28th INTERNATIONAL SCIENTIFIC SYMPOSIUM
METROLOGY AND METROLOGY ASSURANCE 2018

INFORMATIZATION AND SCALING OF TECHNOLOGY FOR SOFTWARE DEVELOPMENT WITH SECURITY REQUIREMENTS

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Abstract: The report describes ways to scale flexible software development methodologies. The approach of informatization and scaling aimed at improving the quality of software in general and software security in particular has been proposed as a preferred solution.

Keywords: software, security, informatization of software development

Introduction

Recently, software developers (software) look for new ways to solve problems of optimization of the development process management and improve existing flexible methodologies continuously. This results to the emergence of new approaches of communication and informatization, as well as management technologies. At the same time, issues related to improving the efficiency of the tools use and resources for ensuring software quality indicators remain relevant.

Research [1 - 4] and experience showed that the improvement of the informatization process within existing software development methodologies would allow to expand the scaling possibilities and, accordingly, improve the flexible technologies of software development. The solution of this task is especially important in the context of increased requirements for software security. The availability of information resources about existing security risks, as well as their adaptive use in the software development process, will significantly improve the quality of the software product and will allow to receive social and financial benefits to the development companies in the future.

In such circumstances, it is necessary to modify certain provisions of management and software development, as well as to introduce new elements into the already existing system and life cycle.

1. A way to scale software development technology

It can be noted that iterative order, feedback and flexibility of Agile-based methods, based on the interaction of development teams, allow continuous release of software. At the same time, a number of uncertainties occurring at the initial stages of development greatly increase the security risks of software. In future it can lied to economic, social and legal nature.

To eliminate such shortcomings, an improved way to scale the technology of software development is proposed.

The basis of this method is the idea of convergence of rigid and flexible software development methodologies. At the same time, the initial stage of software design should be expanded given the scope and level of increasing security demands. The software security risks should be thoroughly analysed.

The improved scheme of the software development cycle, taking into account the presented proposal, is illustrated in Fig. 1.

As you can see from this scheme, the general cycle of software development is recommended to began with a full analysis of security risks with attracting additional resources and the participation of specialists (DevOps, tester, "Ethical hacker"), as well as to include the following in the SCRUM (flexible software methodology) process:

1. Secure coding;
2. Secure DevOps – inclusion of additional subjects and security tools;
3. Modeling of threats – it assumes introduction of a new role of the cybersecurity manager.

In addition, it is advised to perform the analysis of security risks after each sprint with the mandatory involvement of the software development team.

2. Informatization of the software development process

Naturally, such a complex process is impossible without constant information support. Informatization of the development, testing and maintenance process is understood as policies and processes aimed at organizing the productive activities of team members through the use of systematically integrated software,

