UTS UNIVERSITY OF TECHNOLOGY SYDNEY

Operationalisation of Artificial Intelligence: How Organisations are Managing the Artificial Intelligent Technologies that are Deployed within their Organisation

by Jacqueline Dinklo

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under the supervision of
Dilek Cetindamar Kozanoglu
Babak Abedin

University of Technology Sydney
Faculty of Engineering and Information Technology

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Certificate of Original Authorship

I, Jacqueline Dinklo, declare that this thesis is submitted in fulfilment of the requirements for the award of Doctor of Philosophy in the School of Computer Science, Faculty of Engineering, and Information Technology at the University of Technology Sydney.

This thesis is wholly my own work unless otherwise referenced or acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

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Without management in an organisation, “disorder, friction and malperformance” are the only activities that evolve. Peter F. Drucker (1973)

Abstract

The effective management of Artificial Intelligence (AI) technologies is a crucial aspect that accompanies the adoption of AI within organisations. As AI's rapid and widespread integration continues, there is an increasing need to comprehend the management practices associated with these technologies. This understanding is essential to ensure that AI deployment benefits organisations without causing harm or detrimental effects. This research aims to investigate how organisations manage their AI technologies to leverage the benefits offered by AI. The study adopts a Grounded Theory approach to explore the management of AI technologies. Qualitative data is collected through unstructured interviews with individuals overseeing AI within their organisations.

The research analysis was conducted on the results of 30 interviews with managers of AI within organisations across three levels of management. The analysis of the interviews identified 11 factors in managing AI and 11 relationships between these factors. The identified factors and their relationships informed the construction of the theoretically grounded theory framework concluded from this research. The framework, factors and relationships allowed for the eight propositions to be established from this research.

The findings of this research indicate that existing management practices are applied to AI technologies to align them with the organisation's goals and objectives. These practices encompass monitoring and measuring the outcomes of AI, reporting on the AI's progress in achieving the organisation's goals and objectives, and continuously improving the AI's performance to enhance goal attainment. Furthermore, the management of AI within organisations involves interdisciplinary collaboration, drawing upon domain-specific expertise related to AI functions coupled with AI skills. The research also identifies the presence of Anthropomorphising, a human-like attribution, in managing AI technologies.

Based on the research findings, this study proposes a theoretically grounded framework that represents how organisations effectively manage their AI technologies. The framework is a valuable contribution to understanding AI management practices within organisational contexts for academics and practitioners.

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Chapter 1. Introduction

This chapter provides the introduction to this research and thesis. The introduction chapter is followed by Chapter 2, the literature review, which discusses the literature on Artificial Intelligence (AI) Management. The method by which this study is conducted is presented and justified in Chapter 3, the Methodology chapter. Chapter 4, the Data Analysis, presents and analyses the data collected in this study. Following the data analysis chapter, Chapter 5, the Discussion, discusses the findings drawn from the data analysed in the preceding chapter. This thesis's sixth and final chapter is the concluding chapter offering a summary of the research, the contributions, limitations, and areas for future studies. The following introductory chapter presents the overview of this research, including the research problem and the significance of the research in AI and its management.

1.1 Introduction

AI is often described as one of the fastest-emerging technologies as we enter the third decade of the 21st century. AI is one of the leading digital technologies, describing it as a frontier technology transforming our society (United Nations, 2019). The functions facilitated by AI are now commonplace in many aspects of an organisation's operations (Haenlein et al., 2019), and the use of AI in organisations has doubled from 2018 to 2022 (Chui, 2022). The complex functions that can be performed with its use are driving the adoption of AI. Grace et al. (2018, p. 729) advise, "Researchers predict AI will outperform humans in many activities in the next ten years, such as translating languages (by 2024), writing high-school essays (by 2026), driving a truck (by 2027), working in retail (by 2031), writing a bestselling book (by 2049), and working as a surgeon (by 2053)". The recent launch of ChatGPT, a product created by the company OpenAI that creates text, has already provided free global access to write essays in seconds, exceeding the Grace et al. (2018) forecast from only a few years earlier (Lund & Wang, 2023).

Driving the adoption and use of AI is the inclusion of AI in enterprise systems, creating a 'next generation' in digital platforms (Donald & Donald, 2019; Rai et al., 2019). AI is already commonly used in understanding customers' spending habits and predicting the next purchase (Kaplan & Haenlein, 2019). Additionally, typical uses include marketing (Kumar et al., 2019; Overgoor et al., 2019), journalism (Hansen et al., 2017), and organisational decision-making (Jarrahi, 2018). Tambe et al. (2019) also investigate the use of AI in human resource management within the organisation. As the use of AI is rapidly advancing in its variety of applications and use in organisations, so too has the need for research into how it is managed (Almeida et al., 2020; Arrieta et al., 2020; Kaplan & Haenlein, 2019, 2020; Rai et al., 2019; Win & Beydoun, 2020).

As AI technologies expand into the organisation, so does the need to evaluate their performance. Successful organisations measure essential areas of their business to ensure their objectives are met (Van Camp & Braet, 2016). As organisations seek to ensure that their resources are being used to the maximum efficiency and effectiveness, the need for the governance and management of the organisation's performance increases (De Haes & Van Grembergen, 2009; Neely et al., 2000; Weill & Ross, 2005). This previous research on organisation performance management supports the need for ongoing management, including new technologies such as AI.

This chapter provides the background and research problem addressed, coupled with the issues raised and its research contributions. The study's significance and research methodology are then introduced. This is followed by the definition and explanation of the range of key terms used, and an outline of the remaining chapters. The key findings are then summarised and the chapter concludes.

1.2 Background of the Research

This section of the chapter provides the background and history of AI, starting in the middle of the 20th century. The evolution of AI technologies is discussed, and highlights of AI's progress are presented in the literature. The evolution of AI, its definition, use, and overview of the management in the organisation research concludes this section.

1.2.1 Artificial Intelligence Emergence

AI is not a recent phenomenon in the 21st century or a concept that has recently emerged with the current technologies (Haenlein & Kaplan, 2019). The concept of another entity having intelligence was discussed in the early to mid-1900s with the seminal work of Alan Turing [1912 – 1954], who raised the notion that computers could exhibit intelligent behaviour by asking, "Can Machines Think?" (Turing, 1950). Moor (2003) and Muggleton (2014) identify Turing's article as one of the original and most influential on AI from the mid-1900s. Muggleton (2014, p. 3) presents three suggested types of AI, as derived from Turing: "(1) AI by programming, (2) AI by machine learning and (3) AI using logic, probabilities, learning and background knowledge". He argues that there are inevitable limitations in the first two approaches and recommends the third as the most promising. The concept and use of AI has existed for some time and has evolved in its application and definition since its emergence in the mid-20th century.

1.2.2 Artificial Intelligence Evolution

In reviewing the evolution of AI, Pan (2016) advises that it has had 60 years of development, placing its birth in the 1950s. We no longer ask, "Can machines think?" (Turing, 1950) as we did in the 1950s. The rapid development in AI has seen the research move from IBM's Chess-playing computer being lauded as the forefront of AI in the 1990s (Haenlein & Kaplan, 2019), to today, where it is not seen as having the necessary skills to be considered AI (Kaplan & Haenlein, 2019). A machine's ability to play Chess was considered a form of AI in the 1960s and '70s (Kobbacy et al., 2007). Perhaps this function for automation is derived from Turing's suggestion that the best place to start with AI is with "a very abstract activity, like the playing of chess, would be best" (Turing, 1950, p. 460). Some decades later, Chess became a significant focus of AI, with much academic literature and public media in the late 1980s and early 1990s focused on it (Bringsjord, 1998; Burmeister & Wiles, 1995; Marsland & Schaeffer, 1990; McCarthy, 1990). However, later in the 1990s, a Chess tournament was played between a human and a machine, with the machine 'winning'; this was considered a significant point in AI (Bloomfield & Vurdubakis, 2008). However, some decades later, Kaplan and Haenlein (2019) classify IBM's winning Deep Blue Chess-playing computer as an 'expert system', not AI.

In understanding the history of AI, it is also worthwhile examining what has been said in forecasting its future. Research has been conducted by Müller and Bostrom (2016) surveying people to understand their expectations and views. Most survey respondents believe AI will achieve 'high-level intelligence' by 2040 to 2050, and one-third of people surveyed believed this would negatively impact humanity. Steven Hawking stated that AI will be ″either the best thing or the worst thing to happen to humanity″ (Herm, 2016). However, one of the oldest academic quotes on AI may still be used to summarise the issue most succinctly: ″We can only see a short distance ahead, but we can see plenty there that needs to be done″ (Turing, 1950, p. 460).

1.2.3 Artificial Intelligence Definition

The literature provides many definitions of AI, and many recent and past scholars agree that there is no one agreed definition of AI. There are many types and many definitions (Kaplan & Haenlein, 2019). Investigating the earliest definitions and possibly the simplest was constructed by Turing (1950), advising the test and default definition would be for the user not to be able to identify if they were dealing with a human or a computer. This definition was still considered an influenceable definition at the turn of the 21st century (Moor, 2003). Another earlier work by McCarthy (1989) identifies AI as automated "common sense" reasoning. The

diversity of definitions and perspectives reflects this field's complexity and evolving nature, and perhaps the lack of agreement on a definition.

More recent literature researching current technologies using AI still acknowledges that there are many definitions (Jarrahi, 2018; Kaplan & Haenlein, 2019; Scherer, 2015). Early literature working with earlier technologies also struggled to define it (Legg & Hutter, 2007; Moor, 2003; Steels, 1993; Von Ahn et al., 2003). While scholars have not agreed on a singular definition, many definitions are established in the current literature. One of the most recent is Kaplan and Haenlein (2019, p. 17), defining it as ″a system's ability to interpret external data correctly, to learn from such data, and to use those learnings to achieve specific goals and tasks through flexible adaptation″, it is this definition that is most applicable to this research. AI technologies meeting the above criteria are used in various organisations and industries (Brynjolfsson & Mcafee, 2017; Kaplan & Haenlein, 2020).

1.2.4 Artificial Intelligence Use

The use of AI has rapidly expanded in organisations, with the continued adoption predicted to increase (Berente et al., 2021; Dwivedi et al., 2021; Dwivedi et al., 2023; Lund & Wang, 2023). The significant expansion of use in recent years can be attributed to advancements in computer hardware, such as data storage and computer processing power, facilitating its enablement. AI algorithm use has expanded to include many applications, including those in organisations looking to improve their productivity, efficiency, and effectiveness in obtaining the organisation's goals. These algorithms are now standard in many organisations, either via enterprise management systems, or as organisations create AI technologies to achieve business goals and objectives (Collins et al., 2021; Furman & Seamans, 2019; Haenlein & Kaplan, 2019).

Uses of AI in organisations include customer retention, answering customer queries, predicting and anticipating customer needs, decision support, customer and employee engagement, and automation of products and services (Borges et al., 2021). The algorithms that facilitate these business functions include Machine Learning (ML) in the prediction of events by learning from data (Mahesh, 2020), and Natural Language Programming (NLP), commonly used in automatically answering customer queries (Cambria & White, 2014; Kang et al., 2020). Chandra Das and Sawhney (2023) advise, "AI-enabled customer service is now the quickest and most effective route for institutions to deliver personalised service". AI has many benefits; however, it also has the potential to create negative consequences through its use, as it amplifies human behaviours and activities. The challenge in using AI is to harness its benefits while simultaneously ensuring that errors and negative impacts are not amplified via its use.

As a result of its rapid spread, the need to manage AI in the organisation is of interest to researchers and practitioners. Almeida et al. (2020, p. 5264) investigate its regulation for societies and provide a framework for use, commenting that the "need and urgency for AI regulation is indisputable". Wang et al. (2020) investigate responsible practices and offer the areas of ethics, risk, data governance and training as core areas of a framework for AI management. Future research opportunities abound: "Attention is urgently needed for research to formulate responsible AI strategies that will enable firms to move forward to leverage AI most efficiently and ethically" (Wang et al., 2020, p. 4969). There is much room for further research as technology develops and the need to understand and manage what it achieves as AI technology is operationalised.

1.2.5 Management in Organisations

Management is vast and divided across many domains and disciplines, including strategy, resources, and process. Accompanying the management literature are also many management definitions. One of the fundamental definitions applicable to all disciplines defines management as "the act of running and controlling a business or similar organisation" (*Oxford Learners Dictionaries*, 2023). Early seminal literature in the management domain is attributed to Fredrick W. Taylor, the founder of Scientific Management (Locke, 1982), and Henri Fayol, whose theories on management provide the foundations for modern studies (Pryor & Taneja, 2010; Wren et al., 2002).

More recent seminal studies on management practices and processes are those of Deming and Drucker. Deming, via the advent of the Total Quality Management Method (Anderson & Rungtusanatham, 1994) and the PDCA (Plan-Do-Check-Act) cycle, presented as a model of improvement (Moen & Norman, 2006). Drucker is known for his management, focus on the customer, and the two business functions of marketing and innovation (Drucker & Maciariello, 2008). The now commonly accepted concept of Management By Objectives (MBO) has been credited to Drucker (Greenwood, 1981). Deming and Drucker's contributions to management concepts and theory have also been the basis for many modern management concepts.

1.3 Research Question and Contribution

Artificial Intelligence's rapid expansion across various industries, applications, and organisations offers numerous benefits, such as improved efficiency, enhanced insights, and increased productivity. However, this widespread adoption necessitates a corresponding level of management and associated practices to ensure its full potential is realised, while mitigating the associated potential risks. Therefore, the focus of this research is to investigate how organisations manage the implementation and use of AI to achieve these benefits while

avoiding the risks associated with its adoption. As AI continues to play an increasingly important role in organisational operations, it is crucial to understand the best practices and challenges associated with managing it effectively.

Current AI research can be divided into two broad fields of research: how AI is created, investigating the algorithms used to produce the AI, and the areas of application and management. As an evolving technology, AI affords many research opportunities and is a popular topic among academics (Haenlein & Kaplan, 2019). Some of the current areas identified for research in the field include economic, ethical, social, technological, data organisational and managerial, political and legal, and policy (Dwivedi et al., 2019). The Management Information Systems disciplines call for further research on managing AI (Berente et al.; Dwivedi et al., 2019; Zandi et al., 2019). Considering these recent requests, the need for research in AIs' many areas is strongly supported.

This research aims to contribute to this understanding by analysing the current practices in managing AI in organisations. The following research question and sub-questions have been defined to investigate this phenomenon and contribute to the body of knowledge on the subject addressing the gap in the current literature (Wang et al., 2020).

1.3.1 Research question

How do organisations manage the AI technologies deployed within their organisations?

Supporting sub-questions to the research question include:

> *What are the **factors** involved in managing AI Technologies?*
>
> *What are the **relationships** between the factors involved in managing AI Technologies?*
>
> *What are the **influences** on the factors and relationships involved in managing AI Technologies?*
>
> ***Who** is involved in managing AI technologies in organisations?*

In answering these research questions, this research aims to make several contributions to theory, practitioners, and policymakers. The contribution to theory includes the theoretical framework of how AI is managed in organisations and propositions explaining how organisations manage the AI they have deployed. This research offers organisations, regulators, and creators of AI technologies insights into how the technologies in use are currently managed, and contributes to furthering academic knowledge and understanding

regarding AI technologies management. This addition to existing knowledge will identify and stimulate further areas for research.

1.4 Significance of the Study

The rapid growth, adoption, and ability of AI argue for the significance of this study. The growth in the creation and adoption of AI by organisations is significant and has seen rapid increases in recent years. Investment has increased, with private investment more than double from 2020 to 2021. Investment by the private sector in 2021 is estimated to have been US$93.5 billion, double that of the year before (Zhang et al., 2022). AI is becoming less expensive to create and train and can be completed in much shorter timeframes. As Zhang et al. point out, "Since 2018, the cost to train an image classification system has decreased by 63.6%, while training times have improved by 94.4%" (2022, p. 11).

AI already exceeds human performance in several areas, including reading comprehension (Zhang et al., 2022). AI significantly impacts society, the economy, and business transformation (Loureiro et al., 2021). Furthermore, organisations' increased uptake of AI has given rise to questions about managing these technologies (Abedin et al., 2022; Berente et al., 2019; Cowls & Floridi, 2018; Dwivedi et al., 2019; Kaplan & Haenlein, 2020). This trend suggests that it is not only becoming more accessible but also has the potential to revolutionise industries and bring about significant changes to the workforce, making it essential to investigate how organisations can manage their integration more effectively.

Management is required to ensure AI achieves the goals and objectives for which it is deployed. The function of management is to carry out various actions concerning resources and is critical in determining the success of a business or organisation (Drucker, 2012). These activities include planning, organising, commanding, coordinating, and controlling (Godwin et al., 2017), and it is through the application of these management functions that resources create utility (Malik & Probst, 1982). Drucker (1973) advises that without management in an organisation, "disorder, friction and malperformance" are the only activities that evolve (Malik & Probst, 1982, p. 153); accordingly, management functions are essential for ensuring that the organisation benefits from its AI investments.

1.5 Overview of Research Methodology

A qualitative methodology, based on an inductive philosophy, has been utilised to investigate this relatively new and rapidly expanding phenomenon: Grounded Theory. This methodology is used to understand the phenomena observed, which here are the individuals who are responsible for managing the artificial technologies within the organisation where they are

engaged, employed, or contracted. The data collection and analysis utilised this method to obtain and analyse the data and construct the findings (Glaser & Strauss, 1967, 2017). Grounded theory was selected for its advantages in investigating new phenomena and coding the resultant qualitative data (Birks et al., 2013; Urquhart, 2012).

The data source for this research is organisations that have adopted AI to enhance their operational efficiency or product offerings. These organisations range from small micro-businesses to large multinational corporations operating in various industries, including engineering, finance, and technology. The diverse range of organisations participating has been intentionally selected to provide a broad perspective on the use of AI in different contexts, and thus enrich the research outcomes.

The participants were selected based on their active involvement in managing AI at various management levels in their respective organisations. Three distinct management levels were identified to ensure diversity in the study: Executive Manager, Middle Manager, and Individual. Each participant was then classified into one of these levels based on their job responsibilities and organisational seniority.

The data collection process commenced with unstructured interviews with the participants. Unfortunately, as a result of the COVID-19 restrictions, most of the interviews were conducted using video conferencing software. The audio recordings were transcribed to create a written record of the conversations, which were then analysed via qualitative analysis software.

The data analysis was conducted using the Grounded Theory coding method of transcribed interviews. Three levels of coding were: first-level or open coding; second-level or selective coding; and third level or themes. Memos taken during the coding process identified the relationships between these codes. The Grounded Theory methodology was then used to create propositions which, by combining the themes and relationships, allowed for the theoretical framework to be established.

Several methodological techniques were employed to ensure validity and reliability. Data saturation was achieved by collecting data until no new themes or insights emerged, thereby enhancing the reliability of the findings. Validity was achieved with theory triangulation and was further strengthened through external data validation. Ethical considerations were considered before the research process, and the potential risks associated with the study were assessed. The research received Ethics Approval, and the risk of conducting the study was determined to be low.

1.6 Outline of Remaining Chapters

This section outlines the following five chapters, presenting them in the order in which they appear. This comprehensive overview provides readers with a clear understanding of the remaining thesis content, setting the stage for the subsequent chapters.

1.6.1 Chapter 2. Literature Review

The Literature Review chapter provides a comprehensive analysis and discussion of relevant literature pertaining to the management of AI in organisations. The sections of this chapter and the review are derived from the research findings in accordance with the usage of Grounded Theory Methodology. The chapter is organised into several sections, including AI management, existing management practices, collaboration, and anthropomorphism. Each is thoroughly explored, considering the existing literature. The literature on Grounded Theory methodology is also reviewed, providing a solid theoretical foundation.

1.6.2 Chapter 3. Methodology

In Chapter 3 provides a comprehensive and detailed account of the methodological approach employed. The justification for this qualitative approach, aligned with an inductive paradigm, is provided. The research procedures are clearly stated, including identifying participants, the environment, and the data collection method, which involves unstructured interviews. The use of Grounded Theory as the data analysis method is explicitly identified, encompassing coding, identification of themes, and relationships. The process by which the propositions and a theoretical framework will be derived to answer the research question is also elaborated, highlighting the systematic approach that will be followed to ensure rigour and validity in the research methodology.

1.6.3 Chapter 4. Data Analysis

Chapter 4 presents the analysed data, providing an overview of the data collected through interviews. The participants' demographics are identified based on their professional and organisational characteristics. The application of Grounded Theory is completed by coding and memo-ing, identifying the themes and relationships to complete the data analysis. The chapter concludes with the findings drawn from the data, which offer answers to the research question and sub-questions, providing valuable insights into the research topic.

1.6.4 Chapter 5. Discussion

Chapter 5 discusses synthesised data, drawing propositions from the relationships identified in the data. These propositions are then substantiated via the analysed data and existing literature and further integrated with established theories. The outcome is the development of

a grounded theoretical framework that presents a comprehensive approach to managing AI in organisations. Subsequently, the research problem is thoroughly examined through three distinct categories of existing management concepts and practices, interdisciplinary collaboration, and anthropomorphism. Considering the synthesised data and relevant literature, these categories are rigorously explored to provide valuable insights into the research problem.

1.6.5 Chapter 6. Conclusion

The concluding chapter provides a comprehensive consolidation of the findings. It presents the key findings, highlighting the contributions to theory that have emerged from the analysis. The research implications for policy and practice are also identified and discussed in depth. The research limitations are also acknowledged and listed, critically reflecting on the study's potential shortcomings. Furthermore, opportunities for further research in this field are identified, pointing towards potential avenues for further exploration and expansion of the knowledge base in this area.

1.7 Summary of Key Contributions

The critical contributions from this research are divided across three domains. These domains encompass the findings drawn from the data analysis, the theoretical contributions, and the practical implications of this research. The findings from the data analysis domain contribute to advancing the current understanding of the topic, while the theoretical contributions highlight new perspectives and directions for future research. The practical implications resulting from this research are intended to provide valuable insights for practitioners and stakeholders in the field, ultimately contributing to the overall growth and improvement of the management of AI in organisations.

The key findings include identifying the factors, relationships, influences, and people involved in the organisation's management of AI. The research identified five factors involved in managing AI in the organisation. These five factors are linked via 11 relationships and three major influences on the factors are identified. The people involved with the management of AI have been categorised into four groups involved in managing AI in the organisation. The findings also identified three conclusions: (1) AI is managed via existing management practices that have been extended and modified for the management of AI; (2) collaboration between interdisciplinary skill groups, such as those with domain skills to which the AI is applied and those with AI skills in managing it is important; and (3) the findings identified that anthropomorphism was both a factor and influence on managing AI in organisations.

As already mentioned, the theoretical contributions of this research include the creation of a theoretical framework describing the management of AI within the organisation and the development of eight accompanying propositions. The theoretical framework offers a conceptual model to guide future research processes. It provides a set of interrelated concepts, definitions, and propositions that explain the management of AI in the organisation. The theoretical framework hopes to assist future researchers in organising and structuring ideas, identifying current knowledge gaps, and generating testable hypotheses. The theoretical framework is anticipated to offer a foundation for further research by providing a framework for understanding and investigating a specific phenomenon of AI management in organisations.

The eight propositions identified explain and support the theoretical framework. They provide the base for further studies to test the theoretical framework and investigate further the management of AI in organisations. It is hoped that the contribution of the propositions is to serve as tentative statements or hypotheses that propose a relationship or link between the factors, relationships, influences, and people identified from the research. The propositions aim to guide future research by setting out straightforward research questions, defining the scope of the study, and specifying the expected outcomes. They may also help organise and structure future research processes by providing a theoretical foundation, as well as a framework for testing hypotheses, analysing data, and drawing conclusions. It is hoped these propositions may help to generate testable research questions, which in turn help to develop a systematic approach to data collection and analysis.

Finally, it is hoped that the propositions can assist in communicating the research findings to the academic community, as they help explain the underlying logic and theoretical framework and provide a clear statement of the leading research findings. In summary, the contribution of the eight propositions is to assist in explaining these research findings and offer guidance, organisation, and communication of future research processes.

The practical implications of this research consist of potential real-world applications of the findings for a range of stakeholders, including policymakers, practitioners, businesses, and individuals. This research may be helpful in policy development regarding the use of AI and its management. Understanding how it is managed may identify policies and regulations useful for managing AI. Improving current practices in organisations is also a practical implication for this research as it allows practitioners to compare the findings to their current AI management practices. Improved AI management may also lead to improved economic benefits, ensuring better use of resources and lowering the risks associated with its management. In summary,

the practical implications of this research are broad and varied. It is hoped that they can affect organisations positively and individuals tasked with managing AI within organisations and society, especially as its adoption and application are amplified.

1.8 Definition of Key Terms

This chapter section offers the definitions used across the remaining chapters, in order to establish a shared understanding of important concepts and terminologies used, and setting the foundation for a clear and consistent interpretation of the findings. These terms and definitions allow a greater understanding of this research's terminology, concepts, and background, and cover the usage and types of AI, management, and management functions. Organisational terms used in the management of the organisation are also defined, and Appendix A describes the software used.

Artificial Intelligence

Artificial Intelligence is the combination of mathematical algorithms and computer science that is assigned to a discipline to enhance insights and outcomes. Examples of AI include Natural Language Processing (NLP), Machine Learning (ML) and Neural Networks (NN). Some of the recent definitions of AI include:

> "Artificial intelligence (AI) is a set of rapidly expanding disruptive technologies that are radically transforming various aspects related to people, business, society, and the environment." (Dwivedi et al., 2023)

> [AI is] "a system's ability to interpret external data correctly, to learn from such data, and to use those learnings to achieve specific goals and tasks through flexible adaptation". Kaplan and Haenlein (2019, p. 17)

In the case of this research, AI is interpreted in terms of its usage to complete organisational functions to assist organisations in performing their organisational functions.

Natural Language Programming (NLP)

NLP is a subfield of AI and computer science that focuses on the interaction between computers and human language. NLP encompasses the development of algorithms, methods, and systems that enable computers to understand, interpret, analyse, generate, and manipulate human language in a meaningful and helpful way (Hirschberg & Manning, 2015; Jurafsky, 2000; Manning & Schutze, 1999). A recent definition of NLP is:

"Natural language processing employs computational techniques for the purpose of learning, understanding, and producing human language content". (Hirschberg & Manning, 2015, p. 261)

Machine Learning (ML)

ML is a subfield of AI. It combines data, mathematical algorithms, and computer science to learn, *in some ways similar to a human. Recent definitions of ML include:*

"Machine Learning enables computers to imitate and adapt human-like behaviour. Using machine learning, each interaction, each action performed, becomes something the system can learn and use as experience for the next time. This work is an overview of this data analytics method which enables computers to learn and do what comes naturally to humans, i.e. learn from experience." (Alzubi et al., 2018, p. 1)

Neural Networks (NN)

Similarly to other forms of AI, NN combine computer science and mathematical algorithms. They are often described as complex models with millions of parameters. They are helpful in "speech recognition and natural language processing" (Zhang et al., 2021, p. 1).

> "Neural networks are that they have the ability to learn complex nonlinear input-output relationships, use sequential training procedures, and adapt themselves to the data." (Basu et al., 2010, p. 24)

Management

Management is a term that refers to the actions undertaken in planning, organising, leading, and controlling resources to achieve organisational goals. These resources can include people, finances, materials, and information. The Merriam-Webster dictionary describes management as ″the act or art of managing: the conducting or supervising of something″ (Dictionary, 2002)

Manager

A manager in the organisation is a person within the organisation required to control resources other than themselves. Peter Drucker advises, ″The manager is the dynamic, life-giving element in every business. Without his leadership' the resources of production remain resources and never become production. In a competitive economy, above all, the quality and performance of the managers determine the success of a business, indeed they determine its survival. For the quality and performance of its managers is the only effective advantage an enterprise in a competitive economy can have" (Drucker, 2012). Managers are responsible for

planning, organising, directing, and controlling organisational resources to achieve specific goals and objectives.

Executive Manager

An executive manager is a senior-level professional managing an organisation's company, division, or department. This individual is typically responsible for overseeing the overall operations, defining, and achieving strategic goals, managing budgets, allocating resources, and making critical decisions that impact the organisation's success. Executive managers are often part of the top management team and report directly to the board of directors or company owners. They are expected to possess leadership, strategic thinking, operational skills and significant experience and expertise in their field (OpenAI., 2021) [1].

Middle Manager

A middle manager is a professional who manages a specific department or unit within an organisation and is responsible for overseeing the work of lower-level managers and employees. Middle managers are an organisation's "middle" layer of management, positioned between senior executives and front-line employees. They play a crucial role in translating the organisation's strategic vision into actionable plans and ensuring that day-to-day operations run smoothly. Middle managers are responsible for setting departmental goals and objectives, allocating resources, managing budgets, and evaluating the performance of their team members. They are also responsible for communicating information and decisions from senior management to their team and vice versa (OpenAI., 2021).

Individual Contributor

An individual contributor is an employee who works independently within an organisation and is primarily responsible for completing tasks or projects related to their area of expertise. Unlike managers or executives, individual contributors do not have direct reports and do not

[1] ChatGPT has been used to create several of the definitions used. The definition that have been provided by ChatGPT have been referenced and credited to ChatGPT. The definitions were checked by the author to ensure they reflected accurately the terms and their use in the research. The reason for the use of ChatGPT is twofold, firstly formal definitions of these terms and software and general terms are not well defined in existing literature or easily obtainable via current academically accepted search engines such as Google Scholar. Secondly, ChatGPT is a new and novel use of AI, currently disrupting many accepted norms in all aspects of human enterprise and invoking the author's curiosity and inquisitiveness, given the research topic.

manage other employees. Instead, they focus on carrying out specific assignments or responsibilities that contribute to the organisation's overall success. Individual contributors may work in various roles and functions, such as sales, marketing, engineering, research and development, or customer support. They typically possess specialised skills or knowledge in their field and are expected to apply these skills to complete their assigned tasks efficiently and effectively. While individual contributors may not hold formal managerial positions, they are still critical to the success of an organisation. Their contributions may include conducting research, developing products or services, implementing strategies, providing technical support, or creating marketing campaigns. In many organisations, individual contributors may have opportunities for career advancement, such as moving into management or leadership roles. However, some employees may prefer to remain in individual contributor roles, focusing on their area of expertise and contributing to the organisation in that capacity (OpenAI., 2021).

Organisation

An organisation is a group of individuals or entities working together to achieve a common goal or set of objectives. The members of an organisation typically have specific roles and responsibilities designed to contribute to the organisation's overall success. Organisations can take many forms, including businesses, non-profit organisations, educational institutions, government agencies, and religious groups. They may be structured in different ways, such as hierarchical or flat organisational structures, and may vary in size from small startups to large multinational corporations. Organisations can be further defined by their purpose, mission, or vision. For example, a business organisation may be focused on generating profit for its owners or shareholders.

In contrast, a non-profit organisation may be focused on providing a social service or pursuing a charitable mission. Organisations are complex entities that coordinate and manage resources, people, and processes to achieve a desired outcome. They play a vital role in society by creating products and services, providing employment opportunities, and contributing to economic and social development (OpenAI., 2021).

Organisational Goals and Objectives

Organisational goals and objectives describe what an organisation intends to achieve over a specific period. Goals and objectives help an organisation to focus its efforts and resources, define its direction, and measure its success. Goals are broad, long-term aims that an organisation wants to achieve. They are general statements of what the organisation wants to accomplish, such as increasing market share, improving profitability, or expanding into new

markets. On the other hand, objectives are specific, measurable, and time-bound steps an organisation takes to achieve its goals. They are more detailed than goals and provide a clear roadmap for achieving them. Objectives should be SMART - specific, measurable, achievable, relevant, and time-bound.

In summary, goals define the destination, while objectives provide a roadmap. Together, they guide an organisation's strategic planning, decision-making, and performance management. (OpenAI., 2021)

Monitor

In organisational management, monitoring is the ongoing process of collecting, analysing, and evaluating information about an organisation's activities, processes, and performance. Monitoring aims to track progress towards achieving goals and objectives, identify potential problems or risks, and adjust as needed to improve performance. Monitoring can involve various methods, such as data collection, performance indicators, audits, and reviews. The data collected through monitoring should be relevant, reliable, and timely to provide accurate information for decision-making. Effective monitoring can help organisations identify improvement opportunities, enhance accountability and transparency, and ensure that resources are used efficiently and effectively. It can also help organisations respond quickly to changes in their operating environment and adjust their strategies accordingly (OpenAI., 2021).

Measure

In the context of organisational management, measuring refers to the process of quantifying or assessing various aspects of an organisation's activities, processes, and performance. Measuring involves using tools and techniques to gather and analyse data and convert it into meaningful information that can be used for decision-making. Measuring can be done using various methods, such as observations from monitoring and performance metrics. The data collected through measuring should be reliable, valid, and relevant to the organisation's goals and objectives.

The purpose of measuring is to provide a quantitative and objective assessment of an organisation's AI performance and to identify areas where improvement is needed. Measuring can help organisations to benchmark their performance against industry standards or best practices, track progress towards achieving goals and objectives, and make informed decisions about resource allocation and strategic direction. Effective measuring requires careful planning, data analysis skills, and understanding the organisation's goals and objectives. It is an

essential tool for continuous improvement and can help organisations to optimise their performance and achieve their strategic objectives (OpenAI., 2021).

