

An Action Research Study on Designing a Hybrid Project Management Process and AI Integration Strategy in a Software Startup

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ISURI SHAVINDYA KARIYAWASAM: An Action Research Study on Designing a Hybrid Project Management Process and AI Integration Strategy in a Software Startup

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Software development organisations have undergone rapid transformation over the past decade, particularly due to the rise of artificial intelligence (AI). However, project management practices have not evolved at the same pace, and companies often treat AI integration as a separate process rather than building on a solid project management foundation. This leads to inconsistent practices that limit the effectiveness of AI. This study addresses this gap by exploring how a hybrid project management process, combining PMBOK and Scrum, can be designed and enhanced through AI integration in a real-world software development organisation. The research adopts an action research approach in two phases. The first phase analyses existing project management practices using interviews, observations, focus groups, and ticket analysis, which reveals a lack of formalised process discipline. Based on this, process improvements are developed for the organisation. The second phase evaluates AI integration within the hybrid process. Testing of AI capabilities in ClickUp shows that performance depends heavily on data quality and consistency and reveals issues with the tool itself. Next, a root cause analysis is performed, which identifies organisational and process issues as key barriers to implementing AI in the organisation. Based on these insights, while measures are taken to improve the organisation's project management processes, an in-house AI agent, Nydi, is developed to automate workflows such as daily updates and communication support in Google Chat. The findings show that AI agents improve efficiency but depend on well-defined processes and human oversight. The study validates PMBOK and Scrum as complementary frameworks, demonstrates a real-world application of agentic AI, and shows that effective AI integration requires an integrated strategy for both process and AI design.

Keywords: Hybrid project management, PMBOK, Scrum, process improvement, artificial intelligence, AI agents, workflow automation

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1 Introduction

1.1 Chapter Overview

This chapter introduces the foundation of the research. It opens with a problem statement that establishes the context and motivation for the study, followed by a definition of the research scope. The chapter then presents the research questions and corresponding objectives that guide the study, and discusses the significance of the research from both an academic and practical perspective. A brief overview of the research methodology is provided, along with a declaration of AI use during the preparation of this thesis. The chapter closes with an outline of the thesis structure and a chapter summary.

1.2 Problem Statement

The software industry is undergoing significant transformation, driven by increasing pressure to deliver faster, operate leaner, and integrate emerging technologies into everyday workflows. Artificial intelligence has become a central consideration in how software organisations plan, execute, and deliver projects.

However, despite this momentum, the adoption of both structured project man-

agement practices and AI tools in software organisations frequently remains reactive rather than strategic. A common pattern observed across the industry is the absence of clearly defined, consistently applied project management processes. Teams address challenges as they arise, roles and responsibilities are often informally understood rather than explicitly structured, and process gaps are patched at the surface level without examining their root causes. The result is a fragmented operational environment in which inefficiencies persist not because organisations lack the will to address them, but because they lack the framework to do so systematically.

This has direct consequences for AI adoption. Integrating AI tools meaningfully into organisational workflows requires those workflows to be well defined in the first place. Attempting to automate processes that are inconsistent or poorly understood does not resolve the underlying problem. Despite this, many organisations move forward with AI adoption before their processes are ready. These decisions are often made at the management level, without sufficient attention to process readiness or the perspectives of the team members who will be most affected.

This research addresses both dimensions of the problem. Working in partnership with Tetrynde PVT Ltd, a software startup in Sri Lanka, the study first examines how a structured hybrid project management process can be designed and validated for a real organisational context. It then explores how AI tools and agentic solutions can be systematically integrated into that process, in the right order, and with the full team's perspectives considered at every stage. The aim is not to produce a theoretical model, but to generate practical, evidence-based insights that are grounded in the lived reality of a working software team.

1.3 Research Scope

This research is conducted in partnership with Tetranyde PVT Ltd, a software startup based in Sri Lanka with 10 - 15 team members. The company was selected for two primary reasons. Its size makes it well-suited for iterative process changes, and its leadership has demonstrated a genuine openness to adopting new processes and AI-driven practices. This context provides a practical, real-world environment to design, test, and refine the proposed approach.

The research is structured in two main phases. The first phase focuses on developing and introducing a tailored project management process for the company, built on a combination of PMBOK (Project Management Body of Knowledge) Knowledge Areas and Scrum practices. This hybrid approach was chosen to provide both the structured process coverage of PMBOK and the agile, iterative flexibility of Scrum, addressing the specific gaps and challenges identified within the organization.

The second phase involves a systematic review of AI tools applicable to different stages of the project management process. This includes an evaluation of the AI capabilities of tools already in use within the company, as well as an assessment of new tools not yet adopted. The literature review will examine agentic AI solutions to identify approaches currently available for organizational process automation. Based on these findings, an AI strategy will be proposed to automate suitable process areas, with careful consideration of the team's perspectives, workload, and long-term interests.

Selected practices and automation capabilities from both phases will then be gradually implemented within the company, enabling real-world validation of the

proposed project management process and AI integration strategy.

1.4 Research Questions

Within the above research scope, the following research questions are expected to be answered by the end of the research.

RQ1 - How has software development evolved over the past decade, and has project management kept pace with these changes?

This question will be addressed in the literature review through an analysis of existing research. The review will trace how recent developments, such as the rise of remote work, agile adoption, and the growing adoption of AI, have changed working practices in the software industry, and whether these changes have had a positive impact on teams and processes. It will then examine whether AI has emerged as an integral part of software development and project management as a result of these changes, and ultimately assess whether project management practices have kept pace with the evolution of software development.

RQ2 - How are project management methodologies currently applied in software development organisations, and what are the strengths and limitations of these approaches in fast-paced environments?

RQ2 will be addressed through the literature review, which will explore how project management methodologies are applied across both software development and other industries, providing a broader perspective on common practices and patterns. The review will cover both traditional and agile approaches, examining their respective strengths and limitations in fast-paced environments.

RQ3 - How can a tailored hybrid project management process, in-

tegrating Agile/Scrum and PMBOK methodologies, be designed and validated to address inconsistent project management practices in an IT company?

To answer this question, a literature review will first establish which elements of Agile/Scrum and PMBOK provide the most comprehensive and complementary coverage for hybrid process design. Alongside this, the company's processes, workflows, and pain points will be examined through focus groups and participant observation in regular team meetings. Semi-structured interviews will then be conducted with each role in the team, combining role-specific questions tailored to individual responsibilities with a shared question set designed to surface common challenges across the organisation. Once the focus group and interview data has been collected, the findings will be mapped against the principles of the selected methodologies to methodically identify gaps in current practices.

A tailored hybrid project management process will then be designed to directly address these gaps, and validated through review by team members and senior management. The process, grounded in both the theoretical literature and the empirical findings from the case company, constitutes the answer to this research question.

RQ4 - How can AI tools and techniques be systematically integrated into the phases of the hybrid project management process to enhance planning, execution, and decision-making in an IT company?

RQ4 builds directly on the hybrid process developed in the previous phase, extending it by exploring how AI can be meaningfully integrated into the company's project management processes. As with RQ3, a literature review forms the theoretical foundation, analysing existing AI tools, agentic solutions, and current

research to understand the state of AI integration in project management contexts. Selected technologies will then be practically evaluated to understand their potential across the phases of project management, with particular attention to planning, execution, and decision-making. This includes an assessment of the AI capabilities of a tool already in use within the company, alongside an evaluation of a tool not yet adopted. To complement these findings with real-world perspective, conversations will be carried out with practitioners who are currently integrating AI into their organisational workflows.

In addition, a root cause analysis using the fishbone technique will be conducted to systematically trace any identified AI integration challenges back to their underlying causes across people, processes, tools, and organisational factors.

Based on the literature, the tool evaluation findings, and the practitioner insights, the final output will introduce how AI can be embedded into the tailored process designed for the case company. As with the hybrid process developed in RQ3, the AI integration recommendations will be validated through review by team members and senior management to ensure practical fit and organisational alignment.

RQ5 - What are the anticipated impacts of an AI-integrated hybrid project management process on software development, quality assurance, and delivery outcomes, as perceived by the team members and senior management of the case company?

RQ5 is distinctive within this thesis in that it shifts orientation from process design to process evaluation, examining how the team and leadership anticipate the AI-integrated hybrid process will affect software development practices, quality assurance processes, and delivery outcomes. To answer this question, structured

feedback sessions, guided by a predefined set of questions across the three impact dimensions, will be conducted following the presentation of the completed process and AI integration recommendations developed in the previous phases.

Senior management, Project manager, and team leaders will participate in a group session, where their collegial relationships and established trust allow for collective discussion of expected impacts. Junior developers and the designer will each be engaged individually to ensure their perspectives are captured without the influence of organisational hierarchy. The findings from these sessions will be analysed to identify shared expectations, diverging perspectives, and areas of concern, collectively forming the answer to RQ5.

1.5 Research Objectives

The research objectives are presented in Table 1.1. They correspond directly to the five research questions presented above and are expected to be achieved by the end of this research.

ID	Objective
RO1	To analyse how software development practices have evolved over the past decade and evaluate whether project management methodologies have kept pace with these changes, with particular attention to the growing role of AI.
RO2	To examine how project management methodologies are currently applied in software development organisations and identify the strengths and limitations of these approaches in fast-paced environments.
RO3	To identify and analyse the root causes of project management challenges faced by the case company by examining its processes and team perspectives, mapping current practices against PMBOK and Scrum principles to identify gaps.
RO4	To design a tailored hybrid project management process that integrates Agile/Scrum and PMBOK methodologies, grounded in both theoretical literature and empirical findings from the case company, and validate it through review by team members and senior management.
RO5	To evaluate existing and new AI tools and develop a systematic AI integration strategy that embeds appropriate tools and agentic solutions into the phases of the hybrid project management process to enhance planning, execution, and decision-making, while applying the fishbone technique to trace AI integration challenges back to their underlying causes.
RO6	To evaluate the anticipated impacts of the AI-integrated project management process on software development, quality assurance, and delivery outcomes as perceived by the case company's team and leadership.

Table 1.1: Research Objectives

1.6 Significance of the Research

While theoretical comparisons of Scrum and PMBOK are present in prior research, the literature lacks empirical studies that apply a combined approach to reviewing real company processes and implementing hybrid frameworks in practice. This research addresses that gap by demonstrating how PMBOK knowledge areas and Scrum practices can be integrated into a context-specific process through direct engagement with a case company, contributing evidence of practical applicability that purely conceptual studies cannot provide.

Similarly, while AI adoption in project management is a growing area of interest, research on building organisation level AI strategies using agentic solutions and evaluating their practical fit within existing workflows remains limited. This research contributes to that emerging area by documenting a systematic approach to AI tool evaluation and integration within a real organisational context, offering a foundation for future empirical work in this space.

Beyond its academic contributions, the process, AI integration strategy, and role specific guidelines produced by this research offer a replicable model for other small software organisations seeking to improve their project management practices in a structured and team centric way.

1.7 Research Methodology Overview

This research is grounded in a pragmatist research philosophy, which prioritises practical outcomes and real-world applicability over adherence to a single theoretical tradition. Rather than testing a predetermined hypothesis, the research aims

to design and validate solutions that work within a specific organisational context.

Within this philosophy, the research follows an action research strategy, where the researcher works directly within the case company to understand its challenges, design solutions, and refine them through an iterative process. Action research was chosen because the goal is not simply to observe and describe, but to produce meaningful change in collaboration with the organisation being studied.

To support this, the research draws on a range of qualitative and practical methods. Data is collected through focus groups, participant observation, semi-structured interviews, and informal conversations with practitioners. This is complemented by structured root cause analysis using the fishbone technique and a practical evaluation of AI tools within the company's context. A literature review supports both phases of the research, building the theoretical foundation for the process design and AI integration. The methodology chapter covers the full research design and data collection approach in detail.

1.8 Declaration of AI Use

AI tools were used in a supporting capacity during the preparation of this thesis in the following ways.

- **Language refinement:** AI was used to improve the clarity and academic quality of the writing throughout the thesis.
- **Data organisation:** During the data preparation stage, AI tools were used to summarise and organise notes gathered from interviews, focus groups, and observations. However, these summaries were manually checked to ensure

that all content was correct.

- **Interview question design:** AI was used to support designing and refining interview questions, particularly to ensure process-related questions were clear and well suited to each role being interviewed.
- **Thesis structure:** AI tools were used to support decisions around how the thesis was organised and structured.

In all cases, AI served as a supporting tool only. All research decisions, analysis, interpretations, and conclusions are entirely the work of the researcher.

1.9 Thesis Structure

Table 1.2 presents the structure of the thesis and provides an overview of the content covered in each chapter.

Chapter	Content
Introduction	Introduction of the research problem, scope, questions, objectives, significance of the research, methodology overview, declaration of AI use, and the thesis structure.
Literature Review	A review on existing literature relevant to the evolution of software development and project management practices and examining the current state of use of AI tools and AI adoption in organisational workflows.
Methodology	Discussion of the research methodology, providing a full account of the action research design, data collection methods, and analytical framework.
Implementation	Presentation of both the tailored hybrid project management process and the AI integration strategy developed for the case company, covering the design process, findings, and practical outputs of both phases.
Discussion and Results	Discussion of the findings across both project management and AI integration phases, evaluating them considering all five research questions.
Conclusion	Conclusion of the thesis by reflecting on the research objectives, summarising the key contributions, acknowledging limitations, and identifying directions for future research.

Table 1.2: Thesis Structure

1.10 Chapter Summary

This chapter has established the foundation of the research. The problem statement outlined the reactive nature of project management and AI adoption in software organisations, and the gap this creates between organisational need and strategic practice. The research scope defined the context of the study and introduced the two-phase structure of the research, covering hybrid process design and AI integration respectively. Five research questions were presented, each targeting a distinct aspect of the problem, alongside five corresponding research objectives.

The significance of the research was discussed in relation to both the academic literature and practical applicability. Finally, a methodology overview introduced the action research approach and the mixed methods employed across both phases.

The next chapter presents the literature review, examining the evolution of software development and project management practices, and the state of AI adoption in organisational workflows, establishing the theoretical foundation on which the rest of the research is built.

2 Literature Review

2.1 Chapter Overview

This chapter reviews existing literature relevant to the research across three areas. The evolution of software development and project management, key project management methodologies, and the current state of AI in project management. The chapter concludes with a synthesis of key findings and research gaps that motivate this study.

2.2 The Evolution of Software Development and Project Management

Software refers to a set of instructions, programs, and data that direct a computer to perform specific tasks, as distinct from the physical components that make up a computer system [1]. Software development is the process of creating and maintaining these software systems, encompassing the full lifecycle of a product including planning, design, development, testing, deployment, and ongoing support. The primary goal of software development is to produce software that meets user needs and business objectives in a reliable, efficient, and secure way [1].

A project is defined as "a temporary endeavour undertaken to create a unique product, service, or result", consisting of structured tasks, activities, and deliverables executed to achieve defined goals [2]. Project management is the application of knowledge, skills, tools, and techniques to successfully complete a project within its defined objectives [3]. The project lifecycle is typically structured across five phases. Initiation, planning, execution, monitoring and controlling, and closure, which are carried out consecutively or iteratively depending on the project's nature [2].

Software project management can therefore be understood as the application of these project management principles, processes, and tools specifically to the planning, execution, and delivery of software products.

Software development and software project management have undergone significant changes over the past decade. The following subsections examine these industry developments from three perspectives: the evolution of software development practices, project management approaches, and work culture, including remote work.

2.2.1 Industry Changes over the Past Decade

The software development field has changed significantly over the past few decades, driven by two broad types of forces. The first is the ongoing search for faster, more efficient, and more reliable ways to build and deliver software. This has led to major shifts in how software teams work, including the widespread adoption of Agile, DevOps, and more recently AI-assisted development practices [4]. The second is the impact of unexpected external events, most notably the COVID-19

pandemic, which disrupted how software teams operate and accelerated changes that might otherwise have taken much longer to happen. This section examines the evolution of software development through both of these lenses.

The Evolution of Software Development Practices

Over the past decade, software development has evolved significantly across two interconnected dimensions. How teams work and how technology supports that work.

In terms of working practices, software development teams have widely adopted Agile methodologies, including Scrum, SAFe, Kanban, Lean Development, and Extreme Programming. These approaches prioritise customer satisfaction, iterative delivery, teamwork, and adaptability to changing requirements, marking a clear shift away from the linear, plan-driven methods that previously dominated the field [5].

Alongside this, DevOps emerged as a prominent practice, aiming to eliminate the gap between development and operations teams and enable faster, more efficient software delivery through closer collaboration [6]. More recently, DevSecOps has gained traction as organisations seek to embed security practices directly into the development process, driven by the increasing use of cloud infrastructure and AI across all aspects of development [7].

The most significant recent development, however, has been the rapid integration of Artificial Intelligence into software development workflows. AI tools now assist developers across a range of tasks, from code generation and completion to infrastructure management and full application development. GitHub Copilot, for example, has grown from 1.3 million paid users and 50,000 organisations in 2024

to over 20 million users and 230,000 organisations in 2025, reflecting the speed at which AI assistance has become embedded in development practice [8][9].

