project team always took the lead to manage risk and other elements within the project as they see fit but the challenge of educating an end user with insufficient support from the organization can derail the. This challenge can be a result of little or no interest from the project team.

More so, the inadequate support is due to insufficient policy implementation or full support from senior managers or the organization. The insufficient support among the project team is tied to their workload and the duration of each sprint. DSDM project teams should acquire sufficient training to develop their business skills because the acquisition of essential competencies is vital for them to steer the end-users into successful ventures. Accordingly, training programmers to focus on providing competencies such as business ethics, business strategy, conceptual skills, leadership skills, management, marketing, and corporate social responsibility should receive attention. The theoretical framework sustaining this study comprises two theories developed within the literature, namely, stakeholder theory and compliance theory. The expectation is that the combination of theories by the DSDM project and the full support of the organization to integrate the end-users successfully into the team can explain the factors that influence the decisions of a project team within a DSDM project.

The reviewed literature indicates the core theories should be symbiotic to advance end-users progress to transform our precept on risk management. Although, this relationship has not received attention in previous research, and, in the context of DSDM, which this study investigated. Therefore, there is a need to adopt a coherent approach to develop the project team alongside the end-users providing adequate support, which can simplify the entire project. There is no evidence within the literature, which has proposed any theoretical framework establishing the significant association between the DSDM project team and the end-user to support risk management, which can drive the universal changes required for risk management progress to transform a DSDM project. Hence, the theoretical framework provides a general picture of the relations among each phenomenon. In addition to the review of literature, facilitated the mapping out of variables embedded in the research topic, research questions, and research objectives.

As such, this study is focused on the business attributes related to the project team and capability of absolving information and their correlation with an established process governing the development of a software application. The attributes chosen in the study are DSDM Knowledge, decision-making, and risk management and these attributes are linked with the compliance theory and stakeholder management theory. This research attempted to link these attributes with the three parameters of software development in an organization named– DSDM framework, scandalized tools, and DSDM team. The researcher has presented thirteen themes to study how the three business attributes (DSDM Knowledge, decision making, and risk management) and the two systemic parameters (Customer satisfaction and product durability) can be correlated to ensure that the success of the product developed can be increase and objectives and customer satisfaction enhanced. The researcher has established that enhancing end-user involvement can reduce risk in the context of developing software using a DSDM framework and can result in effective customer satisfaction and product durability.

3.3 Stakeholder Theory

The theory of stakeholders has been radically tested by applying and testing various existing theories as well as the proposition of new ones (Johnson, et al., 2020) setting the tone of what

is generally known today as stakeholder theory. Stakeholder theory is a concept of organizations planning to undertake and adapt their activities in response to pressures from either internal or external sources who influence the organization (Freeman, 2017; Freeman, 2023). In this case, the pressure is coming from the end-users for better visibility and involvement in the end-to-end process of the project life cycle. As significant stakeholders (end-users), they may in turn try to influence corporate decisions and actions in a multitude of ways. Its foundation is traced back to (Freeman, 1984) proposal of the stakeholder model, his notion was that the impression of organizations carrying out business activities only considering the interests of just their shareholders or stockholders without concern for others is an anomaly (Freeman, Harrison, Wicks, Parmar, & De Colle, 2010). As part of his argument, organizations should be making efforts to ensure that they try to protect the interests of all their stakeholders, which is every one that is directly or indirectly associated with the organization.

In this view, the model lacks depth and efficiency in areas such as explanation of process, linkage of variables, attention to systemic issues, and environmental assessments. Freeman was proposing a model inclined to abuse since it was aimed at a careless transfer of decision-making power and wealth from those who were deemed to have to others who do not. Stakeholder theory has the potential for conflict arising from divergent interests that could result in a clash of such interests and the difficult situations they generate (Barney and Harrison, 2020). In contrast, the definition of the theory is argumentative, but it is simply one that makes it a primary managerial task to influence, manage, or balance all relationships that can influence the achievement of organizational purpose. It can also be observed that the organisation is a wealth-creating vehicle Post et al., (2002) for all stakeholders of the companies and not just shareholders in response to Freeman's view of the primary or original purpose of the firm being shareholders' wealth creation (Freeman, 2023). Although these are compelling, Freeman's initial findings establish the core deliverable of this research, demonstrating how end-users can affect the achievement of an organization's goals and can be hindered by the decisions and actions towards the achievement of its objectives. In retrospection, (Paloviita and Luoma- aho 2010). argues that stakeholder theory maintains that an organization will seek (albeit, often selectively) to understand and address the requirements (risk management), and expectations of its various stakeholders (involving end-users) to continue to exist and function It also addresses the nature and degree of an individual or group's (end-users) interest in, and influence upon, an organization and its activities may vary considerably between stakeholders (Freeman, 2023) along with the broad categories like regulators, customers, and suppliers, the types, and levels of stakeholder interest and influence will often vary considerably. As stakeholders are a socially constructed concept, and individuals and groups, and their interests are often non-homogenous and are somewhat dynamic, it has therefore been recognized that interests and perceived importance of stakeholders are therefore, relative, can change over time, and are often issue-specific.

3.4 Descriptive, Instrumental, and Normative Views of Stakeholder Theory

Stakeholder theory should be viewed from the perceptive of descriptive, instrumental, and normative (Donaldson and Preston, 1995; Miles, and Friedman, 2020; Phillips, Freeman, and Wicks, 2019; Polonsky, 2019) with the view of describing or explaining as well as impacting the workings, (see figure 4) and activities of the organization (Polonsky, 2019)

Three Aspects of Stakeholder Theory

1. Descriptive Aspect:

- This aspect of stakeholder theory describes corporations as entities composed of various stakeholders, each possessing intrinsic value. It acknowledges that organizations are not solely driven by the interests of shareholders but are rather a complex network of cooperative and competitive interests. Stakeholder theory recognizes the importance of stakeholders such as employees, customers, suppliers, communities, and others, and highlights the interdependence between these stakeholders and the organization. This aspect emphasizes understanding and managing the diverse interests and relationships within the organizational ecosystem (Miles, and Friedman, 2020; Phillips, Freeman, and Wicks, 2019).

2. Instrumental Aspect:

- The instrumental aspect of stakeholder theory provides a framework for analysing how managing stakeholders can influence the achievement of business performance goals. It suggests that effective stakeholder management can contribute to improved corporate performance outcomes. By considering the needs, expectations, and concerns of various stakeholders, organizations can enhance their reputation, mitigate risks, foster innovation, and ultimately achieve better financial results. This aspect encourages organizations to view stakeholder engagement as a strategic tool for achieving long-term success and sustainability (Harrison, and Freeman, 2021; Polonsky, 2019).

3. Normative Aspect:

- The normative aspect of stakeholder theory emphasizes the moral and ethical obligations of corporations towards their stakeholders. It recognizes stakeholders as groups with legitimate interests in both procedural and substantive aspects of corporate activities. This aspect advocates for the acceptance of stakeholders' concerns and interests as essential values in decision-making processes. It promotes the idea that organizations should not prioritize the interests of shareholders at the expense of other stakeholders but should strive to balance the needs of all stakeholders. This aspect underscores the importance of corporate social responsibility, ethical conduct, and stakeholder inclusiveness in organizational governance. Phillips, (Freeman, and Wicks, 2019; Friedman, and Miles, 2020).

Three Aspects of Stakeholder Theory

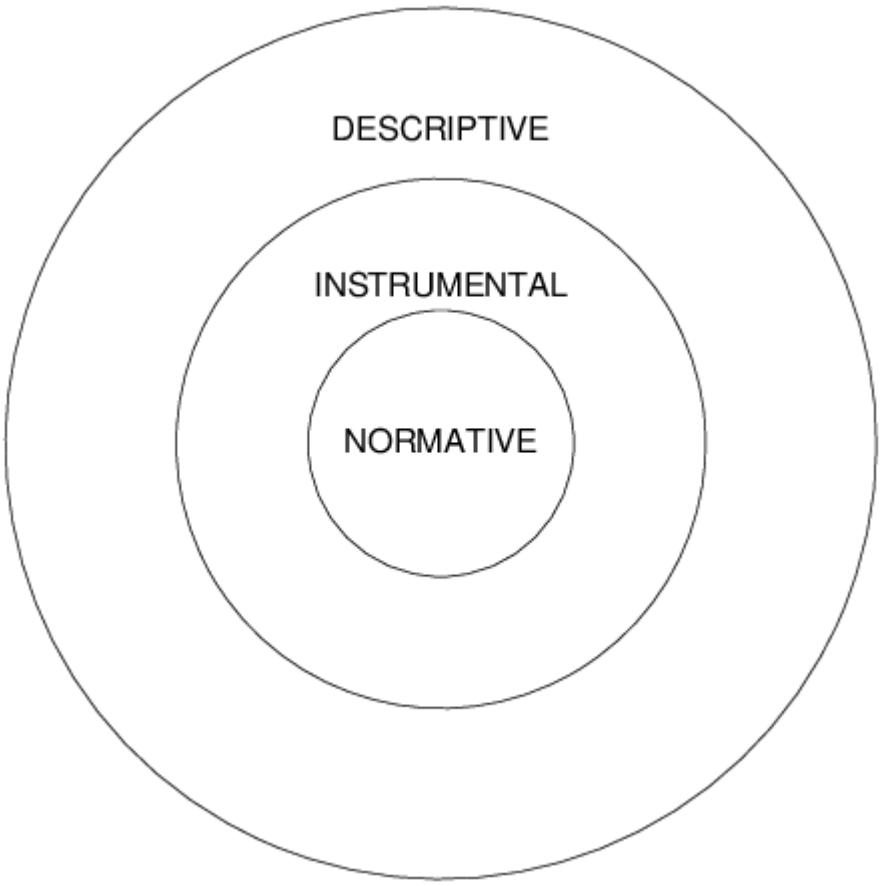

Figure 3. Three Aspects of Stakeholder Theory (Source: Donaldson and Preston, 1995)

Since these three aspects make up the theory, any discussions within the area must align with at least one of them to be considered appropriate, although it primarily derives its foundation from the normative aspect. Consequently, the theory is valuable for prescribing, explaining, or predicting the actions and reactions of stakeholders to each other, as well as the outcomes of such interactions. The researcher emphasized that these three aspects collectively constitute the theory, therefore any discussions within the area must align with at least one of them to be deemed relevant, even though the normative aspect predominates.

From the perspective of DSDM, it is not typically utilized in the agile environment based on the researcher's knowledge. However, this approach will draw on specific features outlined in Table 3.

Stakeholder theory reference

Stakeholder Theory reference	**How does this inform this study's DSDM analysis**
Descriptive- The corporation is a constellation of cooperative and competitive interests possessing intrinsic value. (Miles, and Friedman, 2020).	Stakeholder theory examines stakeholders by analyzing the nature and scope of the various relationships involved. From the perspective of DSDM, this approach to software development can enhance the understanding of end-users, who are often

	overlooked or underutilized. Lacity and Hirschheim (1993) suggest that misalignment of IT strategy can be rectified by addressing stakeholder agendas. Employing a strategic approach enables the researcher to better analyze the value of including end-users in a project, as well as the alignment with business objectives and operational practices. Therefore, the central element of the stakeholder approach is to offer a fresh perspective on addressing stakeholders' concerns by enhancing performance.
Instrumental- Establishes a framework for examining the connections, if any, between the practice of stakeholder management and the achievement of various corporate performance goals. (Harrison, and Freeman, 2021; Polonsky, 2019).	As a proponent of stakeholder theory, Ahn and Skudlark (1997) argue that managing conflicting stakeholder interests can be instrumental in IT implementation. The research adopts this approach because conflicting interests between the organization and the inclusion of end-users often involve agreed deliverables and meeting expectations. This approach proves helpful for measuring performance and evaluating the product delivered.
Normative- Involves acceptance of stakeholders or groups with legitimate interests in procedural and or substantive aspects of corporate activity and the interests of all stakeholders are of essential value. (Freeman, and Wicks, 2019; Friedman, and Miles, 2020).	It is ethical to consider stakeholders, including end-users, and for organizations to adhere to their views. Rackley (1996) argues that this approach minimizes risk, as it fosters confidence in the relevance of end-user participation in risk management for project evaluation. This supports the use of stakeholder theory for end-user lead risk management because it facilitates a mixed-method approach and structures the analysis framework in a readily understood causal chain.

Table 3: Stakeholder theory reference (Source: Author, 2021)

The analysis presented in Table 3 confirms the significant relevance of stakeholder theory within the agile community. Consequently, it is advanced as the proposed theoretical research framework and further developed in the subsequent chapter. In this next phase, stakeholder theory will serve as the guiding principle, providing direction and structure for the application of a mixed methods approach.

3.5 Stakeholder Theory in Risk Strategy

Stakeholder theory has been applied to Information and Communication Technology and Information Systems for several years and its definition can be traced back to (Boddy and Buchanan, 1986; 2018). All those who have a practical concern for the effective application of new technologies, and who are in a position to take or to influence decisions about why, and how they are used" Boddy and Buchanan, (2018). Stakeholder theory provides the benefit of determining who is key in a project, and if and how they can be managed (Hillson,

2023). It has been observed in our rigorous literature review that stakeholder theory has been applied to different fields (ICT environment) and it is therefore appropriate to align it with this research. Through the lens of stakeholder theory, it is thought that organisations may attempt to involve stakeholders and address their views and concerns in the planning, and implementation of their risk strategies, in the hope that all risks will be captured and mitigated promptly. In exchange for doing so, and for ultimately improving their performance. In exploring various perspectives and motivations associated with an organization's dealings with its stakeholders, defined both a normative (ethical) approach and a positive (strategic management) approach.

The normative approach is based on the view that all stakeholders have the right to be heard and treated fairly by an organization (Valentinov, Roth, and Will, 2019), in which case end-users (stakeholders) contribute to both capturing and mitigating risk, and these businesses' activities are beneficial to all. In contrast, the strategic management approach indicates that corporate decision-makers will consider the perceived, relative importance of each stakeholder (Bromley and Meyer, 2017) and the need for its support for the continued existence and functioning of the firm, and this will determine the degree of effort that it will invest in attempting to manage and satisfy a given stakeholder and its interests. Stakeholders set norms for, experience the effects of, and evaluate corporate behaviour (Freeman, 2017). Therefore, it is the responsibility of decision-makers in the organization to safeguard the welfare of the corporation and balance the conflicting claims of multiple stakeholders, hence managers must develop an understanding of the stakeholder landscape and identify those actors that can have a major impact on a company's ability to serve the marketplace. This theory is interrelated with compliance theory and is challenged by severe yet common problems of goal-facilitating enhanced risk management as well as sustained organizational goals and objectives.

Nevertheless, stakeholder theory, in the context of DSDM methodology is a technique to ensure daily behaviours are consistent with DSDM policies and that all stakeholders are fully involved and not blindsided or left behind because it is the formal institution of strategic IT decision-making on the requirements for end-user participation, user story, risk control, development of processes and procedures, deployment, and monitoring procedures for the fulfilment of DSDM requirements. An important function that emerged from stakeholder theory is user awareness, knowledge, and understanding of DSDM and risk management solutions, including end-user and project team behaviour of DSDM practices and information that can be accessed from the level of compliance to the established DSDM policy requirements. Depicts the defined roles and responsibilities that are instituted to properly locate decision-making responsibilities, to promote the parallel connection between the project team, end-users, and business functions, and ultimately, to achieve a project goal. Stakeholder theory can coordinate decisions in an integrated structure across business, it is essential to form groups such as executive teams, committees, or end-users. They may be formed temporarily on a task or can be instituted permanently as an overlay structure in the organization. This approach can act as an advisory function or exercise formal decision-making authority.

3.6 Compliance Theory

Compliance theory as developed from Amitai Etzioni's 1961 study, 'A Comparative Analysis of Complex Organisation's which was later revised in 1975, the concept of compliance was initially designed to define and explain organizational control structures, which before this time was not widely recognized. This is based on the idea that as a social unit with goals and

objectives, organizations are planned and deliberately structured to serve these specific purposes, as well as behave according to norms and rules in place. Etzioni identifies three types of organizational power: coercive, utilitarian, and normative, and relates these to three types of involvement: alienation, calculative, and moral. While exceptionally oversimplifying the relationships, helps to make clear the pattern among the components. It should be noted that life in organizations is much more complicated.

Majority of organisations can be categorized into one of three congruent relationship dynamics: coercive compliance (coercive power and alienation involvement), utilitarian compliance (remunerative/utilitarian power and calculative involvement), and normative compliance (normative power and moral involvement) (Hyle 2006; Lunenburg 2012). Relationships between the team and the end-user are possible, but the underlying premise of compliance theory suggests that organizations will be inclined to shift the power used by the project team or change their involvement as the type of power can influence decision-making. Additionally, organizations will resist change that threatens the congruency of the compliance relationships (Hyle, 2006).

Particularly, the theory is proposed to help examine the relationship dynamics between those who hold power in an organization and those who are subjected to that power. Lower-level participants are subordinates who can have formal, or informal roles within the organization (Dodge, 2016). The key components of compliance theory are the types of power utilized by an organization, the types of involvement of the lower-level participants, and the resulting relationship between the two.

Organizational power differs based on the means chosen to control participants (Lunenburg 2012). This could be conceded as physical, material, or symbolic. Compliance theory classifies organizational power as coercive, remunerative, utilitarian, and normative.

a) Coercive power utilizes force or the threat of physical sanctions to control lower-level participants. Coercive power structures are common in prison and military settings.
b) Remunerative power (also referred to as utilitarian power) constructs, organizational representatives control lower-level participants through extrinsic rewards. These include salary, commissions, job security, and more.
c) Normative power rests on the allocation of symbolic or intrinsic rewards to exert control over lower-level participants. Some examples of normative power structures include churches, professional associations, and schools (Lunenburg 2012).

In the area of organizational theories, compliance theory specializes in analysing the relationship and power dynamics within an organization. Outside actors may interact with the organization and its members; however, the low level of adherence to any of the dimensions of participation eliminates them from consideration within the framework of this theory. Similarly, lower-level participants are more important than higher-level participants within the theory's framework as controlling a lower-level participant may be more difficult and the largest differences in levels of 4 Compliance Theory of Organizations compliance are found when studying lower-level participants.

The primary concept is this type of power used by organizations and their representatives (end-users) and the types of involvement they might have within a project. End-users can sit within remunerative or utilitarian power and utilize extrinsic rewards (such as monetary benefits) to establish control because normative control employs symbolic and intrinsic

rewards to encourage compliance). While coercive power is characterized as the use of force or threat of force to maintain control. A later study on the concept of compliance confirmed the previous findings by concluding that within structured organizations or groups (such as a DSDM project team), the behaviour of subjects or actors conforms to the requirements of behavioural prescriptions (Young, 1979). At the centre of the compliance theory is the understanding that organizations differ in the means used to control those under their authority and ultimately, the response and involvement of such participants toward them. It is therefore on this notion that the concept of compliance becomes relevant within the premise of DSDM, more specifically, within the area of capturing risk with the help of the customer. Similarly, from a wider perspective, the responses of 'organizations' tend to differ considerably towards the adoption, application, and implementation, mostly based on the varying levels of understanding and acceptance of such provisions.

3.7 Layered model of organizational project management (OPM)

To build upon the contextual variables from the theories and literature review in Chapter 2, which provide a 'lens' for the research design, the study took an organizational-centric perspective to better understand the implications of such an approach in light of the challenges faced by end-users in orchestrating risk management. In order to stay current with the literature, the researcher referenced the Onion Model (Müller, Drouin, and Sankaran, 2019) from their book 'Organizational Project Management'. This model offers a seven-layered framework providing 'logical cohesion' and 'logical adhesion' both within and between layers. To provide context for this research, it offers an adaptable framework to be investigated, encompassing three layers: Business Integration, Organizational Integration, and Project Management, as depicted in Figure 9. This approach offers perspectives from various dimensions of portfolio, program, and project management, thereby contributing to an agreed-upon approach of including end-users in capturing and mitigating risk. Building on the conclusions drawn from existing research, the contextual variables have been applied to the Müller OPM Onion Model (Müller et al., 2019). Figure 4 serves as a guide to shape the evolving evidence based DSDM research framework.

The OPM onion model (showing: three DSDM measurement domains: business integration (blue) organization integration (yellow), and project measurement (green)

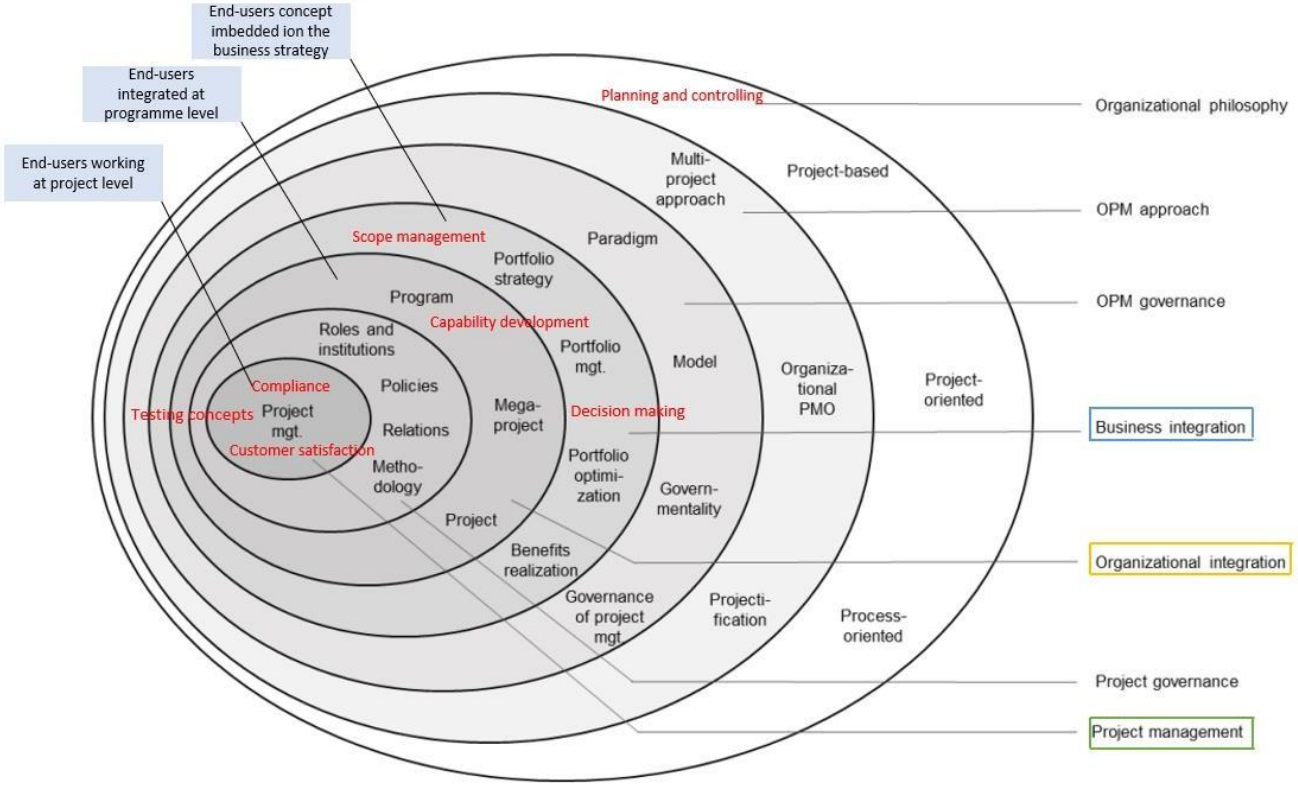

Figure 4: Adaption of the OPM onion model (showing: three DSDM measurement domains: business integration (blue) organization integration (yellow), and project measurement (green), mapped to Muller's seven levels (Source: Müller, Drouin, Sankaran, 2019)

There were nine contextual variables identified within the OPM model that were included in the study. Seven of these variables were derived from the literature findings (highlighted in red text) with the additional two issues being: the level of organizational complexity (the three levels shown in the Organizational Integration onion ring); and the 'Type of Organization' that sits within the Organizational Philosophy layer. The DSDM relevance of these nine variables is shown in Table 4 below.

	Variables (7) from LR and OPM	**Can traditional risk variables be used to capture end-user-led risk strategy?** **How can the DSDM process be customized to capture?** **risk strategy using end-user voice?**

Organizational Philosophy	Type (complexity) of Organization (its business nature) Planning and controlling	The view of the organization determines its possible approach to end-users' involvements. Not limited to market share, interaction with its stakeholder, shareholders, and venders. Müller et al (2019) describe this as also including whether the organization is project based, project oriented, or process oriented.
Business Integration	Decision making	The business must identify, the benefits of end-users, prioritize and align them to the business strategy therefore slipping over to portfolio alignment and eventually achieve the goal of inclusion.
	Scope management	The portfolio office offers a bird eye view for the different the functionalities that police the projects within the organization. If performance of either the end-users or the project team reduces the quality of the product can be hindered. These benefits being aligned to DSDM provides the link between organizational strategy and delivery success based on business case assumptions. (Killen and Drouin, 2017; Keeys and Huemann, 2017; Marnewick, 2016)
Organizational Integration	Capability development	(Müller et al, 2019) viewed this layer to be how it addresses the form of organizational integration of project-related work, which has a strong influence on the way DSDM projects are delivery and governed.
Project Management	Compliance	Leadership and ability to make the right decision at the right time is critical to success and continue improvement of the project. So, introduction of end-users to hence Productivity and reduce risk require clarity of direction and define role and responsibility.

	Customer satisfaction	Customer satisfaction seemed like the corner stone of any organization, The ability to overlay the new approach needs to be based on a good understanding of both. DSDM and the end-user and the ability to collaborate
	Testing concepts	The Müller onion diagram included a robust connection between roles, policies, relations, and methodology in the project governance layer. The methodology comprises the tools, systems and process maturity that are both in existence and need to be adapted if the introduction of a new framework model for DSDM is to be successful.

Table 4: Summary of contextual variables across organizational boundaries using the Müller Onion Model (Source: Müller, et al., 2019).

3.7.1 Identification and proposed usage of the 7 'Variables Framework' issues

The above contextual variables were pulled out of the literature's nodal structure of context variables and the Müller OPM Onion Model (Müller et al., 2019). This knowledge the evidence of this research framework, shown below will be taken forward as the 'Variables Framework' for investigating the propositions since it is suggested that propositions cannot be tested directly because they are derived from associations between abstract constructs. As an alternative, they are tested indirectly by examining the relationship between corresponding measures (variables) of those constructs, and by gathering empirical evidence from the interviews and case studies. They will be repeated through derived learnings at each stage of the research to inform the proposition analysis, thereby meeting the research objectives and answering the research question.

3.7.2 The hierarchy/levels between project organization to DSDM framework

In software development, several considerations need to be taken into account. These include whether the new product (at the project level) meets the client's expectations, whether the anticipated benefits have been achieved, if the team has delivered using the DSDM framework (project governance), whether they encountered any pushbacks, and if the project aligns with the business strategy (portfolio strategy). These aspects are crucial for understanding the successful integration of end-users into DSDM project development and delivery, as the answer is more strategic than redundant. One of the contextual issues identified is the necessity to identify and build the right knowledge for end-users, paving the way for project success and aligning it with the business objectives. Fundamentally, this fosters collaboration between the theories that reinforce the research.

The success of DSDM projects has not been heavily researched from the researcher's perspective, although a large body of literature exists on 'project success' within the project management environment. However, the connection between project success and DSDM success is linked to achieving a specific combination of objective and subjective measures assessed at the project's conclusion. There are three levels of success criteria: Was the project done correctly? Was the right project undertaken? And were the projects completed correctly, consistently over time? This insight is relevant for linking project success with DSDM projects, as these projects deliver longer-term impacts that align with business objectives, including end-user involvement.

3.8 Synthesizing the initial Theoretical model End-user Risk Framework (ERF) from the literature.

The components of DSDM offer long-term benefits for the project. This is crucial for end-users because, as discussed earlier, there is evidence that the current relationship limits their involvement. Therefore, the majority of organizations recognize the difference between what they can allow and what they cannot. Moreover, to achieve the desired outcome, there may be many steps between an organization's activities (such as amending business strategy, portfolio/program, and project structure) in an attempt to find common ground for end-users and establish a suitable DSDM framework.

Based on the literature review from the previous chapter and the theoretical analysis in this chapter, an initial theoretical model has been developed, called the End-user Risk Framework (ERF). A prototype will be provided in a later chapter, but for now, here is an initial description of the design. ERF is based on two underlying theoretical models discussed earlier in this chapter. This provides a link to the end user's integration into the DSDM framework to address the dark cloud of risk management, which is also managed by the project team. In essence, ERF offers a new holistic method to improve variability that emerges through risk. This approach will enhance decision-making and mitigate extra costs that might arise if risks are not addressed.

3.9 End-User Risk Framework

As discussed in the study, the agile project environment serves as a framework that promotes continual adaptation based on evolving requirements. Consequently, documenting project requirements and associated risks becomes essential. However, user involvement in project development activities is often limited, with project phases and relevant activities typically not communicated to users. Nonetheless, managers do involve users when reviewing project progress.

Literature suggests that increased end-user involvement in project development can help reduce project risks. However, project management researchers have not proposed or extensively researched a framework focusing on risk identification and mitigation by end-users. The End User Risk Framework (ERF) is derived from the theoretical principles of compliance theory and stakeholder theory. These theories collectively emphasize risk management to enhance relationships among contractors, clients, businesses, and other stakeholders. In complex project development environments such as agile and DSDM, the ERF theory advocates for continuous collaboration between the project development manager and the product owner, who is also considered the end-user. This framework aims to enhance end-user and project-manager relations, akin to the theoretical frameworks presented in stakeholder and compliance theories.

The ERF theory encompasses multiple aspects, including stakeholder relationships, controlling and planning agile DSDM project delivery, and a structured approach to risk management. All these concepts are critically analysed to develop the ERF model, underpinning stakeholder and compliance theories. Additionally, the theory outlines an efficient approach to identify steps involved in risk analysis and plan risk mitigation strategies involving end-users. The following sections comprehensively describe the ERF concepts to provide a better understanding of the model.

3.9.1 Concept 1 – Compliance End-user Risk Framework (ERF)

The overarching End User Risk Framework (ERF) is integrated into the DSDM framework,

with several principles discussed earlier forming the core of the proposed ERF model. These principles define a series of iterations based on user stories, with each logical relationship flowing to produce the final product. The ultimate success of DSDM lies in its ability to demonstrate progress toward achieving the desired outcome through continued collaboration with the product owner (end-user representative) and the project team. Success strongly relies on planning and controlling, compliance and risk management, and personal engagement with DSDM.

A key aspect of this research is understanding the DSDM approach and how end-users can be more engaged at the project level. This understanding stems from insight into the DSDM lifecycle and how end-user participation is crucial for initiating the project 'correctly', aligning stakeholders, and business strategy. Figure 5 illustrates both the end user and the project team working within compliance parameters to standardize the process and ensure a smooth transition of risk workshops occurring at the beginning and end of each increment."

