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PROJECT TEAM MANAGEMENT MODEL UNDER RISK CONDITIONS

The paper examines the state of the problem of the influence of risks on the project team's work process. The processes of the team's work during the implementation of the project sprint are defined. The authors identified risk factors that affect the effectiveness of the project team. An analysis of modern approaches was carried out and three directions were identified, which represent the research of project team management processes under conditions of risk. A comprehensive reference model of project team management under risk conditions is proposed in the form of a framework. It reflects the interrelationship of four models: the project team behavior model, the model for assessing the quality of the formation of sprint tasks, the model for determining the distribution of tasks in the project team, and the model for the formation of recommendations. The project team evaluates the text description of the task, obtained from the information system, using the sprint task formation quality assessment model. Natural language processing methods are used to create a model for evaluating the quality of forming sprint tasks, which combine the method of processing text information and the method of learning based on precedents, which allows taking into account the previous experience of the team and its behavior. The project team behavior model allows taking into account the risks of irrational work organization during the sprint. The behavior of the project team is analyzed using Process Mining methods. The case representation model allows the project team to store and reuse knowledge and experience based on simulation modeling and reinforcement learning approaches. It allows the team to determine and evaluate possible options for the distribution of tasks and resources in the team in accordance with the reduction of possible risks. The central element of the proposed framework is the model of recommendations used in decision-making. It provides the project team with the necessary information for effective decision-making in terms of risks in project management. The proposed framework provides an opportunity to reduce the impact of the risks of non-fulfillment of project tasks during the sprint. Further studies of the task of managing the project team under conditions of risk should be directed to the development of specified models of the proposed framework.

Keywords: project, risk, project team, sprint, project tasks, framework

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МОДЕЛЬ УПРАВЛІННЯ ПРОЄКТНОЮ КОМАНДОЮ В УМОВАХ РИЗИКУ

В роботі досліджено стан проблеми впливу ризиків на процес роботи команди проєкту. Визначено процеси роботи команди при виконанні спринта проєкту. Авторами виділено фактори ризику, які впливають на ефективність роботи команди проєкту. Проведено аналіз сучасних підходів та визначено три напрямки, які представляють дослідження процесів управління командою проєкту в умовах ризику. Запропонована комплексна еталонна модель управління проєктною командою в умовах ризиків у вигляді фреймворку. Він відображає взаємозв'язок чотирьох моделей: моделі поведінки команди проєкту, моделі оцінки якості формування задач спринта, моделі визначення розподілу задач у команді проєкту та моделі формування рекомендацій. Команда проєкту оцінює текстовий опис задачі, отриманий із інформаційної системи за допомогою моделі оцінки якості формування задач спринта. Для створення моделі оцінки якості формування задач спринта використовуються методи обробки природної мови, які об'єднують метод обробки текстової інформації та метод навчання на основі прецедентів, що дозволяє врахувати попередній досвід команди та її поведінку. Модель поведінки команди проєкту дозволяє врахувати ризики нераціональної організації робіт протягом спринта. Поведінка команди проєкту аналізується за допомогою методів Process Mining. Модель представлення прецедентів дозволяє зберігати та повторно використовувати знання та досвід командою проєкту на основі підходів імітаційного моделювання та навчання з підкріпленням. Вона дозволяє визначити та оцінити можливі варіанти розподілу завдань та ресурсів в команді відповідно до зниження можливих ризиків. Центральним елементом запропонованого фреймворку є модель рекомендацій, яка використовується при прийнятті рішень. Вона надає команді проєкту потрібну інформацію для ефективного прийняття рішень в умовах ризиків при управлінні проєктом. Запропонований фреймворк надає можливість знизити вплив ризиків невиконання завдань проєкту на протязі спринта. Подальші дослідження задачі управління проєктною командою в умовах ризиків необхідно спрямувати на розробку означених моделей запропонованого фреймворку.

Ключові слова: слова: проєкт, ризик, команда проєкту, спринт, завдання проєкту, фреймворк.

Introduction. In recent decades, the most popular approach to project team management in the development of software products is the Scrum methodology. Like most agile project management methodologies, the Scrum methodology [1] introduces an iterative, gradual approach that makes it possible to improve the achievement of project goals and reduce risks. This approach to building products through the continuous rapid delivery of valuable working functionality is presented in the Agile Software Development Manifesto [1].

In the process of using the SCRUM methodology, the project team plans the functionality that will be developed during the sprint. Each sprint can be considered a project with a time frame, usually within one month [2]. The product owner discusses the goal to be achieved in the current sprint and the items in the product backlog that will help to achieve the sprint goal. The product backlog is an ordered list of tasks that must meet the requirements for any changes that may need to be made to the software product [2]. The Product Owner is responsible for the Product Backlog, including its content, availability, and organization.