The Stack Overflow Developer Survey (2025), conducted among 49,000+ professionals across 177 countries, reveals that the proportion of developers using or planning to use AI tools in their development process has increased by 8% compared to the previous year. However, the survey also reveals that more developers actively distrust the accuracy of AI tools than trust it, with only 3% reporting that they highly trust AI-generated output. Furthermore, positive sentiment towards AI tools has declined in 2025, falling from above 70% in both 2023 and 2024 to 60% in 2025 [10].

Beyond individual tools, the field is moving towards multi-agent systems in which AI can make independent decisions during the development process, representing a fundamental shift in how software is built [11]. According to the Stack Overflow Developer Survey, AI agents are not yet mainstream according to the survey findings. However, among those who do use them, 70% agree that agents have improved their personal efficiency with development tasks and 69% report increased productivity. In contrast, only 17% agree that agents have improved collaboration within their team, suggesting that the productivity benefits of AI agents currently remain at the individual level rather than translating into broader team-level impact.

Research consistently shows that the combination of Agile practices, DevSecOps, and AI has the potential to accelerate development cycles, reduce costs, and improve software quality [12][13]. While the adoption of AI tools is increasing, the data also shows that positive sentiment towards them is declining. However, the use of AI agents has shown positive results in terms of individual productivity, as

reflected in recent developer surveys.

The Evolution of Project Management Practices

Since the beginning, the core goal of project management has remained the same. To complete projects within time, budget, and resource constraints. What has changed over the past decade is how this goal is achieved. Advances in technology, changing workplace structures, and growing pressure to deliver more with fewer resources have all shaped how project management is practised today [14].

The most visible change has been the move away from traditional, plan-driven approaches such as waterfall towards more flexible and iterative methods. As organisations looked for more adaptability, agile frameworks became widely adopted, and scaling frameworks such as SAFe and Scrum at Scale emerged to meet the needs of larger organisations managing multiple teams. According to the 18th State of Agile Report published by Digital.ai, which captured responses from 349 practitioners across diverse roles, industries, and regions, the most widely adopted frameworks are the Scaled Agile Framework (SAFe), used by 44% of respondents, and Scrum at Scale, used by 23% [15]. Alongside this, many companies have started tailoring their project management practices to fit their specific context rather than following a single fixed methodology.

The COVID-19 pandemic also played a major role in changing how projects are managed. The shift to hybrid work challenged traditional project management approaches that had depended on in-person interaction and structured workflows. In response, organisations quickly adopted digital tools, cloud-based platforms, and AI-powered solutions to keep communication, task allocation, and progress tracking running across distributed teams [16]. However, hybrid environments

have also brought new challenges such as miscommunication, misalignment, and the risk of declining team morale if not managed well. This is why emotional intelligence has become an increasingly important leadership skill, helping project managers maintain good relationships, handle conflict, and keep teams motivated when working remotely [16].

The growing role of AI in project management is perhaps the most significant recent development in the field. An analysis of AI-related project management publications from 2019 to 2024 reveals a 70.32% annual increase, reflecting how quickly interest in this area has grown [17]. This is further supported by industry data. The research by the Association for Project Management found that 70% of project professionals reported their organisation used AI, up from 36% just two years earlier [18]. Gartner has predicted that by 2030, 80% of routine project management tasks will be handled by AI [19], suggesting the transformation of the profession is still in its early stages.

However, adoption has moved faster than capability. The PMI Pulse of the Profession, which surveyed 2,841 project professionals globally, found that only 20% of project managers report having extensive or good practical AI skills [20]. This gap between the pace of AI adoption and the readiness of project managers to use it effectively is a pattern that runs through much of the recent literature, and one that has direct implications for how organisations design and implement project management frameworks today.

The Evolution of Work Culture and Remote Work

The COVID-19 pandemic brought about one of the most significant shifts in work culture the software industry has experienced. As organisations scrambled to main-

tain productivity under lockdown conditions, remote and hybrid working rapidly became the default rather than the exception.

The scale of this shift was substantial. Prior to the pandemic, only 12% of Europeans worked remotely, a figure that surged to 50% working from home at least partially during the pandemic [21]. In the United States, data from the Pew Research Center shows that while only 7% of workers with remote-capable jobs worked from home before the pandemic, this rose to 55% by October 2020. By 2022, around 35% were still working from home full time, indicating that remote work had become a lasting feature of the employment landscape rather than a temporary response [22].

By 2026, hybrid models had become a global standard. Colliers reports that 47% of organisations in the Asia Pacific region operate on hybrid arrangements, with countries such as Australia showing particularly high adoption at 91%, while countries such as Taiwan, Indonesia, and China remaining largely office-based. The same report highlights a deepening of what it terms the "hybrid paradox", the growing tension between employer and employee expectations around remote work with 60% of companies enforcing some level of attendance mandate [23].

The evidence on productivity further demonstrates that the hybrid paradox persists. Studies suggest that remote work can improve employee satisfaction and engagement by giving workers more control over their schedules and working environments, which in turn supports higher productivity [24]. However, a Microsoft survey from 2022 revealed a striking disconnect between perception and reality. While 87% of employees felt they were productive working from home, only 12% of leaders felt confident that their teams were actually productive [25]. This gap between employee experience and leadership perception points to a broader challenge

in managing distributed teams effectively.

These challenges were particularly significant for those in leadership and project management roles. Research by Kniffin et al. highlights that the pandemic forced leaders to fundamentally rethink how teams could be managed remotely, requiring new approaches to communication, coordination, and performance oversight [26]. Beyond productivity, organisations also had to adapt their processes to support employee wellbeing, as prolonged remote working raised concerns about mental health, isolation, and team cohesion [27].

Colliers 2026 annual report also indicates that employee voices remain largely absent from workplace strategy decisions in the Asia Pacific region, with only 19% of companies actively considering employee opinions when shaping their workplace approach, and only 10% planning to do so. This varies considerably by country. In Australia, 58% of companies report engaging all employees in shaping workplace strategy, while countries such as Taiwan and Indonesia rely predominantly on leadership to make these decisions [23].

Despite employer hesitance, employees around the world continue to demonstrate a strong preference for remote and hybrid working. Data from the Pew Research Center shows that in the United States, 46% of remote-capable workers said they would likely leave their job if their employer no longer allowed them to work from home, with a further 26% stating it was very unlikely they would stay [22].

Taken together, these findings suggest that the shift towards remote and hybrid working is not a temporary phenomenon. Despite employer concerns about productivity, employees have demonstrated a strong and consistent preference for flexible working arrangements, with many indicating they would leave their jobs

if required to return to the office full-time. This suggests that hybrid work culture is likely to remain a feature of the software industry for the foreseeable future. However, the extent to which this plays out may vary by region. In countries where employees have a say in shaping workplace strategy, flexible arrangements are more likely to be sustained. In contrast, in regions where these decisions rest primarily with leadership, the prevalence of hybrid working may be more limited. For project management, this means that the challenge of coordinating and managing distributed teams is not going away. It is a reality that frameworks and practices need to actively account for.

2.2.2 Comparison of the evolution of software development and project management practices

Reflecting on the statistics and insights discussed above, it is evident that while software development and project management have both evolved considerably over the past decade, they have not evolved at the same pace. Software development, particularly in its adoption of AI, appears to have moved faster than project management.

In some areas, the two fields have moved in a similar direction. The shift away from rigid, plan-driven approaches towards more flexible and iterative methods is observed in both software development and project management. Agile frameworks are now widely adopted across both fields, and the growth of scaling frameworks such as SAFe and Scrum at Scale reflects a shared recognition that more structured coordination is needed as organisations grow in complexity.

The challenges of adapting to remote and hybrid work culture are also observed

on both sides. However, the literature highlights that for project management in particular, the challenge of coordinating distributed teams is becoming increasingly significant, given that communication has always been a central element of effective project management practice.

The gap between the two fields becomes most visible when examining AI adoption. Software development teams have embraced AI tools at a remarkable pace, with 84% of developers using or planning to use AI and GitHub Copilot alone growing to over 20 million users by 2025. In contrast, only 20% of project managers report having extensive or good practical AI skills [20].

This disparity may partly be explained by the challenges project management has faced in adapting to remote and hybrid work, which may have slowed broader technology adoption. However, this relationship needs further investigation, and future research should explore whether the difficulties of managing distributed teams contributed to the slower uptake of AI in project management practice.

Furthermore, the Stack Overflow Developer Survey 2025 shows that positive sentiment among developers towards AI tools is declining as they encounter the limitations in practice [10]. The absence of comparable data from a project management perspective suggests that project management as a profession has not yet reached the stage of widespread AI adoption, let alone the critical reflection on its limitations that is already emerging among developers.

2.3 Project Management Methodologies in Software Organisations

Project management methodologies vary widely across organisations, ranging from structured traditional frameworks to flexible agile approaches. Traditional methodologies such as PMBOK and PRINCE2 follow linear, plan-driven processes, while agile frameworks such as Scrum and SAFe adopt iterative and incremental approaches better suited to fast-changing environments. As organisations increasingly seek to balance structure with flexibility, hybrid methodologies that combine elements of both traditions have gained considerable traction in the software industry.

This section examines the key methodologies relevant to this research, traditional, agile, and hybrid, analysing their strengths, limitations, and suitability for software project management. The insights drawn from this examination form the theoretical foundation for the hybrid framework developed in this study.

2.3.1 Traditional project management - PMBOK and PRINCE2

Traditional project management, often referred to as the heavyweight approach, follows a linear and sequential process that moves through project initiation, planning, execution, monitoring, and closure. It places strong emphasis on defining project scope and requirements early in the process, with changes to scope managed through formal procedures. Several methodologies fall under this umbrella, each offering structured guidance for managing projects of varying complexity and

scale [28].

Two of the most widely used traditional project management methodologies are PMBOK (Project Management Body of Knowledge) and PRINCE2 (PRojects IN Controlled Environments). Both are examined in this section based on prior literature.

PMBOK

The PMBOK Guide is a reference document developed by the PMI (Project Management Institute) that outlines best practices for managing projects. It has been regularly updated since its origins in 1987, with each version refining its processes, terminology, and structure [29]. The sixth edition organises project management into ten Knowledge Areas: project integration, scope, time, cost, quality, resource, communication, risk, procurement, and stakeholder management, and five Process Groups: initiating, planning, executing, monitoring and controlling, and closing. These work together as an integrated system in which all areas overlap and influence each other rather than functioning in isolation [29].

While subsequent editions of the PMBOK Guide have continued to evolve this structure, the ten knowledge area and five process group framework remains widely referenced in academic literature and forms the basis of the comparative analysis conducted in this study.

As stated in literature, the PMBOK Guide is not a rulebook or a step-by-step manual but a flexible reference tool. Project managers should treat its processes and guidelines as adaptable reference points rather than prescriptive rules, since not every process applies to every project. The real value of the guide comes from combining its framework with practical experience, judgement, and creativity [30].

In terms of strengths, Simonaitis et al. highlight that PMBOK offers 132 integrated tools and methodologies, giving project managers a wide range of options to work with. The schedule baseline serves as a key mechanism for tracking delays by comparing actual progress against the approved project timeline. PMBOK is also particularly useful for risk management and project planning across a variety of project types [31].

Its weaknesses, however, are also noted in the literature. The framework places the majority of responsibility on the project manager, while the roles of other team members are not clearly defined. Additionally, some areas are described in excessive detail, which can make the guide harder to apply in practice [31].

PRINCE2

PRINCE2 is a process-based project management methodology used globally, designed to manage projects within three primary constraints: cost, time, and quality. PRINCE2 focuses on the business case of a project and applies a structured organisational approach with clearly defined roles and processes. The framework is built around seven principles: continued business justification, learning from experience, defined roles and responsibilities, managing by stages, managing by exception, focusing on products, and tailoring to the project environment. These are supported by seven themes, which are ongoing areas of focus throughout the project including business case, risk, quality, plans, change, progress, and organisation. The framework also defines seven processes covering the full project lifecycle from starting up through to closing a project. Compared with PMBOK, a notable difference is that PRINCE2 does not include procurement management [31].

Research by Pawar and Mahajan identifies several benefits of PRINCE2, in-

cluding its reliable and structured approach, well-defined roles, strong focus on product delivery, and its "manage by exception" principle which enables efficient senior management oversight. However, the same research highlights key limitations including rigid change management procedures, a heavy documentation burden, weak risk management guidance, and limited attention to team motivation [32].

Research further note that while PRINCE2 integrates its seven processes with seven themes, making it adaptable to projects of varying types and sizes, it offers only 40 tools and methodologies, significantly fewer than PMBOK. The framework also requires all team members to follow its processes precisely, meaning that if one person deviates, the entire project can become difficult to manage [31].

While both PMBOK and PRINCE2 offer structured approaches to project management, their linear and documentation-heavy nature has led many software organisations to seek more flexible alternatives. This shift towards agile approaches is examined in the following section.

2.3.2 Agile project management

Agile methodologies adopt an iterative and incremental approach to software development, allowing teams to adjust dynamically to changing requirements even in later stages of a project. At the core of Agile is the Manifesto for Agile Software Development, which establishes four core values: valuing individuals and interactions over processes and tools, prioritising working software over comprehensive documentation, fostering customer collaboration over rigid contract negotiation, and responding to change over following a fixed plan [33].

Building on these values, the Agile Manifesto outlines 12 guiding principles that emphasise close collaboration between stakeholders and development teams, trust in motivated and self-organising individuals, and the delivery of functional software as the primary measure of progress. The principles also promote technical excellence, simplicity, sustainable work practices, and regular reflection to continuously improve team effectiveness [33].

In practice, Agile has been shown to improve software quality by integrating testing throughout the development process rather than treating it as a final stage. It also supports faster delivery cycles and more efficient use of resources by breaking work into manageable increments and encouraging cross-functional collaboration [34].

Agile encompasses a range of frameworks, each suited to different project contexts and organisational needs. As discussed previously in this literature review, SAFe (Scaled Agile Framework) and Scrum at Scale are the most popular frameworks according to the 18th state of agile report published by Digital.ai. These frameworks will be examined in detail in the following section.

2.3.3 Scrum, Scrum at Scale, and SAFe: The most widely adopted agile frameworks

Scrum

The concept of Scrum was first introduced in 1986 by Nonaka and Takeuchi in their influential Harvard Business Review article, where they used the term to describe a collaborative, cross-functional approach to product development. Building on this foundation, Jeff Sutherland and Ken Schwaber developed Scrum as a formal

software development framework in the early 1990s [34]. Today, Scrum is defined as a lightweight framework that helps people, teams, and organisations generate value through adaptive solutions for complex problems [35].

The Scrum team consists of three core roles. The Product Owner is responsible for maintaining and prioritising the product backlog which is the ordered list of requirements and refinements that defines what needs to be built. The Scrum Master is responsible for facilitating the process, removing impediments, and ensuring the team adheres to Scrum principles. The remaining team members form a cross-functional group of developers, testers, and other specialists who collectively carry out the work [34].

The fundamental unit of Scrum is the Sprint which is a short, time-boxed iteration typically lasting one to three weeks during which the team works to complete a selected set of backlog items and deliver a potentially releasable increment of the product. At the start of each Sprint, a Sprint Planning session is held in which the team decides which backlog items to work on and how they will approach completing them. Throughout the Sprint, a Daily Scrum meeting is held to track progress and surface any blockers. At the end of the Sprint, a Sprint Review is conducted where the team presents completed work to stakeholders and gathers feedback, which is then incorporated into the backlog as needed. Finally, the Sprint Retrospective provides an opportunity for the team to reflect on what went well, what problems were encountered, and how those problems were or were not resolved [35].

In addition to these events, backlog refinement is an ongoing activity in which the Product Owner and the team review, prioritise, and discuss backlog items to ensure that upcoming Sprints are always well prepared. Without regular refine-

ment, teams may struggle to prioritise work effectively [36].

An important concept in Scrum is the Definition of Done, which describes the quality standards an increment must meet before it can be considered complete. This provides a shared understanding of completeness that supports effective inspection during the Sprint Review and helps stakeholders accurately assess the work being presented [35].

Scrum is guided by three important elements: Transparency, inspection, and adaptation, and five core values: commitment, focus, openness, respect, and courage. These values give direction to the Scrum Team in their work, actions, and behaviour [35].

Scrum at Scale

While Scrum works well for individual teams, it does not on its own address the challenges that arise when multiple teams need to work together on the same product or within the same organisation. Scrum at Scale, also known as Scrum@Scale, was developed to address this limitation. It was created through a collaboration between Scrum Inc. and Scrum Alliance, led by Jeff Sutherland, one of the original creators of Scrum.

Scrum at Scale is built on three core principles: small teams, organisation-wide scaling, and minimal bureaucracy. It extends standard Scrum practices by introducing a Scaled Daily Scrum, in which representatives from each team coordinate across teams to surface and resolve dependencies and impediments. As the scale of the organisation increases, an EAT (Executive Action Team) is established to guide the overall transformation, ensure alignment with Scrum values, and remove organisational impediments. An EMT (Executive MetaScrum Team) works along-

side the EAT to define organisational vision and strategic priorities, including the direction of products and services [37][38].

SAFe

SAFe (Scaled Agile Framework) is one of the most widely adopted frameworks for scaling agile practices across large organisations. Originally designed for software development, SAFe has since expanded into other industries including healthcare, manufacturing, engineering, and financial services [39].