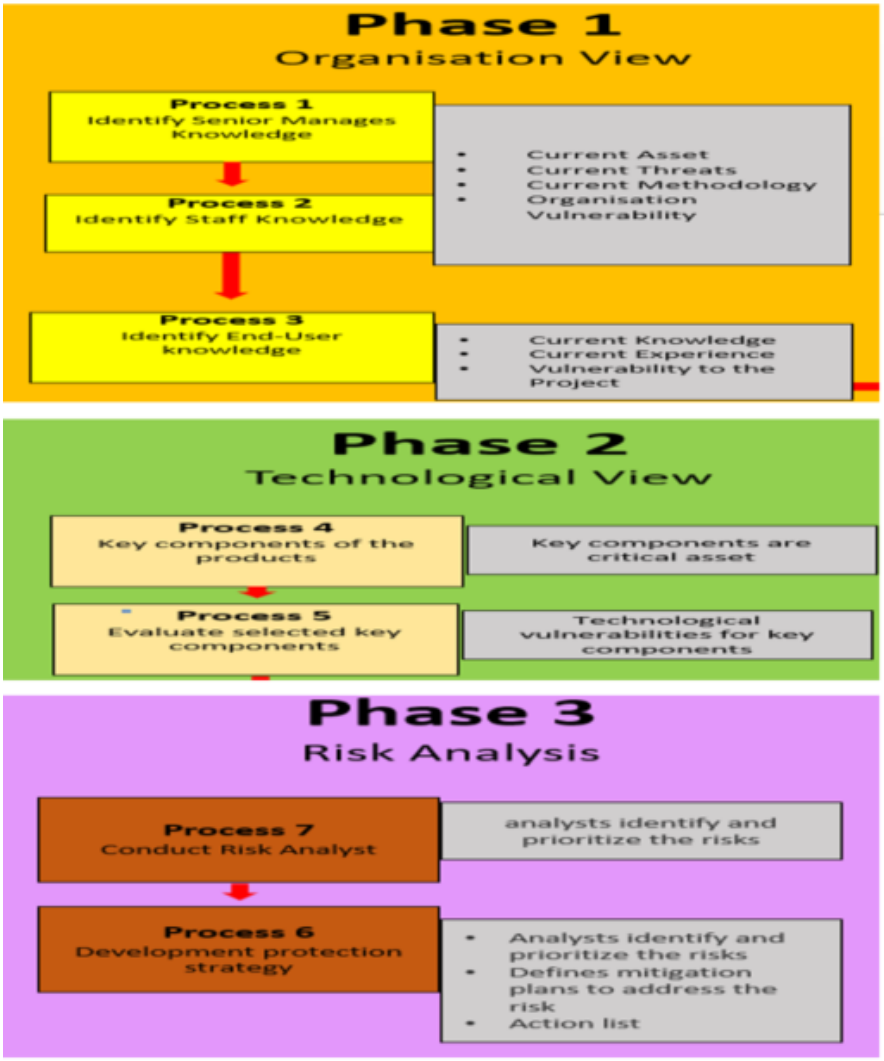

Figure 5: Concept 1 – Compliance End-user Risk Framework (ERF) (Sources: (Author, 2022)

Concept 1 – Compliance End-user Risk Framework (ERF),

3.9.2 Concept 2 – Planning and Controlling Delivery of Projects with end-users in an Organizational Structure

In general, agile projects or Infrastructure project management are not designed to fully incorporate the contributions of end-users. This approach is disciplined, focusing on phased delivery within the constraints of time, cost, and scope to deliver a defined output. The DSDM framework is well-disciplined in planning, designing, and delivery. Therefore, any external interference might be viewed as an additional requirement to the framework.

Engaging the right stakeholders (end-users) at the right time and using the right tools to design the appropriate approach will result in product durability and customer satisfaction. Thus, this framework will operate within the boundaries (as demonstrated in Figure 6) set by the project team.

Concept 2 - Planning and controlling Delivery of Projects with end-users in an Organisational Structure

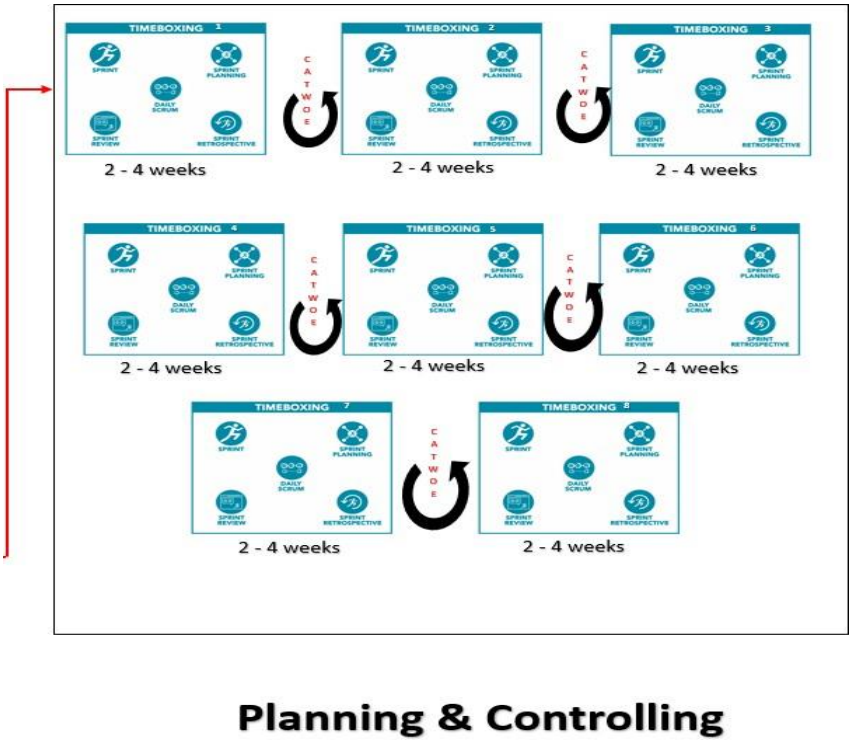

Figure 6: Concept 2 Planning and Controlling Delivery of Projects with end-users in an Organisational Structure (Sources: Author, 2022)

3.9.3 Concept 3 – Structured risk management approach.

DSDM is an iterated technique, therefore any formula of risk management must mirror such an approach.

Concept 3- Structured risk management approach

Figure 7: Structured risk management approach. (Source: Author, 2022)

The researcher acknowledges the importance of reviewing risks before and after each sprint, as traditional risk management is typically standalone and reviewed only occasionally. Risks in DSDM can be complex if not fully understood and managed, challenging the concept of traditional risk management as discussed in earlier chapters. This understanding recognizes a connection that aligns with concepts 1 and 2 described earlier.

These concepts are demonstrated in Figure 8 below, illustrating how risk is continuously monitored throughout the project duration. With end-users (product owners) chairing risk discussions, specific or unforeseen issues can be identified and addressed before they become unmanageable. These initiatives provide successful monitoring during and after project closure, ensuring alignment with business strategy and mitigating potential hindrances. Consequently, this framework operates as a set of organized and interconnected systems, enabling the project team to address any issues effectively. It focuses on identifying the interrelationships between risk capture and mitigation strategies.

End-user Risk Framework

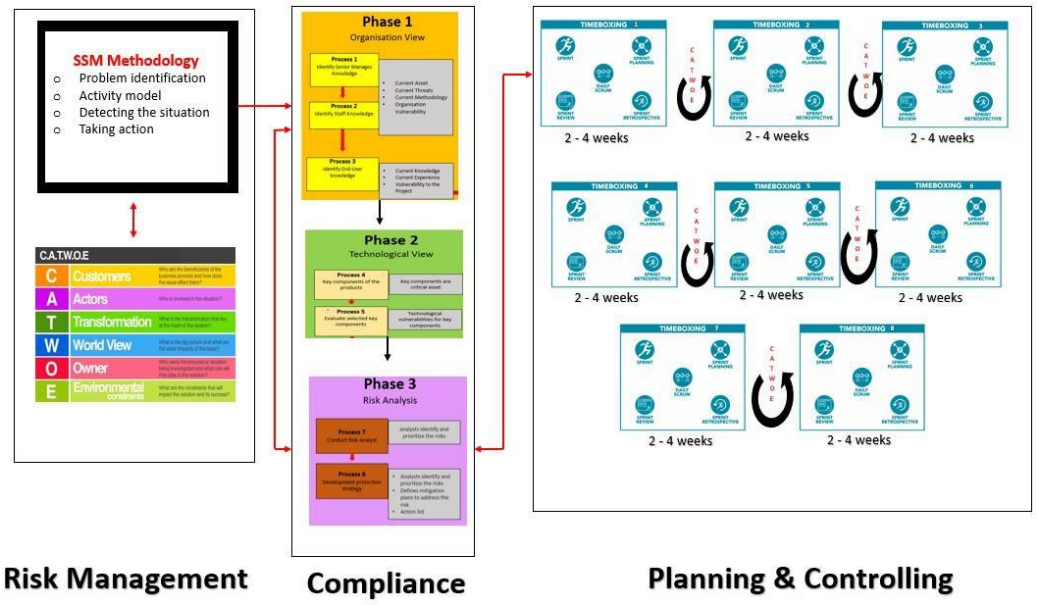

Figure 8: End-user Risk Framework (Source: Author, 2022)

3.10 Summary and Implications

3.10.1 Justification of the theoretical framework

Both descriptive and instrumental approaches focus on competitive interests possessing intrinsic value and examine the connections, if any, between the practice of stakeholder management and the achievement of various corporate performance goals. Therefore, the researcher views these as fitting for the research.

The normative approach involves the acceptance of stakeholders or groups with legitimate interests in procedural and/or substantive aspects of corporate activity and considers the interests of all stakeholders to be of essential value. These three approaches together form the theory, so any discussions within the area must align with at least one of these aspects to be considered fitting, although it primarily draws most of its basis from the normative aspect. This influences the decisions stakeholders make, including giving consent to agreements, considering available choices, and deciding on strategies to achieve their goals.

As such, the theory is valuable for prescribing, explaining, or predicting the actions and reactions of stakeholders to each other, as well as the outcomes of such interactions. The researcher insists that these three approaches together form the theory, and discussions within the area must align with at least one of these aspects to be considered fitting, although it primarily draws most of its basis from the normative aspect.

Regarding participants in the normative approach, these include end-users, the end-product, the DSDM framework, the DSDM team, external stakeholders, and compliance theory. They set the tone for performers, stakeholders, processes, and procedures, and are in a relationship with each other to protect certain interests (such as the end-product) or access critical resources (such as stakeholders including end-users and the DSDM team).

Both Compliance theory and the DSDM framework emphasize the role of reason, mind-set change, policy, procedures, and fairness in decision-making for anyone directly or indirectly involved in the project. The end-product and end-users represent power, which depends on the controller of resources (the DSDM team), while the DSDM framework represents the responsibility of ensuring that all members associated with the end-product comply with the terms of the agreement within the DSDM framework and compliance theory. Consequently, if any party fails to fulfil their responsibilities, the researcher believes participants can protest or withdraw their support. Therefore, decisions are aimed at win-win situations for all parties involved, even as each party attempts to protect its self-interest rationally.

Stakeholder theory is consistent with finding a variable and the process of risk strategy within DSDM to identify and manage risk, as it emphasizes the adoption of recognized influential stakeholders who seek to protect their interests in the project. This concept aligns with the core Agile value of "customer collaboration." Moreover, stakeholder theory ensures that this can be achieved by indoctrinating key members in an Agile way. Stakeholder theory also affirms its adherence to universally recognized norms, allowing organizations to undertake and adapt their activities in response to pressures from internal or external sources that influence the organization. Consequently, such standards can be enforced based on their suitability, culture, and acceptability within stakeholder theory communities.

Within the realm of implementation, the concept of compliance can explain the unreliable thirst for power and control under examination in this study, particularly regarding end-users. Compliance theory builds on the understanding that organizations vary in their use of control over those under their authority, leading to differences in the response or behaviour of project teams aiming to work efficiently with minimal interaction from end-users. Therefore, the concept of compliance theory becomes relevant within the context of DSDM, especially in the area of capturing risk with the help of the customer. Furthermore, the responses of organizations toward the adoption, application, and implementation of provisions vary considerably based on their understanding and acceptance of such provisions.

The theoretical framework encompasses statements about the relationships between its theories and variables. This thesis argues that risk management should encompass all elements of risk. The literature review on organizational agility suggests the potential for involving external participants in processing data and information within a project, extending beyond traditional risk management practices. Consequently, the ability of an organization to adapt and better accommodate the needs of end-users reflects its capacity to influence the evolution of its business strategy. This perspective views business strategy changes as an evolutionary process rather than simply planning, emphasizing both technology and the role of people interacting with it.

This perspective contrasts with much of the research on agility, which often assumes a blank canvas and easy change, typically led by the IT estate. The literature review suggests the concept of modifying risk management tools to better suit organizational needs, which can both enable and pressure innovation within organizations. The evolution of infrastructures, such as risk management tools, is both enabled and constrained by the existing installed base. These constraints can sometimes become resources, for example, when deadlines drive people to complete tasks. The modularity and generativity of tools may facilitate quick changes in IT, whereas growing bureaucracy in some organizations may hinder such changes. Consequently, organizations may not always make optimal decisions but may be satisfied

with making good enough decisions.

Information and its free flow are crucial factors in this context, enabling new activities of sensing and responding. Information is explicitly regarded as an element of decision-making, risk management, the DSDM framework, and associated tools. This focus allows for an examination of interactions between the project team, the business, and end-users. Moreover, it suggests that fresh insights from end-users, knowledge management, and knowledge transfer activities involving all relevant participants could capture and respond to unanticipated risks while addressing the tasks at hand.

3.10.2 Summary

This chapter has delineated the theoretical framework that will be employed to address the initial research question posed in Chapter One: Risk management in a DSDM environment. Here, risk management is defined as a collaborative effort that acknowledges the interaction between end-users and the project team within an organization, serving a specific purpose. These efforts are relational, emerging from the dynamic relationship between technology and organizational practices, and are not directly controllable by management.

Risk management is conceptualized as an organizational practice within the DSDM methodology, involving the identification and response to activities related to the flow of risk within its boundaries. In detailing the theoretical model, this thesis contends that risk management processes should be understood within the context of business strategy, end-users' perspectives, and the agility of the project team as practices evolve.

To comprehend these processes, the framework proposes a focus on the interactions among the project team, the business, and end-users. Consequently, the theoretical framework integrates standardized tools, the DSDM framework, and end-users as elements, illustrating how this combination can facilitate an understanding of the impact of end-user-led risk management."

Chapter FOUR: METHODOLOGY

4.1 Introduction

The fourth chapter of the current research delves into the methodology, which examines why the case study approach and literature review were chosen as the most suitable methods for the study. This decision is justified by the need for a research methodology that is rational, relevant, and achievable (Merriam and Grenier, 2019). The chapter primarily covers the methodological philosophy, research paradigm, study approach, research design, data collection and analysis, and ethical approval. The research philosophy refers to the beliefs and assumptions guiding the research process, including the nature of knowledge, the role of the researcher, and the methods used to gather and analyse data. In this section, focus was placed on the ontology and epistemology research philosophies, which play a significant role in shaping the design and interpretation of case study-based research.

Additionally, the research paradigm, a philosophical framework guiding the design and execution of a case study, was discussed. This chapter elucidates how the analysis derived from earlier chapters informed the research design and methodology, utilizing an approach to gain insights into the project team.
Lastly, the study addresses ethical considerations crucial in all forms of research, including case study-based research. This includes obtaining informed consent and maintaining the confidentiality of information retrieved from the case studies.

4.2 Research Philosophy

The concept of research philosophy encompasses the development and nature of knowledge. It defines the researcher's belief system, which consistently guides the execution of the research, shaping their perception and worldview of issues throughout the research process. These aspects are crucial as they inevitably influence the researcher’s choice of research methods, instruments, and, importantly, the interpretation of findings. In case study-based research, research philosophy refers to the underlying beliefs and assumptions that aid in the design and explanation of the study. The chosen research philosophy influences the research questions, data collection methods, and data analysis techniques employed. In the current study, the research philosophy encompasses the researcher’s ontological and epistemological positions in case study-based research. Ontology relates to the researcher’s assumptions about the nature of reality (objective or subjective reality), while epistemology pertains to what the researcher considers acceptable knowledge and the process of knowledge development within the field of case study. Another aspect of research philosophy concerns the role played by the researcher’s values in the research process (Value-free). This aspect questions whether the research is conducted in a manner that is value-free, value-laden, or value-bound.

4.2.1 Ontology

This pertains to the researcher’s assumptions about the nature of reality, encompassing the acknowledgment of multiple realities among participants, often represented through various themes derived from the actual words and perspectives of different individuals (Moustakas, 1994). The question arises: Is reality objective or subjective? For this study, the researcher adopts a pragmatist position, which posits that reality is external but can be interpreted through multiple viewpoints to address the research questions.

The pragmatist approach shifts the focus from questioning whether knowledge accurately reflects an underlying reality to evaluating whether it serves the intended purposes. Pragmatists argue that there is no additional benefit in postulating a reality 'behind'

appearances and concerning oneself with whether statements accurately represent that reality. Given the nature of this study, the researcher adopts this position because it recognizes that there are multiple versions of reality regarding risk management and decision-making, whether perceived or otherwise. These realities influence how a project team operates in a fast-paced environment, thus informing the research questions and objectives to be addressed.

Ontological positions have been guided by the nature of research questions and objectives developed at the start of the research. Thus, given the nature of this study, the researcher has adopted a pragmatist position. The pragmatist stance in case study research is a philosophical perspective that emphasizes the practical utility of research and the importance of considering the context and circumstances of the study. This perspective asserts that there is no single, objective truth and that knowledge is shaped by the context and experiences of both the researcher and participants. Pragmatist case study researchers stress the importance of tailoring research design and methods to the specific context and circumstances of the study, rather than adhering to a fixed set of procedures (Kaushik & Walsh, 2019). This may involve employing multiple data collection methods such as interviews, observations, and document analysis. In the contemporary study, interviews are utilized to gain a comprehensive understanding of the phenomenon under investigation. The pragmatist perspective also emphasizes using research to address practical problems and improve real-world outcomes, rather than merely generating abstract knowledge. This is evident in the selection of research questions and methods for gathering and analysing data. Overall, the pragmatist stance in case study research prioritizes flexibility, practicality, and relevance, and underscores the significance of considering the unique context and circumstances of the study in shaping research design and interpretation (Kelly & Cordeiro, 2020).

This is predicated on the fact that the current study focuses on analysing the risk processes of an organization, with an emphasis on the end-user rather than the project team. This necessitates the researcher to not only examine and analyse existing frameworks using doctrinal, documentary, and comparative analyses but also to interview key players within the agile community (empirical analysis based on a case study approach). While some research questions can be answered using data from secondary sources such as scholarly journals, articles, and books, others require a more contemporary perspective and are thus addressed with primary qualitative data and case studies. Consistent with the pragmatic perspective explained earlier, the researcher's primary focus is to adopt techniques and methods that adequately address the research questions based on the case study approach.

4.2.2 Epistemology

A researcher's epistemological position relates to what the researcher considers acceptable knowledge (and the process of knowledge development) within a particular field. Epistemology is essentially concerned with knowledge and belief. In case study-based research, epistemology refers to the researcher's beliefs about the nature of knowledge and the best way to acquire and understand it. These beliefs shape the design and interpretation of the study and determine the types of data that are collected, as well as the methods used to analyse it. The epistemological stance posits that knowledge is socially and historically constructed by the project team, particularly those who play critical roles in a project. The project team is likely to bring and endorse knowledge that has been shaped and influenced by their circumstances, qualifications, or other factors, thereby influencing the outcome of a case study-based project. To accomplish the methodological goals and aims of the case study-based research project, the contemporary study employs research philosophy while incorporating the ideas of ontology and epistemology.

4.3 Research Approach

With a clear understanding of the ontological and epistemological boundaries of the case study-based research paradigm, it becomes possible to define the research process. Within the case study-based literature, there are three types of research processes: 'deductive', 'inductive', or 'abductive'. Abductive research is considered to encompass both deductive and inductive approaches, with varying degrees of induction and deduction. Deductive research involves starting with the identification of existing theory and examining how it can be validated. Conversely, inductive research aims to generate theory based on the findings produced through the research process. In the present case study-based research, both approaches are employed, combining to form an inductive approach. The study utilizes a deductive approach, where theory is developed through the creation of a conceptual framework based on existing literature. Additionally, an inductive approach is used to consolidate empirical findings and generate a framework to enhance risk strategy throughout the process. This dual approach is suitable for the research as it is conducted in an organized and structured manner, ensuring credibility and reliability. Consequently, the conclusions drawn are based on observable facts, making the process replicable. Studies employing both deductive and inductive logic are considered abductive in their research approach.

In particular, the present study is of an inductive nature. This approach allows for the generation of new hypotheses and theories based on the data collected from the case study design. The case study design enables the researcher to conduct an in-depth examination of a specific phenomenon within its real-world context. This design allows for a detailed examination of the subject matter and provides a holistic understanding of the issue under investigation. The inductive approach, in conjunction with the case study design, allows for the exploration of new and previously unexamined aspects of the subject matter, providing a thorough and nuanced understanding of the phenomenon being studied. This approach is valuable because it allows for a more flexible and creative way of thinking, encouraging researchers to consider multiple explanations for a phenomenon rather than just one. The table below outlines the key stages of the research study method, including data collection, analysis, and interpretation.

*S*ummary of the main stages of the research

Literature Review (Chapter 2):	• A comprehensive examination of existing literature on DSDM and risk strategy. • Analysis of DSDM theory, practice, origins, purposes, and its role in managing risks. • Review of theories and research related to risk strategy, including motivations, deterrents, and potential outcomes.
Theoretical Framework (Chapter 3):	• Synthesis of insights gained from the literature review. • Development of a theoretical framework for DSDM and risk strategy. • Establishing a structured foundation to guide subsequent research design and analysis.
Approach and Methods (Chapter 4):	• Description of the research approach, emphasizing its qualitative, inductive, and exploratory nature. • Overview of data collection methods, including rationale for sample selection and design of interviews. • Discussion of data analysis and interpretation techniques employed in the study.

Data Collection (Chapter 4):	• Conducting interviews and other data collection methods to gather insights from practitioners and stakeholders involved in DSDM projects. • Recording and reporting of interview findings.
Data Analysis (Chapter 4):	• Analysis and interpretation of collected data to derive meaningful insights. • Utilization of qualitative analysis techniques to address research objectives effectively.
Findings (Chapter 5):	• Presentation and organization of key research findings based on themes and research questions. • Discussion of insights into DSDM emerging from the data analysis process.
Triangulation of Results and Development of ERF (Chapter 6):	• Synthesis of insights from literature review and interviews. • Refinement and expansion of the End-user Risk Framework (ERF) based on iterative development and review.
Discussion (Chapter 7):	• Examination of main findings and outcomes in the context of existing literature. • Identification of contributions to DSDM theory and practice.

Table 5: Summary the main stages of the research (Source: Author, 2024)

4.3.1 Justification for Qualitative Research

Throughout the current study, a qualitative research methodology is employed. Qualitative research is inherently subjective, which can lead to perceptions of unreliability in its results. Therefore, it is crucial for the researcher to be reflective in validating such research and applying the relevant research instruments. This technique ensures that the necessary data to address all research aims and objectives are effectively obtained.

The research context of this study is subjective and case study-based, as the researcher explores the organization through qualitative interactions with its managers to delve into the strategy process and its procedures. By exploring the strategy process procedures, a qualitative approach can be used to answer research questions about the strategic activities and the tools used in the case study-based strategy process. A qualitative approach is appropriate for developing an in-depth understanding of strategic activities within an organization. This is achieved by studying a small population within the organization without controlling the environment, thereby enriching the data collection process. Through this approach, it is possible to understand which activities and tools are employed within the organization during the strategy process, and more importantly, why they are used.

Throughout the research process, meticulous attention was paid to mitigating subjectivism's influence on the research findings, considering the culture and personalities of the individuals involved. Despite the weaknesses inherent in qualitative research, several strengths justify this approach.

These strengths encompass obtaining more in-depth information, facilitating ease of arrangement, and fostering group interaction, which encourages further discussion. Qualitative research offers a realistic depiction of the observed world, providing flexibility in data collection and interpretation, as well as a comprehensive description of the world through primary, unstructured data. The qualitative method is preferred for in-depth

investigations of research problems, as it examines subjects in their natural settings, aiming to interpret phenomena based on the meanings people attribute to them. This approach involves the inductive analysis of data, progressing from specific details to general themes, with the researcher interpreting the data's meaning.

Qualitative research seeks to comprehend the meaning that individuals or groups assign to social or human problems, analysing authentic situations within familiar settings and incorporating people's expressions and activities in their local contexts. In contrast, quantitative methods explain phenomena by collecting numerical data analysed using mathematically based methods. Quantitative research is suitable for testing objective theories in relation to variables and provides breadth of information from a large number of units. However, when exploring a problem or concept in-depth, qualitative research is more appropriate.

For this study, the qualitative research approach was deemed most suitable. Nevertheless, qualitative research remains essential in case study-based research, offering a rich and in-depth understanding of complex phenomena. This approach allows for thorough exploration of the context in which a case occurs, providing a unique perspective on the experiences and perspectives of the individuals being studied. Unlike quantitative research, which relies on statistical analysis and generalization, qualitative research is flexible and adaptable, enabling the customization of research methods to suit the case's unique needs. Furthermore, qualitative research generates rich data, including detailed descriptions and interpretations of individuals' experiences, contributing to the development of new theories and concepts.

4.4 Research Design

Research must provide clear definitions or descriptions, as they not only aid reader understanding but also clarify the preferences and, perhaps, the biases of the author or researcher. The primary aim of any research is to acquire new knowledge, whether through the process of inquiry and investigation or through addressing a specific problem. It is regarded as an area of critical importance and is pursued to expand our understanding. Research can be likened to a voyage of discovery, involving the exploration of three main questions: 'what', 'why', and 'how'.

4.4.1 Research Strategy (Case Study)

Research methods are fundamental to the research process, with commonly utilized strategies including experiments, surveys, analyses of historical achievements, and case studies. Describing a case study isn't straightforward due to its complexity. In a case study, the focus is placed on a specific unit. The case study method isn't solely aimed at analysing cases; rather, it serves as a means to define cases and explore settings to understand them.

The case study method involves exploring a real-life, contemporary bounded system (or multiple bounded systems) over time through detailed, in-depth data collection from multiple sources of information. It results in a case description and identifies case themes. Case studies play a crucial role in theory building, particularly in investigating emergent organizational behaviour where current theories may be weak or underdeveloped and where there may be numerous variables (Shekhar, 2014).

Furthermore, case studies enable the exploration of social processes within their natural organizational and environmental contexts. They often reveal uniqueness rather than typicality, allowing researchers to closely engage with the informant's domain and capture the

concepts and categories used by informants to organize their world. This aids in the emergence of new insights.

4.4.2 Justification of Case Study

The case study strategy was chosen here because it allows for the attainment of certainty regarding the findings, which is crucial. Case studies can be either single or multiple-case designs, with multiple designs following a replication logic rather than sampling.

Single case studies can richly describe the existence of a phenomenon. Multiple cases bolster the results by replicating pattern-matching, thereby enhancing confidence in the robustness of the theory. However, single case studies hold an advantage over multiple cases because they can generate additional and superior theories. With a single case study, the researcher can question existing theoretical relationships and explore new ones, leading to a more thorough investigation and a deeper understanding of the subject. Table 5 provides a comparison of single and multiple case studies.

The advantages of using a case study allow the researcher to investigate predefined phenomena in detail within their own context. This differs from an experiment, which seeks to study phenomena out of context. During the planning process, the context of the case study was defined, as well as the method for data collection. Based on this design, the case study was prepared, data was collected, and analysis was conducted. Conclusions were drawn from the analysed data, making inferences about whether the theories existing in the literature on the strategy process of DSDM and risk were supported.

This study employs a multiple-case design as evidence from multiple cases is often considered more compelling, thereby enhancing the overall study's robustness. The case study was conducted in two organizations in the UK in May 2021. The table below illustrates the characteristics of both single case studies and multiple case studies."

Single case study and multiple case study

Single Case Study	**Multiple Case Study**
Critical case in testing well-formulated theory	Replication logic as per multiple experiments
An extreme or unique case	Literal replication: case selected because similar results predicted
The representative or typical case	Theoretical replication: case selected because contrasting results predicted, but for predictable reasons
Revelatory case: previously inaccessible	Compare different studies

Table 6: Single case study and multiple case study (Source: Source: adapted from Eisenhardt and Graebner, 2007)

4.4.3 Design of Case Study

According to Yin (1994), it is crucial to define the type of case study approach used in

research. The three primary types of case study approaches are exploratory, descriptive, and explanatory. The chosen approach aids in anticipating research issues and shaping the researcher's interaction with theory. Additionally, when designing a case study, two key factors should be considered: the number of cases involved and the number of units of analysis. Furthermore, case studies can be categorized based on factors such as intrinsic (unique), instrumental (aiming to improve theory), and collective (for generalization), referred to as the nature of the case study.

In this research, an exploratory case study approach was selected. This decision was influenced by prior knowledge obtained through a literature review and deductions from existing studies. The insights gained from the literature review helped refine the case study design, enabling the researcher to anticipate research problems and expand the study's scope to thoroughly explore risk strategy within DSDM. The exploratory case study approach entails the researcher leveraging prior knowledge derived from theory and determining how to interact with that theory.

This research seeks to find out whether the theory holds true in the context of this specific case study. Secondary data from the organization such as risk management and lesson learned were reviewed, and 5 in-depth interview questions from different project contexts (5 projects) were asked by focus group interviewees. This method was selected for the study to gather useful insights based on user experiences. However, it is important to note that the results of this study might not be replicated in different contexts. Therefore, for this research, a case study approach was considered the best approach.
Figure 9 illustrates the specific approach taken by the research.

Research Onion

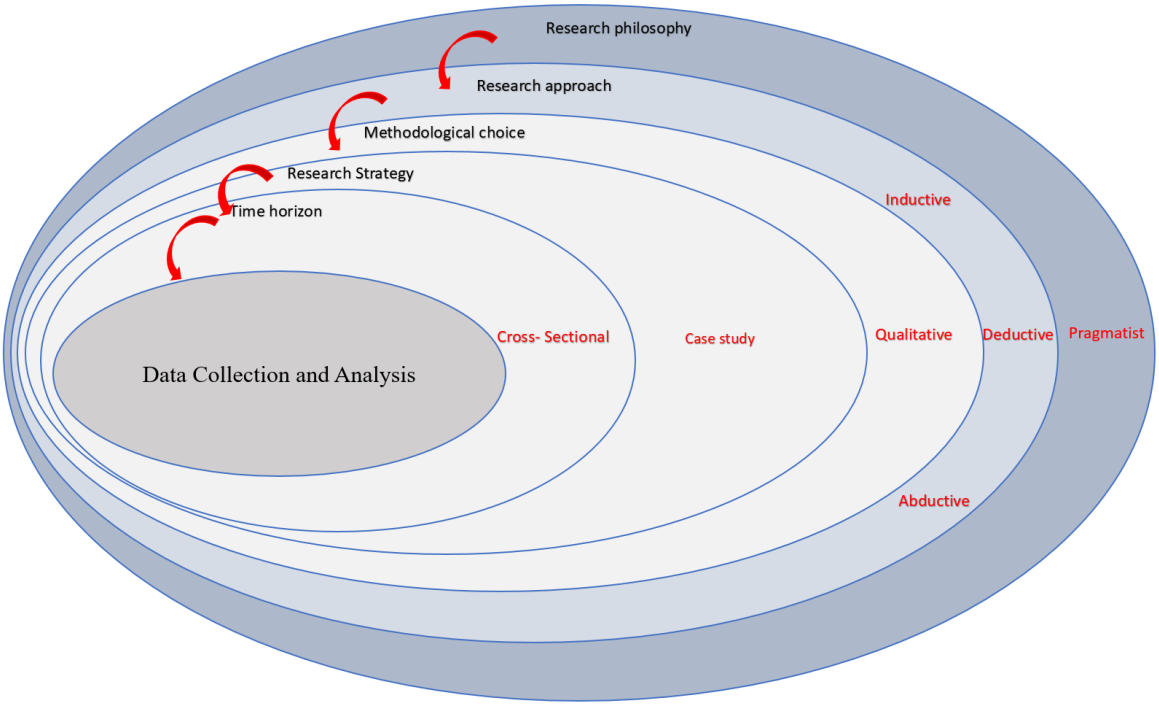

Figure 9: Research Onion (Source: Adapted from Saunders et al., 2012)

4.5 Data Collection and Sampling

The research is based on qualitative data, implying that data is gathered from either a public or targeted group of individuals through interviews. According to Barrett and Twycross (2018), qualitative data aids in analysing straightforward responses, thus enhancing the reliability of the research. Data collection through case studies is a critical aspect of the research process as it furnishes the information necessary to comprehend the case under study. Various methods can be utilized to collect data, including interviews, observations, archival data, surveys, focus groups, and historical documents. Face-to-face or telephone interviews with key informants or participants can yield rich and detailed information about the case. Direct observation of the case can offer valuable insights into the context and behaviour of the individuals involved. Reviewing existing documents, such as reports and records, can also provide valuable information. Surveys enable the gathering of data from a large number of individuals, while focus groups involve bringing together a group of people to discuss a specific issue, offering rich data about attitudes and experiences.

Firstly, archival research involves the systematic analysis of existing documents, records, and data sources to answer research questions. While archival research can provide valuable insights into a given phenomenon, it may lack the depth and richness of data that can be obtained through direct engagement with the subjects of study, as is often the case in traditional case study research. Secondly, the research incorporates interviews and focus groups alongside the analysis of secondary data from the case study companies, this falls within the realm of case study research rather than pure archival research In the current research, the interviews are used to collect data systematically and rigorously, using appropriate methods that are appropriate for the specific case, and to triangulate data from multiple sources to provide a more comprehensive and reliable understanding of the case (Alam, 2021).