The scrum team works together to formulate what needs to be done during the sprint [2]. The inputs to this are the product backlog, the latest product increment developed, the development team's capabilities, and past performance metrics. The number of items from the product backlog that the team is able to complete in a sprint is determined by the team itself. Only the project team can objectively estimate the amount of work it will be able to complete in the next sprint. The product backlog items selected for execution during a sprint and the plan for their development are called the sprint backlog.

The general scheme of the project implementation process based on the Scrum methodology is presented in fig. 1.

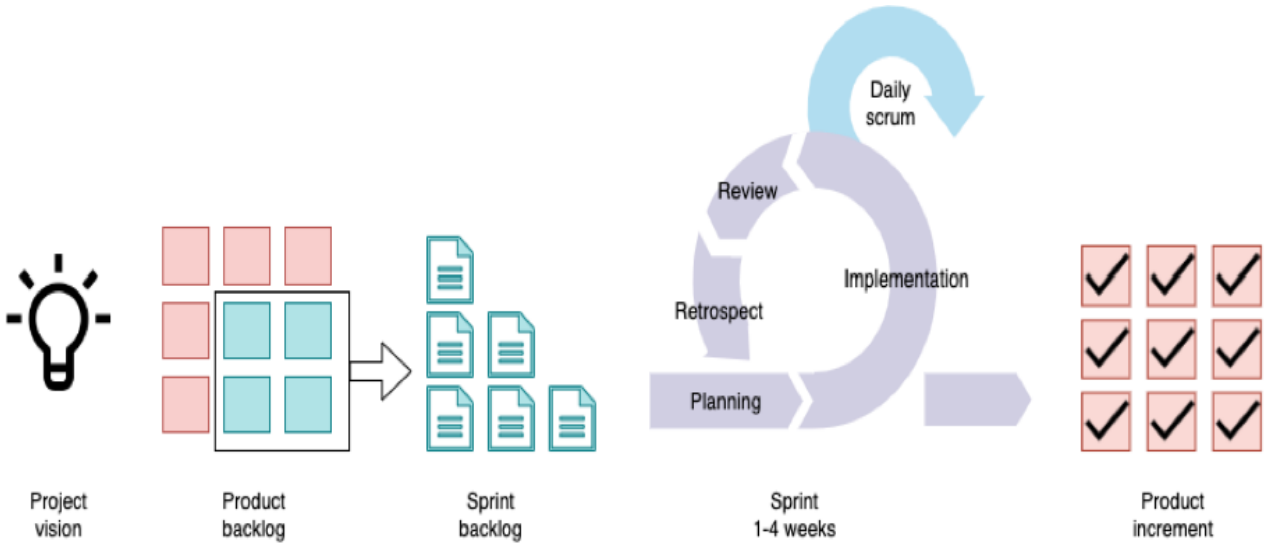

Fig. 1. General scheme of the project implementation process based on Scrum

The project team begins by planning the work, thanks to which the Sprint backlog can be turned into a working Product Increment. Work can vary in volume and complexity. However, usually the project team plans the amount of work that can be completed in a sprint. It organizes the work on its own, planning the step-by-step fulfillment of requirements from the Sprint backlog both during sprint planning and, if necessary, throughout the sprint [1, 2].

Tasks of Scrum-based project management include: control over the implementation of assigned tasks within a sprint or several sprints (technical assignment), allocation of resources and operational coordination in cases of unforeseen circumstances in order to ensure effective team work. Considering the limited period of management, the study of the factors ensuring the effective work of the team becomes especially relevant. However, the use of flexible methodologies does not fully solve the problems of the impact of risks on the work of the project team.

In general, the effectiveness of the project team is influenced by a large number of factors. We will highlight, in our opinion, the most influential:

− developer qualification, which determines the professional level of the team, the ability to realistically assess sprint tasks and complete them on time and at the required level;

− inaccuracy in the estimation of sprint tasks, which can significantly affect the allocation of resources, deadlines and the final result. Mistakes in estimating sprint tasks can have consequences, even outside of a single sprint, such as requiring a change in all subsequent deadlines;

− an inaccurate description of the tasks created by the technical manager, or a false understanding of them by the developers, together with their insufficient qualifications. This can lead to inaccurate estimation of tasks (antecedent factor) with the same consequences;

− reduction of team resources (planned or sudden), including the temporary absence of one of the developers (illness, vacation, etc.), which leads to a sharp drop in the volume of work performed and the risk of disruptions to the sprint deadlines;

− the internal culture of the team, which determines the rules and procedures for the distribution of sprint tasks, communication within the team, the decision-making strategy in a crisis situation, which generally determines how the team can overcome unforeseen circumstances and complete the assigned tasks on time and at the required level.