SAFe is structured around seven core competencies of the lean enterprise: team and technical agility, agile product delivery, enterprise solution delivery, lean portfolio management, organisational agility, continuous learning culture, and lean-agile leadership. Within this framework, multiple agile teams following Scrum, Kanban, or a combination of both work cross-functionally to deliver product increments in a coordinated and aligned manner [40].

While SAFe and Scrum at Scale are primarily designed for large enterprises, understanding their principles remains relevant to this research. Both frameworks build on the same Scrum foundation that underpins the hybrid framework developed in this study, and their emphasis on structured coordination, defined roles, and iterative delivery informs the design decisions made in the framework design phase.

2.3.4 Comparison of PMBOK and Scrum

Given the context of the case company, this section focuses specifically on comparing PMBOK and Scrum. PMBOK was selected as the representative traditional

framework over PRINCE2 for several reasons. It offers a significantly larger number of tools and techniques, its flexible and non-prescriptive nature makes it more adaptable to different organisational contexts, and its ten knowledge areas provide comprehensive coverage of all major project management process areas. Scrum was selected as the representative agile framework because the case company already follows some Scrum practices, and as a small startup, its team size and project complexity are well suited to Scrum without requiring a scaling framework such as SAFe or Scrum at Scale.

Prior research has examined how well PMBOK and Scrum align with each other, providing a useful theoretical foundation for the hybrid framework developed in this study. Rosenberger and Tick [41] conducted an extensive analysis comparing PMBOK and Scrum across PMBOK's ten knowledge areas and five process groups: initiation, planning, execution, controlling, and closing. The study found that agile practices, and Scrum in particular, make a valuable contribution to PMBOK's process goals, suggesting that the two frameworks are more complementary than they are conflicting. However, the authors acknowledge that their findings are derived from a theoretical comparison rather than empirical evidence, and explicitly identify the lack of practical validation as a gap in the research.

A similar comparison was conducted by Fitsilis [42], who examined not only Scrum but also other agile methodologies including Extreme Programming (XP) and Feature-Driven Development (FDD) against PMBOK's knowledge areas. This research found that agile methods do not provide full coverage of traditional project management. Agile frameworks tend to focus primarily on scope, resource, and quality management, while leaving risk, cost, and procurement management largely unaddressed. The study concludes that combining agile methods with PM-

BOK has the potential to significantly improve software project management by addressing the gaps that each approach leaves on its own.

Taken together, these studies provide clear theoretical justification for a hybrid approach that integrates PMBOK and Scrum. Both studies also highlight that while the theoretical case for such a combination is well established, empirical evidence of its practical application in real organisational settings remains limited. This gap directly motivates the first phase of the present research, which seeks to design, implement, and validate a hybrid framework within the specific context of a small software organisation.

2.4 AI in Project Management

2.4.1 The current state of AI adoption in software organisations

Recent surveys suggest that developers are embracing AI tools enthusiastically and seeing tangible benefits in their daily work. BairesDev's 2025 survey found that developers save several hours of work per week through AI assistance, with the majority reporting faster coding and higher productivity [43].

This is reflected in PMI's AI and Project Management survey in 2024 [44], where most project managers similarly identified increased productivity as the clearest benefit of AI adoption. A notable finding across both studies is that many individuals are actively investing personal time in developing AI skills, suggesting that the motivation to adopt AI is coming from individuals rather than from their employers.

The individual enthusiasm is not matched by organisational readiness. BairesDev survey states that very few projects have formal AI training programmes, and even fewer have AI embedded into their core workflows [43]. A similar picture emerges from the PMI report, which noted that many executives are limiting themselves to small, isolated AI experiments rather than committing to broader organisational change [44].

What these findings collectively suggest is that individuals are advancing their AI capabilities at a pace that their organisations are not keeping up with. This gap between individual readiness and organisational preparedness is one of the most consistent patterns in the recent literature on AI adoption.

The reasons organisations are holding back are also worth examining, as they differ depending on role. BairesDev's survey further states that while both developers and project managers share concerns about security and data privacy, their other barriers diverge significantly. Developers feel constrained by outdated systems and overly restrictive internal policies, while project managers are more concerned about demonstrating a measurable return on AI investment [43]. This distinction is significant because if the two groups are focused on different problems, building a shared path forward becomes considerably more difficult.

Beyond role-specific concerns, research suggests that organisational culture itself shapes how effectively AI is adopted. Companies that were more open to experimentation tended to derive greater value from AI, while more rigid organisations struggled to move beyond initial pilots [45].

Taken together, the literature consistently demonstrates that having the right technology is not sufficient on its own. How an organisation is structured, how decisions are made, and whether people at different levels share a common un-

derstanding of what AI is for all play an equally important role in determining whether AI adoption succeeds. The productivity gains seen at the individual level will only translate into meaningful organisational change when supported by proper structures, shared direction, and a culture that is genuinely open to change.

2.4.2 AI capabilities in project management tools

The integration of artificial intelligence into project management tools has accelerated significantly in recent years, with most major platforms now offering some form of AI-driven functionality. These capabilities range from intelligent automation and predictive analytics to conversational AI assistants and autonomous agents. This section examines the AI capabilities of key project management tools, grouped by the depth and nature of their AI integration.

AI-native tools

ClickUp represents one of the most comprehensive examples of AI integration in project management. Research by Hussain et al. indicates that AI capabilities are embedded throughout the platform, from resource allocation to time estimation. ClickUp's algorithm matches tasks with the most suitable team members based on task complexity and required skills, and identifies unrealistic deadlines by estimating more accurate timeframes for project completion [46]. Central to ClickUp's AI offering is ClickUp Brain, a built-in AI agent that functions as a virtual team member. Unlike general-purpose AI tools, ClickUp Brain is specifically designed around the project context it operates within, enabling it to generate daily stand-up summaries, retrieve documents, and support decision-making without requiring

additional configuration [47].

Established tools with significant AI enhancements

Several widely adopted project management tools have integrated substantial AI capabilities into their existing platforms.

Jira, when combined with Atlassian Intelligence, provides AI-driven capabilities designed to automate repetitive tasks and improve process efficiency. Atlassian Intelligence comprises three components: standard AI functionality embedded in premium editions, offering generative AI features such as summarisation and natural language search, the Jira Service Management Virtual Agent, which helps resolve issues through predefined intents and AI-generated responses, and Rovo, a separately licensed product that centralises knowledge from internal and external sources to provide organisation-specific content generation, collaboration support, and project insights [48][49].

Microsoft Project, when integrated with Microsoft 365 Copilot, enables AI-assisted automation across several project management functions including planning, documentation, data analysis, and risk management. The integration supports schedule and report generation, discussion summarisation, resource suggestions for faster task assignment, and predictive identification of obstacles and delays. Integration with Microsoft Graph further enables insights into project progress and key performance indicators [48].

Wrike incorporates a self-learning AI engine specifically designed for work management. Wrike AI can automate routine tasks, generate content, summarise discussions, and support error resolution. One of its most notable features is the ability to predict project risks using historical data, while its advanced analytics

help optimise resource allocation and prevent delays [48][50].

Monday.com has developed an integrated suite of AI capabilities it terms AI blocks, which enable text generation, summarisation, sentiment detection, task prioritisation, and data extraction within workflows. The platform also offers AI-powered workflow automation, an AI assistant called Sidekick, and an AI Notetaker for meeting management. These features collectively support end-to-end process automation across project management functions [51].

Asana was among the first major project management platforms to introduce built-in AI features, launching its Asana Intelligence suite in 2023. Its capabilities include smart summaries, AI-generated status updates, workflow automation through AI Studio, and AI Teammates that can be assigned tasks and respond with updates within the team's existing workspace [52].

Taken together, these tools demonstrate that AI integration in project management has moved well beyond basic automation. The most advanced platforms now offer context-aware agents capable of executing tasks autonomously, while even traditional tools have embedded generative AI features into their core workflows.

2.4.3 Agentic AI and workflow automation

Research shows that there will be a significant rise in the use of agentic solutions in the future. For example, Gartner's survey states that by 2028, 33% of enterprise applications will incorporate agentic AI, a significant increase from less than 1% in 2024. Similarly, a Capgemini report highlights that currently only 10% of companies employ AI agents. However, this is expected to rise substantially, with

82% planning to integrate agents within the next three years [53].

What are AI Agents and Agentic Solutions

An AI agent is a software system that can autonomously carry out tasks without requiring step-by-step human instructions. It works by taking in information from its environment, making decisions based on that information, and executing actions to achieve a defined goal [54].

What distinguishes AI agents from conventional AI tools is their capacity for autonomous decision-making. A standard AI tool responds to a specific input and produces a specific output. An AI agent, by contrast, can plan a sequence of actions, use external tools, access real-time information, and adapt its approach based on what it encounters along the way. This makes agents capable of handling complex, multi-step tasks that would otherwise require ongoing human involvement.

To support the practical implementation of AI agents, several open-source frameworks have been developed, providing researchers and developers with resources to build and test agent-based applications [54]. Two of the most widely used are LangChain and AutoGen.

LangChain is an open-source framework for building applications powered by large language models, with common use cases including intelligent question-and-answer tools, chatbots, and code interpreters. It supports integration with a wide range of external services including vector databases, API providers, and cloud storage platforms, though research has noted that these integrations can introduce security vulnerabilities if not carefully managed [55].

AutoGen, developed by Microsoft, is an open-source framework designed for

building multi-agent AI applications capable of handling complex tasks. It includes AutoGen Studio, a low-code interface aimed at simplifying agent development for non-technical users. However, Microsoft has explicitly described AutoGen Studio as a research prototype not intended for production use, meaning that production-level implementations still require technical expertise [56].

Beyond these open-source frameworks, commercial platforms such as **Google's Gemini Agent Platform** provide enterprise-grade infrastructure for building, deploying, and scaling AI agents. A notable feature is Agent Studio, a low-code visual designer that simplifies agent development, and Agent Garden, which provides pre-built agent samples to accelerate implementation [57]. While peer-reviewed research on the Gemini Agent Platform specifically is still emerging, Google's Gemini API has been studied in other contexts, with research highlighting its strengths in contextual understanding and accuracy [58].

Agentic AI in Project Management

The application of AI agents in project management is an emerging and rapidly growing area of research. A comprehensive review by Anjum et al. [59], drawing on existing literature and case studies, identifies an increasing trend in applying AI within agile project management environments, driven by the adaptive nature of agile methodologies. Key applications highlighted include sprint planning support, task prioritisation, and resource allocation using historical data, as well as the automation of routine administrative work and the use of predictive analytics for early risk identification. The study also highlights the role of machine learning in helping teams anticipate delays, manage costs, and address performance issues, alongside the use of natural language processing for communication management.

Complementing these findings, research by Zosimov et al. [60] and Adapa et al. [61] explores the use of AI and multi-agent frameworks specifically for developer performance evaluation, identifying this as a further area of project management that can be effectively automated.

With specific reference to software project management, Cinkusz et al. [62] introduce a framework of LLM-powered cognitive agents designed to support agile software project management across both Scrum and SAFe environments. The framework assigns distinct roles to different agents, which collaborate as a multi-agent system to support the complete software development lifecycle. This represents one of the most directly relevant examples in the literature of agentic AI being applied to the kind of project management context examined in this research.

Beyond software project management, studies in fields such as construction and space project management further demonstrate the breadth of agentic AI's applicability [63][64]. These studies highlight resource allocation, team coordination, scheduling, delay reduction, quality assurance, risk management, and knowledge capture as key areas where AI agents add measurable value. While these contexts differ from software development, the project management challenges they address are largely universal, reinforcing the case for agentic AI adoption across organisational settings. Taken together, the literature points to a clear and growing body of evidence that agentic AI has the potential to automate and enhance a wide range of project management functions. However, empirical studies examining practical implementation within small software organisations remain limited, particularly in the context of integrating agentic solutions into an existing hybrid project management process. This gap directly motivates the AI integration strategy developed in this research.

2.4.4 Synthesis and Research Gaps

The literature reviewed in this chapter highlights the following key findings:

- Software development practices, particularly AI adoption, have evolved at a faster pace than project management frameworks, creating a growing gap between how software is built and how it is managed.
- Hybrid project management frameworks combining traditional and agile approaches are gaining traction, but empirical evidence of their practical implementation in real organisational settings remains limited.
- AI adoption across both software development and project management is inconsistent, with individual enthusiasm outpacing organisational readiness in terms of training, strategy, and cultural openness.
- The shift to remote and hybrid work has introduced new coordination and communication challenges for project managers that existing frameworks were not designed to address.
- AI capabilities in project management tools are advancing rapidly but vary significantly in depth and maturity across platforms.
- Agentic AI shows strong potential for automating project management functions, but practical implementation within small software organisations remains underexplored in the literature.
- Decisions around both framework design and AI adoption are frequently made at the leadership level without adequately considering the perspectives of the wider team, reducing effectiveness and buy-in.

These findings reveal three clear gaps in the existing literature.

- While theoretical comparisons of PMBOK and Scrum are well represented, empirical research demonstrating how a combined approach can be applied in a real organisational setting to design and validate a hybrid framework remains limited [41][42].
- Research on agentic AI in project management is still emerging, and existing studies often rely on simulated rather than real project data, limiting their practical applicability.
- The literature tends to treat project management framework development and AI strategy development as separate areas of inquiry, despite the fact that a well-defined process needs to be in place before an effective AI strategy can be meaningfully developed.

This research addresses all three gaps by working directly within a real startup environment using actual processes and team member insights, by documenting a practical approach to agentic AI evaluation and integration in a small software organisation, and by treating framework design and AI strategy development as two connected phases of the research process.

The findings also directly address the first two research questions of this study.

- **RQ1**, which examines how software development has evolved and whether project management has kept pace, is answered through the analysis in Section 2.2.
- **RQ2**, which examines how project management methodologies are currently

applied and what their strengths and limitations are, is addressed through Section 2.3.

The remaining research questions are addressed through the empirical phases of the research outlined in the following chapters.

2.5 Chapter Summary

This chapter reviewed the existing literature across three interconnected areas. The evolution of software development and project management, key project management methodologies, and the current state of AI in project management. The first area addressed RQ1, revealing that software development has advanced at a faster pace than project management, particularly in AI adoption. The second area addressed RQ2, establishing the theoretical justification for combining PMBOK and Scrum as the foundation for the hybrid framework developed in this research. It was also noted that empirical validation of this combined approach in a real organisational setting remains limited in the literature. The third highlighted the limited empirical research on agentic AI implementation in small software organisations. The following chapter outlines the research methodology through which the remaining research questions are addressed.

3 Methodology

3.1 Chapter Overview

In this chapter, the research methodology is introduced and discussed in detail. The research strategy and underlying philosophical approach are presented first, followed by a description of the data collection methods used across both phases of the research. The sampling strategy, including the selection and profile of participants, is then outlined. The chapter also covers the data analysis methods used to interpret the collected data, and concludes with a discussion of the ethical considerations and limitations of the research methodology.

3.2 Research Strategy

This research comprises both theoretical and practical components. With reference to the research objectives outlined in Table 1.1, RO1 and RO2 are primarily theoretical in nature, with findings derived from a structured literature review. In contrast, RO3 to RO6 build upon this theoretical foundation and are addressed through empirical engagement with the case company. Accordingly, the study adopts an action research strategy, in which the researcher collaborates closely

with the case organisation to understand its challenges, develop context-specific solutions, and iteratively refine these solutions through continuous feedback and evaluation. The underlying research philosophy is pragmatism, as the study prioritises practical relevance and real-world applicability. The objective is not only to generate theoretical insights but also to design and validate solutions that are effective within a specific organisational context. The collaboration with the case company is structured into two main phases, each consisting of several sub-phases (RO3 - RO6):

1. Development of the Hybrid Project Management Process

- (a) Establishing a structured approach to evaluate the organisation's existing project management practices
- (b) Identifying the underlying causes of inefficiencies and performance gaps
- (c) Designing an improved project management process and providing implementation guidelines

2. Development of the AI Strategy

- (a) Assessing the organisation's current project management tools and their AI capabilities
- (b) Identifying the underlying causes of AI integration challenges
- (c) Evaluating alternative tools and technological approaches through a literature review
- (d) Developing an AI integration strategy aligned with organisational needs
- (e) Initiating the implementation of the proposed AI integration approach

3.3 Data Collection Methods

3.3.1 Phase 1: Development of the Hybrid Project Management Process

To develop a tailored project management process for the case company, an in-depth assessment of existing project management practices was conducted. Multiple data collection methods were employed to ensure a comprehensive understanding of processes, workflows, and team interactions.

- **Participant Observation:** The researcher attended regular project meetings as a non-participant observer, gaining direct insights into team communication, decision-making processes, and the practical execution of tasks. Observations were recorded systematically to capture both formal procedures and informal practices.
- **Semi-Structured Interviews and Focus Group Discussions:** Semi-structured interviews and focus group discussions were conducted with team members across various roles. The interview questions were designed based on the PMBOK knowledge areas and Scrum practices, ensuring that all relevant project management dimensions including scope, time, cost, quality, risk, and stakeholder management were addressed. These interviews aimed to capture individual perspectives on current practices, challenges, and perceived gaps.
- **Ticket Analysis:** Historical tickets from the company's project management tool were analysed to understand task documentation practices, status

updates, workflow consistency, and alignment with sprint planning. This analysis helped identify patterns in task assignment, progress tracking, and delivery reporting.