4.5.1 Interviews

Interviewees were involved in or impacted by the DSDM project in addition to the personal relationship with the interviewer. These stakeholders include the project team members (e.g., project managers, developers, testers), business representatives (e.g., product owners, business analysts), end-users or customers who will interact with or benefit from the software, key decision-makers and executives overseeing the project and other relevant stakeholders such as suppliers, regulatory authorities, or external consultants. Given the specific focus of the study on stakeholder perceptions of a DSDM project, purposeful sampling was used to select interviewees who had first-hand experience or significant involvement in the project. This sampling strategy ensures that the interviewees possess relevant knowledge and insights related to the research questions. Moreover, the data collected from the interviews is a straightforward approach for directly meeting the participants to know about their experience, recent approaches for qualitative data collection use web-based applications for video conferencing such as skype, zoom, etc. The variation between interviews is found based on open or unstructured questions, which are then shaped by the interviewer. The study does not employ a quantitative approach, which involves analysing data statistically using statistical tools. Instead, the research utilizes a qualitative approach to gather valuable insights from company employees regarding their experiences with agile methods for project development and managing related risks. Qualitative data yield results that can enhance interventions by engaging participants, such as stakeholders, to improve the quality of research outcomes (Busetto, Wick, & Gumbinger, 2020). Qualitative data consist of words rather than numeric values, and various methods can be employed to collect primary qualitative data, such as individual interviews with participants or focus groups.

4.5.2 Focused Group

The focus group consisting of group interviews that differentiate from individual interviews due to participant interaction. Focus groups entail collective conversations or interactions among participants who share common experiences or exposures, such as involvement in DSDM projects. The aim is to understand participants' views, beliefs, and attitudes regarding a specific topic. Various data collection methods were explored, and while some differences and contradictions were identified, they generally represented the approach utilized by the team within each project rather than between the two organizations. This method enables data collection that describes both the group perspective and the individual perspectives of particular individuals, determined by the team members' views. Researchers can utilize stimulus material, such as problem scenarios or videos, for participants to discuss, but in this study, findings from the initial interviews were used to inform a new framework driving the process of end-users leading the risk management process.

Focus groups encourage the project team to explore others' views, leading to a more detailed exploration of ideas than in one-to-one interviews. Discussions provided an opportunity for the team to share individual experiences, which was not done in the first interview. Each group discussion was based on a small number of key questions and lasted approximately 50 minutes. Focus groups also added to the interview method of data collection by generating dialogue around experiences and perceptions. Participants were invited to a focus group online due to current economic restrictions and the researcher's limited access to one of the organizations' buildings. A total of fourteen participants attended, and the use of the new model stimulated broader discussions of issues raised during Phase 1 interviews. Discussions also included different characteristics of end-users, risk management, decision-making, company culture, and knowledge transfer using the framework drafted by the researcher as a guide.

The end-user-led framework is designed to help DSDM project teams delegate responsibilities to end-users, leading to improved risk management and assessing progress in developing a positive culture. It encompasses critical dimensions of project benefits reflecting areas such as risk management, monitoring, and control, the project team's knowledge, and processes. The tool provided a framework for discussion following the structured discussion of Phase 1 findings, empowering participants to reflect on and discuss perceptions in pairs before exchanging views within the wider group. Focus groups were facilitated by the researcher, and discussions were audio-recorded.

4.5.3 Secondary data

This study also collects data from interviews and focus group interviews in two phases. Besides primary data collection, the study also gathers secondary data from the company's records. Two companies were selected, both of which had large, complex projects involving various aspects such as cost, quality, time, risk, and scope. These risks are documented and updated in the company's risk register, which is accessible to the project team. The secondary data thus collected will be analysed by extracting project risk management documents and developing themes to discuss in contrast to the literature. The 'what' describes the characteristics of a concept the 'why' clarifies the relationships between processes or events; and the 'how' offers a practical outcome and intervention. Nevertheless, some academics have proposed other research questions such as 'who', 'where', 'how many', how much, and 'when'); they recognise that these are unlike the 'what'. This research aims to answer the "what" and "how" – the what questions include "To what extent, if at all possible, can

DSDM be used in capturing the end user's voice for developing Business Risk Strategy?", and the "how" questions includes "How capable the above methods are in 6 criteria aligned with hybrid business strategy?", "How can the DSDM process be customised to capture risk strategy using end-user voice?", "How can the risk management framework and DSDM framework be combined?", "How effective is this model in capturing end-users' voices?" The strategy will offer focus and direction to the research questions in so doing, it will successfully address the research problem and constitute the blueprint for the collection, measurement, and analysis of data. It therefore under the canopy of a qualitative approach providing specific direction for procedures in research.

The purposive sampling technique was used in the research to recruit the participants for the study. The methods allow the researcher to collect more information based on the knowledge of participants. The technique best-fits the research to collect the data from a targeted group of people. The focused group interview lasted for 45 minutes, whereas individual interviews lasted for 20 minutes with each manager. This means that the total duration of the interview was 65 minutes.

As part of this research, the researcher reviewed the following documents from the two organizations: stakeholder management document, risk management document, and lesson learned document (also known as feedback). In the researcher's view, the notion of stakeholder management is a problem-focused coping strategy. The researcher set out to determine what end-users perceive to be essential and what the client outlines as a problem that needs addressing. Both organizations adapted a power and interest matrix (see Figure 10) by Johnson and Scholes (1999). Arguably, this framework's strength lies within the complexity of the relationship, the influence of the stakeholder (project sponsor), managing the relationship, and interest in the project. The stakeholder management document reviewed had an accepted definition which addresses the role of the business, expectations of the end-users, communication strategy, and actual safeguarding practices that align with the company's business strategy. As suspected, stakeholder documents emphasize the importance of stakeholder engagement and management, decision-making, and the capacity to identify stakeholders' expectations from start to finish as core elements of project success.

The power-interest matrix

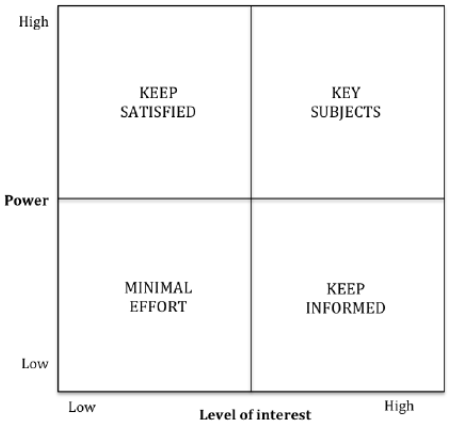

Figure 10: The power-interest matrix (Source: adopted from Johnson and Scholes, 1999)

A risk is a circumstance that affects the achievement of goals, potentially impeding the ability to deliver key objectives. The documents address the policy and procedure of the 'Business Risk and Internal Control Policy'. As part of an overall program of continuous risk reduction, all employees have a responsibility to engage in active risk management and not to accept or become accustomed to the continued presence of known risks. Hence, the focus is

on the project team to explain the risk to the stakeholders and why the concept is mainly seen as a contribution to community development, especially with hostile stakeholders. One organization, with a network of professionals and the significance of knowledge/training materials, emphasizes their risk document as a moral interest in favour of their clients. They fill the gap in the process to provide fresh insight and employ key influential attributes to their clients.

The risk management document reviewed shows a universal agreement on the definition, identification, analysis, and mitigation of risks. Therefore, all risks follow a similar pattern which includes considering and identifying what risks are evident in all aspects of their work. This includes reporting any evident control weaknesses requiring process or control improvements and determining the potential severity of the risk. This is done by assessing the likelihood of the risk (probability of it occurring, ranging from rare to almost certain) and the potential impact of the risk (consequence if it occurs, ranging from insignificant to catastrophic), and multiplying the scores to give the resulting risk rating. It then determines what risk management actions are required (both in the short and long term) to mitigate (i.e., reduce) the risk to an appropriate level of control, record the risks and mitigating actions in the relevant team risk register, review and update the risk register monthly, and record the actions taken and the current risk rating that remains when any mitigating controls have been considered. On the other hand, the risk structure ensures that each team maintains a risk register and will ensure the risks and the actions taken are reviewed as often as is reasonable. High risks will require more attention than low risks, but each risk register will be reviewed at least monthly (commonly as part of a regular team meeting) and updated to provide an auditable record of the current status.

The purpose of the lessons learned document is to capture the project's lessons learned in a formal document for use by other project managers on similar future projects. This document is strictly for internal purposes and cannot be shared with the client. On one hand, the document may be used as part of new project planning for similar projects to determine what problems occurred and how those problems were handled and may be avoided in the future. On some occasions, this document details what went well with the project and why, so that others may capitalize on these actions. On some occasions, this has been used to solicit feedback from the project team. Both organisations put a lot of emphasis on capturing lessons learned as it's an integral part of every project and serves several purposes however because of the nature and business strategy of the other business they put a lot of emphasis on this document. They ensure that formal lessons learned document is completed during the project closeout process, however, capturing lessons learned should occur throughout the project lifecycle to ensure all information is documented in a timely and accurate manner. The lessons learned document serves as a valuable tool for use by other team members. The researcher discovered that, does not only describe what went wrong during a project and suggestions to avoid similar occurrences in the future, but also describes what went well and how similar projects may benefit from this information. Based on the information received this document is a valuable assets and archives as part of the lessons learned database.

One of the advantages of using the documents form an organisation was that it's limited to the company and training is conducted by the company to fully engulf their personals to understand, the key process, and enhance their ability to make the appropriate decision at the right time. As expected, all the documents were the latest version, they were elements of continuing development in line with the current software industry environment. The researcher conducted an in-depth analysis of the credentials, the information current or out of date, the intended audience, and the document's coverage of the topic area broad or too

narrow, compared to related data are the measures somewhat consistent. Knowing the purpose of data collection will help to evaluate the quality of the data and discern the potential level of bias (Novak 1996). Secondary data analysis was carried out rather quickly when compared to formal primary data gathering and analysis exercises. This approach lends itself to trend analysis as it offers a relatively easy way to monitor change over time and it helps the researcher understand the conditions or status of the organisation. Secondary data is a valuable source of information for gaining knowledge and insight into a broad range of issues and phenomena. Review and analysis of secondary data provided another path of addressing the researcher's question, conducting cross-national comparisons, understanding the company's specific conditions, determining the direction and magnitude of change, and trends, and describing the current situation.

4.6 Data Analysis

As the research used qualitative methods for data collection, such that the study gathers primary and secondary qualitative data from direct resources, the researcher employs a variety of techniques to analyze the data. The qualitative responses gathered from interviews, focus group interviews, and text-based secondary data from the company's archival data are analyzed by using NVivo software. NVivo coding includes several processes such as importing data into the software and coding the processes that were used to gather information at one place known as nodes. There are distinct types of NVivo codes such as theme node code, auto code, and inductive codes. This study uses deductive codes to draw new themes or analyze pre-existing themes from literature. Furthermore, the imported data in NVivo generates qualitative results in the form of a word tree, which helps to find frequently used words by the respondents, reflecting how these keywords are used by participants, leading to drawing themes. Additionally, the software also helps in finding patterns and connections in the data, which can be useful for identifying themes and making conclusions about the research question. This mixed-method approach to data collection and analysis allows for a more comprehensive understanding of the research problem.

Twenty-six structured interviews were conducted with 20 key actors within the software development community which shows their role, number of years in the organisation and either full-time, contractor, or line manager). Before the interviews were conducted, a pilot interview (five interviewees), was chosen to test the reliability of the questions and participants were free to comment on any aspect of the pilot study after completing the interview and probed, via an informal discussion, in an effort to pinpoint any potential flaws in the questions. Feedback from the pilot interview was put into consideration before proceeding to the actual interview. The plot interview assists in developing accurate questions to gather the most relevant information from the participants. The weaker questions were however disregarded from the study in order to utilize interview duration in a purposeful way. To ensure that the participants were fully informed of the nature and purpose of the interviews, again participant information sheet was provided, containing background information on the nature and purpose of the research. The participants were also informed of their rights throughout the exercise (See Appendices 2 and 3). The interviewees consist of project managers, programme managers, portfolio managers, programme director's procurement managers, risk managers, solution architects, test analysts and test managers. These individuals are key actors within their field and so possess an understanding of the requirements of these standards, and they are conversant with the current agile processes. The significance of the interview process was to complement the findings drawn from the documentary, doctrinal and comparative analyses conducted within this study. More importantly, the interviews were used to obtain more detailed and updated insight into the current level of risk management approach. The interview questions have been carefully designed to align with the research question, based around the concept of DSDM, risk

management and end-users. The questions were designed and informed by the literature, research objectives and questions, which are all focused on adequately answering the research aim. The interview process was flexible as emphasis was placed on enhancing the interviewees' understanding of the issues in question. Significant emphasis was thus laid on ensuring that the participants understood the issues raised and fully engaged in the discussion, thereby providing more detailed insight into each of the questions raised.

Participant information

Position	Line Manager (Y/N)	Year in organisation	Industry	Employment contract
Business Analyst	Y	4	IT Consultant	FT/ Permanent
Project Manager	Y	12	IT Consultant	FT/ Permanent
Assistant Project Manager	Y	3	IT Consultant	FT/ Permanent
Software Tester	N	2	IT Consultant	FT/ Permanent
Risk Manger	Y	21	IT Consultant	FT/ Permanent
Test Manager	Y	5	IT Consultant	FT/ Permanent
Director	Y	25	IT Consultant	FT/ Permanent
Developer	Y	7	IT Consultant	FT/ Permanent
Developer	N	3	IT Consultant	FT/ Permanent
Solution architect	y	4	IT Consultant	FT/ Permanent
Financial Manager	Y	19	Utility	FT/ Contractor
Procurement Manager	Y	1	Utility	FT/ Permanent
Software Tester	N	1	Utility	FT/ Contractor
Solution architect	Y	4	Utility	FT/ Contractor
Program Director	Y	11	Utility	FT/ Contractor
Financial Manager	Y	3	Utility	FT/ Contractor
Risk Manger	Y	1	Utility	FT/ Permanent

Figure 11: Participant's Information Sheet (Source: Author, 2022)

The interviews were conducted between April and May 2021. The interviews were conducted via video conference (teams and skype) because of the current restrictions. Before the interview, all participants had received by email a document named Participant Information Sheet and Consent Form (see Appendix 2 and 3). The first phase of the interview (interview questions see Appendix 4) lasted for about one hour and when appropriate, supplement questions were used to prompt more detailed responses to the above questions. The researcher entertained participants' questions and general comments and thanked them for their participation.

The interviews gain access to 20 participants as demonstrated, due to the researcher's relationship with both organisations, all 20 participants fully engaged, and it took approximately 1 hour to complete each interview. All the interviewees had significant knowledge of agile software development and IT infrastructure, but not all had detailed knowledge of how their organisations engage in DSDM processes. The reason for some having lower knowledge of DSDM is because their projects use either waterfall or Scrum and it's estimated that they might be on the project for approximately 12 to 18 months. But most

were actively involved in multiple projects which included DSDM. This did not come as a surprise to the researcher because, in such an environment, the team can work on multiple projects with a wide variety of frameworks, but subject matter experts are required to work on one project at a time due to their skills and knowledge. However, others can work on multiple projects at one time due to their ability or knowledge of DSDM.

As part of the first phase of interviews, the researcher read the interview answers with the aim of exploring and identifying the themes and relationships between them. Then, the identified themes were reviewed and described.

Firstly, the researcher familiarised himself with the data. In this stage, the researcher listened to phonetic data and read the data in an active way searching for meanings, and patterns in the audio and written data to immerse themselves in the data to the extent that they are familiar with the depth and breadth of the content. The researcher read the interview transcripts while searching for patterns and meanings. Secondly, this involved generation of initial codes where the researcher generated an initial list of ideas that emerged from the familiarisation process and assigned each idea a code. Thirdly, this also involved searching for themes. In this phase of the data analysis process, the researcher used the coded data to identify possible themes, which were defined as patterns or similarities among codes. Fourthly, this involved the process of reviewing the themes where the researcher refined the themes while eliminating irrelevant and redundant ones and the fifth stage involves defining and naming the themes. At this phase, the themes were adequately described based on evidence from interview data. Lastly, the writing of the report where all the themes are summarized.

At this point, data was analysed initially using an inductive approach which identifies patterns and relationships that can be used to explain phenomena. This part of the data was analysed using NVivo, as such, the data was analysed by transferring raw data into transcriptions which represented each attendance together with the corresponding and their rationale for the new model. The researcher viewed constant comparison analysis, also known as the method of constant comparison, as a suitable method for analysing the data. Analysing the data consisted of three major stages, firstly, the researcher breaks all the data into small units and attaches codes to each of the units this is known as open coding. Secondly, the data are grouped into categories this is known as axial coding. Lastly, the researcher developed themes that express the content of each of the groups this is known as selective coding. Although patterns were noticed within the data this increase the range of complexity. As repeated iterations of coding identified a range of cues that were utilised during decision-making because of the process of the model as well as mitigating and monitoring risk, cultural structural and the influence of end-users. The final picture that emerged was notable consistency across the two organisations.

4.6.1 Analysing Archival Documents

The study collects secondary data besides the primary data, for secondary data collection, the researcher approached managers of 2 companies Company A (Consultancy) and Company B (Utility) to collect the risks management reports present in hardcopies in the company's data centre. Companies' risk management reports were accessed by the manager and database manager only. However, the files were handed over to researchers that were based on agile-based DSDM projects. The company archival documents held the project information and methodological details that were experimented with during the project life cycle. Therefore, the researcher only gathered the files related to risk management documentation and strategies for risk mitigation. Access to company files was not given to the researcher, however, required files were given to the researcher through an email platform, having several copies in USBs to avoid data loss.

From the risk reports researcher extracted the strategies planned and implemented in DSDM projects before delivery and after the delivery of the project. However, to gain useful data the researcher had to contact the company's managers several times to understand the information documented in the reports. The strategic approach of both companies was focused to assess similar and differentiating characteristics, in order to implement the framework development of this study. The study focuses on developing a framework that could be applied to DSDM and agile-based project development lifecycles to identify the risks and manage them through the strategic framework for meeting quality and cost criteria. Historical data of the companies thus help in presenting the framework based on experimented results that enhance the strategic planning and decision-making of project managers and end-users. The framework developed in this study also takes insights from theoretical frameworks applied in the projects to achieve successful outcomes of the agile and DSDM projects.

4.7 Thematic analysis process

Thematic analysis is useful for answering questions regarding specific groups or respondents (Green et al., 2015). Thematic analysis helps organise data, as it is data driven, using codes directly formed from the data to develop themes and describe data in rich detail (Braun and Clarke, 2006; Attard and Coulson, 2012). Thematic analysis is not tied to a specific discipline or construct (Spencer et al., 2014), therefore provides theoretical freedom and flexibility, while providing rich, detailed, and complex accounts of data (Braun and Clarke, 2006). Thematic analysis is useful for answering questions regarding specific groups or respondents (Green et al., 2015). Thematic analysis helps organise data, as it is data driven, using codes directly formed from the data to develop themes and describe data in rich detail (Braun and Clarke, 2006; Attard and Coulson, 2012). Thematic analysis is not tied to a specific discipline or construct (Spencer et al., 2014), therefore provides theoretical freedom and flexibility, while providing rich, detailed, and complex accounts of data (Braun and Clarke, 2006. It is important to note that this approach of managing and analysing data is not necessarily a linear, rigid process, the researcher can revisit earlier stages in the analysis should immersing oneself in the data reveal further key themes or issues. This approach ensuring that quality of the research conducted is high, and there's a clear account of interpretation of the data and how it was developed. (Mays and Pope, 2000).

4.8 Transformation of Data into Concepts and Categories

The process of coding began by breaking down the data into various codes. This is the initial step of analysing data. According to (Allan, 2003),

> **Codes** – collection of similar types of incidents (word or phrases) highlighting an issue or interest in the research.
> **Concepts** – collection of similar codes that are grouped together based on their properties and dimensions.
> **Categories** – higher level of similar concepts that are grouped to develop a theory.

All data was transcribed and examined as the interviews were conducted. Therefore, constant evaluation helped to compare, group codes into concepts based on their

properties. Due to the mass data, the researcher verified some of the examples of how the open coding was performed and additional grouped together into concepts. The process of developing concepts began when the researcher started coding transcripts. There were two types of coding performed when doing analysis:

NVivo Coding – Words used by the participants.

Descriptive Coding – Summarizes an instance from the data in a word or phrase.

Nivio and Descriptive are suitable option when conducting this type of research (Corbin and Strauss, 2008). At the end of the process 4 category emerged, 15 sub-category, 30 concepts and 117 code (see appendix 1) and figure 16 represents the stages and an overview of how the coding was performed.

Coding process

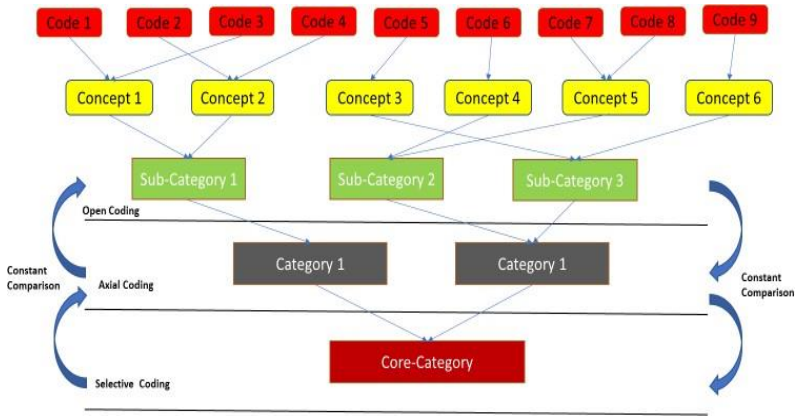

Figure 12: Coding Process (Source: Author, 2021)

The above figure illustrate how coding was conducted for this research under three main stages of Open, Axial and Selective.

4.9 multi-triangulation contribution of methods, sources, and researchers

Multiple triangulation approach combines various data collection, sources of data and investigators with multiple areas of expertise. Figure 13 presents these methods, sources and researcher and the relationship between them. Triangulation is not a tool or a strategy of validation, but an alternative to validation (Denzin and Lincoln 1994), the goal reveals a different aspect of reality, as such, interviews, secondary data, focus group and the relationship between them are to identify and validate of relevant issues. According to (Guba, 1981) multiple triangulations enhances the credibility, dependability, and 'confirmability' in qualitative studies. Triangulation has been employed in this study because a single method is not satisfactory to solve the problem of various factors under investigation. Moreover, this method enhances the validation of collected data (Jennings, 2001).

Multiple Triangulation

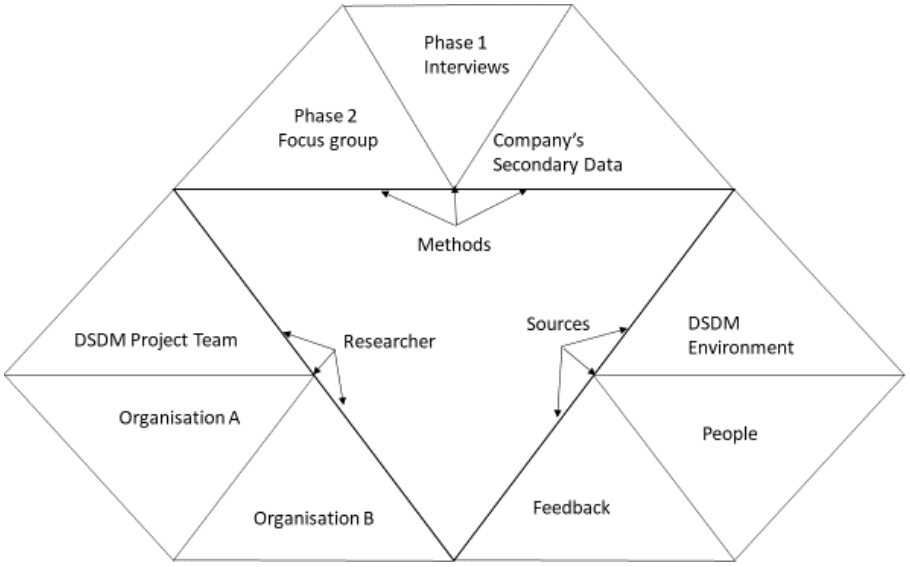

Figure 13: Multiple triangulation (Source: adopted from Guba, 1981)

Exploiting different avenues of data collections from each participating, including document review, interviews, and focus groups was critical in accessing different types of data for comparison across methods. A primarily objective is to the exploratory nature of the study and to address the research question, in order to maximise credibility, dependability and confirmability of the findings (Guba, 1981). Hence why, the study was conducted in a controlled environment and the outcome from literature, secondary data, and phase one interview contributed to the End-user risk framework (EFR). As such, explored during discussions at the focus group (phase two) and further elaboration by the researcher combine with the review of literature, theoretical review, lesson from the interviewees (see chapter 7) contributed to the final EFR framework as demonstrated in figure 20. The data collection methods that were used and their respective advantages and disadvantages are presented in Table 6 below.

The study is triangulated based on various methods used in the data collection, primary and secondary data collected from interviews, focused group and archival documents used NVivo software for analyses, and themes drawn from NVivo results led the researcher to generate a questionnaire having open-ended questions. In this way, themes were created and analyzed during the interviews taking responses from the participants. 20 participants were involved in the focus group interviews and shared their experience regarding risk mitigation in DSDM projects, whereas two managers were included in phase one interview shared their experience regarding project management (see methods and ration of collected in figure 14) and risk mitigation activities in the software development cycle. Various projects developed in their sector were communicated by the

Interviewees focusing on risk capturing and management strategies. More ratio of responses was collected from primary qualitative data while only short text-based data

was gathered from the company's risk management reports to contrast with different themes.

Methods and Ration

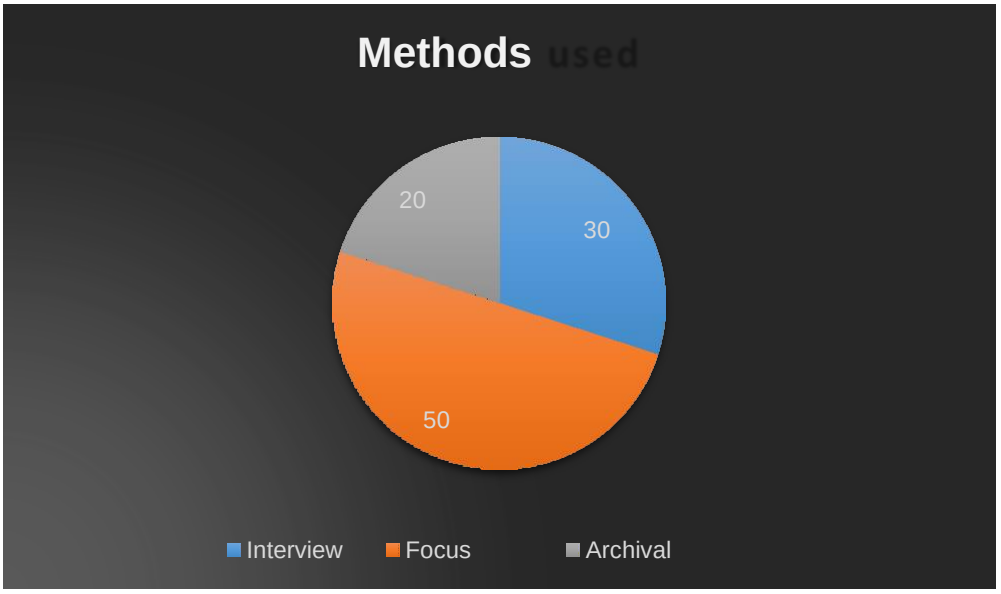

Figure 14: Methods and ratio of collected data (Source: Author, 2022)

It can be observed from the pie chart shown above that focus group interviews led to collecting most of the data for qualitative analysis, while first-phase interviews gathered 30% of the data, and archival documents gathered 20%. The focus of the analyzing archival documents analysis was to note the strategic practice of companies A and B for risk identification and mitigation. The companies' data collected from DSDM project managers, DSDM project team members, and companies' risk management documents collectively provided useful data for drawing study results.

Advantages and Disadvantages

	Advantages	**Disadvantage**
First Phase Interviews	Easy to arrange and carry out	Difficulty for interviewees to recall. information
	Investigated to clarify meaning or in-depth information	Interviewees provided just enough. information

Second Phase Interview	Shared experiences such as culture, ambition, expectations	Difficulty for interviewees to recall. information and reluctant to continue to discussion
	Encouraged interaction which	Require enough interviewees at the
	stimulated further discussion	same time
Company's Secondary Data	Recent data for DSDM project were. reviewed	Some data were amended for use
	Researcher chose what data to review	Reluctant to share confidential data

Table 6: Advantages and Disadvantages (Source: Author, 2021)

Triangulation commenced from methods (includes phase interview, focus group and secondary data), from there was an adoption researcher and source to develop and implement the study's aims and objectives. Analysing secondary data, the researcher deliberated on practical and theoretical issues, constantly reviewing with update information to ensure the organisations were either a step ahead or behind the current climax. This allowed a broad range of concepts to emerge along with increasing understanding of the drive behind a range of policies, processes, and procedures. Phase one interview increase the researchers understanding of the context of the organisations as result the themes erupted were used as bedrock for phase two focus group questions, discussion guideline and designing of end-user led risk strategy. Both phases were analysed using constant comparison method (Bradley, Curry, Devers, 2007) as it helped maintain a degree of reliability. The study was dependent upon three key sources of data. The secondary data assisted in obtaining relevant organisational documentation and accessing potential interview participants for Phase one. They also assisted in the designing in the interview question for both Phases one and two including the concept of a focus group. As the data collection was conducted in chronologically, the initial data analysis followed a thematic approach as it allowed data collected using a range of different qualitative methods to be analysed in a similar way as demonstrated in the sections above. Data was initially coded to provide a number of categories which were then grouped thematically across cases and compared to ensure that themes incorporated all relevant data. To ensure that the credibility of the research the was designed to include the perspectives and experiences of a broad range of DSDM team this capitalised on possible inclusion of end-user at the center of capturing risk in a DSDM project.

4.10 Quality Criteria both interviews and documents

4.10.1 Reliability

To ensure reliability, the researcher documented the procedures and steps taken throughout the case study analysis. This ensures that the approaches taken are consistent and reliable (Yin, 2003). Furthermore, the transcripts used were checked rigorously to make sure that there were no inconsistencies in the definition or

classification of the codes or themes used during the coding process.

4.10.2 Validity

This consists of ensuring that the findings obtained are accurate and credible (Creswell and Dana L Miller 2000). At this point, the researcher has the responsibility of demonstrating that the conclusions drawn are accurate and are based on the data collected. Here, the researcher endeavored to grasp an in-depth understanding of the concept of risk management, not just as applied within the DSDM framework, but also how it incorporates with end users for the purpose of eliminating unforeseen risk. This will help the researcher to adequately interpret the findings obtained.

4.10.3 Replicability

This refers to the ability of a researcher to replicate the findings of another (Bryman and Bell, 2015). As such, in order for replication to take place, the study must be replicable. The possibility of replication is highly dependent on the clarity of the research objectives and procedures, which must be clearly spelled out in great detail. This tends to lend credibility and reliability to the study, as it implies that such objectives and procedures can be used by others as reliable measures to replicate the study. In the case of this research, the research objectives have been clearly spelled out from the start of the research and the selected research strategies and process have equally been clearly outlined, making it possible for replication. This also mitigates the incidence of bias.

4.11 Ethics Approval

Obtaining ethics approval is a critical step in case study-based research, as it ensures that the research is conducted in a responsible and ethical manner (Griffin, and Leibetseder, 2019). The current case study-based research has been conducted by taking ethics approval from the board of London South Bank University, School of Business. Whereas the data collected by the researcher from the participants is kept secure at the university's board and can be accessed by the researcher when needed. Ethical approval included clauses related to environmental ethics, human rights, and technical concerns. Moreover, the research focused on ethical approval focusing on professionals, Institutional, and respondents. The ethical considerations were followed throughout the study and research methodology specifically during data collection. A more detailed view of ethical approval and considerations can be given as follows,

Respondents: As the research is based on direct interviews, so the study considered all the ethical concerns regarding respondents' rights and their privacy. The participant's identity and personal information such as contact number and email were kept confidential as per the university's requirement. The participants were given the consent form and information sheet, which described the nature of the research and clarified the purpose and objectives of the research. So that they are

clear on how and when their data will be used. The main purpose of the information sheet distribution among the participant was to ensure the participants are aware of the interview subject so that they are ready to give their detailed opinions and share their experiences. The consent form was also signed by the participants, which shows that the participants' involvement is voluntary.

Professional: The researcher has taken measures to consider intellectual property rights, by using proper citations and giving credits for material used in the acknowledgment section. These measures assure that the information collected is unbiased and non-discriminatory, which also respects and credits the parties directly or indirectly involved in the research.