The listed factors affect the quality of project tasks, so it is important to create a flexible mechanism by which the team will be able to reduce the impact of these risk factors on the effectiveness of achieving the project's goals.

Analysis of research and publications.

The issue of increasing the effectiveness of the project team management process is the subject of research by many scientists. The analysis of the literature showed that modern studies consider the processes of managing the project team under conditions of risks in several directions.

The first direction is related to the study of the influence of the behavior of team members on the results of project tasks. The work [3] demonstrated the possibility of using a multi-agent approach to modeling any project management processes. To support the process of research and development of these methodologies, the authors [3] proposed the use of an agent paradigm and the use of multi-agent systems. Their use is a consequence of the adaptability of agents to simulate the work of project teams. The authors of [4] proposed a multi-agent model to support IT project management and conducted experiments in which the implementation of a typical medium size was reproduced, the implementation of which was carried out using the proposed hybrid methodology. But this approach gives good results only for large and medium-sized projects. The paper [5] presents a hybrid, fuzzy-ontological team management system, which is the basis for indicating its cohesion. In addition, it can be used to improve the selection of team

members from a given set of candidates. Unfortunately, the limitations of this approach are the insufficient scale of projects and difficult access to the necessary information. In [6], the influence of the functional diversity of teams and the interdependence of employees on team productivity in different economic conditions is investigated using agent-oriented modeling. This study suggests that managers use knowledge of employee interdependence to protect higher performing employees by minimizing the impact of interdependence when selecting team members to improve company performance. In the article [7], the authors consider the modeling of teamwork, which covers various disciplines from business management to cognitive science and distributed artificial intelligence. The authors [7] investigated teamwork in two areas: the social structure of the team and social behavior. This study provides an organizational framework for analyzing teamwork modeling systems.

In [8], an approach for modeling, control, and management of the cognitive flow process was created, and a solution for applying this approach to a distributed team during software development was presented. The results of the experiment showed that this approach can improve the team's ability to solve problems that arise during project implementation.

The second direction is related to the consideration of the influence of the qualitative assessment of tasks and the formulation of project requirements on the work of the team. In [9], risk factors are identified and classified according to the taxonomy of software development proposed by the Software Engineering Institute (SEI). In total, 148 different risk factors were classified. It was found that the most related segments of management, which were affected by the specified factors, were an unstable organizational environment and the absence or inadequate planning of the project. However, the work does not consider the relationship between the identified risk factors, and there is no analysis of the impact of the software development environment on risk factors. The article [10] proposes a method of relative assessment of tasks that can be used in flexible methodologies. It is designed to reduce the time of estimation of tasks and requirements for developers. Algorithms are described in the article, which ensure high accuracy of estimation of the tasks of large projects with a significant number of tasks. The advantages of this technique are the calculation of the estimation error and the mathematical expression of the reference task, which is necessary for the evaluation of the current tasks.

The study [11] proposed an alternative approach to estimating the time of work for Kanban project teams with the possibility of taking into account the addition and removal of tasks to the reserve, changing their priority and, in general, the level of the team's work productivity. Automating this process by creating an expert system will reduce the level of effort required by the team to make these assessments. Using this approach, there is an opportunity to increase the efficiency and productivity of project managers and project groups by automating work through the creation of expert systems.

The authors of [12] proposed a technique for estimating the cost and time of the project based on software that collects these inputs from the team and evaluates them. This approach to cost estimation reduced the problems associated with Scrum-based software development projects and made them more efficient. The authors of [13] proposed a new questionnaire structure for obtaining a dataset in which machine learning classifiers were applied and risk prediction was performed for each of the identified software models. Using this result, project managers can define software development model according to the requirements along with the predicted percentage of risk. The authors of the article [14] propose a method of configuration and modification of software processes in companies based on the collected knowledge, and this approach allows to support and optimize management processes using formal modeling methods and modeling based on machine learning.