Collaboration

In organisational management, collaboration refers to working with others towards a common goal or objective. Collaboration involves individuals or groups from different parts of the organisation, or even from different organisations, coming together to share knowledge, expertise, and resources to achieve a common goal. Effective collaboration requires open communication, mutual respect, and a willingness to work together towards a shared goal. Collaboration can take various forms, such as team meetings, joint projects, and partnerships. The benefits of collaboration in organisational management include increased creativity and innovation, improved problem-solving, and better decision-making. Collaboration can also help to build stronger relationships between individuals and groups within the organisation and to promote a sense of shared purpose and commitment to organisational goals. To facilitate collaboration, organisations may need to create a culture that supports teamwork and cooperation, provide training and resources to help individuals develop collaboration skills, and establish clear goals and objectives aligned with the organisation's overall strategy (OpenAI., 2021).

Outcomes and Results

In the context of an organisation, the outcomes and results refer to the achievements or impact of the organisation's activities or initiatives. Outcomes are the changes or benefits that result from the organisation's work. They can be short-term, medium-term, or long-term and can be positive or negative. Examples of outcomes may include increased customer satisfaction, reduced costs, improved employee morale, or increased revenue. Results are the specific, measurable achievements the organisation has accomplished because of its activities or initiatives. These are often quantitative and may include metrics such as sales growth, market share, customer retention rates, or error reduction. Both outcomes and results are essential for an organisation to track, measure and evaluate the success of its strategies and initiatives. By measuring outcomes and results, an organisation can identify areas of strength and weakness and make data-driven decisions to improve its performance and achieve its goals (OpenAI., 2021).

Continuous Improvement

Continuous improvement is a systematic approach to identifying, analysing, and improving organisational processes, systems, and practices. It is an ongoing effort to enhance the

organisation's performance, efficiency, and quality by identifying and eliminating waste, reducing errors, and improving customer satisfaction. Continuous improvement requires a culture of collaboration and accountability, where all employees are encouraged to identify areas for improvement and contribute to the organisation's success. It is not a one-time event but a continuous process that requires ongoing commitment and dedication to excellence. By continuously improving its processes and practices, an organisation can improve its performance, reduce costs, increase customer satisfaction, and gain a competitive advantage in the marketplace (OpenAI., 2021).

Operationalisation

Operationalisation in the context of an organisation refers to the process of defining and implementing specific, measurable actions or indicators that will be used to track progress toward achieving organisational goals or objectives. It involves translating abstract or high-level concepts into concrete, actionable steps that the organisation's employees can implement. Operationalisation involves breaking down complex goals or objectives into smaller, achievable steps or metrics that can be monitored and evaluated over time. These metrics are then operationalised by defining specific targets or thresholds that must be met to achieve the goal.

Operationalisation is essential to effective goal-setting and strategic planning in organisations, providing a clear roadmap for achieving desired outcomes. It also helps to ensure that all stakeholders are aligned around the same objectives and understand how progress will be measured and evaluated (OpenAI., 2021).

Anthropomorphism

Anthropomorphism attributes human characteristics, emotions, and behaviours to non-human entities, such as animals, objects, or natural phenomena. Anthropomorphism can be a common tendency among humans, as they project human experiences and perspectives onto the world around us. Anthropomorphism can be seen in many areas of human culture, such as literature, art, and religion. It has also been the subject of scientific psychology and anthropology studies (OpenAI., 2021).

1.9 Conclusion

This chapter has introduced the research topic, provided the background, and offered the justification for this topic to be investigated. The research questions this research to address the identified research problem of how AI is managed in organisations have been stated. The

methodology for how this research will be conducted has been outlined, describing the qualitative approach that will be taken using Grounded Theory to analyse the data and draw relevant conclusions. Key concepts and software definitions to ensure a common understanding, the chapter outlines, and the critical contributions of the research project are provided. This chapter has also presented the foundations for how this research will be undertaken. The next Chapter, the Literature Review, will present the relevant academic literature on how AI is managed amid the existing management practices, collaboration and anthropomorphism pertaining to this research.

Chapter 2. Literature Review

This chapter presents an overview of the current literature on Artificial Intelligence (AI) management and the literature related to the findings of this Grounded Theory research. The chapter builds on the context and critical concepts established in Chapter 1 Introduction, and sets the stage for reviewing the research findings in Chapter 5 Discussion. This literature review is followed by Chapter 3 Methodology, which outlines the research methods used to investigate the management of AI. Subsequent chapters include Chapter 4 Data Analysis, where the findings are presented and interpreted. Chapter 5 Discussion, explores the study's implications, and Chapter 6 Conclusion, summarises the key findings. By reviewing the current literature, this chapter establishes a framework for understanding the findings and their implications, thus providing the supporting literature to frame this research and conclusion.

2.1 Introduction

As AI rapidly grows in its application and use, it is disrupting existing practices in many areas. A sphere increasingly using AI is that of organisations to assist with its functions, including creating new products, improving insights, and offering greater efficiency and effectiveness in its operation. This significant and rapid adoption and wider use of AI requires a level of management and management practices. This research investigates how the function of managing AI is undertaken in organisations. As AI becomes more prevalent in organisations, it is increasingly important to understand how it can be effectively managed to maximise its benefits and minimise potential risks and negative impacts. This research aims to contribute to this understanding by examining the current practices in managing AI in organisations.

This literature review aims to provide a strong foundation for this research's theoretical framework developed through Grounded Theory. The literature reviewed has been selected to align with the topics that relate to the research question and this research's findings. This review reflects the Grounded Theory methodology employed in this research, with the findings of the data analysis and research question influencing the selection of literature and the topics explored. The scope of the review covers the areas of AI management, existing organisational management practices, collaboration between resources within organisations, and the anthropomorphism of technology, all of which are relevant to this research's findings.

The focus of this literature review is to identify and discuss the literature pertaining to the research objective of understanding how organisations are managing their AI. The literature has been selected to support and provide context to answering the research question of:

`How do organisations manage the AI technologies deployed within their organisations?'

This literature review also considers the literature pertaining to the supporting sub-questions:

- What are the factors involved in managing AI technologies?
- What are the relationships between the factors in managing AI technologies?
- Who is involved in managing AI technologies in organisations, and what is their role in the management process?
- What are the facilitating and inhibiting influences on the factors and relationships in managing AI technologies?

The strategy by which the literature was identified and the method by which the literature has been analysed has been chosen to support the identification of literature concerning the research questions and findings.

The strategy for reviewing the relevant literature has been selected to align with the GTM used in this research project. To support this Grounded Theory-based research and thesis, the review is focused on the literature that supports the theory that has been developed, the research questions, and the research findings. The literature from leading academic databases in AI and management and articles from quality peer-reviewed journals have been sought to facilitate this strategy. Articles have been selected for their relevance to the research questions and findings of this research. Following this strategy for selecting the literature to be reviewed, the selected literature can be synthesised.

The synthesis of the identified literature has been designed to provide a comprehensive analysis of the existing knowledge landscape in AI management in organisations to support the developed Grounded Theory in this research. The examination of this related literature has been collated into the themes relating to the research questions and findings of the research to support the proposed theory. The literature is discussed and analysed. Patterns, trends, and gaps in the identified literature are noted concerning the research conducted.

This literature review chapter is organised as follows. First, the search strategy used to obtain the literature is described, including the databases searched, search terms used, and inclusion and exclusion criteria. Next, the synthesis process is detailed, including the organisation, summary, and critical literature analysis, with attention paid to identifying trends, patterns, and gaps in the existing literature. The synthesised literature is then presented on how AI is being managed in the organisation, management practices, collaboration, and the

anthropomorphism of technology. A discussion of the findings from the review is presented, highlighting the implications for the research questions and the theoretical framework proposed by this study. Finally, the chapter concludes by summarising the main findings and their significance in answering the research questions and offering recommendations for future research based on the review's findings.

2.2 Approach to the Literature Review

This section of the chapter identifies the approach undertaken to conduct the literature review. The section details the topics the literature will be sourced from, and the rationale for the search strategy by which the literature is identified for inclusion in the literature review reading. The identified literature will be analysed, assessed, and synthesised. The overview of the approach to the literature review is presented in Figure 2.1 Overview of Literature Review Approach below.

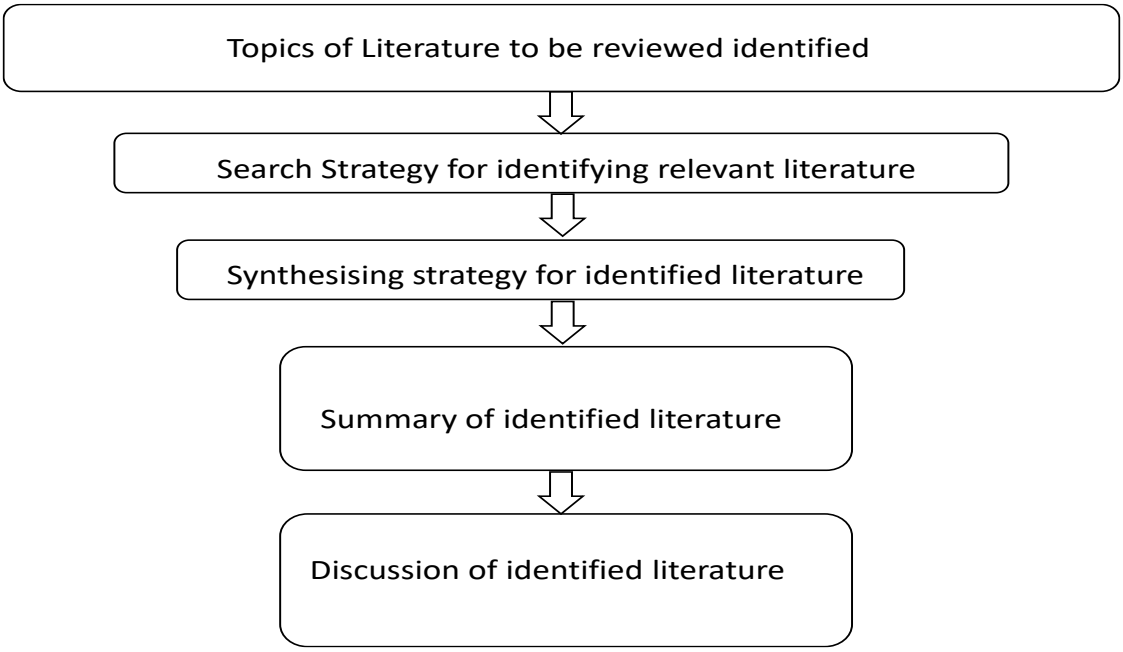


Figure 2-1 Literature Review Approach

Source: (Glaser & Strauss, 2017; Urquhart, 2012)

2.2.1 Focal Points for the Literature Review

The topics of focus for this literature review have been derived from the Grounded Theory approach to this research. Grounded Theory suggests that the literature reviewed closely aligns with the research question and the Grounded Theory framework that has emerged from the research. The literature review in the Grounded Theory thesis is used to support the development of the Grounded Theory, covering the research questions and the concepts from

the theory developed (Dunne, 2011). The literature topics reviewed in this chapter included 'How AI was managed?' and the research findings, including existing management practices, collaboration, and anthropomorphism. These topics have been incorporated into the literature search and synthesis strategy by which the literature review has been conducted.

2.2.2 Search Strategy for the Literature

This section identifies the strategy by which the literature review was conducted and aligns with the GTM on which this research is based (Dunne, 2011; McGhee et al., 2007). It includes the databases that were searched, the journals that were reviewed, and the inclusion and exclusion criteria for selecting articles deemed relevant to the current AI environment and their applicability to the research question and findings (Webster & Watson, 2002).

The literature search was undertaken across several online databases, including EBSCOhost, and Scopus, to find relevant articles. Quality, peer-reviewed journal articles were also accessed and reviewed for relevant articles to the research questions and findings. Key topics on which the databases and journals were searched reflected the research question's topics, 'How AI was managed?' and the findings of existing management practices, collaboration, and anthropomorphism. This strategy and topics are aligned with the GTM by which this research is conducted.

To ensure a comprehensive and up-to-date review, and to capture the most recent advancements and developments in AI the inclusion criteria for articles considered the recency of publication encompassing a time frame focused on the past five years. The review also thoroughly examined seminal works underpinning AI and management, aiming to comprehensively analyse the existing knowledge landscape.

2.2.3 Synthesis in the Literature Strategy

The literature synthesis in this review has been organised thematically, in line with the research questions and the Grounded Theory findings of the research. The main findings and arguments of the articles have been assessed and documented, highlighting the similarities and differences between them. In discussing the findings and arguments considered, they have been analysed for their strengths and weaknesses and evaluated for their quality of research. The summarisation and analysis of the existing literature related to the research questions and findings of this research will allow for identifying the patterns, trends, and gaps in the existing literature.

2.3 Synthesis of the Relevant Literature

The literature presented in this review is organised thematically (Braun & Clarke, 2006) based on its application to the research questions and findings. The topics on which the literature is presented are AI management, existing management practices, collaboration, and anthropomorphism. The literature is summarized and evaluated, and trends, patterns and gaps are identified.

2.3.1 AI Management in the Organisation

It is widely accepted that AI and its application are being rapidly adopted in many domains and is attracting much attention in business, academia, regulators, and the general public (Berente et al., 2021; Haenlein et al., 2019; Robert et al., 2020). This rapid adoption has led to a growing focus on the requirement to manage AI, with popular topics of academic research on the management of AI including the need to have responsible AI, to ensure AI is explainable, and that the management of bias in AI and ethical considerations associated with the use of AI are considered.

2.3.1.1 AI Explainability

AI explainability (XAI) is a popular topic amongst academics when seeking to understand how AI should be managed. AI explainability is defined as an "action or procedure taken by a model with the intent of clarifying or detailing its internal functions" (Arrieta et al., 2020, p. 84). The function or requirement of AI to be explainable is a popular topic in AI literature and supports the need for AI explainability to facilitate the fostering of trust and understanding in those who use AI. Discussions supporting the need for explainable AI and calling for agreed ways to measure and qualify the techniques for AI explainability have evolved from this requirement. While more nuanced literature discusses the stakeholders to which the AI needs to be explained and notes the differences in requirements and levels of understanding of different groups and skill sets (Silva et al., 2023). Therefore, exploring AI explainability is not only a factor in fostering transparency and trust, but it also involves balancing different stakeholder needs, necessitating adaptable and nuanced measures to accurately convey the workings of AI systems.

The literature offers the benefits of explainable AI as increasing trustworthiness in technology users. Ferrario and Loi (2022) posit that explainability engenders trust in AI and offers a philosophical explanation. Amann et al. (2022) investigate AI explainability in Clinical Decision-making support systems and find that explainability can be valuable if it is technically feasible,

and has a level of validation of explainable algorithms in the context in which it is used and with key user groups. Arrieta et al. (2020) advise that understandability is the critical component of XAI; they state that understandability is the extent to which a human's decision derived from the AI is understandable. However, they note that the literature on XAI does not agree on the goals XAI should achieve, and there is much to be done to unify the literature on the topic. Gunning and Aha (2019) identify the challenges in XAI including how to develop strategies and principles for creating explanations for AI to offer understanding and adequate explanations. While identifying factors required to explain AI, they also investigate the psychological aspects required to ensure that AI is understood. While explainable AI can considerably foster trust and understandability among users, there is an evident need for a unified framework and approach in the literature, addressing the technical and psychological facets of creating explanations that can render AI systems comprehensible to diverse user groups.

The benefits of explainable AI are noted in the existing research, however agreed measures of explainability have not yet been commonly agreed on in the literature. Sovrano et al. (2022) note that present studies focus on classifications to achieve explainability but fail to address how to measure its quality. Earlier research by Gunning et al. (2019) notes the possibility that not all AI needs to be explainable, and comments that evaluation and measures of XAI are still not widely agreed upon; they also note that there is a 'sweet spot' between accuracy, interpretability and tractability that needs to be identified in being able to explain AI outcomes and algorithms. Some research also notes that psychological factors are involved in achieving the explainability of AI. Despite the recognised benefits of XAI, the field is still struggling with establishing standardised measures for its quality and identifying the ideal balance between accuracy, interpretability, and tractability, considering the psychological factors that play into its practical explanation.

The literature notes the different skill sets of those involved with the management of AI and the requirements of XAI may be different across these different stakeholder groups, depending on their skill sets and management levels and their involvement with the AI (Brennen, 2020; Gerlings et al., 2022; Langer et al., 2021; Preece et al., 2018). Rai (2020) observes that AI Machine Learning (ML) professionals can inspect AI models and can explain the AI. However, this complex understanding may not be afforded or valuable for the end user of AI technologies. Different stakeholders of AI may have different requirements and needs for understanding it. AI managers have needs such that "In an organisational context, there are "AI Managers" who, for example, need explanations to supervise and control the algorithm, its

usage and assure its compliance." (Meske et al., 2020, p. 10). The requirements for AI explainability are not uniform but vary among different stakeholders based on their roles, skills, and understanding of AI technologies, thus underlining the need for context-specific explainability that caters to the unique needs of each group, ranging from AI professionals to end-users and AI managers.

In summary, the literature agrees that explainable AI is beneficial to using and managing AI. However, some areas require further investigation and development, including when AI should be explainable, who it is explainable to, and what needs to be explained to different audiences. The literature also calls for the actual measures that will define the acceptability of what is being explained and the quality of the explanation. Reviewing the academic conversation on the explainability of AI, there are many avenues and opportunities for further research.

2.3.1.2 AI Ethics

As the integration of AI technologies into many organisational functions becomes prevalent and its applications extend to innovative domains, it is essential to address the rising ethical concerns surrounding AI's roles and functions. The necessity for comprehensive research focusing on the ethical dimensions intrinsic to AI's development and implementation has become increasingly evident. Consequently, the study of AI management concerning these ethical dilemmas has surfaced as a critical area of inquiry and concern. These concerns underscore the importance of a balanced approach that empowers AI's transformative potential while consciously mitigating potential ethical pitfalls.

The recent literature on the management of AI discusses the guidelines, frameworks, and audit tools available for use in the management of AI regarding the ethical aspects. The operationalisation of these frameworks is also discussed in the literature. However, it is noted that there are inadequacies in this area, and further research into the operationalisation of ethical AI is required. Different applications of AI are reviewed for different ethical requirements. Finally, the literature offers actions that may improve the creation and operation of ethical AI as a solution.

To address these concerns with the ethical use of AI, much attention has been focused on creating and implementing guidelines, frameworks, and audit tools to assist in achieving ethical AI. Hickok (2021) advises that over 100 principles and guidelines have been developed to assist in the ethical use of AI by a wide range of public and private organisations. The ethics of AI functions must be considered to ensure the fundamental ethical principle of preventing

harm or adverse effects on human well-being (Kazim & Koshiyama, 2021). The literature on the guidelines published for ethical AI notes five common principles, which include transparency, justice and fairness, non-maleficence, responsibility and privacy. Again the authors note that details on implementing these characteristics are lacking and still require development (Jobin et al., 2019; McLennan et al., 2020). Another challenge in the literature is that frameworks may be inadequate as they offer considerations, not a complete, operational decision-making process (Canca, 2020).

The ethical requirements of AI may vary from the development stage to the operational stage of AI. The literature notes that current guidelines for ethical AI focus on AI development, not AI operation (Ayling & Chapman, 2022). Further practical and measurable aspects of AI are required to be able to more accurately manage its ethical aspects (Hickok, 2021). However, Morley et al. (2021) note that ethical considerations may be difficult to incorporate into AI algorithm design, noting that AI ethics is no simpler than ethics for humans. Alternatively, Zhu et al. (2022) note the unique characteristics of AI, stating that AI has its agency, therefore raising the question of how to design and develop ethical AI considering this attribute.

The literature also addresses different ethical requirements and considerations depending on the field in which AI is applied. For example, can driverless cars make ethical decisions (Etzioni & Etzioni, 2017)? In the application of AI in health care, the question is asked what ethical issues need to be addressed? (Bartoletti, 2019; Murphy et al., 2021). Kazim and Koshiyama (2021) explore the different aspects of ethics and the predecessor fields, such as digital technology ethics and engineering ethical considerations and philosophies that can guide or ground the development of AI ethics. In the differing and diverse applications of AI, the research raises questions of what the ethical considerations are to be made, and what are the differences required in these varying fields of use.

In understanding the requirement for ethical AI, several researchers offer approaches that may address this requirement. Identifying the multidisciplinary nature of AI ethics and formal education on ethics to be provided by universities to AI studies, they note that ethical skills training may not have been available for AI developers (Borenstein & Howard, 2021; Christoforaki & Beyan, 2022). Mökander and Floridi (2021) have claimed that auditing can assist in bridging the gap, because auditing for unethical aspects in AI can identify the AI functions that are unethical, addressing the issue of the gap between principles and practice of ethical AI. Identifying audits can improve the quality of decision-making and human satisfaction, in theory, according to commentary on the subject. Hagendorff (2022) suggests that specific practices are required for ethical AI, which is more than just frameworks, and

posits a broader question of where AI should even be used and highlights the need for those outside of the AI professions to be involved in determining the ethics of AI. Lauer (2021) states that to have ethical AI you need ethics and explores ethical AI, via the principles of the organisations creating and using the AI. The ethics of AI is derived from the principles of the organisations that are using, creating, and implementing AI. Note that the complexity of organisational ethics plays a role and influences the ethical aspect of the AI in use within the organisation.

It is generally agreed across the literature that there is a need for ethical consideration in the creation and operation of AI. However, there are yet to be detailed strategies and processes that require more guidelines and principles into detailed instructions on how they can be implemented, effectively closing the divide between ethical aspirations and practical implementation. The current challenge in the literature lies in bridging the gap between theoretical discussions on AI ethics and developing tangible mechanisms that enable organisations to incorporate ethical considerations into their AI systems and practices. In reviewing the literature on improving and creating more ethical AI, a growing body of work suggests that humans creating and operating AI are responsible for developing and operating AI ethically. It is through education, culture, and examination of AI that ethical AI can be achieved.

2.3.1.3 AI Bias

Concerns are raised in the literature about the bias that may occur in the AI algorithms and the associated data on which the algorithms are applied (Ntoutsi et al., 2020) and bias in data in AI (Roselli et al., 2019). The literature discusses bias in AI across several disciplines (Ferrer et al., 2021). Bias across various disciplines is researched, including health care (Albahri et al., 2023; Parikh et al., 2019). There is research on disability bias in AI (Whittaker et al., 2019) and in clinical safety (Challen et al., 2019). To address the bias and unfair outcomes of AI, the literature discusses options for managing the bias in AI algorithms. To manage bias, the need for standards for identifying bias (Schwartz et al., 2022), auditing AI for bias (Landers & Behrend, 2022) and the need to address bias in both AI and humans (Silberg & Manyika, 2019) is commonly mentioned.

2.3.2 Existing Management Literature

The current literature on management techniques is significantly mature in its investigation, and many current topics have been presented and understood in academic literature for many decades. So too, is the adoption of these techniques in industry and practice. The accepted

practice of management has led to current academic resources on the topic being related to particular disciplines and industries, and technologies as the academic conversation seeks new areas to investigate and study. The literature on managing via outcomes, the monitoring and measuring and continuous improvement activities that contribute to the management of organisations are presented in this section, further deepening and reflecting on the findings of this research.

2.3.2.1 Management via Outcomes

There is much support in the management literature for the benefits of managing by the results or outcomes that functions in the organisations produce (Beyer et al., 2010; Crawford et al., 2018; Graham et al., 2005; Lombardi & Secundo, 2021). Seminal works also include those by Drucker (2001); Kiessling and Glenn Richey (2004); Swaim (2011). The literature also reviews the outcomes regarding Environmental, Social and Governance (ESG) (Abdul Rahman & Alsayegh, 2021; Arvidsson & Dumay, 2022; Murphy & McGrath, 2013). The benefits of managing via outcomes are also noted in healthcare (Lebovitz et al., 2021). The literature also offers frameworks and measures for managing via the outcomes functions produced (Wholey, 2001).

2.3.2.2 Monitoring and Measuring and Continuous Improvement

When managing the outcomes that are produced, a critical component is the monitoring and measuring of the outcomes (Bititci et al., 2012; Neely, 1999). This research shows that the existing practice of performance measurement is still applicable and used in the management of AI. Accompanying the management practices of measuring and monitoring also includes continuously improving the functions (Bhuiyan & Baghel, 2005; Schroeder & Robinson, 1991). The concept of continuously improving the functions of an organisation is supported in the literature (Ahmed et al., 1999; Irani & Sharp, 1997; Zmuda et al., 2004). Continuous improvement is also supported in the literature to apply to many industries (Bhuiyan & Baghel, 2005; Fryer et al., 2007; Terziovski & Samson, 1999) and offers strategies and frameworks for achieving it (Bessant et al., 1994; Fryer et al., 2007; Schroeder & Robinson, 1991). The results of continuously improving an organisation's functions and practices include the organisation's performance (Khan et al., 2019; Terziovski, 2002) and improved innovation (Bessant & Caffyn, 1997).

2.3.3 Collaboration

Collaboration within organisations between individuals holding different knowledge and skills has been widely acknowledged in the existing literature in the past decades. The literature

demonstrates that collaboration between those holding varied expertise provides value to innovation and problem-solving. There are several definitions of collaboration within organisations that capture these sentiments. Bruner (1991, p. 6) defines collaboration as "an effective interpersonal process that facilitates the achievement of goals that cannot be reached on their own" and "Collaboration involves two or more people engaged in interaction with each other, within a single episode or series of episodes, working towards common goals" Patel et al. (2012, p. 1). The definition of collaboration is widely accepted and adopted, to capture the concept of individuals working together to achieve a shared goal. The literature on collaboration covers various areas, including the skills required to achieve collaboration, the motivation requirements for achieving collaboration, collaboration that is required in creating AI, and the benefits achieved because of collaboration. Concerning AI used in organisations, the literature also shows that collaboration is present in creating AI and can have a positive impact.

2.3.3.1 Collaboration Skills

The literature identifies the skills required by the individual participating in the collaboration to collaborate successfully. These skills are independent of the expertise or domain knowledge an individual can bring to a collaboration. Van Laar et al. (2017) identify the core and contextual skills required in 21st-century ICT skills, including "seven core skills: technical, information management, communication, collaboration, creativity, critical thinking and problem-solving. Five contextual skills were also identified: ethical awareness, cultural awareness, flexibility, self-direction and lifelong learning" (Van Laar et al., 2017, p. 577). These skills were identified from a systematic literature review of 75 articles relating to collaboration.

2.3.3.2 Collaboration for Innovation in Organisations

Collaboration is seen as a critical element for innovation in organisations. In collaborating for innovation, the motivation of individuals and the facilitation are explored, along with the requirement to manage the process. Battistella and Nonino (2012) explore the motivation for collaboration for innovation from the company's and individual's perspectives. The requirements of physical collaboration spaces within organisations to foster innovation and find collaboration spaces require "four affordances of convergence, generativity, socialisation, and collaborative learning." (Caccamo, 2020, p. 178). Greer and Lei (2012) note that much of the research on collaboration notes positive impacts on innovation. However, they also note the opposing perspectives and a requirement to manage the collaborative process.

2.3.3.3 Collaboration Facilitates Learning

Collaboration has a role in increasing learning among individuals. Guo et al. (2020) propose an online learning model for collaborative learning to boost all students' learning levels using AI neural networks. Moreover, Laal and Ghodsi (2012) identify benefits from learning in collaboration in the areas of social, psychological, academic and assessment benefits. Domain expertise and practical knowledge management are explored via collaboration supported by technology, such as the intranet (Barão et al., 2017).

2.3.3.4 Collaboration Improves Problem-solving

Collaboration affords better problem-solving solutions via a greater diversity of skills and experience when problem-solving. A reason for improved problem-solving via collaboration is provided by Graesser et al. (2018), noting that teams perform complex work. Hence between team members, collaboration is a critical element. Hennessy and Murphy (1999) provide a framework for analysing collaborative problem-solving in design and technology and conclude that collaboration is essential to problem-solving as it, in turn, enhances learning. Roschelle and Teasley (1995) investigate how the benefits of collaborative problem-solving are realised and conclude that a framework of shared language, situation and activity is required.

2.3.3.5 Collaboration in the Creation of AI

Recent literature is exploring the existence of collaboration in the creation of AI. Van Den Broek et al. (2021) find in an ethnographic study within a large organisation developing machine learning systems to assist with hiring employees that " developers and experts arrived at a new hybrid practice that relied on a combination of ML and domain expertise." Furthermore, "our study foregrounds their interdependence and shows the dialectic nature of developing ML." (Van Den Broek et al., 2021, p. 1557). Chowdhury et al. (2023) Investigate the organisational resources required to develop AI Human resources management capability. The study finds a diverse set of skills is required, including the "need to look beyond technical resources, and put their emphasis on developing nontechnical ones such as human skills and competencies, leadership, team coordination, organisational culture and innovation mindset, governance strategy, and AI-employee integration strategies, to benefit from AI adoption" (Chowdhury et al., 2023, p. 1). Noting the need for knowledge-sharing via employee collaboration, they suggest that AI and HRM resources are required to create and implement AI HRM tools.

Concluding this literature review on collaboration, the literature identifies collaboration as a positive attribute in organisations regarding innovation, problem-solving, and common goal

achievement. The positive outcomes of collaboration can be facilitated by the possession of specific skills by those involved in the collaboration, and collaboration can be enhanced with process management and physical spaces within the organisations. Drawing these elements, the literature also supports and identifies the benefits of collaboration in creating AI within the organisation.

2.3.4 Anthropomorphism of AI

Current research identifies the relationship that exists between AI and anthropomorphism. Anthropomorphism is the "attribution of human characteristics to nonhuman beings or entities" (Li & Suh, 2022, p. 2245). Original works, such as (Epley et al., 2007, p. 864), state, "Anthropomorphism describes the tendency to imbue the real or imagined behaviour of nonhuman agents with human-like characteristics, motivations, intentions, or emotions." The study of anthropomorphism has increased exponentially in recent years, with 48 studies conducted between 2019 – 2020, contributing 80 per cent of the work on the topic (Li & Suh, 2022). The research identifies both positive and negative aspects identified in the literature of the anthropomorphism of AI by those interacting with it.

The anthropomorphism of AI has become a popular topic of research recently. As the creation and use of AI has increased, so has the assignment of human-like characteristics to AI by those that use it. Li and Suh (2022) conducted a literature review of 55 articles on AI anthropomorphism and found the investigation of the topic was studied predominately via experiments (*n-30*), followed by surveys (*n=14*) and interviews (*n=4*). Their research findings categorised anthropomorphism's consequences into three groups: overall appraisal, intention, and behaviour. The literature review also notes the lack of operationalisation in the anthropomorphism of AI, and in the ability to measure the concept.

A popular area of research in the literature is the positive relationship between anthropomorphism and the use of AI by consumers. The research focuses on the expectations of humans for AI to have human-like characteristics, the positive effects on use, and the willingness of consumers to share personal and private information with AI that they anthropomorphise. Duffy (2003) discusses and highlights anthropomorphism's positive aspects in encouraging the use of social robots. The study notes the issues of robots not meeting the expectations of human's anthropomorphism of them and calls for balance in the creation of robots with human-like qualities. Epley et al. (2007, p. 879) find, "Facilitating anthropomorphism may also increase the usefulness of technological agents by creating social bonds that increase a sense of social connection." Kronemann et al. (2023) reflect on how

anthropomorphism by consumers influences their privacy concerns and disclosure of private information when interacting with AI. Their findings show that the consumers anthropomorphising AI positively affects consumers' attitudes towards the digital assistant and increases their willingness to disclose information.

Some research has covered the attributes of humans and AI influencing the likelihood of anthropomorphising. Blut et al. (2021) developed a model to investigate the relationships between robots resembling humans and increased customer service use, identifying the antecedents and consequences related to anthropomorphism. The study finds that "Customer traits and predispositions (e.g., computer anxiety), sociodemographics (e.g., gender), and robot design features (e.g., physical, nonphysical) are identified as triggers of anthropomorphism. Robot characteristics (e.g., intelligence) and functional characteristics (e.g., usefulness) are identified as important mediators, although relational characteristics (e.g., rapport) receive less support as mediators" (Blut et al., 2021, p. 632). The study supports the role of anthropomorphism in increasing customer use of a service robot. The study notes the limitation of the research conducted in lab settings and survey data and could benefit from qualitative methods for studying customer anthropomorphism of service robots. Furthermore, the research also identifies three attributes of humans that influence their anthropomorphism: that the human is the central being of the universe, that they have the motivation to explain and understand the behaviour they experience, and finally, the desire for social contact. (Epley et al., 2007). Research has shown the characteristics and traits that impact the anthropomorphism of AI.

The literature discussed the consciousness and unconsciousness of individuals anthropomorphising AI. The consciousness or unconscious attribution of human characteristics to AI can occur in the general use of AI. Kim and Sundar (2012) investigate the mindfulness or mindlessness of humans assigning human traits to computers and find that mindlessness anthropomorphism impacts human judgement of the credibility of information. While a significant number of 93 participants who partook in the research were drawn from a student group, their behaviour was assessed concerning a mock website. The study found that the mindlessness of humans in assigning anthropomorphic attributes to technology-led humans to believe the technology was more credible than if they did not assign human traits. The study also noted that better measures for mindless anthropomorphism are sought.