3.3.2 Phase 2: Development of the AI Strategy

To develop the AI strategy, data were collected through interviews, focus group discussions, tool assessments, and a review of existing literature. The goal was to understand the team's current challenges with manual work, identify the most time consuming areas of their workflows, and determine how AI could be practically integrated into the company's project management processes. Additionally, external expert opinions were gathered through interviews to understand how they approach AI integrations in their organisations.

- **Interviews and Focus Group Discussions:** Individual interviews were conducted with team members to understand their perspectives on AI adoption within the organisation. Questions focused on identifying which manual tasks consumed the most time, which tasks would benefit most from automation, and how comfortable team members were with the idea of AI and agentic solutions being integrated into their workflows. Focus group discussions complemented the individual interviews by enabling collective exploration of shared challenges and opportunities.
- **Expert Interviews:** An interview was conducted with an industry practitioner who has experience implementing agentic AI solutions within their organisation. This provided practical insight into real-world AI integration approaches beyond what the academic literature covers.

- **Assessment of Existing Tools:** The AI and agentic capabilities of the company's existing project management tool were analysed in depth to understand how it could be used to automate selected project management processes.
- **AI Tools and Technologies Research and Benchmarking:** Additional AI tools and agentic solutions were evaluated through the literature review, as well as practical assessments, examining their features and capabilities to identify the most suitable options for the company's context and scale.

3.4 Sampling Strategy

A purposive sampling method was employed to select participants for interviews and focus group discussions. Participants were selected from diverse professional roles within the case company to ensure a comprehensive range of perspectives across different functions and levels of responsibility.

The length of time each participant had been with the company was also considered as a relevant factor, as it provided insight into both the onboarding experience and the depth of familiarity with existing processes. The seniority of team members was taken into account to ensure that both strategic and operational perspectives were captured.

A summary of the participants is presented in Table 3.1. In addition to internal participants, one external industry expert was interviewed to provide practical insight into AI and agentic solution implementation beyond the case company context.

Participant	Role	Time Since Joining
Participant 1	Chief Executive Officer	6 years (since 2020)
Participant 2	Project Manager	3 years (since 2023)
Participant 3	Associate Tech Lead	3 years (since 2023)
Participant 4	Software Engineer	2 years (since 2024)
Participant 5	Software Engineering Intern	6 months (Since october 2025)
Participant 6	Associate Software Engineer	3 months (since January 2026)
Participant 7	UI Designer	7 months (since September 2025)
Participant 8	AI Specialist	External Expert

Table 3.1: Participant Summary

3.5 Data Analysis Methods

A qualitative data analysis approach was adopted for both phases of the research. All interview questions were structured based on each participant's role and covered PMBOK knowledge areas, Scrum practices, and AI integration. Interview insights were summarised by role at the conclusion of each interview. The collected data were then analysed through the lens of both the PMBOK framework and Scrum methodology. PMBOK served as a structured reference for evaluating the presence and effectiveness of knowledge areas, process groups, and standard project management practices. Concurrently, Scrum provided a framework for examining agile practices, including sprint planning, backlog management, and iterative delivery. Given that the company operates in one-week sprints, particular

attention was given to how tasks, roles, and responsibilities aligned with Scrum ceremonies and artefacts.

The PMBOK-Scrum mapping approach applied in this study was informed by existing research on integrating traditional and agile project management methodologies [41][42]. This dual-framework analysis facilitated the identification of gaps between current practices and best-practice standards, forming the basis for the development of the tailored project management process.

The AI strategy was subsequently developed to align with the project management processes established in Phase 1. The implementation of both the Project Management Process and the AI strategy is discussed in detail in the following chapter.

3.6 Ethical Considerations

Upon entering into a formal agreement with the case company, access was granted to all organisational data relevant to the research, under the condition that the anonymity of both clients and team members would be maintained throughout. All participants were informed of the purpose of the research and provided their consent to participate prior to data collection. All conversations, observations, and findings were recorded and stored solely for research purposes and will not be disclosed publicly.

3.7 Limitations of the Methodology

Although this study includes the initiation of AI implementation within the case organisation, it does not evaluate post-implementation effectiveness using quantitative performance measures such as time efficiency or productivity gains. This is primarily due to the scope and time constraints of the research. Instead, the effectiveness of the proposed AI integration is assessed through qualitative feedback obtained from key stakeholders within the organisation. While this provides valuable insights into usability, perceived value, and organisational fit, it does not allow for measurable validation of performance improvements.

3.8 Chapter Summary

This chapter introduced and discussed the research methodology in detail, covering the research strategy, data collection methods, sampling approach, data analysis methods, ethical considerations, and methodological limitations. The following chapter presents the implementation of the project management process and AI strategy within the context of the case company.

4 Implementation

4.1 Chapter Overview

This chapter presents the findings and outputs of both phases of the research. The first phase covers the analysis of the case company's existing project management processes and presents a set of improvement suggestions organised into three tiers based on the level of disruption to current processes. The second phase covers the AI integration strategy, including the identification of AI capabilities mapped to the hybrid process, an evaluation of the existing project management tool's AI capabilities, a root cause analysis of the difficulties encountered, and the implementation of Nydi, the organisation's in-house AI-based teammate.

4.2 Project Management Process Analysis and Improvements Based on PMBOK and Scrum

Drawing on prior research that maps PMBOK knowledge areas and processes against Scrum practices [41][42], a structured analysis template was developed to evaluate the case company's existing project management processes. This template was then applied using data collected throughout the research, including meet-

ing observations, semi-structured interviews, focus group discussions, and ticket analysis. The analysis captured perspectives from across the organisation, including leadership, junior developers, and the UI designer, ensuring that the findings reflected the full range of team experiences rather than a single organisational viewpoint.

A full process analysis is provided in Appendix A. Table 4.1 presents a summary of the identified areas for improvement, classified into three tiers based on the level of organisational disruption each change would require, and further organised under the five main project management phases.

- **Tier 1 - Low Disruption:** These improvements add structure around existing practices without significantly changing how work is currently done. They can be introduced immediately with minimal impact on team workflows.
- **Tier 2 - Moderate Disruption:** These improvements require changes to existing ways of working but do not affect team structure fundamentally. A transition period and clear communication would be needed to implement them effectively.
- **Tier 3 - High Disruption:** These improvements involve significant changes to team structure, organisational culture, or long-standing practices. They require careful planning, stakeholder buy-in, and a phased approach to implementation.

Table 4.1: Process Improvement Suggestions for the Hybrid Framework

Suggestion	Rationale	Company's Feedback
Initiation		
<i>Lower disruption</i>		
Introduce a project initiation checklist outlining the tasks required to successfully initiate a project.	Prevents work from starting with incomplete or unsigned requirements and provides a clear structure for project initiation.	High priority and needs to be implemented immediately.
Introduce an internal team kick-off.	Ensures the development team understands project goals before work begins.	This is now implemented.
<i>Moderate disruption</i>		
Introduce a new section in the SRS describing the change management process.	Reduces the risk of receiving ad hoc requests later in the process.	High priority. It is important to include this. However, instead of the SRS, it could be added to the proposal and the proposal walkthrough video.

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Table 4.1 continued from previous page

Suggestion	Rationale	Company's Feedback
Formalise a buffer for small change requests in contracts.	Prevents untracked effort from accumulating due to small client requests.	High priority. The current process includes a standard buffer but needs to formalise the approach.
<i>Higher disruption</i>		
Add lightweight risk identification at initiation.	Formalises informal risk assessment already occurring at the start of projects.	While this is important, it is not a high priority at the moment.
Planning		
<i>Lower disruption</i>		
Create a dedicated change management channel in Google Chat.	Prevents change requests from being lost across multiple communication channels.	This is now implemented.
Document processes and define communication protocols.	Ensures processes and communication are handled consistently.	High priority and should be implemented immediately.

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Table 4.1 continued from previous page

Suggestion	Rationale	Company's Feed-back
Establish a standard for minimum requirements documentation and make acceptance criteria mandatory in all tickets.	Prevents developers from piecing together requirements from emails and other unofficial channels, and reduces defects caused by missed scenarios.	High priority.
<i>Moderate disruption</i>		
Reintroduce story point estimation as a whole-team practice.	Enables data-driven sprint capacity planning and reduces over-commitment. This also gives more ownership to junior team members.	High priority. Discussions have already been held to implement this.
Activate velocity tracking in ClickUp.	Replaces intuition-based capacity planning with team-owned metrics.	High priority. Discussions have already been held to implement this.
<i>Higher disruption</i>		

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Table 4.1 continued from previous page

Suggestion	Rationale	Company's Feed-back
Consolidate grooming into a single structured process extending the current approach of separate grooming by tech leads and the project manager.	Reduces ticket inconsistency and keeps the team informed about project direction.	High priority.
Expand sprint planning participation to the full team.	Builds team understanding of sprint goals and distributes workload awareness.	Already planned, but requires backlog clean-up beforehand.
Protect a sprint capacity buffer for internal work during planning.	Ensures client commitments account for internal company activities.	Primarily needed for lead capacity. Considered medium priority.
Execution		
<i>Lower disruption</i>		
Make ticket creation mandatory for all development work.	Prevents invisible effort and handover issues when modules change ownership.	This is extremely important to address and will be implemented.

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Table 4.1 continued from previous page

Suggestion	Rationale	Company's Feedback
<i>Moderate disruption</i>		
Introduce a mid-sprint developer handover session to review work completeness.	Improves internal quality checks, especially in the absence of a dedicated quality team.	This is already planned.
Make sprint metrics visible to the whole team.	Builds ownership and helps junior developers understand their contributions.	Important to implement. However, estimation practices should be established first.
<i>Higher disruption</i>		
Embed Scrum education in onboarding.	Addresses the lack of understanding of Scrum practices during onboarding.	Basic topics such as estimation and Scrum ceremonies can be added to the company Moodle, with further improvements over time.

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Suggestion	Rationale	Company's Feed-back
Run a team-wide Scrum training initiative.	Ensures new processes are understood and adopted, while strengthening team cohesion.	The company is willing to fund certified courses such as Certified Scrum Master (CSM). Particularly important for leads.
Shift to team-owned task management (without direct PM task assignment).	Reduces dependency on the project manager and builds team accountability.	This is very important and will be implemented immediately.
Introduce a workload visualisation dashboard.	Makes team member overload visible before it impacts delivery.	A valuable addition that can be implemented.
Gradually transfer planning and estimation responsibilities to the team	Reduces reliance on a single individual and builds long-term team capability.	This is a highly important initiative. However, supporting processes must be established before transferring planning and estimation responsibilities to the team.

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Table 4.1 continued from previous page

Suggestion	Rationale	Company's Feedback
Monitoring and Controlling		
<i>Lower disruption</i>		
Define a standard definition of done.	Reduces quality inconsistency caused by informal standards.	High priority and can be initiated quickly.
Introduce a change request triaging process before acceptance.	Prevents untracked effort from accumulating due to unassessed changes.	This is very important. Client communication practices must also be standardised to support this.
<i>Moderate disruption</i>		
Introduce a change log linked to cost tracking.	Makes the cost of accumulated small changes visible.	Challenging due to strong client involvement.
Add a cost tracking step at each sprint review.	Enables early detection of budget deviations.	Very important. Financial analysis can be supported by an external expert.

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Suggestion	Rationale	Company's Feedback
Include junior developers in risk discussions.	Builds team-wide risk awareness and reduces dependence on leads.	Can be considered once a formal risk management process is in place.
Standardise security testing requirements per project type.	Addresses a recognised security gap at a manageable effort level.	Necessary but currently challenging. Could be initiated internally by junior team members.
<i>Higher disruption</i>		
Transition procurement and asset tracking to a dedicated system.	Replaces Excel-based tracking with a more reliable and auditable solution.	Currently a low priority but could be initiated internally by junior team members.
Closing		
<i>Lower disruption</i>		
Introduce a release checklist.	Ensures consistent quality checks across all releases.	High priority and can be implemented immediately.
<i>Moderate disruption</i>		

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Table 4.1 continued from previous page

Suggestion	Rationale	Company's Feed-back
Define a minimum cadence for sprint reviews and retrospectives.	Introduces a structured forum for feedback and continuous improvement.	Important to implement, preferably as group sessions even when automation is considered.
Define a post-delivery stakeholder engagement process.	Transforms informal upselling into a structured and consistent activity.	Initial steps have been taken through Clutch reviews, which provide a credible foundation.

Note: Within each phase, suggestions are ordered from least to most disruptive. Implementation statuses are decided and feedback is gathered after discussions with the company's leadership team.

4.3 Implementation of the AI Strategy

Following the development of the project management process improvements, the AI strategy development phase was initiated. The first step was to identify potential areas of automation aligned with the new hybrid project management process, which combines elements of both PMBOK and Scrum.

4.3.1 Proposed Hybrid Project Management Process with AI Agent Capabilities

Table 4.2 presents the key activities of the proposed hybrid project management process, integrating standard practices from both PMBOK and Scrum, along with best practices identified for the case company through the analysis presented in the previous section. The previously introduced process improvements are also incorporated into this revised process.

For each phase, corresponding AI agent capabilities are identified.

Table 4.2: Proposed Hybrid Project Management Process with AI Agent Capabilities

Key Activities	AI Agent Capabilities
Initiation	
Client discovery call and internal discussion between PM and tech team.	Summarise discussions into a structured project brief and generate meeting notes based on templates.
Lead support (designer involvement for branding projects) and client knowledge transfer where required.	Support client knowledge transfer by guiding clients through technical details or product-related decisions when necessary.
Internal project kickoff meeting (<i>new</i>).	
Proposal preparation and scope definition.	Draft proposals using collected information and templates.
Rough cost estimation.	Generate preliminary cost estimates using historical project data.

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Table 4.2 continued from previous page

Contract and NDA signing (usually sent by clients).	Prepare and send project contracts based on templates (human validation is crucial).
SRS preparation, validation, walkthrough, and client approval.	Assist in drafting SRS documents from client inputs and templates.
Client credentials setup and sharing.	Due to the absence of a strong security process, this should be handled by humans at this stage.
Initial risk identification (<i>new</i>).	Identify early-stage risks based on similar past projects.
Milestone and payment structure definition.	Automate quotation generation.
Initiation checklist validation before execution (<i>new</i>).	Validate completion of the initiation checklist before project execution.
Planning	

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Table 4.2 continued from previous page

<p>Gantt chart and milestone planning.</p> <p>Backlog creation and prioritisation.</p> <p>Backlog grooming with requirements and technical details.</p> <p>Define acceptance criteria and test scenarios for all tickets (<i>new</i>).</p>	<p>Provide assistance in milestone planning based on historical data.</p> <p>Convert SRS into structured backlog items with user stories, acceptance criteria, and other technical details.</p> <p>Create ClickUp tasks/stories automatically from messages shared by leads in Google Chat.</p> <p>Identify dependencies and potential scope risks in the backlog.</p> <p>Recommend story and task prioritisation adjustments.</p>
<p>Story point estimation by the full team (<i>new</i>).</p>	<p>Facilitate story point estimation by engaging team members, collecting story points, and aggregating their inputs.</p>
<p>Sprint planning with full team participation (<i>new</i>).</p> <p>Velocity setup and tracking (<i>new</i>).</p> <p>Sprint goal definition and communicating it clearly to the team (<i>new</i>).</p>	<p>Support the PM in finalising sprint scope using historical velocity data.</p>

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Resource and capacity planning. Internal capacity buffer for non-client work (<i>new</i>). Task assignment with team ownership for managing task completion, without direct calendar allocations. (<i>new</i>).	Assist in resource and capacity planning based on current workload.
Google Calendar integration for meeting visibility (<i>new</i>).	–
Milestone linking to payment terms.	Automate quotation generation and sending to clients based on milestones.
Execution	
Sprint execution with team self-managing tasks (<i>new</i>). Ensuring ticket updates by all team members (<i>new</i>).	Recommend task prioritisation adjustments based on workload and sprint progress. Enforce ticket lifecycle compliance through automated monitoring and end-of-day reminders.
Daily stand-up meetings (15 minutes).	Automate stand-up minute-taking and distribute notes after each stand-up.
Blocker resolution sessions after stand-up. Security checks during development (<i>new</i>).	Provide development support including testing guidance and security checks.

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Table 4.2 continued from previous page

PR review and lead approval.	Provide review support through initial analysis (human validation remains important).
Mid-sprint developer handover sessions where completed work is reviewed (<i>new</i>).	Summarise feedback received in meetings and share it with the team. Create additional tasks, if necessary, with PM approval.
Change request handling through a dedicated channel (<i>new</i>).	Centralise and structure change requests from multiple channels into actionable tickets.
Team performance reviews (360-degree).	Support 360-degree performance reviews through feedback collection, synthesis, and delivery.
Monitoring and Controlling	
Daily stand-up-based progress review. Sprint metrics tracking (velocity, burn-down, and WIP) (<i>new</i>).	Generate real-time sprint performance insights and flag overdue tickets. Provide daily aggregated project updates based on team activity.