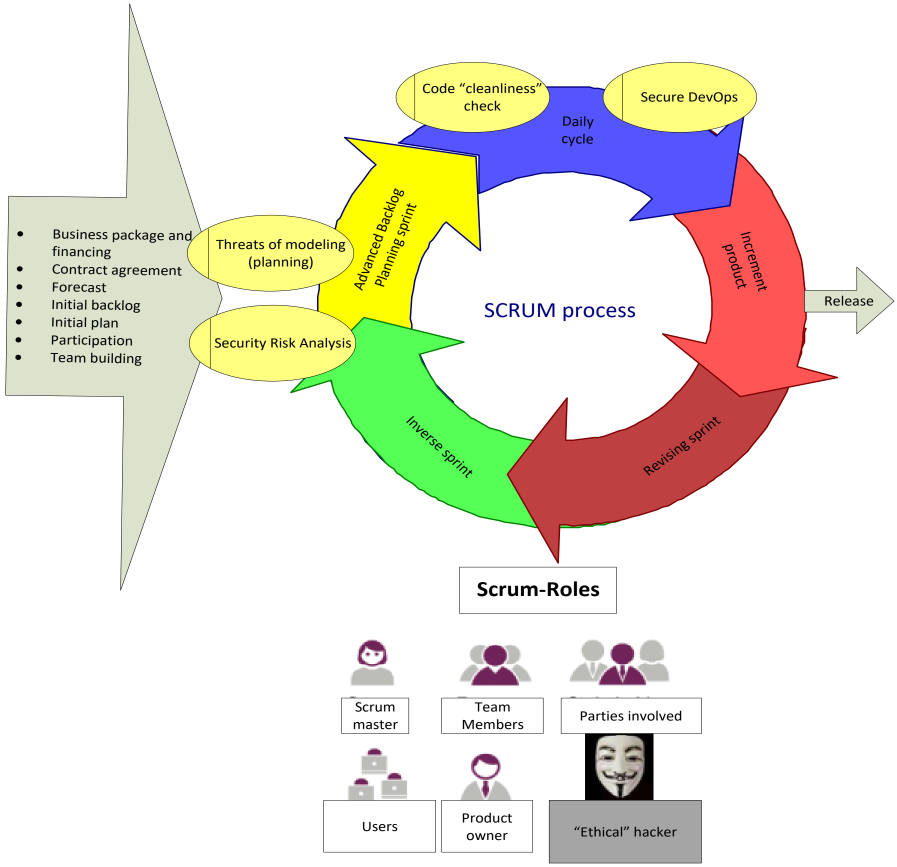


Fig. 1. Improved software development cycle

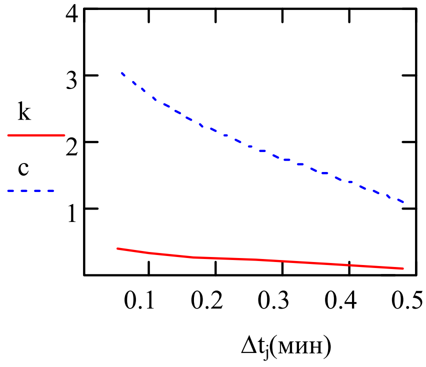
information, computer and telecommunications facilities. Implementation of the necessary information directly into the development process becomes the responsibility of the team members, mostly DevOps, security experts, business analysts and testers.

It is known from scientific works [1-3] that one of the indicators included in the general analytical expression for calculating of the average time for initialization of the software development process is the time for setting the tasks until the next meeting T_{nocm}. This time is calculated using the expression:

$$T_{nocm} = \sum_{i=1}^{\overline{\overline{N}}} \left(\overline{\overline{a}}_i + \overline{\overline{\Delta t}}_i \right) \qquad (1)$$

where $\overline{\overline{N}}$ – the number of tasks before the next SCRUM-meeting, $\overline{\overline{a}}_i$ – the time allocated for the presentation of the i-th task before the next SCRUM-meeting, $\overline{\overline{\Delta t}}_i = \mathring{a}^{-\left(\frac{\overline{\overline{N}}}{r}\right)}$ – the rejection of the time for delivery of the i-th task until the next SCRUM-meeting, r – the average complexity of the tasks ($r = \{2, 3, \ldots 45\}$). It should be noted that this coefficient directly depends on the indicator of the completeness of information support.

Figure 2.a shows the relationship of the rejection of the time for speaking the participants in the g-th iteration during the justification of their assessment from the coefficient k characterizing the average level the participants' professional skills in the SCRUM-meeting and the coefficient c characterizing the average level the participants' communication skills in the SCRUM-meeting, in conditions when $v = 0{,}6$,



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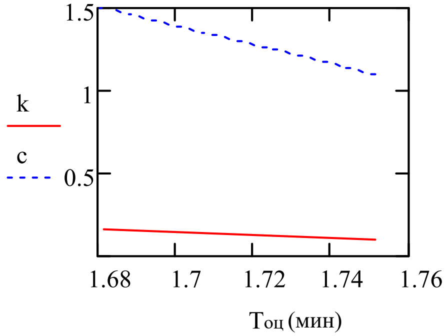

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Fig. 2. The relationship of the rejection from the coefficients and

$\hat{n}_g = 2$. As can be seen from these graphs, coefficients k and c increase the time Δt_j significantly (up to 2.5 times).

Figure 2.b shows the relationship of the rejection of the time T_{ou} the initial collective assessment of the project's complexity from the coefficient k characterizing the average level the participants' professional skills in the SCRUM and the coefficient c characterizing the average level the participants' communication skills in the SCRUM, in conditions when $v = 0{,}6$, $\hat{n}_g = 2$, $t_{umm_g} = \{0{,}5 \ldots 1\}$ min., $n_{umm_g} = 6$, $\Delta t_g = 0{,}1$ min., $a_{g_j} = \{0{,}1 \ldots 0{,}2\}$ min.

As can be seen from the relationship in Fig. 2.b, the improvement in the average level of communicability of participants in the SCRUM-meeting by 1.1 times (up to 10 minutes in one hour) will reduce the time of the initial collective assessment of the complexity of the project.

It should be noted that approximately similar results can be achieved with an increase in the level the participants' professional skills in the SCRUM-meeting.

Conclusion

The analysis of the proposed development showed that the implementation of an improved method of scaling the existing software development methodology and additional procedures for informing the team may lead to some slowdown in the task setting and code execution, an increase in the number of detected defects (bugs) during alpha testing, and, therefore, cycle of bugs. However, these local impairments can achieve a better end result (improving the safety of the developed software) and provide both rapid growth of functionality and an acceptable level of service quality in the future. And this, in turn, will be an attractive motive for further cooperation between the customer and the developer.

Literature

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