The consciousness and unconsciousness anthropomorphism of AI is also identified in the literature as occurring in research. The anthropomorphism of AI is not confined to those using it. Salles et al. (2020) explore the anthropomorphism of AI concerning ethical impacts while

also drawing attention to anthropomorphism exhibited by academics in AI research and introducing the concept of potential epistemological and ethical consequences of using anthropomorphic language and discourse in academic discussion. This paper raises a unique point: while there are benefits to the general population using anthropomorphic techniques to understand the concepts and adopt AI to gain the benefits it affords. Those individuals involved with AI should be mindful of the difference between human intelligence and AI intelligence, not anthropomorphise AI, or at least be aware of the consequences. The consciousness and unconsciousness of the anthropomorphism of AI can both have positive and negative impacts that need to be managed concerning AI use and research.

Several themes emerge in a review of the current literature relating to the anthropomorphism of AI. Anthropomorphism of AI is a common phenomenon and attribute of human use of AI that is generally accepted amongst the academic community. When humans using AI anthropomorphise AI, they are more likely to use and accept the AI. The increased anthropomorphism of AI facilitates more freely interacting with the AI and provides the AI with more personal and private details. The research suggests that anthropomorphism is because of the complex nature of AI. As AI is not widely understood, assigning human-like traits to the AI allows for acceptance and understanding. The literature also finds that researchers and academics also anthropomorphise AI. Concerns of epistemological and ethical consequences related to those creating scholarly research also anthropomorphising AI are raised. The research calls for academics and researchers to be conscious of the difference between human intelligence and AI and not assign the traits of one to the other.

2.4 Discussion of Literature

This discussion section of this Literature Review interprets the findings of the reviewed literature and offers the implications regarding the research question and findings. Potential directions for further research are highlighted based on the gaps identified in the literature reviewed. The discussion is based on the literature on the management of AI in organisations, current management practices and the research findings relating to collaboration and anthropomorphism.

In discussing the current literature on the management of AI, the topics of the current investigation, including explainability, trustworthiness, and the ability and need for AI to be ethical, receive significant attention. The following section discusses these topics from the literature synthesised in this review. This literature review identifies many areas that still require attention, suggesting that the current literature on AI management is still to reach its

maturity. Many research opportunities remain as the literature and field endeavour to reach a higher level of maturity.

2.4.1 AI Explainability

While it is widely recognised in the academic literature that there are benefits to AI being able to be explained, the literature agrees that the research has not yet reached a point of maturity to be able to advise the precious factors involved in the explanation or the precise details of who, when, and how the AI is to be explained. In understanding the quality of the explanations for the AI outcomes it provides, there is a gap ready to be addressed in the academic literature. Providing these details would also benefit practitioners and regulators alike, by having proven detailed metrics by which to measure the explainability of AI.

Questions remain unanswered in the literature about the need for explainability across different disciplines and functions of AI, or in what situations AI needs to be explainable. Another area identified as requiring attention is the lack of a framework that offers a process for users of AI, either organisations or individuals, to measure or be able to explain their AI, such as at what level, to whom, and when the AI should be explainable. The current literature suggests that explainable AI is not an operatable concept, and further investigation is required.

Can AI be explainable when embedded in enterprise management systems, where the AI is the IP and competitive advantage of the vendor? For example, AI is rapidly being adopted by individuals in the public arena via ChatGPT. This raises the question of what role explainable AI has to play in the public use of AI. It raises questions, such as whether the public understand the mathematical algorithms concepts constructing the AI, and do they even care? Just as many use their car daily without fully understanding the concepts underlying the car's functions, so too they may successfully use AI to assist in many aspects of their lives.

2.4.2 Ethical AI

There is broad agreement that AI should be ethical in its operation to ensure it does not harm. Literature has agreed on a standard set of principles that can be used as guidelines to assist AI in being ethical. The research has not yet been able to agree on tangible methods for the implementation of ethical AI in its creation or operation. An answer may be found to creating further tangible instructions via reviewing areas previously dealing with ethical issues such as digital technology. Also, the answer to how to create ethical AI may be found in the philosophical aspects of ethical principles, such as being mindful and understanding the ethical behaviour and the culture of the organisations using AI. This may also be a starting point for understanding, implementing, and ensuring ethical AI.

2.4.3 Managing via Outcomes, and Continuous Improvement

The literature on management via outcomes and the process of continuous improvement to ensure the organisation's success is widely accepted in the literature across many existing domains and disciplines. However, the literature related to these practices being applied to AI outcomes has yet to be explored in theoretical and practical research. This gap in the literature offers many avenues for exploration and may identify a framework and practical process by which AI may be successfully managed. The potential may exist for the concept to be helpful to both organisations and individuals and is also worthy of further formal academic research.

2.4.4 Collaboration

There are many documented benefits of collaboration between individuals in the organisation to achieve common goals. The literature shows that the creation of AI also benefits from collaboration between different areas of expertise within the organisation. This existing literature supports the findings of the research that collaboration is beneficial to the organisation in achieving its goals and is also valid in creating AI. The findings of this research, expanding these concepts to include the management of AI, can benefit from the collaboration between different areas of expertise. These differing areas include individuals in the organisation with AI expertise and those with the domain expertise to which the AI is being applied.

2.4.5 Anthropomorphism

The discussion of the anthropomorphism of technology is well-recognised in the current literature. The attributes that determine the level of anthropomorphism, the reasons humans attribute human values to technology, and the benefits of anthropomorphism are also identified in existing research.

Anthropomorphism is also discussed concerning AI, and current research identifies anthropomorphism as a factor in AI. Researching robots and technology, Salles et al. (2020) raise a novel issue: those unfamiliar with AI can benefit from assigning human characteristics to it to benefit from it. The use of anthropomorphism in encouraging the adoption and use of general AI has been established in the literature. Areas of future research could explore the use of anthropomorphism in the management of AI and the management of the anthropomorphism of AI, and provide various benefits to the management of AI. However, those closely involved and educated in AI should be aware of assigning human characteristics to AI to ensure that negative impacts are not fostered. An area that can be further addressed is

the management of anthropomorphism to ensure that the benefits are achieved and the negative aspects are minimised.

In the general assessment of anthropomorphic literature, the gaps in the current research include the methodology by which anthropomorphism is studied and the settings in which it is studied. While many of the studies on anthropomorphism are quantitative, there is the potential for further qualitative research to be conducted. Opportunities exist for studies in real-life situations rather than lab environments (Li & Suh, 2022). As no agreed scale or measures of anthropomorphism exist presently, the literature suggests opportunities that exist for a method to be developed by which measurement of anthropomorphism can be conducted. Addressing these gaps in the methods of study and measurement of anthropomorphism could also assist in the anthropomorphic aspects of managing AI.

2.5 Conclusion

To conclude, the main findings of the literature review have been summarised, and the objectives and significance of the research question have been highlighted. Finally, recommendations for future research based on the literature review have been provided. This literature review on how organisations manage their AI technologies has identified the main findings and the current themes in academic literature relate to the research question. The literature on the management of AI currently focuses on AI explainability to support its trustworthiness and acceptance by users. The ethical aspects and the risks of AI being unethical are also much discussed in the current literature.

The objective of this literature review has been to provide insights into the current literature on the topics that relate to and support the overall research question:

How do organisations manage the AI technologies deployed within their organisations?

The review also addresses the four supporting sub-questions:

1. What are the factors involved in managing AI technologies?
2. What are the relationships between the factors in managing AI technologies?
3. Who is involved in managing AI technologies in organisations, and what is their role in the management process?
4. What are the facilitating and inhibiting influences on the factors and relationships in managing AI technologies?

Answering the central research question and its four sub-questions will provide significant insights into managing AI technologies' rapidly expanding and changing domain. These insights provide a range of new opportunities, including offering a practical framework for managing AI in organisations that can be implemented and potential areas for further research.

Recommendations for future research and exploration based on this review include detailed and practical processes and measures that can be used to operationalise AI in organisations and to manage it. The current topics associated with AI management identify attributes that AI should possess or not possess to avoid the risks associated with AI, such as explainability, bias, ethics, and trustworthiness. However, AI management literature has yet to offer straightforward methods for managing AI. Few studies provide how these attributes should be managed to ensure they are achieved or avoided. The actual measures and processes that would allow these concepts' to be operational have not yet been identified in the literature.

Conversely, academic literature on the traditional management practices of governance, management, and control have reached maturity and are widely accepted and proven in academia and industry. There is a gap in the literature and opportunity for research to investigate the application of traditional management techniques, procedures, and practices to the management of AI to understand if these existing practices will also allow for the successful management of AI technologies and address the concerns the literature has identified regarding AI on explainability, ethics, and bias.

The literature supports the research findings that the functions and process of existing management practices, collaboration, and anthropomorphism can offer value in managing AI use in organisations. However, the literature also notes that these functions and processes, if applied or carried out incorrectly, can cause poor outcomes. Hence, they must be conducted appropriately, and attention must be focused on good execution of them. This is even more important when applied to AI as AI affords incredible speed and broader reach in its application and outcomes. The consequences of failing to execute these management functions and processes when applied to AI can be widespread and occur in minimal timeframes.

Concluding the current research into the management of AI across the topics of explainability, ethics and bias is yet to research their maturity and offer practical solutions to the management of AI in organisations. However, existing management practices have researched maturity and have been justified across many industries and practices.

Chapter 3 Methodology

This third chapter of the research thesis identifies, justifies, and details the method by which this research is conducted. This chapter follows Chapter 1, the introduction to the research, and Chapter 2, the literature review, which presents and discusses the current and relevant literature. This chapter precedes Chapter 4, the data analysis chapter, which presents and analyses the data. Chapter five, the discussion, offers the research findings and is followed by Chapter 6, the conclusion, which identifies the contributions of this research.

3.1 Introduction

This methodology chapter presents the approach and philosophical paradigm adopted in this research. The chapter includes the research method utilised to obtain the data and the theory by which the data is analysed. The research procedures are detailed, advising how the research was conducted, including the environment in which it took place and the selection of the participants. The data analysis approach and the software tools used are detailed and presented. The validity and ethical considerations of the research are presented.

The research approach adopted in this study is qualitative with an interpretive research paradigm. The qualitative approach uses Grounded Theory methodology to analyse the data and build a theory of AI management in organisations. The environment in which this research was conducted is confined to organisations operating AI, and the data for analysis was collected via unstructured interviews.

Participants in this research were AI and or domain professionals and divided into three categories: executive managers, middle managers, and individuals responsible for using AI within the organisation. Participants were recruited using the researcher's professional network and snowball techniques. The selection criteria for participants were based on a theoretical sampling process, sampling individuals who manage the AI technologies used within the organisations with which they are associated as employees, owners, or contractors.

Using the Ground Theory Method (GTM), the data were analysed using the principles of open, selective, and theoretical coding and memo-ing techniques. These GTM coding techniques and processes were then used to identify the factors and relationships to build a theory from the data analysed, an important and fundamental feature of GTM. This chapter concludes by presenting the validity of the research data and detailing the ethical considerations undertaken as part of this research.

3.2 Research Paradigm and Methodology

The philosophical assumptions by which this research has been designed are those of an interpretive paradigm. The research was based on an epistemology of interpretivism, supported by an ontological approach of subjectivity and a qualitative methodology. The interpretive epistemological position strives toward understanding phenomena in its social setting, in "understanding the deep structure of the phenomena" (Orlikowski & Baroudi, 1991, p. 5). The ontology of subjectivity (Burrell & Morgan, 2017) assumes that "reality is a social construct" (Urquhart, 2012, p. 59). The qualitative methodology, in terms of utilising Grounded Theory, was used to gain an in-depth understanding of the topic, thus facilitating the inductive approach. Grounded Theory provided a "Chain of Evidence" (Urquhart, 2012, p. 159), via first-level codes, second-level codes, and theme and relationship identification. This research approach and paradigm created the foundation for qualitative research to be rigorously conducted (Klein & Myers, 1999; Sarker, Xiao, Beaulieu, & Lee, 2018b; Walsham, 1995).

The research philosophies used in studying organisations and Information Technology (IT) are often based on an interpretive paradigm. Interpretive research is a popular paradigm in Information Systems Research (Walsham, 2006), and an appropriate approach when studying Information Systems and organisational processes (Myers, 1997). This philosophical position was chosen for the paradigm's suitability for investigating how organisations manage the AI they operate, and to reflect the philosophical beliefs of the researcher.

Qualitative research methods were employed in this study to be commensurate with the research approach. They produce "findings not arrived at by statistical procedures or other means of quantification" (Strauss & Corbin, 1998, p. 10), as they are based on data collected from interviews with participants, documents and participant observation (Myers, 1997). The qualitative method adopted here provides benefits by investigating social processes and behaviours, identifying new insights, discovering new phenomena, and developing new theoretical accounts (Bansal, Smith, & Vaara, 2018; Sarker, Xiao, Beaulieu, & Lee, 2018; Sarker et al., 2018). The qualitative approach of this research is justified in that it identified AI as a new phenomenon and aimed to gain new insights into how AI is used in the social process of management.

Qualitative research methods have grown in popularity and maturity in information systems research since Orlikowski and Baroudi (1991) first called for the diversification of research methods in Information Technology (IT) research. More recently, Cecez-Kecmanovic et al. (2020) have continued the call for qualitative research in IT to understand this complex

phenomenon. Due to this phenomenon's new, complex nature, a qualitative methodology was chosen for this research into the management of AI technologies in organisations. This new phenomenon included social constructs of management interacting with new technology.

Grounded Theory was adopted in this research for data analysis and theory construction (Glaser & Strauss, 1967, 2017), and provided the framework for the data collection (theoretical sampling), data analysis (coding), and the method by which the research findings emerged to create a new theory. Grounded Theory is defined as a method of generating theory through systematically analysing data (Glaser & Strauss, 2017), and is a valuable, increasingly used model in Information Systems Research (Urquhart and Fernández, 2016; Wiesche, Jurisch, Yetton, and Krcmar, 2017). Articles in the top Information System journals that use GTM are quoted more often on average than those that have used other theories (Wiesche et al., 2017).

There is a great deal of support for using the Grounded Theory as a useful method for theorising and for studying IT: it is fundamentally used for developing a theory, not testing a theory (D. F. Birks, Fernández, Levina, & Nasirin, 2013). Grounded Theory is “Firstly useful where no previous theory existed. Second, it incorporated the complexities of organisational context into understanding the phenomena. Third, Grounded Theory was uniquely fitted to studying, process and change.” (Urquhart & Fernández, 2016, p. 457). It has been used successfully in Information Systems research, and should therefore contribute to Information System theories (Urquhart & Fernández, 2016). Grounded Theory “works well with Information Systems, which are defined as actor-networks of technology and people “ (Lehmann, 2010, p. 1). Cecez-Kecmanovic et al. (2020) identify Grounded Theory as popular in IT research and different research methods. Grounded Theory is also noted as flexible, compatible and valuable in the socio-technical field of Information Systems (D. F. Birks et al., 2013). Given these attributes of Grounded Theory and the requests for a theory in the new field of AI management, where no previous theory exists, Grounded Theory is chosen for this study.

3.3 Research Procedures

This section identifies the procedures and processes used to conduct the research: the data collection, preparation, and analysis. The data collection identifies the environment from which the data will be collected, the participants and the research selection process. This is followed by the method by which the data will be obtained from the participants in the specified environment. The data analysis process details the data preparation and analysis of

the data. The software technologies used in the data collection and analysis are also identified, detailed, and discussed.

3.3.1 Environment

The environment in which this study took place is within the organisations that use and manage AI technologies to assist with the organisation's function. No limitations were placed on the type of organisation, industry, AI type or purpose of the AI that the participants managed within the organisation. This study's scope includes organisations operated within Australia by global, regional, or local entities. The organisations included in the scope include public and private entities. All sizes of organisations, industries, and AI applications were sought to participate in this research. Other than an Australian representation and the use of AI, no limitations were placed on organisations that operated or managed AI.

3.3.2 Participants

The participants in this study were those involved with managing AI within the organisation with which they are associated, and were selected for their direct involvement with managing AI technologies in their organisation. Participants who did not have a direct role or experience in managing or being involved in the operations process of AI were included in the study. The participants can be classified into three identifiable groups: executive managers, middle managers, and individuals directly managing AI.

Participants involved with the management of AI were established in the initial communications before an interview was offered. This ensured the effective use of both the researcher's and the potential participant's time (as shown in Appendix B). If a participant was incorrectly accessed due to the interview, the participant was deemed not to be directly involved with managing AI technologies in organisations. In this case, the interview was removed from the research. However, if the information provided was not used in the research, it was handled according to the participant's consent.

Participants were recruited from the researcher's professional network via the social media platform 'LinkedIn', and some snowballing techniques, where one participant recommended another participant (Parker, Scott, & Geddes, 2019). Participants were contacted via email or 'LinkedIn' message. The recruitment plan and strategy were to connect with potential participants via phone, email, or messenger technology. Once preliminary communication was established, and the participant indicated they wished to be involved in the research, further communication established a mutually agreeable time and technology for the interview. As this is a qualitative study, approximately 30 - 45 participants were recommended to reach data

saturation (Perry, 1998). Approximately 30 – 40 participants were sought for the study or until data saturation was achieved.

3.3.3 Data Collection

This section details the processes undertaken to collect the data used in this research. Including the process of gaining the consent of the participants, the interview method, techniques, and technology used. The data preparation processes engaged are presented that allow for data analysis. The theoretical sampling process undertaken in selecting the following participants in the research is also provided. The data collection and analysis have been conducted simultaneously in an iterative process of data collection and analysis (Glaser & Strauss, 2017).

The majority of the data collected in this research took place during the COVID-19 global pandemic, which was declared via the World Health Organisation (Cucinotta & Vanelli, 2020) and subsequent Australian and NSW Government policies of restriction enacted in response to the pandemic (Storen, 2020). Due to this, interactions and data collection with most participants occurred online via various technologies that may not have been otherwise adopted. These online activities ensured that the research followed the government's restrictions. The technologies adopted, and the processes used are documented in the following sections and deal with obtaining the participant's consent, and conducting the interviews online. The process followed to collect the data can be found in Figure 3-1 The Data Collection Process.

Participant Consent

The participant's consent was sought following the ethical requirements of this research. Participants consented to have the information they shared before the interview was conducted. Due to COVID-19 restrictions, consent was provided via an online agreement. The pre-consent research information emailed to potential participants can be found in Appendix C. The online consent form was created in the Qualtrics software to facilitate the COVID-19 requirements. The consent form can be viewed in Appendix D. The design logic and flow of the form are provided in Appendix E. If the participants requested a copy of the consent form, the author emailed a copy to their specified email address, as shown in Appendix F. The list of de-identified consenting participants that have taken part in this research is located in Appendix H.

Interviews

Unstructured interviews were used for the data collection in this research. Unstructured interviews were chosen as the data collection technique for their ability to provide rich data for analysis. Myers and Newman (2007, p. 23) claim that "the qualitative interview is a powerful research tool. It is an excellent means of gathering data and has been used extensively in IS (Information System) research". For these reasons of acquiring rich data and providing an in-depth understanding of the topic, unstructured interviews were selected. Unstructured interviews allowed the participants to discuss what topics were important to them, and what came to mind when asked how they manage AI in their organisations. Unstructured interviews align with the inductive nature of this research, allowing the Grounded Theory codes and themes to emerge from the interview. "Key concepts to surface, instead of being deductively derived beforehand" (Wolfswinkel, Furtmueller, & Wilderom, 2013, p. 46).

Zhang and Wildemuth (2009, p. 240) summarise unstructured interviews as "where the researcher comes to the interview with no predefined theoretical framework and thus no hypothesis and questions about the social realities under investigation". The purpose and advantage of the tool for research is that it will uncover undefined themes, concepts, and relationships. Zhang and Wildemuth (2009, p. 240) advise, "No hypothesis should be made beforehand, and the purpose of the inquiry is theory development, rather than theory testing" when undertaking an unstructured interview. Thus, unstructured interviews were adopted to facilitate theory development on how AI is managed in organisations.

Unstructured interviews were started with the statement which aligned to 'How are you managing your AI technologies? How do you know the AI is performing as you expect?'.[2]

Preparations for the interviews also involved the creation of an aide-memoire. An aide-memoire (aid to the memory) is a document to be used as a guide rather than proposed interview questions. An aide-memoire was created to assist in interviewing, facilitate the conversation and encourage the participant's responses if required. The aide-memoire contained popular topics regarding AI in the current academic and industry environment. The aide-memoire was used only in a few instances for support at the end of the interviews to

[2] The researcher has had a previous career in the management of Information systems in organisations and is familiar with the participant's concepts, jargon, and environment.

assist the participants in recalling any other topics they wished to discuss. A copy of the aide-memoire used in this research is provided in Appendix I.

The majority of interviews with participants were conducted via video conferencing technologies such as Zoom, Google Meet or Microsoft Teams[3] while the COVID-19 restrictions were in place, as advised by the Australian government (Cucinotta & Vanelli, 2020; Storen, 2020). If interviews were conducted when COVID-19 restrictions were removed, several interviews took place in person or in public areas such as an organisation's office or café. All interviews were audio recorded on a laptop and a mobile phone. The two devices were used to ensure redundancy via the alternate recording device in case of a device failure. The dual recording of interviews was conducted for in-person interviews, and interviews were conducted via video conferencing software.

The audio recording allowed for the interviews to be auto-transcribed. The auto-transcription was facilitated via various transcription software. The transcription software used to transcribe interviews from audio to written data was first performed via Google Meet software, using transcribing software. Various transcribing software was used as the transcribing software quality advanced during the data collection period. The final interviews were conducted in Microsoft Teams, and the accompanying transcription offering was used in the software.

Data Preparation

The interview data (audio) was captured via audio recording and auto-transcription. The transcription of the interview was manually checked against the audio recording of the interview by the author. Interview transcripts were de-identified and assigned a reference number. Once the transcript accurately represented the interview and audio file, the data was loaded into the NVivo coding software used in this research. The audio file of the interview, consent forms and transcription were copied to a secondary location to be used as a backup, and stored as per UTS data storage policies and procedures. All files relating to the research were password protected, backed up and stored in the UTS OneDrive Cloud. Once the research

[3] Due to the span of time of data collection, there was significant and rapid advancement of video conferencing and transcription software due to the COVID-19 pandemic due to the requirement for many people globally to interact online. As improvements were made by the various software vendors, the software that was chosen to capture the data was changed to take advantage of these improvements.

was completed, the UTS STASH database archived all audio files, interview transcripts, and memos.

Theoretical Sampling

As detailed in GTM, identifying and selecting the next participant in the research was based on a theoretical sampling approach (Glaser & Strauss, 2017). Theoretical sampling is understanding the data collected and selecting the resultant data collection from the participant differentiated from those interviewed previously. Theoretical sampling assists in allowing the findings to be generalised. An approach of maximised sampling was undertaken to ensure the diversity of data (Urquhart, 2012, p. 65).

To achieve the data differentiation requirement, data were obtained from participants with different demographics, gender, industry, AI application, management levels, and differing types of AI to collect a broad range of data. Theoretical sampling was undertaken after the first interview to select the second interview participant, and occurred until the 30th interview was conducted and data saturation in data collection was achieved (Saunders et al., 2018).

Theoretical Saturation

Data collection ceased when theoretical saturation was achieved. Theoretical saturation is reached when no new findings, codes or relationships are obtained from the most recent data collected (Gerlach & Cenfetelli, 2020; Urquhart, 2012). Theoretical saturation was tested for after open (first level) coding for each interview transcript, as depicted in Figure 3-1 Data Collection Process.

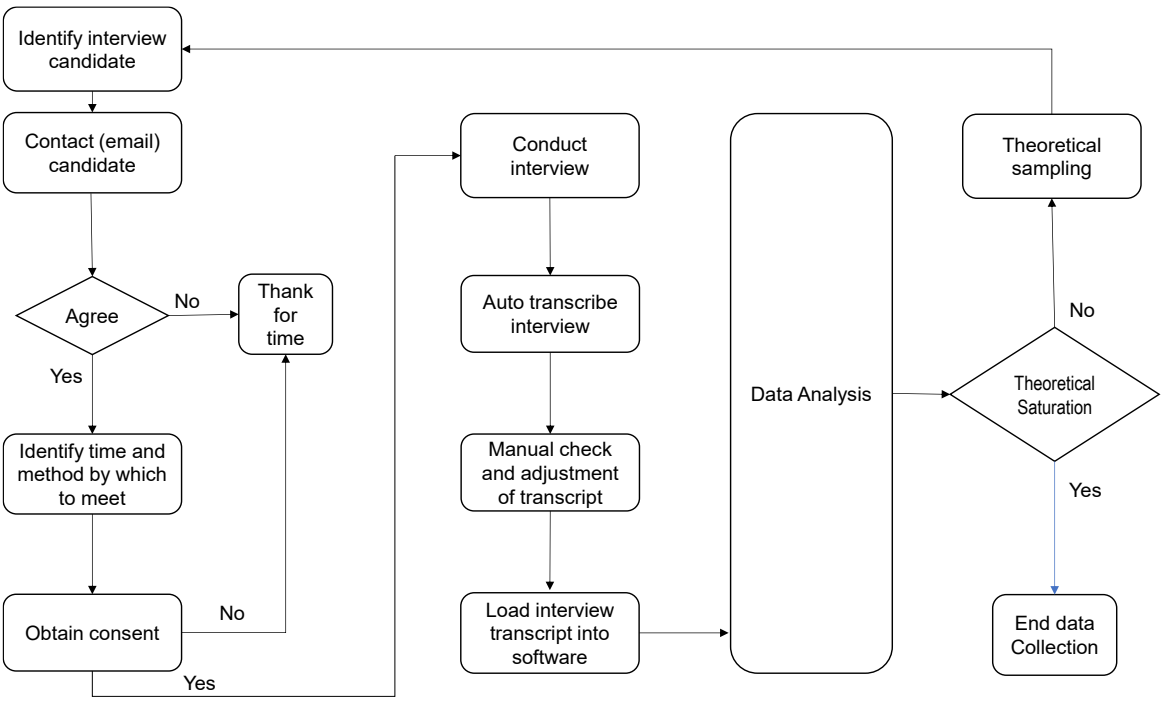


Figure 3-1 Data Collection Process

Source: (Glaser & Strauss, 2017; Urquhart, 2012)

3.3.4 Data Analysis Techniques

This section describes the techniques used to analyse the data collected from the participants in this research. The Glaserian approach to coding in Grounded Theory is described, and the three levels of coding and memo-ing are articulated (Glaser, 1978). The constant comparison of previous and present coded data is also explained. The deduction of the relationships, propositions and theory development is detailed to complete the description of the method of data analysis. A diagram of the data analysis process undertaken is shown in Figure 3.2 Data Analysis Process.

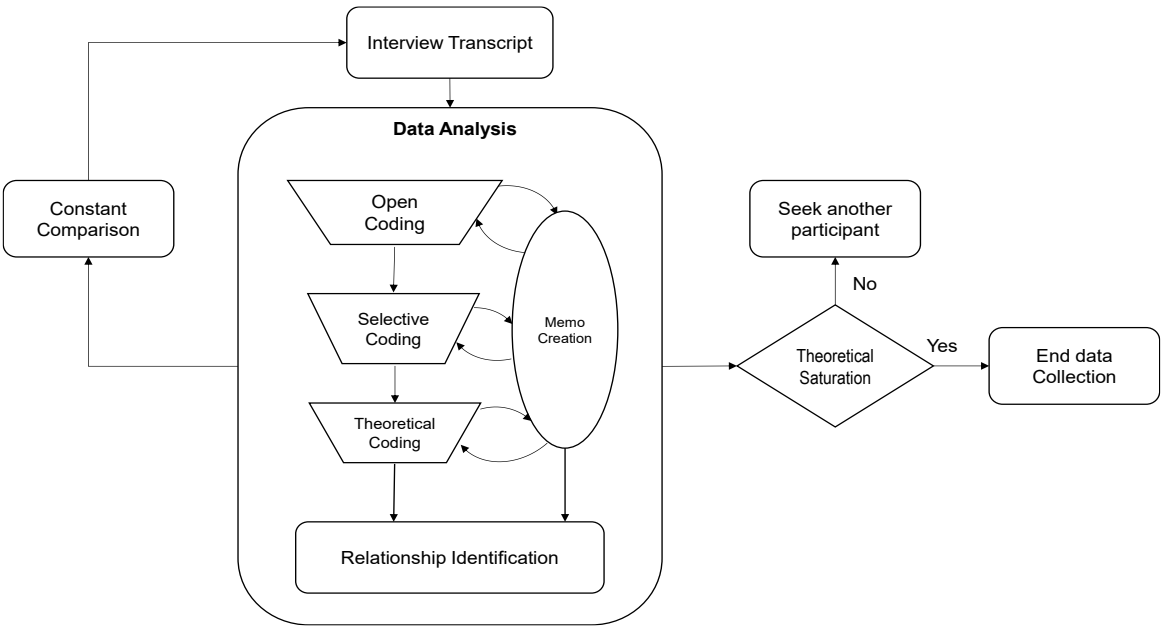


Figure 3-2 Data Analysis Process

Source: (Glaser & Strauss, 2017; Urquhart, 2012)

Glaserian Coding -Grounded Theory

The Glaserian method was used as the framework for coding the data. The three phases of Glaserian coding are open (first-level) coding, selective (second-level) coding, and theoretical coding (Gerlach & Cenfetelli, 2020; Glaser, 1978; Urquhart, 2012). These three coding stages are executed and accompanied by memo writing to capture the researcher's thoughts, inklings, and reflections (Urquhart, 2012). Following the guidelines for Grounded Theory use in Information Systems as advised by Urquhart, Lehmann, and Myers (2010), the steps of constant comparison, theoretical sampling, and theoretical integration were followed in applying Grounded Theory to this research. The Glaserian coding process was adopted to ensure the full benefits of Grounded Theory were obtained.

Open Coding

Using the Glaserian Grounded Theory approach to coding data, open coding was the first step in analysing the data. Open coding was conducted at the word and sentence level. Each word or sentence was analysed to determine the concept conveyed. A code was created or assigned to the word or sentence reflecting the topic of the word or sentence. Memo-ing also occurred at this stage of data analysis. The first level of coding and all subsequent levels of coding and memo-ing were captured in the NVivo Software.

Memo-ing

The process of memo-ing took place to capture the thoughts of the researchers during the coding process and to assist with the data analysis. Memo-ing is the researcher's creation of memos, a process known as memo-ing. Sentiments from the interview, relationships and thoughts of the researcher were captured in these accompanying memos. Memo-ing is a valuable technique in Grounded Theory and qualitative research (M. Birks, Chapman, & Francis, 2008). To facilitate memo creation and storage, the NVivo software was used.

Constant Comparison

Constant comparison is comparing previous and newly collected data (Hallberg, 2006). Constant comparison is the Grounded Theory technique of constantly comparing the previous data collected and coded with the newly collected data and coding to ensure that the data coded is constant with the previously coded data (Glaser & Strauss, 2017). Urquhart (2012, p. 192) describes the constant comparison process as "the act of comparing one piece of data you have attached a concept to with another piece of data you have attached the same concept, in order to see if it represents the same concept". Glaser and Strauss (2017) suggest constant comparison can be performed in a four-step approach of comparing categories, integrating categories, delimiting, and writing the theory.

In this research, constant comparison was conducted by reviewing the existing categories before a new category or code was created as part of the open coding process. After each of the five interviews, all the data attached to each code were reviewed and compared to ensure it was consistently on the same topic. The constant comparison of coded data was then used in identifying the relationships and creating the propositions and theory.

Selective Coding

After the data was coded at the first level, the first level, the open codes were reviewed and grouped into similar or related topics (Glaser, 1978; Glaser & Strauss, 2017). These related topics were named and form the second-level or selective code. Memo-ing was also used to confirm the intent or sentiment related to the code to assist with the grouping. After every five interviews, the codes were also reviewed to assess if they could be grouped into any related categories of related groups. Selective coding was completed and recorded in the NVivo software.

Theoretical Coding

Theoretical coding occurred with the selective (second) level codes grouped into similar topics and assigned a summarising code (Urquhart, 2012; Urquhart et al., 2010). All selective codes created in the Glaserian analysis were grouped into summarised groups to form the theoretical codes (Glaser, 1978). The theoretical codes were then used to identify the themes in this research. The theoretical coding was also subject to a constant comparison process to ensure the consistency and accuracy of the analysis. Some memo-ing also took place at this phase of the data analysis to capture thoughts of the research. The Theoretical coding process and recording of the theoretical codes also occurred in the NVivo software.

Relationships Identification Between Themes

The relationship identification between codes was facilitated by identifying sections from interviews referencing a relationship (Glaser & Strauss, 2017; Urquhart, 2012). Relationships in the data were first analysed within the interview and then between the interviews (Eisenhardt, 1989). A memo was created to capture the identification of a relationship in the data. In the constant comparison of the memos and recorded relationships, relationships between themes in the data were identified. The coding and recording of the relationships identified contributed to creating the theoretical framework of how organisations are managing their AI. Relationship identification was undertaken using Memo-ing in the NVivo software and coding relationships in the software.

Theory Development

In the use of Grounded Theory, *"*rigour and credibility should stem from full and reflexive interrogation of the data in order to allow theory to emerge, rather than succumb to the temptation to prematurely test underdeveloped or descriptive accounts of the phenomena under study" (Goulding, 1998, p. 56). The theory proposed in this research was created from the relationships and themes identified in the data analysis process, allowing the theory to emerge from the data set. The development of the theory was approached with no preconceived concepts or relationships (Eisenhardt, 1989). Following the direction of Strauss and Corbin (1994), *"*A theory is a set of relationships that offer a plausible explanation for the phenomena under study*"*. The relationships between the themes were compiled and mapped. The mapped relationships and themes were presented in a pictorial form, allowing the theory to emerge from the analysed data. The diagram of the theory offers a plausible explanation for the management of AI in organisations, as drawn from the data.