Institutional: The study attained ethical approval from London South Bank University, therefore, the whole research follows the guidelines given by the university.

Moreover, the researcher focused on the technical group as interview participants to collect responses in the form of face-to-face interviews and the interviews were recorded for further analysis. Further, each interview was taken individually from the participants to maintain the integrity of the participant's information and identity. The study is free from any kind of biases such as racial, language, cultural, and religious bias to avoid the negative consequences of the study in the future. Participants' identities were kept anonymous while only responses were added to the research analysis. No environmental harm was observed throughout the study process and no specie was harmed during the research process. Moreover, the data demographic data of participants was only used to segregate the results while the rest of the information was kept safe under the university's supervision. Contact details of the researcher were also mentioned after the information sheet for query resolution and confusion among participants regarding the research subject. The data is used for academic research and publishing the results; therefore, participants are able to withdraw from the research after the paper is published, however, no participant can withdraw once the interviews are conducted.

4.12 Limitations

Case study-based research is a valuable research method for understanding complex phenomena, but it also has several limitations. One of the main limitations is generalizability, which refers to the extent to which the results of a study can be applied to other cases or populations. Case studies are often focused on a specific case or a small number of cases, and the results may not be generalizable to other cases or populations. Another limitation is bias, as the researcher's perspectives, values, and beliefs can influence the interpretation of the data. In addition, case study- based research often relies on a limited number of sources, such as interviews or documents, and may not provide a comprehensive understanding of the case being studied. The small sample size of case studies can also limit the statistical power of the results, making it difficult to detect significant differences or relationships between variables (Kim et al., 2020). Moreover, it is also important to

critically evaluate the results and the overall study. Given the time limit within which the case study- based research was conducted, the researcher has been unable to test the theory in other section such as public, financial, education and media sectors, besides those mentioned earlier. Such a detailed and varied analysis would have granted a much more detailed insight and a more robust platform on which to proffer recommendations for the improvement of risk management. Certain limitations that need to be taken into account when considering its. Contribution includes the system specification will depend on the breadth of the people interviewed; they will be the key to how complete the specification of the system will be. Therefore, throughout the interviews a broad spectrum of collaboration system users must be sought for the interviews and the users within this study are sourced from 2 organisations the results

would mean the system would be specifically tailored to those two organisations, and not to the business as a whole. Additional, single case study inter- related issues of methodological rigor, researcher subjectivity, and external validity (Willis, 2014). Is seen as an unorthodox process because of the absent of methodological guidelines. The use of the case study absolves the author from any kind of methodological considerations. (Zeev Maoz, 2002). Furthermore, unrefined data is another form of limitation as it may not provide the richest insight, lead to overgeneralization or grievous misunderstandings of the relationship between variables or processes (Bennett and Elman, 2006). In conclusion, while case study-based research is a valuable research method, it is important to consider these limitations and to use other research methods to supplement and triangulate the findings.

4.13 Summary

This chapter has chosen a case study-based research design to be logical, relevant, and achievable (Merriam and Grenier, 2019). In the most suitable way, the needs of the case study have been achieved. This chapter also explained how the derived analysis from the earlier chapters has informed the case study research design and methodology that uses a mixed methods study to address the propositions. A more detailed analysis of the research setting, covering the design, results, and discussion of the surveys in the new few Chapters.

Chapter FIVE: FINDINGS

5.1 Introduction

This chapter will present the findings from the interviews and archival documents, while also describing the framework adopted by this research to achieve the aims and objectives stated in Chapter 1. The goals of conducting both interviews and secondary data analysis from the companies were utilized to validate the ERF model and to provide insights into how risk data can be collected without compromising DSDM principles. The study offers valuable insights into DSDM practices, as well as information for the further development of the ERF model. The research findings are derived from interviews and focused group qualitative data collection, involving participants from multinational companies employed in the firm. These results are further analysed in this chapter in alignment with the study.

5.2 Interviews

The research method included three main components, archival document analysis, interviews with representatives from industry, and focus groups. Initially, archival documents related to the subject of the research were analysed to gather historical data, background information, and context. Following the archival document analysis, interviews were conducted with representatives from Company A and B. These interviews aimed to gather insights, perspectives, and first-hand experiences related to the research topic. In addition to the interviews, focus groups were held to further explore and validate the findings from the archival document analysis and interviews. These focus groups involved participants from Company A and B who were interviewed earlier, providing an opportunity for in-depth discussions, feedback, and collaboration on the research findings and proposed solutions. By utilizing a combination of archival document analysis, interviews with industry representatives, and focus groups, the research aimed to gather comprehensive data, validate findings, and incorporate diverse perspectives into the study.

5.2.1 Nature of an Organisation's Risk Management

A central focus of this research is to investigate whether there are specific motivations, constraints, and other elements influencing end-user risk strategy among employees in an Agile DSDM environment, and how these factors impact the risk management process, or the adoption of a practical planning approach facilitated by the DSDM team. Consequently, this comprehensive study suggests that end-user risk strategy is initially and fundamentally shaped by several critical considerations such as skills, experience, culture, communication, and other contextual factors that determine the overall necessity and feasibility. This pertains to specific aspects of the organization's business operations and overarching business strategy.

Drawing on secondary data from organizations A and B (risk management documents), it is evident that there is a consensus regarding the definition, identification, analysis, and mitigation of risks. Thus, all risks follow a similar pattern, which includes the consideration and identification of risks present in all aspects of their work. This entails reporting any apparent control weaknesses requiring process or control enhancements and assessing the potential severity of the risks.

"As part of an overall programme of continuous risk reduction, all employees have a responsibility to engage in active risk management and not to accept or become accustomed to the continued presence of known risks" (Extract from Company A Risk Management document)

This involves assessing the likelihood of the risk (the probability of it occurring, ranging from rare to almost certain) and the potential impact of the risk (consequence if it occurs, ranging from insignificant to catastrophic), as outlined by Silva et al. (2019). Multiplying these scores provides the resulting risk rating, which helps determine the necessary risk management actions

required, both in the short and long term, to mitigate (i.e., reduce) the risk to an appropriate level of control, as suggested by Lechner and Gatzert (2018). It is essential to record the risks and mitigating actions in the relevant team's risk register, review and update the risk register monthly, and document the actions taken along with the current risk rating after considering any mitigating controls (Lechner and Gatzert, 2018).

Evidence suggests that traditional risk variables decrease in comparison with a modern risk strategy. For example, one organization has a network of professionals and emphasizes the significance of knowledge/training materials, which is of considerable interest to their clients in this complex environment. In contrast, a similar document from Organization B lacks the strength and breadth of Company A's approach. It is evident that Company A fills the gap in the process to provide fresh insights and employs key influential attributes to serve their clients effectively.

"The approach we have taken to manage risks for this project included a methodical process by which the project manager identified, scored, and ranked the various risks. The most likely and highest impact risks were added to the project schedule to ensure that the assigned risk managers take the necessary steps to implement the mitigation response at the appropriate time during the schedule". (Extract from Company B Risk Management document)

Nonetheless, there is a growing array of planning options, necessitating the association of DSDM with a customized end-user risk strategy. The levels of uncertainty within the team were identified as contributing factors to the perceived need for an end-user approach. Respondents' perspectives on the potential outcomes of an end-user-led risk framework in addressing this specific situation and context were also considered.

Significantly, none of the secondary data supports the endorsement of an end-user-led risk strategy, as the researchers perceive it as an uncharted field.

"The approach we have taken to manage risks for this project included a methodical process by which the project manager identified, scored, and ranked the various risks". (Extract from Company B Risk Management document)

From the interviewees' perspective, decisions regarding the potential end-user strategy were found to be consistent and primarily influenced by the team's direct experiences with end-users and the broader business strategy and interests. Overall, some interviewees expressed the belief that their current plans and activities related to risk management were adequate and did not require any involvement from end-users.

"No, the risk is a complicated task that requires sufficiently imminent. End- users involvement will upsurge the risk, which could lead to an increase in cost or delay with the budget." (Interviewee #P19)
"We developed a companywide risk perspective by anchoring and discussions around risk strategy. For this preseason, it will not be advisable to include end-users when it comes to capturing risk". (Interviewee #P15)

"ONLY the decentralized teams have the authority and expertise to help the business lines respond to threats and changes in their risk profiles. Anyone outside of this team cannot and should not participate in risk management." (Interviewee #P18)

However, others expressed minor concerns or reservations but remained open to the possibility of addressing the gap from their perspective with the end-users. This was evident as some interviewees noted their stance, either for or against, regarding the consideration of involving

end-users in addressing project risks.

*"Yes, highest value delivery and it will improve the relationship, understand what the team goes through the pressure they face on a daily basis". (*Interviewee #P20)
"If they were to be involved, I guess risk strategy will require a different analytic approach because the team will find it difficult to envision risk during their normal strategy processes. We might have to identify several risk factors that have associated with end-user involvement." (Interviewee #P20)

Therefore, their business activities would likely remain an area of relatively low focus and priority in this approach.

5.2.2 Agile influence an organisation's risk activities

In addition to the aforementioned considerations, the overall business activities and company culture were also found to influence interviewees' perspectives regarding the necessity and suitability of an end-user-led approach to risk management.

"Draw on expertise. It's easier to adopt new behaviours when there's someone who can demonstrate them, recognize areas for improvement and applaud when things are done well." (Interviewee #p19)

As discussed in Chapter 3, this potential issue was identified early on and was taken into consideration in the overall design of the study, including the selection of the industry sector (Utility and Consultancy) from which the research sample could be drawn. In particular, the inclusion of individuals working in various aspects of the organization, with extensive experience in both DSDM and risk management, was intended to facilitate an investigation into the potential influences of this and other factors on interviewees' perspectives regarding the end-user-led risk strategy.

The interview results revealed that DSDM was accepted by the interviewees, primarily because it was mandatory and therefore formed part of the overall business strategic plan. Projects deemed suitable had to comply with this framework.

"DSDM has historically considered risk from a narrower perspective. This seems counterproductive at first, as DSDM focuses on continuous improvement and change — circumstances that sometimes seem to be risk conduits. For that reason, nothing needs to be changed." (Interviewee #p9)

In this case, all the projects covered under this research were associated with DSDM. End user lead risk strategy was typically rejected by organisations because didn't align with their business objective and interests. Similarly, the concept of end-user lead was found to be of limited interest due to a very strict reign and planning of risk involved in the individual projects following a firm (Galli and Battiloro, 2019).
"I *don't expect any but if there are any changes people from across the company come together for a series of meetings to learn about the intended changes and to get their ideas"* (Interviewee #p16).

In both cases, interviewees noted that the individual project level remained the most appropriate stage for end-user-led risk management. However, any attempt to enforce this approach could potentially influence the organization's culture and risk activities, ultimately undermining the integrity of the project.

"In my view end-users will be external risks, it cannot typically be reduced or avoided through the approaches used for managing preventable and strategic risks." (Interviewee #p18)

An organization considering changes to its risk strategy must take into account unclear environmental requirements or social interests that need to be acknowledged. Forecasting potential implications for overall costs and profitability in these areas is essential. This often leads to rigorous planning, involving multiple decision-makers, diverse cultures, and employees located in various geographical locations. Consequently, there are uncertain environmental issues and associated risks, and strategic risk planning involves understanding and ultimately selecting the right strategy to satisfy all stakeholders. However, it was noted that both organizations likely do not undertake these actions through an overarching business strategic plan. Instead, they are more likely to identify and proceed with smaller, individual projects to test their viability before making a formal decision to continue or cut their losses.

For this reason, Companies A and B heavily rely on the lessons learned document, as it plays a crucial role in capturing the overall business benefits of past projects.

"The purpose of the lessons learned document for the XXX Project is to capture the project's lessons learned in a formal document for use by other project managers on similar future projects. This document may be used as part of new project planning for similar projects in order to determine what problems occurred and how those problems were handled and may be avoided in the future." (Extract from Company B Lesson-Learned document)

This document is utilized as part of new project planning for similar projects, aiming to identify past problems and how they were addressed, as well as how to prevent them in the future. Both organizations place significant emphasis on capturing lessons learned, considering it an integral part of every project and serving several purposes. However, due to the nature and business strategy of one organization, they particularly prioritize this document.

They ensure that a formal lessons learned document is completed during the project closeout process. However, they also recognize that capturing lessons learned should occur throughout the project lifecycle to ensure timely and accurate documentation of all information. This document serves as a valuable tool for other team members. The researcher discovered that it not only describes what went wrong during a project and suggests ways to avoid similar occurrences in the future but also outlines what went well and how similar projects may benefit from this information.

5.2.3 Available decision-making and risk control

One of the most direct and recurring findings from the interviews was the strength of the current risk strategy, the interest it has garnered, and its effective utilization. This strategy was found to be robust in capturing, planning, and controlling risks, driving overall risk strategy and decision-making. The majority of interviewees cited this as a key reason for solidifying their strategy. Conversely, a lack of knowledge among end-users was often cited as a reason why end-user-led risk planning would not be necessary or useful.

"Each team within IT will maintain a risk register relevant to their area of work and will ensure the risks and the actions taken are reviewed as often as warranted. High risks will require more attention than low risks, but each risk register will be reviewed at least on a monthly basis (commonly as part of a regular team meeting) and updated to provide an auditable record of the current status." (Extract from Company A Risk Management document)

"I am satisfied because the entire process produces results. DSDM, the customer is always involved in the decision-making process which leads to greater customer retention. In the

traditional framework, the customer is only involved in the planning phase and does not influence execution which affects flexibility and adaptability. By keeping the customer in the loop and making changes according to their feedback, you deliver value to the customer and ensure that the final product is truly according to their requirements." (Interviewee #P8)

"The level of collaboration can be difficult to maintain because of the greater demands on developers and clients and if the necessary documentation is not up to date it is certain the project will fall off track. On the other hand, you can deploy software quicker, so your customer can get value sooner rather than later. The advantage is that it has a /higher chance of meeting customers' expectations and the metrics for efficiency and data-driven decision-making." (Interviewee #P10)

Through the interviews, several contextual factors were identified as determining or influencing the nature and diversity of risk control options available to an organization, thus affecting its potential need for and interest in a DSDM team. Many interviewees noted the essential nature of risk planning options that would necessitate and enable end-user-led risk planning, particularly in relatively small projects within the business. This was attributed to the organization's structure, sector, and project duration.

"Once work has been assigned to each team, management will need to hold those teams — rather than individuals — accountable for success. In order to move from thinking and working as individuals to thinking and working as cross-functional teams, everyone in the organization will need a fundamental shift in perception." (Interviewee #P12)

It was also noted that the strength of any risk policy relies heavily on the available planning time allocated to capture, control, and mitigate risks. This plays a pivotal role, especially in situations where the company has invested a significant amount of money into the project.

"In my view, I believe the nature of DSDM does not give room for another risk strategy to penetrate easily" (Interviewee #P9)

Several interviewees from the consultancy background emphasized that risk management was a critical aspect of the project due to the client's investment. Some also mentioned that while they wouldn't advocate for or endorse the current risk strategy as a standard policy across the entire business, mainly due to limited options or concerns, they would be interested in implementing end-user-led risk management if the opportunity arose.

"In theory, the DSDM methodology will never fail. It works in small sprints that focus on continuous delivery. There is always a small part that can be salvaged and used in the future even if a particular approach doesn't go as planned." (Interviewee #P10*)*

Several interviewees also indicated that despite their risk activities being relatively routine and occasionally tailored for project specifications, they would be open to applying changes to any element of their risk policy.

"If you think DSDM is the right fit for your next project, you are probably right. Because of the flexibility, process, and team coordination." (Interviewee #P20*)*
"I'm very pleased with the path of DSDM. I have made a series of conscious decisions that was productive for the entire team. In mine, other agile frameworks limit decision-making skills." (Interviewee #P19)

Several interviewees also indicated that DSDM, in terms of risk management, was significantly more efficient than traditional risk management approaches. They expressed that in DSDM, it is

often not useful or appropriate to engage with stakeholders at the level of planning, as the organization has the capability to consider and address most issues through its planning processes.

"DSDM allows managers to have better control over the project due to its transparency, feedback integration, and quality-control features. Quality is ensured throughout the implementation phase of the project and all stakeholders are involved in the process with daily progress reports through advanced reporting tools and techniques." (Interviewee #P4)

In DSDM projects, is an integrated part of the project execution phase which means that the overall quality of the final product is greater. The client remains involved in the development process and can ask for changes depending on the market realities. Since DSDM is an iterative process, self-organizing teams keep on learning and growing with time and continue improving. (Interviewee #P18)

"If someone on your team or perhaps your entire team is convinced that DSDM has no value, you will have trouble influencing him or her to use it effectively. If you're set on switching your organization and product development to DSDM it's best to do it with people who are as enthusiastic about it as you are and whose personal values are in line with DSDM values. If your staff isn't as enthusiastic, try engaging a DSDM coach. No one can explain the values and core principles of DSDM better than someone who is professionally trained to do just that". (Interviewee #P17)

5.2.4 Stage of Planning risk management model

As we delve into data collection and analysis, the core of the research has been explored, focusing on factors that determine how the end-user voice is captured, filtered, and applied to risk management. This is achieved by identifying their opinions and aligning them with what has already been captured by the project manager. The interviews also provided valuable insights, such as the importance of educating end-users and integrating them into the organizational culture, as well as insights into the organization's perspectives and decisions regarding each approach.

Decisions about how a risk strategy is applied to a particular project are determined by factors such as duration, cost, benefits, and stakeholders. Risk policies can be applied to every stage of the project lifecycle, as discussed in Chapter 2. In the development of this initiative, the identification and evaluation of each risk are reviewed at the initiation stage when using a DSDM methodology. This finding was not surprising to the researcher, as interviewees acknowledged that while projects may be tailored to specific business strategies, the end result remains the same because organizations require the capture of customer voices. Typically, this is applied at a relatively early stage of project development, particularly in the initial identification and analysis of risks.

"If they (end-users) were to be involved, I guess risk strategy will require a different analytic approach because the team will find it difficult to envision risk during their normal strategy processes. We might have to identify several risk factors that have associated with end-user involvement." (Interviewee #P20)

Indeed, the researcher can conclude that the use of DSDM was primarily, if not exclusively, perceived by these interviewees as a means of providing a rapid software solution to assist the customer's endeavours.

Regarding the type and level of risk management to which DSDM would be applicable and applied by the project team, it became apparent from the initial (background) interview questions that while all represented companies engaged in fairly structured and hierarchical planning processes (such as operating programs, individual development projects, and activities), there was

flexibility in deciding at what level(s) DSDM would be utilized. In instances where interviewees expressed support for increasing the type and level of analysis and documentation in their risk planning and decision-making, they noted that a key consideration would be determining the level of analysis required in interpreting end-users' voices and the planning process at which to consider and address any particular issue.

"DSDM values include willingness to adjust to changes in requirements, collaboration with customers, interaction within the development teams, and frequent and incremental delivery." (Interviewee #P18)

Moreover, it was also evident that some respondents were only interested in seeing this take place at particular stages, notably the initiation stage, of their planning processes. At one extreme, 40% of interviewees believed that end-users' voices should be thoroughly assessed and addressed throughout the project. Meanwhile, 30% expressed a neutral stance, and another 30% did not support this approach.

"If there is a change which I cannot predict it needs to be cascade top-down. This is the typical approach. Each leader on the leadership team drives the change through their own part of the organization" (Interviewee #P19)

One respondent suggested, for example, that if risks cannot be identified and managed at the planning stage, then it is very likely that the core principle of DSDM has been neglected, and the project is set to fail.

"Risk management in DSDM is divided into short sprints that are both manageable and flexible enough to allow the team to implement changes on short notice. This unmatched flexibility is one of the top reasons why dynamic organizations prefer to use DSDM in their project." (Interviewee #p13)

"In theory, the DSDM methodology will never fail. It works in small sprints that focus on continuous delivery. There is always a small part that can be salvaged and used in the future even if a particular approach doesn't go as planned." (Interviewee #p11)

In several instances, respondents noted that DSDM rejects uncompliant customers, particularly when the type and level of customer involvement would exceed the organization's ability and responsibility. It was observed that customer involvement issues are often driven by financial motivations, and assessing and managing them falls under the responsibility of the project team already engaged in their daily tasks.

While end-user-led risk management was of interest to and accepted by many interviewees, they described its potential application as adding an additional feature to a product. They viewed the primary rationale for using DSDM as proactively identifying and addressing end-user-led risk issues early in planning. The researcher perceives DSDM as a framework intended to aid in identifying, selecting, steering, and planning decisions away from those with associated fatal flaws from a risk perspective.

5.2.5 Focus and Scope of Strategic Risk Planning

It was evident from the interviews that respondents often recognized significant differences in the types of project issues that could and should be assessed and considered early in the planning stage, as opposed to later in planning or during eventual project design and implementation. Several interviewees highlighted the necessity for any DSDM process to offer considerable flexibility and support from managers to identify and focus on a select number of

important and relevant external risks (such as end-user-led risk strategy) at the planning stage, with the ability to scope and screen out those that are less critical. Furthermore, it was believed that the type and level of required analysis would vary between internal and external risks, corresponding to their importance and relevance to the overall project.

"Yes, Organisational influence is a two-way exchange: Organizations cannot accomplish their goals if they can't influence their members to do the right things. ... In the best case, when individuals and organisations can influence one another, the best outcomes can be achieved: high performance and satisfaction for all." (Interviewee #p1)

"DSDM requires a certain comfort with flexibility, and the willingness to pivot as each project moves along its path towards completion. The original vision for a project will never match the end result, as DSDM forces you to improve your product at every step of the journey." (Interviewee #p9)

In some cases, interviewees expressed a preference and specified a focus on considering internal and external risks in the company's strategic planning, particularly concerning achieving overall compliance with relevant legislation and regulations, as well as with internal corporate requirements and objectives where they exist. This entails determining whether and how risk compliance can likely be achieved for each stage of the project and, if so, at what comparative costs, as well as evaluating the likelihood of eventually obtaining the required regulatory approvals. Consequently, some interviewees perceived the company's risk strategy as having a clear focus on "hard" regulatory requirements and compliance standards, which would have implications for the overall project and entail associated technical and financial considerations.

"The level of collaboration can be difficult to maintain because of the greater demands on developers and clients and if the necessary documentation is not up to date it is certain the project will fall off track. On the other hand, you can deploy software quicker, so your customer can get value sooner rather than later. The advantage is that it has a higher chance of meeting customers' expectations and the metrics for efficiency and data-driven decision-making." (Interviewee #p9)

"Start by following the principles and practices of the DSDM framework you've chosen, without any deviations. Once the team has mastered these, adjust your processes to better fit their needs. Ultimately, you end up developing a completely original process that works well for you. Make your process as simple as possible and understand why you're using this practice." (Interviewee #p12)

In describing and rationalizing their preferred focus on matters of risk compliance, some participants noted that it was difficult, if not impossible, to anticipate and address external risks in the planning phase comprehensively. Adhering to regulatory requirements is usually so relevant and significant that failing to address them appropriately could result in either a win or a loss. It was apparent that these factors often necessitate the consideration of external risk issues, which may not have specific statutory requirements unless they apply, and which would have fewer direct and immediate costs associated with them, to be categorized as internal risks.

Interviewees also frequently expressed the view that it would be challenging, if not impossible, to attempt to assess and compare risk options if end-users were involved. Conversations such as those concerning profit, loss, and outcomes would have to be filtered. Therefore, the focus can be dimmed with issues that would have direct and indirect outcomes and costs, some of which might impact the standards and product. Interviewees suggested that their organizations should not try to add additional responsibilities that would blur their focus, as this would make the DSDM too awkward and complex and spread a negative trend that everything about DSDM would result in

being untuneful. These interviewees' views suggest that risk should focus primarily, if not exclusively, on project matters, and there may be negative implications of not maintaining this focus.

5.2.6 Stakeholder Involvement in Projects

Stakeholders play a vital role in achieving project success within the framework of DSDM. These stakeholders encompass project leaders, scrum masters, product owners, clients, vendors, and project sponsors. They contribute to meeting project objectives by providing support in navigating challenging situations. Interviewees acknowledged that maintaining open dialogue with stakeholders, particularly during challenging project periods, is essential. This ensures that an appropriate level of support can be obtained in a timely manner before situations become unmanageable.

Furthermore, Stakeholder management documents from Company A and B highlight the importance of the business's role, expectations of end-users, communication strategies, and actual safeguarding practices that align with the company's business strategy. These findings suggest that the success of the project heavily relies on stakeholder engagement and management, effective decision-making processes, and the ability to identify stakeholders' expectations from project initiation to completion.

"While not always the easiest task to accomplish, there is a process to getting this level of management on your side. As time and their schedules allow, keep them informed and show them the importance of getting your projects off the ground. Lack of senior management commitment is routinely listed as one of the major risks. With this in mind, I have the full support of senior managers". (Interviewee #p5)

In my experience, the consequences of not having senior management support are easy to predict. Here's what I have seen that senior management support means and the consequences of not having it:

The most common and show-stopping consequence is little, or no budget allocated to a particular project or initiative. If senior management doesn't truly support a particular initiative, they won't allocate sufficient, if any, funds to it. This significantly reduces the chances of project success or may even prevent it from moving forward altogether (Interviewee #p10).

The motive for such communication is to maintain visibility regarding the current state of the project. To avoid blame-shifting, there must be an audit trail at all times. If there's no active interaction with stakeholders, additional measures to eliminate or mitigate risks need to be taken. In my view, the level of collaboration should be predetermined to understand the extent of assistance stakeholders are willing to provide. Therefore, it is important for all team members to revisit stakeholder documents and determine how often and under what circumstances they should interact with stakeholders (stakeholder power grid).

The research acknowledges that team members prefer unrestricted access to key stakeholders, as it encourages them to proceed with projects without the fear of setbacks or project alterations. Consequently, it is prudent to say that risks that occur could impact overall project performance. Hence, involving stakeholders regularly can reduce doubts and help resolve any risks sooner.

5.2.7 Team Satisfaction

Achieving overall satisfaction in a complex project environment is crucial, as teams require motivation to sustain the project's momentum. Satisfaction among team members fosters a positive work environment, enhances collaboration, and boosts morale. When team members feel satisfied

with their contributions and the project's progress, they are more likely to remain committed and engaged. This, in turn, increases productivity and facilitates the successful completion of the project. Therefore, prioritizing measures to ensure overall satisfaction among team members is essential for project success in a complex environment.

"Yes, as the team always want to learn something new, and this framework gives us the opportunities to learn and enhance our skills". (Interviewee #p19)

"I'm so happy with DSDM. I have an excellent team, an excellent manager, and an excellent environment in which l can work easily most importantly team collaboration" (Interviewee #p15)

In the researcher's view, the team's drive to succeed is closely linked to their ability to reduce or control the outcome of risks. Likewise, when teams are not contented, their performance may suffer. Team satisfaction plays a vital role in responding to risks and challenges effectively, as team members are more confident in their work. Higher levels of motivation lead to improved communication and a greater tendency to manage project uncertainties effectively.

The data also suggest that the culture of the organization is conducive to the success of the project team. The organization has established a support system that is positioned to ensure maximum success, thereby empowering the project team to thrive. This supportive environment fosters collaboration, innovation, and problem-solving, contributing to overall project success.

"Draw on expertise. It's easier to adopt new behaviours when there's someone who can demonstrate them, recognize areas for improvement and applaud when things are done well." (Interviewee #p19)

In the researcher's view, it is essential to assess whether the team possesses the necessary skills to undertake the work, provide appropriate facilities, and provide the most important ingredient, which is supporting the team throughout the project lifecycle. The participant highlighted the significance of expectations and a strong support system in achieving continuous team satisfaction. This can be achieved through the provision of the right tools, training for teams, a supportive system, and standardized processes and procedures that help sustain stability in a project environment. These measures contribute to reducing uncertainties and achieving balanced rapport within the team.

5.3 Focus group workshop

The final phase of the research involved a one-day workshop with 14 participants aimed at gathering feedback on a new model (ERF) based on the findings from phase one of the research. The workshop provided an opportunity for stakeholders to review and refine the model, with a focus on adopting a more open-minded approach towards end-users.

The workshop captured viewpoints suggesting that considering end-users as "opportunity risk" could lead to reduced project risks and enhanced collaboration, service delivery, and project benefits. This perspective shift encourages the project team to view end-users not only as potential risks but also as opportunities for collaboration and improvement.

By embracing end-users as "opportunity risk," the project team can enhance collaboration, gain insights for improved service delivery, and maximize project benefits. This approach fosters a deeper understanding of user needs and preferences, leading to increased user satisfaction and greater project success.

The workshop served multiple purposes. First, it provided an opportunity for the project team to receive feedback on the new model (ERF) based on the research findings from phase one. Second, it allowed for further review and refinement of the model based on the insights gathered during the workshop. A total of 14 participants attended the one-day workshop who provided valuable feedback on the model. The workshop focused on capturing viewpoints regarding the potential benefits of the project team becoming more open-minded and accepting end-users as "opportunity risk." This approach aims to shift the perspective on end-users from being solely perceived as potential risks to also being seen as opportunities for collaboration, service improvement, and overall project success. By embracing end-users as "opportunity risk," the project team can potentially reduce risks associated with the project by fostering collaboration, identifying new opportunities for service delivery, and maximizing project benefits. This mind set shift encourages the team to view end-users as valuable resources rather than just potential sources of problems. Embracing end-users as "opportunity risk" promotes collaboration between the project team and end-users, leading to a deeper understanding of user needs and preferences. This can result in improved service delivery that better meets the expectations and requirements of end-users.
By incorporating feedback from end-users and adopting a more open-minded approach, the project team can maximize the benefits of the project. This may include increased user satisfaction, higher adoption rates of the new model, and ultimately, greater success in achieving project objectives.
Overall, the workshop provided a valuable opportunity for stakeholders to review and provide feedback on the new model, while also exploring strategies to enhance collaboration, service delivery, and project benefits by embracing end-users as "opportunity risk."

5.3.1 Project Team's Relationship with Risk Model

The risk model influenced the experiences of all participants in different ways, forming a relationship with each of them. Most of the discussions were initiated by the project team members who had a brief encounter with the model.

A few participants discussed the importance of the relationship with end-users and the new risk model.

"I think it starts with some unfamiliar techniques; from your elaboration, I see where you're going with this framework. It's working on connectivity, listening, and detail problem review. To me it is telling a story, it is pretty clear that end-users will have little difficulty connecting with the entire project and the team". (Interviewee #p19 -Company B)

One participant expressed concerns about the sustainability of the model in a live project, suggesting that all phases might need to be repeated.

"The other thing I would say, I thought that was quite a difficult approach, so I'm not really sure how accurately that reflects in a real live project. I think that there's no big difference between phase two and phase three in terms of their duration, technique and the manpower required. I think there will be a lot of repetition between the two including loads of issues with this task, and I didn't really feel it was a fair reflection of the DSDM framework. Personally, I just wasn't inclined to use move from phase 2 and to phase 3".

Another participant suggested that phase three should be eliminated to emphasize the need for efficiency and ensure smooth operation.

"I think you're absolutely right. But, I mean, phase three wouldn't have any bearing. Partly, even though it is a very complex phase, you wouldn't have long gaps, or you wouldn't find yourself getting stuck if it was missing. You would be able to proceed and let the team know that you're

actually producing results without gaps". (Interviewee #p12 -Company B)

The general sentiment regarding relationships with end-users being in the driving seat was negative. It was noted that good relationships with the different phases are more likely to lead to better results compared to if the relationship was poor.

"Oh, I see. Well, you could, yeah, if that's the purpose, is to help and it is what it is... end-users can process this on time while they're doing other stuff. But it's just a question of normal activities, I don't know why we need the end-users wouldn't you just leave all the tasks to the project team". (Interviewee #p15 -Company B)

Less support for their involvement was highlighted as a contributing factor to this model and a negative relationship with the project team.

"I think it's to get their own ideas and point across without push back." (Interviewee #p1 - Company A)

"Then that reflects in the process, and it's also more related to the kind of task that you're expecting them to produce or hear. Whereas, yeah, if you give them a difficult project, their approach is going to suffer, or it might depend on the size of the project. Then you could teach them ways to deal with risk as they occur, you know" (Interviewee #p4 -Company A)

Participants also identified factors that might hinder the entire process if it comes under great duress, with end-users being highlighted as potential hindrances. If a project can be crippled under a small or medium-sized duress, then large projects should be out of the question. When this occurs, they felt the relationship suffered, leading to subsequent poor outcomes.

