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Discussion on How to Innovate and Improve the Computer Software Engineering Management

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Abstract: In the current rapidly changing information technology environment, computer software engineering management is facing many challenges. The traditional software development model is inefficient and difficult to adapt to frequent changes in demand; weak project management ability, leading to problems such as schedule delay and overspending; cross-departmental collaboration is inefficient, which affects the overall development process; the emergence of emerging technologies raises new requirements for management. To address these challenges, this paper proposes a series of innovative strategies. Through the implementation of these strategies, it is expected that the software engineering projects can improve the development efficiency, ensure the delivery quality, adapt to the changing market demand, and win a competitive advantage for enterprises.

Keywords: Software engineering management; Agile development; Cross-departmental collaboration; Emerging technologies

Introduction

As the most active and innovative field of software engineering, its management practice is facing unprecedented challenges. With the rapid iteration of information technology, user needs are also constantly evolving, which requires software engineering to keep pace with The Times and adopt flexible and efficient development mode to meet the changing market needs. With the continuous development of artificial intelligence, big data, cloud computing and other emerging technologies, software engineering management extremely needs to integrate these advanced technologies, improve development efficiency and optimize software performance. Through continuous exploration and innovation, software engineering projects can remain competitive in a rapidly changing environment and continuously meet user needs.

1. The significance of innovating and improving the computer software engineering management

With the rapid development of information technology, computer software has become an important foundation of modern economic and social operation. However, the software development process is often full of uncertainty and complexity, project delay, quality problems, cost overruns and other problems occur from time to time, bringing a lot of trouble to enterprises and users. Innovating and perfecting software engineering management is conducive to improving the efficiency of software development. The traditional waterfall development model is often inefficient and difficult to adapt to the frequent changes of demand. The adoption of emerging concepts and methods such as agile development and lean management can improve the response ability to demand changes, shorten the development cycle, and thus greatly improve the efficiency. Optimizing process design and using automated tools can also help eliminate non-essential links and waste, and further release the potential of efficiency. By strengthening whole-process quality control, strengthening test and verification, improving defect management and other measures, software defects can be reduced, and reliability and user experience can be improved. The introduction of advanced technologies such as artificial intelligence can also improve the ability of code quality analysis and automated testing to further ensure software quality. Innovation and improvement of software engineering management is conducive to enterprises to continuously obtain competitive advantages. Fast response to market demand, software quality and cost control are the key to software enterprises to win the market. Through management innovation, enterprises can achieve rapid iteration, efficient delivery and quality assurance, so as to occupy a dominant position in the market competition and win greater space for development. Enterprises should attach great importance to the innovative practice of software engineering management, keep pace with The Times, and continue to learn and optimize.

2. Innovate and improve the strategy of computer software engineering management

2.1 Adopt the agile development method

In the process of software development, the traditional waterfall development mode is too rigid in the early definition, often unable to

effectively respond to the change of demand, resulting in development progress delay, quality problems and so on^[1]. To solve this problem, agile development methods have emerged. Agile development advocates improving adaptability to demand changes through iterative incremental development, highly collaborative, and continuous delivery practices. The core idea is to embrace change, avoid waste, and consistently deliver high-quality software. This is in sharp contrast to the traditional model. During the agile development process, the customer and the development team work closely together to repeatedly refine and adjust the requirements, delivering a running software version for each iteration cycle, continuously obtaining customer feedback and adjusting the subsequent development based on the feedback. This highly flexible and fast iterative approach allows development teams to respond to new demand changes in a timely manner, greatly reducing the response time. Through cross-functional collaboration, face-to-face communication, visual management and other practices, the collaboration efficiency among team members has been significantly improved. The introduction of continuous integration, automated testing, test-driven development and other technical means is also conducive to shortening the feedback cycle, reducing defects and improving software quality. Agile development method is highly compatible with the rapidly changing market demand, and has become an important innovation direction of software engineering management. There is also a need for greater mastery of agile concepts and practices to better navigate the rapidly changing market environment.