Proposition Creation and Theoretical Integration

This proposition creation and theoretical integration process is derived from Eisenhardt (1989, p. 533). The creation of propositions was derived from the relationships identified in the coding process in the data analysis. The relationship was transformed into a proposition statement that reflects the actions of the relationship identified from the analysed data. The propositions are supported by evidence from the analysed data. (Gerlach & Cenfetelli, 2020; Urquhart, 2012).

The propositions drawn from the data analysis were then identified and supported by comparison with existing literature to achieve theoretical integration. Following the identification of existing literature pertaining to the proposition, existing theories related to the proposition were identified and used to integrate the proposition theoretically. The existing literature was integrated into the findings and was utilised to extend the emerging theory into the current literature. In this process of integrating the proposition with existing theories, the proposition is enfolded in the literature (Eisenhardt, 1989). This process is shown in Figure 3-3 Proposition and Theory Creation Process.

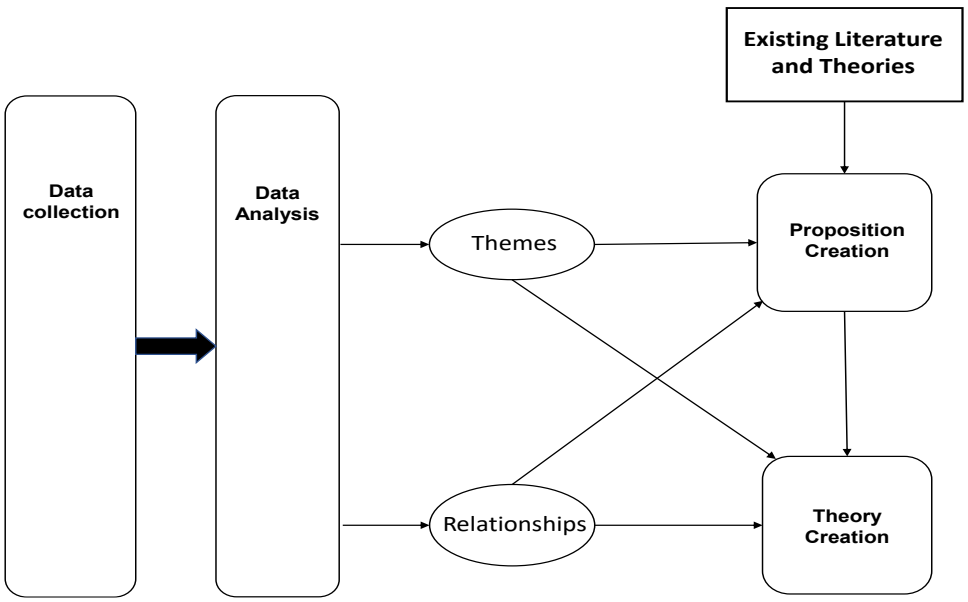


Figure 3-3 Proposition and Theory Creation Process

Source: Eisenhardt (1989); Urquhart (2012)

3.4 Reliability and Validity

This section outlines the steps this research took to ensure that the chosen research method draws valid and reliable conclusions. To reduce the potential for bias and to ensure that the findings are trustworthy, several methods were incorporated into the research design to establish reliability and validity.

Reliability

Reliability in qualitative research refers to the consistency and stability of the research findings. To ensure the reliability of the research, the methodological approach of data saturation was deliberately designed and implemented in the research. This approach helped to enhance the trustworthiness and dependability of the research findings by ensuring the data was thoroughly saturated, and multiple data sources or methods were used to collaborate and validate the findings.

Data saturation was pursued during data collection to ensure that the findings were consistent and dependable. Saturation is achieved when no new information is obtained during subsequent interviews or when further interviews confirm previously identified information (Charmaz & Belgrave, 2007; Saunders et al., 2018). The saturation of the data was used to assist in establishing the reliability of the research.

Validity

Several methodological actions were undertaken to enhance the validity of this research and ensure an accurate representation of AI management in organisations, including internal validation via the data collected and external data validation with theoretical sampling. The validity of the research was also strengthened with the use of theory triangulation, offering credibility to the research.

Internal validity was achieved by using evidence from the collected data in quotes from the analysed data (Eisenhardt, 1989). To further validate the findings of this research, quotations from the data were used to support the relationships and propositions identified, with evidence used to verify and validate the propositions (Glaser & Strauss, 2017).

Theoretical sampling was used to ensure the external validation of the study (Creswell & Miller, 2000; Glaser & Strauss, 2017). Participants were selected from different environments involved in managing AI in organisations, including data collected from participants in various organisations, management levels in the organisations, applications, and types of AI being managed. This method is also referred to as data triangulation.

In addition, to strengthen the research's validity, identifying existing proven theories that supported the propositions from the research findings were used. Using existing theories to support the research findings is also known as theory triangulation (Charmaz, 2014; Creswell & Miller, 2000).

3.5 Ethical Considerations

This section discusses the ethical considerations provided for this research. Ethical considerations were undertaken in this research's creation, planning and performance. To ensure there was no harm to participants, informed consent was provided to participants in the research, participants' privacy was respected, and participants were not deceived (Walsham, 2006). To ensure these ethical considerations were addressed in this research, participants were provided with detailed information on the research being conducted (Appendix B).

The ethical risks related to this research have been considered for the people and organisations partaking in the study. All participants completed the consent document before participating in this research (Appendix C). While the research was deemed low risk, the risks associated with the project were identified, documented, and mitigated as required by the University of Technology Sydney's Human Research Ethics Committee (HREC).

The University of Technology Sydney ethics approval process was undertaken to ensure ethical research. The UTS Ethics Committee process deemed this a low research risk. Ethics Application ID ETH20-4586 was completed and submitted for review by the University of Technology Sydney's ethics committee. The committee reviewed this research, assessed it as low-risk, and approved it. See **UTS HREC REF NO. ETH20-4586** (Appendix J). Following this approval, the research was undertaken to meet the University of Technology Sydney's policies and guidelines. This ethics application was also updated and reapproved to reflect the social distancing requirements enforced by the Australia Government due to the COVID-19 pandemic in the years 2020 and 2021.

3.6 Conclusion

This methodology chapter presented the research approach, paradigm, method, and procedures by which this research was undertaken. The participants and the environment in which they operate were identified and scoped. The data collection strategy identified and the method by which the data was analysed were outlined and defined. The process by which the analysed data was then used to propose a Grounded Theory was identified, and the approach to ensure the study's validity was identified. The ethical considerations given to this study were discussed. The following chapter describes and provides the demographics of the data collected, and analyses the data following the method and techniques described in this chapter.

Chapter 4. Data Analysis

This chapter presents the data obtained via this research and provides the analysis and findings to address the research question, and it is the fourth of five chapters in this thesis. This chapter is situated between the Methodology chapter and the Discussion chapter. The proceeding Methodology chapter identified, justified, and detailed the method used in collecting and analysing the data presented in this chapter. Chapter 5, Discussion, examines the result of the data analysis in relation to the existing literature and discusses the findings in terms of the research question. Chapter 6, the Conclusion, identifies and discusses the implications, limitations and areas for future research. This data analysis chapter provides an overview of the data collected in this research and the analysis of the data. The analysis of the data and the results identified provide the propositions and a proposed theoretical framework related to the research question and sub-questions as presented in Chapter 1, the Introduction. In addition, existing literature related to the study is discussed in Chapter 2, the Literature Review.

4.1 Introduction

This chapter's objectives include presenting the data collected, documenting the data analysed using Grounded Theory, and answering the research question. The following chapter is presented in five sections. Firstly, an overview of the data offers the participants' demographics via four views: the interviews conducted, the participants, the AI participants managed, and the demographics of the organisations that employed the participants. Following the demographic description of the data and participants, the Grounded Theory analysis of the data is presented in the forms of the first and second levels of codes identified, followed by the themes and relationships derived from the codes and memos. The conclusion to the chapter is then offered, answering the research questions.

4.2 Data and Demographic Information of Participants

The following section identifies the characteristics of the data collected in this study via four aspects: the interviews, the participants, the organisations in which the participants are employed, the AI technologies with which the participant work, and the demographics of the organisation they represented. Demographic characteristics displayed have been modelled on those used by Mikalef and Gupta (2021). The demographics are presented in the chapter to describe the data, not to predict or identify patterns, as the participants were selected purposefully for their diverse nature (Glaser & Strauss, 2017; Urquhart, 2012).

4.2.1 Interview Characteristics

The data for this research was obtained via 30 interviews with 30 independent participants. An unstructured interview format was adopted for all interviews, as discussed in Chapter 3. The data collection yielded 195,640 words, totalling 364 pages of interview transcripts. The interviews were conducted over 21 months, from November 2020 to July 2022. The duration varied, from the shortest lasting 17 minutes and 35 seconds, to the longest at 1 hour and 39 minutes. The maximum number of words for an interview was 13,038 words, and the shortest yielded 1,453 words. The average interview was approximately 46 minutes in length. The average number of words per interview was 6,380 words. Coding was undertaken on the interview transcripts, with the number of unique codes per interview ranging from 21 to 61, with an average of 36 unique codes identified. The total number of references coded per interview ranged from 42 to 200, with an average of 95 coded references per interview. Details of each interview can be viewed below in Table 4.1. Interview Characteristics.

(N=30)

Interview	Date	Duration	Words	Codes	Code References
01	20210115	1:01:17	11,011	54	184
02	20210205	0:17:35	2,233	34	89
03	20210312	0:33:56	4,488	26	66
04	20210324	0:53:03	7,323	37	98
05	20210329	0:41:03	4,834	29	84
06	20210416	1:00:18	5,200	30	67
07	20210511	1:39:48	8,220	29	72
08	20210706	0:38:29	12,069[4]	23	52
09	20210709	1:09:15	13,038	26	200
10	20210811	0:26:02	5,177	37	77
11	20210913	0:25:43	6,154	39	65
12	20210915	0:45:10	8,349	46	122
13	20211126	0:57:01	7,986	48	99
14	20211203	0:56:39	8,923	52	142
15	20220314	0:58:11	12,057	30	83
16	20220405	0:46:05	5,877	49	126
17	20220408	0:54:41	8,605	47	135
18	20220419	0:44:30	2,954	28	60
19	20220420	0:45:51	6,379	26	53
20	20220510	0:36:01	4,429	44	81
21	20220518 2 pm	0:31:28	3,342	31	83

[4] Note Interview 7 duration was significant because it has a lower word count than interview 8, which has a shorter time duration and greater word count. This is due to a difference in the level of English language between the two participants.

22	20220518 4 pm	1:03:35	6,125	31	57
23	20220520	0:34:56	2,341	21	42
24	20220523	0:57:57	8,773	43	123
25	20220524	0:28:53	3,709	21	89
26	20220527	0:33:23	4,549	26	72
27	20220522	0:32:41	2,995	23	80
28	20220701	0:34:22	1,453	30	50
29	20220708	0:50:52	6,440	56	136
30	20220729	0:53:48	10,607	61	174

Table 4-1 Interview Characteristics

Source: Research Interviews

4.2.2 Participant Characteristics

The participants in this research are described by management level and gender. An equal number of males and females across three levels of management (Executive, Middle and Individual) participated in the research. Theoretical sampling provided an equal number of managers at each management level and an equal number of males and females, as shown below in Table 42 Management Level and Gender of Participants.

		(N=30)
Management Level	**Males**	**Females**
Executive Manager	5	5
Middle Manager	5	5
Individual (no people mgt)	5	5

Table 4-2 Management Level and Gender of Participants

Source: Research Interviews

The participant's ages ranged across categories, from 20 – 60 years, with the majority (13 or 43%) in the 40 to 50 years old category. The interviewee's experience with AI ranged from one year to more than ten years. Most interviewees (18 interviewees, 60%) had four years or more experience with AI. The fields where the participants held their skills are categorised into domain or AI skills. Many participants managing the organisation's AI held skills dominant in the domain area (17 or 56%). The domain area of the organisation is one not associated with technology or data science but the area to which the AI was being applied, such as customer service, sales, or marketing. The participant's education levels ranged from no tertiary education to holding doctoral degrees. Most participants held bachelor's degrees (15, or 50 %). The discipline in which most participants had completed their tertiary education was Business and Information Management (9 or 30%). Of the participants interviewed, six or 20% held degrees in AI or mathematics as their primary discipline. In comparison, 80% of participants interviewed held degrees in fields other than AI, with three participants having no tertiary education. The characteristics of the participants are described below in Table 4.3 Participant Characteristics.

	(N=30)
Age	
20 - 30 years	4
30 – 40	6
40 – 50	13
50 +	7
Total AI Experience	
Less than 1 Year	2
1-2 years	8
2-3 years	2
4 + years	18
Job Function Relation to AI	
AI Skills	13
Domain Skills	17
Education	
High School	3
Bachelor's degree	11
Master's degree	8
Doctorate	8
Tertiary Education Discipline	
AI / Mathematics	6
Business / Information Technology	9
Engineering	5
Other	7

Table 4-3 Participant Characteristics

Source: Analysis of Research Interviews

4.2.3 Professional Characteristics of Participants

The AI characteristics of the participants are classified into three categories. The first classification reflects the dominant type of AI engaged and deployed. The second category is the purpose of the organisation's use of the AI function. The third category identifies the source of the AI, being part of a software package or having been created by the organisation. The dominant type of AI used is Machine Learning (ML), with 24 or 80% of interviewees identifying ML as the dominant AI in use. The purpose of the AI was predominantly for the management and administration of customers, including marketing activities, with 14 (47%) respondents identifying this was the use of the AI they managed in their organisation. Five respondents Identified engineering as the use of AI. Four identified various business functions, five identified GIS (Geographic Information Services), and two were classified as other. Finally, the AI that participants discussed was predominantly created within their organisation, with 17 or 57% identifying that the AI was of that type. These characteristics of the AI discussed by the participants are shown below in Table 4.4 AI Characteristics.

	(N=30)
Dominant Type of AI	
NLP	3
ML	24
Robotics	2
Neural Networks	1
AI Purpose	
Customer Service /Management	14
Engineering	5
General Business	4
GIS / Environment	5
Other	2
AI Source	
Created in Organisation	17
Packaged software	13

Table 4-4 Professional Characteristics of Participants

Source: Analysis of Research Interviews

4.2.4 Organisation Characteristics

The organisations represented are described by three attributes: the industry in which they operate, the number of employees, and their location. The largest industry represented is technology, with 12, or 40% of the participants employed by organisations in the technology section. The number of employees measures the participant's organisation size. The organisation's size represented, most often, is organisations employing over 10,000 employees, with 15, or 50%, of the participants employed by very large organisations. Finally, the location of operation of the organisation is described as local, national, or global. Most participants, 18 or 60%, were employed in global organisations. Details of the organisations are shown in Table 4.5 Organisation Characteristics.

	(N=30)
Industry	
Banking and Finance	4
Energy	1
Engineering	5
Infrastructure	2
Media	2
Professional Services	2
Robots	1
Technology	12
Telecommunications	1
Organisation Size	
Micro (1-9 Employees)	1
Small (10 -49 Employees)	1
Medium (50-249 Employees)	4
Large (250 +10, 000 Employees)	9
Very Large (10,001 + Employees)	15
Orientation	
Local	6
National	6
Global	18

Table 4-5 Organisation Characteristics

Source: Analysis of Research Interviews

4.3 Analysis of Data

This section contains the analysis of the data obtained via the participant interviews. Following the Grounded Theory of data analysis (Glaser et al., 2013; Glaser, 1992; Glaser & Strauss,

2017), it initially identifies the open or first level of codes associated with the topics and sentiments of the transcribed text. The first-level codes are then used to form the second-level codes by grouping the related first-level codes. The second-level codes are then formed. The themes are then drawn from the second levels by grouping second-level codes into themes. The relationships between the themes are then identified and supported by references from the interview data, including any memos taken during coding (Urquhart, 2012). Finally, combining the themes and relationships, a theory of AI management is proposed (Urquhart, 2012). The propositions are then deduced from the themes and relationships that have been established. Figure 4.1 provides an overview of the data analysis process.

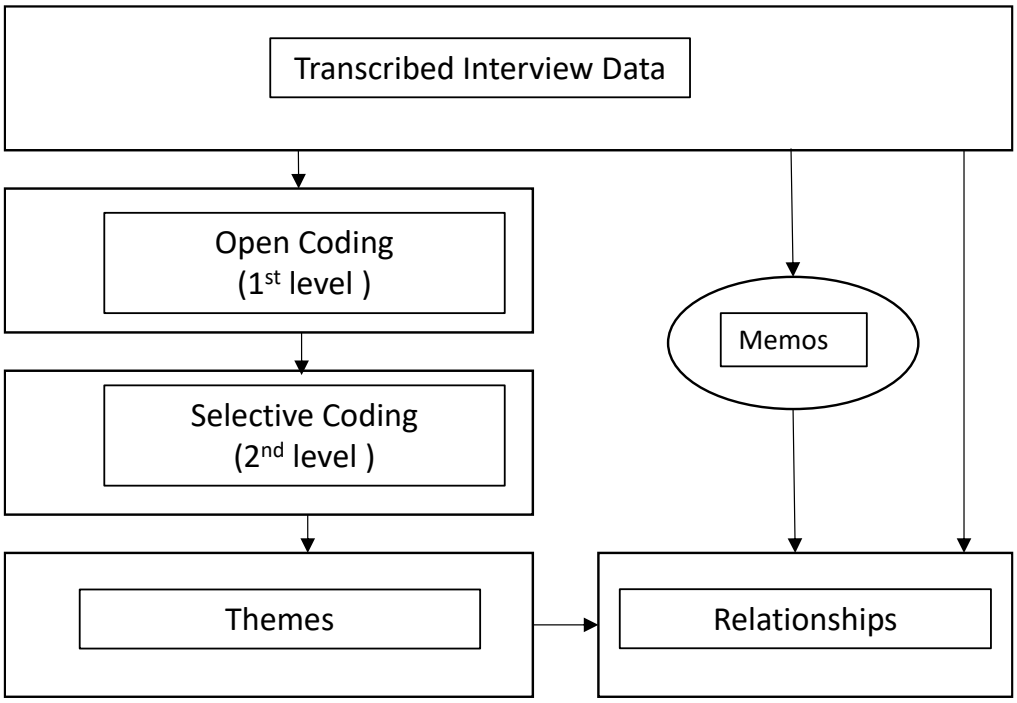


Figure 4-1 Overview of Data Analysis

Source: Glaser and Strauss (2017); Urquhart (2012)

4.3.1 Grounded Theory Application

This section contains the analysed data obtained from 30 unstructured interviews across the four components of Grounded Theory. The transcribed interview data were coded by open coding (first-level), selective coding (second-level), and thematic coding, and the relationships between the themes were identified. The following sections, 4.3.2 through 4.3.6, present the three coding levels and the relationships identified.

4.3.2 Open Coding

The open coding process in Grounded Theory requires the transcribed interviews to be coded line-by-line to identify the topics and sentiments presented in the interviews (Goulding, 2002).

An example of the open coding of the data can be found in Appendix K. In total, 117 open codes were identified. The number of interviews with an occurrence of an individual code ranged from 1 to 14. There were 44 codes, with only one interview mentioning the code. The code associated with the most interviews was 'Organisation Problem Solving', coded in 14 of the 30 interviews. The code with the highest number of references is also 'Organisation Problem Solving', with 47 references applicable to the code. Table 4-6 lists the 25 most frequently identified open codes from the interviews. The complete list of open codes identified is located in Appendix L.

Open Codes (first level)	**Number of interviews code mentioned**	**Number of references applicable to code**
Organisation Problem Solving	14	47
Resource Management	13	23
Data Set	12	23
Creating an AI Model	11	32
Organisation Culture	9	15
Big Data	8	12
Efficiency Metrics	8	22
Improvement	8	10
Technology Understanding	8	11
Organisation Function (growth)	7	19
Privacy	7	7
Dashboard	7	12
Ai Roles	6	8
Management Actions	6	8
Review	6	6
People Behaviour	6	10
Data Scientist	5	10
Machine Learning	5	8
Variables	5	15

Data Privacy	5	7
Communication	5	6
Visualisation	5	11
AI Non-Performance	5	5
People's AI Fears	5	6
Positive Sentiment	5	6

Table 4-6 Frequently Identified Open Codes Derived from the Data

Source: Analysis of Research Interviews

4.3.3 Selective Coding

The similar open (first-level) codes were then grouped to form the selective (second-level) codes (Goulding, 2002; Urquhart, 2012). The 23 selective codes are derived from the open codes and are displayed in Table 4.7 – Selective Codes. The selective code with the most number of interviews represented was 'Organisation Strategy', with 21 of the 30 containing this code. The code 'Organisation Strategy' also had the highest number of references associated with it, recording 118 references to the code across the 30 Interviews. Conversely, the code with the least references was 'Anthropomorphism as a Management Technique' and 'Anthropomorphism as a Challenge to Managing AI', with only two interviews referring to the code.

Selective Code (Second Level)	**The Number of Interviews Code mentioned**	**Number of References Applicable to the Code**
Organisation Strategy	21	118
Regulatory Requirements	3	9
Domain Areas	10	22
Subject Matter Experts	12	26
AI Skills and Experience	15	52
AI Algorithms	4	7
Data	5	14
AI Functions	12	41
Creating AI	8	13
Checking AI	3	8

Reporting	11	27
Actions	4	7
AI Monitoring	13	32
Business Function Monitoring	4	9
Business Measures	4	7
AI Measures	13	31
Organisation Goals	11	26
AI Goals	7	10
Feedback	15	40
Education and Experience	10	17
Organisation Culture and Behaviour	20	69
Anthropomorphism as a Management Technique	2	17
Anthropomorphism as a Challenge to Managing AI	2	5

Table 4-7 Selective Codes

Source: Analysis of Research Interviews

4.3.4 Theoretical Coding

Theoretical coding is the third stage of Grounded Theory data analysis (Glaser, 1992; Glaser & Strauss, 2017). The process identifies the themes from the selective codes by grouping them into similar themes (Goulding, 2002; Urquhart, 2012). The analysis and grouping of the selective codes has produced 11 themes. The number of theme occurrences across interviews ranged from 22 to two. The theme with the most significant occurrence in interviews was 'AI skills and resources'. The theme with the least number of occurrences across interviews was 'Anthropomorphism'. The number of times a theme occurred across the data ranged from 129 to 11. The theme with the most significant number of occurrences is 'Organisational Goals and Objectives', and the theme with the least is 'Anthropomorphism'. Table 4.8, Theoretical codes, lists all the themes that have resulted from this analysis, the number of interviews in which they occurred, and the total number of instances across the entire data set. The full list of open codes, selective codes and themes can be found in Appendix M, the Data Structure Diagram.

Theme	Number of Interviews Identifying Theme	Number of Occurrences of Theme
Organisation Goals and Objectives	21	129
Domain Skills	19	54
AI Skills	22	117
Collaboration	20	65
Outcomes	13	38
Monitoring	15	43
Measures	20	84
Organisation Goal Achievement	19	74
Continuous Improvement	15	63
Influences	23	86
Anthropomorphism	2	26

Table 4-8 Theoretical Codes

Source: Analysis of Research Interviews

4.3.5 Integrated Codes and Themes

To summarise the Grounded Theory analysis, the two levels of analysis are shown in Table 4.5 Data Structure Diagram. The table presents the second-level codes and related themes from the transcribed interviews (Gerlach & Cenfetelli, 2020). The Data Structure Diagram showing all three levels of coding is available in Appendix C.

Selective Codes	Themes
o Organisation Strategy o Regulatory Requirements	Organisation Goals and Objectives
o Domain Areas o Subject Matter Experts	Domain Skills
o AI Functions o Algorithms	AI Skills

○ Data ○ AI Attributes	
○ Seeking Additional Skills ○ Checking AI	Collaboration
○ Reporting ○ Actions	Outcomes
○ AI Monitoring ○ Business Function Monitoring	Monitoring
○ Business Metrics ○ AI Measures	Measures
○ Organisation Goals ○ AI Achievements	Organisation Goal Achievement
○ AI Goals ○ Feedback	Continuous Improvement
○ Education and Experience ○ Organisation Culture and Behaviour	Influences
○ Management Technique ○ Anthropomorphism as a Challenge to Managing AI	Anthropomorphism

Table 4-9 Data Structure Diagram, Selective Codes and Themes

Source: Analysis of Research Interviews

4.3.6 Relationships Between Themes

This section details the relationships that have been identified from the data analysis. The relationships between the themes are derived from the Grounded Theory process of data analysis by coding the identified relationships and reviewing the memos created when coding the interview with the participant (Glaser & Strauss, 2017; Urquhart, 2012). Identifying the themes that emerged from the data allowed for the relationships to be identified and confirmed via a review of the codes, themes, and memos.

Eleven relationships have been identified from the data analysis. The relationships occur between the themes relating to people, people and the organisation, people and the AI, and the organisation and the AI. Below, the 11 relationships are identified in detail and explained, accompanied by the references from the data that support the claim of the relationship. The relationships, the description of the relationships and the supporting quotes from the interviews are shown below.

Relationship 1. Organisation Goals and Objectives and Domain Resources

The coded data identified a relationship between the organisation's goals and objectives and the domain resources management and the creation of the AI. The organisation's goals and objectives provide the direction to the domain resources within the organisation by which to manage the creation and operation of AI within the organisation. The management of the AI created is based on how well the AI supports the organisation's goals and objectives.

Relationship 1	Description and Supporting Data
Organisation Goals and Objectives ↓ Domain Resources	An example of this is given in the statement below from a domain resource in middle management, managing the creation of the AI regarding improving the experience of customers when engaging with the organisation: *"The one that we're working on now is sentiment analysis and that one actually got quite a bit of traction. So we've gotten it through the proof of concept stage. We've gotten good results and now we're just trying to get it in the queue of productionization….And that's because we are able to sell it as an extra extra metric to gain insights into our business and our operations. So the business can clearly tie it to like - drivers of improvement and customer experience improvement" (#30, MM)* The quote below is from an executive in a financial service company responsible for the operations of the organisation, a domain expert in organisational operations. They identified some of the organisation's key objectives, such as reducing bad debt, identifying customers discontinuing their service with the organisation, and finding new customers to take up the organisation's services with new customer

Relationship 1	Description and Supporting Data
	lead generation. These are three organisational objectives are those by which the domain resource used to manage the creation and use of AI in the organisation. This is represented in the quote below: *"We're a financial services company, so identifying people who are likely to miss their payment. Identifying people who are likely to leave and go to another organisation and what those different attributes (are, is important)…. So it's those customers and those opportunities. In more recent times, we then started to overlay that into a lead generation" (#5, EM)* Another example of the management of AI by domain resources in relation to the organisation's goals is shown in the following quote. This quote refers to the reduction in resources gained with AI in performing the organisation's functions in an engineering organisation. The CEO refers to the increased speed at which AI can assist with the design work in the organisation. Once again, showing the relationship between the organisation's goals and objectives and the domain resources managing the AI: *"We considered speed to be the major driver for use of the platform. So using print, takes effectively - like 15 days worth of engineering design work and distil it down to 15 minutes you'd get a specification straightaway" (#25, EM)*

Source: Analysis of Research Interviews

Relationship 2. Organisation Goals and Objectives and AI Resources

The data analysis identified a relationship between the organisation's goals and objectives and the AI resources managing the organisation's AI. Similar to the relationship between the organisation's goals and the domain resources, there was a relationship between the organisation's goals and objectives and the AI resource managing the AI. However, it was not as strong in all interviewees that were defined as an AI resource, compared to a domain resource (as depicted in the relationship by the dotted line). While some AI resources were aware of the organisation's goals and objectives, there were also instances where the AI

resources depended on the domain resources to identify the areas to which the AI should be applied regarding the organisation's goals and objectives.

Relationship 2	Relationship Description and Supporting Data
Organisation Goals and Objectives ↓ AI Resources	The following excerpt of an interview with a data scientist shows that while they discuss managing the AI, to ensure it is correctly achieving the required outcomes, they would work closely with the domain resources, which are referred to as 'the business' or 'stakeholders' (in the interview) to provide the direction on the AI and what the AI needs to achieve: *"So the business would be like your stakeholders where I'm obviously be creating a model for the business, who would the people or product team per se, that would be interested in having that model incorporated into their part of the product." (#11, I)* In another interview with an AI resource, a mathematician was able to identify the organisation's goal that the AI was to obtain when asked: Interviewer: *"Is there a specific metric that you're looking for to determine that success?"* Interviewee: *"Yeah, primarily what we care about is a net promoter score, our customer satisfaction." (#1, EM)*

Source: Analysis of Research Interviews

Relationship 3. Domain Resources and AI Resources

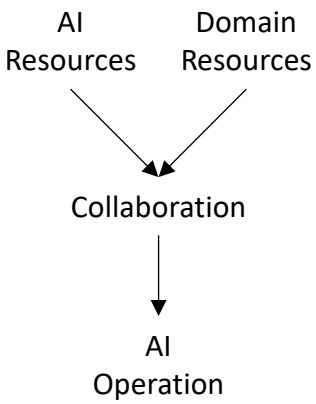
The domain resources (customer service, operations, bankers, engineers) and AI resources (mathematicians, data scientists, data analysis) closely relate to managing AI within the organisation. The two groups work together to create the AI to address a specific organisational goal and then manage the AI creation and operation. While AI resources create and manage the AI, the domain resource also performs management tasks regarding the AI, such as directing the area of usage, checking that the outcomes are as expected, and approving the AI for use in the organisation. They also work to ensure that the AI functions perform as expected to meet the organisation's goals that have been tasked to be achieved. The domain resource may also identify the variables used in the AI models.

Relationship 3	Relationship Description and Supporting Data
Domain Resources ↓ AI Resources	The following excerpt from an interviewee captures this relationship; in the interview, they discuss how they work together with the domain resource (stakeholders) to understand anomalies in the data or the outcome of the AI. The following excerpt of an interview with an AI resource outlines how they work together with the domain resources and the domain resource's role in managing the AI's creation: *"It's a collaboration it's not like just one data scientist creating a model up for no good reason. You have stakeholders who want something done and you give them a data science solution. So obviously you'll be working close with the business of your stakeholders. And for instance, because they would be subject matter experts in how people would usually interact with the product, or what like what's common trends and what's not common. So, they would be able to explain some like, weird things in the data, or, you know, if something happened last year. For instance, like they rolled out a new product incentive, why was there such an increase or decrease in demand? And, you know, they will be able to explain what the truth explains what the truth is behind some demand. And, you know, they will be able to data occurrences. So you can understand if it's a data issue, a model issue, or if it actually makes sense because it's actually happened in the data." (#11, I)*

Source: Analysis of Research Interviews

Relationship 4. Collaboration Between Domain Resources and AI Resources

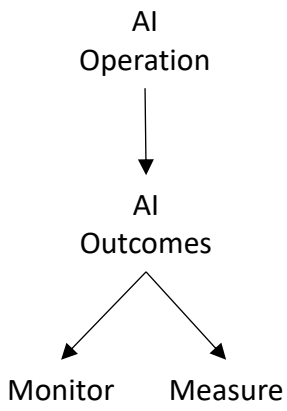
The collaboration of the domain resources and the AI resources are related in the operation of AI, and both are responsible for its operational management. The resources with AI skills manage the algorithm components, and those with the skills in the domain to which the AI is being applied manage the domain aspects. An example is the management of the organisation's customer chatbots, which are based on AI using NLP (Natural Language Processing). The AI resources creating the chatbots seek to be directed by the domain skills that the chatbot will be operationalised.

Relationship 4	Relationship Description and Supporting Data
	The quote below shows the relationship between an AI resource releasing the AI to production and the domain resources having the final approval of the AI (ball) going into operation: *"On our upload site, once that test is good, we basically, push the AI to production. And then it's up to this final approver….. To click Yes. - And then the ball is released into the world." (#12, I)* The quote below is from a participant with domain skills, identifying the relationship with moving the AI into operation, or "*productionisation*" as they have stated: *"We've gotten good results, and now we're just trying to get it in the queue for productionisation" (#30, EM)* The excerpt below identifies the relationship an executive AI resource has with the operation of AI in their organisation: *"we've got, you know, 200 machine learning models and we have 20 million calls a day that the numbers are 400 machine learning models running on top of 157 billion* data points all *of which operate in real-time and there's over 30 million calls to the customer engagement engine every day." (#1, EM)*

Source: Analysis of Research Interviews

Relationship 5. Outcomes of AI and Monitoring and Measuring

The operation of AI in the organisation produces outcomes or outputs. These outcomes, resulting from the AI, assist the organisation in meeting its goals and objectives. These outputs are then monitored and, when monitored, can be measured.

