Chapter 7
Enhancing Lifecycle Stages and Navigating Implementation Hurdles for AI-Powered Tools and Challenges in Cloud-Native Software Development

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ABSTRACT

This chapter examines the transformative impact of artificial intelligence (AI) on software development within a cloud-native context. As the adoption of AI tools has intensified, their integration throughout the Software Development Lifecycle (SDLC) offers both opportunities and challenges. It explores the benefits of AI in areas like requirement analysis, design, implementation, testing, and maintenance, each experiencing advancements in efficiency, accuracy, and scalability. AI aids in automating processes, predicting system issues, optimizing resource use, and enhancing software quality, bringing substantial changes to conventional methods. It emphasizes the specific challenges posed by AI adoption, such as data quality, skill gaps, integration complexity, ethical considerations, and technical scalability. Key sections address the research questions and methodological approaches to understanding the integration barriers. The findings underscore AI's potential to enhance the SDLC but highlight the need for robust strategies.

1. INTRODUCTION

As the pace of software creation rises day by day, a new term that has gained the most significance is AI – a term that has entirely changed the concept and the way things can be done. Over the past decade, there has been a growing trend towards incorporating AI-powered tools in different stages of the software development life-cycle in the detection of the need to maximize productivity, the quality of the code produced as well as the speed in which the software is offered in the ever competitive market. This paradigm shift is particularly important in the field of cloud-native software engineering where the integration of AI with cloud technology is contributing to new dimensions of innovation and productivity.

The prospects of these technologies and AI in particular in the field of software development have been influencing the industry over the years. Starting with the most institutionalized AI related tasks, such as expert systems or automated testing; the term has increased to cover even more high level domains such as machine learning, natural language processing, deep learning etc. Those sophisticated AI tools are being increasingly used throughout the whole software development life cycle (SDLC) process, starting from the requirement analysis phase up to the maintenance and evolution phase. With complexity comes sophistication and of course with that comes the use of AI to ease management of such complexities, increase