The third direction of research into the process of project team management under risk conditions is related to the development and use of certain risk management strategies when performing project tasks. Based on a study of 139 software development projects, risk prioritization strategies (risk-oriented prioritization and updated prioritization performance) were proposed and their respective application, advantages, and disadvantages were explained in [15]. The authors found that depending on the sufficiency of the project, organizational resources and profile requirements for project implementation, project managers can use these strategies as practical guidelines for systematic, thorough and effective risk reduction of a software project. The authors [16] proposed a questionnaire that allows measuring the risks and results of software development projects. With its help, a survey was conducted on the implementation of 145 software projects of global IT companies. As a result, a structural equation model was developed that shows the interdependence of the main risk factors and their impact on the project outcome.

Researchers in [17] characterized the difference between risk and uncertainty and identified five methods and 18 practices to reduce, specifically, uncertainties. The paper proposes an approach to uncertainty management and describes strategies that allow team members to clearly formalize and manage uncertainty in software projects. The study [18] presents a simulation model of the process of strategic management of software development projects. The main advantage of the proposed model is that it provides an integrated management structure in which risk management, cost estimation and project management planning are connected.

In the article [19], the authors proposed a multi-agent model of risk management. It is designed using repeated individual training using the Q-learning algorithm. This can help project managers determine the status of their project and take certain actions according to the status of the identified risk. The proposed model includes an action or a set of actions for each source of the risk factor. But an important shortcoming of the model is that the work does not consider a model with multiple possible risks and the

corresponding proposed actions to achieve the project's goals in this case.

Researchers in [20] proposed a machine learning model to predict failures in project management knowledge areas for software companies. The model includes three factors: the project manager's context, the project's context, and the company's context. The results of the study showed that the support vector machine is more effective than other potential algorithms for forecasting the company's project management process.

In [21], a model of the system dynamics of the company is proposed, which takes into account the processes of financing, outsourcing of activities, schedule adjustment, labor management, etc. Project managers must consider the dynamic feedback loops of delay and disruption behavior. This will allow them to compare alternative change management strategies in terms of performance indicators.

In the article [22], an auxiliary tool is proposed, which allows using the ontology as a flexible provider of practical knowledge. The authors, with the help of a survey of experts, present an extended ontology that will allow managers to decide which practice to adopt, how to apply it, etc.

The authors of [23] proposed a method of determining the factors influencing the project on the development of an IT company, taking into account its activities, development goals and strategy. The implementation of this method allowed the project office to rationally plan the company's resources, determine the directions of activity in the IT market and adjust further development.

The analysis of the work given above made it possible to outline existing approaches to project team management under the influence of various risk factors. Each direction considers the process of managing the project team under conditions of risk without taking into account other factors influencing the performance of the project, i.e. each analyzed approach solves the task of managing the project team under conditions of certain risks in a separate direction, without taking into account other factors influencing the performance of the tasks of the project team.

Unfortunately, the question of creating a flexible mechanism for the work of the project team, which will provide recommendations for reducing the risks that arise during the execution of project sprint tasks, remained outside the scope of attention.

The purpose of the study. The paper examines the impact of risks on project implementation. The main factors of such influence are: irrational organization of the work of the project team members, lack of clarity in the description of project sprint tasks, insufficient number of cases for solving the situation when performing project sprint tasks. The purpose of the study is to create a project team management model that will reduce the impact of risk factors on project performance results.

Task formulation. In this study, we will consider the functioning of the project team and the performance of tasks at the level of one project sprint. The process of performing tasks by the project team is presented in fig. 2.