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Table 4.2 continued from previous page

Change request triage and impact assessment (<i>new</i>).	Detect delays, stagnation, and workflow inefficiencies.
Workload and WIP limit monitoring (<i>new</i>).	Analyse the impact of change requests on cost and schedule and report to the PM. Monitor WIP limits and alert when team members are overloaded.
Risk register and technical debt management (<i>new</i>).	Predict sprint risks using historical and current trend data and recommend mitigation actions.
Quality checks (definition of done, PR reviews, and listed test scenarios).	Provide guidance for quality checks using scenario checklists and acceptance criteria.
Cost and invoice tracking at the end of each sprint, with follow-ups as necessary (<i>new</i>).	Generate summaries of cost impacts by considering change requests and effort spent.
Closing	
Sprint review and client feedback collection.	Summarise sprint outcomes for client and stakeholder reporting. Summarise client feedback from the sprint review. Create additional tasks, if necessary, with PM approval.

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Table 4.2 continued from previous page

Release checklist verification (<i>new</i>). Acceptance and deployment. Release notes preparation and distribution.	Validate release checklist completion. Generate release notes automatically from completed work items.
Invoicing upon milestone completion.	Trigger invoicing workflows automatically upon milestone completion (human validation required).
Sprint retrospective meeting (<i>new</i>).	Collect and consolidate retrospective feedback from team members. Analyse retrospective data to identify recurring improvement areas.
User training and guidance document delivery. Annual Maintenance Contract (AMC) sending. Post-project stakeholder engagement and upselling.	Generate user training and guidance documentation based on templates. Automate AMC generation and sending at project closure and renewal dates. Recommend upselling opportunities based on project data and client history.

Note: Key Activities include both current company practices and new activities introduced by the hybrid process. AI Agent Capabilities describe where automation or AI assistance is proposed to support each phase.

In addition to the aforementioned AI capabilities, with the initiation of automation, it is essential to establish AI usage guidelines and guardrails for the organisation.

4.3.2 Analysis of AI Capabilities in the Current Project Management Tool

As noted by the company's Chief Executive Officer, ClickUp was selected as the organisation's project management tool partly due to its forward-looking design and AI capabilities. As discussed in the literature review, ClickUp can be classified as an AI-native project management tool, with AI deeply embedded throughout the platform. The analysis therefore focused first on understanding how ClickUp's built-in agentic capabilities could be applied within the company's existing workflows.

The primary focus was ClickUp Brain's Super Agents, built-in AI agents designed to function as virtual team members. ClickUp offers two approaches to deploying these agents: selecting a pre-built agent from a catalogue, such as the Project Manager Super Agent, or building a custom agent from scratch with manual configuration. A natural language builder is available in both cases, allowing users to describe their requirements conversationally and refine the agent's behaviour through an iterative dialogue.

Given the time constraints of the research, it was decided to work with the pre-built Project Manager Super Agent rather than building a custom agent from scratch. Future work could explore the potential of a fully customised agent configuration to better match the company's specific needs.

Discussions with the team revealed that resource planning is currently one of the most time-consuming aspects of project management within the organisation. The agent was therefore tested specifically on automating the resource planning workflow. Table 4.3 presents the results of the testing sessions conducted between December 2025 and January 2026.

Date	Duration	Outcome	Observations
Dec 23rd	~1h 20m	Failed	Resource access issues prevented the agent from recognising project permissions. When tested with real client projects, several task lists were ignored. Tasks were scheduled inefficiently, with short tasks stretched unnecessarily across multiple days.
Dec 30th	~1h	Failed	Team members were left unassigned despite availability. Tasks were stretched across days without reflecting actual effort. Cross-functional assignments were avoided despite being permitted. Not all project lists were considered.
Jan 9th	~1h 30m	Partially successful	Step-by-step prompting improved performance significantly. However, the agent could not verify resource access to task lists, excluded two team members due to high task load, and missed one project list due to priority filtering.
Jan 13th	~1h 45m	Successful	Assignments were completed and approved. Remaining issues included inability to verify list access independently, occasional inclusion of the dummy project, schedule mix-ups between team members, and instruction forgetting. Calendar assignments were finalised after multiple prompt iterations.

Table 4.3: ClickUp Project Manager Super Agent Testing Results

The testing process surfaced three recurring issues with the company’s current project management practices that directly affected the agent’s ability to perform accurately:

- **Tasks and user stories lack sufficient descriptions**, meaning the agent cannot fully understand the context of a requirement. Several tickets in the backlog contained no description at all.
- **Tasks are not consistently closed on time**, causing the agent to treat completed work

as outstanding and re-assign it during resource planning.

- **Priority levels are not set correctly across tickets**, preventing the agent from identifying and acting on the most important work first.

These findings reinforced a central premise of this research: that a well-defined and consistently followed project management process must be in place before AI agents can be integrated effectively. An agent is only as reliable as the data it operates on, and where that data is incomplete, inconsistent, or poorly maintained, the agent's outputs will reflect those same deficiencies. This observation directly informed the decision to prioritise project management process development before advancing the AI integration strategy.

Root Cause Analysis of Difficulties in AI Agent Integration

To understand the underlying causes of the difficulties encountered during the ClickUp agent testing phase, a root cause analysis was conducted using the fishbone technique. Identifying these root causes is important not only for addressing the immediate integration challenges but also for preventing similar issues from arising in the future.

The fishbone diagram presented in Figure 4.1 illustrates the root causes identified through this analysis.

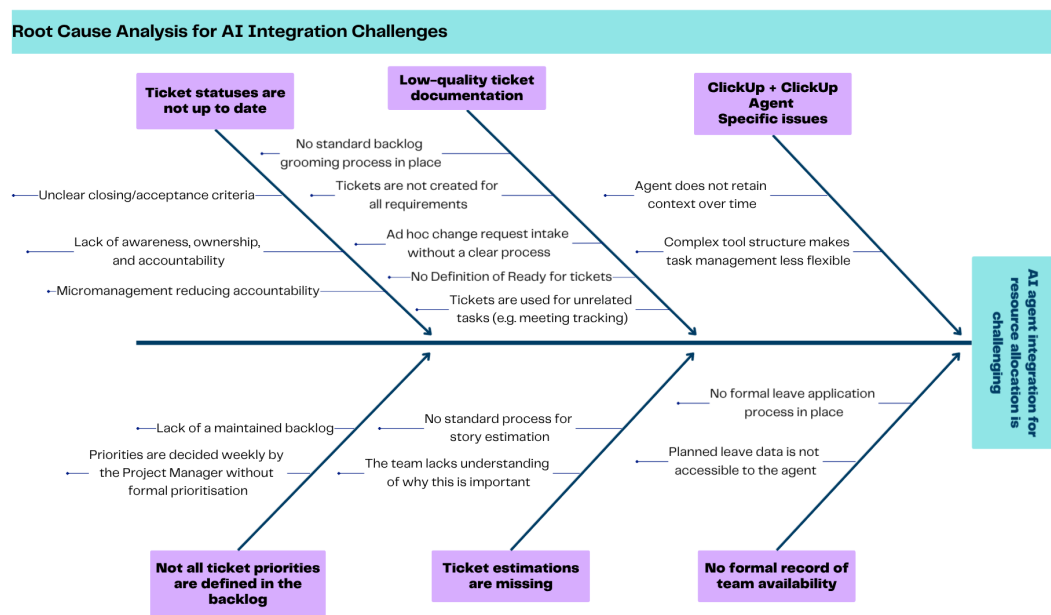


Figure 4.1: Root Cause Analysis for AI Integration Challenges

The analysis identified three principal root causes:

- Micromanagement and poor ticket hygiene:** The team’s ticket updating practices are inconsistent, partly as a result of long-standing micromanagement practices within the organisation. Tasks are frequently added directly to team members’ calendars by the project manager, which discourages self-management and reduces the team’s ownership of ticket maintenance. As a result, tickets are often left incomplete, undescribed, or open after completion.
- Focus on task completion over process discipline:** The team tends to prioritise completing immediate tasks over maintaining the process structures, such as documentation, estimation, and backlog management, that benefit the organisation in the longer term. Issues are frequently resolved through ad hoc workarounds rather than through systematic process improvements, leaving underlying inefficiencies unresolved.
- Tool complexity:** While ClickUp offers a comprehensive range of features, its complexity

has made it difficult for the team to follow consistent ticket practices. Rather than maintaining a single, well-organised backlog which is the recommended approach for effective sprint prioritisation, the team has developed informal workarounds that further fragment the data the agent relies on.

4.3.3 Evaluation of ClickUp’s Agentic Capabilities and Consideration of Alternative Approaches

While ClickUp was originally selected for its all-in-one and forward-looking design, interviews with team members revealed a notable divide in experience. Those in management roles often reported consistent difficulties with task creation and management, while junior developers found the tool straightforward to use in their day-to-day work. This suggests that ClickUp’s complexity affects those responsible for maintaining the project management data that the agent depends on.

The researcher also observed that ClickUp’s learning curve is steeper than that of comparable tools such as Jira. Beyond the scope of this research, the organisation should consider evaluating alternative project management tools to identify a platform that better balances the needs of both management and development roles.

Regarding ClickUp’s agentic capabilities specifically, the testing phase demonstrated that the Project Manager Super Agent can perform well on tasks such as resource allocation when the underlying ticket data is accurate and well maintained. The agent’s transparency is a notable strength. Every step of its decision-making process is explained, making it easier to identify where errors occur. However, a significant technical limitation observed during testing was that the agent periodically forgets previously given instructions, requiring repeated input and causing unnecessary rework. Additionally, because the agent is a closed platform with no direct access to its underlying implementation, diagnosing unexpected behaviour was difficult.

Taking into account the availability of open frameworks for building custom agents, the company’s level of technical expertise, and the need for a fully customisable solution that can be tailored precisely to the organisation’s processes, it was decided to implement an in-house agent solution rather than continuing with ClickUp’s built-in agent. This decision is discussed further

in the following section.

4.3.4 Implementation of "Nydi" as an AI-Based Teammate

Based on the AI integration strategy developed in this research, the company proceeded with the implementation of an in-house AI agent named Nydi. Nydi is designed to function as an AI-based teammate available on G-Chat, which is the main communication channel of the team, automating selected project management workflows to reduce manual effort and improve process consistency. The technical implementation was led by the company's development team, with the automation flows and requirements defined based on the findings of this research. The implemented flows are intended for ongoing use within the organisation.

Technology Selection

Windmill, an open-source workflow engine and developer platform, was selected as the foundation for this implementation. It supports the building of comprehensive internal tools and also provides a built-in AI agent solution that can be configured through a low-code approach [65].

Windmill was selected for the following reasons:

- **Extensive and convenient integration capabilities:** Windmill supports over 200 integrations, including tools already in use within the company such as ClickUp, Outline, AWS, Bitbucket, and G-Suite [65].
- **Unified development environment:** Coding, building, deploying, integrating external tools, and managing logs can all be performed within a single platform, eliminating the need for multiple separate tools during development.

Implementation Attempt 1

The team tried using the AI Agent of Windmill by simply providing configurations to it to build the custom agent. However, even though initially it was successful, it was noted that when other components such as the LLM model used by the agent gets updates, the tool malfunctions in

some occasions. Therefore it was decided to code an agent within WindMill by primarily using it as a development platform and for supporting new integrations.

Implementation Attempt 2

For implementation Attempt 2, an agent was coded using Python by using LangGraph as the agent framework and Gemini 3 flash as the LLM model, currently the latest version of Gemini. This reduces the dependency on Windmill and issues that may occur due to its internal bugs.

For this implementation,

- **LangGraph** was used as the agent framework especially due to its wide use in the field and additionally the choice is supported by literature review [54].
- **Google Gemini** was selected as the underlying language model for the agent. As discussed in the literature review, Gemini demonstrates strengths in contextual understanding and accuracy [58]. The company also holds premium access to Gemini, enabling full utilisation of its capabilities without additional licensing constraints.

The architecture of the solution is discussed in the next section.

Agentic Solution Architecture

The architecture of the agentic solution is illustrated in Figure 4.2.

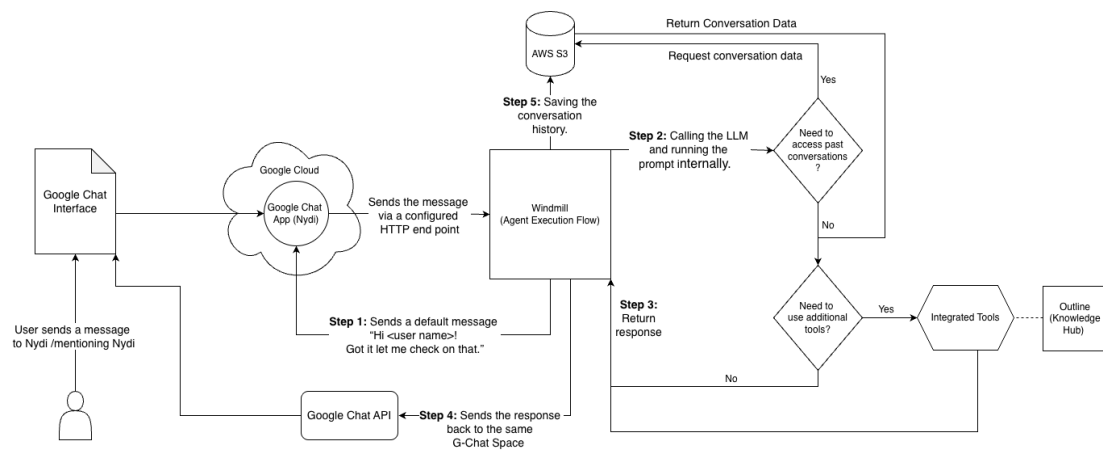


Figure 4.2: Nydi Agent Architecture and Execution Flow

Nydi is accessible to all team members through the company’s Google Chat workspace, where it can be used in direct messages or added to shared spaces. In spaces, team members can interact with the agent by mentioning it using @Nydi. The agent is implemented as a Google Chat App within Google Cloud, making it available across the team’s existing communication environment. The application is connected to Windmill via HTTP endpoints, through which the agent’s execution flow is managed. Outline, an open-source knowledge management tool, is integrated as the agent’s knowledge base, and conversation history is stored and managed in AWS S3.

When a user sends a message to Nydi, the message is routed to Windmill via the HTTP endpoint, triggering the agent execution flow. An automatic acknowledgement response, "Hi <username>! Got it. Let me check on that.", is sent immediately to the Google Chat space while the execution flow continues in parallel.

The execution flow involves two decision points:

1. **Does this action require access to past conversations?** For example, if a team member asks for updates from earlier in the day, the agent retrieves the relevant conversation history from AWS S3. If no historical context is needed, the flow proceeds to the next decision point.

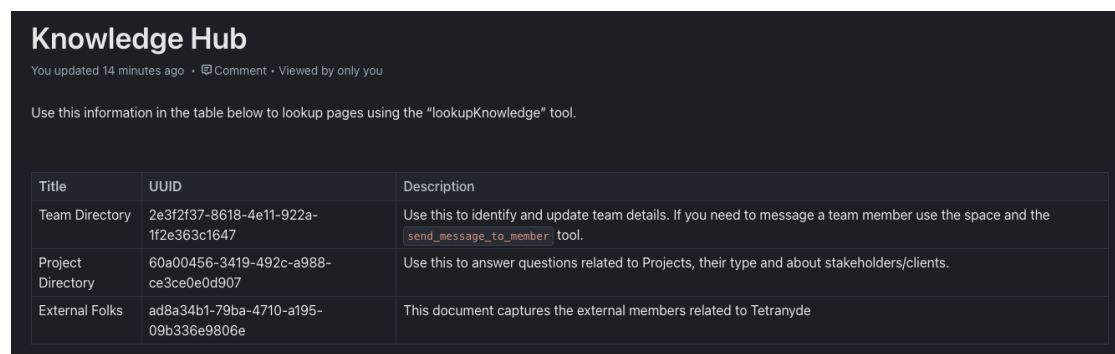
2. **Does this action require access to integrated tools?** For example, if a team member requests information about a specific project, the agent queries the Outline knowledge base to retrieve the relevant data. If no external tool access is required, the agent generates a response directly from the language model.

Once the response is generated, it is delivered to the same Google Chat space via the Google Chat API.

Knowledge Base Design and Maintenance

The approach to knowledge base maintenance is noteworthy, as it enables non-technical team members to expand the agent's capabilities without requiring developer involvement. The knowledge base is maintained in Outline, the documentation tool already used by the company.

A central document titled "Knowledge Hub" serves as the index for all knowledge accessible to the agent. Each entry in this document contains the document title, its unique identifier, and a context description that helps the agent determine when and how to access it. An example of this structure is presented in Figure 4.3.



Title	UUID	Description
Team Directory	2e3f2f37-8618-4e11-922a-1f2e363c1647	Use this to identify and update team details. If you need to message a team member use the space and the <code>send_message_to_member</code> tool.
Project Directory	60a00456-3419-492c-a988-ce3ce0e0d907	Use this to answer questions related to Projects, their type and about stakeholders/clients.
External Folks	ad8a34b1-79ba-4710-a195-09b336e9806e	This document captures the external members related to Tetranide

Figure 4.3: Knowledge Hub Structure

New information can be added to the knowledge base in three steps:

1. Create a new document in Outline with the relevant information.
2. Retrieve the unique identifier of the document.

3. Add a record to the Knowledge Hub document with the document name, identifier, and context description.

This design ensures that the knowledge base can grow incrementally as the organisation's needs evolve, without placing the burden of maintenance on technical team members.