"I disagree, if it does not suffer with small projects, it will not suffer with large-scale projects". (Interviewee #p11 -Company B)

"To put (end-user lead model) under duress we can deal with it, but to me, that's not really an issue of this model. You know, the purpose of the model is for the end-user to be able to capture, monitor and mitigate risk at various stages of the project, presumably. Therefore, I'm not really sure how that SSM methodology really helped." (Interviewee #p3 -Company B)

Where a good alliance was not achieved with the project team, the SSM methodology was regarded as an important alternative to other approaches.

"Well, I disagree with you, SSM methodology is very helpful. Even for me, if I was to describe or give a solution to a problem, my first stop will be with this framework because I can deal with them from the company's perspective and forces them to look for a solution that can be more than just technical." (Interviewee #p16 -Company B)

While there is an assumption in the end-user-led risk model that it's focused on eliminating deficiencies, capturing risk, and addressing all risks to produce a successful outcome, it may also

be important to take into account issues such as the importance of good communication and collaboration with the project team for making the right decisions.

One of the crucial elements of the model was being able to place trust in end-users. Some participants regarded end-users as unknowledgeable about the decisions that needed to be made and were comfortable with them taking a back seat to risk management and the critical decision-making process.

“The bosses might not be too pleased with this but in the past, I have been losing my patience a little bit with end-users. So at least they should know how we work some the issue we encounter.” (Interviewee #p8 -Company A)

Several participants viewed the model as a flexible framework but were open to making adjustments to align with any organization's business strategy. Consequently, the entire team would need to intervene, identify, and implement any changes required for a better outcome.

"It is designed in such a way, but we always tailor our framework when/if require buying the client. If some circumstances, we have educated them on that approach" (Interviewee #p9 - Company A)

Another participant mentioned the limited number of adjustments that might be provided by the organization.

In their understanding of the new model, end-users must be willing to follow the process as set by the organization. This includes knowing the processes inside out and being prepared to deal with difficult situations where an organization might refuse to accommodate or adjust.

“Yes, for collaboration to work, the vision and purpose must be clear.” (Interviewee #p7 - Company A)

5.4 Expected Business Outcome

As participants discussed the model, the idea of integrating it into the business strategy arose for measurable outcomes and effective processing. However, it was unclear to what extent, if any, the business strategy had or would have on this model if it was given the green light. While they were not explicitly asked about these outcomes, the scarcity of comments may indicate that they are rarely used in any current model, or that little explanation is provided about their purpose.

Some participants revealed an understanding of the purpose of having a business strategy to firmly establish the company’s brand on the approach over time. However, other participants highlighted the difficulties in proceeding without the aid of the business strategy.

"There’s no right or wrong answer. It very much depends on the company's policy and the demand of the client. Both should be dealt with in merit, but the team must know how to deal with each more clearly so that ... Maybe they are not paying attention to the collaboration and might pay less attention to documentation. I think time should be invested in both if that happens an appropriate level of expectation will be maintained through the duration of this and future projects". (Interviewee #p17 -Company B)

"It is designed in such a way, but we always tailor our framework when/if required by the client. If some circumstances, we have educated them on that approach."

"That was my ... I mean, yeah, you could sort of say more abstractly they need to know how to deal/know the processes inside out and how to deal with difficult situations where an organisation might refuse to accommodate and adjustment." (Interviewee #p8 -Company A)

5.5 Service-Related Risk

Participants discussed both positive and negative views on what is viewed as either internal or external risk.

"So, we don't always use this kind of statement, obviously, in this case, external risks are generally more difficult to predict and control but I kind of agreed that unpredictable behaviour can be associated with external risk" (Interviewee #p11 -Company B)

The flexibility of risk can be regarded as an advantage, and some highlighted the benefits of external risk.

"I guess it can be addressed as an external risk if we want to improve the outcome of the project and improve the quality". (Interviewee #p8 -Company A)

Others were not forthcoming, as such end-user risk was not viewed as an external risk but rather an internal risk. Perhaps, their close contact within the project is perceived as internal rather than external.

"This is not an external risk – such risk is supposed to be aligned with governance, strategic, operational, market, legal, and environment risks" (Interviewee #p4 -Company A)

"Yes agree- external risks are unpredictable and challenging to control but as you said, they are stakeholders. As stakeholders we capture their risk and it's viewed as internal". (Interviewee #p7 -Company A)

Although the participants had different views on risk, some discussed the benefits of external risk and the categories under which they fall.

"If the risk impacts the scope, then and only then can such risk be accepted but it's effortless to say if the risk is internal or external or just another risk that is more related to what you expect." (Interviewee #p18 -Company B)

5.6 Individual Needs and Familiarity with End-Users

The project team emphasized the importance of having end-user-led risk management and ensuring that these requirements are acknowledged by the agile community.

"I think it starts with some unfamiliar techniques; from your elaboration, I see where you're going

with this framework. It's working on connectivity, listening, and detail problem review. To me it's telling a story, it is pretty clear that end-users will have little difficulty connecting with the entire project and the team". (Interviewee #p19 -Company B)

"Like anything else, it would be very difficult. Sometimes we might struggle with the approach, but even so, I do know that this is different from what we're used to, what how clients are used to. But still, there are no complicated tasks in this framework. This means it is feasible to implement, issues can be addressed without any technical abilities". (Interviewee #p16 -Company B)

Others held quite the opposite view, recognizing the model as a total disaster for capturing risk.

"The other thing I would say, I thought that was quite a difficult approach, so I'm not really sure how accurately that reflects in a real live project. I think that there's no big difference between phase two and phase. Three in terms of their duration, technique and the manpower required. I think there will be a lot of repetition between the two including loads of issues with this task, and I didn't really feel it was a fair reflection of the DSDM framework. Personally, I just wasn't inclined to use move from phase 2 and to phase 3". (Interviewee #p16 -Company B)

While recognizing the value of DSDM, the project team also expressed an understanding that this approach may have its pros and cons for managing the types of risk that present themselves. They acknowledged that the way risks are managed may not be appropriate for using this tool.

This was discussed in relation to how the team can adjust and benefit from such an approach in the project. One participant mentioned how drilling in DSDM terminology could be a saving grace if there's any chance of having end-users as leads. A change in language might be the key.

"I think our communication approach can be adjusted, try to use more simple words, they can associate with. From experience It will be, to some extent, will be the same communication problem that they might encounter. At one point of the task, so communication is the only this that can amend, and they need to master this skill". (Interviewee #p3 -Company A)

Some participants discussed the specific need for SSM as a tool, seeing it as an opportunity to elaborate on a problem. They perceived SSM as formulaic rather than personalized, which could help in addressing specific needs effectively.

"Well, I disagree with you, SSM methodology is very helpful. Even for me, if I was to describe or give a solution to a problem, my first stop will be with this framework because I can deal with them from the company's perspective and forces them to look for a solution that can be more than just technical." (Interviewee #p7 -Company A)

5.7 Participants Expectations

Several participants expressed uncertainty about what to expect from this model and its features. This uncertainty stemmed from their first encounter with the model, and they were unsure about their expectations regarding the duration of the task.

"I think it starts with some unfamiliar techniques; from your elaboration, I see where you're going with this framework. It's working on connectivity, listening, and detail problem review. To me it's telling a story, it is pretty clear that end-users will have little difficulty connecting with the entire project and the team." (interviewee #p8 -company a)

In relation to the effectiveness of this model, some perceived it as a change of perspective. Many expected the model to fail, but a change of perspective might be critical as expectations will match reality.

"It does depend on what you are saying it's not really the purpose of the changing perspective. I think it's about adapting. We don't need to change or modify – this is a hybrid organisation which means we are flexible to deal with any circumstance we encounter. Therefore, we adapt and train the end-users to use this approach." (interviewee #p12 -company b)

Individuals also identified their expectations of the model in relation to its ability to adapt and adjust. Since the organization is hybrid-oriented, they expect it to be able to swiftly adjust to fit their needs.

"Indeed, we're hybrid but if it's about adapting and not adjusting, the framework could be designed to adapt to any circumstance." (interviewee #p14 -company b)

5.8 Information Provision

The project team is diverse in their levels of satisfaction and expectations regarding the amount of information that the end-user will be exposed to about the organization if sensitive documents related to risk are made available to them.

"Currently, we can only take the responsibility of risk from the pm and allow the end-users to take the drive. From the company's perspective, we can't disclose certain information due to the nature of work." (interviewee #p14 -company b)

Another participant also highlighted the importance of end-users taking responsibility, based on their previous encounters with the project team.

"The bosses might not be too pleased with this but in the past, i have been losing my patience a little bit with end-users. So at least they should know how we work some the issue we encounter." (interviewee #p1 -company a)

In circumstances where a participant expressed dissatisfaction, this was generally associated with difficulties stemming from the lack of information provided to end-users.

"Yeah, but did you feel that they hinder the project and test your ability and understanding, particularly in this area." (interviewee #p2 -company a)

As a result of these difficulties, many felt that an approach such as this requires information from a variety of sources, such as the project team and the organization, because the path of risk becomes volatile if the relevant person is in charge.

"That's a tricky question, isn't it? Because once you're used to a process, it becomes much easier to overlook. I find when it comes to end-user risk it should be treated with care as you don't know

which direction it will take" (interviewee #p9 -company a)

Several participants believed that it was the duty of the project team to provide support for the end-users. They felt that having such support would reduce the levels of error associated with risk management.

"Even if they're higher level. But, yes, i think some of the external risks, would be difficult for a person who doesn't have any experience with them." (interviewee #p6 -company a)

Others felt that having information was an important element in decision-making and changing mindsets. However, they also believed that collaboration increases the likelihood of making good decisions, even with limited information, as it allows for diverse perspectives to be considered.

"The key here is collaboration it's also a two-way task. We as an organisation thrive from collaboration it is the focused-on team members naturally feel a part of something bigger than themselves by giving them the best way to transition from an individual to a collaborative mindset. Working with this type of mindset adhere to decrease confusion, finger-pointing, and the disintegration of team cohesion." (interviewee #p12 -company b)

5.9 Personal Decision-Making Process Involvement

Most participants were content with the level of collaboration required to engage in risk management. They expressed views about involvement in documentation, communication, transparency, accountability, and decision-making in relation to processes and outcomes. In terms of their personal experiences, some expressed their views about specific aspects of end-user involvement. By collaborating, end-users can invest some time to discuss different avenues of risk, and a satisfactory amount of information can help make a better decision. The existence of a partnership between the end-user and the project team was evident in many of the discussions, with the project team being aware that it is not just the end-user that ultimately makes the final decision.

"I think collaboration must be communicated to all participants minimum standard. To foster this, everyone must be provided with defined individual and collective roles and responsibilities they will hold within the team. When they have a clear understanding of their position, each team member will work more effectively and without accidentally stepping on another person's toes and creating unforeseen conflicts." (interviewee #p15 -company b)

There was recognition of the benefits that cooperation brought in terms of the outcomes of risk, most of which were related to issues of control and enablement.

"In a collaborative environment, each team member experiences what it means to take part in the shared responsibility of results. With this type of focus, what starts out as a goal becomes a battle with the experience of success changing from an individual achievement into a bonded group experience building comrades and morale?" (interviewee #p14 -company b)

However, some participant's experiences of involvement in teamwork and decision-making

were less positive:

"In my experience, if team members do not care or are unclear about the goals and objectives presented to them, they will find all kinds of reasons not to collaborate." (interviewee #p7 - company a)

Others were not content; they believed that the only prudent way forward was to set achievable goals and establish a way to manage processes and procedures, including decision-making. This dissatisfaction was evident when the project team was perceived to have adopted a more overprotective approach.

"I don't disagree but from the perspective, the purpose of collaboration is to set goals that provide team members with achievable wins. These wins have a magical way of breaking down barriers and creating positive momentum individually and collectively. Further, it's imperative to re-evaluate goals and redirect whenever necessary". (interviewee #p4 -company a)

The choices made by the project teams varied; many had negative perceptions about working hand in hand with the end-users. They perceived potential difficulties, leading them to view project documents as a better alternative to teamwork.

"I know what you mean at this level, but documentation is viewed at a high esteem than collaboration. For audit purposes but like you said it's who you work for not what works for you." (interviewee #p6 -company a)

Others indicated that teamwork and documentation are overrated, and communication should take precedence as the forefront aspect.

"Maintaining collaboration should not be related to documentation. That said, collaboration in an agile environment should be related to communication. It's apparent, documentation is critical, collaboration is a must, but communication sits above both." (interviewee #p15 -company b)

When an opportunity is made available, team members have the capability to make the right decision if they are well-informed. In some circumstances, this resulted in them making the right decision with little or no support.

"In agile documentation is a road map for all stakeholders and decision-makers and it is a decision-making tool. I personally do not think there's a great demand for anyone associated with the project. Of course, there will be pressure coming from all angles, but we are trained and skilled to deal with or minimize if they occur". (interviewee #p1 -company a)

Some participants felt that the only way forward was to engage with the end-users to seek out more preferable approaches through alternative means.

"Yeah, agree and that equips each member of the team including the client to actively engage with the team." (interviewee #p3 -company a)

“I agree, as long as a firm process is in place, all revenants’ documents are confirmed, and the entire team is on board there shouldn’t be any problems”. (interviewee #p19 -company b)

One of the important issues that emerged in the discussion was centred around knowledge. The majority held negative perceptions about the knowledge of the end-users, particularly in terms of integrating without any supervision. However, some felt they can be supportive if given the necessary resources.

"If they are taught about the scope of our work, educate about the culture and benefits of our product and service we offer i think they are supportive instead of been challenging." (interviewee #p15 -company b)

Several initially made a decision not to entertain that capacity and subsequently did not acknowledge their involvement as a positive step forward.

“Yeah, but can we meet all the objectives without them no we can’t”. (interviewee #p14 -company b)

5.10 Case studies

5.10.1 Company A

The findings from Company A indicate that the organization has been highly effective in implementing DSDM while integrating customer feedback. The organization has adopted an agile approach to product development, aiming to achieve optimal product quality. Company A demonstrates significant inclusion of end-users through various means such as surveys and feedback, facilitating effective change and product development. One key aspect of Company A is its implementation of effective risk management with the assistance of customers. This enables the organization to efficiently reduce risks and enhance product success in the market. The information provided is sourced from an official document of Company A.

“As part of an overall program of continuous risk reduction, all employees have a responsibility to engage in active risk management and not to accept or become accustomed to the continued presence of known risks” (extract from company a risk management document)

It is evident that the company has rigorously implemented a policy of including all employees in the risk management process. This approach proves effective for organizations in guaranteeing the highest quality of projects. Furthermore, interviews conducted with personnel from Company A revealed that the company has been actively involving end-users to ensure the success of its products. This increasing collaboration between employees and customers is a pivotal aspect of the ERF model. Consequently, by integrating end-users, the efficiency of the DSDM model is heightened, as risks are identified with the assistance of the end-users. This practice enables organizations to ensure that the best products are launched into the market after meticulously managing risks. By engaging customers in the decision-making process, Company A has demonstrated commendable project performance.

In addition to customer inclusion, it is imperative for businesses to ensure the involvement of stakeholders, including investors, management, and suppliers. Documents from Company A and

employee confirmations highlight the integration of stakeholders into the risk management process. The incorporation of stakeholders in risk management is a critical facet of DSDM and is aligned with the theoretical concept of structured risk management in the ERF model. This process ensures that all individuals associated with the business can share their perspectives on potential risks and provide valuable feedback to enhance decision-making. Extracts from Company A's documents indicate that stakeholders bear the responsibility of ensuring that risks are given proper attention to prevent any negative impact on performance.

"Each team within it will maintain a risk register relevant to their area of work and will ensure the risks and the actions taken are reviewed as often as warranted. High risks will require more attention than low risks, but each risk register will be reviewed at least on a monthly basis (commonly as part of a regular team meeting) and updated to provide an auditable record of the current status." (Extract from company a risk management document)

The document underscores the importance of each team function having its own risk register to identify and analyse risks. This practice significantly increases the likelihood of recording and analysing all potential project-related risks, thereby facilitating effective management. The case of Company A further highlights the crucial role of effective communication in risk management. Poor internal communication within organizations can hinder effective risk management, consequently elevating the risk of project failure.

However, employees at Company A have raised specific concerns regarding the integration of end-users into the DSDM life cycle. During the study, it was observed that employees often encounter difficulties when engaging with end-users due to the latter's limited understanding of the organization's operations. End-users typically serve as external stakeholders and thus lack awareness of operational procedures, making it challenging for them to identify and mitigate risks effectively. Consequently, this presents a significant challenge within the DSDM life cycle, as it is essential for end-users to possess adequate awareness of organizational issues and risks to facilitate meaningful collaboration between company employees and end-users. Otherwise, the information provided by customers for risk management may not effectively contribute to product development enhancement.

Furthermore, individuals from Company A discussed aspects of business strategy to ensure the effective implementation of the ERF model. While the ERF model's significance in product development is substantial, its impact on measurable business metrics remains uncertain. Consequently, firms may still be unsure about the benefits the model brings to the business. In this context, one interviewee from Company A stated:

"That was my ... I mean, yeah, you could sort of say more abstractly they need to know how to deal/know the processes inside out and how to deal with difficult situations where an organization might refuse to accommodate and adjustment." (interviewee #p8 -company a)

It is evident that challenges exist regarding the integration of end-users throughout all stages of the DSDM life cycle, potentially hindering the model's success. Therefore, it is crucial for the firm to identify and address these challenges to effectively improve business performance. People from Company A suggest that increasing familiarity with end-users is necessary to ensure the model's effective implementation and enhance risk management practices.

5.10.2 Company B

Company B was also examined regarding the integration of end-users with the DSDM life cycle. It was observed during the study that the collection of data concerning risks poses a significant challenge for the organization. Ensuring the validity of information provided by end-

users for inclusion in the decision-making process proves highly challenging for organizational personnel. Additionally, in the study with Company B, it was noted that heightened expectations on developers and customers may make sustaining collaboration challenging, potentially leading projects astray if relevant documentation is not up to date. Conversely, accelerated software delivery may benefit customers more quickly, increasing the likelihood of meeting consumer expectations, efficiency metrics, and data-driven decision-making standards. This poses a critical challenge to the inclusion of end-users in the decision-making process.

Moreover, individuals at Company B also emphasized that for effective implementation of the ERF model within the DSDM life cycle, structural and policy changes within the organization are essential to achieve desired results. The excerpt from Company B's document underscores the importance of properly documenting and reporting risks to enhance management practices.

"The approach we have taken to manage risks for this project included a methodical process by which the project manager identified, scored, and ranked the various risks. The most likely and highest impact risks were added to the project schedule to ensure that the assigned risk managers take the necessary steps to implement the mitigation response at the appropriate time during the schedule". (Extract from company b risk management document)

The structural approach to risk management ensures that risks are analysed based on their significance, enabling the organization to adopt successful mitigation strategies. Effectively including end-users in this process can yield significant benefits, enabling managers to embrace a more user-centric approach. Another excerpt from Company B's document also highlights a similar approach.

"The approach we have taken to manage risks for this project included a methodical process by which the project manager identified, scored, and ranked the various risks". (Extract from company b risk management document)

While the approach is effective and can improve project performance, involving end-users in the process can lead to a better approach as they can provide developers with valuable insights into potential risks. The company utilizes a lesson-learned document to organize feedback and input from end-users, integrating it into the development phase. This practice significantly enhances risk management performance.

"The purpose of the lessons learned document for the xxx project is to capture the project's lessons learned in a formal document for use by other project managers on similar future projects. This document may be used as part of new project planning for similar projects in order to determine what problems occurred and how those problems were handled and may be avoided in the future." (Extract from company b lesson-learned document)

However, Company B also acknowledges the challenge of including end-users in the phases of the DSDM lifecycle. One significant issue is that in the context of complex projects, end-users may struggle to provide valuable insights for decision-making. Consequently, there is concern about the validity of user input for risk management purposes.

"To put (end-user lead model) under duress, we can deal with it, but to me, that's not really an issue of this model. You know, the purpose of the model is for the end-user to be able to capture, monitor and mitigate risk at various stages of the project, presumably. Therefore, I'm not really sure how that SSM methodology really helped." (interviewee #p3 -company b)

Hence, it is evident from the case studies that the ERF model can significantly enhance the

DSDM life cycle and facilitate a more effective risk management process with the involvement of end-users. Therefore, adopting this model is crucial to improving project performance. However, both companies have highlighted issues that arise when including end-users in the decision-making process at different stages of the DSDM life cycle. One key challenge is the lack of knowledge among end-users, which makes it difficult for firms to ensure the reliability of the information provided by end-users for risk management. Thus, addressing this concern is essential to enhance the model's implementation in firms without adversely affecting the DSDM life cycle.

5.11 Finding's relationship to the research themes

In the research data collection from case studies, both qualitative and quantitative information were gathered to evaluate the impact of user involvement in risk assessment. As highlighted in the gap section, the researcher's knowledge and experience invigorated the study's theoretical foundation. The hypothesis posits that involving end-users in projects' risk identification and assessment facilitates the design of suitable strategies for risk treatment. Risks emerging in the software development life cycle may differ from those occurring at the user's end. Some user-centred risks include network failures, cyber-attacks, and environmental threats. Additionally, research by Viswanathan and Jayagopal (2021) categorizes threats based on the severity of their impact. In dynamic systems, user requirements may change even after project deployment, leading to potential risks that must be reported to the project development team.

The selected articles for qualitative analysis further emphasize that decision-making at the user end aids project risk managers in documenting risks for further treatment. Moreover, research by Neelu and Kavitha (2020) demonstrates that communication from the client's end serves as a vital measure for clarifying project requirements and specifying project goals. Consequently, communicating detected risks while using the product to the project team can be mitigated by adopting risk management strategies during the risk planning phase. Furthermore, interviewees were asked about risks detected at their end, with users responding that the lack of a framework for addressing and communicating end-user risks to project managers results in negative impacts such as cost overruns and delays. This underscores the accuracy of the hypothesis and the potential implementation of theoretical concepts to develop a new model specific to end-user collaboration with project managers. Knowledge enhancement has been a primary focus of researchers in agile projects and the DSDM framework. The study analysed various research to extract variables that enhance project outcomes through risk reduction. Literature discusses that a lack of knowledge and skills among end-users to use software developed through advanced technology leads to significant human and technical risks. Several theoretical and conceptual models studied in the literature resulted in extracting additional variables to mitigate risks.

Moreover, enhancing coordination among team members facilitates effective information sharing, enabling successful completion of project tasks. Individual perspectives of respondents also indicate that a user-centred risk management framework improves knowledge sharing to foster trust between the company and client, ultimately leading to a high success rate of project outcomes. Interview responses added discussions regarding risk management variables such as company culture, decision-making, performance, and progress evaluation, which also contribute to achieving both customer and company goals. Furthermore, the research analysed stakeholder and compliance theories proposing frameworks for knowledge improvement among stakeholders to assess risks. It was also evident in the research articles and interview responses that a lack of explanation of theories, variables, and environmental risks results in weak models for risk decision-making, negatively impacting project goals.

5.12 Summary

This chapter started from the premise that there was an opportunity for end-users to lead risk

in a DSDM project. To achieve the objective of exploring the identified gap in the literature, the study adopted a mixed-method approach. There's a strong focus and desire, to try this framework in a live environment. However, at this stage of the research identified that there is a gap between the importance of the impact that will emerge if end-users manage risk, compared with their current capabilities (such as skills, knowledge, tools and approaches). The findings of this chapter include the results achieved from the interviews and focused group interviews. In the findings the interviews of MNC's managers are detailed, in addition, the results of focused group interviews are reflected which are categorized under different themes.

Chapter SIX: TRIANGULATION OF RESULTS AND DEVELOPMENT OF ERF

6.1 Introduction

This chapter captures the triangulation of results that informs the further development of the End-user Risk Framework (ERF) from an initial theoretical model into a more robust prototype, for the Agile community. This is done through the synthesis from Chapters 2 and 3, interview and case study stages. This early model was developed and reviewed, and upon further discussion with the interviewees, it's been re-developed.

6.2 Insight from literature and theoretical review (Chapters 2 and 3)

The first concept aligns with compliance theory as the fundamental basis of the theoretical ERF model. It aids in examining the relationship dynamics between those who hold power in an organisation and those who are subjected to that power. Lower-level participants are subordinates who can have formal, or informal roles within the organization. The key components of compliance theory are the types of power utilized by an organization, the types of involvement of the lower-level participants, and the resulting relationship between the two. It is therefore on this notion that the concept of compliance becomes relevant within the premise of DSDM, more specifically, within the area of capturing risk with the help of the end-user. Similarly, from a wider perspective, the responses of 'organizations' tend to differ considerably towards the adoption, application, and implementation, mostly based on the varying levels of understanding and acceptance of such provisions. DSDM risk is analysed at all times within the life of the project, during the daily meetings where each iteration is planned, release planning meetings, and retrospective review meetings where the risks are presented and resolved. Risk in this sort of environment must be viewed as a structured approach where only the risk involved in the project development is analysed. At each sprint planning, the team should discuss and check the risks of each individual requirement again, as well as identify and evaluate any new risks, and define actions. The EFR was aligned against the DSDM development process, utilizing all stages, but especially at the initiation stage to align end-users to the risk management process. The OPM model (Müller et al., 2019) provided useful perceptions of both organizational and project context, engulfing every stage and full activity of the project. Therefore, it is adaptable to future needs such as a program or portfolio level with a few adjustments if required.

On the other hand, stakeholder theory was used in the development of the ERF framework, as the theory gave insights for improving the relationship between end-users and project managers. The theory proposes a framework by which the terms among stakeholders can be enhanced within and outside the organization. The theory usually prefers efficient management in organizations and businesses and related ethics. The stakeholders basically include employees, local communities, suppliers, creditors, etc. In software-based project management, companies use an agile approach for project management where user requirements change along with rapidly striding trends. In software projects stakeholders are contractors and businesses as clients, also According to the study by (Uribe, Ortiz-Marcos, and Uruburu, 2018), the theory attempts to eradicate conflicts among stakeholders which itself is a risk in project management stages leading to unsuccessful project outcomes. Therefore, it was learned through the stakeholder theory that stakeholders must be involved in the project development cycle from the initial to the final stage to communicate the identified risks. The risks can then be mitigated effectively before project delivery however, in the DSDM project environment risks can be managed even after the delivery of projects. Stakeholder theories thus provided a framework base to manage risks at the user end.

6.3 Learnings from interviewees

There was unanimous belief that the IT industry needed ample time to embrace this concept, as current business strategies require project teams to assess risks. From the researcher's perspective, it's advantageous for business, as more than half of the participants expressed interest. This was supported by participants being optimistic that their organization would draw towards a more

suitable approach that will make the measurement and mitigating of risk more consistent, and supportable, with increasing balance to decision-makers making the right investment because of this approach. From one perspective risk management tools haven't changed drastically over the years but this mode needs to ensure strategic alignment, which recognizes the importance of defining risk, monitoring and mitigating benefits of risk from start to finish, and which assumes an explicit need to plan for longer-term impacts. A number of the interviewees noted (off the record) the importance of building a clearly defined model that can be interpreted by users outside of the agile community by enhancing the demonstration of progress in a way that causal linkage and indicates that the EFR is effective in achieving its outcomes. It is imperative that the ERF should therefore not be viewed as another reporting mechanism that is loaded onto an already stressed project team, but instead, be seen as a way of providing reliability and simplicity of capturing, mitigating, monitoring, and controlling risk.

6.4 Synthesizing the initial theoretical model (End-user Risk Framework (ERF) from literature.

The initial ERF theoretical model, described in Chapter 3 and shown below in Figure 36 was based on two underpinning theoretical models, these provided the link to ERF through a more grounded approach to address the gaps in risk management in the context of end-users. ERF provides an all-inclusive method to potentially lessen risk within a project and risk when the project is transferred to the client. From this perspective of, the prototype is both an 'original model of something that serves as a basis for other things' and an 'early model that can be examined through tests to find a design solution. It is the 'process involving the test- refinement-completion of designs using prototypes called 'prototyping'. Considering these viewpoints, this study adopted a version of. 'The ERF prototype is an adaption of other models and an early sample to test the concept and process of mitigating risk in a DSDM project'.

6.5 Triangulation approach and result

As discussed in the earlier chapters, triangulation has been used extensively in qualitative and social research. According to (Guba, 1981) multiple triangulations enhance the credibility, dependability, and 'confirmability' in qualitative studies. (Denzin, 1970) argues that it is a method that can improve the validity (the extent to which a study accurately reflects or evaluates the concept or ideas being investigated) and credibility (trustworthiness and how believable a study is). The construction of the triangulation evidence is aligned with the three concept areas that were derived from the outputs of the literature review and the theoretical chapter, shown in the chapters above.

6.5.1 Results from interviews (individual and focus group)

It can be observed that the study drew its results from interviews taken in two different phases, which 1st phase included the interviews of multinational company managers from 2 companies, referenced in the study as company A and company B. The responses were gathered qualitatively by asking questions related to risk-capturing and mitigation strategies adopted by the project managers in DSDM projects. A set of 26 open-ended questions was asked by each of the managers to observe the organizational practice of project managers to capture and resolve risks and get informed about the risk from users. To the questions, managers responded that the DSDM approach suits their operations when it comes to clients' satisfaction. It was evaluated from the responses of 1st phase interviewees that quality and customer satisfaction can be obtained, but time and costs are often compromised in agile projects. Whereas the goals of DSDM projects are meeting time and cost edges effectively without compromising project quality. There was a small piece of useful information collected from the first phase interviews as the themes drawn from them did not highlight the user-end risk capturing and mitigation, however, the strategies adopted by the project team and managers included enhanced communication and collaboration to capture and mitigate the risks.

After the themes drawn from the 1st phase of interviewees, the researcher initiated another phase of interviews from the focused group of employees that were engaged in the project development

based on agile and DSDM. The respondents in the focused group suggested using SSM methodology to consider user-end risks, a respondent also said that managing risks even if they are external is mitigated by them. Communication and collaboration among the team and end-user representative is also needed to satisfy project quality. Themes were developed to categorize the interview responses of participants in focused groups, some of the main factors extracted from the themes are service-related risks, information provision/ documentation, individual needs, and coordination with end-users to deliver project progress in intervals. In the interview, it was also analysed that expected outcomes and decision-making done at the user end can be effective in addressing project risks.

6.5.2 Archival Documents and secondary data

In the study data collection, the data was analysed qualitatively by secondary reports extracted from company records. The records were extracted from the company's risks management document, through the document analysis the results were developed as a common definition, and strategies were followed in order to identify, analyse and mitigate the risks. The practice was common in almost every project development cycle. However, it was identified that the communication was strong among the team members and managers, and the uncertainty at any point was reported to the management authority to follow a risk mitigation plan. Employees were addressed with proper communication channels to report the risks and document them for immediate treatment, whereas active participation of employees was found to report the risks and relevant details to the project team and manager. The risks are overviewed by the manager to allocate team members that implement a risk mitigation plan.

In the result analysis of secondary data extracted from company B's archives, the researcher targeted the risk management document from other documents. By extracting the files of company, A, the researcher analysed that effective communication channels must be built to address the risks, whereas company B reports were extracted achieving insights into project risk management. In company B project risks were identified and mitigated methodologically applying various risk management frameworks. In the process of risk management, project team members and the manager analyse the risks from all aspects to assess whether the risk is connected to another risk or not. The risks are scored and ranked, in other words, risks are prioritized based on their score of impact, so the high-scoring risks are mitigated first. The strategy reduced the impact of risks that affect the quality of the overall project. But in this case, project risks are mitigated by meeting the project deadlines, while also ensuring the quality of the project, which is one of the significant goals of DSDM projects.

6.5.3 Overlapping results in contrast to the triangulation graph.

Throughout the study, various methods were used to gather meaningful data and generate useful results for future risk management practices in the DSDM project development cycle. The study collected secondary data from the company's archives to extract the strategies adopted by Company A and Company B for risk management. Moreover, the research collected primary data from direct interviews with company managers (manager from company A and manager from company B). Further, the researcher collected interview responses from a focused group, the group focused on this study were the participants from both companies A and B who were asked open-ended questions. The results extracted were categorized under themes reflecting effective risk management factors such as stakeholder relations, the expectation of project participants, and business.

Several factors identified in both phases of interviews and secondary data from the company's archival documents were clearly overlapping. Such as Communication and coordination among the team were analysed from company A's report, and also in the interviews one of the participants reflected on the need for communication among employees and stakeholders to manage risks effectively. In this regard, companies must develop effective relations with stakeholders to capture risks and manage to meet cost and time constraints in DSDM projects.

