***O. Chyzhmotria, Senior Lecturer***
***O. Dienichieva, PhD in Ed., As. Prof.***
***V. Malivskyi, Student***
*Zhytomyr Polytechnic State University*

# APPLICATION OF AGILE METHODOLOGIES IN SOFTWARE DEVELOPMENT TO ENSURE HIGH QUALITY

Given the age of digitalization and intense competition in the software industry, IT organizations' potential to come up with great software products within the due date is the single most important aspect that determines their achievement as well as subsequent growth. The major outcome of addressing these problems has been the extensive utilization of agile methodologies within software development, forming a new wave paradigm of managing the work of development teams guided by values such as human resources, working software, collaboration, and readiness for change.

The Philosophy of Agile is embedded in the Agile Manifesto (2001) where the top values are stated as [1]:

1. Promotion of human resources and personal communication ahead of procedures and tools;
2. Another key point made by the authors in their statement is that "working software should be valued more highly than complete documentation." Coordinated customer collaboration during the contract negotiation [1].

The 12 Principles behind the Agile Manifesto include [2]:

1. Accept the changing requirements even in the late stages of development to use them to gain a competitive advantage for the client;
2. Ensure close day-to-day collaboration between developers and customers to maintain a steady pace of sustainable development, allowing sponsors, developers, and users to continuously support their efforts.

*Agile Methodologies and Practices:*

Leading Agile methodologies are Scrum, Kanban, Lean Software Development, and Extreme Programming (XP). They all have an iterative incremental approach where the development cycles are small, continuous integration is done with automated testing at each level of delivery, and customers and users actively participate in all lifecycle stages [2].

The Agile process is realized in Scrum by adopting explicitly short iterations (sprints) that take a maximum of 24 weeks; coordinated daily meetings, which are part of the control (Scrum meetings); defined cycles for regular sprint planning and reviewing intermediate results. Kanban is the other Agile methodology that applies visualizing the flow by means of Kanban boards, principles limiting work in progress, and considering improvement as an integral part of the software development life cycle [1].

Technical excellence, pair programming, code refactoring, and collective code ownership are all key engineering practices in XP methodology. Other effective agile practices include test-driven development (TDD), continuous integration and continuous delivery, early and often delivery, collective code ownership, and more.

*Agile scaling of large programs:*

For large software projects involving multiple teams, special scaled agile frameworks are used, such as Scaled Agile Framework (SAFe), Large Scale Scrum (LeSS), Disciplined Agile (DA), Nexus, etc. The goal is to ensure that work between teams higher up in the organizational hierarchy is properly coordinated while maintaining the operational autonomy and flexibility of individual teams at lower subsystem levels [1;2].

*Benefits of agile for software quality:*

Using agile methods makes the development process easily manageable and transparent for everyone involved, ensuring rapid adaptation to customer market needs and timely detection and elimination of errors in early stages. Activities such as continuous integration, automated unit testing, regular code refactoring, and code reviews greatly improve the technical excellence and system stability of software products. Customer involvement through direct representation of our team allows for a better match between the functionality of our systems and their actual needs [2]. In addition to operational aspects, agile methods also have a positive impact on the "human element" and increase motivation, engagement and interaction within teams by focusing on self-organization and lateral connections, as well as collective responsibility for the end result.

In addition to operational aspects, agile methods also have a positive impact on the "human element" and increase motivation, engagement and interaction within teams by focusing on self-organization and lateral connections, as well as collective responsibility for the end result [1; 2].

*Challenges of agile implementation:*

Despite the obvious advantages, the successful application of agile methods requires a significant shift in the traditional hierarchical model of business management and workflow organization. Necessary conditions include the willingness of top managers to delegate broader authority and strengthen horizontal linkages between departments, thereby creating a culture that is open to constant change and its associated risks [1]. At the development team level, implementing an agile approach requires revisiting traditional roles, emphasizing cross-functionality and multidisciplinary and increasing the autonomy, initiative, and responsibility of each participant.

Additional challenges arise from the need to integrate agile practices into existing strategy and portfolio management systems for enterprise-wide programs and projects. Ensuring that the work of large, multi-component software scales and coordinates effectively can also be a complex task [2].

Flexible, agile software development methods have proven to be very effective in increasing the productivity of design teams and ensuring the right quality of software products from both a functional and technical perspective.

## REFERENCES

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