4.3.5 Currently Implemented Functionality

Among the process gaps identified during the evaluation phase, two areas were consistently highlighted across interviews and discussions as particularly important: resource and capacity planning, and daily team updates management. It was decided to prioritise the automation of daily updates management in the initial implementation phase. Resource and capacity planning was deferred to a later phase, given the complexity observed during the ClickUp agent testing and the greater effort required to implement it reliably.

Another area of functionality, knowledge management and communication support was also implemented, given the importance of maintaining an accessible knowledge base for the agent and the practical value of automated communication support for a fully distributed team.

Daily Updates Management Automation

Team members share their daily updates by mentioning Nydi in the team's Google Chat workspace, which captures and stores the information throughout the day. At any point, typically at the end of the day, the project manager or senior management can interact with Nydi to retrieve a consolidated summary of all updates received. This is particularly valuable given that the company operates as a fully distributed team, with members working across different locations including senior management based outside of Sri Lanka, making real-time visibility into daily updates a practical necessity.

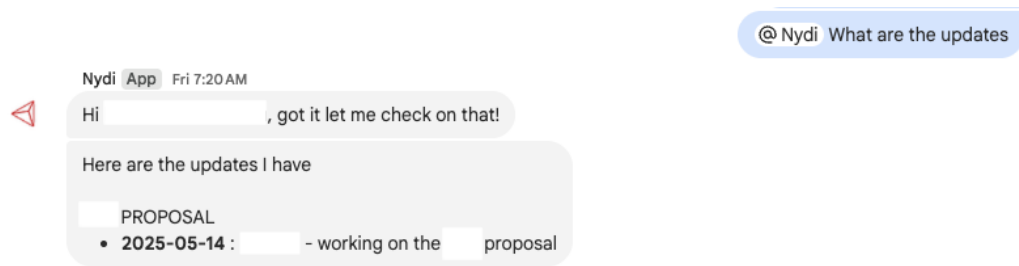


Figure 4.4: Daily Updates Management Automation

It is also worth noting that the same flow can be extended to other areas in the future. Change management, retrospective feedback collection, and feature estimation from team members are all areas where this approach could be applied, with the potential to make recurring meetings more efficient by collecting input in advance.

Knowledge Management and Communication Support

Nydi is able to provide team members with information about projects and stakeholders on demand, functioning as a guidance resource available at any time of day. Project and stakeholder information is maintained in the Outline knowledge base as described in Section 4.3.4. This reduces the need for team members to reach out to leads or the project manager for routine information queries.

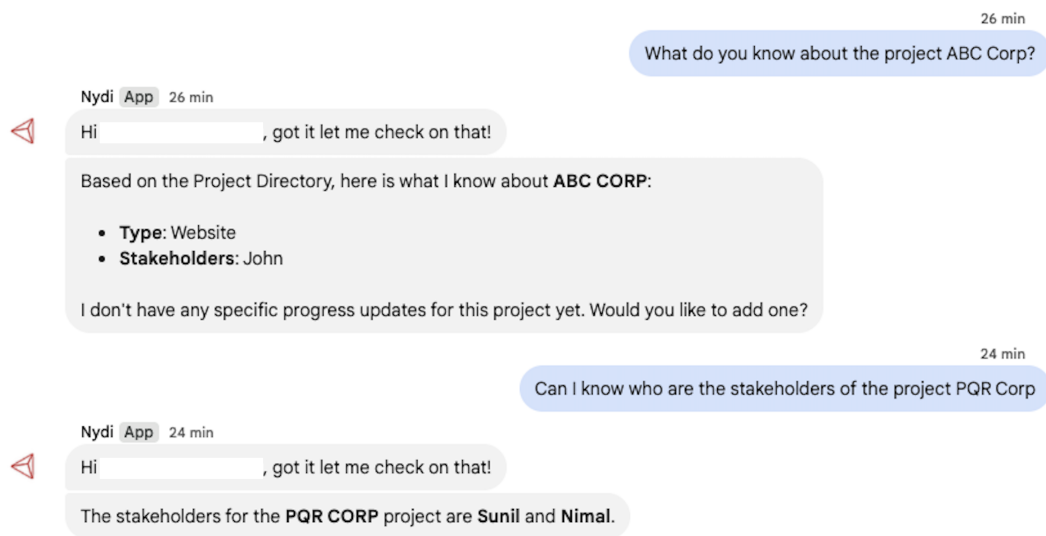


Figure 4.5: Knowledge Management Automation

One currently implemented communication flow is the sending of reminders on request. The knowledge base includes a team members document containing each person's name, role, and Google Chat Space identifier. When the project manager asks Nydi to send a reminder to a specific team member or to the full team, for example about an upcoming meeting or a task deadline, the agent retrieves the relevant details from the knowledge base and delivers the message directly, eliminating the need for the project manager to contact each person individually.

This functionality can also be extended to automate client communications where appropriate. However, it is important that robust knowledge management processes are in place to ensure the accuracy of information in the knowledge base, and that any automated client-facing communications are thoroughly tested for accuracy, tone, and quality before broader deployment.

AI Agent's Privacy Controls

Currently, the AI agent is implemented in such a way that private messages are not shared with other team members. For example, if a user requests personal messages shared by a team member, the agent responds that it is not permitted to share such information. This is shown

in Figure 4.6

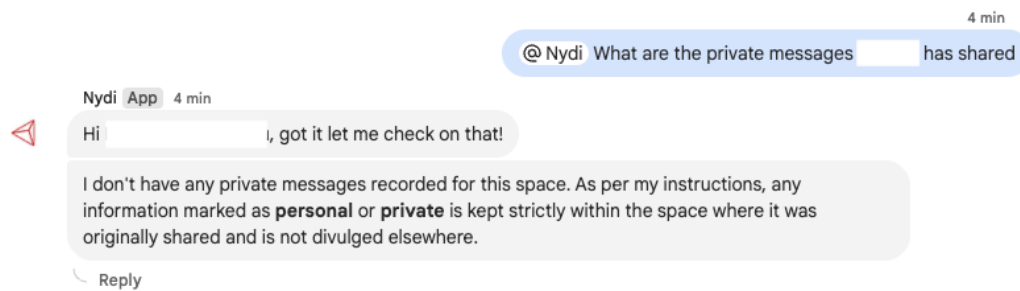


Figure 4.6: Nydi's Privacy Controls

4.3.6 Planned Future Capabilities

While the features currently implemented represent an initial phase of development, they establish a strong foundation for broader automation across the organisation's project management processes. In addition to the capabilities identified through this research, further automation opportunities emerged through ongoing discussions and brainstorming sessions with team members during the research process. Currently, the following capabilities are planned for implementation by the end of Q2 2026:

- Completion of the automated change management workflow
- Automated project bootstrapping
- Progress tracking for projects, milestones, and sprints, including automated reminders for approaching deadlines or tasks that have been in progress for an extended period
- Automated client communication management, including assistance to team members in drafting appropriate client responses

The broader set of automation capabilities identified in this research, as outlined in Table 4.2, as well as additional suggestions from the organisation, are currently under discussion for scheduling and prioritisation in Q3 and Q4 of 2026.

4.4 Chapter Summary

This chapter presented the implementation of both phases of the research. The first phase produced a tiered set of process improvement suggestions grounded in PMBOK and Scrum practices. The second phase evaluated the existing tool's AI capabilities, conducted a root cause analysis of the integration difficulties encountered, identified AI automation capabilities for the new project management process, and documented the development and initial implementation of Nydi, the case company's in-house AI agent. The following chapter discusses the findings across both phases in relation to the five research questions of this study.

5 Discussion and Results

5.1 Chapter Overview

This chapter discusses the findings of the research in relation to the five research questions. Each research question is discussed in turn. RQ1 and RQ2 are addressed through the literature review findings, while RQ3 and RQ4 draw on the empirical findings from the implementation phase. RQ5 presents the findings from the structured feedback sessions conducted with the case company's team and leadership.

5.2 Analysis of Results in Relation to the Research Questions

In this section, the results of the research are discussed based on the research questions that this study aimed to answer. The results provide answers to the research questions and also confirm the validity of the research.

5.2.1 Software Development and Project Management Evolution

RQ1 - How has software development evolved over the past decade, and has project management kept pace with these changes?

RQ1 explores how software development has evolved over the past decade and whether project management has kept pace. The literature reviewed in Chapter 2 reveals that both fields have evolved in a similar direction, away from rigid, plan-driven approaches towards more flexible, iterative, and AI driven methods, but not at the same pace.

In software development, the adoption of Agile, DevOps, DevSecOps, and AI-assisted practices has progressed rapidly. AI integration in particular has moved at a remarkable speed, with GitHub Copilot scaling to over 20 million users by 2025 and 84% of developers using or planning to use AI tools. Developers have already moved through initial enthusiasm to a phase of critical reflection, with positive sentiment dropping to 60% in 2025 and only 3% reporting high trust in AI outputs [10].

Project management has followed a similar directional shift but consistently lags behind. While organisational AI usage has increased from 36% to 70% in two years, only 20% of project managers report having strong practical AI skills [20]. The COVID-19 pandemic further complicated this by shifting project management from in-person coordination to managing distributed teams, a challenge that existing frameworks were not initially designed to handle.

In answer to RQ1, software development has evolved at a faster pace than project management, particularly in AI adoption. This gap is directly relevant to the case company, which operates in a fast-moving software environment and faces the challenge of integrating AI into project management practices that are not yet fully defined or consistently followed.

5.2.2 Project Management Methodologies and Their Applicability

RQ2 - How are project management methodologies currently applied in software development organisations, and what are the strengths and limitations of these approaches in fast-paced environments?

RQ2's objective is to understand how project management methodologies are currently applied in software development organisations and what their strengths and limitations are. This question was also addressed through the literature review in Chapter 2. The literature shows that project management methodologies vary widely across organisations and industries, ranging from

structured traditional frameworks such as PMBOK and PRINCE2 to flexible agile approaches such as Scrum and SAFe. Each approach carries distinct strengths and limitations. PMBOK provides comprehensive coverage of all major project management process areas through its ten knowledge areas, but places the majority of responsibility on the project manager and can be overly detailed in practice. Scrum offers iterative flexibility and team ownership but does not fully address areas such as risk, cost, and procurement management [42].

The literature also shows a clear and growing trend towards hybrid approaches that combine elements of both traditions. Research by Rosenberger and Tick [41] and Fitsilis [42] both demonstrate that PMBOK and Scrum are more complementary than conflicting, with agile practices making a valuable contribution to PMBOK's process goals. However, both studies identify the absence of empirical validation in real organisational settings as a significant gap.

These findings directly informed the methodology selection for this research. PMBOK was selected over PRINCE2 as the representative traditional framework due to its greater flexibility, larger number of tools and techniques, and comprehensive process coverage. Scrum was selected as the representative agile framework because the case company already follows some Scrum practices and its team size and project complexity are well suited to Scrum without requiring a scaling framework. The combination of these two methodologies provided the theoretical foundation for the hybrid project management process developed in this study, addressing the empirical gap identified in the literature by applying and validating this combined approach within a real organisational context.

5.2.3 Design and Validation of a Hybrid Project Management Process

RQ3 - How can a tailored hybrid project management process, integrating Agile/Scrum and PMBOK methodologies, be designed and validated to address inconsistent project management practices in an IT company?

RQ3 explores understanding how a tailored hybrid project management process, integrating Agile/Scrum and PMBOK methodologies, can be designed and validated to address inconsistent project management practices in the case company. This question was addressed through the

empirical phase of the research, combining participant observation, semi-structured interviews, focus group discussions, and ticket analysis to understand the company's current practices and inform the design of a new project management process. The proposed process was subsequently reviewed in a formal validation session with the company's leadership team.

Key Findings from the Process Analysis

The process analysis, drawing on data collected through participant observation, semi-structured interviews, focus group discussions, and ticket analysis, revealed a consistent pattern across all five project management phases. While the company follows some Scrum practices and has established informal ways of working that function reasonably well at a surface level, the analysis identified a significant absence of structured processes, documentation standards, and shared team ownership across the project lifecycle. Many challenges such as inconsistent ticket practices, unclear requirements, and ad hoc change management, were not isolated issues but symptoms of the same underlying problem: that processes had evolved reactively rather than being deliberately designed. A full account of the findings is provided in Appendix A, and the resulting process improvement suggestions are presented in Table 4.1 in Chapter 4.

Validation of the Hybrid Process

The proposed process improvements were reviewed in a formal session attended by the Chief Executive Officer, the Project Manager, and the technical leads. The overall response was strongly positive and many of the suggestions had emerged collaboratively through the research process itself through brainstorming sessions, interviews, and discussions with the team. The validation session confirmed the leadership team's commitment to implementing them. At the time of writing, the majority of the suggested improvements are either already being implemented or formally planned for implementation, which can be considered a direct and tangible outcome of this research. This is consistent with the action research approach adopted in this study, where the researcher worked directly within the organisation to identify challenges and co-develop solutions rather than imposing an externally derived structure.

The leadership team also validated that the combined use of PMBOK and Scrum as an

analytical framework is effective for evaluating company processes and developing formal process guidelines, confirming both the process analysis approach and the resulting process suggestions.

In addition, the feedback naturally reflected the tiered classification used in the improvement suggestions. Lower disruption changes were largely accepted for immediate implementation, while higher disruption changes were acknowledged as important but requiring more careful planning and team buy-in.

A significant observation was raised by the Chief Executive Officer, who noted that Agile's story point estimation does not always translate well to client-facing projects where clients expect time-based milestones. This highlights the value of complementing Scrum's estimation approach with traditional structured milestone and cost management practices, addressing both internal sprint velocity tracking and external client expectations simultaneously.

Reflection

The hybrid process therefore provides the answer to RQ3. By grounding the design in both the theoretical literature, drawing on the complementary strengths of PMBOK and Scrum as established by Rosenberger and Tick [41] and Fitsilis [42] and the empirical findings from the case company, the process addresses the specific gaps and inconsistencies identified while remaining practical and implementable within the organisation's existing context.

5.2.4 AI Integration in Project Management

RQ4 - How can AI tools and techniques be systematically integrated into the phases of the hybrid project management process to enhance planning, execution, and decision-making in an IT company?

This research question explored how AI tools and techniques can be systematically integrated into the phases of a hybrid project management process to enhance planning, execution, and decision-making. It was addressed through a combination of a literature review, evaluation of the company's existing project management tool, practical testing of its AI capabilities, mapping of potential AI functionalities to the newly initiated process (RQ3), and the implementation of an in-house AI agent named Nydi.

Findings from the AI Tool Evaluation

The evaluation of ClickUp's built-in Project Manager Super Agent provided a practical understanding of what AI integration in project management looks like in a real organisational context. The testing sessions, conducted between December 2025 and January 2026, revealed that while the agent was capable of performing resource allocation tasks under the right conditions, its effectiveness was directly dependent on the quality and consistency of the underlying project management data. Tickets without descriptions, tasks left open after completion, and incorrect priority settings all caused the agent to produce inaccurate or incomplete outputs.

This finding validated the core idea of this research, that a well-defined and consistently followed project management process must be in place before AI agents can be integrated effectively. The root cause analysis conducted following the testing phase further confirmed that the process issues identified by the agent, such as poor ticket hygiene, micromanagement practices, and tool complexity, were not simply technical problems with the agent but organisational and cultural ones that no AI tool can resolve on its own.

The evaluation also revealed practical limitations of closed AI agent solutions. The agent periodically forgot previously given instructions, could not independently verify resource access to task lists, and offered no visibility into its underlying implementation, making it difficult to diagnose unexpected behaviour. These limitations informed the decision to develop a custom in-house agent solution rather than continuing with ClickUp's built-in agent.

The AI Integration Strategy

Based on the literature review, the tool evaluation findings, and interviews conducted within the organisation, a systematic AI integration strategy was developed and mapped to all five phases of the hybrid project management process. The proposed AI agent capabilities, presented in Table 4.2 in Chapter 4, cover the full project lifecycle from initiation through to closing, identifying specific automation opportunities in a wide variety of areas, and the significance of this is that this strategy is developed to match the ideal project management process for this company.

The decision to map AI capabilities to all five phases ensures that the AI strategy is com-

prehensive and aligned with the full scope of the hybrid process, rather than addressing only the most visible or immediately urgent pain points. This also provides the organisation with a clear roadmap for progressive automation as the process matures and team capability grows.

The in-house implementation of Nydi represents the first practical step in executing this strategy. Built using Python, LangGraph and Google Gemini, and deployed through Windmill as the workflow engine, Nydi is currently automating daily updates management and knowledge management workflows within the organisation.

Validation of the AI Integration Strategy

The AI integration strategy and the proposed automation capabilities were reviewed as part of a formal validation session attended by the Chief Executive Officer, the Project Manager, and the technical leads. The response was strongly positive, and the leadership team specifically noted that defining AI agent capabilities across all five phases of the project management cycle provided a comprehensive view that they had not previously developed for their own roadmap for Nydi.