6.6 Development of the ERF Methodology

ERF is a framework that provides the guidance needed to initiate risk management, is a

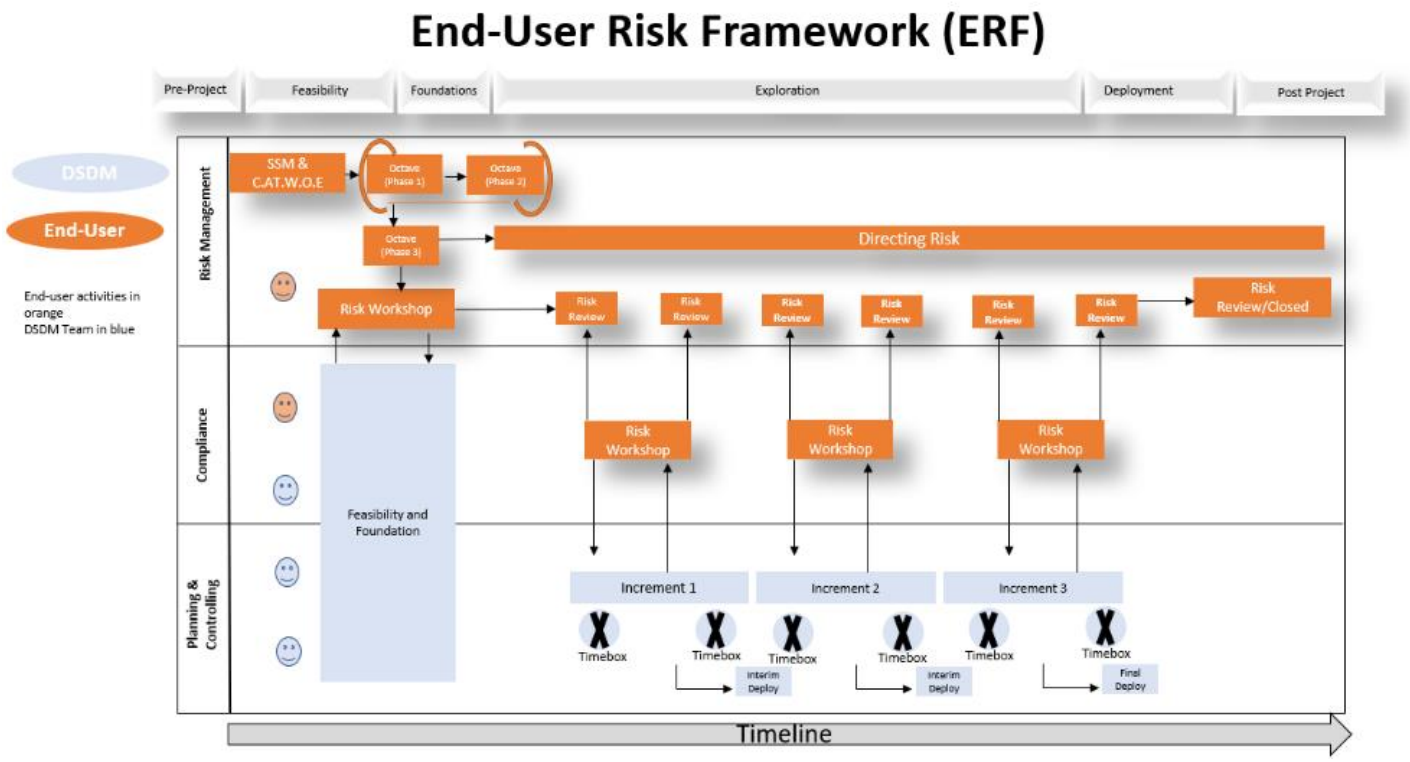

Figure 15: End-User Risk Framework (ERF) (Source: Author, 2022)

The decision-making guide sets the prescriptive for managing risk and provides a gateway for the project team to focus on core activities such as day-to-day project activities. Fundamentally, ERF is about supporting the project team, not a standalone role, it provides the flexibility required to achieve the project objective and it's aligned to existing DSDM methodology and well as existing risk management tools. This aids decision-makers and helps project teams identify defaults during the planning, design, and implementation phases. Therefore, ERF is a controlling tool, ensuring that internal and external stakeholders can collaborate to make more informed decisions. EFR is not to propose that risk within DSDM was not conducted right but rather mitigating some key responsibility such as risk will task end-users will contribute to the effectiveness and long-term durability of the project and the project team. Their role can be identified as informative, consultative, and participative this can lead to product functional empowerment and effective, efficient, and economical products See Figure 15 demonstrates the proposed ERF methodology.

6.6.1 Application of ERF

1.1.1.1 Concept 1 – Compliance End-user Risk Framework (ERF)

End-user framework (ERF) has a key component in the shape of compliance that deals with ensuring that the actions and flow of processes are within the desired scope. This ensures that the final product is as per the expectations of the end-user and meets the quality requirements. The compliance component of the ERF model is based on the synchronization between the business needs, customer requirements, technological view, and risk analysis. The compliance of the ERF model ensures that the DSDM life cycle is completely based on the business and customer needs by mitigating the risks. This component has an advantage that enables the success of the product development phase with a minimal number of risks. The integration of the stakeholders in the ERF model ensures that the requirements of the customers are met effectively. In this case, the implementation of the ERF model with a DSDM life cycle enables higher chances of success. This

is mainly because the ERF model integrates the customers, which are the end-users of the products, in the risk management phase. This is highly beneficial because customers have a different view of the technology and organization, which enables them to analyse risks with a more critical approach. Through this practice, the end-users are able to ensure compliance with the DSDM life cycle. Apart from this, the integration of the end-users in the development phase, along with the development team, makes the expectations of the end-users clearer. Due to this, it becomes easier for the developers to ensure that their product development is within the desired scope. Hence it is important to ensure that your model is applied in the DSDM life cycle to enable effective and efficient development and delivery of the product to the end-users, which is able to meet the requirements.

Compliance End-user Risk Framework (ERF)

Feature	**Supporting Evidence**
Compliance Component	The compliance component of the ERF model ensures alignment between business needs, customer requirements, technological aspects, and risk analysis. It mitigates risks and ensures the DSDM life cycle is based on business and customer needs. According to research by Azarnoush et al. (2018), effective compliance management within development methodologies leads to reduced project risks and increased success rates. Additionally, a study by Boehm and Turner (2003) highlights the importance of aligning project objectives with stakeholder needs and mitigating risks to achieve successful project outcomes. The integration of stakeholders in the compliance process ensures that customer requirements are effectively met, as emphasized by research on stakeholder involvement in project management (Papke-Shields et al., 2010).
Integration of Stakeholders	Integrating stakeholders, including end-users, in the ERF model ensures effective risk management and clearer understanding of customer requirements. This integration leads to higher chances of success in product development, especially when coupled with the DSDM life cycle. Empirical evidence from research by Karlström and Runeson (2006) suggests that involving end-users in development processes enhances product quality and customer satisfaction. Similarly, a study by Järvinen (2007) demonstrates that stakeholder involvement in development projects improves communication, reduces misunderstandings, and ensures that product outcomes meet user expectations. The integration of end-users in the development phase clarifies expectations and facilitates product development within the desired scope, as supported by findings from research on agile methodologies (Williams et al., 2000).
End-User Involvement	The involvement of end-users in the ERF model facilitates effective risk management and ensures compliance with the DSDM life cycle. Research by Cockburn (2001) highlights the importance of continuous end-user involvement in agile development processes to maintain alignment with customer needs and enhance product quality. Additionally, a study by Highsmith and Cockburn (2001) emphasizes the benefits of customer collaboration in mitigating project risks and ensuring successful product delivery. End-user involvement in the development phase enables developers to gain a clearer understanding of customer requirements, leading to more efficient and targeted product development, as indicated by research on user-centred design principles (Norman and Draper, 1986)

Table 7: Compliance End-user Risk Framework (Source: Author, 2023)

Emphasizing stakeholder interaction and communication throughout Agile Project Management (including DSDM), differs from traditional project management practices primarily in the following ways:

1. Continuous Stakeholder Engagement: Agile methodologies prioritize ongoing stakeholder interaction and communication throughout the project life cycle. This means stakeholders are actively involved in providing feedback, clarifying requirements, and validating deliverables at every stage. In contrast, traditional project management approaches often involve limited stakeholder engagement, primarily at the beginning and end of the project.

2. Iterative and Incremental Delivery: Agile projects typically follow iterative and

incremental development cycles, allowing stakeholders to see tangible progress and provide feedback early and frequently. This approach ensures that project outcomes align closely with stakeholder expectations and can adapt to changing requirements. Traditional project management methods may follow a more sequential or waterfall approach, where stakeholder involvement is often limited to specific milestones or phases.

3. Dedicated Stakeholder Roles: Some Agile projects designate specific roles, such as Product Owner or Customer Representative, to facilitate stakeholder engagement and communication. These roles are responsible for representing stakeholder interests, prioritizing requirements, and ensuring alignment between project outcomes and business objectives. In contrast, traditional project management roles may not explicitly focus on stakeholder interaction to the same extent.

4. Emphasis on Collaboration and Transparency: Agile methodologies promote collaborative decision-making and transparency by encouraging open communication channels among stakeholders, development teams, and project leaders. This collaborative environment fosters trust, fosters creativity, and enables stakeholders to actively contribute to project success. Traditional project management practices may rely more on hierarchical decision-making structures and formal reporting mechanisms, which can hinder effective communication and collaboration.

5. Adaptability to Change: Agile approaches recognize that stakeholder needs, and project requirements may evolve over time. Therefore, Agile Project Management frameworks like DSDM prioritize flexibility and adaptability, allowing projects to respond quickly to changing priorities, market conditions, or technological advancements. In contrast, traditional project management methods may struggle to accommodate changes once the project scope is defined, leading to potential discrepancies between project outcomes and stakeholder expectations.

Overall, the core concept of stakeholder interaction and communication in Agile Project Management, including DSDM, represents a paradigm shift from traditional project management practices by placing greater emphasis on collaboration, flexibility, and continuous feedback loops throughout the project life cycle.

1.1.1.2 **Concept 2 – Planning and controlling Delivery of Projects with end-users in an Organisational Structure**

Planning and delivery of products is an important part of the DSDM life cycle. This process involves various risks like inability to accomplish the functional goals, technical challenges, ineffectiveness to meet the requirements of the end-users, and poor usability. These risks can cause the product to fail in the market as the end user would not be getting any good value. Therefore, it is important to ensure that the ERF model is employed, which can enable the integration of the end-users in the development and delivery phase. The integration of the end-users in the planning and controlling of the delivery of the products within the organization is highly critical because the integration of the end-users reduces the number of risks. Hence, users are able to contribute through their knowledge and feedback, including the processes of planning and control, which enables the organization to manoeuvre its procedures and activities in the direction of reduced risks. Besides this, another important part of the ERF model is that the end-users are able to provide deep insights and critical feedback into the product functions so that the performance of the project can be optimized before its delivery to the market. It has also been noted that the integration of the end-users in the planning and delivery controls enables organizations to visualize the end-to-end processes. This is very beneficial because this gives the business an entire picture of the project scope, potential risks, and performance. Through this practice, the organizations are

able to do better decision-making and enhance the planning process, enhancing the performance of the project while mitigating the risks. In addition to this, the ERF model integrates the customers through different methods like surveys and interviews. During this process, in-depth information is collected from the end-users, which centralizes the planning and delivery processes of the organization on the customer needs. Hence the market risks associated with the project are reduced, and the project can be enhanced to be successful upon delivery. The planning and controlling processes of the ERF model are structured based on time as the integration of the end-users takes place with periodic intervals during which the development and testing of the projects also take place. Therefore, the use of the ERF model in the DSDM lifecycle enables a dynamic and systematic approach to the conceptualization, planning, design and development, testing, and delivery of the product. The integration of the end-users in all of these phases ensures that the risks are mitigated as soon as they are determined, enhancing the chances of success.

Planning and controlling Delivery of Projects with end-users in an Organisational Structure

Feature	**Supporting Evidence**
Planning and Delivery Process	Planning and delivery in the DSDM life cycle involve various risks, including failure to meet functional goals, technical challenges, and poor usability, which can lead to market failure. Research by Boehm and Turner (2003) highlights the significance of effective planning and delivery processes in mitigating project risks and ensuring successful product outcomes. Similarly, studies by Highsmith and Cockburn (2001) emphasize the importance of involving end-users in the planning and delivery phases to align product features with customer needs and enhance usability. Integration of end-users in planning and delivery controls reduces risks by leveraging their knowledge and feedback, as evidenced by research on user-centred design principles (Norman and Draper, 1986).
End-User Integration	Integrating end-users in planning and delivery controls allows organizations to leverage their insights and feedback to optimize product performance before market delivery. Research by Karlström and Runeson (2006) suggests that involving end-users in development processes enhances product quality and reduces the likelihood of market failure. Additionally, studies by Cockburn (2001) and Highsmith and Cockburn (2001) emphasize the benefits of customer collaboration in improving product usability and mitigating risks. End-user integration enables organizations to visualize end-to-end processes and make informed decisions, enhancing project performance and risk management (Azarnoush et al., 2018; Papke-Shields et al., 2010). Methods like surveys and interviews centralize planning and delivery processes on customer needs, reducing market risks and increasing project success rates (Boehm and Turner, 2003).
Structured Planning Processes	The structured planning processes of the ERF model, which integrate end-users at periodic intervals, enable a dynamic and systematic approach to project conceptualization, design, development, and delivery. Research by Karlström and Runeson (2006) highlights the importance of structured development processes in enhancing project efficiency and reducing risks. Similarly, studies by Williams et al. (2000) suggest that incorporating end-user feedback into development

	phases improves product quality and reduces the likelihood of market failure. Integration of end-users in all phases of the DSDM life cycle ensures early risk mitigation and enhances project success rates (Boehm and Turner, 2003).

Table 8: Planning and controlling Delivery of Projects with end-users in an Organisational Structure *(Source: Author, 2023)*

The approach outlined above, which emphasizes the integration of end-users in project risk management processes through the ERF model within the DSDM life cycle, may not align with the perspectives shared by some practitioners who do not see a role for end-users in the project risk management process.

The discrepancy could arise due to several factors:

1. Diverse Perspectives: Practitioners' views on the role of end-users in risk management may vary based on their organizational culture, industry norms, project complexity, and individual experiences. Some practitioners may prioritize internal expertise or traditional risk management approaches over external stakeholder involvement.

2. Limited Awareness: It's possible that some practitioners may not be fully aware of the potential benefits of involving end-users in risk management processes. They may be more accustomed to conventional risk management techniques that do not explicitly incorporate end-user perspectives.

3. Perceived Challenges: Practitioners may perceive challenges in integrating end-users into risk management processes, such as communication barriers, time constraints, or difficulties in aligning diverse stakeholder interests. These perceived challenges could influence their reluctance to involve end-users in risk management activities.

4. Organizational Context: Organizational structures, hierarchies, and decision-making processes can also influence practitioners' perspectives on stakeholder involvement in risk management. In some organizations, decision-making authority may be centralized, limiting opportunities for meaningful stakeholder engagement.

Given the variation in practitioners' perspectives, it's essential to consider the specific context, challenges, and opportunities within each organization when evaluating the feasibility and effectiveness of integrating end-users into project risk management processes. While the approach outlined may align with best practices and research findings in certain contexts, it may require adaptation and tailored implementation to address practitioners' concerns and optimize outcomes in others. Open dialogue, collaboration, and shared learning between researchers, practitioners, and stakeholders can help bridge gaps in understanding and foster alignment on effective risk management strategies.

1.1.1.3 Concept 3 – Structured risk management approach

Risk management is a critical process that is involved during the DSDM life cycle. It is important for organizations to ensure that they identify, analyse, and manage different risks associated with the project. There are various types of risks that are managed during the DSDM lifecycle. These risks can be associated with technology, customer needs, market risks, financial risks, etc. The implementation of the ERF model has ensured the structured risk management approach that reduces the chances of risks affecting the project. Risks can be very detrimental to the success of the product development phase and cause significant loss of capital and time. In order to avoid

these catastrophic consequences, the implementation of the ERF model in the DSDM life cycle enables the end-users to identify the risks and analyse themselves. This provides organizations and businesses with great insight into the risks. Hence, they are able to plan and implement effective risk management strategies through which the success of the project will be enhanced. In various circumstances, there are risks that are not identified inside the organization, and thus when these projects are launched in the market, they become a great failure. To avoid these failures, it is important that the end-users are integrated with the DSDM life cycle due to the complexity of the risks and the inability of the organization to identify the risks completely. Therefore, the collaboration of the end-users and the developer of the project enhances the risk identification and analysis activities. With the use of the ERF model, end-users are integrated systematically into the development phases, which enables them to critique and identify the risks associated with the project during different activities. This identification of the risk by the end user has enabled the developers to perform strategic thinking and enhance the performance of the product based on the market needs.

Hence, the integration of the three critical components of the ERF model with the DSDM lifecycle enhances the chances of success are the product in the market. This is mainly because the organizations are able to gain an end-to-end view of the development phase as the end-users are integrated throughout the process. The end-users provide their feedback and input into the design, development, testing, and implementation phases. Therefore, the risks are identified analysed, and managed before the product is launched into the market. This enables the organizations to save a significant amount of time and capital and avoid the failure of their project. Hence, the ERF model recommends the integration of the end-users during all stages of the DSDM life cycle through different methods of communication and interaction so that the end-users can effectively provide their input and feedback about the project. Through this practice, compliance, planning and control activities, project delivery, and risk management activities are majorly enhanced.

Structured risk management approach

Feature	**Supporting Evidence**
Risk Management	Effective risk management is crucial in the DSDM life cycle to identify, analyse, and mitigate various types of risks, including those related to technology, customer needs, market, and finance. Research by Boehm and Turner (2003) underscores the importance of structured risk management processes in mitigating project risks and ensuring successful outcomes. Similarly, studies by Azarnoush et al. (2018) emphasize the need for organizations to implement systematic risk management approaches to reduce the impact of unforeseen risks on project success. Integration of the ERF model in the DSDM life cycle facilitates structured risk management by involving end-users in risk identification and analysis, as supported by research on user-centred design principles (Norman and Draper, 1986). Collaborating with end-users enhances risk identification and analysis activities, reducing the likelihood of project failures (Karlström and Runeson, 2006).
End-User Integration	Integrating end-users throughout the DSDM life cycle enables organizations to gain insights into risks that may not be identified internally. Research by Cockburn (2001) suggests that involving end-users in development processes enhances risk identification and ensures alignment with market needs. Similarly, Highsmith and Cockburn (2001) emphasize the benefits of customer collaboration in mitigating project risks and enhancing product performance. End-user integration enables developers to perform strategic thinking and align product features with market demands, as evidenced by research on agile methodologies

	(Williams et al., 2000). The ERF model recommends systematic integration of end-users in all stages of the DSDM life cycle through various communication and interaction methods to effectively gather feedback and input, thereby enhancing compliance, planning, control, project delivery, and risk management activities (Boehm and Turner, 2003; Papke-Shields et al., 2010).

Table 9: Structured risk management approach *(Source: Author, 2023)*

The integration of end-users in the ERF model within the DSDM life cycle presents several distinctions from standard risk management techniques and technical approaches such as Failure Modes and Effects Analysis (FMEA). Here's how they differ:

1. End-User Integration and Holistic Risk Management:
The ERF model emphasizes the integration of end-users not only in risk identification but throughout the entire project life cycle, including planning, development, testing, and delivery phases. This holistic approach ensures that end-users contribute not only to risk identification but also to various aspects of project development and delivery.
- In contrast, while techniques like FMEA involve stakeholders' inputs to identify failure modes and effects, the focus is primarily on technical aspects related to engineering risk. The involvement of stakeholders may not be as comprehensive or integrated throughout the project life cycle as in the ERF model.

2. Market and Customer-Centric Focus:
The ERF model places significant emphasis on understanding customer needs, market dynamics, and usability concerns by integrating end-users at every stage. This ensures that risks associated with meeting customer expectations and market demands are effectively addressed.
- On the other hand, while FMEA considers technical failures and their effects, it may not necessarily focus extensively on customer requirements or market risks unless explicitly incorporated into the analysis.

3. Iterative Feedback Loops and Continuous Improvement:
The ERF model, particularly when integrated with agile methodologies like DSDM, emphasizes iterative feedback loops and continuous improvement based on end-user inputs. This allows for real-time adjustments to mitigate risks and enhance project success.
- In contrast, while FMEA may involve periodic reviews and updates, it may not inherently prioritize continuous stakeholder engagement or iterative improvements throughout the project life cycle.

4. Integration with Agile Development Practices:
The ERF model's integration with agile practices, such as DSDM, facilitates rapid adaptation to changing requirements and risk factors. This agile approach enables proactive risk management and responsiveness to end-user feedback.
FMEA, while valuable for identifying technical risks, may not inherently align with agile development principles, which prioritize flexibility, collaboration, and customer satisfaction.

Although both standard risk management techniques and technical approaches like FMEA involve stakeholder inputs to mitigate risks, the ERF model distinguishes itself through its comprehensive integration of end-users, market focus, iterative feedback loops, and alignment with agile development practices. This integration ensures that risks related to customer needs, market dynamics, and usability are effectively managed throughout the project life cycle, ultimately enhancing the chances of project success and customer satisfaction.

Risk workshops in the ERF involve active participation of stakeholders, including end-users, to identify potential risks associated with the project. These workshops typically include structured discussions, brainstorming sessions, and risk assessment exercises to comprehensively identify and evaluate risks. Accordingly, risk reviews in the ERF are conducted periodically throughout the project lifecycle. These reviews involve stakeholders reviewing identified risks, assessing their likelihood and impact, and prioritizing them based on their significance to project objectives. Reviews may occur during project planning, iteration reviews, or milestone checkpoints.

The study highlights that the ERF aligns with existing risk management frameworks from project management by incorporating similar processes for risk identification, analysis, evaluation, treatment, and monitoring/review. The ERF ensures that risks are systematically identified, analysed, prioritized, addressed, and monitored throughout the project lifecycle to minimize potential impacts on project success. ERF integrates with root cause analysis techniques and analysis to identify underlying causes of risks. By understanding root causes, the ERF aims to develop targeted risk mitigation strategies that address fundamental issues contributing to project risks.

Additionally, the study indicates that the ERF is compatible with broader Lean and Agile approaches used to support decision-making, such as DMAIC (Define, Measure, Analyse, Improve, Control). The iterative and incremental nature of Lean and Agile methodologies aligns well with the ERF's emphasis on continuous stakeholder engagement, feedback-driven development, and adaptive risk management practices. Overall, the study provides detailed insights into how the ERF addresses key aspects of risk management, integrates with existing frameworks, incorporates root cause analysis techniques, and aligns with Lean and Agile methodologies to support effective decision-making in project management.

6.7 Conclusions

This chapter has summarized research into the further development of ERF from the triangulation of data and feedback from interviewees. This has led to the ERF being jointly developed by identifying key elements from the interviews and case studies to support risk management in a DSDM project. This evolution of the risk management tool meant that DSDM methodology and risk management have been in a firm relationship which has been tried and tested therefore, this ERF model had been developed based on two models and data from the literature and feedback from interviewees.

Chapter SEVEN: DISCUSSION

7.1 Introduction

The major conclusions and significant results of this study are presented and discussed in this chapter. It begins by outlining its main conclusions on the numerous factors to be taken into account and components of risk management usage, as well as how they are relevant and present in everyday situations. The discussion additionally assesses these research findings in relation to pertinent facets of the literature that was previously examined in Chapter 2 in order to recognise and emphasise the connected contributions of new knowledge that are being produced via this exploratory investigation. This places a special emphasis on weighing the research findings against current theoretical viewpoints regarding the ultimate goal, assessing the project team's relevance and end users' relationships, and providing end users greater authority than normal to make important decisions.

7.2 DSDM Risk Management Approaches

Two organizations were chosen for their flexibility and their ability, to reflect DSDM interactions within the team to a better extent than the other agile methods reviewed. Organizations are of different sectors IT Consultancy and a utility company. The end users, risk assessment management, decision-making, organizational culture, and knowledge transfer characteristics of both companies have been assessed and evaluated. However, the findings are related to these firms and do not apply to other industries.

It facilitated a greater understanding of the way in which DSDM professionals make decisions, their view on end-users, and the processes involved within the project environment. Responsiveness had an exceptional relationship with all the main categories as emerged from the data. These categories are DSDM, Decision-making, and Risk Management. This relationship with each category was recognized during the review of the data where respondents stressed the application of these characteristics.

Primarily, it has been determined that 'Responsiveness' depends upon Four components, as such these components facilitate the development of a robust collaboration between the entities. Therefore, reducing the overall uncertainties in end-user-led risk management.

Links can be made from the findings to the models detailed earlier in Chapter 3 (theoretical framework) with the findings it was possible to capture the kind of information the project team anticipated, and interpretations can be made about how information follows, decisions are made, knowledge transfer, and end-user involvements. Basically, there are numerous options available for the DSDM team to venture into in order to achieve the right result in a decision to be made. This process is demonstrated within the findings where the project team asked a higher number of questions in circumstances where doubt about the appropriate approach was present. In general, this was for scenarios where it was suggested that end-users play a pivotal role in leading risk management. Clearly, this was a complex situation as this has never been done before neither has the scenario presented itself. Researchers have claimed that decision-making on a bigger scene is both an art and a science that involves the effective structuring of logical and rational thinking (Hansson, 1994). This claim appears also to be relevant for risk-related decisions (Polanyi, 1983) and links with previous literature. Decision-making should comprise serious and rational thinking by the decision maker (DM) so as to come to a fixed decision on a specific situation.

As such decision support system (DSS) will aid the team with efficient decision-making making as a hybrid system It can elaborate communications infrastructure and quantitative models to help a

team of decision-makers solve problems and make choices. Therefore, for established organizations this initiative will generate an opportunity for success and the right balance will guarantee a competitive advantage as a strategic initiative. A Deliberate action must be taken by decision-makers to help create a new strategic position (end-users capturing risk) that may open up a new business opportunity. For this reason, the researcher agrees that their field study of a large telecommunications company has succeeded in showing how successful unrealized strategy gave an organization a competitive advantage.

The approaches of risk management identified from the data are supported by the thematic analysis in the Literature review. The three risk management approaches include DSDM, risk management, and decision-making. The literature review entails that the DSDM approach aids in assessing the different knowledge areas. In addition, these knowledge areas include scope, time, cost, human resources, and rising risks. The previous studies asserted that the DSDM approach in the software provides positive outcomes in managing the risks in organizations. Risk management is found significant as this helps in ensuring the management of the future risk of the organizations. The process of the risk management approach first includes risk identification, analysis, and evaluation. Moreover, it involves the treatment and effective monitoring of the risk. The companies that are utilizing web-based and software-based technologies have the risk associated with human, time, cost, environment, and technicality. Similarly, the literature review also asserted the importance of decision-making in organizations. It is indicated that client requirements are dynamic in the agile environment, which requires a system with self-organized teams. However, decision-making aids in these project development and risk management processes. The decision-making works in a way that focuses on the identified risk and selects the most effective and alternative solution for managing the risk.

7.3 Current Use of DSDM

The current use of DSDM is recognized as the basic requirement for speed and quick-fix projects. As such, it is seen as an imperative role in maintaining a high collaboration level between the distributed project stakeholders. It is fair to say, that DSDM enthusiastically views this approach as reliable in the industry with respect to the project settings and requirements, the DSDM Consortium advocates that because each organization is different none of its practices are detailed. Though it supports knowledge sharing and the use of appropriate tools in an unorthodox project, it leans toward projects in that the team and stakeholders' discreet and depend strongly upon each other for technical resources. Exploiting DSDM effectively aids in overcoming challenges to a great extent as the teams can have a high relationship and communication level. As the project team is engulfed in their project, the data suggests that the team has the relevant tools before undertaking any projects. The product owner, clients/sponsors, and offshore teams all are accessible through multiple platforms, supporting the frequent flow of communication. In the researcher's view, DSDM, therefore, is the only critical component that brings end-users together. The fundamental idea behind DSDM is to fix time and resources (Nazir, Zafar, and Abbas, 2018), and then adjust the amount of functionality accordingly rather than fixing the amount of functionality in a product, and then adjusting time and resources to reach that functionality. The best feature of DSDM is that it provides an environment where all interested parties involved in a project can cooperate and collaborate for the successful completion of the project, with a primary focus on user involvement, empowering the team for the decision process, focus on recurrent project delivery, Iterative development and entertain changes (Nazir, Zafar, and Abbas, 2018).

The finding demonstrates that DSDM was accepted by interviewees, and therefore, was part of the overall business strategic plan.

"I'm so happy with DSDM. I have an excellent team, an excellent manager, and an excellent environment in which l can work easily most importantly team collaboration." (Interviewee #p15)

One of the relatively unexpected findings within this study was the limited role of knowledge and skills decision-makers. The literature suggests it is unlikely that one single factor can reliably

predict outcomes. However, the foundation for the majority of decision-making within a DSDM team is generally based upon knowledge and standardized strict measurement because decision-making, for which we gather most of our information, has become a mathematical science today. Multi-criteria decision-making in general follows six steps including, (1) problem formulation, (2) identifying the requirements, (3) setting goals, (4) identifying various alternatives, (5) developing criteria, and (6) identifying and applying decision-making techniques. There was an association found if decisions are made on familiar knowledge (DSDM environment) the significant goal can be achieved it would be expected that those involved in the project subsequently would be more readily recognizable in terms of their level of severity. It was concluded that around half of the interviewees made critical decisions in their respective projects that were indicative of the intervention matching their overall project objective needs. This research agrees with the conclusion of the finding, in that any deviation from decision-making is a problem is not necessarily what the project team regards as a good outcome but the issue of conflicting definitions of 'project outcome' between stakeholder and project team.

7.4 Planning Risk Management Critical Evaluation

The fact that standards are performance indicators will be used to evaluate and carefully choose the possibilities in order to maintain integrity, viability, and mutual independence while preventing redundancy. Many of their conclusions coincided with those in this study. Despite receiving thorough information before the project began, it was discovered that people engaged, both internal and external, lacked knowledge, and many claimed to have taken judgements based on the information available at the time. These expectations affected how their desired results were actually achieved. The project team reported that there's room for improvement and sufficient time was required to deliberate on key issues and to gain detailed knowledge of the entire project brief (including those not visible to the project team) in a way clampdown on the problems. The researcher was under the impression that group decision support system (DSS) an umbrella of decision support system (DDS) would be employed by the project team. As this is seen as a group project as DSS is a hybrid system that uses an elaborate communications infrastructure and quantitative models to help a team of decision-makers solve problems and make choices. Of particular significance for decision-making, it is also important to note that more intensive communication may also fail to meet the expectations of choices and decisions made or to be made. Therefore, the researcher emphasized the value of understanding how low-intensity involvements are most suitable for individuals with little or no involvement, and in doing so an element of understanding persists and choices are significant to the project goal. Giving the project team the opportunity to extend their knowledge beyond the project brief may in part help to overcome poor outcomes. However, there is conflicting evidence about the impact that this may have. In considering the findings from this research and literature there are two identified means of making decisions – using standardized tools and increase in knowledge.

Each team within IT will maintain a risk register relevant to their area of work and will ensure the risks and the actions taken are reviewed as often as warranted. High risks will require more attention than low risks, but each risk register will be reviewed at least on a monthly basis (commonly as part of a regular team meeting) and updated to provide an auditable record of the current status." (Extract from Company A Risk Management document)

7.5 End-user-led Risk Project Preference

Some of the interviewees expressed a desire to involve end-users in critical decision-making as they view this as an opportunity to eliminate risk prior to the handover of the project. The importance of incorporating end-users in the decision-making process is also consistently reported in the study but not in the secondary data or the company policy. However, there is little research exploring the impact that involving end-users in critical decision (technical based) problems and

researchers are now scrambling to conduct such research. As per the findings, end-user involvement is tailored along non-technical roles such as user stories and feedback on the final product. The literature highlights these views within the lens of the project team and the business strategy as an approach to obtaining a more traditional approach to emphasize the importance of the project team working collaboratively with end-users to spring an explanation that can be used to satisfy the project goal. Although the relationship of the end-user and project team are established the findings explored the benefits of active inclusion. The literature surrounding this approach is unclear and it is difficult to determine which approach, or combination of approaches, would best be suited to meet the needs of decision-making in end-user involvement. Exploring these approaches is important to improve the experiences not only of end-users (by better addressing their needs) but also of the project team and senior managers faced with difficult decision-making situations.