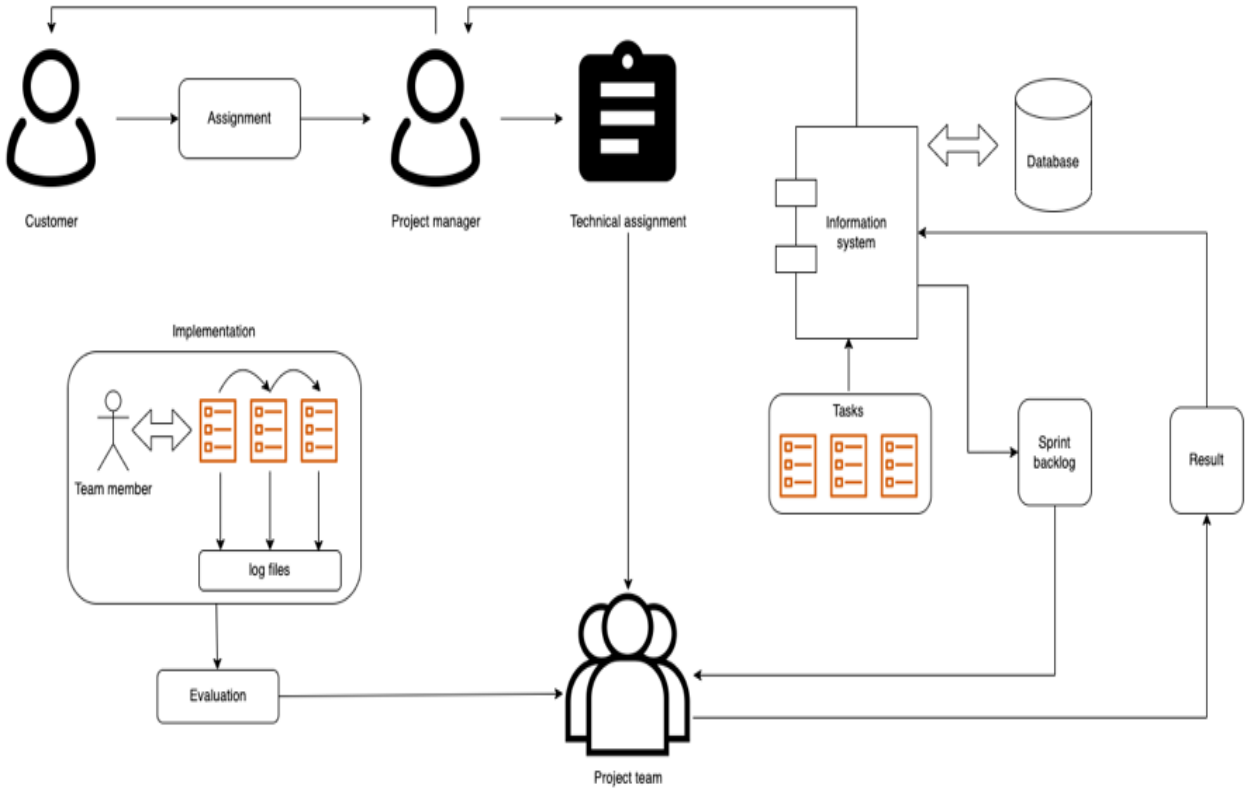

Fig. 2. Scheme of task performance by the project team at the sprint level

The project team is considered within the framework of the respective project and consists of the following persons: project manager, developers, technical manager, who also performs work on project implementation, and quality assurance engineer. Work on the project is performed iteratively, each iteration (sprint) is one week long. The project manager performs the function of management and communication with the customer, receiving tasks from him and clarifying the basic technical conditions. This process can take several forms, such as personal communication, exchange of text messages with the help of a certain project management information system, etc. As a result of this process, a document with a description of the project, or a technical assignment for development (part of the project, improvement or new functionality) is formed. Each task is broken down by the team into clearly defined tasks, for which a completion time estimate is established. This estimation is carried out by the person who will perform this task, but under the control of the project manager and technical manager. Next, there is a general estimation of the terms of implementation and the cost of the project, which are reported to the customer.

The next step, after the approval of the tasks and the estimation of the time, is the implementation of the approved tasks by the team during the sprint. During their implementation, team members should timely note the progress of tasks and log time every day for each task. In cases where the functionality does not fully or partially meet the set requirements, the task is returned to the developer with comments. At the end of the sprint, the project team reviews its implementation in the form of product increments and, depending on the result, determines the list of tasks for the next sprint. All changes and execution are recorded on the Scrum board. At the end of each sprint, the results are demonstrated to the customer. In the process of such a demonstration, the technical task may change and the final task may be adjusted, taking into account the priorities of one or another part of the task. Once in several sprints (usually once a month), a retrospective of the project implementation is conducted with a calculation of work speeds, estimation adequacy, etc. The results of the retrospective are recorded in a text document to which all members of the project team have access. Since all tasks and time tracking are carried out in the project management information system, there is always the possibility of exporting reports in the form of tables and the ability to collect all information on tasks in a free format. This information includes task moves, all changes and comments to the task.

Thus, the output data for the execution of tasks during the sprint is stored in the information system in text format in natural language. Tasks that the team allocated for the sprint are also formulated in natural language and stored in text format. In the process of work, each team member changes the status of his task (the change is recorded in the information system) and can leave comments either in the task card or in the chat. The manager can monitor the execution process and predict possible deviations in time.

During the implementation of the project, the following problems often arise:

- performers do not fit in the estimated time of the task;
- when estimating the time to complete project tasks, there is a lack of data or insufficiently defined requirements;
- performers do not fill in or do not reliably fill in the data in the information system and it is impossible to conduct a retrospective analysis of errors, etc..

Therefore, it is relevant to develop a monitoring mechanism when creating recommendations for project team management. It will allow you to take into account the risks that arise during the estimation of project tasks, the distribution of tasks among team members and the untimely completion of tasks.