Relationship 5	Relationship Description and Supporting Data
	The excerpt below is from an executive manager, explaining the process regarding the operation of the AI, and managing the AI that they have deployed, people in the team, and monitoring and measuring the outcomes: *"We have data engineers and we have people who build and deploy test the next best Conversation [AI] and data scientists to build and manage and monitor all the models as well as then our Insight analysts who understand everything that we do they measure everything that we deploy. (#1, EM)* The excerpt below from an interviewee discusses how the chatbots are monitored and measured in their conversations with the organisation's customers. They monitor and similarly measure the AI chatbots to humans doing a similar function: *"And we have a report, so what we've built into the process. What the [chat] bot does effectively is tells us every action, …that it performs. Then over the top of that, we apply - We have an algorithm or a pretty basic piece of analysis, which runs over top and looks ……looking for any anomalies so that, yes, we have the QA check that we also have this anomaly. Checking [what's] happening to see if there's anything, any Behavior which is outside the norm, it immediately picks up and flags. Okay. So, say for a Customer Service rep where you take a percentage of their phone calls and look through them to quality assure. You take a group of interactions with your customer that the bot does. And then analyse them by [a] human to make sure it's on track, as well as some sort of. Analytics automated analytics over the top looking for anomalies. (#5, EM)* The quote below is from further into the interview where the participant again reiterates the controls that are in place are the same monitoring and measuring as for humans performing the

Relationship 5	Relationship Description and Supporting Data
	tasks: *…. How do you govern that process? and what, what it came down to, in the end is …took us a little bit of work, but we need the same…. As a human, can make an error. So can the machine and we need to have the same controls. The same checks in place. The same quality assurance program that we have in place before a bot doing the work as we do a human. … now what we have effectively is we've got I we're going to QA program so like we have a QA program across about all their people, we have a QA program which sits over the top of the Bots and does the same sample checking on the box. (#5, EM)*

Source: Analysis of Research Interviews

Relationship 6. AI Measures and Reporting

The measures are then communicated via reports such as dashboards and visualisations, indicating that there is a relationship between the measures of the outcomes of AI and the reporting of the outcomes of the AI in operation. The data analysis identified that the outcomes' measures were reported on and used in the organisation.

Relationship 6	Relationship Description and Supporting Data
Measure ↓ Reported	The response below indicates that the reports from the measure are useful to people in the organisation: *"… as well as continuous sticky insights from that by creating dashboards and things that people can check in and how they can slice and dice that data" (#30, MM)* Again, the respondent below supports the use of reporting on the measure of the AI via a dashboard: *"…. we do need some sort of dashboard". (#15, MM)* However, the data obtained and reported on analysis also indicated that some participants perceived that not all the measures reported

Relationship 6	Relationship Description and Supporting Data
	on were acted upon. This is identified from the below quote, from an interviewee, who did not believe that salespeople were interested in the reports created from the AI; only a small group of people were interested: *"I really don't believe that any customer [recipient of the AI outcomes] actually wants a dashboard. I don't believe any salesperson does any type of analysis. It's probably five people in your organisation. We market it, [so] that we have salespeople that can drill into their data. A salesperson can't even understand granularity." (#16, MM)* The data analysis of the interviews identified that there was a relationship between the measurements and the creation of the reports, it may be that it is dependent on who, or the role of the individual in the organisation is receiving the reports.

Source: Analysis of Research Interviews

Relationship 7. AI Reporting and the Achievement of Organisations Goals and Objectives

The reported measures of the AI's performance are then compared to the organisation's goals and objectives. Reporting the AI algorithms' achievements against the organisation's goals is another relationship identified in the management of AI within the organisation. This relationship allowed for the management of AI via the determination of the usefulness of the AI and the productive use of AI.

Relationship 7	Relationship Description and Supporting Data
Report ↓ Organisation Goals and Objectives Achievement	An example of this was the discontinued use of AI when it was not assisting the organisation in meeting its business goals: *"How they manager they really tested and measurement you said it as well against the organisation goals so is a better audio is it better voice is it will be making more sales we can anticipate what our customers want" (#21, MM)*

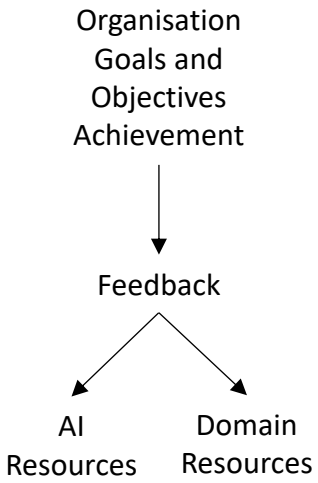
Relationship 7	Relationship Description and Supporting Data
	The quote below reiterates the relationship that the outcomes of AI need to be quantified to the organisation's goals when discussing ML assisting Salespeople selling: *"It's an iterative, month over-month effort, with a deployment live with people interacting with the model every day, in order for you to get the outcomes, and you got to be able to quantify it." (#16, MM)* The participant below identified the management of the AI via the relationship between reporting of the organisation's goal of revenue improvement that the organisation gained with the use of AI: *What if the improvement was one percent? …, you know, from the three metrics that the revenue improved by one per cent, but that one per cent Improvement is tens of millions of dollars. I mean, it is good enough. (#4, MM)* The excerpt below has the participant identify the importance of the relationship between measures of success from the organisation's goals perspective: *"So we try to make sure that the products we take on are not that they're not just experiments for experiment sake, that they actually solve hopefully even a very critical business problem….So the way that we've reported in perspective, the way that we start is the, we make sure that we identify how they're going to measure success from [the] business perspective.. (#6, MM)*

Source: Analysis of Research Interviews

Relationship 8. Organisations Goals and Objectives Achievement and Feedback

The relationship between the AI meeting the goals and objectives of the organisation, and the AI and domain resources is provided by feedback. The feedback on the performance of the AI against the organisation's goals and objectives is provided to the domain and AI resources. The data analysis provided insights into the relationship between the AI's performance against the organisation's goals and objectives to the AI and domain resources responsible for managing

the AI via feedback. This feedback loop allows for the continuous improvement of the AI in use.

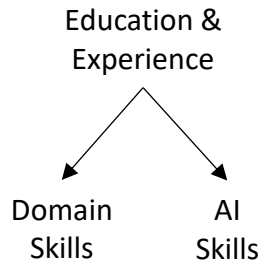
Relationship 8	Relationship Description and Supporting Data
	The quote below is an example of the quantity of feedback obtained in a large organisation on the use and benefit of AI in the organisation. The feedback is communicated to the AI resources to improve the AI: *"You know in the last four years we've had over 1,000 bits of feedback from our frontline who use the system every day help us make it better and we get feedback from our customers pretty much by 30 million times a day." (#1, EM)* The excerpt below is from an interview with an AI resource responsible for programming a chatbot, identifying the feedback they receive on the performance of the AI weekly: *Participant: So we'd get on Monday morning the exceptions from the week before and generally, right now, it is about maybe 100 to 200 lines of what people have asked the AI. So not many right now, we're growing on it* *Interviewer: So, you get every conversation in a report back to you is that what you are saying?* *Participant: Yeah, we get every line. Yes.* *(#12, I)* Once the AI resource responsible for programming a chatbot has identified an area for improvement, such as a question that the chatbot was unable to answer, they improve the chatbot, by modifying what they have previously trained:

Relationship 8	Relationship Description and Supporting Data
	"it's that, what we've assumed will be asked. [then] something we never thought would be asked, is asked. And then we can kind of modify what we already have trained, the AI, maybe a sentence. So if that question asked [again] it hits the new response" (#12, I), The quote below is from a middle manager of a team of customer management resources using AI to improve their customer's experience: *"that's part of the consider continuous learning feedback" (#18, MM)*

Source: Analysis of Research Interviews

Relationship 9. Education, Experience and Domain and AI Resources

The data analysis has identified a relationship between education and experience and the domain resources and AI resources. The analysis shows that the domain and AI resources are influenced by their education and experience, as well as their skills and understanding of AI and its usefulness. The individuals' skills influenced the AI created and how it was managed, so the organisation looks for individuals such as data scientists and mathematicians to work on AI with specialist skills in the domain areas and the AI skills.

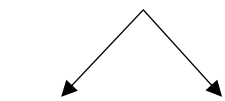
Relationship 9	Relationship Description and Supporting Data
	Below is a quote from an Executive Manager, identifying the relationship between the senior executive's education and experience supporting the use and management of AI: *"So the c-suite in the organisation. [name redacted] runs the retail banks and is the chief executive officer. They understand this area. So well, it's incredible to think that organisations are now investing so much in it." (#1, EM)*

Relationship 9	Relationship Description and Supporting Data
	The quote below links AI resources to having a higher education: *"And most of them. I mean, again, I would say, that the average software engineer has a higher mathematical. Education or familiarity than most." (#6, MM)* The quote below also references the levels of understanding required when managing AI, and that it is 'not magic': *"Every now and then you do get the odd. Question of, can it do this? Or can we just plug it in here and turn it on? It'll magically do it. So you do hit the occasional person who's still not quite at the level of understanding that AI is not magic. (#10, MM)*

Source: Analysis of Research Interviews

Relationship 10. Organisation Culture and Monitoring, Measuring AI

The existing organisation culture, including the prevailing values and practices, influences the monitoring and measuring of the AI in operation, demonstrating the relationship between the two factors. The organisation's culture and senior executives could influence the management of AI, and the culture of the organisation was to ensure that the AI also benefited the customer.

Relationship 10	Relationship Description and Supporting Data
Organisation Culture  Monitor Measure	The excerpt below identifies the Executive Board asking how the solution would benefit the customer: *So obviously we love to sell to people. That's no hidden secret about that. But all the executives are very strict on… So then when I was presenting, one executive remarked about how cool this idea is and all my metrics was about, how much money you can earn by doing all these things. Then the constant question in individual meetings and in*

Relationship 10	Relationship Description and Supporting Data
	group meetings was what's in it for the customer? What's the problem of the customer you're solving? Otherwise, they're not going to want it. (#4, MM) The excerpt below discusses the organisation's existing cultural methods for managing non-AI processes (with humans) and the organisation applying the same methods to the AI processes performing the same tasks: *"How do you govern that process? and what it came down to, in the end is…. Took us a little bit of work, but we need to do the same…. As a human, can make an error. So can the machine and we need to have the same controls. The same checks in place. The same quality assurance program that we had in place before a [chat] bot was doing the work as we do a human. So now what we have effectively is we've got - we're going to QA program so like we have a QA program across all their people, we have a QA program which sits over the top of the Bots and does the same sample checking on the box." (#5, EM)* The excerpt below shows the need for change to the organisational culture when using AI and the need to improve the speed at which approvals are given: *"It was in the beginning and what we basically did was [we] had to change the attitude towards knowledge management as a whole. That this is no longer, the way we used to run a business where you could take six weeks to sign off content. This was real-time. This was, we're making changes daily." (10, MM)*

Source: Analysis of Research Interviews

Relationship 11. Anthropomorphism and AI Management

The data analysis revealed a relationship between anthropomorphism and the management of the operation of AI within the organisation. Anthropomorphism is defined as assigning human

characteristics to non-human entities, which in this situation, is assigning human traits to the AI in use. The anthropomorphism of AI within the organisation facilitates the management of AI in that the organisation and the individuals attribute human traits to AI in order to more easily manage it.

Relationship 11	Relationship Description and Supporting Data
Anthropomorphism ↓ AI Operation	The quotes below are from an AI resource, at an Executive level, discussing how they encourage the use of anthropomorphism to manage the AI (digital workers) who are used in the organisation: *"the creation of them as a digital worker.."we call them our digital workforce" (#24, EM)* *"Because, yes, they have to have a user ID and that to exist, right." (#24, EM)* Anthropomorphism is encouraged and used to ensure that people actively manage the AI robots as they would humans in their teams and departments. This is shown in the quotes below: *"I encourage people who created them and to think of them as your digital workforce because it's not a set and forget about this during your process" for you whereby yourself or somebody else in your team used to look after that* *…" we name them as well.." (#24, EM)* *"I let the team create their own name. So that's a way to encourage it……each team has its own culture." (#24, EM)* The anthropomorphism of AI is to ensure the AI is managed the same way as a human resource in the organisation, as shown in the quotes below. They are ensuring that when a change occurs in the business, the impact on the AI robot is also considered and managed: *"Because when there is a change in business process or something that comes or a change that surrounds what happens to them that impacts their business process." (#24, EM)*

Relationship 11	Relationship Description and Supporting Data
	" We encourage them to think of their workers as well as their digital workers just like we encourage [them to think of their] people when we have an IT upgrade or maintenance." (#24, EM)

Source: Analysis of Research Interviews

4.4 Conclusion

This chapter has presented and analysed the data obtained in this research concerning the research questions and can now be used to propose a theory that represents the management of AI within organisations. The data has purposefully been drawn from various interview candidates with differing skill sets and knowledge in managing AI. The data has been sourced across diverse industries, applications of AI, and diverse sizes of organisations in accordance with Grounded Theory.

The data analysis identifying themes and relationships allows the questions of this research to be answered. The question and sub-questions of this research are answering include, 'What are the factors involved?' 'What are the relationships between the factors?' 'Who is involved?' and 'What are the influences on these factors?' These questions allow for the focus of the research to be answered - "How are organisations managing their AI Technologies in use within the organisation?". The sub-questions of the research, which allow the overarching research question to be answered, are stated and answered below.

Answering the research question, ***'How do organisations manage the AI technologies deployed within their organisations?'*** has been derived from addressing the following four sub-questions.

A. 'What are the factors involved with Managing AI in Organisation?'

Five factors have been identified in relation to managing AI within the organisation. They are:

1. the organisation's goals and objectives.
2. the collaboration of the AI skills and domain skills involved in managing AI.
3. the monitoring, measuring, and reporting on the outcomes of the AI in use.
4. the continuous improvement via the feedback and adjustment of the AI.
5. the achievement of AI in reaching the organisation's goals and objectives.

B. What are the relationships between the factors involved in managing AI Technologies?

Eleven relationships have been identified in the management of AI. They are

1. the relationship between the organisation's goals and objectives and domain resources.
2. the relationship between the organisation's goals and objectives and AI resources.
3. the relationship between the domain resources and AI resources.
4. the relationship between the collaboration between domain resources and AI resources.
5. the relationship between the outcomes of AI and monitoring and measuring.
6. the relationship between AI measures and reporting on the outcomes of the AI.
7. the relationship between AI reporting and achieving the organisation's goals and objectives.
8. the relationship between the organisation's goals and objectives achievement and feedback.
9. the relationship between the AI and domain resources and their education and experience.
10. the relationship between the organisation culture and the monitoring, and measuring of AI.
11. the relationship between the anthropomorphism of AI and AI management.

C. Who is involved in managing AI technologies in organisations, and what is their role in the management process?

In identifying who is involved with the management of AI in organisations, two categories appear: those individuals involved directly and those involved indirectly.

Those directly involved in managing AI within the organisation have been identified as domain and AI resources within the organisation. The domain resources bring the complex knowledge and experience of the domain that the AI is being applied. The AI resources provide the management in-depth knowledge of the mathematical, programming and data elements, including the creation and adjustment of the AI in use. The AI resources, such as data

scientists, mathematicians, and data analysts, create the AI in collaboration with the domain specialists. Those indirectly involved in the management of AI within the organisation are those that set the organisation's goals and objectives and those involved in the monitoring and measuring of AI.

D. What are the facilitating and inhibiting influences on the factors and relationships in managing AI Technologies?

The skills and experience of the resources involved with AI management influence AI management in the organisation. The organisation's culture influences the management of AI in the organisation, as existing management techniques are often extended or implemented to manage AI. The application of anthropomorphism, the assignment of human characteristics to AI, can also influence the management of the AI.

This chapter has identified and presented the data and its analysis regarding the research question and sub-questions. The analysed data will be discussed, and conclusions are drawn in the following Chapter, Chapter 5 – Discussion. The Discussion chapter provides the propositions drawn from this research, offers a theoretical framework for managing AI in organisations, and offers the conclusions to the research question.

Chapter 5. Discussion

This chapter discusses the analysed data in this research and is the fifth of six chapters in this thesis. This chapter provides the study's unique findings and interprets these results. The preceding chapters to this chapter include Chapter 1, the Introduction to the research, Chapter 2, the Literature Review, and Chapter 3, the Methodology by which this research has been conducted. Chapter 4, the Data Analysis chapter, immediately precedes this chapter, presents the data, and analyses its contents. This chapter is followed by Chapter 6, Conclusion, which provides the final research synthesis. This chapter presents the findings from the data analysis in the preceding chapter.

5.1 Introduction

This chapter discusses the analysed data in this research as presented in Chapter 4. The data analysis findings identified the people, factors, influences, and relationships involved in managing an organisation's AI. The people involved in managing AI and the skills they contribute have been identified as those with domain skills and AI skills. These individuals within the organisation have domain knowledge such as customer management, marketing, or engineering to which the AI is applied. The domain disciplines are then accompanied by those with AI skills in data science, mathematical algorithms, and AI support technologies to manage the AI throughout its creation and operation.

This research has identified the factors involved in managing AI, including the organisation's goals and objectives, the collaboration between the AI Skills and the domain skills, and monitoring, measuring, and reporting the outcomes created by AI. The factor of continuous improvement of AI via feedback and adjustment is also present. Anthropomorphism is identified as a factor in the management of AI, and lastly, the achievement of AI in reaching the organisation's goals and objectives is evident.

The influences on the factors associated with managing AI include education, knowledge and skills of the people involved and the organisational culture. The education, knowledge and skills of the domain, and AI resources involved in managing AI, influence their management practices. The organisation's culture is also shown to influence the management of AI. The relationships between factors are identified as shown in Table 5.1. Relationships and Corresponding Propositions.

The research findings of how AI is being managed in the organisation, with the people, factors, relationships, and influences, are discussed further in the eight propositions presented here.

The eight propositions have been identified from the factors and relationships. The propositions discuss the findings, offer support from the data analysis, discuss the relevant literature related to and supporting the proposition, and then integrate the results into the relevant academic theory or theories. Finally, drawing on the propositions of this research, a grounded theoretical framework is presented, identifying the factors, relationships, and influences in the management of AI in organisations. Following the grounded theoretical framework, the discussion on the significance of this research provides a summary of the key findings and their relevance in the existing literature and academic conversation managing AI in organisations.

This chapter is presented as follows; the propositions drawn from the relationships are presented and then discussed in terms of GTM. The resulting grounded theoretical framework of AI management in organisations is developed based on the propositions identified in the data analysis. Finally, the results are discussed with the current research and contextualised regarding AI and its management in organisations.

5.2 Relationships and Concluded Propositions

This section identifies the eight propositions based on the 11 relationships identified from the data analysis in Chapter 4. In developing the propositions from the data analysis, the relationships between the themes have been identified, and similar relationships grouped, related, and combined to form the propositions. Three of the propositions have been established from the combination of two relationships, resulting in a fewer number of propositions than the number of relationships.

Proposition 1 is a combination of two relationships. Proposition 1 combines Relationship 1: 'Organisation goals and objectives and domain resources' and Relationship 2: 'Organisation goals and objectives and AI resources'. These two relationships identify the link between the organisation's goals and objectives, the functions AI is to set up to achieve, and the people with the skills and knowledge to create the AI. The combination of these two relationships suggests that 'The organisation's goals and objectives set the basis for the AI technology within the organisation and are a fundamental driver in managing the AI within the organisation'.

Proposition 2 is a combination of two relationships. Proposition 2 combines Relationship 3: 'Domain resources and AI resources.' and Relationship 4: 'Collaboration between domain resources and AI resources.' Relationship 3 identifies the people within the organisation who work together to manage and create the AI. Relationship 4 identifies how these two groups of people work together. Hence, the combination of these two relationships generates

Proposition 2. The collaboration between domain skills and AI skills manages the creation and operationalisation of the AI.

Proposition 4 is also a combination of two relationships. Proposition 4 combines Relationship 6: 'AI measures and reporting.' and Relationship 7: 'AI reporting and the achievement of organisation's goals and objectives.' Relationship 6 identifies the function of 'Monitoring and measuring the outcomes of the AI', while Relationship 7 identifies the communication and comparison of the AI to expectations to ascertain the achievement of the AI regarding the 'organisation's goals and objectives'. The combination of these two relationships provides Proposition 4: 'Reporting the achievement of the AI is a factor in the management. AI is managed via the outcomes it produces'.

The remaining five relationships have been directly translated into propositions. A summary of the concluded propositions and the relationship(s) they are drawn from can be found in Table 5-1 Relationships and corresponding concluding propositions.

Relationship	Propositions
Relationship 1. Organisation goals and objectives and domain resources Relationship 2. Organisation goals and objectives and AI resources	1. The organisation's goals and objectives set the basis for the AI technology within the organisation and are a fundamental driver in managing the organisation's AI.
Relationship 3. Domain resources and AI resources. Relationship 4. Collaboration between domain resources and AI resources	2. The collaboration between domain skills and AI skills manages the creation and operationalisation of the AI.
Relationship 5. Outcomes of AI and monitoring and measuring	3. AI is managed by monitoring, measuring, and reporting on the outcomes of AI to ensure the achievement of the organisation's goals.
Relationship 6. AI measures and reporting Relationship 7. AI reporting and the achievement of organisations' goals and objectives	4. AI is managed via the outcomes and results it produces.
Relationship 8. Organisations goals and objectives achievement and feedback	5. The continuous improvement via the feedback loop on the AI achievement of organisational goals is critical to the management of AI.
Relationship 9. Education, experience and domain and AI resources	6. The Education and experience of the resources influence the management of AI.
Relationship 10. Organisation culture and monitoring, measuring AI	7. Organisational Culture is an influence on the management of AI.
Relationship 11. Anthropomorphism and AI management	8. Anthropomorphism occurs in the management of AI.

Table 5-1 Relationships and Corresponding Concluded Propositions

Source: Analysis of Research Interviews

5.3 Propositions and Theoretical Integration of Findings

This section presents the propositions derived from the data analysis, followed by the theoretical integration with the current literature related to the propositions. Each proposition

is explained, and the findings are supported by data from the respondents obtained. Finally, these findings are aligned with the existing literature and theories to support the conclusions and enrich the study. These steps are defined and discussed in terms of the GTM presented in Chapter 3 and used to create the propositions derived from this research.

The propositions have been formulated from the coding, themes, and relationships identified in the data analysis in Chapter 4. The 11 themes and 11 relationships observed from the data analysed have been combined to develop eight propositions. These propositions are presented in the following subsections. In each proposition, the findings identified are described and discussed, and are interpreted in terms of how they contribute to the answers to the research questions. In addition, the propositions are discussed in relation to their correlation with the current literature, and integrated with supporting theories.

This section is presented as follows, each proposition is stated, described, and defined. The supporting quotes from the data justify the proposition. Next, the literature relating to the proposition is identified, referenced, and stated. Finally, the supporting theories from the existing literature are identified and integrated into the proposition, as defined by GTM. Combining the data analysis, the current literature and the related theories allows the following research question to be answered: 'What factors in terms of relationships, and facilitating and inhibiting influences are involved, and who are involved in managing AI within the organisation?'.

5.3.1 Organisational Goals and Objectives Motivate and Define the Management of AI

We observed from the data analysis shows that the organisation's goals and objectives direct and motivate the management of AI within the organisation. These goals are derived from two elements of the organisation. Firstly, the organisation's function and, secondly, the regulatory requirements to which the organisation is subject. The need to fulfil the organisation's goals drives the management of AI across the organisation's AI creation, implementation, and operation. The success of AI is determined by its ability to assist the organisation in achieving its goals and objectives. The operationalisation of AI is managed by its ability to help the organisation meet its goals and objectives.

The analysed data strongly support this proposition. This finding appeared in 21 of the 30 interviews where the participants discussed the organisation's goals and objectives for managing the AI. This theme appears in the coding 129 times. It is divided into the sub-categories of 'organisation strategy' and 'organisation regulatory requirements' as reflected in the second-level codes of the same name.

The organisation's strategy is derived from two elements of the organisation. Firstly, the fulfilment of the organisation's purpose is to create new and improved products, such as better customer service, faster information to customers via chatbots, identifying rust on a building via AI, or predicting a product a customer may require. The second element is solving the organisation's problems, such as reducing costs and improving productivity. The research shows that both these elements had a role in managing AI within the organisation. Examples of these uses are shown in the quotes below from the interview transcripts, where the participant describes the management of AI in relation to facilitating the organisation's strategy.

The following quote is from the participant identifying their job function aligned with the organisation's goal of increasing profitability. In addition, the participant identifies two ways that increasing profitability can occur:

"So effectively, my job is to increase the profitability of an organisation, and profitability comes in two ways. One is to cut costs, and second is to increase, basically, revenue and increase margin, depending on the phase of the economy." (#4, *Middle Manager*)

The participant then offers the role of AI facilitating revenue by increasing customer sales. Using the data, the organisation possesses and uses AI to predict the customer's needs without needing the customer to identify the requirement:

> *"So, we have this breadth of information, sitting in isolated data lakes if you like, how can we predict [what the customer wants] without anyone knocking on our door? What is the next thing that they need without having them know." (#4,* Middle Manager*)*

Another example of AI being managed by the organisation's goals and objectives is shown with the quote below referencing meeting the organisation's strategy of excellent customer service through AI:

> *"The chief marketing officer and the chief digital officer, when I joined, they all wanted to build this (AI) platform. They all wanted to build great experiences and interactions with our customers." (#1, Executive Manager)*

The respondents below identify ways they improve the organisation's operations as the driver for directing the AI and AI resources within the organisation:

> "The one that we're working on now is sentiment analysis, and that one actually got quite a bit of traction. So, we've gotten it through the proof-of-

concept stage. We've gotten good results and now we're just trying to get it in the queue of Productionisation. … and that's because we are able to sell it as an extra metric to gain insights into our business and our operations. So the business can clearly tie it to like - drivers of improvement and customer experience improvement." (#30, Middle Manager)

"So that's usually we see that a lot more is utilising data and making interpretations from those data. So we are going very big from an environmental sustainability perspective. So we are partnering and working with certain organisations. And then how do you use that data as well as the AI technology to help you on two fronts, right one is one of the organisations it's all about climate science and helping you and working with research organisations to help you basically obviously, from a climate perspective, that make better decisions." (#29, Executive Manager)

"So how do you make sure that you can't really you are optimising and utilising your resources that are drawn down on. So switching off your second element in your data centre, when it's not being used to try and just optimally effectively utilise those. So again, doing that code technology, so and driving sustainable actions for the various companies and helping them through that achieve their net zero status, because a lot of companies are trying to achieve the net zero status by 2030 and so on and so forth. So, it is still quite an ambitious plan. So, it's, that's another use case". (#29, Executive Manager)

The participants also identified AI technologies as assisting in solving the organisation's problems, as seen in the following quotes identifying business challenges, cost savings, and reducing bad debt in a financial organisation:

"…so, we kind of take on some of their biggest, biggest, business challenges, often times problems that they haven't been able to solve or have never solved before sometimes" (#6, Executive Manager)

"…So, it's about improving internal processes basically." (#30, Middle Manager*)*

"I don't think it was on an ethical basis from what I can remember; it was on a speed-to-approve basis. We didn't want to put in a secondary layer of

checks. So, what would happen is that it would go through the normal credit check and then and then we would then put the machine learning in as a secondary layer to either approve or approve more people or decline more people based on extra information that we can see within those credit check forms Yes, it was to help reduce bad debt." (#30, Middle Manager*)*

The respondent below identifies two issues that the AI employee can assist with in meeting the regulatory requirements of not displaying inappropriate content, improving productivity by having the AI review the files, and only needing a subset to be reviewed by a human, while also improving the job and role of the employee by reducing the 'offensive' aspects and improving the mental strain that may occur:

"There are agencies out there who have to scan for content and import content…. (a) human being who's manually looking through that content. Right., if they do, your job is to review that content, which is quite offensive…It can be, you know, violence, it can be pornography can be different things, right? As a human being to do that it can cause a lot of mental repercussions for them….using technology to scan through it, and using AI algorithms to scan through it, and then actually utilising it to flag certain files, so you don't now have to go through 100 files in a day. But these are the files ten files that have been flagged for today." (#29 Executive Manager)

The research data obtained from the participant's interviews show a direct connection between the management of AI and the need to meet the organisation's goals and objectives. Participants identified the organisation's goals or objectives they endeavour to fulfil using AI and carried out management activities to facilitate achieving these goals and objectives. In addition, the data identifies individuals in the organisation who allocate AI resources when they observe and justify that the AI resources can assist in attaining the organisation's goals and objectives.

The management of the organisation's resources to meet its goals and objectives is supported by the extant literature on managing various domains in the organisation. Human resources management is identified as a component of organisational success (Becker & Gerhart, 1996; Schneider & Bowen, 1993; Sims, 2002). Information Technology Management of resources is also beneficial for organisations meeting their goals and objectives (Drnevich & Croson, 2013; Powell & Dent-Micallef, 1997; Ullah & Lai, 2013). Financial management relating to the

management of the organisation's financial affairs and resources is also closely related to the success or failure of an organisation (Chandra, 2013; Omopariola & Windapo, 2019). George et al. (2019) Identified the importance of strategic planning of the organisation's resources in positively impacting organisational performance. Supporting research by Jingyu et al. (2021) identifies the role of senior management and the support of AI in the organisation.

To theorise the management of AI concerning the organisation's goals and objectives, the existing literature has established that aligning resource allocation to the organisation's goals and objectives benefits the organisation. The concept of Management by Objectives is credited to Drucker (2012b) for efficiently managing the organisation's resources. Using the goals and objectives to manage the performance and motivate employees of the organisations is posited in Goal Setting Theory (Latham & Locke, 1979; Locke & Latham, 2019). A more recent concept in this area also includes managing and tracking objectives and key results to improve the organisation's performance (Helmold, 2020; Radonić, 2017; Zhou & He, 2018). Several widely recognised management theories support the use and argue the benefits of managing the organisation resources via the alignment to the organisation's goals and objectives.

Hence, we conclude that the management of AI within the organisation originates from the need to fulfil its goals and objectives. AI is adapted and used by the organisation to assist the organisation in attaining them. The organisation's goals and objectives are conveyed to the domain resources and, to some extent, the AI resources responsible for implementing the actions required to achieve the organisation's goals. These actions taken by the domain resources in the cases of the interviewees included the use of AI to assist in attaining the organisation's goals. AI is measured by its achievement or assistance in achieving the organisation's goals and objectives; therefore, it is managed with an aim to help achieve the organisation's goals and objectives. Given these findings, we propose the following:

Proposition 1 - The Organisation's goals and objectives set the basis for the AI technology within the organisation and are a fundamental driver in managing AI.

5.3.2 Collaboration between Interdisciplinary Skills

The collaboration between the two skill sets of the domain skills and AI skills was evident in the management across the stages of development and operation of AI. In organisations, AI is managed with input from individuals, which can be broadly grouped into domain specialists and AI specialists; the domain specialists in the area where the AI is to be applied, and AI specialists, who use their mathematical, programming and data skills that create and adjust

the AI. The collaboration between these two groups involved in creating, implementing, and operating the AI models facilitates the management of AI in the organisation.

Many interviewees identified different skill sets involved with the management of AI and the need to work closely together for the management and success of AI. Significantly different skill sets were named in the creation of AI and the operation and management of the AI. Participants highlighted the legal department's involvement in ensuring the legal and regulatory requirements were satisfied. One participant acknowledged that a psychologist was involved to ensure positive interactions with the Chatbot they had created. The theme was identified in 20 of the 30 interviews with 65 occurrences.

Constantly comparing the data gained via the interviews, participants identified two different skill sets required for managing AI in all sizes of organisations. In micro and small organisations, there were examples of just one person holding both the skills of domain and AI. In these cases, the dominant skill was in the domain that AI was being applied and the subdominant was in the area of AI. If their sub-dominant knowledge area was AI, they used the AI as a tool to assist them with performing their domain skills and functions. On the other hand, where AI skills were the dominant skill held by the participant, the individual with the AI skills sought persons with the domain skills to assist in managing the development and operation of AI to ensure the outcomes meet the goals. This is evident in the quote below:

> *"You have stakeholders who want something done, and you give them a data science solution. So obviously you'll be working closely with the business and your stakeholders" (#11, individual)*

It was not only individual data scientists, mathematicians, or programmers but also specialists with skills in the roles that the AI was performing, such as customer service, that were involved in managing AI. Two skill sets have been broadly identified as being involved with the creation of AI. First is AI / mathematical skills, and the second is the domain skill that the AI will be applying, for example, in the case of a Chatbot performing customer support. The domain skills are that of customer management or customer support. An example of this is shown in the excerpts below:

> *"the department that I run is multidisciplinary. So, it's very diverse in terms of the types of people, backgrounds (and) experience that they have." (#1, Executive Manager)*

"It's a collaboration. It's not like just one data scientist creating a model for no good reason" (#11, individual)

The people with various skills work closely to ensure the AI performs as expected. This includes regular meetings to discuss the creation and operation of the AI components. Reviewing AI components from different disciplines and management levels ensures it operates as expected. The process of formally approving AI functions to be used in operation for the business function was also identified. It was perceived that collaboration occurred because different people with different skill sets were required to work together in the organisation to create, operate, and manage the AI. No individual possessed the overall skills to develop or manage the AI alone. The theme of collaboration is constant in the interviews conducted. Participants at all management levels mention and identify working with others to create and manage the AI technology to improve its operation.

Collaboration to achieve organisational goals is a common element in management studies. Collaboration is identified as improving innovation (Battistella & Nonino, 2012; Caccamo, 2020; Greer & Lei, 2012). It can enhance learning among individuals in learning environments and organisations (Andrew, 2019; Guo et al., 2020; Houghton et al., 2022; Laal & Ghodsi, 2012), and can lead to better solutions when solving problems, allowing for a greater diversity of problem-solving experiences and skills (Hennessy & Murphy, 1999; Nelson, 1999; Roschelle & Teasley, 1995). To summarise, the literature shows that collaboration between individuals and different skill sets can improve outcomes due to its ability to foster learning, innovation and problem-solving.