2.2 Improve the intelligence of management tools

With the increasing degree of scale and complexity of the software, the traditional management tools and means have been difficult to meet the demand. In the process of demand analysis and architecture design, intelligent management tools can help mine and analyze a large number of unstructured text and spoken language requirements, and automatically generate structured models. Through natural language processing and other technologies, the system can accurately identify the requirements themselves, their priorities, constraints and conditions, etc. In the code implementation phase, intelligent tools can automatically evaluate and improve the code quality. Using machine learning algorithms to analyze historical code defect patterns, the system can automatically detect potential risks. Features such as automatic code completion and refactoring can also help to improve developers' productivity. In the test and verification process, the intelligent test tool has the ability to automatically generate test cases and perform automatic tests. By analyzing the historical defect data, code semantics and other information, the system can intelligently identify the functional points that need to be mainly tested, and generate a high-quality test case set, which greatly reduces the workload of manual writing of test cases. By analyzing project data, rules and historical experience, intelligent systems can assist decisions in milestone planning, progress monitoring, quality assessment, etc., to enhance the foresight and initiative of management. Improving the intelligence of management tools and making full use of emerging technologies such as artificial intelligence and big data can bring a lot of benefits to all aspects of software engineering management, and improve efficiency, quality and decision-making ability.

2.3 Optimize the process flexibility

Rational design and optimization of these processes is essential to improve the efficiency, quality and management of software development. However, in the current rapidly changing market environment, software engineering management is faced with the problem of insufficient process flexibility, so the process flexibility should be optimized to give the process the ability to flexibly adapt to changes^[2]. Too complex process specifications will increase communication costs and lead to inefficient execution. Excellent process design should simplify the necessary norms and standards as far as possible, and keep the process simple and flexible to deal with emergencies. The process should also have the ability of visual management to ensure the transparency of the whole process through multi-dimensional real-time monitoring of data. When determining the specific process, we should fully consider the differences between different projects. The common practice is to set up differentiated process templates according to the scale, complexity, innovation degree and other factors of the project to meet the needs of different types of projects. For example, for small projects with low risk, simplified process templates are adopted to avoid excessive control, while for projects with innovative and frequent change, highly flexible and iterative agile processes need to be designed to cope with rapid changes in demand. Excellent process design should reflect openness. Using cloud services, a unified process platform can be built to achieve highly automated and integrated management. To establish a scientific and reasonable process system advancing with The Times, software engineering management can truly adapt to the rapidly changing market environment and promote the quality and efficiency of software development^[3].

2.4 Utilization of emerging technologies

The rise of these cutting-edge technologies has brought brand-new opportunities and challenges to software engineering management. Artificial intelligence technology is the most transformative emerging technology in software engineering management innovation. Artificial intelligence can empower management tools with more intelligent capabilities and improve the quality and efficiency of software develop-

ment. Artificial intelligence will help all aspects of software engineering management, and is an important driving force of future management innovation. Big data technology is another emerging technology with broad application prospect in software engineering management. Big data analysis technology can deeply mine these data and automatically identify potential laws and risk points, so as to provide decision-making basis for demand planning, quality assessment, progress control, resource optimization and so on.

3. Conclusion

In the current environment of rapidly changing information technology, computer software engineering management is faced with many challenges, such as the frequent changes in demand, difficulties in project control, low efficiency of cross-department collaboration and the impact of new technologies. This paper presents a series of innovative strategies for these problems, aiming to improve the agility, controllability, synergy and technological advancement of software development. Looking forward to the future, software engineering management will face more new challenges, such as the rise of open source and open collaboration models, and the intensification of privacy and security risks. Software engineering management must keep pace with The Times, and constantly innovate and practice.

References

- [1] Jia Linqun. Application of computer software [J]. Integrated circuit applications, 2023, 40 (04): 220-221.
- [2] Su Weiqiang. On the innovation way of computer software engineering management in the new era [J]. Digital Communication World, 2022 (08): 132-134 + 137.
- [3] Tang Hongyuan. Discussion on computer software engineering management and application analysis [J]. Computer fans, 2017, (08): 20.