Methods and approaches to project team management in risk conditions

The analysis of the state of solving the problem of managing the project team under conditions of risk showed that the main factors determining the risk of project failure are inaccuracies in the formulation of tasks evaluated by the team, low communication culture of the team and imperfection of the procedure for distributing tasks in the team. The tasks performed by the team during the sprint are formulated in natural language in a text format, so it is necessary to use linguistic technologies of intelligent text analysis to analyze the task and assess the risks of incorrect estimation. Team communication, especially in remote work conditions, is completely dependent on corporate culture, the need to use working channels for communication, timely tracking of working hours, changing task statuses, commenting and control, which takes place entirely in the project management information system. The availability of such information provides an opportunity to apply the methods of intellectual analysis of business processes to solve the tasks of monitoring and control the execution of the sprint, as well as to explore ways of improving the organizational structure of the team to reduce the risks of late completion of project tasks. At the same time, the distribution of sprint tasks still depends significantly on the qualifications of the project team and the quality of the retrospective. Solving this problem is possible based on the analysis of precedents and simulation modeling, as a tool to support decision-making and the formation of recommendations.

Let us consider in more detail the approaches that form the theoretical basis for solving the specified problems.

The behavior of the project team, based on the analysis of the peculiarities of its work, reflects the activity of its members, the status of tasks and the deadlines for their completion or the reasons for non-fulfilment. Input information for such a model is data from event logs (log files) in the information system.

The analysis of business processes of team work can be performed on the principles and methods of intellectual data analysis [24]. Such methods are able to extract knowledge from the log of events that are usually available in modern information systems. These

technologies provide new means of detecting, monitoring and improving processes in various fields of application. Suppose that all business processes can be sequentially written so that each event refers to an activity (that is, a clearly defined stage in some process) and is associated with a separate case (that is, an instance of the process). In addition, logs can store additional information about events. The results of the application of intelligent data analysis methods will provide additional information (time, status of tasks) to the project manager, who analyzes the received data and develops actions to reduce risks.

The clarity of the task description affects the result of its execution. Therefore, to process the text description of the sprint tasks, it is advisable to use the methods of linguistic analysis of text processing to obtain a high-quality formulation of the tasks for the project team. To implement the stages of the text analysis process, algorithms are used that annotate new types of information in it, or classify, link, normalize or filter previously annotated information. Such algorithms perform analysis of various computing costs, starting from, usually, cheap evaluation of one rule and regular expressions, comparison of dictionary terms and statistical classification of text fragments to complex syntactic analysis [25].

Allocation of tasks in the project team can be performed on the basis of reinforcement learning [26]. Reinforcement learning uses a formal structure of decision-making processes to define the interaction between a learning agent and its environment in terms of states, actions, and rewards [26]. A reinforcement learning agent can learn by interacting with the real world or with a simulation of some fragment of the real world, or a mixture of these two sources. Simulators provide a safe environment in which an agent can explore and learn without the risk of actual self harm or harm of the environment. The reinforcement learning model [26] is used on the basis of the formed cases of applicants, with its help it is possible to form different strategies for the optimal behavior of the team during the execution of the project sprint.

Another theoretical approach that can be used to solve the given task is the formation of recommendations based on behavior, estimation of tasks and strategies for optimal allocation when performing sprint tasks. Recommendation systems use methods of intelligent data analysis and prediction algorithms to predict users' interest in information [27]. One of the key reasons why a recommender system is needed in machine learning is that with too many precedents, they can choose the optimal response to emerging project risks.

Thus, according to the authors, the formation of recommendations regarding the distribution of tasks and execution of the sprint by the project team should take into account the results of solving the problems of assessing the quality of task formulations, evaluating the effectiveness of work organization, and also be based on previous experience and simulation of possible risks during the execution of the sprint. The implementation of such a recommendation system involves a detailed study of the specified tasks and determination of their interaction.

Results. Let us highlight the main concepts of the task of project team management under risk conditions. First, it is the project team, the project and the sprint that define the object of the study. From the beginning, the project team receives tasks for the project sprint from the project's product backlog. The team needs to evaluate the quality of the tasks presented in text form. At each sprint, the project team receives a text description of the task, which is stored in the project management information system. A situation (precedent) that arises within one sprint can be characterized by the behavior of the team and the task it solves during the sprint. As the analysis showed, the qualification of the team and the culture of communication together with a clear description of the statement of the sprint task are the main risk factors for the implementation of the project, so they must be taken into account when forming recommendations.