To ground the element of collaboration in the management of AI, there are current theories that offer academic support to the claim that collaboration are essential in successfully managing AI in the organisation. Theories such as Cropanzano and Mitchell (2005, p. 887) Social Exchange Theory (SET) identify one social exchange aspect as an economic transaction in an economic relationship to explain why the collaboration occurs. Similarities can be drawn between the SET and the collaboration between the domain and AI resources managing AI within the organisation. Resource Dependence Theory (RDT) offers the bases for seeking complementary resources to achieve common goals (Hillman et al., 2009; Nienhüser, 2008). The participants in this research identified this need to seek differing skills from their own colleagues to manage the AI. Group Decision-Making Theory (Simon, 1979) suggests that group decisions can assist problem-solving (Simon et al., 1987). Achieving the organisation's goals and objectives can be seen as a problem to be solved, thus drawing on Group Decision-

Making Theory to support this proposition. We offer the proposition below to align with the objectives of the individuals managing AI to meet the organisation's goals.

Proposition 2 - The collaboration between domain skills and AI skills manages the AI's creation, implementation, and operationalisation.

5.3.3 Existing Management Processes Assist in the Management of AI

AI is managed with existing management techniques and processes to ensure it achieves the goals and objectives of the organisation. The operating functions in the organisation, including monitoring and measuring the outcomes of functions and processes, are performed on AI technologies, similar to current technologies and functions within the organisation.

The outcome of the AI in the organisation is monitored and measured against mathematical, domain and organisation goals and objectives. The organisation's existing management techniques are applied to the outcomes of the AI technologies to assess and manage their success in achieving the organisation's goals and objectives. This behaviour of applying existing management techniques can be observed in the following quotes from the interview participants:

> *"same as a human can make an error – we have the same checks in place. – same quality assurance program as we had before we had the bots" (#5, Executive Manager)*

The AI was managed by measuring its output, and the result was managed by the differing specialist disciplines at the three levels of management were identified. While AI specialists measured the mathematical aspects of AI, as shown in the quote below:

> *"data scientists to build and manage and monitor all the models, as well as then our Insight analysts who understand everything that we do they measure everything that we deploy." (#1, Executive Manager)*

Managers of the organisation's function providing customer service that used AI, such as chatbots providing customer service, also measured the AI output and success. Customer satisfaction and service are measured in much the same way as a human providing customer service, as shown by the excerpts from the participants below:

> *"Primarily what we care about is a net promoter score our customer satisfaction" (#1, Executive Manager, #4, Executive Manager)*

"We've got the normal controls that we would have if you were a human being in one of our contact centres. So, we actually have people who read those transcripts, the conversations customers are having with the virtual assistant." (#10, Executive Manager)

"Basically the metrics is always very important that this is the thing that we always try to actually set in place" (#4, Middle Manager)

Individuals managed the AI with existing management functions. The examples below identify the management functions of feedback measuring and metrics. The response is from a participant who proudly offered the business metrics achieved in response to the effectiveness and efficiency afforded by the AI:

"we've had over 1,000 bits of feedback from our frontline who use the system every day to help us make it better, and we get feedback from our customers pretty much by 30 million times a day". (#1, Executive Manager)

You have to have a team that's looking after them, monitoring them and making sure when these sorts of things scale across the whole organisation, in different pockets or different business units…., so you need to keep them upgraded and maintained and monitored" (24, Executive Manager)

"You're asking about now - How do you govern that process? and what, what it came down to, in the end, it took us a little bit of work, but we need to do the same as a human can make an error. So can the machine and we need to have the same controls in place". (#5, Executive manager)

Below is a list of the measures one participant identified in managing the chatbot AI in their organisation, including coverage, effectiveness, usage, and knowledge growth:

"- Coverage: a measure of the percentage of user enquirers that are answered.

- Effectiveness: a measure of the percentage of good responses in our weekly rating of chats

- Usage: a measure of the total number of interactive users

- Knowledge growth: total number of responses in the AI."

(#12, Individual)

This observation from the data recognised managers applying current functions of monitoring, measuring, and reporting on AI processes to manage them. The organisational activity of monitoring and measuring performance is well-established in practice. Bititci et al. (2012, p. 305) note that "performance measurement and performance management practices are commonplace in all sectors of industry and commerce, including the public sector". This topic is popular in academic literature, with 3600 articles published in the two years between 1994 and 1996 (Neely, 1999). This research shows that the existing practice of performance measurement is still applicable and used in the management of AI.

To integrate this observation into the academic theory, the Sensemaking Framework explains the value of using existing techniques and processes and applying them to a new phenomenon (Weick, 1995; Weick et al., 2005). Sensemaking occurs when "External and identity threats trigger the sensemaking process" Cristofaro (2022, p. 393). In this case, we identify the trigger of the sensemaking process as the adoption of AI. Considering the sensemaking model of drawing on past experiences to 'make sense' of new situations, this may explain the adoption of past practices in the management of AI. The data in this research supports the idea that sensemaking has been enacted when managing AI in an organisation. Coupling this theory with that of organisational performance management benefits, we posit the following proposition.

Proposition 3 – AI is managed by the existing functions of the organisation, including monitoring, measuring, and reporting to ensure the achievement of the organisation's goals.

5.3.4 AI Results and Outcomes are a Factor in Managing AI

Reporting the outcomes and results of AI functions is a factor in managing AI. Reporting the outcomes of the AI provides information on whether the AI is meeting its goals and objectives and provides the opportunity for resources with the domain skills and AI skills to adjust and continuously improve AI in the organisation. The quotations below offer examples where respondents identify the reporting on the results and outcomes of the AI functions as part of the management activities undertaken. The following excerpts are from managers at all levels of management in the organisation identifying the use of reporting via dashboards and visualisation of the data on the AI performance:

> *"Visualisations data insights, optimisation models and as well as continuous sticky insights from that by creating dashboards and things that people can check in and how they can slice and dice that data" (#30, Middle Manager)*

> *"You don't want to be overly managing it, but we do need some sort of dashboard" (#15, Middle Manager)*

"I've done quite a lot of stuff with our shiny dashboards and stuff."

(#15, Middle Manager)

"So, we have built an asset around that, that creates these fancy dashboards which showcase to the client, which machines are on which machines are off, and when they were on actually, were they doing any processing, where they're not doing any processing." (#29, Executive Manager)

"Because we have a very good relationship around reporting and analytics."

(#30, Middle Manager)

"If I heard something being asked, that wasn't able to be answered correctly [by the robot]. I had a web interface where I could instantly go and bring up. So, for example, if it was like a question about going somewhere and it [the robot] didn't have an answer for it, I could instantly go in and add in that answer. So, that it could then update and the next person who asked that question was able to have that answer." (Interview 14, Individual)

"And we've actually got a separate dashboard for the machine learning modelling as well. The intention is to kind of unify some of that, particularly the machine learning modelling. …So that essentially, it's available to everyone if you like" (#17, MM)

Reporting on the outcomes of an organisation's processes is a well-established research topic concerning organisation management. In the domain of accounting and finance within the organisation, much importance is placed on reporting financial outcomes to assist the organisation in management and success (Beyer et al., 2010; Crawford et al., 2018; Graham et al., 2005). The use and benefits of digital technologies and corporate reporting in the organisation are helpful and relate to the organisation's success (Lombardi & Secundo, 2021). Recently, organisation reporting has been investigated in the area of Environmental, Social and Governance (ESG) (Abdul Rahman & Alsayegh, 2021; Arvidsson & Dumay, 2022; Kruglanski et al., 2017; Murphy & McGrath, 2013). Lebovitz et al. (2021, p. 1514), in their study investigating the evaluation of AI tools in health care, note "the usefulness of assessing the outputs and outcomes". The importance and benefits of reporting on the outcomes of the organisation's

process to assist in managing them and the organisation, is also well-established in the extant literature.

To theorise the management of AI via the reporting of outcomes, we related our findings to academic frameworks such as Results-Orientated Management. The Results-Orientated Management framework suggests the following three steps for managing via results (Wholey, 2001, p. 344):

> (1) developing a reasonable level of agreement among key stakeholders on missions, outcome-orientated goals, and strategies to achieve the goals.
>
> (2) measuring performance (in particular, outcomes achieved) regularly.
>
> (3) using performance information to improve program effectiveness and strengthen accountability to key stakeholders and the public.

Wholey (2001, p. 343) offers the value of Results-Orientated Management lies in "the regular monitoring of activities and outcomes in terms of indicators developed with the participation of key stakeholders". The existing literature supports the benefits of managing functions by reporting the outcomes the function produces.

We also draw on the basis for much of Drucker's work on managing the organisation concerning our findings. Drucker is often referred to as the "Father of Modern Management" (Drucker, 2001; Kiessling & Glenn Richey, 2004; Swaim, 2011). In the book, Managing for Results, Drucker (2012a, p. 183) states that "at every step of the analysis, there must be measurable results". Managing by results and the results-orientated framework concepts mirrors the concept identified in our data. Individuals are reporting on the results and outcomes of the AI to manage the AI in the organisation. This proposition is drawn from the data analysis themes of 'outcomes' and the 'organisation's goals and objectives achievement', and the relationship between the two themes.

Proposition 4 – AI is managed via the outcomes and results it produces.

5.3.5 Continuous Improvement is Based on Feedback from the Outcomes of AI

Continuous improvement has been identified as a factor in managing AI in the organisation. The outcomes and results of the AI in operation are measured against the attainment of the goals and objectives of the organisation. This information is fed back to the domain and AI resources responsible for managing the AI. Feedback on the ability of AI to achieve organisational goals is critical in managing AI. The feedback on the performance of the AI

meeting the organisation's goals allows for adjustment of the AI to improve its performance in meeting the organisational goals and objectives. This function also assists in ensuring the organisation's resources are used efficiently and effectively in achieving the goals. The following quotes from the data identify the continuous improvement tasks; two respondents even named them as 'continuous learning' and 'continually improve':

> *"if you work at it over and over and over, you will continually improve, improve, improve the model, so you get the insights." (#27, Executive manager)*

> *"We then have to figure out how we kind of attribute the impact, right and the accuracy because, again, that is part of the consider continuous learning feedback". (#17 Middle Manager)*

> *"So, for example, if it was like a question about going somewhere and it (the robot) didn't have an answer for it, I could instantly go in and add in that answer. So that it could then update and the next person who asked that question was able to have that answer and then anything similar to - like to that as well because it would also, effectively, kind of learn that. For the future as well." (#14, Individual)*

> *"Yeah, putting this forward, was it an efficiency thing that made it a no-brainer?" (#5, Executive manager)*

> *"… through our data, to try to identify opportunities to improve some of their key focus areas and to give you a sense, you know, we're a financial services company, so they're identifying people who are likely to miss their payment, identifying people who are likely to leave and go to another organisation and what those different attributes [are]. (#5, Executive manager)*

The concept of continuous improvement is discussed at length in the literature across various industries and paradigms. It is investigated from the viewpoint of the culture that facilitates the enactment of continuous improvement in various organisations (Ahmed et al., 1999; Irani & Sharp, 1997; Zmuda et al., 2004). Continuous improvement is discussed in industries such as manufacturing, healthcare, and education (Bhuiyan & Baghel, 2005; Fryer et al., 2007; Terziovski & Samson, 1999). The literature offers differing strategies for implementation and adoption (Bessant et al., 1994; Fryer et al., 2007; Schroeder & Robinson, 1991). The benefits of continuous improvement are also discussed in relation to improved performance of the

organisation (Khan et al., 2019; Terziovski, 2002) and improved innovation (Bessant & Caffyn, 1997). The literature presents the history of continuous improvement concepts and practices in organisations from the 1800s (Bhuiyan & Baghel, 2005; Schroeder & Robinson, 1991). Bhuiyan and Baghel (2005, p. 761) define continuous improvement as "a culture of sustained improvement targeting the elimination of waste in all systems and processes of an organisation".

Integrating the findings here into current theories, the observed continuous improvement behaviour is similar to various relevant academic theories. Continuous improvement theories include Total Quality Management (TQM), Lean Management, and Six Sigma. The TQM theory or framework is based on the conceptualisation of all individuals being focused on improving the quality in the organisation's outputs (Hackman & Wageman, 1995; Waldman, 1994). Lean Management focuses on eliminating waste by efficiently attaining goals and objectives through continuous improvement (Ballard & Tommelein, 2012; Helmold, 2020). Six Sigma offers a framework or set of processes for improving processes and services or eliminating defects. (Arnheiter & Maleyeff, 2005; Kwak & Anbari, 2006; Parmar & Desai, 2019; Schroeder et al., 2008). These three theories encompass Deming's definition of continuous improvement as the "Improvement Initiatives that increase successes and reduce failures" (Bhuiyan & Baghel, 2005, p. 761).

Proposition 5 – The continuous improvement via the feedback loop on the AI achievement of organisational goals is critical to the management of AI.

5.3.6 Education, Knowledge, and Experience Influence the Management of AI

The individuals' knowledge, education, and skills influence AI management in the organisation. While diverse skill sets were identified in creating AI, these participants and their colleagues in the study were also identified as specialists in their fields. Formal and informal education levels were high, with participants having graduated at doctoral levels of education. High education levels were coupled with participants possessing many years of experience in their business or technology discipline. The following quotes identify the individuals working with AI and acknowledge their colleagues' education, knowledge, and experience can positively influence the management of AI across its creation and use. The lack of education, knowledge, and experience with their colleagues is also evident as an influence on the management of AI, and is identified in the interview data:

> *"We were fortunate enough to have [Senior Executive], who was the CIO at the time, get it." (#10, MM)*

"So, the c-suite of organisations like a [organisation], [Senior Executive] that runs the retail banks and the chief executive officer. They understand this area. So well, it's incredible to think that organisations now are investing so much in it" (#1, EM)

Conversely, the same participant expressed frustration when employed at a previous organisation, as the senior Executive did not have the knowledge to understand the technology, AI capabilities, and benefits:

"We wanted to build a single customer layer within a data warehouse. And the business case for that… we're going to spend a lot of money and the Chief the Executive, one of the executives was like, well, this data warehouse that you talk of? What does it look like? You have to take me to see it! I was like, Why do you need to see it? ….at that point people didn't understand, they didn't really know." (#1, EM)

Respondents also discuss the importance of education in the management of AI and the higher level of education among software engineers:

"The thing that works to make it effective is communication, and communication by way of education. If you've got a data strategy that leads to data policy, including AI policy. You've got the makings of being able to communicate and educate your staff about the direction that you're taking." ("#2, EM).

"It's more than that software. Engineering side controls, then a mathematical control because they're, yeah, creating a new mathematical correction. And most of them. I mean, again, I would say, the average software engineer has a higher mathematical education or familiarity than most." (#6, MM)

The respondent below identifies the "occasional person with less understanding" and assumes AI has magical qualities:

"Every now and then, you do get the odd question of, can it do this? Or can we just plug it in here and turn it on? It'll magically do it. So, you do hit the occasional person who's still not quite at the level of understanding that AI is not magic." (#10, MM)

The data has clarified that higher skill sets, knowledge, and education operate as a positive influence and are beneficial to the management of AI. Conversely, the lack of knowledge about AI is seen as a negative influence on managing it in the organisation. This claim can also be ascertained from the existing literature, which finds the benefits of higher skills and knowledge in individuals within the organisation to positive organisational performance.

Academic research in this field has also found that organisations benefit when they have specialised or higher skill levels among their employees (Baron & Armstrong, 2007; Cuozzo et al., 2017; Hayton, 2003; Ingham, 2007; Toner, 2011). Leiponen (2005) finds innovation more profitable with increased employee skills. These increased and complementary skills employees hold are essential factors in successful innovation. Nerdrum and Erikson (2001, p. 127) claim that "Strengthening organisational resources constitutes a central topic of the strategic management literature", and a deficiency in the skills of resources can negatively impact productivity in organisations (Haskel & Martin, 1993). Drawing on this prior research, it can be claimed that the higher skills of employees engaged with the management of AI influence the management and success of AI in the organisation.

In theorising this observation, several existing theories have drawn on that identify the impact of the varying skills of employees and individuals within the organisation on the organisation's performance. These theories include the Human Capital theory (Becker, 2009) and the Intellectual Capital Theory (Nerdrum & Erikson, 2001; Ulrich, 1998).

Human Capital Theory (Schultz, 1961) posits that the skills and knowledge that individuals hold are a form of capital that is useful to the organisation, while also acknowledging that individuals have differing skill levels. Similarly, the Intellectual Capital Theory also identifies the benefits for the organisation due to the intellectual capital that the individuals in the organisation possess. The greater the intellectual capital an individual holds, the more significant benefit they bring to the organisation (Nerdrum & Erikson, 2001).

To conclude, we offer that the skills of the individuals involved in managing AI in the organisation influence the organisation's management of AI.

Proposition 6 – The Education, knowledge, and experience of the resources influence the management of AI.

5.3.7 Culture is an Influence on the Management of AI

The organisation's prevailing culture and behaviours influence the management of AI. Participants identified the existing cultural attitudes and behaviours in the organisation that

impacted the management of AI considered for creation and use, both positively and negatively. The first two quotes below are from a middle manager presenting a proposed AI solution to improve a customer service process to the senior executives. While the respondent had the business metrics to support using the new AI, the senior executives also wanted to ensure it met the business values. The respondent was surprised and pleased with the rigour that the senior executives enacted on the organisation's values and high ethical culture:

> *"So obviously we love to sell to people. That's no hidden secret about that. But all the executives are very strict on… So when I was presenting, one Executive spoke about how cool this idea is and all my metrics were about how much money you can earn by doing all these things. Then the constant question in individual meetings and in group meetings was what's in it for the customer? What's the problem of the customer you're solving? If you only want to sell and not look at another thing…. you know there is a problem. Otherwise, they're not going to want it". (#4, MM)*

> *"So, we add the value. Obviously, we sell for that and, you know, I mean this is really promising, right? If I'm dealing with people that have a higher ethical standard that even myself, and I considered myself as having high ethical standards. So, you know, you are safe sort of" (#4, MM)*

The quote below is from a middle manager in a long-established financial organisation discussing the organisational culture, which had long lead times to authorise a change to a business function and knowledge management:

> *"It was in the beginning and what we basically did was had to change the attitude towards knowledge management as a whole. This is no longer [the case]. The way we used to run a business where you could take six weeks to sign off content. This [AI- Chatbot] was real-time. This way we're making changes on a daily basis. So we actually endorsed a couple of principles that allowed the conversation owner and the delegation that we've given to one of the teams who can make a decision on what content they choose to push live.: (#10, MM)*

The respondent below discusses the organisation culture in terms of national culture, the difference between countries, Australia, and Japan, the impact this has on AI robot use, and some of the challenges experienced in managing AI:

"I talk about behaviour, I mean, human behaviour. And the reason I bring this and point this out and it's only for Australia is that in Japan where there's lots and lots of robots around. People are very respectful of the robot. In Australia, there's always somebody in a group that goes it's gonna be so funny to put my foot out underneath the wheel of the robot. and then, It is it is and it's just you know that's how that's how people back and if you're in a situation where there's people drinking or something like that, you know" (#14, I)

The respondent below discusses using the organisational culture as a way of endearing the AI robots use by allowing the managers of the robots to name them and aligning them to the corporate culture. In this example, the use of corporate culture is beneficial in managing AI:

Well, actually, I let the team create their own name. So that's a way to encourage it. Because if you find that there's teams where each have, like you have, a corporate culture or culture within the company, but each team has its own culture. (#26, EM)

These observations from the data are consistent with current literature in the field of organisational culture and its impact on the organisation's management. It is recognised that an organisation's culture impacts its actions and functions, including those of management and leadership (Cadden et al., 2020; Carvalho et al., 2019; Mohelska & Sokolova, 2015; Muls et al., 2015; Tortorella et al., 2021). Wallace et al. (1999) identify a relationship between an organisation's culture and managerial values in an Australian public sector agency. The organisation's culture is an important influence on the adoption of digital technologies to improve organisational performance (Martínez-Caro et al., 2020). Innovation within the organisation is also identified as being influenced by its culture (Halim et al., 2014; Lee et al., 2008; Salim et al., 2019). The study of organisational culture in academic literature is a popular field in management disciplines, and much literature exists in the domain of an organisation's cultural influences, on organisational management, performance, and innovation in organisations.

In relating relevant theories to the observed influence of organisational culture on AI management, we can note several theories. One is Social Exchange Theory (Cook et al., 2013; Cropanzano & Mitchell, 2005), which, while originating in social contexts, also has applications in organisational situations (Ahmed et al., 2018; Chernyak-Hai & Rabenu, 2018). The theory is

based on an individual's voluntary actions undertaken because of the rewards that may be returned (Blau, 2017).

There is also Leader-member Exchange (LMX) Theory (Dansereau et al., 1975; Graen et al., 1982). This notes that it is the quality of communication between a leader and subordinates that influences the actions carried out within the organisation (Cropanzano et al., 2017; Liden et al., 1997; Van Breukelen et al., 2006). Liden et al. (1997, p. 47) advise that "LMX is determined by a number of antecedents, and in turn, influences a wide range of individual and organizational outcomes". It is the communication and relationship with the leader of the individuals that are managing the AI that interprets the corporate culture and manages AI accordingly.

Schein's Model of Organisational Culture (Schein, 1990) identifies a framework of three levels comprised of the artifacts, values and behaviours that influence an organisation's culture (Hogan & Coote, 2014; Schein, 1983). These artifacts, values, and behaviours by the leaders and senior executives in the organisation influence the AI managers in their management of AI in the organisation. This applies across all the functions of AI that are to be created and implemented, operated, monitored, and measured.

The management of AI is also influenced by the returns the managers will receive from the decisions they make regarding the management of AI. These are indirect or non-written expectations that are taken into account at the manager's discretion to seek rewards or avoid costs that are perceived to result from an action. The following proposition is posited, based on theories of Social Exchange, Leader-member Exchange, and Schein's Model of Organisational Culture.

Proposition 7 – Organisational culture is an influence on the management of AI.

5.3.8 Anthropomorphism is a Factor in Managing AI in the Organisation

Anthropomorphism was observed in two of the interviews conducted in this research. In one interview, it was used as a positive element in managing the AI used within the organisation. In the other instance, it was presented as an element that needed to be managed and had a negative aspect in AI management. We observed that anthropomorphism was present in the management of AI and could therefore be both a positive and negative element to be considered.

Where anthropomorphism was encouraged and viewed positively as an aid to managing the AI in the organisation, the AI was a software robot that completed the functions that a human

employee had performed previously. The managers of the AI were encouraged to name the AI robot as they would a person in the team to assist with the management of the AI, as they would with a human team member. The AI robot's name was recorded in the organisation's human resources system to track and register the AI's existence to ensure it was effectively managed. The management of the AI robot included ensuring it was upgraded in line with other systems and met the information security requirements of identifying the system user.

Providing AI with the characteristics of an employee allowed it to be accounted for in the organisation's systems and processes. This involved for example how many AI robots were being used and assigning a human manager. The Anthropomorphic element also engendered a fondness or positive affection towards the robot. In the quote below, the participant identifies the use of the culture to encourage the engendering of human traits to the AI. The quotes below refer to the AI software robots in use as 'digital workers' as a way for the managers in the organisations to manage them in similar ways to human employees in their teams:

"So we encourage people to think about their digital workers […] We encourage them to think of their workers as well as their digital workers just like we encourage people when we have an IT upgrade or maintenance." (#24, Executive manager)

"I let the team create their own name. So that's a way to encourage it. Because if you find that there's teams where each have, like you have a corporate culture or culture within the company, but each team has its own culture." (#24, Executive Manager)

"But the first name can be, you know, Penguin or like, so this one team who was into the animals that we said, we have a menagerie of robots for like a farm happening over there. And then there's some people into Star Wars and some people into you know. The thing is, is that for change culture, that's what you know. That's what helps them remember as well." (#24, Executive manager)

The quote below provides an example of the participant instilling a management element by defining a common surname for the robots to be registered within the organisation's human resources system:

"But when we're scaling, and each bought was a different animal name…. So the surname we tried to give [was] 'Robo' because everybody was naming it whatever they wanted, but we wanted a consistency. So, the family name 'robo'."(#24, Executive manager)

This participant identified anthropomorphism as a positive way the AI was managed within their realm of accountability. Encouraging the management of the robot by leveraging the existing human management techniques ensured standardisation, accountability and ownership of the AI used within the organisation. The situation in which positive anthropomorphism occurred was intentional and encouraged to foster sound management.

Another study participant again identified anthropomorphism; however, this was from a different perspective. In this case, the recipients of the AI's service projected human characteristics onto the AI. Therefore, the human anthropomorphism toward the AI robot in service needs to be managed. The anthropomorphism of the AI robot then needed additional management elements, such as the example below of a child sharing their sandwich with the AI robot in service:

> *"Surprising behaviour was how much the children responded to the robot there. So, there was a lot of excitement which we expected and just so many wanted to interact. We actually had, you know, a situation where somebody wanted to share their food with the robot, and it's, it's quite difficult to explain to a small child that the robot can't have their sticky sandwich because it will cost thousands of dollars to properly clean it" (#14, individual)*

In contrast, individuals involved in managing AI in their organisations claim that AI is managed, controlled, and explainable. So it is that 'people fear what they do not understand' and engender the view that "these machines are running away doing stuff." The participant viewed the technology termed 'AI' as not actually being as 'artificial' as it has been portrayed:

> *You know, I definitely think that people fear what they don't understand, so I would say probably that…You know, there's a sense that all these machines are running away doing stuff. I mean for me, one of the things that I talk to my team in the organisation about when I think about AI, I I talk about automated or augmented intelligence.*
>
> *Not artificial because everything that we do has a human governance and oversight, you know, everything that we're doing is still explainable.*
>
> *I certainly don't think the financial services should be at a point where they're building things that are very black box like really really impossible to explain to regulators or customers.*

So I think people fear that, but you can control it, right you set the settings, to the point that you're comfortable with it.

…and some of the things that we do in the machine learning models that we build; we get them approved by the regulators and make sure that they're comfortable with what we're doing. (#1, EM)

Anthropomorphism and technology are current topics of investigation in academic literature. The literature demonstrates that AI is often anthropomorphised not only by those who use it but also in academic research (Salles et al., 2020). Mindfulness and anthropomorphism of computers have been discussed, finding that people are often mindless in their assignment of human traits to computers (Kim & Sundar, 2012). Regarding social robots, Duffy (2003) suggests that anthropomorphism is a valuable consideration in designing social robots and their interactions with people. Current research highlights both the positive and negative aspects of anthropomorphising technology in that those involved with its function may or may not be conscious of the process. Our research also finds that both the positive and negative elements of anthropomorphism are present in the management of AI, which individuals and those managing AI may or may not be conscious of.

Anthropomorphism is recognised and explained in several theories. The Three Factor Theory describes the motivations for anthropomorphism as elicited agent knowledge, effectance motivation and sociality motivation (Epley et al. (2007, p. 864). These three factors of the theory align with the participant's motivation for AI management to be associated with anthropomorphic elements. There is a perceived similarity between the AI and a human; in the case of our research, the AI performs the functions humans had previously completed, or the AI robots physically resemble a human. The AI in our research required management and control, with these elements aligning with the effectance motivation and the desire to control and attain competence. The social motivation identified by the theory can also be seen in the team's attachment to the robots via their naming of them.

Proposition 8 - Anthropomorphism has both a positive and negative impact on the management of AI.

5.4 Proposed Grounded Theoretical Framework of AI Management in Organisations

This section offers the proposed theoretical framework concluded from this research. The GTM data analysis is completed with the proposed theoretical framework of AI management

within organisations, as shown in Figure 5.1, a proposed Theory of AI Management within organisations. The 11 themes, 11 relationships and eight propositions drawn from the data analysis have been combined and presented to explain AI management within the organisation.

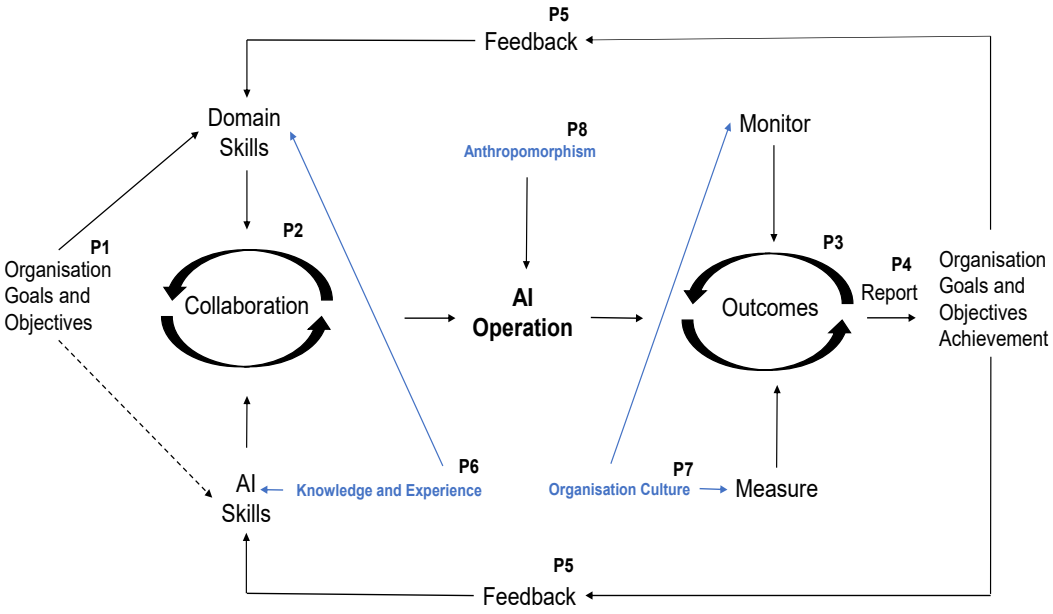


Figure 5-1 Proposed Theoretical Framework of AI in Organisations

Source: Grounded Theory analysis of research interviews

5.5 Discussion of the Research Problem

This section of Chapter 5 summarises the findings in a review of the propositions presented in this study. The findings are grouped into three categories: existing management techniques and influences, collaboration, and anthropomorphism. These three categories are described and discussed in relation to answering the research question of 'How are organisations managing their AI technologies?'.

The successful creation, implementation, and operation of artificial technologies within an organisation require a mix of management techniques. These management techniques are drawn from existing organisation management frameworks and are coupled with enhanced collaboration practices between interdisciplinary skills groups comprising domain skills and AI skills. The management of AI is also accompanied by new elements, such as anthropomorphism; this can assist in the successful management of AI within organisations, or bring challenges that AI managers need to be mindful of. The research findings contribute to

the current discussion on the management of AI and are discussed in relation to the existing academic conversation.

5.4.1 Existing Management Concepts and Practices

Many existing management techniques and frameworks are being applied to the management of AI within organisations. Management functions, practices, and policies that the organisation had in place before the adoption of AI have been extended to include or are being applied to the management of AI within the organisation after its adoption. The existing management practices identified in this research include managing the AI functions and resources in line with the organisation's goals and objectives, monitoring and measuring the functions of AI, managing AI via the outcomes and results AI produces, and managing the continuous improvement of AI to better achieve the organisation's goals and objectives.

The practice of organisations setting goals and objectives and prioritising the organisation's resources to obtain them is an existing practice that is well accepted by organisations and the academic literature (Greenwood, 1981). This practice of assigning the organisation's resources to achieve its goals and objectives is a fundamental part of successful organisations. This practice has also been extended to the management and allocation of AI resources and AI technologies to assist in attaining the organisation's goals and objectives. Regarding the allocation of resources, AI resources are managed no differently than the existing resources in the organisation.

Using existing practices of monitoring, measuring, and reporting on outcomes of the resources and functions of the organisations is an existing technique that organisations are again applying to the management of the AI resources they have deployed. To understand the performance of the organisation's resources, it is common practice to monitor, measure, and report on the performance of the resource. This practice is also evident in the management of AI resources and functions. The management of AI regarding monitoring, measuring, and reporting on its outcomes are no different from the existing functions in place within the organisations.

Management by results is a fundamental aspect of management in successful organisations (Drucker, 2012a). Managing AI via the results that it achieves is identified in this research as applicable, also to the management of AI in the organisation. The AI results, compared to the organisation's goals and objectives, offer the manager information on the decisions and controls they need to enact in carrying out their management functions.

The practice of continuous improvement of processes and functions of the organisation via feedback on the achievement or performance of the organisation's processes and functions is already an existing process in the organisation, and in the associated literature on organisational management (Drucker & Maciariello, 2008). The reporting on the outcomes and results of the organisation's AI, and the measuring against the goals and objectives, provide feedback to those managing the AI to adjust the AI resources to improve their function of meeting the organisation's goals and objectives. Again, managing the organisation's resources, including AI technologies, is managed by the ability of the resources to achieve the organisation's goals and objectives.

This research finds and concludes that existing management practices within the organisation are being applied to the management of AI. These existing management practices assist in controlling and managing the AI resources deployed.