The leadership team expressed that the automation capabilities identified in this research have the potential to bring Nydi to a commercial level in the future, representing a contribution that extends beyond the immediate research context. Some of the suggested capabilities are already being automated, most notably the change management workflow. The broader set of capabilities outlined in Table 4.2 is currently under discussion for scheduling and prioritisation in Q3 and Q4 of 2026.

Reflection

The AI integration strategy therefore provides the answer to RQ4. Based on both the theoretical literature on agentic AI and practical evaluation within the case company, and by mapping automation capabilities systematically to all phases of the hybrid process, the research provides both an immediate implementation foundation and a longer-term roadmap for AI-driven project management automation in small software organisations.

5.2.5 Anticipated Impact of the AI-Integrated Hybrid Project Management Process

RQ5 - What are the anticipated impacts of an AI-integrated hybrid project management process on software development, quality assurance, and delivery outcomes, as perceived by the team members and senior management of the case company?

RQ5 explored what the anticipated impacts of an AI-integrated hybrid project management process are on software development, quality assurance, and delivery outcomes, as perceived by the team members and senior management of the case company. To address this question, a group discussion was conducted with the leadership team. Due to time constraints and the current workload of junior team members, their perspectives could not be gathered through a dedicated formal session. However, this question was explored during the individual interviews conducted earlier in the research, and their views are incorporated into the findings below.

Leadership Perspective on Anticipated Impact

The consolidated feedback from the leadership team was strongly positive. With the implementation of Nydi already underway, the leadership team expressed that an AI-integrated hybrid project management process is anticipated to have a meaningful positive impact on software development practices, quality assurance, and delivery outcomes. The change management automation already in place was mentioned as an early example of how AI integration can reduce manual effort and improve information flow across the team.

However, the leadership team also acknowledged that AI integration is not always inherently beneficial. As evidenced by the ClickUp testing conducted during the research, integrating AI into an inconsistent or poorly defined process does not improve efficiency. Instead, it can reduce efficiency by introducing additional complexity without addressing the underlying issues. This feedback further validated the sequencing approach adopted in this research. The process should be in place first before AI is integrated.

Junior Team Member Perspectives on Anticipated Impact

Junior team members expressed cautious but generally positive views about AI integration, with some important concerns. While they recognised the potential benefits of a more structured process and AI-assisted support, they expressed discomfort with the prospect of a fully automated project management environment. In particular, they highlighted that human interaction is important to them, especially given that the team works fully remotely. Automating all communications and routing them through an AI agent was seen as potentially isolating, with negative implications for team morale. This finding highlights the importance of team perspectives in AI adoption decisions and supports the study's emphasis on involving the entire team in both process design and AI integration.

The Importance of Human Validation

A consistent finding across both the leadership and junior team member perspectives was the critical importance of human validation in an AI-integrated process. Neither group expressed a desire for full automation. The leadership team emphasised that human validation is essential for ensuring the accuracy and appropriateness of AI-generated outputs, particularly in client-facing contexts such as communication management and change request handling. The balance between automation and human judgement was identified as the key factor in making the process both efficient and reliable.

Reflection

The findings presented above provide an initial and qualitative answer to RQ5, capturing the anticipated rather than actual impacts of the AI-integrated hybrid process. It is worth acknowledging that this question can be more definitively answered through observation of the real impact of the process and AI integration on software development, quality assurance, and delivery outcomes over time. This represents a direction for future research, as discussed in the following conclusion chapter.

5.3 Chapter Summary

This chapter discussed the findings of the research in relation to all five research questions. RQ1 and RQ2 were addressed through the literature review, confirming the gap between software development and project management evolution and establishing the theoretical basis for the hybrid process. RQ3 and RQ4 were addressed through the empirical findings, with the hybrid process and AI integration strategy both validated positively by the leadership team. RQ5 captured broadly positive anticipated impacts from both the leadership and junior team members, with a shared emphasis on the importance of human validation and avoiding over-automation. The following chapter presents the conclusion of the thesis.

6 Conclusion

6.1 Chapter Overview

This chapter presents the synthesis of the research findings in relation to the research objectives. It summarises the overall study, reflects on each research objective, and outlines the key contributions of the research. The chapter also discusses the limitations of the study, future research directions, and concludes with key learnings from the case organisation.

6.2 Summary of the Research

This research was conducted in partnership with Tetranyde Pvt Ltd, a software startup based in Sri Lanka, following a pragmatist research philosophy and an action research strategy. The study was structured into two phases. The first phase focused on analysing the case company's existing project management practices and developing a tailored hybrid project management process grounded in PMBOK knowledge areas and Scrum practices. The second phase focused on developing an AI integration strategy for the company on top of the updated hybrid project management process. This included identifying automation capabilities for the new process across the five project management phases defined by PMI, evaluating existing tools for their automation capabilities, and implementing an in-house AI agent named Nydi.

Data was collected through a combination of participant observation, semi-structured interviews, focus group discussions, and ticket analysis. Participants were selected to represent different roles as well as seniority levels.

6.3 Reflection on the Research Objectives

In Table 6.1, the research objectives presented in Chapter 1 are listed along with reflections on how they were achieved.

Table 6.1: Reflection on Research Objectives

ID	Objective	Reflection
RO1	To analyse how software development practices have evolved over the past decade and evaluate whether project management methodologies have kept pace with these changes, with particular attention to the growing role of AI.	The findings confirm a clear divergence in evolution speed, with software development advancing more rapidly than project management, particularly in AI adoption.
RO2	To examine how project management methodologies are currently applied in software development organisations and identify the strengths and limitations of these approaches in fast-paced environments.	Hybrid approaches are widely used but inconsistently applied. The study confirms that Agile and traditional methods are complementary and also provided the foundation for the process analysis framework, which evaluates company processes using a combined PMBOK and Scrum approach.
RO3	To identify and analyse the root causes of project management challenges faced by the case company by examining its processes and team perspectives, mapping current practices against PMBOK and Scrum principles to identify gaps.	The issues were traced back to the absence of intentionally designed processes, leading to reactive and inconsistent project management practices.

ID	Objective	Reflection
RO4	To design a tailored hybrid project management process that integrates Agile/Scrum and PMBOK methodologies, grounded in both theoretical literature and empirical findings from the case company, and validate it through review by team members and senior management.	A validated hybrid process was developed and accepted by leadership, with several improvements already being implemented in practice.
RO5	To evaluate existing and new AI tools and develop a systematic AI integration strategy that embeds appropriate tools and agentic solutions into the phases of the hybrid project management process to enhance planning, execution, and decision-making, while applying the fishbone technique to trace AI integration challenges back to their underlying causes.	AI effectiveness was found to depend strongly on process maturity and data quality. This validated a core idea presented in the research: that an appropriate process must be in place to implement an AI strategy effectively. The root causes of AI integration challenges were largely related to process issues and limitations in the current tool, which also guided the development of the in-house AI agent, Nydi.
RO6	To evaluate the anticipated impacts of the AI-integrated project management process on software development, quality assurance, and delivery outcomes as perceived by the case company's team and leadership.	Stakeholders anticipate improved efficiency and coordination but emphasise the continued importance of human oversight, human interaction, and balanced automation.

6.4 Key Research Contributions

This study makes three primary contributions to existing research. Each contribution is motivated by limitations identified in the literature review (Chapter 2), where relevant research gaps were observed.

Contribution 1: Empirical validation of hybrid PMBOK-Scrum frameworks

Although PMBOK and Scrum have been widely compared in theory, limited empirical work exists on how a combined approach can be applied in real organisational settings to design and validate a hybrid framework [41][42].

This research contributes by empirically validating that PMBOK and Scrum are complementary rather than contradictory. A structured process analysis was developed using PMBOK and Scrum and applied within the case company, enabling a comprehensive understanding of both the overall project management process and the Scrum practices in use. This analysis framework can be reused by future researchers and practitioners to evaluate and design hybrid project management approaches.

Contribution 2: Real-world application of agentic AI in project management

While research on agentic AI in project management is emerging, most existing studies rely on simulated or theoretical environments, limiting their practical applicability.

This study contributes by implementing and evaluating AI integration within a real startup environment, using actual project data, workflows, and team insights. The findings demonstrate the practical feasibility and organisational value of AI integration in live project management settings, thereby strengthening the external validity of existing theoretical research.

Contribution 3: Integrated approach to project management process design and AI strategy development

The literature often treats project management process design and AI strategy development as separate research areas, despite their strong interdependence.

This study addresses this limitation by treating process design and AI integration as sequential and interdependent stages. It demonstrates that a well-defined and stable project management process is a prerequisite for effective AI integration. This is a key contribution of the research, as it provides a structured approach that organisations can follow to improve AI adoption in project management. In addition, the proposed AI integration strategy and automation capabilities provide practical guidance for organisations seeking to embed AI into their project management processes.

6.5 Limitations of the Research

The main limitation of this research is the lack of post-implementation effectiveness evaluation due to scope and time constraints, as the proposed hybrid project management process and AI automations are currently being implemented. Therefore;

- **Quantitative performance measures such as time efficiency and productivity gains are not assessed in this study.** The effectiveness of the proposed hybrid project management process and AI integration strategy is evaluated through qualitative feedback received from key stakeholders within the organisation. If a comprehensive post-implementation evaluation were conducted, RQ5 concerning the anticipated impact of an AI-integrated hybrid project management process on software development, quality, and delivery could be assessed in quantitative terms.
- **The research is conducted within a small company of 10-15 team members.** The applicability of the proposed methodology in medium and large organisations has not yet been evaluated.

However, these limitations inform the future research directions discussed in the next section.

6.6 Future Directions of the Research

Deriving from the limitations discussed above, the main and immediate future direction of this research is to implement all components of the proposed project management process and evaluate their outcomes. Furthermore, the AI capabilities identified in this study should be implemented through the AI agent Nydi, followed by a comprehensive post-implementation evaluation combining both quantitative and qualitative methods.

An interesting future research direction would be to explore how AI is adopted within the organisation over time, particularly whether concerns emerge after the initial adoption phase has stabilised, as suggested by recent industry trends in developer adoption.

In addition, the impact of AI-driven project management on other components such as software development, quality, and delivery can be quantitatively assessed in future studies.

6.7 Learnings from the Company

The main learning that can be drawn from Tetranyde Pvt Ltd is their forward-thinking attitude and adaptability, as well as their willingness to embrace significant change. The company demonstrates a clear interest and commitment to continuous development and does not hesitate to take on challenges. Furthermore, feedback from all stakeholders is consistently welcomed and respected within the organisation.

The company actively seeks to improve and grow, and all feedback provided through this research was treated with the same level of attention and consideration from the beginning to the end of the project.

6.8 Chapter Summary

This chapter presents the conclusion of the research. The thesis has examined the design and evaluation of a hybrid project management process, developed using PMBOK and Scrum principles and integrated with AI capabilities, and validated within Tetranyde Pvt Ltd. The study demonstrated the importance of a well-defined process as a foundation for effective AI integration

in project management.

The research contributes a hybrid project management process through a process analysis framework, an AI integration strategy, and a practical implementation through the Nydi agent, while also identifying limitations and future directions. Overall, the research provides both theoretical and practical insights into combining structured project management methodologies with emerging AI technologies. This marks the conclusion of the thesis.

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Appendix A Project Management Process Analysis Based on PMBOK and Scrum

As discussed in the Implementation chapter, the company's project management processes were first analysed in order to develop a new project management framework. This analysis was conducted using both PMBOK knowledge areas and Scrum practices. It was informed by prior research that mapped PMBOK and Scrum, thereby providing broader coverage for the process analysis.

While this structure guided the analysis, it was carried out using data collected throughout the research process, including meeting observations, interviews, focus group discussions, and ticket data.

The full analysis is presented in Table A.1.

Table A.1: Current Process Analysis Mapped Against PMBOK Knowledge Areas and Scrum

Phase	PMBOK Process	Scrum Equivalent	Current Company Practice	Diagnosed Problems	Implication for Hybrid Process
Knowledge Area: Integration Management					

Continued on next page

Table A.1 continued from previous page

Phase	PMBOK Process	Scrum Equivalent	Current Company Practice	Diagnosed Problems	Implication for Hybrid Process
Initiation	Develop project contract	Define goals in kickoff meeting	A formal project initiation process exists: discovery call, SRS creation, video walkthrough, and a kickoff presentation. However, no official kickoff meeting is held with the internal development team. Tickets do not include clear business goals. There is also no project initiation checklist to confirm that prerequisites (e.g. SRS done, SRS sign-off obtained) are in place before development begins.	The absence of an internal kickoff meeting means the development team begins work without a shared understanding of business goals. Without an initiation checklist, there is no systematic gate to confirm readiness before execution begins, increasing the risk of starting development on incomplete or unsigned-off requirements.	The hybrid framework should incorporate a structured internal kickoff process that translates client-level SRS artefacts into team-facing goal definitions. A mandatory initiation checklist (automated where possible) should serve as a prerequisite gate before sprint planning begins.

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Table A.1 continued from previous page

Phase	PMBOK Process	Scrum Equivalent	Current Company Practice	Diagnosed Problems	Implication for Hybrid Process
Planning	Develop project plan	Define next sprint	<p>Sprint planning is conducted in weekly meetings attended only by the four team leads and the PM. ClickUp Gantt charts with milestones are created, though these are sometimes omitted under client time pressure. The sprint duration is one week. Sprint goals and upcoming milestones are discussed at the start of each planning meeting. Junior developers do not attend and are not yet accustomed to the process.</p>	<p>Excluding team members from sprint planning undermines collective commitment and self-organisation. The broader team lacks understanding of sprint goals, capacity constraints, and lead workload, contributing to excessive interruptions for leads. Without velocity metrics, sprint commitment is controlled by PM judgement, making over-commitment a structural risk.</p>	<p>The hybrid framework should expand planning participation incrementally, starting with observation by junior developers. Velocity tracking should shift sprint boundary decisions from PM intuition to team-owned capacity data.</p>

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Table A.1 continued from previous page

Phase	PMBOK Process	Scrum Equivalent	Current Company Practice	Diagnosed Problems	Implication for Hybrid Process
Execution	Manage execution	Development team is managing itself	Tasks are assigned to each team member's calendar by the PM, including when each task should be completed. Team members can adjust their schedule, but in practice tend to follow assignments as given rather than managing their own work.	Assigning tasks by calendar goes against Scrum's principle of self-managing teams. Team members complete what they are told rather than taking ownership of how they organise their work. This reduces accountability and creates a bottleneck on the PM for day-to-day task decisions.	The hybrid framework should set clear boundaries between PM responsibilities (milestone tracking, capacity planning) and team responsibilities (deciding the order and timing of daily tasks). Shifting to team-owned task boards would be a practical first step toward self-management.

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Table A.1 continued from previous page

Phase	PMBOK Process	Scrum Equivalent	Current Company Practice	Diagnosed Problems	Implication for Hybrid Process
Execution	Manage project knowledge	Not defined	A knowledge hub exists and is actively maintained. Deployment and feature handover documentation is created, though mainly by leads. A Moodle-based onboarding system is in place. Meeting minutes are automated via n8n. However, tech leads sometimes complete tasks without creating a ticket or adding details, leaving no record of the work done.	Knowledge creation is concentrated among leads. When tech leads complete work without creating or updating tickets, there is no record of what was done or why, creating handover problems. Junior developers contribute less to documentation, increasing dependency on leads for institutional knowledge.	The hybrid framework should make ticket creation a mandatory step for all completed work, including lead developer tasks. Knowledge contribution expectations should be built into the definition of done, so that feature context, decisions made, and regression areas are documented by all team members.

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Table A.1 continued from previous page

Phase	PMBOK Process	Scrum Equivalent	Current Company Practice	Diagnosed Problems	Implication for Hybrid Process
Controlling	Control progress	Development team and Scrum master control sprint progress	The PM acts as Scrum Master. Daily standups are effective, completing within 15 minutes. Blockers are raised consistently and resolved in follow-up discussions after the standup. However, ticket non-closure is a recurring daily issue, driven by task switching, unclear closing criteria, and insufficient understanding of why ticket hygiene matters.	Recurring ticket hygiene failures indicate a structural problem. Root causes include unclear definition of 'closed', cognitive overload from context switching across up to six projects, and insufficient Scrum knowledge. The standup functions well as a communication event but is not resolving the underlying compliance gap.	The hybrid framework should introduce an explicit ticket lifecycle definition (including closing criteria) and lightweight automated end-of-day reminders. Scrum education including the rationale for ticket hygiene should be embedded in onboarding from day one.

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Phase	PMBOK Process	Scrum Equivalent	Current Company Practice	Diagnosed Problems	Implication for Hybrid Process
Controlling	Manage change	By product owner in the product backlog	Changes are logged in Utrack; clients are asked to submit bugs and change requests there. However, ad hoc change requests frequently arrive via WhatsApp, email, and direct calls, and are relayed to project Google Chat spaces. No dedicated change management channel exists. Small changes accumulate untracked, amounting to an estimated hours of unaccounted effort per cycle. All changes are typically accepted without formal triage.	The absence of a centralised change intake channel means requests are lost or not communicated to the PM, and accumulated small changes represent unrecognised cost. The normalisation of accepting all changes without triage is a scope and cost management failure.	The hybrid framework should define a structured change intake process with a dedicated channel and a mandatory triage step before changes are accepted. A change log linked to cost tracking would address unrecognised effort accumulation. An agent could automate change capture and surface pending requests during sprint planning.