The proposed comprehensive reference model for project team management under risk conditions is presented in Figure 3. The framework reflects the relationship of four models: the project team behavior model, the model for assessing the quality of the formation of sprint tasks, the model for determining the allocation of tasks to project teams, and the model for the formation of recommendations.

The textual description of the task, which the team receives from the information system, is evaluated using the sprint task formulation quality assessment model using natural language processing (NLP) methods. According to the developed framework, it is necessary to define a benchmark for the presentation of the task, which allows to evaluate the formulation in terms of clarity, unequivocalness, tracing and validation of the task by the team during the sprint. The problem of forming such a standard is the insufficient number of samples and subjectivity in assessing the quality of the formulation of the problem. Therefore, the project team management system should have a model for assessing the quality of the formation of sprint tasks from the point of view of the risks of misinterpretation of the task. This problem can be solved by combining the method of processing textual information and the method of learning based on precedents, which allows taking into account the previous experience of the team and its behavior. The description of the task in text format, the evaluation of the quality of the wording and the situation (precedent) are stored in the information system.

The behavior of the team during the sprint, which is determined by the distribution and fixation of tasks among team members, commenting on tasks, changing their status with validation and retrospection included, is stored in the event log, which records the history of the behavior of the project team during the work on the sprint tasks. This history of project team behavior is analyzed in an event log analysis model using Process Mining techniques. The project team behavior model allows you to take into account the risks of irrational organization of work during the sprint, the lack of communication within

the team and the peculiarities of the team during the planning of subsequent sprints. The structure of the project team management framework under risk conditions is presented in fig. 3.

