Chapter 8
AI-Driven Backlog Refinement for Enhancing User Story Quality and Sizing in Agile Projects

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ABSTRACT

This chapter explores the transformative role of Artificial Intelligence (AI) in enhancing Agile backlog refinement processes through data-driven intelligence. It examines how AI technologies specifically machine learning (ML), natural language processing (NLP), and predictive analytics optimize user story quality, improve estimation accuracy, and streamline prioritization and dependency management. The chapter discusses the evolution from manual, intuition-based refinement to AI-assisted decision-making that enhances objectivity, consistency, and scalability. It also highlights the importance of human-AI collaboration, emphasizing that AI serves as an augmentative tool that strengthens, rather than replaces, human judgment. By integrating AI into Agile workflows, this chapter demonstrates how modern organizations can achieve greater delivery predictability, efficiency, and strategic alignment, ultimately redefining how software development teams plan, evaluate, and execute work in rapidly evolving digital environments.

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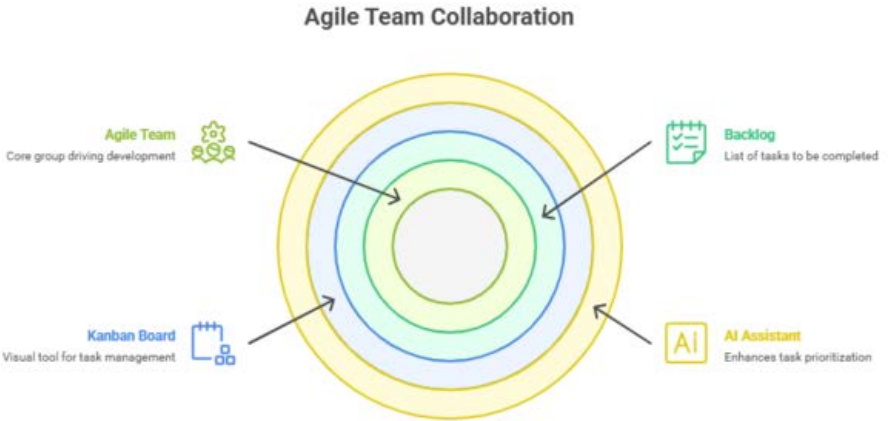
1. INTRODUCTION

Artificial Intelligence (AI) has been a key enabler of change in almost every aspect of project management and software engineering in recent years. Organizations now view efficiency, quality, and innovation differently as a result of its quick transition from experimental automation to mainstream operational intelligence. It is now more important than ever to offer products more quickly while retaining accuracy and flexibility in digital ecosystems. These days, modern businesses work in markets that are marked by constant change, high client expectations, and pressure from competitors to iterate quickly (Sekti, 2025).

Figure 1. AI Integration in Backlog Refinement Processes



As illustrated in Figure 1, AI acts as a collaborative assistant within Agile team environments, interacting with the core development team, backlog, and Kanban board to enhance coordination and prioritization. By providing intelligent recommendations, the AI assistant supports backlog management and decision-making processes, ensuring that Agile workflows remain efficient and aligned with project goals. This integration reflects the broader transformation of modern software development, where Agile methodologies have become the dominant paradigm for managing projects. Agile offers a flexible framework that prioritizes collaboration, adaptability, and iterative value delivery (Rodrigues et al., 2025). Within this paradigm, backlog refinement, the process of ensuring that user stories are well-defined, properly prioritized, and accurately estimated, serves as the intellectual backbone of Agile planning, where ideas evolve into actionable tasks and the clarity of definition directly shapes delivery predictability. Within this paradigm, backlog refinement