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Table A.1 continued from previous page

Phase	PMBOK Process	Scrum Equivalent	Current Company Practice	Diagnosed Problems	Implication for Hybrid Process
Closing	Close project or phase	Sprint review meetings and acceptance by product owner	Review meetings occur after major releases only. For major releases, a demo is conducted and a video recording is shared with clients. Release notes are sent by email for all releases. Sprint retrospective meetings are not currently held, though leadership acknowledges they are important. Closing activities include user training, guidance documentation, and client satisfaction feedback.	The absence of sprint retrospectives removes a key mechanism for continuous process improvement. Infrequent sprint reviews increase the risk that accumulated quality issues are discovered late. The team has no structured forum for raising process concerns.	The hybrid framework should define a minimum review and retrospective cadence, decoupled from release size. A standardised release checklist should ensure closure criteria are consistently applied. Retrospective outputs should feed into process improvement cycles.
Knowledge Area: Scope Management					

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Table A.1 continued from previous page

Phase	PMBOK Process	Scrum Equivalent	Current Company Practice	Diagnosed Problems	Implication for Hybrid Process
Initiation	Define project goals	Define vision and a release plan	An SRS document is produced with user flow diagrams and a video walk-through. Clients sometimes have limited knowledge of their own requirements and may need guidance. New requirements frequently emerge after the SRS is signed off, as clients continue to develop their ideas during development.	Even with a structured SRS process, scope creep is a recurring problem. Clients who are not yet clear on their needs at initiation tend to raise new requirements during execution. There is no formal process to handle additions or changes to scope after SRS sign-off.	The hybrid framework should add a structured requirements elaboration step such as backlog grooming with defined acceptance criteria to bridge the gap between the high-level SRS and the detailed work required during development.

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Table A.1 continued from previous page

Phase	PMBOK Process	Scrum Equivalent	Current Company Practice	Diagnosed Problems	Implication for Hybrid Process
Planning	Collect requirements	Define next sprint and collect requirements in product backlog	Backlog grooming is split: the PM grooms tickets for requirements and tech leads groom them separately for technical details. Acceptance criteria are briefly noted but not defined in detail. Junior developers are not involved in grooming. Backlog prioritisation is done on a FigJam board as leads find ClickUp difficult for prioritisation.	The split grooming process means tickets reach junior developers without a unified review, increasing the chance that requirements and technical details are inconsistent. Junior developers report incomplete tickets as a recurring experience. Exclusion from grooming means the team does not collectively identify regression risks or edge cases.	The hybrid framework should consolidate grooming into a structured process with mandatory outputs: acceptance criteria, technical notes, and regression areas per ticket. Phased developer inclusion in grooming should be formalised. AI-assisted acceptance criteria drafting should reduce cognitive load on leads.

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Phase	PMBOK Process	Scrum Equivalent	Current Company Practice	Diagnosed Problems	Implication for Hybrid Process
Planning	Develop project structure plan	No long-term plan foreseen	A ClickUp Gantt chart with milestones is created at the start of a project, but this is sometimes skipped when clients need a quick turnaround. No long-term plan beyond the current sprint is actively maintained.	Without a maintained long-term plan, it is difficult to assess how scope changes affect overall delivery timelines. Milestone tracking is reported as unreliable in practice, which has led to delays in sending client invoices.	The hybrid framework should keep lightweight milestone planning as a standard practice at every project, even when a detailed Gantt chart is not practical. A minimum set of milestones, linked to payment terms, should be defined at initiation and kept up to date.

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Table A.1 continued from previous page

Phase	PMBOK Process	Scrum Equivalent	Current Company Practice	Diagnosed Problems	Implication for Hybrid Process
Execution / Controlling	Validate and control content	Validation by development team; control by product owner	Features are tested primarily by leads and the PM. Clients perform most acceptance testing. Junior developers conduct mostly black-box testing with no structured process. The level of internal quality focus shifts depending on how strict the client is.	Over-reliance on client-side acceptance testing introduces variability in quality outcomes. When clients are less engaged, internal quality assurance is deprioritised. Junior developers lack a defined testing process, meaning their coverage depends on individual judgement rather than defined scenarios.	The hybrid framework should define a developer-side testing process including scenario identification at ticket level, a minimum set of checks before raising a PR, and standardised PR evidence. Quality expectations should be consistent regardless of client engagement levels.
Knowledge Area: Schedule Management					

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Table A.1 continued from previous page

Phase	PMBOK Process	Scrum Equivalent	Current Company Practice	Diagnosed Problems	Implication for Hybrid Process
Planning	Estimate duration of actions	Assign story points to sprint user stories	Story point estimation was initiated and base-lines were documented, but the practice was discontinued. ClickUp supports story points and velocity tracking but these are inactive. Not all team members participate in estimation and some tickets remain unpointed. Meetings are added as tasks in ClickUp to make meeting time visible.	The discontinuation of story point estimation removes the mechanism for data-driven capacity planning. The team's hesitancy to estimate stems from perceiving estimates as personal commitments rather than planning inputs. Adding meetings as backlog tasks distorts sprint metrics and velocity calculation.	The hybrid framework should reintroduce story point estimation as a whole-team practice, framing estimates as planning inputs. Velocity tracking should be activated in ClickUp. Meeting time should be made visible through calendar integration rather than backlog tasks, preserving backlog integrity.

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Phase	PMBOK Process	Scrum Equivalent	Current Company Practice	Diagnosed Problems	Implication for Hybrid Process
Execution / Controlling	Manage schedule and adapt planning	Control using Kanban and Burndown Chart	Shared calendars are the main scheduling tool. Tasks not updated or closed are flagged in standups. Context switching across multiple projects up to six per week for one lead developer disrupts schedule adherence. No time is protected for internal work; Fridays were originally reserved for this but the practice has not been maintained. Junior developers have noted that sprint metrics and performance visibility would help them understand their contribution.	Heavy context switching is a structural scheduling problem that contributes directly to ticket hygiene failures and makes burn-down charts an unreliable progress indicator. Without a protected buffer for internal work, company-level activities are continually deferred, and internal time costs are excluded from client estimations.	The hybrid framework should introduce workload visualisation and set WIP limits to manage context switching. A protected internal work allocation should be built into sprint capacity. Sprint-level metrics should be made accessible to the whole team.

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Table A.1 continued from previous page

Phase	PMBOK Process	Scrum Equivalent	Current Company Practice	Diagnosed Problems	Implication for Hybrid Process
Knowledge Area: Cost Management					
Initiation / Planning	Rough budget estimations; estimate and define costs	Define MVP as basis for budget estimation; Roughly estimate number of sprints; estimate based on velocity, backlog size, and team members	Three-point estimations are used. The cost formula is customised based on client type, hours, and resources. Clients frequently negotiate. Payments are milestone-based. Features are removed rather than costs reduced when budget is constrained.	Milestone tracking is unreliable, leading to invoice delays. The cost formula does not account for ad hoc change request hours (estimated 6-8 hours of untracked effort per cycle). Profitability tracking is a recognised gap; value depreciation is not calculated.	The hybrid framework should link milestone completion to automated invoicing triggers and introduce a change request cost tracking mechanism. A base retainer or buffer provision for small change requests should be formalised in contract templates.

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Phase	PMBOK Process	Scrum Equivalent	Current Company Practice	Diagnosed Problems	Implication for Hybrid Process
Execution / Controlling	Manage and control costs	Not defined	No active cost control process during execution. AMC contracts are sent annually but with delays. CTC for new hires is tracked. Upselling after project completion is a recognised opportunity. Asset and procurement tracking is currently handled in Excel sheets.	The absence of execution-phase cost control means deviations from budget are identified late, if at all. Procurement and asset tracking via Excel is fragile and disconnected from project cost data. Annual AMC delays represent lost revenue.	The hybrid framework should incorporate a lightweight cost tracking step at each sprint review. Procurement and AMC management should be transitioned to a system-based process, and automated reminders for AMC renewals should be introduced.
Knowledge Area: Quality Management					

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Table A.1 continued from previous page

Phase	PMBOK Process	Scrum Equivalent	Current Company Practice	Diagnosed Problems	Implication for Hybrid Process
Planning	Plan expected quality	Setup definition of done by product owner each sprint	There is no formally documented definition of done at the sprint level. Acceptance criteria are briefly noted in backlog tickets but are not consistently detailed. Leadership has specifically asked tech leads to write more thorough acceptance criteria, especially for tickets handed to junior developers.	Without a shared definition of done, quality standards are set informally by individual leads and vary across the team. Junior developers are most affected as they cannot judge whether a task is truly complete without clear criteria to check against.	The hybrid framework should define a standard definition of done at both sprint and ticket level. This should include acceptance criteria, required testing scenarios, and evidence of testing before a PR is raised.

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Phase	PMBOK Process	Scrum Equivalent	Current Company Practice	Diagnosed Problems	Implication for Hybrid Process
Execution	Manage quality	Continuous testing in sprint	Developers test their own stories. Leads and the PM also test features. Client testing is the main acceptance check. Basic security checks are done (e.g. token bypass vulnerabilities), but there is no formal testing framework, no unit testing standard, and no penetration testing process in place.	Relying on developers to test their own work without defined test scenarios is not sufficient, particularly for junior developers who may not anticipate edge cases. Because client testing is the primary quality gate, the level of quality focus shifts depending on client engagement. Known security testing gaps remain unaddressed.	The hybrid framework should define a clear internal testing process: each ticket should include test scenarios defined before development starts; developers should check against these before raising a PR; and PR evidence should be required. Security testing requirements should be standardised per project type.

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Table A.1 continued from previous page

Phase	PMBOK Process	Scrum Equivalent	Current Company Practice	Diagnosed Problems	Implication for Hybrid Process
Controlling	Control quality	Acceptance by product owner in sprint review	Sprint reviews take place only for major releases. When a major feature is completed, developers demo it to the PM. Some developers share screenshots or short videos when raising a PR, but this is not a required step and depends on the individual.	Because reviews only happen for major releases, quality problems in smaller releases are not systematically caught. The internal demo and PR evidence practices that do exist are inconsistent because they are not required by any defined process.	The hybrid framework should make internal demos and PR evidence a standard requirement for all work, not just major releases. A release checklist should ensure that the same quality checks are applied consistently regardless of release size.
Knowledge Area: Resource Management					

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Table A.1 continued from previous page

Phase	PMBOK Process	Scrum Equivalent	Current Company Practice	Diagnosed Problems	Implication for Hybrid Process
Planning	Plan resource management; estimate resources	Not defined	No formal resource planning process. The PM assigns tasks to individuals via calendar. CTC for new hires is tracked. 360-degree performance reviews are conducted with some AI integration for aggregating feedback.	Without resource planning, team capacity is estimated informally by the PM. Context switching across up to six projects for a single lead developer suggests allocation decisions are not optimised, contributing to schedule and quality issues.	The hybrid framework should introduce a resource allocation step at sprint planning, making team capacity visible and informing commitment decisions. WIP limits per team member would reduce context-switching pressure.

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Phase	PMBOK Process	Scrum Equivalent	Current Company Practice	Diagnosed Problems	Implication for Hybrid Process
Execution	Develop and manage team	Team is self-organising and self-managing	The team does not currently self-organise in practice due to PM-driven task assignment. Ownership among non-lead team members is low. The onboarding process (first 2-3 weeks using a Moodle system and Knowledge Transfer sessions) is reported as effective and confidence-building. However, onboarding does not currently cover Scrum processes or the reasoning behind them. Scrum knowledge is limited across the team, including among some leads.	The gap between Scrum's self-managing team model and PM-directed task assignment is the central team management problem. The existing onboarding is a strength but an underused opportunity to build process understanding. Without Scrum education, team members follow instructions without understanding why certain practices matter.	The hybrid framework should use the existing onboarding infrastructure to introduce Scrum principles, ticket hygiene, and estimation practices from day one. A team-wide Scrum training initiative should be part of the framework rollout. Responsibilities for planning and estimation should be transferred to the team gradually.

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Table A.1 continued from previous page

Phase	PMBOK Process	Scrum Equivalent	Current Company Practice	Diagnosed Problems	Implication for Hybrid Process
Knowledge Area: Communications Management					

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Table A.1 continued from previous page

Phase	PMBOK Process	Scrum Equivalent	Current Company Practice	Diagnosed Problems	Implication for Hybrid Process
Planning	Plan communication	Not defined	<p>No formal communication plan exists. Meeting structures are well-defined and consistently followed. Automated meeting minutes are produced via n8n and formatted email summaries are sent to stakeholders.</p> <p>The team uses Discord virtual offices for remote collaboration. Each team member has a voice channel they join when working, and colleagues can drop in unless the person is on busy mode. Junior developers find this setup motivating.</p>	<p>While communication tooling is reasonably well developed, the absence of a formal communication plan means ad hoc channels (WhatsApp, direct calls, email) operate alongside official channels. This allows change requests and decisions to bypass the PM and project records. The Discord virtual office approach may not scale easily as the company grows.</p>	<p>The hybrid framework should define communication protocols for different types of messages, specifying which channel should be used and what the escalation path is. The Discord virtual office practice could be documented as part of the remote work protocol.</p>

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Table A.1 continued from previous page

Phase	PMBOK Process	Scrum Equivalent	Current Company Practice	Diagnosed Problems	Implication for Hybrid Process
Execution / Controlling	Manage and control communication	High focus on communication; supported by Scrum Master	Communication gaps occur when backlog grooming is insufficient. Developers make assumptions about features rather than asking for clarification. In some projects, junior developers have had to piece together requirements from email threads because no proper requirements document existed. Google Chat is the main internal platform, with a separate space per project.	When developers make assumptions instead of raising questions, it leads to rework and defects. The root cause is insufficient discussion during grooming, combined with fragmented documentation. Routing a large volume of client communication through leads creates a bottleneck and raises the risk of requests being missed.	The hybrid framework should treat grooming as a communication event, set clear expectations for raising questions at ticket level before development begins, and define minimum documentation requirements per project. An agent-based Google Chat-ClickUp integration should reduce manual overhead on leads.
Knowledge Area: Risk Management					

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Table A.1 continued from previous page

Phase	PMBOK Process	Scrum Equivalent	Current Company Practice	Diagnosed Problems	Implication for Hybrid Process
Planning	Plan risk management; qualitative and quantitative risk analysis; define mitigation measures	Scrum Master can question risks in daily standup; mitigation discussed with development team	No formal risk management process exists. Technical risks are informally assessed when reviewing requirements (e.g. API integration costs). Delivery risks such as team leave affecting milestones are also considered informally. Security risks are not assessed in any structured way. There is no risk register and no documented mitigation plans. Technical debt is mentioned in reviews but is not tracked anywhere.	Although some risk thinking happens, it depends on individual initiative and varies across projects. Security risk assessment is a recognised gap at leadership level. Technical debt is accumulating with no mechanism to track or prioritise it. Junior developers are excluded from risk discussions, limiting the team's collective awareness.	The hybrid framework should introduce a lightweight risk identification step at project initiation and at the start of major features, covering technical, delivery, and security risk categories. A simple risk register should be maintained in ClickUp alongside a technical debt backlog. Junior developers should be included in risk discussions as a defined part of the process.

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Table A.1 continued from previous page

Phase	PMBOK Process	Scrum Equivalent	Current Company Practice	Diagnosed Problems	Implication for Hybrid Process
Knowledge Area: Stakeholder Management					
Initiation / Planning	Identify stakeholder; plan stakeholder engagement	Not defined	No formal stakeholder identification or engagement planning process. The PM/PO role is combined. On many projects a client-side PO exists, which the company considers adequate. Client engagement is managed through structured meetings, SRS sign-off, and formatted email communications.	Without a formal stakeholder engagement plan, client communication relies on individual relationships rather than defined protocols. This increases vulnerability to ad hoc requests bypassing formal channels and to knowledge loss when key individuals are unavailable.	The hybrid framework could include a stakeholder mapping step at project initiation, identifying communication preferences and escalation paths. This is particularly important given the combined PM/PO role, which concentrates client communication risk in a single person.

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Table A.1 continued from previous page

Phase	PMBOK Process	Scrum Equivalent	Current Company Practice	Diagnosed Problems	Implication for Hybrid Process
Execution/ Control- ling/ Closing	Manage and control stakeholder engagement	Product owner involves stakeholder; acceptance by product owner or sponsor	Client satisfaction feedback is requested at project close. Upselling of new features to existing clients is a recognised practice. Clients reportedly respond differently to automated versus human-sent invoices, with less resistance to machine-generated billing.	Post-project stakeholder engagement is informal and opportunistic rather than planned. The observed difference in client response to automated invoicing suggests that communication medium affects stakeholder perception, a factor not currently leveraged systematically.	The hybrid framework should define a post-delivery stakeholder engagement process, including satisfaction capture, upsell opportunities, and AMC renewal communication. Automation of routine stakeholder communications should be formalised as part of the framework.

Source: Field observations and semi-structured interviews with CEO, project manager, tech leads, senior and junior developers, Tetranyde PVT Ltd.