7.6 Focus on Organisation Culture and Strategic Planning

Findings are also associated with a change of mind set a situation whereby individual perceptions need to change and align with the norm. Although the literature didn't align with the findings that suggests that the decision can be conducted in line with the current data and not necessarily in line with the company structure or culture. The decisions made in such scenarios may, in part, be explained by the benefits the decision maker recuperates and is precise as a business strategy decision-making process. Recognizing such factors (business strategy decision-making process) may have an influence over the ability to make a rapid decision in an unpredicted environment. The researcher acknowledged, however, that these factors must be taken with caution as they are made under the assumption that either the project team or the end-user will be following the decision-making process as instructed by the organization. For the most part, decisions made by the project team were not necessarily made out of character as all have adopted a more analytical processing approach to their decision-making and very rarely if at all, made an unorthodox decision. Their approach was more in line with the process that is described in Chapter 2 a system that filters data and enables the project team to make an appropriate decision that is aligned with the project goal and company's decision-making framework. In making their decisions a process of gathering and analysing information occurred prior to making their decision.

An example of where a change of mind-set was most likely to arise was found in decisions made about the introduction of DSDM as an agile tool to implement software. For this situation, the interviewees acknowledged that switching from one framework to the other required a process of gathering additional information before making a formal decision because this approach may be related to the lack of unforeseen factors with the framework and the need therefore for the project team to adopt a more analytic approach. Some of the data collected was supportive of the argument that rapid decision-making tends to be non-analytic and may be followed by a reflective (analytical) phase. For a small number of the project team this appears to have been the case where, following their initial decision, they then went on to ask further questions about the objective's presentation. Accordingly, while formerly making an immediate decision they then felt the need to ask additional questions to validate or disconfirm their decision.

Supposing the project team made an overconfident judgment and that when making spontaneous decisions, emotions such as excitement and enthusiasm may be invoked. These emotions may subsequently influence their perceived levels of confidence in the decision made. Therefore, in the researchers' view, a line can be drawn, and links can be made between stakeholder theory and Compliance theory where it appears that where rapid, often unconscious, judgments are activated this may impact their subsequent behavioural intentions and accordingly the decision made.

Studies have found that end users are the company A external stakeholders do not have any knowledge regarding the operational procedures of the company. This results in making them feel difficult to identify any risk and limit the risk. Therefore, this requires their involvement in order to ensure prompt risk identification and its mitigation measures. This is aligning with the stakeholder theory which has been discussed in the literature review chapter. The stakeholder theory suggests

and emphasizes the worth of involving all the stakeholders in the decision-making. According to stakeholder theory, stakeholders' legitimate concerns about the administrative and sustainable aspects of business operations should be valued and acknowledged. Moreover, the findings reveal the need for manpower in the company to capture and handle the risk. The findings from the project team member's workshop declare that they find difficulty in comprehending the differences between phase two and phase three of the DSDM framework. This is reflected in the compliance theory which is presented in the literature review chapter. The compliance theory suggests that the type of power is a key component in the organization. In addition, the involvement type of the lover level participants in the organization and its relationship with the type of the power. The idea of the compliance theory is parallel with the DSDM. This indicates the need for power in the DSDM, for the identification of the risk by the collaboration with the end users.

7.7 Rapid decisions in risk activities

In such environments where decision-making is not triggered by the data but as the situation presents itself, however, the researcher does not support the assumptions that repetitive exposure to the same process of decision-making can erupt into behaviour experiments. Part of their argument was that if an individual was repeatedly exposure to making such decisions continuously then it's likely to make more rapid decisions in an involuntary fashion. Although this might be expected it seems that the process in which decisions are made might be dependent upon the actual data. As such, in the researcher's view, these factors do not influence the decisions made under pressure therefore no circumstance will play a pivotal role. On that note, making the wrong decision can expose the project to new risks therefore, the risk is viewed as an important factor in the decision-making process and is often closely associated with the overall project goal. Where a project was perceived as high risk, the level of a decision does not change but rather follows the same process if the risk was lower. The concept of measuring the value of a project risk before assessing the appropriate tool to aid the project team with identifying and making decisions would be most appropriate, in a slow-paced setting where changes to the project have little or no impact on the outcome.

7.8 Standardizing risk management Process

As per the literature and secondary data, the objective of risk management is to reduce the probability of negative risks and maximize the probability of positive risks which could bring benefits to the organizations, in order words, the project team has the methodical process of recognizing, examining, and planning a response, and monitoring and control of the uncertain event for each risk according to the substrate from Company B. Moreover, a number of researchers have reduced the number of stages while implementing the PMBOK risk management procedures in software development projects (Boehm, 1991) but the finding suggests that these organizations have adopted a five-stage approach risk identify, risk analyses, risk plan, risk control, risk track (as demonstrated in chapter 2) The approaches and procedures to manage risks seems to be aligned in every organization the researcher has an encounter which includes the standard framework provided by the governing body PMBOK and PRINCE2. As such, from the perspective of the governing body, risk can only be managed by an individual who has been qualified to work using such procedures. Managing projects successfully is much more than only applying risk management procedures, hence why effective risk management needs to be embedded into the project prior to its start date. This in the researchers' view has had a negative impact on the inclusion of end-users as the go-to person for risk.

The findings reveal that there are several factors that have impacted the risk management process. These involve internal risk, external risk, and financial risk, whereas the risk model proposed is supposed to increase access to end-users, and access issues impacting upon the project, and it could follow capture, control, monitor, and eliminate risk as they emerge. Particular importance, it was highlighted throughout many of the findings that there were tensions between following the principles of the organization's risk model whilst entertaining end-users needs and negotiating issues that they had very little control over. The use of standardised instruments to identify and

navigate risk was one of the variables that led to these conflicts and had special importance to decision-making. The ultimate outcome of risk was typically perceived as more of a prerequisite for analysing the effect of risk than instruments to merely aid with monitoring and making choices about risk, even if it was considered a beneficial tool for the monitoring of risk progress. Some people believed that because they did not accurately represent the experiences of others, the instrument was ineffective at identifying danger or assisting in decision-making. Despite the categorization of risk mitigation tactics, other models used in the industry share many similarities with the risk model.

7.9 Standardized risk management tools

The project team aims to improve end-user involvement but at the same time has a focus on ensuring value for money, and standardizing processes, and procedures with the aim to reduce partiality in project objectives. In the researcher's view standardizing processes, and procedures often pose difficulties when the individual project problems do not fit with guidelines or service constraints such as the teams' culture, knowledge, skills and experiences, budget, and stakeholder's objective and customers' overall goal this impacted upon the ability to adhere to recommendations. It is these standardized approaches that conflict with ensuring that each project is approached using its objective rather than the standardized approach. These findings are comparable to a recent risk management study on Managing Dynamic Risks in Global IT Projects, it highlighted the pessimism surrounding the use of risk in relation to the ability to identify dynamic risks from internal (people, process, and technology) and external (project environment) interactions and the view that their inclusion is driven by project agendas rather than personal agenda. Based on the findings the decisions made by the project team are strengthened by the scandalized tools placed by the organization and therefore, reflect the effectiveness of treatments delivered, where a large responsibility is placed on those measuring the effectiveness of these decisions. The findings have highlighted the potential benefits of such improvement in decision outcomes, management of the decision-making process, and in improving the integrity of the project. The literature, however, is not exclusively positive and, in line with the findings in this study, highlights concern about their acceptability, applicability, and reliability (Davison, 2000) when considering the individual nature of interviewees' problems.

7.10 Inclusion Criteria of End-users

While research has highlighted the overlap between risk outcome and end-user involvement the emphasis placed on standardized processes such as those measuring all levels of risk management is significantly greater. The view that capturing the right amount of risk or personal experience in DSDM is required to make decisions alongside standard guidelines was consistent with the findings. Some interviewees viewed the inclusion of end-users as a 'threat' to their judgment whilst, some did not view it as a threat, but it came across as a disagreement. However, the various element seen as a threat to risk and decision-making has been addressed in the literature. Although risk management is seen as an important part of DSDM projects practice, unaided it is said to be prone to error, bias, or misunderstanding. Therefore, adopting one approach over another may have implications for the quality of the decisions made. The research also addressed the attitudes of the project team and the importance of an individualized approach towards end-users. While identifying the value that they add, such as improving assessments and helping to identify familiar risks before they emerge, the project team saw them as only a part of the new form of risk. The importance of end-users and gathering an understanding, skills, and experience including their abilities and conduct in addition to their problem-solving skills was regarded as an important aspect of managing risk from the perspective of some project teams as the end-user becomes familiar with the team and company culture. The complexity of end-users navigating and making critical decisions in the presence of the project team might influence the outcome of the overall project. Therefore, in the researcher's view, end-users making risk-related decisions cannot go beyond the use of risk management tools and often beyond their role boundaries.

The duty to respond to the end-user's needs was stressed. In contrast, the project team

acknowledged that they prefer some end-users as they helped them to understand their risk better but also identified their limitations when pondering about the needs and circumstances of the organization they are currently employed. The importance of involving end-users lead the risk management process should be reviewed by organisations as the findings suggest, the entire risk management framework is an umbrella of the company's business strategy. Based on the teams' approach to risk management it is clear that decision is made based on what seems right by the organization rather than the project team, however, the findings suggest that if end-use involvement require an adoptive and project-based approach where necessary, particularly when each project present with complex cases such as security clearance, resource, and financial constraints.

7.11 Business strategy perspective – Circulating company culture.

Decision-making within risk management is structured for the project team only, although does not support end-users and, does not follow a standardized decision-making framework for them either, or thus the decisions that end-users will make at this point are faced with complex. The impact that limits the inclusion of end-users is upon senior management the problem has been demonstrated in a study, as such evaluating and integrating a community end-user into a business structure may not be urgent to address this matter. Probably, this leads to difficulties in the risk management and responses will be ineffective, at times, resort to other sources of information to assist with the risk management process. Additionally, the decision to make such changes sits with the company board or CEO and not purely senior managers or the project team. There's no current evidence that any organization research has instigated end-user-led risk management this provides an indication that other factors are likely to have played a role in the progression of such an endeavour. The influence of end-user characteristics has been demonstrated and it has been argued that such an approach is necessary when presented with complex projects. In such instances, the importance of 'taking into account' more condition-specific factors alongside general factors to improve such proposals and to better capture risk is regarded as being important. In reviewing the way in which such a service will be implemented it's prudent to stress the need to move away from the current risk management approach to a more hybrid approach to ensure end-users are provided with a high level of care. Again, these findings provide evidence for the need for the move away from complete reliance on a standardized approach towards gathering a fuller picture of all aspects of risk, and considering the ways in which decisions are made to ensure risk pathways are efficient and responsive to end-user’s need is of great importance. Making risk a priority within a DSDM project has resulted in many project teams holding their card closer to their chest until they can access the appropriate risk tool and has full training and full control to implement the functioning. The finding identified that project teams with adequate training regularly and the most commonly interpreted risk data more accurately than those with less adequate training. This was seen as a way to 'contain the situation' while those with less adequate training 'work' through minimum risk.

7.12 Business strategy perspective low-intensity team

In the researcher's view of the business, Company B it's clear that, in some instances, they had very little control over whether the project team followed the precise protocol or not as they have a long-term face-to-face role with the client and they can be influenced as the relationship grows. Company A, on the other hand, a project team based in-house and oversees a project over a restricted time period for the benefit of their company. However, whilst not necessarily providing risk assessment over lengthy periods provided clear evidence of the instances where the project team felt the need to hold the hands of an end-user. One of the most frequently reported reasons related to the presence of end-users was scope creep (a project's requirements increasing over a project lifecycle) leaving end-users on their own during the tenure of the project might lead to an unexpected increase of additional requirements. This was a particular problem for team members with little or no skill and resulted in frustration as end-users with little or no experience might result in a similar manner. The experiences of these workers mirror those less adequate training as

detailed above. The findings revealed the difficulty of having such a person make critical decisions requires capability development. They emphasized the lack of resources, direction, and constraints impacted negatively upon their experiences and considered decision-making making 'grey area' in which they often worked beyond their professional remit.

The difficulty for any business new member is that their levels/knowledge of risk management may not be clear and that might also add to the complexity of decision-making. As such the drive for these limitations was restrictions and knowledge therefore the way forward is to shadow more senior personnel and increase the amount of involvement in risk management and decision-making. The project team recognized the importance of involving new team members in making the right decisions to ensure that their preferences and choices were taken into account. They recognized; however, that these new team members have to adapt to the new culture and understand the business risk strategy which the project team is very often unable to provide them because of time constraints, particularly when they are engulfed in their task. The business may or may not be aware of instances where they have employed personnel with little or no knowledge and are unable to cope, do not provide a positive outcome, and are often not focused on meeting the client's need. This may get the best if they receive effective training which may involve having a positive impact on the end-user this might elevate their self-esteem or motivation. The researcher sees no implications where the team supports each other and identifies suitable in terms of the level, focus, or content of training they require. On the other hand, the time that is utilized for training and development could have been devoted to a more appropriate one. Furthermore, the literature suggests that strategic purity or clear choice of one generic competitive strategy (low cost, differentiation, focus) contributed to healthier performance and creating a sustainable competitive advantage (Porter, 1980, 1985, 1996). As such, the core drive of any organization is to enhance quality, reduce cost, and converge processes in new ways to achieve goals and respond to challenges.

7.13 Application of Business Model in DSDM Project Environments

If the project and the team perform, they will require appropriate focus on the task at hand and may potentially cruise without any problems without jeopardizing the project. In addition, for the business to be sustainable the team must feel a sense of inclusion, and be rewarded, it may cause them to unlock their potential. With respect to the findings in this study, however, it is clear that the role of the project team, end-users, and stakeholders are not equivalent to that of a senior manager or decision maker of the company but that project teams are been held back due to lack of resources, capability development, and the need to manage their own strategy to adaptor to the culture. The decision the project team is faced with is not simply to refer to a more suitable approach but instead to leave the playing field long enough to complete their task until an appropriate solution becomes available if a critical risk emerges. (Porter, 1980, 1985, 1996) The model provides guidance about focus where the project team should be referred to and therefore, for the most part, it is not that the team will be receiving a piece of inappropriate information due to poor judgment about business structure, or differentiation strategy but instead because senior management is aware that competitive advantage is at the core of their business structure nothing else should hinder it. Porter's model emphasizes serving the needs of clients professionally (Porter, 1980, 1985, 1996), but without information, if the team is not receiving the resources that they require this may have implications for the fundamental propositions of the model.

If the team is faced with complex decisions about how to manage risk which at times results in them compromising as no other option appears available. Lack of senior management involvement and potentially the team providing an inappropriate service, other problems associated with such judgment will result in the project coming to a halt or possible legal action. Findings suggest project team is aware of their role within the business structure and although there is a certain degree of flexibility within that remit, they recognize the importance of being aware of the limitations of their capabilities. As such new team, members might find themselves managing high-level risk for a client and identify that doing so may be unhelpful to the client or themselves.

From the researcher's personal encounter, the complex decisions that these project teams face will impact negatively them in terms of stress, and hindrance and may have implications on their long-term relationship with the client. Also, in line with the finding, whilst training was provided it rarely covered all the relevant issues they were expected to manage and make decisions about. In helping to manage such difficulties a supportive role that supervisors, team members, and end-users will be prudent in easing the complexity of risk management and decision-making process.
In the case of the focus, a collaborative approach was adopted between the organization's secondary data and the DSDM teams to develop and implement the research's aims and objectives. A significant aspect of achieving the objectives of this study was to develop a relationship requiring a connection between the DSDM project team, end-user, and secondary data from the organization. The focus group shared some light on pre-project settings, expressing that the approach was a closed book more specifically only allowing allocated team members therefore all participants are fully indoctrinated in the processes and organisation's culture. The model for an end-user lead risk (figure 16) was conducted as a result of the data from the first stage of interviews the study was guided by the consolidation of different elements that contributed to the final model. The structure of the model was further enhanced as a result of a pilot trial, eliminating five out of eight box processes of the product stage. The pilot trial has helped in minimizing the efforts and time and assist in optimizing the resources. When the C.A.T.W.O.E results are found similar consequently multiple times, the other box processes were eliminated to save time and effort.

7.13.1 End-user risk model version one

The interviewees were concerned that the development stages carry data that might be sensitive such as contracts, statements of work, procurement, personal data, etc. Therefore, any third party might have limited access and limit their involvement in the entire project lifecycle. The findings disclose that there are a variety of aspects that influence how a project team or end-user will make an appropriate decision. These involve knowledge, skills, support, culture, team members, and related factors. Whilst the model is supposed to limit risk and increase access, access issues are

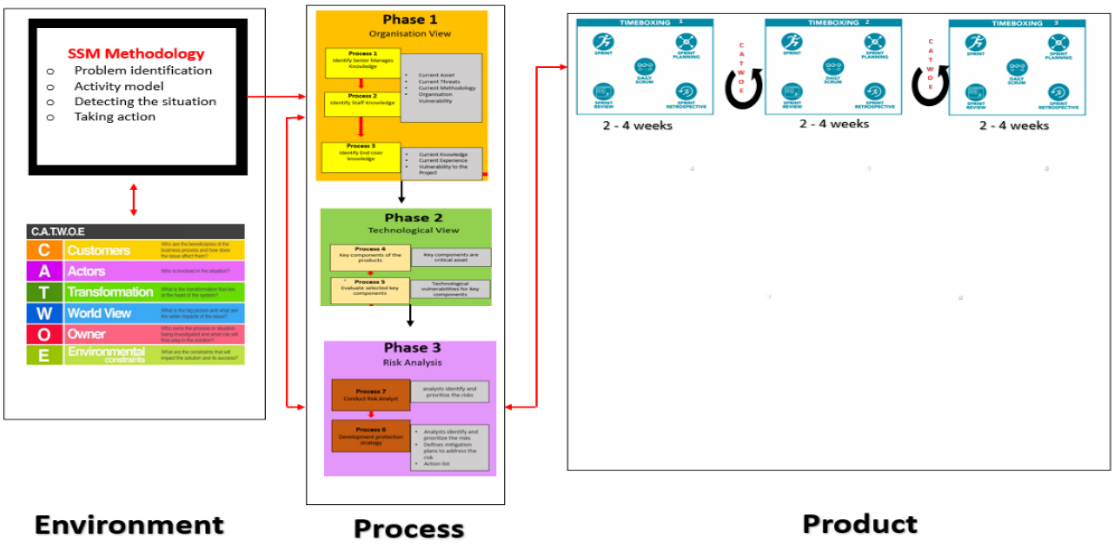

Figure 16: End-user risk model version one (Source: Author, 2021)

impacted upon the project team which they fail to recognize due to their ability to follow the principles of risk management or their respective organization. Of particular importance, it was highlighted throughout many of the themes that there were tensions between following the regime methodology of the risk management process whilst responding to end-users' needs and negotiating their level of interest that they had very little control over. One of the factors that

contributed to these tensions that had particular relevance to end-user participation was the use of standardized processes and tools. Whilst regarded as a useful tool for the capturing, monitoring, and controlling of risk progress, mitigation actions were generally viewed as being more of a requirement for evaluating the impact of risk rather than tools to virtuously assist with monitoring and making decisions about risk.

As part of the initiation stage of this model some held the view that they did not reflect the actual expectation of risk management, and accordingly were not useful in the decision-making process. Although procedures to capture risk, control, and mitigate risk are the same across the IT industry, this model is very much related to the current risk management process that is standardized in Companies A and B. The model aims to improve the project team's workload and reduce their bandwidth but at the same time focus on ensuring that risk is evaluated and reduced. It was argued that standardized procedures often posed difficulties when a third party such as the end-user does not fit with the culture nor comprehend the business structure or service constraints such as technical aspects that impact upon the overall project goal. It is these standardized approaches that conflict with ensuring that end-users are not fully integrated into the project team. These findings are comparable to recent literature that has highlighted the pessimism surrounding the use of risk management tools for capturing and controlling expected outcomes. This relates to the ability of the organization to continue to grow and quicken its response to risk in an efficient manner as required by the organizational structure and to address the issue of standardization by enforcing the change in perspectives and the outcome is expected more or less goes through the same path, issues concerned with their (end-users) interpretation validated as per the organization's structure (Silva et al. 2019; Zou et al. 2019), and the view that end-users inclusion will undermine the agenda rather than having a project management focus (Blanco-Mesa et al. 2019).

As such the first phase of both OCTAVE and soft risk methodology carry the same weight. OCTAVE builds asset profiles in this phase of all the important assets, prevailing security practices, and vulnerabilities in organizations in addition to that, staff knowledge about assets, their vulnerabilities, and current security strategies are identified. Based on such information most important vulnerable assets are sorted out. Whilst soft risk identified risk, establishing an environment that encourages people to raise concerns and issues and conducting quality reviews throughout all phases of a project are common techniques for identifying risks). Similarly, as part of the researcher's assessment, it was found that Soft Systems Methodology (SSM) a structured approach to understanding real-world problems from the multiple perspectives of the people (project team and end-users) involved, rather than from a single (project team) viewpoint (Checkland and Holwell, 1998a).

The information collated can then be used to help effectively manage the risk a key element in successful change management and project completion of any change project with this in mind the findings can be tailored for either a smaller agile team or DSDM environments. This approach concentrates on all the risk areas including investigating and helping enhance decision-making. This approach deals with risk from product, process, and constraints. It identifies risk, categorizes, diagnoses, and helps the project team decide whether the risk is acceptable or not. Therefore, it is fair. Finally, a strategy for the protection of assets is developed and approval is requested from the management or the Project Management Body of Knowledge (PMBoK), The model developed by the Software Engineering Institute (SEI).

While findings have highlighted the overlap between the initiation stage and development stage the importance of end-user involvement had an influence on the emphasis placed on standardized processes such as those used in capturing risk, measuring its level, and preferred position within the organization is significantly greater. The view that the project team is required to make decisions alongside tailored guidelines or company proposals to measure risk was also consistent with previous findings that the company can tailor their approach to measure emerging risk on a project. The participants from company B did not necessarily regard them as a prudent approach to deal with or report on risk as they were in disagreement with company A. However, the clash of these conflicting approaches to risk management has been addressed in the literature. Although the

capturing of risk is regarded as an important part of risk management, unaided it is said to be prone to error, bias, or misunderstanding. Therefore, adopting one approach over another may have implications for the quality of the decisions made particularly when those decisions are championed by the end-user. On that note, the model is tailored from the 1end-user's perspective but driven by the entire team.

The model specifically addresses this uncertainty by adapting octave risk assessment, which is a very versatile method, allowing users to achieve various tasks at various levels of complexity.
There are numerous risk assessment methodologies used by different organizations such as Asset Audit, CORAS, NIST, and Risk IT although some methodologies require to function efficiently in different territories such as the size of the organization and the knowledge of the project team as they are quite sophisticated to use. Most of the methodologies are commercially developed and, therefore, unavailable to other organizations. This approach used in the methodology will provide clear and transparent procedures to evaluate risk and to help build a feasible and useful plan to aid risk. The findings suggest that the end-users must be educated in the processes and procedures including bedding to the culture of the organisation. The use of octave entertains end-users on the project with the help of the project team as it's been tailored to effectively include the end-users. This procedure is comprised of three phases and each phase consists of a number of processes.
Phase 1 (process 1 to 3) - Identifying senior managers, project team, and end-user knowledge This includes experience, knowledge of the framework, and vulnerabilities based on this data most important vulnerable which include the severity of the end-users are sorted.
Phase 2 (process 4 to 5) - Identify key components of the product and the ability of the organization to manage and evaluate risk if mislead can harm the durability of the final product.
Phase 3 – (process 7 to 8) - At this stage, the risk is identified, and a plan is put in place to prioritize, mitigate, and control.
The project teams' attitudes in similar processes have been highlighted in the findings and the importance of a structured approach. While identifying the value that the structured approach adds, such as improving assessments and helping to standardize the process, in the researcher's view the project team saw them as only a part of the senior leadership problem hence why this model includes a section of identifying and evaluating the knowledge of the senior managers. The importance of critical judgment and gathering an understanding of end-users including their coping abilities and technical knowledge in addition to their ethos to risk was regarded as an important aspect of managing risk from a minimal perspective. The complexity of such a view on decision-making by the project team and the influence of a precise outcome of each risk can be associated with or by exploring the approach and the knowledge of the individual/team behind it. Participants reported that managing risk on a project went beyond the use of tools and often beyond their role boundaries. The duty to respond to each need of the project was also beyond their boundaries. In contrast, several participants in Company A reported that they liked this risk management approach, thought it might help them to understand risk better but also identified that they do not work beyond their role as such this model reflects that and there are limitations when fewer effort is not to spend on exploring another part of the project something that is missing from this model. Participants identified the importance of involving the end user in a limited decision-making process but taking advantage of them in risk management may be lost because the model eliminates such beliefs giving them an important role. A large telecommunications company has succeeded in showing how successful unrealized strategy gave an organization a competitive advantage. However, this approach requires the project team to adapt to each other's ability and indirectly or directly choose not to pay attention to cultural differences. However, in the researcher's view, there are times when adopting is based more on an individual's approach and not necessarily the organization particularly when the project team is present with complex views of the end-users where guidance is lacking.
Decision-making within the model, although supported by available guidance and measurable outcomes, does not follow a standardized decision-making framework and consequently, the

decisions that the project team is faced with are less complex. The impact that limited guidance has upon the management of end-users as a lead evaluating their intervention as inappropriate and such a problem will lead to difficulties in risk managing and responding effectively. Consequently, at times, the project team can revert to the process to review any other sources of information to assist with the decision-making process.

The evaluation of the development stage demonstrates additional evidence that decisions are not made purely on the basis of these procedures alone. For one aspect participants revealed that end-users can show similar baseline scores to in the project because the model provides an indication that they are likely to have played a role in the decision-making process. The influence of factors such as the characteristics of the development stage has been demonstrated previously where it has been argued that an individual approach is necessary when presented with complex tasks an automated such as this can give the end-user flexibility. In such instances, the importance of tackling risk alongside the elements of the model improves understanding and better captures what the project team regards as being important. These findings were additionally supported by a study conducted with key stakeholders at the demonstration sites. In discussing the ways in which decision-making has become a mathematical science today, the model implemented stresses the need to move away from a traditional decision-making process into a hybrid approach known as a group decision support system (DSS) a system that uses an elaborate communications infrastructure and quantitative models to help a team of decision-makers solve problems and make choices. This way of thinking ensures the project team is provided with high-quality data. Again, these findings provide evidence for the need the move away from complete reliance on project team lead risk and standardised processes motivated by senior managers. Consideration of the ways in which decisions are made to ensure risk trials are efficient and responsive to the actual needs was also of great importance. In making decisions incorrect data results in many results in 'holding' the entire project for ransom. The issue of delayed decision-making can have an inappropriate bearing on the function of the final project in the researchers' experience it has resulted in going back to the drawing board and the project going over budget.

Previous literature has identified new emerging technological advancement as a deliberate attempt to balance the business strategy. The challenge for established organisations explores existing or new opportunities to the fullest because today's success is a guarantee for tomorrow and the balancing of exploitation and generating a competitive advantage is a strategic initiative. A deliberate action must be taken by decision-makers to help create a new strategic position (end-users lead risk management) that may open up a new business opportunity. Some businesses may be strategically positioned to absorb new adventures if they present themselves in some instances, either the project team or end-users might have little control over whether a new process will be for the long or short term.

As such, the core drive of any organization is to enhance quality, reduce cost, and converge processes in new ways to achieve goals and respond to challenges. This is because traditional performance procedures which are largely dependent upon finance have been criticized by many researchers, these financial measures are short-term, lagging indicators and are not proactive to indicate the present and future. Hence, this model includes a process (Development stage phase 1 to 3) that can be used to evaluate both individual and the organization performance and it also serves as a source of information about business operations such as planning, directing, and controlling2. However, whilst not necessarily perceiving this model from either a short or long term the findings suggest any adjustment to any process must provide clear evidence of its track record for instance, they felt that many processes have been introduced without it thoroughly being tested. In regard to the concept of technology roadmap developed by Motorola, technology road mapping is a powerful technique for supporting technology management and planning, especially to explore and communicate the dynamic links that exist between technological resources, organizational goals, and changes in the external environment. It is also a method that supports organizations in describing the path to mainstream technology products and services. In the researcher's view, this technique is suitable for established technology-based companies embarking

on a new journey. Within a company, this tool (TRM) integrates all levels in a structure that supports the initiatives and strategic decision tactics. TRM is not a tool but rather a knowledge base technique because of the feature that it can be applied, focusing on the know-how of the organization. For this reason, treating technology as a type of knowledge is helpful, as knowledge management concepts can be useful for more effectively managing technology. One of the most frequently reported reasons related to such an adventure was gaining new knowledge with little time at hand and such a process might affect their performance or the performance of the project. However, in the researcher's view, technological knowledge usually includes both explicit and tacit knowledge. Explicit knowledge is that which has been articulated these include reports, procedures, or user guides, and the physical manifestations of the end result (equipment). Tacit knowledge cannot be easily articulated and relies heavily on training and experience. The members of the development team's heads include a large portion of the tacit knowledge used in DSDM development. As a result, the development teams may become extremely important to the organisation, and the management may find itself in a weaker position. Many organisations might not find such a circumstance acceptable. By deciding which information should be codified and what should remain tacit, this deadlock can be broken. Because explicit knowledge is one that can be simply communicated, recorded, and passed from one person to another, it was chosen as the preferable option for this reason. Knowledge has traditionally been regarded as the one-of-a-kind component of commercial success and the undisputed basis of competitive advantage.

7.14 Summary

In almost all cases where ERF was accepted, the rationale and objective of this approach were to seek increased stakeholder understanding and acceptance of planning, dialogue, and learning. Therefore, notwithstanding views and reports that suggest this approach cannot be sustainable in the long run. The study has demonstrated the longevity and possible integration of this framework as well as recognized by key interest to potential users, and especially, decision-makers need to actively voice the benefits and expectations including more through processes of early consultation and learning. The study further shows that even where there is an ability and willingness to engage, review, and evaluate the outcome in a live environment. This stage of the research study provided empirically grounded insights from the 20 employees on their perception of how their organizations will react to a third party such as the end-user participating in risk management. In addition, the research validated the theory-driven propositions such as Decision Support System, Responsiveness, and Deliberate Action that were produced from the literature. For instance, according to Aversa, Cabantous, and Haefliger, (2018), a Decision Support System aids in resolving unstructured and complex issues. This also helps in enhancing communication in the infrastructure to ensure effective resettlement of the issue by the automated decision-making system.

The acceptance and integration of the ERF can also be understood through the lenses of compliance theory and stakeholder theory. Compliance theory suggests that organizations adhere to frameworks and regulations to meet societal expectations and legal requirements. In this context, the adoption of ERF may be driven by the need for organizations to comply with risk management standards and regulations, ensuring they meet stakeholder expectations regarding risk mitigation and decision-making transparency. Stakeholder theory emphasizes the importance of considering the interests and concerns of various stakeholders in organizational decision-making processes. The ERF's objective to increase stakeholder understanding and acceptance aligns with the principles of stakeholder theory, as it recognizes the significance of engaging stakeholders early on in risk management discussions. By involving end-users and other stakeholders in the decision-making process, organizations can better address their concerns and preferences, ultimately enhancing trust and legitimacy. Thus, when viewed through the perspectives of compliance theory and stakeholder theory, the adoption and integration of ERF not only serve regulatory and societal expectations but also contribute to building stronger relationships with

stakeholders by incorporating their input into risk management practices.
Furthermore, this stage of the research study identified that, whilst end-users had their enquire role within the DSDM framework, however on theory embraces this new concept. Although the interviewee described in the study specifically worked within or outside of the project team. Accordingly, future studies sought to include wider stakeholders involved in business decision-making and this approach helped to ensure the broader relevance of end-users.

CHAPTER EIGHT: CONCLUSION

8.1 Introduction

At this moment of this study, the researcher would like to highlight a summary of what has been accomplished, the key conclusions, limitations and constraints, and some recommendations for future research. This section will provide readers an outline of where the developed paradigm stands, and how well it addresses the research aim and objectives. This research study was based on examining the practices that could help integrate end-users in leading the project team in capturing, controlling, and mitigating risk overcoming and uncertainties in a DSDM project environment. The main objective of the study was to explore the possibility of using DSDM in capturing the end user's voice for developing a Business Risk Strategy.

8.2 Conclusion summary of the research study results.

This research was built on two stages, firstly, literature studies informed the research objectives, shared in Chapter 1, sustaining the research question. This helped to understand the contextual situation in which end-users can integrate into a DSDM framework and undertake different responsibilities, and through empirical research, evaluate how the current processes can be improved by the development of a new end-user lead model that is suitable for software development. The intent was that the ERF would provide a practical way to mitigate all the responsibility of risk management on a DSDM project to the end-user. The literature studies link through a sequence of evidence gathering and conclude by answering the research question, objectives, and propositions established in Chapters 1 and 2. Each chapter had an exclusive research focus, to capture the main findings from the research at the end of each stage and linked this chronologically to the next steps of the investigation. In this fashion, the evidence is progressively built, therefore providing summary findings from each chapter in a complete review of the overall research question.