5.4.2 Collaboration Between Interdisciplinary Skills

A unique aspect observed from the research was the importance and reliance on the collaboration between the different skills to manage the AI. The research identified two different skill sets that were involved in the management of AI. The collaboration between these two skill sets, held by the domain and AI resources, carried out the management functions. It was not only the skills associated with AI, such as data scientists, programmers or mathematicians involved in the management of the AI algorithms, but also the involvement of the domain skills to which the AI was applied. The area of the organisations to which the AI is being applied is referred to as the domain. The domains in this research and to which AI is being applied include customer management, marketing, and engineering skills.

The resources with skills in the domain in which AI was applied were highly engaged with the management of AI. This was due to the results of the AI meeting the requirements of the domain's function, which contributed to attaining the organisation's goals and objectives. The domain resources understood the organisation's goals and objectives at a strategic and detailed level, and possessed the skills in the domain to which the AI was applied. The resources with the domain skills used the AI resources as tools to research their goals and objectives, and managed them accordingly.

The resources with skills in AI included those individuals with skills including data analysis, data scientists, programmers or mathematicians or specialist knowledge in the software that facilitates the AI functions. These resources have specific and deep skills in the areas of AI, and they managed and controlled the AI elements within the AI functions in the organisation.

Collaboration between domain and AI resources includes sharing skills, information, knowledge, and undertaking complementary tasks via meetings, approvals, testing and reviewing the AI technologies and functions. Those with domain and AI knowledge are involved with the complex functions and concepts and the deep understanding required in the management of AI. Due to this combination of complex skill sets required by management, collaboration was seen as an important component in management AI. AI management of the creation and operation is therefore equally, if not more, undertaken by those with domain skills to which the AI is applied. The strong and deep collaboration between these skill groups carries out the management of AI in organisations.

5.4.3 Anthropomorphism

This research has pinpointed the prospect that individuals can assign an independent identity to AI or assign human attributes in relation to managing it in a way that personifies AI as an independent entity. The assignment of human attributes can assist in the management of AI or hinder its management. This concept has been identified here as anthropomorphism, the assigning of human traits to a non-human entity.

The anthropomorphism of AI can assist with the management of AI, ensuring an endearment to it in similar ways to what humans would have with other humans. It also helps with assigning management practices, policies, and processes to it, similar to human resources. Assigning AI with human attributes can assist with managing AI in the organisation, as noted by those study respondents managing AI. However, AI's anthropomorphism also allows it to be portrayed or perceived as an independent body that cannot be managed or controlled. In a way, AI is 'magic', or 'is running away doing stuff'. Benefits may exist in the communication and education that AI can be efficiently and effectively managed and controlled.

Those involved with the management of AI clearly need to be mindful of anthropomorphism. AI should not be seen as an entity that cannot be managed or controlled. It should not be seen as an uncontrollable entity but rather as being controllable and manageable.

5.6 Conclusion

This chapter has discussed the data analysis findings and presented the propositions drawn from this research. It has offered a grounded theoretical framework for the management of AI in the organisation and discussed the findings concerning the research question on the management of AI in the organisation's context. In understanding the management of AI in the organisation, the management of AI extends beyond the AI resources. It includes the

management of the domain to which AI is applied and the goals and objectives of the organisation. AI management is not confined to the mathematical aspects of algorithms, although they are essential. It must be managed in the greater context of the organisation's goals and objectives.

Given this greater context for AI management, the principles derived from existing theories of management and resource management can be applied to its management. AI is another resource or tool an organisation may use to attain its goals and meet its objectives. Using existing management practices and techniques, and coupled with the collaboration between interdisciplinary resources involved in the management of AI, AI management functions span more than one domain or resource skill set. Finally, this research has identified and highlighted the need for AI managers to be mindful of assigning human attributes to AI. Anthropomorphism can have both a positive and negative impact on its management.

This chapter has discussed the data analysis results regarding the research problem defined in Chapter 1. The following Chapter, Chapter 6 Conclusion, summarises this research and the implications of this discussion. The concluding chapter also discusses the significance and the contributions of this research to this field of study. The conclusion chapter also provides the research's strengths and limitations and future research opportunities.

Chapter 6. Conclusion

The preceding chapters to this chapter include Chapter 1, the introduction to the research, offering the background to the research, and the research question. Chapter 2, the review of related literature. Chapter 3, the methodology by which this research has been conducted. Chapter 4 is the data analysis chapter, which presents and analyses the data. The preceding chapter, Chapter 5, discusses the data analysis and offers the findings. This chapter presents the conclusions drawn from the study and identifies the implications and contributions to the existing research and knowledge.

6.1 Introduction

This chapter is the final chapter in this thesis of six chapters and offers the unique findings of the research and the contributions to knowledge that can be concluded. It concludes the research by offering the critical findings, research contributions, and implications of how organisations manage their AI technologies. This research is inspired by the recent growth in AI technology use in organisations which has created the requirement for it to be managed. It was undertaken following calls in academic literature to investigate AI management, and requests for explanatory theories and frameworks to be established. To answer this call for further research, the following request question, and sub-questions were established.

The primary, overall research question, *How do organisations manage the Artificial Intelligent (AI) technologies deployed within their organisations?* is supported by four sub-questions, the focus of which is to identify the factors, relationships, people, and influences, involved with managing AI within the organisation. The research sub-questions are:

1. *What are the factors involved in managing AI Technologies?*
2. *What are the relationships between the factors in managing AI Technologies?*
3. *Who is involved in managing AI technologies in organisations, and what is their role in the management process?*
4. *What are the facilitating and inhibiting influences on the factors and relationships in managing AI Technologies?*

This study has taken a qualitative, inductive approach to answering the research questions, using GTM to create a theoretical framework. Thirty unstructured interviews were conducted with AI managers within organisations, ranging from senior executives to the individuals who specifically manage AI. The participants were drawn from various industries and their

associated organisations, including finance, engineering, telecommunications, and technology (software and hardware). The organisations the participants represented varied in orientation from global to national to local. The organisational size varied from large companies, with over 100,000 employees, to small businesses with two employees. The participants managed various AI types, including chatbots, machine learning, and robots, with customer management, marketing, and engineering applications.

The data was analysed by coding the transcribed interviews and creating memos capturing the participants' sentiments and conversations. The themes and relationships were then derived from coding and memo-ing as described by the GTM. The propositions and theoretical framework presented were developed from the identified themes and relationships. The investigation identified the factors, people, relationships, and influences in managing AI in organisations.

In understanding these factors, roles, influences, and relationships in the management of AI, this research contributes to theory via a proposed framework explicating AI management in organisations. Further contributions from this research were delivered via the implications that can be drawn for theory, practice, and policy resulting from this research. Concluding this research, an evaluation of the limitations and areas of future research areas have been documented.

This chapter is presented as follows: the key findings and research contributions are identified; the implications of this research are stated regarding the theory, policy, and practice; the limitations of the research are listed; and finally, the implications and opportunities for further research are stated.

6.2 Findings from the Research

The findings from this research are represented here in three stages.

1. Stage one answers the research's sub-questions by identifying the factors, people, influences, and relationships involved in managing AI within the organisation.
2. Stage two answers the research question by synthesising the answers to the research's sub-questions, resulting in the theoretical framework (Figure 6-1) and propositions (Table 6-1) that answer the research question.
3. Stage 3 presents the culmination of the findings drawn from the research questions.

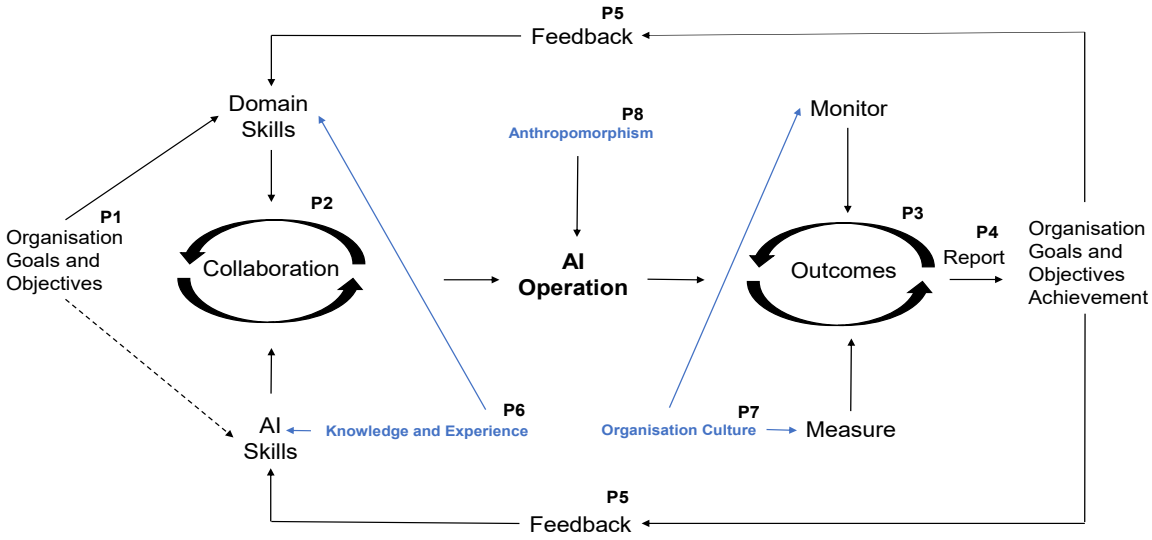


Figure 6-1 The Theoretical Framework of AI Management in Organisations

Source: Analysed Data

The answers to the research sub-questions include:

What are the factors involved in the management of AI technologies?

This research has identified five factors involved in the management of AI.

1. The organisation's goals and objectives: the organisation's goals and objectives are used by those managing the AI to determine how the organisation's functions will be applied with the new technology.

2. The collaboration of AI skills and domain skills involved in managing AI: the management of AI is carried out by more than one skill set. The management of AI requires collaboration between the resources with AI skills and domain skills in the area that AI is being applied.

3. The monitoring, measuring, and reporting of the outcomes of the AI: an important component of the management of AI is the monitoring and measuring of the outcomes that AI is producing. The monitoring and measurement of the AI outcomes and results are performed by both the resources with AI skills and domain skills.

4. Continuous improvement via the feedback and adjustment of the AI: continuous improvement is a function of the management of AI. It is via monitoring and measuring that the AI is assessed and adjusted to improve its functioning.

5. The achievement of AI in reaching the organisation's goals and objectives: the goal and objective of AI in organisations is to assist the organisation in reaching the

organisation's goals and objectives. AI is monitored and measured to ensure it is meeting the organisation's goals and objectives.

Management actions are taken to ensure that the AI is achieving the goals and objectives of the organisation. These management actions are understanding the organisation's goals and objectives, and the collaboration between the interdisciplinary resources of domain and AI skills and knowledge. The monitoring and measuring of the outcomes and results of the AI and the ongoing adjustment to ensure that the AI is meeting the goals and objectives of the organisations. It is the combination of these management functions by which organisations are managing their AI.

What are the relationships between the factors involved in managing AI technologies?

This research has identified 11 relationships in the management of AI, which are listed below, accompanied by an explanation of each.

1. **Organisation's goals and objectives and domain resources.**

   The relationship between the organisation's goals and objectives and the domain resources has been identified in managing the functions of AI created and what the AI needs to achieve. The organisation's goals and objectives are communicated to the domain resources to be used in the management of the AI.

2. Organisation's goals and objectives and AI resources.

   Similar to the above relationship, the organisation's goals and objectives are communicated to the AI resources to assist in managing AI to ensure the AI benefits the organisation.

3. Domain resources and AI resources.

   A relationship exists between the domain and AI resources in managing AI. Both entities communicate their information and knowledge pertaining to the management of AI. The skills of the domain in which the AI will function, and the AI skill sets are together required to manage AI.

4. Collaboration between domain resources and AI resources.

   A collaborative relationship has been identified between domain resources and AI resources. The relationship is the sharing of each resource's skill set to manage the AI, through the stages of creating, operating, measuring, monitoring, and improving the function of AI and finally assessing if the AI is meeting the organisation's

requirements. The relationship resources the different skill sets to share their knowledge iteratively to manage the AI.

5. Outcomes of AI and monitoring and measuring.

   The outcomes and results of the AI functions are monitored and measured, and the elements monitored and measured are also guided by the organisation's goals and objectives.

6. Measures and reporting on the outcomes of the AI.

   The measures are then reported to those managing the AI. The measures reported are compared to the organisation's goals and objectives.

7. Reporting on AI achieving the organisation's goals and objectives.

   The reporting on the outcomes and results of the AI functions in operation is then compared to the organisation's goals and objectives, which the AI was set up to achieve.

8. Organisation's goals and objectives achievement and feedback.

   The attainment of the AI in achieving the goals and objectives, or its failure to do so, is followed by feedback to those who continuously manage the AI to improve it, or those who assign the AI resources.

9. AI and domain resources and their education and experience.

   A relationship exists between AI and the domain resources who manage the AI and their education and experience. Greater education and experience held by those managing the AI were seen as a benefit and influence in successfully managing the AI.

10. Organisation culture and the monitoring and measuring of AI.

    A relationship exists between the organisation's culture and the monitoring and measuring the AI in use. The organisation's culture influences the monitoring and measuring conducted on the AI in use.

11. Anthropomorphism of AI and AI management.

    A relationship was detected between the management of AI in organisations and the individuals assigning human-like characteristics (anthropomorphism) to the AI in use.

The relationship was noted to occur between those managing AI, and those using the AI. Both those using and managing the AI could anthropomorphise the AI functions.

Who is involved in managing AI technologies in organisations, and what is their role in the management process?

This research has identified two categories of individuals involved in managing AI within an organisation. The two categories are those involved directly and indirectly.

Those directly involved in managing AI within the organisation.

- Domain resources.
- AI resources.

Those indirectly involved in the management of AI within the organisation.

- Individuals that set the organisation's goals and objectives.
- Individuals involved in the monitoring and measuring of AI.

What are the influences on the factors and relationships in managing AI technologies?

Three influences have been identified on the management of AI in organisations.

1. The skills and experience of the resources involved with AI management, influence AI management in the organisation. The resources managing the AI draw on their experiences and education and apply their knowledge when managing the AI.
2. The organisation's culture influences the management of AI, as existing management techniques are often extended or implemented to manage AI.

   The organisation's culture influenced the monitoring and measuring of the AI performed within the organisation. Existing practices were extended and adopted by those responsible for the AI management. The existing practices influenced what was measured and how the AI was measured.
3. The application of anthropomorphism, the assignment of human characteristics to AI, can influence the management of AI. The assignment of human traits to AI by those managing the AI influenced the actions required and then taken to manage the AI.

The second stage of this research's findings is answering the question, '***How do organisations manage the AI technologies deployed within their organisations?'*** The research question is answered by consolidating the findings of the research sub-questions. The findings of the sub-

questions as to the factors, relationships, influences, and who is involved in the management of AI have been integrated to produce eight propositions and the theoretical framework. The research propositions are shown in Table 6-1 Propositions Concluded from the Research, and the Theoretical Framework of AI Management in organisations is shown in Figure 6-1.

Number	Proposition
1.	The organisation's goals and objectives set the basis for AI technology and are a fundamental driver in managing its AI.
2.	The collaboration between, domain skills and AI skills manages the creation and operationalisation of the AI.
3.	AI is managed by the existing functions of the organisation, including monitoring, measuring, and reporting to ensure the achievement of the organisation's goals.
4.	AI is managed via the outcomes and results it produces.
5.	The continuous improvement via the feedback loop on the AI achievement of organisational goals is critical to the management of AI.
6.	The education and experience of the resources influence the management of AI.
7.	Organisational culture is an influence on the management of AI.
8.	Anthropomorphism occurs in the management of AI.

Table 6-1 Propositions Concluded from the Research

Source: Analysed Data

The third phase of the findings identified from this research is the summary of the key findings. The first key finding is that the existing management practices and influences in the organisations also manage and influence the AI in the organisation. These influences include those of existing organisational culture and the knowledge, education, and experiences of those managing the AI. These influences impact the resources with the domain skills and AI skills in managing AI. At the same time, the existing management practices of monitoring, measuring, and reporting on the outcomes of AI form the basis of AI management in the organisation. These outcomes and the result of AI use are then compared to the organisation's goals and objectives.

Considering the management of AI via the outcomes and results AI produces in the organisation's greater context, current management and resource management theories can

be applied to the management of AI. AI is another resource or tool that the organisation can use to meet its goals and objectives; hence, it is also managed in this context. AI is managed because it is deemed to be a resource that can assist the organisation in meeting its goals and objectives.

The second key finding is that the management of AI in the organisation extends beyond the AI resources. AI management is not confined to the mathematical aspects of algorithms, although they are essential. Managing AI also requires domain resources to be involved in management and to and carry out related tasks in managing AI. It includes the management of the domain to which AI is applied and connects to the overall goals and objectives of the organisation. Organisations manage AI in the greater context of the organisation's goals and objectives. It therefore requires those with knowledge and understanding of those disciplines to be involved with the management of AI.

Finally, a novel finding of this research includes the identification of anthropomorphism in the management of AI. This research has found that managers anthropomorphise AI in resource management. Managers may also need to manage the AI stakeholders who may anthropomorphise the AI in their management. Those managing AI should be conscious of the effects of anthropomorphising AI, as it can be both a negative and positive element in the management processes.

To summarise the key findings, the extant management practices continue to be applied to the management of AI, collaboration between AI and domain resources is essential in managing AI, and anthropomorphism is used in association with the management of AI.

6.3 Research Contributions to Theory

This research contributes to theory and the existing body of knowledge in predominately three ways:

1. by offering a theoretical framework for managing AI within organisations.
2. by offering propositions that can be used to test the theoretical framework.
3. by applying the grounded theory methodology to investigate the management of AI in organisations.

This research therefore proposes a theoretically grounded framework to describe the management of AI in the organisation and which contributes to the call for theoretical work on how AI should be managed in organisations (Berente et al., 2021; Brynjolfsson et al., 2021;

Chiarini Tremblay et al., 2021). The proposed framework incorporates the factors, themes, relationships, and influences identified from the research, and constructs a theoretical framework in response.

This research provides eight propositions by which the framework is constructed and supported. These propositions also contribute to the current body of knowledge on managing AI within the organisation. These propositions also offer a theoretical basis for testing in future research (Perry, 1998).

This research also contributes theoretically to exemplify the use of GTM by applying it to the management of AI within organisations. The research also supports Grounded Theory as a method for studying new phenomena, including those in Information Technology and AI management, as offered by Glaser et al. (2013); Lebovitz et al. (2021); Levina (2021). This research again supports GTM for its usefulness in creating new theories via its application and contribution to developing management understanding, as Douglas (2003) noted.

6.4 Implications for Policy and Practice

Much of the current discussions and critical areas of concern on the management of AI focus on ethical issues (Canca, 2020; Hagendorff, 2020, 2022; Schiff et al., 2020), managing the bias in AI (Challen et al., 2019; Haussler, 1988; Ntoutsi et al., 2020; Parikh et al., 2019) and the need for AI to be explainable (Arya et al., 2019; Holzinger et al., 2019; Preece, 2018; Silberg & Manyika, 2019). This research offers some novel differences and variations from this trend, identifying existing management practices that are transferred, enhanced, and used in managing AI in the organisation and have implications for policy and practice.

6.4.1 Implications for Policy

There are several implications for public sector policy and regulations resulting from this research. This research provides an understanding of how organisations currently manage AI. Understanding how organisations are currently managing AI in use assists policies and regulations to be created and implemented with more significant impact, accuracy, and effect.

While much research exists calling for new policies and regulations concerning the management of AI use (Erdélyi & Goldsmith, 2018; Pesapane et al., 2018; Roberts et al., 2021; Smuha, 2021), this research finds that existing management practices are being used and suggests that existing policies and regulations may still be applicable. This research indicates that existing policies and regulations can be applied to the management of AI. Those creating policies could investigate strengthening or dedicating existing policy functions to AI.

Strengthening regulations like current data privacy regulations and anti-discrimination laws could provide the required guidance. Dedicating police functions to the area of AI could also be helpful. An example of applying existing regulation functions may be appointing a dedicated independent ombudsperson (Daskal et al., 2020) to AI, which may be appropriate for regulating AI rather than new policies. This research hopes to provide some regulatory and policy institutions insights into how AI is managed in organisations, thus offering guidance on the regulation and policy to assist in gaining the benefits of AI.

6.4.2 Implications for Practitioners

Practitioners in organisations, both public, private, and not-for-profit organisations, can benefit from this research. This study may be helpful to practitioners through the implications of this research. The research findings may benefit managers within organisations and educators of AI skills and disciplines adopting AI technologies. This research offers four findings: the theoretical framework, the identification of the existing management practices being applied to AI, the importance of collaborations by skilled interdisciplinary resources, and the mindfulness of the anthropomorphism that AI can attract.

The first implication noted from this study is that the theory offers a framework by which an organisation can manage the AI in use to assist in successfully attaining its goals and objectives. Practitioners managing AI in organisations are provided with a framework to review. This study may assist the managers of AI by providing insights into how various organisations across various industries and AI applications manage AI technologies. At the same time, the framework may also offer the opportunity to avoid the negative impacts of AI use that are also widely discussed (Fast & Horvitz, 2017; Vinuesa et al., 2020).

Secondly, the study highlights that existing functions and processes can be used to manage AI technologies. Existing management practices involving managing by results are applied to AI, ensuring that the results of AI are monitored and measured against the expected outcomes, and aligned with the organisation's goals and objectives. Understanding how AI is managed in and by organisations can also assist in directing those who set the goals and strategies of the organisation.

Thirdly, this research highlights to managers of AI within the organisation the importance of collaboration between the different skills groups of the domain area and AI skills within the organisation. These different skill resources are required to understand all aspects of AI, its output in the domain area to which it is applied, and the AI algorithms. These different skill groups must work together to manage the AI to successfully derive the benefits AI affords.

Lastly, this research identifies the presence of anthropomorphism in managing AI. Practitioners need to be mindful that anthropomorphism can exist in managing AI and can be helpful in managing AI. However, this research has also identified that managers of AI need to be mindful when stakeholders anthropomorphise AI, as this can harm its management.

This research may be helpful to educators of students in the fields of AI and domains in which AI can be applied. Students of AI should have good AI skills, such as mathematics and data science, but also the ability to collaborate and understand the concepts of an organisation's goals and objects and the importance of domain knowledge in managing AI across its creation and operation. Students in the domain fields to which AI is applied also require an understanding of AI, collaboration skills and the importance of enacting them, and understanding the organisation's goals and objectives. For both its positive and negative aspects, those managing AI need to be aware of anthropomorphism and its impact on managing the technology.

Similarly, domain resources should comprehend the usefulness of AI to complete their goals and objectives within the organisations and their need to partake in the management of AI within their domain. Management scholars can benefit from an awareness of AI and the requirement for management practices to be applied.

6.5 Limitations of the Research

This study has several limitations, including the broad orientation of this research. This research does not cover the popular areas of ethics, bias or explainability in the management of AI. The theoretical framework and propositions offered by this research have not been tested in this research.

This study is based on various industries, AI functions and applications. Specific fields or industries may have different models and requirements for AI management in such applications and organisations. This research contained no medical applications of AI, and this may be an industry with a differing management framework. No limits were placed on the type of AI or any subcategory, such as Machine Learning (ML), Natural Language Programming (NLP) or Neural Networks (NN) management. These subcategories of AI may have nuanced functions for their management that would also be worthy of further investigation. This study is broad and did not focus the investigation on the nuances of any field or topic.

This research has focused on general management functions, including management by outcomes, monitoring, measuring, and continuous improvement as identified by the GTM

analysis. These are high-level management functions. However, many other elements, including mathematical management and domain-specific elements, were present in the interviews, and were identified as a sub-component of the factors identified.

Ethical issues, bias, and explainability are popular topics in AI discussions. Much literature in both academic and mainstream domains discusses these in managing AI, however this research has not commented on these elements. The current topics in academic discussion regarding AI management, such as ethics, was not a dominant factor offered in the interviews by participants about how AI was managed and are thus not included in this research. Bias is also a popular topic in AI, as much popular literature raises the concern that AI is biased and needs to be managed for this. Again, this was not an important topic, or the first topic discussed regarding AI management with the participants in this study.

This research offers as its findings eight propositions and a theoretical framework of how AI is managed in organisations. These eight propositions were not tested via qualitative or quantitative techniques to validate the findings. The theoretical framework derived from the research has also not been tested qualitatively or quantitatively to confirm its effectiveness in representing the management of AI in organisations.

6.6 Further Research Opportunities

Further research opportunities are available to build on this research in several areas. This study is based on a broad range of industries and AI functions, which offers the opportunity for a deeper investigation into the possible differences in AI management across different industries and applications of AI management. The management of AI in medical applications and organisations may differ from that of non-medical applications, and different industries may offer nuances in how AI is managed. Opportunities exist for future studies to focus on specific industries to provide deeper insights into unique anomalies (Berente et al., 2021; Haenlein et al., 2019).

The propositions and theoretical framework identified in this research also offer opportunities for testing in future research (Alsheibani et al., 2018). The eight propositions identified in Chapter 5 can be tested in future research (Perry, 1998). The theoretical framework resulting from this research allows researchers to test, refine, and expand the framework to advance its effectiveness and use. Quantitative studies would also add value to this conversation on how organisations manage AI and test the proposed framework.

The popular topic of ethics, bias, and explainability could also be studied regarding the framework and where they are situated within its structure. The ethical component involved with the management of AI has much potential for further research; it was not a dominant topic offered by the interviewees in this research, despite the fact that there is much academic literature on the topic (Canca, 2020; Jobin et al., 2019; Whittlestone et al., 2019). Further research could investigate this phenomenon to increase understanding and identify differences in findings on the ethical management of AI. It is also worth exploring the ethical management within the organisation's operations outside of AI, and those concerned with AI, to note if consideration is given to AI functions as opposed to regular or other business functions, as it is not only AI that can be unethical (Jeanes, 2017).

Similarly, bias is another factor that was not prominent in this research and is offered as an area to be explored as to why it was not a significant factor in this research, even though it gets mentioned in academic and other literature (Ferrer et al., 2021; Roselli et al., 2019).

One topic prevalent in academic literature is the explainability of AI (Arya et al., 2019; Ehsan et al., 2021). Again, this factor can be explored with future research to identify its relationship with the proposed framework or if a different or alternate theory is needed for its operations. This research has identified two different skill sets involved with managing AI: domain skills and AI skills, which are the skill sets responsible for explaining the AI in the organisation. The question arises as to who are the individuals or skill sets that are the recipients of the explanation, and which skill set is responsible for managing the explainability of AI? These are questions worthy of future research.

Differences may occur in the management of AI created within the organisation and between the management of AI within enterprise management systems. Further studies could focus on how organisations manage the AI in their enterprise management systems with AI embedded in them and those they create themselves. There may be differences in the management of these different sources of AI due to the AI embedded in the enterprise system not being as visible or as easily measured by the organisation as the AI created within the organisation. This is also a possibility for further research.

The recent popularity and rapid adoption of generative AI such as ChatGPT (OpenAI., 2021) offers another opportunity for examination and research. The ChatGPT offering allows individuals within the organisation to access AI for little or no cost and can significantly benefit individuals performing their job functions. Future research will add useful insights into how the

organisation manages this, given the adjustment from AI being an organisation's tool, to an individual tool of use in carrying out an organisation's functions.

Finally, an opportunity exists to investigate the management of AI and the organisation's performance (Chowdhury, 2019; Kamble & Gunasekaran, 2020; Rehman Khan et al., 2022). An investigation into the success of the organisations using AI and the organisations' AI management techniques and overall performance is possible. Examining the correlation between AI management and AI achievement and the organisations' success or profitability is a possible area for further research. It may add value to the theoretical framework this research has developed.

6.7 Conclusion

This thesis qualitatively investigates the management of AI in organisations via the inductive, Grounded Theory methodology. The research provides a theoretical framework for the management of AI in organisations, and has identified three main elements in the management of AI:

1. the existing management techniques of managing via results, monitoring, and measuring the outcomes are still applied to the management of AI.
2. collaboration between different disciplines is critical to the management of AI.
3. it is crucial that AI is seen as controllable and is not mindlessly anthropomorphised.

This research has contributed to the research and knowledge base into the management of AI in organisations by identifying critical aspects of the management and the individuals involved.

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Appendix A Definitions

LinkedIn

LinkedIn is a professional networking platform that allows individuals and companies to connect, network, and find employment opportunities. The platform is designed to help users build professional relationships, showcase their skills, and experience, and find job opportunities. Users can create profiles that include their work experience, education, skills, and other relevant information. They can then connect with other users, join groups related to their industry or interests, and engage in discussions and conversations. LinkedIn also allows companies to create pages where they can showcase their products and services, share updates and news, and post job opportunities. The platform offers a range of features for both individual users and companies, including job searching, messaging, and networking tools. LinkedIn is available as both a website and a mobile application. (OpenAI., 2021)

NVivo

NVivo is qualitative data analysis software developed by QSR International. The software is designed to help researchers organise, code, and analyse large amounts of unstructured or qualitative data such as text, audio, and video files. It provides a range of tools and features for analysing data, including the ability to create Visualisations such as word clouds, mind maps, and charts, as well as advanced search and query capabilities. NVivo is widely used in academic and professional research contexts, particularly in social sciences, business, and healthcare fields. (OpenAI., 2021)

MS Teams

Microsoft Teams (MS Teams) is a collaboration platform developed by Microsoft, designed to bring teams together in a single digital workspace. The platform offers a range of communication and collaboration features, including chat, video conferencing, file sharing, and project management tools. It is designed to improve organisational communication and productivity by allowing team members to work together in real time, regardless of their physical location. Microsoft Teams also provides an audio transcription feature that automatically transcribes audio from meetings and calls. This feature allows users to search and read transcripts of recorded meetings, making it easier to find specific information and follow up on action items. The transcription feature also includes speaker attribution, clarifying who said what during the meeting. The platform is available as a desktop and mobile application and a web-based version (OpenAI., 2021).

Google Meet

A Google Meeting is a web-based video conferencing platform developed and provided by Google. It allows users to conduct virtual meetings with audio and video, share screens, and

collaborate with others in real time. Participants can join a meeting via a web link or the Google Meet app on their computer, tablet, or mobile device. The platform facilitates remote communication and collaboration, making it particularly useful for individuals or teams working remotely or in different locations. (OpenAI., 2021)

Zoom

Zoom is a cloud-based video conferencing platform allowing users to host and participate in virtual meetings, webinars, and events. It provides high-quality video and audio communication, screen sharing, recording, and collaboration features. Zoom is designed for businesses, educational institutions, and individuals who must communicate and collaborate remotely. Users can join Zoom meetings from their desktop, laptop, tablet, or mobile device and share their screens, files, and applications with other participants. The platform also offers a range of security features, including password protection, waiting rooms, and encryption. Zoom has become increasingly popular in recent years, particularly during the COVID-19 pandemic, as it allows people to work, learn, and socialise from home (OpenAI., 2021)

Appendix B Call for Participants

Operationalisation of Artificial Intelligence

As you are aware Artificial Intelligence (AI) technologies, such as those assisting with customer retention, marketing and, analysis and decision making are currently being utilised to improve productivity within organisations. These AI technologies are embedded into many Enterprise Management Systems and are also being developed within organisations for application to business functions. I am conducting research, as part of my PhD at the University of Technology Sydney, into how these Artificial Intelligence technologies are operating in organisations and how they are being governed, managed, and controlled.

I am looking for people who work with these functions of Artificial Intelligent applications in their direction, operation, and delivery. If this is you, and you would be interested in sharing your knowledge and insights on this topic, it would be great to hear from you. Your involvement would be anonymous and approximately one hour of your time would be required for an online meeting to discuss the topic.

If this sounds like you and you would like to know more, please message me or contact me at jacque.dinklo@student.uts.edu.au

Regards
Jacque Dinklo
MMgt, MBA, MRes

Appendix C Participant Pre-Consent Information

Participant Pre-Consent

Thank you for considering to taking part in this research - Managing Artificial Intelligence.

Please see the below for details of the research and your role as a participant that you will be asked to agree to via the online consent form.

Participant Information

What is this research project about?

This research project is about the management and governance of Artificial Intelligence (AI) Technologies in operation within organisations. This research is to understand how organisations are managing their Artificial Intelligence Technologies.

Who is doing this research?

My name is Jacque Dinklo, and I am a doctoral student at the University of Technology Sydney, I will be conducting the research. My supervisor is Associate Professor Dilek Cetindamar Kozanoglu, email: Dilek.CetindamarKozanoglu@uts.edu.au

Funding

The researcher receives scholarships from the Australian Government and the University of Technology Sydney to support their studies, however, receives no external funding.

Who can participate?

You have been invited to participate in this study because you have a professional role related to the management and or governance of Artificial Intelligence (AI) technologies within an organisation.

What is involved?

If you decide to participate, you will be invited to participate in a 1-hour interview that will be audio-recorded.

Will participation be anonymous?

Yes, your participation in this research will be anonymous. Your name, your place of work, and the organisation you are associated with will not be identifiable in this research.

Do I have to say 'YES'?

Participation in this study is voluntary. It is completely up to you whether or not you decide to take part.

What happens if I decline to participate?

If you decide not to participate, it will not affect your relationship with the researchers or the University of Technology Sydney. If you wish to withdraw from the study once it has started, you can do so at any time without having to give a reason, just advise the interviewer that you wish to stop the interview and withdraw from the study. If you withdraw from the study, the study audio recordings (if any) will be erased and any transcripts will be destroyed.