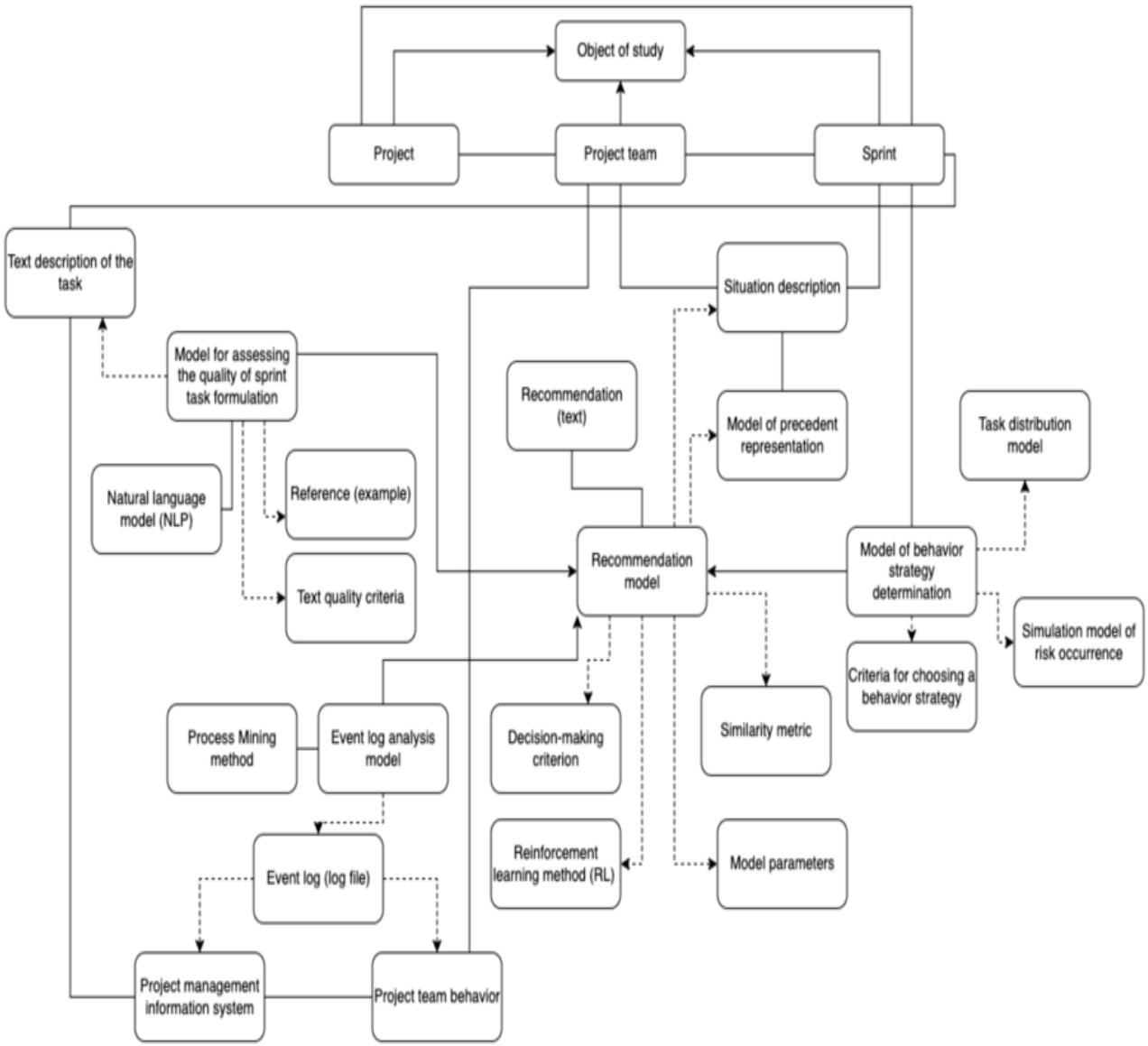

Fig. 3. Project team management framework under risk conditions

The precedent representation model is an important component of the project team management framework under risk conditions, which allows to store and reuse the knowledge and experience gained by a certain team. This model displays, in an easy-to-store and reusable format, every situation according to the team's execution of the sprint, from the tasks that were selected for execution to the retrospective, as well as the behavior of the team during the implementation. This information is an integral part of the recommendation formation model.

The model for determining the strategy of the project team's behavior based on the approaches of simulation modeling and reinforcement learning allows you to determine and evaluate possible options for the distribution of tasks and resources in the team in accordance with the reduction of possible risks. The formation of the strategy should take into account the previous experience of the team, the context of each sprint and simulate events that may cause risks to the project, such as illness, loss of communication, etc.

The central element of the framework (Fig. 3) is a model of recommendations, which should provide the project team with the necessary information for decision-making in conditions of uncertainty and risks in project management. Such a model takes into account the results provided by the model for assessing the quality of the formation of sprint tasks, the model for analyzing the event log, and the model for determining the strategy of the project team's behavior. The recommendation system is created on the basis of decision-making criteria, similarity metrics, and setting model parameters in accordance with project features, team qualifications, the precedent base, and quality assessment data for formulating sprint tasks and evaluating team behavior. Further studies of the task of managing the project team under conditions of risk should be directed to the

development of specified models of the proposed framework.

Discussion. The analyzed works of researchers offer approaches that solve the problem of risk exposure from the point of view of evaluating teamwork behavior using the agent paradigm [3, 4, 6]. Other authors propose models with the help of which the impact of task description and assessment on the results of the project team is investigated [9, 10]. The works [18, 19, 20] analyzed approaches to the creation of risk management scenarios when performing project tasks.

This paper proposes an approach that, unlike others, takes into account all risk factors affecting the project. For this purpose, a framework is proposed, during the creation of which the approaches and technologies that form the theoretical basis will be applied. It consists of four models. Further research on the task of managing the project team under conditions of risk should be directed specifically to the development of the specified models of the proposed framework. The methods of intelligent data analysis will be used to develop a model of the project team's behavior. The methods of linguistic analysis of text processing will be used to form a quality assessment model for the formation of sprint tasks in order to qualitatively formulate the tasks of the project team, namely the method of processing text information and the method of learning based on precedents. To develop a model for determining the distribution of tasks in the project team, reinforcement learning technology will be applied, which uses the structure of decision-making processes to define the interaction between the learning agent and its environment in terms of states, actions and rewards. Methods of intelligent data analysis and forecasting algorithms will be used to create a model for the formation of recommendations.

The primary next task of the research is the development and implementation of a quality assessment model for the formation of sprint tasks, taking into account the risk factors affecting the project, which are determined in the conducted research.

Conclusions. The paper examines the state of the problem of the impact of risks on the work process of the project team. The processes of the team's work during the implementation of the project sprint are defined. The authors have identified risk factors that affect the effectiveness of the team. An analysis of modern approaches related to the study of the influence of various risk factors on the work of the project team was carried out. The main concepts of the project team management task under risk conditions are defined. A comprehensive reference model of project team management under risk conditions is proposed. The proposed framework reflects the interrelationship of four models: the project team behavior model, the model for assessing the quality of the formation of sprint tasks, the model for determining the distribution of tasks in the project team, and the model for the formation of recommendations. Central to this framework is a recommendation model that is used in decision-making. It provides the project team with the necessary information for effective decision-making in terms of project management risks. The proposed framework provides an opportunity to reduce the impact of the risks of non-fulfillment of project tasks during the project sprint.

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