Moreover, the research was divided into two stages. The first stage involved a review of the existing literature to establish the research objectives and research question. The second stage involved empirical research to evaluate the current processes and develop a new end-user-led model for risk management in DSDM projects. The research question and objectives were answered through a sequence of evidence gathering and analysis, leading to a conclusion that summarized the findings of each chapter and linked them chronologically to provide a complete review of the research question. So, the findings from the research showed that Responsiveness impacts the current risk practices in DSDM project teams, with the four interdependent elements playing a crucial role in increasing end-user involvement and reducing uncertainties. The research-built evidence progressively, answering the research question and objectives established in the earlier stages and providing a complete review of the findings against the overall research question. In addition to this, the findings from the research showed that Responsiveness impacts the current risk practices in DSDM project teams, with the four interdependent elements playing a crucial role in increasing end-user involvement and reducing uncertainties. The research-built evidence progressively, answering the research question and objectives established in the earlier stages and providing a complete review of the findings against the overall research question. Furthermore, the demonstration of the limitations that were specifically faced during the research, such as the inability to comprehensively test the module in a live project, difficulty in obtaining authorization to review secondary data, and the possibility of researcher bias introduced during the data collection process. On the other side, the qualitative nature of the data made it difficult to present the findings visually and in a concise manner.

8.3 Summary results against the Research Objectives

Based on the research question the table below summarizes where the research investigation sought to achieve the research objectives and whether, in the view of the researcher, they were met. Shown in Table 10 below, seeks to reflect on the original Research Objectives, where they were evaluated, and whether they were achieved.

8.3.1 Research Mapping

The research was a qualitative study that aimed to explore the concepts and methods used in DSDM project risk management. The study was based on data collected from two phases of interviews and secondary sources. The first phase of interviews involved collecting qualitative data from various sources to develop a theoretical and practical model. The second phase of interviews involved collecting data from a focus group of 14 participants from both organizations, Company A (Consultancy) and Company B (Utility). The obtained data from the focused group interviews were further analysed with the help of the Nvivo software. It assisted in processing the qualitative data in order to identify the most frequently used keywords. The analysis focused on the participants' experiences regarding agile and DSDM project risks and the mitigation strategies they followed in their organizations. The NVivo results revealed up to 1000 frequently used keywords, which were further analysed to identify themes and concepts for further research.

Additionally, the study collected secondary data from the risk management reports of both organizations (A and B). This helped to analyse the practical implementation of risk assessment at the end-user level. The risk management records in the company report covered all aspects of risk analysis and mitigation from planning to the delivery phase in DSDM projects. The combination of all three sources of data helped the researcher to develop and implement a framework for capturing and managing risks at the end-user level. The research mapping is further summarized in the table below.

Research Map

Research Questions/Objectives	**Investigation completion phase**	**Results and findings**	**Was the objective met?**
RO1: Exploring the possibility of using DSDM in capturing the end user's voice for developing a Business Risk Strategy.	• Literature Review (Ch 2). • Theory (Ch 3). • Interviews (Ch 6)	The DSDM risks can be captured at the users' end by enhancing communication and coordination between the project manager and developers, to communicate and address the risk according to stakeholder and compliance theory. From the interview, it was assumed that end-user risk capturing can be effective in order to satisfy users.	High confidence that the objective was met by ensuring wide networking with academics and practitioners to test the validity of research findings.

RO2: Identify the elements of the DSDM risk strategy	• Literature Review (Ch 2). • Theory (Ch 3). • Methodology- NVivo approach (Chapter 4)	The research conducted in the pasta and theoretical research states that project governance, decision making, communication, end user knowledge, team relations, expectations, and adoption according to changes were identified as the elements that derive DSDM risk strategy	High confidence that the objective was met due to extensive publications of research findings
RO3: Identify the process for the DSDM strategy	• Literature Review (Ch 2). • Theory (Ch 3);	The processes of DSDM involve pre-project feasibility study, business study, iteration of the model, designing and developing iterations, application, and after-completion processes such as testing, delivery, and monitoring. Traditionally project management includes the comprehension of time, cost, and scope with clients.	High confidence that the objective was met from the extensive feedback through interviews (phases 1 and 2).
RO4: Building the end-user-centered DSDM risk strategy	• Theory (Ch 3). • NVivo Analysis (Chapter 4) • Interviews from both phases and companies' secondary data (Ch 5 and 6)	The study identified that the end-users oriented DSDM risk strategy or framework is not yet developed, while the interviews and secondary data analysis led to the development of an End-user Risk Framework that is end-user centred model contributing to literature, theories, and practical implementations.	High confidence that the objective was met by having an evidence-based development from theories.

RO5: To what extent is this model effective in capturing the end user's voice projects	• Development of the Prototype (Ch 7). • Conclusions and Recommendations (Ch 10) Triangulation of Results and Development	A model is an effective approach considered by DSDM project team members; However, the durability of the model has not been tested by the researcher which is because of the short time for research.	High confidence that the objective was met because the model was reviewed and feedback from the project team and it can support in live project

Table 10: Research Map (Source: Author, 2021)

Research objectives drew the researcher's interest toward developing a model that is focused on user-end risk capturing. Following the research objectives, the researcher developed the methodology to collect data from primary and secondary resources, however, only qualitative data was collected throughout the research to gain useful information for model development. The study extracted the elements of the DSDM risk strategy and explored the processes involved in DSDM risk assessment and management. Further, by an inductive approach, the researcher analysed data to develop themes to categorize interview data. The research gathered the artifacts to develop an ERF model that can be implemented in DSDM projects for risk assessment and mitigation at the users' end. To extract the elements for risk strategies in the DSDM project environment, the researcher followed the epistemological approach to analyse the theories. Whereas the research paradigm was obtained by underpinning stakeholder theory and compliance theory to develop a theoretical framework for the study.

8.4 Referring to Research Problem/Gaps and Objectives

After evaluating the findings, several features emerged which have not been discussed extensively in the literature. The use of case study methodology provided a chance for this research to expand its perspective and bring all the real-life practices into consideration rather than depending upon pre-assumptions. As suspected, this study has revealed various concepts and categories that elaborate the core value of the research aim, where the researcher explores the suitability of DSDM for managing the strategic risk, identifying the variables and the process, and building the end-user-centred DSDM risk strategy. The study strongly verifies these issues as well as highlights various dimensions of the risk management practices of DSDM projects. The findings, therefore, highlight that the risks can be reduced, controlled, or eliminated when end-users are indoctrinated with the organization's risk management approach and amendments to the company's business structure or have a proactive system in place which could better adapt to emerging needs as they happen in DSDM project environments. Bearing in mind that, the project team, works under the constraints of time, cost, scope, and quality, the force is to remain proactive in an unpredictable environment at sure, an antidote to reduce uncertainty, and eliminate probabilities of risk. Also, the industry doesn't stress end-users lead risk management, rather the project team has taken fixed measures to eliminate and reduce risks when they occur. Frankly, some members of the project team have ignored the inclusion of end-users as risk management leads in their practices, giving zero emphasis on their skills and knowledge.

The participants were keen to test the new module as long as they were given the green light by their organization several times, they have highlighted that there are no particular formal practices or tools that take into account the model presented. The end-users can utilize this model

in a project environment but still, it requires awareness and mindfulness about the project team. The researcher to the best of his knowledge can also presume that the findings provided in this study are firmly integrated into the actual data and signify participants' viewpoints that were amassed during the data collection and analysis process. The findings clearly outline the fact that the ineffectiveness of the current DSDM process did not give an opportunity to go beyond their boundaries which is for their voices to be captured for the purpose of running the project due to a multitude of factors, some of which are quite recurrent throughout the data such as the lack of knowledge, skills, experience about the DSDM framework Similarly, culture awareness of the organization and the lack of adequate and well-laid structures were highlighted as another key challenge within this process. Where such structures are limited or inadequate, end-users are reluctant or unable to participate in such endeavours. There's a link between the end-user and the project team but the association of risk management is directly linked to the project team who are overseers of risk management. Improving the link between risk management and end-users which is required via increasing knowledge will improve decision-making and the team's performance and the lack of evidence that end-user relation within the DSDM framework is limited due to business strategy (including regulation, and contractual), DSDM principles, and the project team. In addition to these reasons, the researcher's own personal and work experience highlighted a knowledge gap in the availability of suitable tools and processes.

Referring to objective 1, several possibilities were explored that demonstrate the advantages of capturing end-users' voices in a DSDM project environment. As such the complexities and potential issues of such proposals provided direction for an organization to redefine their structure to accommodate the new way of working when embarking on a new project either small or large. As DSDM projects draw their strength from the business strategy and there are different relationships and collaborations with various aspects that hope to achieve an expected outcome including, end-users, company cultures, and regulation. The end-user voice helps the project team to review and plan the upkeep and complexities of the project and navigate the factors surrounding any issue that might hinder the progression and competition of the project.
Referring to objective 2, it has been examined that the project team drew their attention to various aspects of the DSDM elements and strategy as laid out by the organizations, particularly its fast paste and the possibility of it being durable in an unpredicted environment. Although the elements and strategy certainly identify end-users as significant members of the team their role is limited as per the structure.
Referring to objective 3 and 4, which were related to the development of a framework have been achieved successfully by developing the findings in end-user-led risk management as shown in figure 20; where end-users lead the project team in capturing, planning, and mitigating risk within a DSDM project, this process is shown and further its influences on the formal risk management procedures have been demonstrated. The model has been developed to deal with risks as they emerge, depending upon key characteristics such as soft system methodology to overcome unexpected problems, and then further depending upon organization view, technological view, and risk analysis to support the integrity of risk management.

8.5 Main Contributions of the Study

The presented study provides a valuable contribution and input to the field by conducting a qualitative analysis of the data collected from interviews and secondary sources, unlike previous literature studies. The findings of the study shed light on the key challenges faced in implementing an end-user-led risk management process in DSDM projects, providing insights to

critical stakeholders such as organizational leadership, project managers, senior directors, and team leaders. On the other hand, in line with this research's aim and objectives, this study has gone a step further to identify core challenges faced within the process of establishing an end-user lead risk manager, as evidenced by both primary and secondary sources, which currently limit the effectiveness of such a process. The results of the study are highly relevant to individuals who are in a position to make important decisions and are looking to improve the effectiveness of DSDM.

The study's unique contribution alongside existing studies like Coyle and Conboy (2009) lies in its focus on the End-User Framework (ERF) as a structured approach to risk management within the Dynamic Systems Development Method (DSDM) life cycle. While Coyle and Conboy (2009) provide insights into risk management within DSDM, the study of the ERF offers a novel perspective by specifically addressing the integration of end-user engagement throughout the project lifecycle to mitigate risks effectively.

The ERF introduces a structured framework for risk management, emphasizing the integration of end-users in risk identification, analysis, and mitigation activities. This differs from existing DSDM approaches, which may not provide as comprehensive or structured a framework for managing risks specifically through end-user engagement.

While timeboxing in traditional DSDM approaches helps manage scope creep and reduce cost and time overruns, the ERF extends beyond timeboxing to address a broader range of risks associated with stakeholder needs, market dynamics, usability, and technical challenges. By integrating end-users throughout the project lifecycle, the ERF ensures that risks are identified and addressed proactively, leading to improved project outcomes and user satisfaction.

The ERF emphasizes continuous feedback and improvement based on end-user inputs, aligning with Agile principles of iterative development and customer collaboration. This focus on ongoing user engagement sets the ERF apart from traditional DSDM approaches that may involve periodic stakeholder interactions but lack the same level of continuous engagement and feedback integration. The ERF recognizes that risks may vary across projects and organizations and therefore advocates for tailored risk management strategies that incorporate end-user perspectives. This personalized approach ensures that risk management efforts are aligned with specific project goals, stakeholder needs, and market dynamics, enhancing the effectiveness of risk mitigation efforts compared to generic risk management approaches.

In summary, while existing DSDM approaches like timeboxing address certain risk factors such as scope creep, the ERF offers a unique contribution by providing a structured framework for risk management that focuses on end-user engagement throughout the project lifecycle. This approach enables organizations to proactively identify, analyse, and mitigate a broader range of risks, ultimately leading to improved project success and user satisfaction.

8.6 Theoretical Contributions

The development of the risk management framework assists in bridging the gap specifically in understanding the actual industrial practices in an agile environment. The call for more research in the area has driven the exploration of effective strategies for including end-users as leads. This

developed paradigm can also benefit future researchers and scholars looking to test its applicability in different settings and regions. So, the paradigm can be useful for researchers and scholars from academia specifically those who further want to test the developed framework in different settings or regions. The model described in Chapter 6 serves as a practical tool for guiding managers, decision-makers, and senior project stakeholders in DSDM projects. Additionally, it supports project team members and individuals in building their knowledge and understanding of the required skills and abilities for project success and development. Bottom of Form

In addition, the proposed End-user risk model is the modified model of the existing models. The model includes three phases such as organizational level, technological overview, and risk analysis. This can be used in future research for the collective phase usage or can be utilized independently. However, future studies can also modify the present model with the different other variables.

8.6.1 Theoretical Contribution of ERF in Agile DSDM

The recent years of project development have specific requirements related to software, and the real world is at a rapid stride of facing various challenges in developing and delivering the project. The fast pace of change in software technology presents significant challenges in the development and delivery of projects. The project managers have responded by adopting new strategies to manage projects, as traditional project management methods are not equipped to handle the complexities of software projects. The conventional software development life cycle, which involves stages of planning, design, development, implementation, and delivery, is not flexible enough to keep up with rapidly evolving trends. This has led to the rise of agile development methods, which break down projects into smaller chunks, allowing for regular delivery and more flexibility. The DSDM framework, in particular, is a popular approach among project developers due to its incremental and iterative approach. DSDM is part of a larger umbrella of agile development methodologies, which also includes Kanban, Lean, ASD, Scrum, Crystal, FDD, and some others. The DSDM approach was designed to cater the issues such as cost overruns and project delays. For more information, the approach has arisen from the development of the RAD application based on nine principles. The DSDM approach ensures incremental delivery besides controlling quality, time, risks, and costs. Further, DSDM has three phases such as pre-development, project lifecycle, and post-development. By meeting time and cost constraints, projects usually fail in risk management, which is the major flaw of agile and DSDM projects. Researchers have developed frameworks and software models that detect and mitigate risk at the project developer's end, which are used by project managers on a large scale.

According to the literature research in this study, it was analysed end-users face significant risks such as operational, technical, and security that are threatening the organizations. A lack of risk management framework in agile and DSDM projects increases the complexity at the user end, ultimately risking the quality of projects. Therefore, the research proposes a framework as a contribution to academic research. Both theoretical and practical implementations are focused on the research to address project risk issues at the user end. As the DSDM framework approach is a look-back approach in project development, the End-user Risk Framework (ERF) collates the project processes as per the nature of risks.

The framework is developed taking the propositions from literature and theories (Compliance Theory and Stakeholder Theory) that focus on enhancing the communication and coordination among the project manager and end-user representative. The framework can be

considered a significant contribution to its theoretical and practical implementations demonstrated in this research. The model is easy to use and takes its theoretical basis from the existing theories already being widely used in project management and risk assessment in order to enhance the quality of the projects. According to a study (Trzeciak, 2020), it can be stated that the involvement of end-users in project development phases reduces the impact of risks cultivating good terms between project managers and end-users. In the frameworks proposed primarily by scholars and project management researchers, there is increased documentation and planning in DSDM projects, which leads to the initial coordination of end-users. However, risks were analysed, documented, and mitigated only on the development side as per frameworks, but ERF is specifically designed to reduce the gap of risk management at the user end by increased coordination in every sprint of the project cycle.

Moreover, the framework also focuses on the elements of DSDM such as cost-efficiency and time-effectiveness, while fulfilling agile aspects of changing requirements iteratively without compromising the quality of the project. This framework can be implemented in various sectors such as banking, academic institutions, e-commerce, business, etc. The research is credible as it has implemented software for data analysis, theoretical concepts giving rise to a new framework, and the development of a framework with strategic measures to capture and assess risks at the user end.

Similarly, previously published studies did not propose any theoretical framework reflecting the relationship between the DSDM project team and the end-user for risk management. However, the present study represents novelty by establishing an innovative framework linking the DSDM project team and the end-user for risk management. This transformation of the theoretical framework has enhanced the credibility of the research.

8.7 Practical Contributions

The study besides theoretical concepts contribute practically, to implementing the model in organizations that follow agile methodologies for project development. All the organizations developing software-based projects, specifically service businesses such as banking, finance, information systems, investment sector, and other businesses integrate software for processing their business operations. Companies using the DSDM approach for project development to ensure cost, quality, and schedule while reducing the risk impact of the software will benefit from the end-user risk framework proposed in this study. Furthermore, companies concerned about client and stakeholder satisfaction usually rely on DSDM project management to make changes as required by the clients. With the growing usage of DSDM methodologies for project development, researchers and practitioners are engaged in developing frameworks for effective project risk management strategies. In service businesses, risks may significantly occur at the developer's end, however, uncertainties can be identified at the user end as well. Therefore, this research proposes a framework that can be implemented in service projects based on agile and DSDM methodology, which enhances project lifecycle and outcome. Furthermore, agile-based projects create conflicts between the project team and users for risk arousal. Thus, the model can be used to enhance coordination and good terms with project stakeholders. Project management and risk management researchers may use this model as the base for their research. Practitioners can further investigate the concepts highlighted in this study as the factors influencing the risk management practices of organizations. Various risk management and identification can be triggered at the user-end that lack the framework for risk reduction at the user-end, therefore, this longitudinal research can be used to implement different theoretical models and different types of data such as quantitative (primary or secondary) to generate statistical comprehensions.

Moreover, companies using software technology can also use the ERF model to identify and manage risk at their end following ERF segments. In addition, the research would aid the project manager and the team members in enhancing their knowledge and understanding regarding effective risk identification. Moreover, this paper involves implications that are applicable to both large and small organizations. Therefore, the project managers can take insights and awareness from this paper and can enhance their risk identification process and its management in their organization.

8.8 Limitations of the Study

This section highlights and discusses the limitations faced by the researcher during the process of undertaking this study. As a qualitative study, this research focuses on investigating the concept of end-users leading risk management for a DSDM team. So, it acknowledges the limitations encountered during the conduct of the study. The employed qualitative research methods focus on exploring the concept of end-user-led risk management in DSDM teams. One of the major limitations that the presented study contains is the inability to fully test the proposed framework in a live project due to time constraints. Wider stakeholder involvement and a broader range of participants could have provided a more comprehensive understanding of end-user-led risk management processes. In addition to this, it was also a challenging and complex process to obtain subtle and sensitive information from the participants as it brought complexities. Some interviewees were hesitant to share their personal details and required assurance of anonymity. The review of secondary data from Companies A and B also proved time-consuming as obtaining authorization and access to the information contain a lengthy procedure as this involved obtaining authorization from the organization prior to starting with the review/study which proved to be a very lengthy procedure.

The other limitation that this study possesses is that this focuses qualitative approach to data collection. It is one of the time-consuming approaches to data collection, difficult to assess its rigidity, and inability to generalize findings. There is also the possibility of researcher bias contaminating the results. Furthermore, the qualitative data collected, being largely text-based, made it challenging to present the findings visually and often resulted in lengthy textual formats that were difficult to understand. Involvement of the researcher in the data collection process also brought several uncertainties, there is the possibility of introducing bias from the researcher which may consequently contaminate the findings obtained. It can also be identified that given the qualitative nature of the data collected which is largely textual, this makes it difficult for the research findings to be presented visually. The tendency, therefore, is to present such data in lengthy textual formats which sometimes renders it difficult to read and understand. Furthermore, the study was primarily conducted in the United Kingdom, and access to participants was limited, particularly for Company A. Due to the pandemic, all interviews and focus groups were conducted via video conferencing, which posed some difficulties as most of the participants were not well-known to the researcher. Despite these limitations, the researcher recognizes the constraints involved and considers them part of the research process.

The research is a mixed approach taking both primary and secondary data, where primary data was collected from the research participants in interviews and focus group interviews, and the secondary reports from the company's archives. The research, therefore, had much data to analyse and present results, moreover, the research developed a framework model by underpinning compliance theory and stakeholder theory to give a theoretical basis to the study. For analysing various concepts derived from the theories, participants were accessed for interviews making it more complex for the researcher to develop a model for practical

implementation. Lastly, the limited time for conducting the research was a big concern for the researcher to experiment with the model on real-world practices for project risk management. Therefore, the lack of a practical implementation and testing model for checking durability and reliability led to a limitation of this research piece, which can be carried forward by a future researcher who tends to develop a user-end-oriented model for risk capturing, assessing, and mitigation.

By analysing the limitations of the research, the researcher has drawn several recommendations that will aid in future research based on a similar subject of the study.

8.9 Recommendations for Professional Practice

This research has presented a framework, to support software development practice in enhancing the relationship between an organization and the end-user. ERF offers one way for the project team to reflect on and improve their task, to be able to respond to opportunities and innovation, and to accommodate unexpected changes more effectively because of uncertain and complex times. The use of ERF adopts the agile principle and practices and has the potential to support strategic conversations and decision-making, draw knowledge and understanding around agility, and change how teams collaborate to produce a product as described by the end user. While this research provides an effective framework to guide and implement, a wider cultural shift is required for it to be successful, that is, organizations must understand the value of end-users in a changing world and continuous improvement, so that it may be adopted in the future software development and viewed as a critical part of an of evolving practice. From this perspective, further research could be carried out on organization culture, shifting to a new dynamic of end-users leading risk. Although tensions erupted within current and future views of end-users that were addressed fully in the literature, current practice omitted them but the desire to break down silos and increase opportunities for collaboration with other areas of the organization including the leadership team and key decision-makers but often present barriers of this happening but with increasing in competitors this can increase competitive advantage but there is little evidence to support this, however, further research can you carried out in this area.

8.10 Future Recommendations

This study has entailed an initial, exploratory investigation of risk management in a DSDM setting and the potential adoption and application of an end-users-led risk management approach. As its key outcomes, the study has provided a new conceptual understanding of managing risk and whether, why, when, and how to use ERF, as well as making associated contributions to the advancement of a new perspective on risk management. In doing so, it has also certainly identified and highlighted a number of associated issues and questions which may form the basis for further research on this subject. This includes future research aimed at live projects confirming the results of this exploratory study, in addition to other related themes that have been identified through this study, but which are outside of its scope. The research is needed to gain insight into the perception of end-users in other industries and how it may evolve over time. It would also be interesting to explore the potential impact of additional information and experience with SEA on these perceptions. The study noted opposing views on the role of end-users in the planning process, with some interviewees suggesting that full support from senior managers is necessary, while others believe engagement with stakeholders could drive change. The reasons behind these differing opinions were not clear and warrant further investigation, particularly in relation to potential engagement at the strategic level. The reasons for these opposing views were not made apparent during the study, and this issue would therefore benefit from further investigation, particularly in relation to potential engagement at the strategic level

rather than the project level.

It would also be beneficial and informative to carry out additional research to investigate whether there are any particular issues or situations that would result in amending an organisation's business strategy to incorporate end-users seeking to manage their own projects or where an organisation may seek to slip responsibilities on a project to achieve an amicable outcome. Additionally, it would be useful to examine any specific issues or situations that may influence an organization's business strategy to involve end-users in project management or to shift responsibility for a project.

Although the specific methods of data collection and analysis that were used in this study were selected for the reasons described previously, any further research in this area should also clearly adopt and use methods that are appropriate to its particular aim and objectives. Any future use of qualitative research methods in this field, such as interviews or other techniques that result in the raw data might also explore the use of other relevant analytical techniques, such as textual analysis), and context analysis to systematically analyse and interpret the data.

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Appendices

Appendix One: Data Category

Core-Category	Categories	Sub-Categories	Concepts	Codes
Responsi	DSDM	Standardise	Project	MS Project

veness		Tools	Management Tools	Jira
				Innotas
				Product backlogs
				SharePoint
				Risk Management tools
				MS Project
				Emails
				Workshops
				Regular meeting
				Kanban Tool
				Word
				Excel
				SAP budgeting tool

				Clarity
				Document repository
	Timeliness			Handover
				Assess to applications
				Reducing misconceptions
		Timely Correspondence	Prompt Response	Delivering the projects on time
				Punctuality and reliability
				Providing Support system
		Scheduling and Planning	Project Planning	Task Allocation
				Project Deadlines
				Reaching Milestones
				Progress Status
			Self-organising	Restructuring schedule

				Prioritising tasks
				Managing workload
		Transformation	Overlapping of Hours	Availability at multiple times
				Overcoming Time shifts
			Flexibility	Working beyond hours
				Work life balance
				Sharing knowledge
				Accommodate others
	Knowledge	Capability Development	Feedback Loops	Sprints
				Sharing alterations
				Error identification
				Turn Product Backlog into Increments of potentially releasable functionality

			Information Sharing	Document repository
				File uploads
				Sending communication in a timely manner
				Avoiding mistakes
			Progress Reporting	status update
				Tracking progress
				Meeting deadlines
				Getting support
			Scope Management	Decision making
				Workshops and Trainings
				Understanding DSDM Framework
				full comprehension of the product

		End-user Involvement	Active Participation	Avoiding uncertain situations
				Following project plan
				Client expectations
			Requirement for Extensive support	Providing training
				Specifying Guidelines
				Providing Direction
		Stakeholder Function	Tracking and Monitoring	adhere to processes and procedures
				Use of communication tools
				update on progress
				Providing guidance
			Risk Owner	Facilitator and Responsibility
				Accountability

				Designing mitigation plan
				Risk Advocate
			DSDM Team	Design and Build using innovative solutions
				Fulfilling Product Durability
				Learning capability
				Managing setbacks
			Need for Improvement	Testing
				Learning/Training and support system
		interrelationship	Building of Assurance	Customer Satisfactions
				building rapport
				adhere to processes and procedures
			Promoting End-	Developing relationship

			user Interaction	Developing DSDM knowledge
				Transparency
		Capacity	Reducing bias	Cultural integrity
				Task cultural norms
			Managing Workload	Scope creep
				multiple assignments/task
				Scheduling workload
			Skills and Experience	achieving success
				Managing milestones
				Benefit Realisation
			Mandatory Skills	Meeting specifications
				Attention for details
				Anticipating risk

		Team Satisfaction	Ambition	Avoiding pitfalls
				Superior productivity
				satisfactory Co-ordination
			Statement of work	flexibility
				improving skills
				Product Durability
			Estimation of benefits	Providing appropriate resource for the team
				Benefit Realisation
				Meeting minimum requirements
	Risk Management	Risk Management Strategy	Risk Estimate	Discussion
				Risk Workshop
				SWOT

				Delphi Method
				Assessment
			Risk Assessment	Likelihood vs Impact Analysis
				Root Cause Analysis
				Implement
				Capture
				Delphi Method
			Managing Risk	Risk Register
				Product backlogs
				Regular risk review
		Risk Management Implementation	Risk Compliance	Managing outside risk
				Risk owners take responsibility
				Mitigation Plan

			Review of Compliance	Managing and controlling Risk
				Advocate critical action
				Reducing Risk impacts

Appendix two: Participant Information Form

To explore the suitability of DSDM for managing the strategic risk

Participant Information Sheet

December 2020

Background to the study

This research aims to investigate the feasibility of Agile Dynamic systems development method (DSDM) in improving long term business strategy. DSDM is a software development tools which aims to develop a working software within a short duration without compromising on quality, time, and budget. In spite of having ticked all the boxes as an effective tool within the Agile community, there remains a gap in the knowledge of its actual level of managing and mitigating risk, mainly because traditional risk strategy remains largely incorporated into a modernised tool, as well as because of a misinterpretation of these standards within different national contexts.

Therefore, it is important to address existence risk strategy because it highlights the position of the project team and involvement of end-users. The researcher seeks to address this dearth in the literature and provide practical insight and guidance.

To develop an understanding of these issues, the study seeks to:

- Explore the suitability of DSDM for managing risk

- Identify its elements and its process
- Build an end-user centred DSDM risk strategy
- Evaluate the developed end-user centred framework

Why is it necessary?

From the information gathered, the researcher hopes to get a better understanding of the DSDM process. This will enable the researcher to provide informed and credible contributions on drivers, benefits, and inhibitors of the DSDM community.

What will happen?

The researcher will proceed to interview 25- 40 participants in 2 organisations through which the researcher hopes to obtain a better understanding of DSDM processes.

How long will it take?

The researcher estimates that the average time for each interview should last between 30mins – 45mins.

Possible disadvantages/risks to participation

There are no disadvantages/risks or cost to you in order to participate. The interviews will take place at your workplace or at another mutually convenient location.

What do we do with the information gathered?

The interview will be recorded (with consent) and all the information gathered will be used only for academic purposes and will be treated confidentially. Data collected will be anonymised.

Who has reviewed the study?

The research has been approved by London South Bank University, School of Business.

Have you got any questions?

If you have any questions about this project, please contact the researcher (contact details provided below).

Thank you for your time.

Johnny Danquah
London South Bank University
Business School
PhD Researcher
Danquaj5@lsbu.ac.uk

Appendix three: Consent form

Research Project Consent Form

Full title of Project: To explore the suitability of DSDM for managing the strategic risk.

Name: Johnny Danquah

Researcher Position: Student

Contact details of Researcher: danquaj5@lsbu.ac.uk

Taking part (please tick the box that applies)	Yes	No
I confirm that I have read and understood the information sheet/project brief and/or the student has explained the above study. I have had the opportunity to ask questions.	☐	☐
I understand that my participation is voluntary and that I am free to withdraw at any time, without providing a reason.	☐	☐
I agree to take part in the above study.	☐	☐

Use of my information (please tick the box that applies)	Yes	No
I understand my personal details such as phone number and address will not be revealed to people outside the project.	☐	☐
I understand that my data/words may be quoted in publications, reports, posters, web pages, and other research outputs.	☐	☐
I would like my real name to be used in the above.	☐	☐

I agree for the data I provide to be stored (after it has been anonymised) in a specialist data centre and I understand it may be used for future research.	☐	☐
I agree to the interview being audio recorded.	☐	☐

Name of Participant	_____	_____
	Date	Signature
	_____	_____
Name of Researcher	Date	Signature

Project contact details for further information:
Project Supervisor: Dr Rea Prouska, Dr Sarah Hasani, Dr Barbra Czarnecka
Email address: prouskar@lsbu.ac.uk, hasanis2@lsbu.ac.uk, czarnecb@lsbu.ac.uk

Appendix four: First Interview questions

1. Can you elaborate on your approach of capturing risk when using Dynamic systems development method (DSDM)?
2. In your view, what other risk strategies can be used in DSDM?
3. What kind of support do you receive from senior managers when it comes to the use of DSDM for the purpose of capturing risk?
4. Are you satisfied with the use of DSDM? If yes, what are the key elements of the DSDM method that make them satisfied? If no, what are the drawbacks of this method?
5. DSDM is an advocate for change in mind-set and change in attitude. Would you say that this influenced its use in your organisation?
6. What are the advantages and disadvantages of your current risk strategy?
7. Is your risk strategy standardised across the entire organisation or tailored

for individual projects?

8. (follow up question) Why do you think it is tailored for individual projects?
9. Who is responsible for capturing risk within your project team?
10. In your view, would you say the project team has adequate training and skill set to capture risk?
11. Do you believe senior managers have interest in how risk is captured and mitigated?
12. What tools are used for capturing risk?
13. What can be done to improve your current tool for capturing risk?
14. What are your views on the DSDM process within the context of Prince2 risk strategy?
15. What are the challenges faced when traditional risk processes are used in any project?
16. What factors can be eliminated within your current risk strategy to effectively enforce a new risk strategy?
17. What are the benefits of such enforcement?
18. Does your current DSDM capture end-users' voices?
19. Do you think involving the end-user's view in your risk process can jeopardize the outcome of product?
20. In your view, should end-users be involved in capturing risk?
21. What kind of cultural change is required to implement a DSDM end-user-led risk strategy?
22. What barriers would undermine the influence of end-users participating in risk management?
23. What other models of risk management do you consider have an end user involvement?
24. What principles of DSDM do you need to improve in order to help end-users participate in risk strategy?
25. How can DSDM be used to define mitigation strategy from the end-user point of view?
26. In summary, what do you consider important in the design of a framework to enable an end-user to participate in risk strategy?

Appendix five: Focus group interview questions

1. What is your view on this model of end-user lead risk strategy?

2. What can be adjusted to make this acceptable by your organisation?

3. Can end-user feedback be accepted as external risk?

4. How difficult is to maintain the level of collaboration because of the greater demands on developers and clients and necessary documentation

5. How much of the team satisfaction comes from End-user's participation?