Confidentiality

By providing your consent below, you consent to the research team collecting and using the information you share for the research project. This information will be treated confidentially. Your responses will be registered under an alias and your response information will be kept only in secure locations. Your information will only be used for the purpose of this research project. The data collected from your interview responses will be used for this doctorial research project and articles that will be submitted for publication in relevant academic journals and books. Individual participants or organisations will not be identified in any part of the published work arising from this study.

What if I have any concerns or a complaint?

If you have concerns about the research that you think I, Jacque Dinklo or the project supervisor can help you with, please feel free to contact me at Jacque.Dinklo@student.uts.edu.au. You will be provided with a copy of this form to keep if you agree to be a participant in the research.

NOTE: *This study has been approved in line with the University of Technology Sydney Human Research Ethics Committee guidelines. If you have any concerns or complaints about any aspect of the conduct of this research, please contact the Ethics Secretariat on ph.: +61 2 9514 2478 or email: Research.Ethics@uts.edu.au and quote the UTS HREC reference number -* ***ETH20-4586****. Any matter raised will be treated confidentially, investigated and you will be informed of the outcome.*

You will be asked to provide your consent to the below.

I have read and understood the Participant Information.

I understand the purposes, procedures and risks of the research as described in the Participant Information Sheet.

I have had an opportunity to ask questions and I am satisfied with the answers I have received.

I freely agree to participate in this research project as described and understand that I am free to withdraw at any time without affecting my relationship with the researchers or the University of Technology Sydney.

I understand that I will be emailed a copy of this document to keep if I choose.

I agree to be audio-recorded.

I agree that the research data gathered from this project may be published in a form that does not identify me in any way.

I understand that the unidentifiable data may be used for future research purposes related to this project.

I am aware that I can contact Jacque Dinklo (jacque.dinklo@student.uts.edu.au) or Associate Professor Dilek Cetindamar Kozanoglu (Dilek.CetindamarKozanoglu@uts.edu.au) if I have any concerns about the research.

Appendix D Participant Consent Form

Participant Consent Form - Managing AI

Start of Block: Participant Information

Q1.1

Research Project Information and Consent Document.

Thank you for considering to take part in this research. Please see the below for further details of the research and your role as a participant. ***Participant Information What is this research project about?***

This research project is about the management and governance of Artificial Intelligence(AI) Technologies in operation within organisations. This research aims to understand how

organisations are managing their Artificial Intelligence Technologies. ***Who is doing this research?***

My name is Jacque Dinklo and I am a doctoral student at the University of Technology Sydney, I will be conducting the research. My supervisor is Associate Professor Dilek Cetindamar Kozanoglu, email: Dilek.CetindamarKozanoglu@uts.edu.au Funding

The researcher receives scholarships from the Australian Government and the University of Technology Sydney to support their studies, however, receives no external funding. ***Who can participate?***

You have been invited to participate in this study because you have a professional role related to the management and or governance of Artificial Intelligence *(AI) technologies within an organisation.*

What is involved?

If you decide to participate, you will be invited to *participate in a 1-hour interview that will be audio-recorded.*

Will participation be anonymous?

Yes, your participation in this research will be anonymous. Your name, your place of work, and the organisation you are associated with will not be identifiable in this research. ***Do I have to say 'YES'?***

Participation in this study is voluntary. It is completely up to you whether or not you decide to take part.

What happens if I decline to participate?

If you decide not to participate, it will not affect your relationship with the researchers or the University of Technology Sydney. If you wish to withdraw from the study once it has started, you can do so at any time without having to give a reason, just advise the interviewer that you wish to stop the interview and withdraw from the study. If you withdraw from the study, the study audio recordings (if any) will be erased and any transcripts will be destroyed.

Confidentiality

By providing your consent below, you consent to the research team collecting and using the information you share for the research project. This information will be treated confidentially. Your responses will be registered under an alias and your response information will be kept only in secure locations. Your information will only be used for the purpose of this research project. The data collected from your interview responses will be used for this doctorial research project and articles that will be submitted for publication in relevant academic

journals and books. Individual participants or organisations will not be identified in any part of the published work arising from this study.

What if I have any concerns or a complaint?

If you have concerns about the research that you think I, Jacque Dinklo or the project supervisor can help you with, please feel free to contact me at Jacque.Dinklo@student.uts.edu.au. You will be provided with a copy of this form to keep if you agree to be a participant in the research. ***NOTE:*** *This study has been approved in line with the University of Technology Sydney Human Research Ethics Committee guidelines. If you have any concerns or complaints about any aspect of the conduct of this research, please contact the Ethics Secretariat on ph.: +61 2 9514 2478 or email: Research.Ethics@uts.edu.au and quote the UTS HREC reference number -* **ETH20--4586***. Any matter raised will be treated confidentially, and investigated and you will be informed of the outcome.*

- ○ I agree to take part in this research and provide my consent. (1)
- ○ I am not sure, I have some questions. (2)
- ○ I do not wish to take part in this research. (3)

End of Block: Participant Information

Start of Block: Participant Consent

Display This Question:

If Research Project Information and Consent Document. Thank you for considering to take part in... = I agree to take part in this research and provide my consent.

Q2.1 **Participant Consent** *I have read and understood the Participant Information. I understand the purposes, procedures and risks of the research as described in the Participant Information Sheet. I have had an opportunity to ask questions and I am satisfied with the answers I have received. I freely agree to participate in this research project as described and understand that I am free to withdraw at any time without affecting my relationship with the researchers or the University of Technology Sydney. I understand that I will be emailed a copy of this document to keep if I choose. I agree to be audio-recorded. I agree that the research data gathered from this project may be published in a form that does not identify me in any way. I understand that the unidentifiable data may be used for future research purposes related to this project. I am aware that I can contact Jacque Dinklo (jacque.dinklo@student.uts.edu.au) or Associate*

Professor Dilek Cetindamar Kozanoglu (Dilek.CetindamarKozanoglu@uts.edu.au) if I have any concerns about the research.

- ○ I agree to take part in this research (1)
- ○ I do not wish to take part in this research (2)

End of Block: Participant Consent

Start of Block: Block 5

Display This Question:

If Participant Consent I have read and understood the Participant Information. I understand the pur... = I agree to take part in this research

Q3.1 Please provide your name, *initial* or pseudonym to confirm your consent to this research.

_____

End of Block: Block 5

Start of Block: Block 3

Display This Question:

If If Please provide your name, initial or pseudonym to confirm your consent to this research. Text Response Is Not Empty

Q4.1 *Thank you for agreeing to participate in this research. I will be in contact with you shortly to organise an interview time.*

- ○ I would like a copy of the participant consent document emailed to me. (4)
- ○ I do not require a copy of the participant consent document. (5)

Display This Question:

If Research Project Information and Consent Document. Thank you for considering to take part in... = I am not sure, I have some questions.

Q4.2 *You have indicated that you would like more information...*

- ○ Would you like the researcher, to contact you to answer your questions? (1)
- ○ I would like some time to think about it, contact me in a couple of weeks. (2)
- ○ I will contact you if I wish to take part. (3)

End of Block: Block 3

Start of Block: Block 4

Display This Question:

If You have indicated that you would like more information... = Would you like the researcher, to contact you to answer your questions?

Or You have indicated that you would like more information... = I would like some time to think about it, contact me in a couple of weeks.

Or Thank you for agreeing to participate in this research. I will be in contact with you shortly to... = I would like a copy of the participant consent document emailed to me.

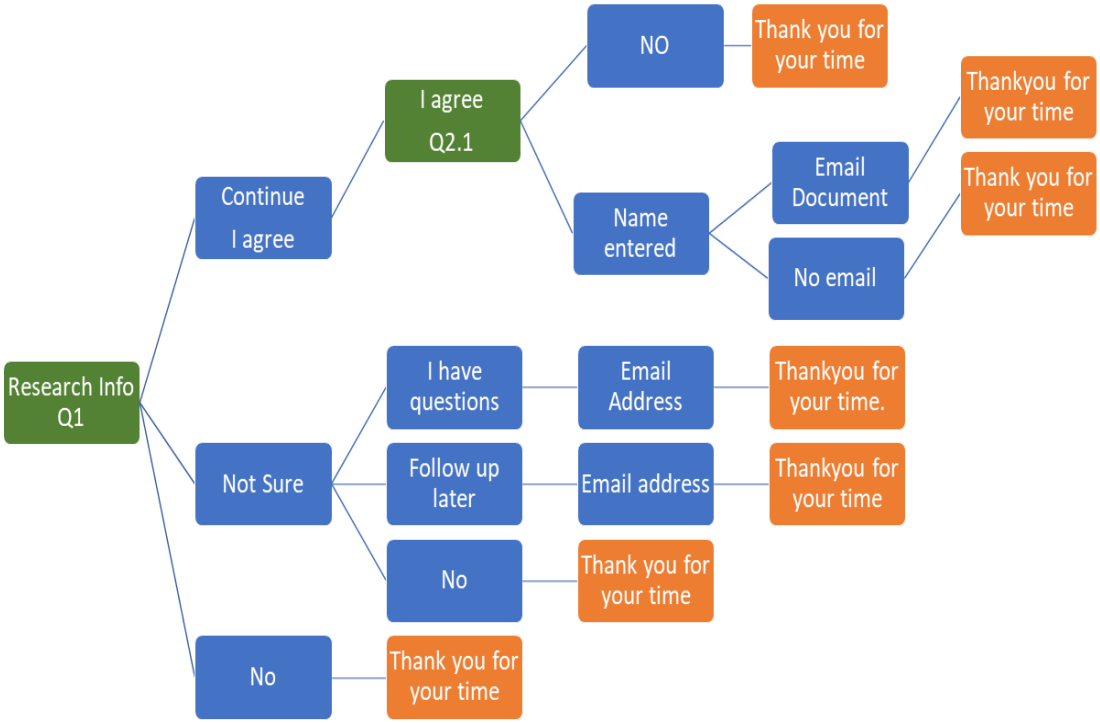
Q5.1 *Please advise your preferred email address*

_____

End of Block: Block 4

Start of Block: Thank you for your time and consideration.

Appendix E Participant Consent Form Logic



Appendix F Post Consent Confirmation Email

Participant Consent Confirmation.

Thank you for taking part in this research - Managing Artificial Intelligence.

Please see the below for details of the research and your role as a participant that you have agreed to, via the online consent form.

Participant Information

What is this research project about?

This research project is about the management and governance of Artificial Intelligence (AI) Technologies in operation within organisations. This research is to understand how organisations are managing their Artificial Intelligence Technologies.

Who is doing this research?

My name is Jacque Dinklo and I am a doctoral student at the University of Technology Sydney, I will be conducting the research. My supervisor is Associate Professor Dilek Cetindamar Kozanoglu, email: Dilek.CetindamarKozanoglu@uts.edu.au

Funding

The researcher receives scholarships from the Australian Government and the University of Technology Sydney to support their studies, however, receives no external funding.

Who can participate?

You have been invited to participate in this study because you have a professional role related to the management and or governance of Artificial Intelligence (AI) technologies within an organisation.

What is involved?

If you decide to participate, you will be invited to participate in a 1-hour interview that will be audio-recorded.

Will participation be anonymous?

Yes, your participation in this research will be anonymous. Your name, your place of work, and the organisation you are associated with will not be identifiable in this research.

Do I have to say 'YES'?

Participation in this study is voluntary. It is completely up to you whether or not you decide to take part.

What happens if I decline to participate?

If you decide not to participate, it will not affect your relationship with the researchers or the University of Technology Sydney. If you wish to withdraw from the study once it has started, you can do so at any time without having to give a reason, just advise the interviewer that you wish to stop the interview and withdraw from the study. If you withdraw from the study, the study audio recordings (if any) will be erased and any transcripts will be destroyed.

Confidentiality

By providing your consent below, you consent to the research team collecting and using the information you share for the research project. This information will be treated confidentially. Your responses will be registered under an alias and your response information will be kept only in secure locations. Your information will only be used for the purpose of this research project. The data collected from your interview responses will be used for this doctorial research project and articles that will be submitted for publication in relevant academic journals and books. Individual participants or organisations will not be identified in any part of the published work arising from this study.

What if I have any concerns or a complaint?

If you have concerns about the research that you think I, Jacque Dinklo or the project supervisor can help you with, please feel free to contact me at Jacque.Dinklo@student.uts.edu.au. You will be provided with a copy of this form to keep if you agree to be a participant in the research.

***NOTE:** This study has been approved in line with the University of Technology Sydney Human Research Ethics Committee guidelines. If you have any concerns or complaints about any aspect of the conduct of this research, please contact the Ethics Secretariat on ph.: +61 2 9514 2478 or email: Research.Ethics@uts.edu.au and quote the UTS HREC reference number - **ETH20-4586**. Any matter raised will be treated confidentially, investigated and you will be informed of the outcome.*

Participant Consent you have accepted.

I have read and understood the Participant Information.

I understand the purposes, procedures and risks of the research as described in the Participant Information Sheet.

I have had an opportunity to ask questions and I am satisfied with the answers I have received.

I freely agree to participate in this research project as described and understand that I am free to withdraw at any time without affecting my relationship with the researchers or the University of Technology Sydney.

I understand that I will be emailed a copy of this document to keep if I choose.

I agree to be audio-recorded.

I agree that the research data gathered from this project may be published in a form that does not identify me in any way.

I understand that the unidentifiable data may be used for future research purposes related to this project.

I am aware that I can contact Jacque Dinklo (jacque.dinklo@student.uts.edu.au) or Associate Professor Dilek Cetindamar Kozanoglu (Dilek.CetindamarKozanoglu@uts.edu.au) if I have any concerns about the research.

Appendix H Participant Consents

Interview Number	Start Date	End Date	Progress	Finish	Recorded Date	Distribution Channel	Q1.1	Q2.1	Q3.1
1	04/11/2020 15:04	04/11/2020 16:00	100	TRUE	04/11/2020 14: 50	anonymous	I agree to take part in this research and provide my consent.	I agree to take part in this research	I do not require a copy of the participant consent document
2	4/02/2021 21:44	4/02/2021 21:45	100	TRUE	4/02/2021 21:45	anonymous	I agree to take part in this research and provide my consent.	I agree to take part in this research	I would like a copy of the participant consent document emailed to me.
3	11/03/2021 21:05	11/03/2021 21:06	100	TRUE	11/03/2021 21:06	anonymous	I agree to take part in this research and provide my consent.	I agree to take part in this research	I would like a copy of the participant consent document emailed to me.
4	18/03/2021 18:38	18/03/2021 18:38	100	TRUE	18/03/2021 18:38	anonymous	I agree to take part in this research and provide my consent.	I agree to take part in this research	I do not require a copy of the participant consent document.
5	28/03/2021 20:33	28/03/2021 20:34	100	TRUE	28/03/2021 20:34	anonymous	I agree to take part in this research and provide my consent.	I agree to take part in this research	I do not require a copy of the participant consent document.
6	15/04/2021 20:47	15/04/2021 20:49	100	TRUE	15/04/2021 20:49	anonymous	I agree to take part in this research and provide my consent.	I agree to take part in this research	I do not require a copy of the participant consent document.

7	5/07/2021 21:56	5/07/2021 21:57	100	TRUE	5/07/2021 21:57	anonymous	I agree to take part in this research and provide my consent.	I agree to take part in this research	I do not require a copy of the participant consent document.
8	7/07/2021 17:50	7/07/2021 17:50	100	TRUE	7/07/2021 17:50	anonymous	I agree to take part in this research and provide my consent.	I agree to take part in this research	I do not require a copy of the participant consent document.
9	15/07/2021 21:18	15/07/2021 21:20	100	TRUE	15/07/2021 21:20	anonymous	I agree to take part in this research and provide my consent.	I agree to take part in this research	I would like a copy of the participant consent document emailed to me.
10	10/08/2021 22:47	10/08/2021 22:48	100	TRUE	10/08/2021 22:48	anonymous	I agree to take part in this research and provide my consent.	I agree to take part in this research	I do not require a copy of the participant consent document.
11	12/09/2021 20:46	12/09/2021 20:48	100	TRUE	12/09/2021 20:48	anonymous	I agree to take part in this research and provide my consent.	I agree to take part in this research	I would like a copy of the participant consent document emailed to me.
12	15/09/2021 1:58	15/09/2021 2:00	100	TRUE	15/09/2021 2:00	anonymous	I agree to take part in this research and provide my consent.	I agree to take part in this research	I would like a copy of the participant consent document emailed to me.
13	22/11/2021 15:36	22/11/2021 15:38	100	TRUE	22/11/2021 15:38	anonymous	I agree to take part in this research and provide my consent.	I agree to take part in this research	I do not require a copy of the participant consent document.
14	25/11/2021 21:47	25/11/2021 21:47	100	TRUE	25/11/2021 21:47	anonymous	I agree to take part in this research and provide my consent.	I agree to take part in this research	I would like a copy of the participant consent document emailed to me.

15	2/12/2021 16:30	2/12/2021 16:30	100	TRUE	2/12/2021 16:30	anonymous	I agree to take part in this research and provide my consent.	I agree to take part in this research	I do not require a copy of the participant consent document.
16	4/04/2022 19:39	4/04/2022 19:40	100	TRUE	4/04/2022 19:40	anonymous	I agree to take part in this research and provide my consent.	I agree to take part in this research	I do not require a copy of the participant consent document.
17	7/04/2022 17:54	7/04/2022 17:55	100	TRUE	7/04/2022 17:55	anonymous	I agree to take part in this research and provide my consent.	I agree to take part in this research	I do not require a copy of the participant consent document.
18	18/04/2022 18:17	18/04/2022 19:36	100	TRUE	18/04/2022 19:36	anonymous	I agree to take part in this research and provide my consent.	I agree to take part in this research	I do not require a copy of the participant consent document.
19	19/04/2022 20:20	19/04/2022 20:28	100	TRUE	19/04/2022 20:28	anonymous	I agree to take part in this research and provide my consent.	I agree to take part in this research	I would like a copy of the participant consent document emailed to me.
20	9/05/2022 22:10	9/05/2022 22:10	100	TRUE	9/05/2022 22:10	anonymous	I agree to take part in this research and provide my consent.	I agree to take part in this research	I do not require a copy of the participant consent document.
21	17/05/2022 20:46	17/05/2022 20:48	100	TRUE	17/05/2022 20:48	anonymous	I agree to take part in this research and provide my consent.	I agree to take part in this research	I would like a copy of the participant consent document emailed to me.
22	17/05/2022 22:11	17/05/2022 23:59	100	TRUE	18/05/2022 0:00	anonymous	I agree to take part in this research and provide my consent.	I agree to take part in this research	I would like a copy of the participant consent document emailed to me.

23	20/05/2022 0:07	20/05/2022 0:10	100	TRUE	20/05/2022 0:10	anonymous	I agree to take part in this research and provide my consent.	I agree to take part in this research	I would like a copy of the participant consent document emailed to me.
24	23/05/2022 17:48	23/05/2022 17:49	100	TRUE	23/05/2022 17:49	anonymous	I agree to take part in this research and provide my consent.	I agree to take part in this research	I do not require a copy of the participant consent document.
25	24/05/2022 21:07	24/05/2022 23:45	100	TRUE	24/05/2022 23:45	anonymous	I agree to take part in this research and provide my consent.	I agree to take part in this research	I would like a copy of the participant consent document emailed to me.
26	26/05/2022 18:19	27/05/2022 0:12	100	TRUE	27/05/2022 0:12	anonymous	I agree to take part in this research and provide my consent.	I agree to take part in this research	I do not require a copy of the participant consent document.
27	29/06/2022 21:40	29/06/2022 21:41	100	TRUE	29/06/2022 21:41	anonymous	I agree to take part in this research and provide my consent.	I agree to take part in this research	I do not require a copy of the participant consent document.
28	30/06/2022 16:31	30/06/2022 16:33	100	TRUE	30/06/2022 16:33	anonymous	I agree to take part in this research and provide my consent.	I agree to take part in this research	I do not require a copy of the participant consent document.
29	7/07/2022 21:28	7/07/2022 22:32	100	TRUE	7/07/2022 22:32	anonymous	I agree to take part in this research and provide my consent.	I agree to take part in this research	I would like a copy of the participant consent document emailed to me.
30	27/07/2022 18:15	27/07/2022 18:26	100	TRUE	27/07/2022 18:26	anonymous	I agree to take part in this research and provide my consent.	I agree to take part in this research	I would like a copy of the participant consent document emailed to me.

Appendix I Aide-Memoire

Aide-Mémoire - Participant Interviews

(Research Question: How are organisations Managing their AI Technologies?)

Pre-interview – Introduction questions and discussion.

Have you been involved with AI for a long time? /When did you start with AI?

How did you start in AI?

How long have you been in your current job?

Is there a dedicated AI / Analytics department?

How do you know that the AI you use is performing as you expect?

Participant Demographics	
Participant Demographics • Size of organisation • Size of department • Participant Title	
Participant Size of AI Install. • Number of Models in use • Number/volume of predictions or decisions? • How long AI has been in use • Level of maturity • Number of people in the department	
Business Function AI is Used to Address. • Customer mgt? • What sort of Decisions is the AI involved in making?	
Type of AI • ML • NLP • Neural Networks	
Level of Management of AI • Senior Exec • Middle Management • Team Leader • Individual Contributor	Senior Exec, Middle Management, Team Leader Individual Contributor
Governance • Directions are given by Senior management in relation to AI • Role's people have / Stakeholders • Structure and Measure to ensure sound oversight	Governance structures and measures? Stakeholders?

• Business function to apply AI to • Policy	Frameworks?
Teams / People /Roles Involved with AI Your Role? Who? How? How do they meet and communicate? **Teams Role** Domains? **Challenges?**	
Management • Measurements • People roles/functions used in Management • Mathematical measures • People • Business function • Challenges with AI?	Discuss and provide examples...
Control • Change • Who has control to change? • Can humans override the decisions? Is there a risk assessment on models? • Check your data? What methods or techniques do you use to ensure the AI predictions are correct?	
General Operations	
Backup/contingency plans in case of failure? Configuration Management - What systems do you use for this? Change Management - Tracking changes? - Implementing changes? Security Management Review of Models / Continuous Improvement? How often are new models released for use?	

General AI Issues	
Ethics How are Ethics Handled?	
Trust?	
Accuracy?	
Policies?	
Training Data?	
Explainable AI?	

Notes: This *Aide-Mémoire* was constructed with the use of the Model of Artificial Intelligence Governance Framework (Almeida, Santos, & Farias, 2020; Commission, 2020).

Is there anything more you would like to add? (Boyce & Neale, 2006)

Appendix J Ethics Research Approval

Dear Applicant,

Re: ETH20-4586 - "How are organisations managing their Artificial Intelligence Technologies?"

Your local research office has reviewed your application and agreed that it now meets the requirements of the National Statement on Ethical Conduct in Human Research (2007) and has been approved on that basis. You are therefore authorised to commence activities as outlined in your application, subject to any conditions detailed in this document.

You are reminded that this letter constitutes ethics approval only. This research project must also be undertaken in accordance with all UTS policies and guidelines including the Research Management Policy.

Your approval number is UTS HREC REF NO. ETH20-4586

Approval will be for a period of five (5) years from the date of this correspondence subject to the submission of annual progress reports.

The following standard conditions apply to your approval:

- Your approval number must be included in all participant material and advertisements.
- Any advertisements on Staff Connect without an approval number will be removed.
- The Principal Investigator will immediately report anything that might warrant review of ethical approval of the project to the Ethics Secretariat (Research.Ethics@uts.edu.au).
- The Principal Investigator will notify the UTS HREC of any event that requires a modification to the protocol or other project documents, and submit any required amendments prior to implementation. Instructions on how to submit an amendment application can be found here.
- The Principal Investigator will promptly report adverse events to the Ethics Secretariat. An adverse event is any event (anticipated or otherwise) that has a negative impact on participants, researchers, or the reputation of the University. Adverse events can also include privacy breaches, loss of data and damage to property.
- The Principal Investigator will report to the UTS HREC annually and notify the HREC when the project is completed at all sites.
- The Principal Investigator will notify the UTS HREC of any plan to extend the duration of the project past the approval period listed above through the progress report.
- The Principal Investigator will obtain any additional approvals or authorisations as required (e.g. from other ethics committees, collaborating institutions, supporting organisations).
- The Principal Investigator will notify the UTS HREC of his or her inability to continue as Principal Investigator including the name of and contact information for a replacement.

This research must be undertaken in compliance with the Australian Code for the Responsible Conduct of Research and National Statement on Ethical Conduct in Human Research.

You should consider this your official letter of approval.

If you have any queries about this approval, or require any amendments to your approval in future, please do not hesitate to contact your local research office or the Ethics Secretariat.

Ref: 12a

Appendix K Example of Open Coding from Interview Data

Open Code	Interview Data Examples
Organisation Function	*"Our customers are marketers" (#16, MM)* *"mortgage"(#16, MM)* *"moving companies applications to the cloud" (#26, EM)* *"like build a building, build a train" (#28, I)*
Dashboard	*"you don't want to be overly managing it but we do need some sort of dashboard." (#15, MM)* *"I really don't believe that any customer actually wants a dashboard." (#16, MM)* *"there are different dashboards for different purposes. Some of it's not in real time. We've actually got a separate dashboard for the machine learning modelling as well." (#17, MM)* *"And as well as continuous sticky insights from that by creating dashboards and things that people can check in and how they can slice and dice that data" (#30, MM)*

AI Measures	*"200 machine learning models and we have 20 million calls a day that the numbers are 400 machine learning models running on top of 157 billion data points all of which operate in real time and there's over 30 million calls to the customer engagement engine every day." (#1, EM)* *"yeah, and get the result, you know, increase the accuracy" (#3, I)* *"Basically the metrics is always very important that this is the thing that we always try to actually set in place" (#4, MM)* *"And so the mathematical rigor is like, well, I can only depend on the accuracy of my data that's so much"* *(#6, MM)*

Appendix L Full List of Open (1st level) Codes

Open Codes (1st level)	Number of Interviews Code mentioned	Number of references to Code
Organisation Problem Solving	14	47
Resource Management	13	23
Data Set	12	23
Creating an AI Model	11	32
Organisation Culture	9	15
Big Data	8	12
Efficiency Metrics	8	22
Improvement	8	10
Technology Understanding	8	11
Organisation Function (Growth)	7	19
Privacy	7	7
Dashboard	7	12
AI Roles	6	8
Management Actions	6	8
Review	6	6
People Behaviour	6	10
Data Scientist	5	10
Machine Learning	5	8
Variables	5	15
Data Privacy	5	7
Communication	5	6
Visualisation	5	11
AI Non-performance	5	5
People's AI Fear	5	6
Positive Sentiment	5	6
Marketing	4	6
Ai Team	4	7
Testing	4	6
Business Process	4	4
Consultants	4	6
Organisational Behaviour	4	5
Compliance Activities	3	3
Infrastructure and Engineer	3	4
Ai Learning	3	4
Mathematics	3	3
Data Accuracy	3	5
Data Strategy	3	5
Information Technology	3	7

Legal	3	5
AI Problem Identification Purpose	3	6
AI Success	3	4
Adjustment	3	3
Learning	3	4
Education	3	3
Executive Support	3	3
Human Behaviour	3	5
Tension	3	9
Government Laws	2	3
Regulatory Bodies	2	2
Customer Sales	2	3
Data Analyst	2	5
Human	2	3
Lack of AI Knowledge	2	3
Software Engineer	2	2
Chatbots NLP	2	14
Social Graph	2	2
Data Error	2	3
Data Governance	2	3
Control	2	3
Alerts	2	4
Customer Satisfaction	2	5
Governance	2	4
Infrastructure Organisations	2	5
Serving Customers	2	2
AI for Well Being	2	4
AI Services	2	2
Chatbots	2	3
Customer Relationship Management	2	2
Customer Sales	2	5
Customers and AI Use	2	2
Frustration	2	2
Assigning AI Human Characteristics	2	7
Audio Skills	1	5
Consultants	1	2
Legal and Risk Departments	1	1
AI Adjustment for Customer Feelings	1	1
Data Principles	1	2
Data Testing Assurance	1	4
External Data	1	2
Social Media	1	1

Approval	1	3
Auditing	1	2
Disparity Metric	1	1
Supervision	1	1
Customer Satisfaction	1	1
Economics	1	2
Performance Indicators	1	1
Accuracy of AI Model	1	1
Number of AI Models	1	1
Customer Satisfaction	1	1
AI in Operating System Infrastructure	1	2
AI in Training	1	1
AI 'Means to an End'	1	2
AI to Detect Process	1	2
AI to Identify Traffic Violations	1	1
Ai Transcription Software	1	1
AI use in Management	1	2
Audio and Video	1	2
Biology	1	3
Climate Science	1	1
Digital Assistants	1	1
Employee Retention	1	6
Emulation of Reality	1	1
Engineering - Infrastructure	1	3
Facial Recognition	1	2
Forecasting Shipping Operations	1	1
Next Best	1	1
Safety with Robot	1	1
Transfer of Knowledge via AI	1	1
Unintended Consequences	1	1
Knowledge	1	1
Negative	1	1
Digital Workers	1	4
Managing AI in the same way as Humans	1	3
Recording AI Robots in the HR System	1	1
Human Behaviour Towards AI	1	1
Perception of AI as Human	1	4

Source: Analysis of Research Interviews

Appendix M Data Structure Diagram

Open Codes	Selective Codes	Themes
○ Organisation Function (Growth) ○ Organisation Problem Solving (Cost Reduction)	Organisation Strategy	Organisation Goals and Objectives
○ Compliance Activities ○ Government Laws ○ Regulatory Bodies	Regulatory Requirements	
○ Audio Skills ○ Consultants ○ Customer Sales ○ Infrastructure and Engineer ○ Legal and Risk Departments ○ Marketing	Domain Areas	Domain Skills
○ Domain Experience ○ Knowledge ○ Psychology	Subject Matter Experts	
○ Ai Roles ○ Ai Team ○ Data Analyst ○ Data Scientist ○ Human ○ Lack of AI Knowledge ○ Software Engineer	AI Skills and Experience	AI Skills
○ AI Adjustment for Customer Feelings ○ Ai Learning ○ Chatbots NLP ○ Creating an AI Model ○ Machine Learning ○ Mathematics ○ Social Graph ○ Variables	Ai Algorithms	
○ Big Data ○ Data Accuracy ○ Data Error ○ Data Governance ○ Data Principles ○ Data Privacy ○ Data Set ○ Data Strategy ○ Data Testing Assurance ○ External Data ○ Privacy ○ Social Media	Data	
○ AI Explainability and Interpretability	Ai Management	

○ AI Managing Itself ○ AI Maturity ○ AI Policy ○ AI Proof of Concept ○ AI Sales - New Products ○ Ai Tools ○ Bias ○ Challenge ○ Cost ○ Ethics ○ Genie Scores ○ Maintaining AI ○ Model Learning ○ Security ○ Shapley Values ○ Testing ○ Trust ○ Use ○ Users Managing their Use of AI		
○ Communication ○ Testing	Seeking Additional Skills	Collaboration
○ Approval ○ Auditing ○ Control	Checking AI	
○ Dashboard ○ Visualisation	Reporting	Results - Outcomes
○ Corrective Actions ○ Optimise	Actions	
○ Alerts ○ Disparity Metric	Ai Monitoring	Monitoring
○ Customer Satisfaction ○ Supervision	Business Function Monitoring	
○ Business Process ○ Customer Satisfaction ○ Economics ○ Efficiency Metrics ○ Governance ○ Management Actions ○ Performance Indicators ○ Resource Management	Business Measures	Measures
○ Accuracy of AI Model ○ Number of AI Models	Ai Measures	
○ Customer Satisfaction ○ Infrastructure Orgs ○ IT	Organisation Goals	Organisation Goal Achievement

○ Legal ○ Serving Customers		
○ AI for Well Being ○ AI in Operating Systems ○ AI in Training ○ AI 'Means to An End' ○ AI Problem Identification Purpose ○ AI to Detect Process ○ AI to Identify Traffic Violations ○ Ai Transcription Software ○ Ai Use ○ AI Use in Management ○ Audio And Video ○ Biology ○ Chatbots ○ Climate Science ○ CRM - Customer Relationship Management ○ Customer Sales ○ Customers And AI Use ○ Digital Assistants ○ Employee Retention ○ Emulation of Reality and Simulation of Reality ○ Engineering - Infrastructure ○ Facial Recognition ○ Forecasting Shipping Operations ○ Next Best ○ Safety With Robot ○ Transfer of Knowledge Via AI ○ Unintended Consequences	AI Achievements	
○ AI Non-Performance ○ AI Success	AI Goals	Continuous Improvement
○ Adjustment ○ Improvement ○ Learning ○ Review	Feedback	
○ Education ○ Knowledge ○ Technology Understanding ○ Consultants	Education And Experience	Influences
○ Executive Support ○ Frustration ○ Human Behaviour ○ Negative ○ Organisation Culture ○ Organisational Behaviour	Organisation Culture and Behaviour	

○ People Behaviour ○ People's Ai Fear ○ Positive ○ Tension		
○ Assigning AI Human Characteristics ○ Digital Workers ○ Managing AI, The Same As Humans ○ Recording AI Robot in HR System	Anthropomorphism as a Management Technique	Anthropomorphism
○ Human Behaviour Towards AI ○ Perception of AI As Human	Anthropomorphism as a Challenge to Managing AI	

Source: Analysis of Research Interviews