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**ENTERPRISE'S INFORMATION MANAGEMENT BASED ON THE
APPLICATION OF THE SCRUM APPROACH
ІНФОРМАЦІЙНИЙ МЕНЕДЖМЕНТ ПІДПРИЄМСТВА НА ОСНОВІ
SCRUM-ПІДХОДУ**

***Summary.** This study presents a theoretical generalization and new interpretation of the scientific problem of the development of theoretical and methodological provisions, as well as practical recommendations for the economic evaluation and management of enterprise's information activities. The results of the work will provide the basis for assessing the level of information activity of enterprises, scientific validity and systematic management of information activity, which lies in the proper level of planning information activities based on the usage of scrum approach elements, the formation of optimal organizational management structures, rational motivation of employees of the information sphere and the entire staff of the enterprise, proper control of their activity and regulation of the information activity, aimed at the effective elimination of detected deviations in the work of employees involved into information sphere and the entire enterprise; will provide an opportunity to obtain all the important prerequisites in order to ensure the effectiveness of the enterprise's information activity, which is necessary to make decision in time regarding the strategy, tactics, policies of the enterprise. This enables business*

owners and executives to ensure an adequate level of decentralization, flexibility and transparency in managing information activities through the usage of scrum approach. The study also outlines the features of the scrum approach to enterprise information management: the inability to use remote access, because the employees of the scrum team must be directly employees of the enterprise; the need for appropriate technical and information support; complexity of controlling the implementation processes of scrum projects; the number of Backlog tasks that characterize information management operations has been identified; dependence on innovation; the need to create specific organizational forms and types of interaction between scrum team employees. Moreover, the structure of the enterprise's information management in conditions of application of the scrum approach implies the creation of a unit for information activity management (information department).

Key words: Scrum team, backlog, sprint planning, scrum master, information management.

Анотація. Дане дослідження є теоретичним узагальненням і новим трактуванням наукової проблеми розробки теоретико-методологічних положень, а також практичних рекомендацій з економічної оцінки та управління інформаційною діяльністю підприємства. Результати роботи є основою для оцінки рівня інформаційної активності підприємств, наукової обґрунтованості та системного управління інформаційною діяльністю, яке полягає в належному рівні планування інформаційної діяльності на основі використання елементів scrum-підходу, формуванні оптимальних організаційних структур управління, раціональної мотивації співробітників компанії. Інформаційна сфера та весь персонал підприємства, належний контроль за їх діяльністю та регулювання інформаційної діяльності, спрямований на ефективне усунення виявлених відхилень в роботі співробітників, залучених в інформаційну сферу всього

підприємства; надасть можливість отримати всі важливі передумови для забезпечення ефективності інформаційної діяльності підприємства, що необхідно для своєчасного прийняття рішення щодо стратегії, тактики, політики компанії. Це дозволяє власникам бізнесу та керівникам забезпечити належний рівень децентралізації, гнучкості та прозорості в управлінні інформаційною діяльністю за рахунок використання Scrum-підходу. У дослідженні також позначені особливості scrum-підходу до управління корпоративною інформацією: неможливість використання віддаленого доступу, оскільки співробітники scrum-команди повинні бути безпосередньо співробітниками підприємства; необхідність відповідної технічної та інформаційної підтримки; складність контролю процесів реалізації scrum-проектів; кількість невиконаних робіт. Були визначені завдання, що характеризують операції з управління інформацією; залежність від інновацій; необхідність створення певних організаційних форм і типів взаємодії між співробітниками scrum-команди. Більш того, структура інформаційного менеджменту підприємства в умовах застосування scrum-підходу передбачає створення підрозділу з управління інформаційною діяльністю (інформаційного відділу).

Ключові слова: Scrum-команда, беклог, sprint planning, scrum-майстер, управління інформацією.

Introduction. It is well known that the processes of collecting, processing, storing and transmitting information are essential elements of effective enterprise management, as information is exchanged daily between the management subsystems of the enterprise and the external environment. They reflect the content of the event, the phenomenon of economic activity in order to make rational and effective management decisions.

In terms of modern economy conditions, characterized by dynamic change of the external environment of the enterprise and its complication under

the influence of globalization and internationalization, development of science, technology, information technologies, the intensification of information flows and processes is traced, as well as the growing importance of information support of the enterprise.

In these conditions, great importance is attached to the technical support of communication processes, the generation of decisions about the volume, location and existence forms of information at the enterprise in the process of management.

At the same time, information activities, as a rule, are not seen as a separate element and component of the management process, which ensures that the needs of the enterprise subsystems and external users for information. This necessitates the development of a scientifically based approach to the enterprise's information management, which involves, in particular, the implementation of economic evaluation processes.

Nowadays, there is a rapid development of information technologies, which forms an information-oriented society and, at the same time, directly influences all spheres of activity of the individual, enterprise and state. Such prerequisites create new rules and opportunities for business entities.

Development of enterprise's information activity as a separate management object helps to optimize its functioning. In other words, the boundaries between the internal and external environment disappear, moreover, competitors, consumers and suppliers acquire partnerships by working in one information base.

The competitive advantages of modern enterprises are achieved by means of access to information, speed of its processing, storage, transfer and improvement of information security level. These prerequisites increase the relevance of the topic and lead to the development of theoretical and applied aspects of enterprise's information activity as an separate object of economic evaluation and management in modern economic environment.

The purpose of study is to develop theoretical and methodological provisions and practical recommendations for economic evaluation and management of enterprises' information activities.

Literature review. One of the main tasks of the enterprise's information activity is to create the information environment that determines the economic security of enterprises [7].

Businesses need sound information support to assess their internal and external environment and make decisions at an appropriate level, which in turn will reduce their uncertainty and minimize risks.

If we consider the development of information activities at the macro level, it is worth noting that the formation of enterprises' information environment can significantly change the structure of national manufacturing [2].

In other words, a significant portion of the total volume belongs to information products, the level of enterprises is determined by the power of their information base, a complex of analytical and calculating tools [10], the ability to process large amounts of information in the shortest time and to ensure its timely delivery to interested users [12].

Efficiency improvement of the economic entity requires special attention to the processes related to its information activities, which is carried out by providing such important areas of work as the activation of innovation processes [1], implementation of information security systems [4], which is closely related to the enterprise's information function - a unique tool for collecting and spreading the necessary information.

Summarizing the researched and analyzed literature resources and practice of enterprise activity, it can be noted that the main problems that impede the quality of information activity in the enterprise are the following:

- 1) lack of effective methodology for information management [13];

2) incompleteness or lack of primary necessary information to make rational management decisions in order to manage information activities effectively and the enterprise in general [8];

3) lack of awareness of the capabilities of modern information and communication technologies in the process of enterprise management [3];

4) imperfection of the regulatory framework regarding the order, forms and content of information exchange between management levels, resulting in both duplication of information, as well as, in its shortage [6];

5) imperfection of regulatory and technical support of information processes, which in turn complicates the interaction and coordination of individual information projects [11];

6) use of outdated or non-standard computer equipment that provide information management of the enterprise [9];

7) complexity of adaptation of existing integrated information management systems to the activity specifics on a particular enterprise, which in turn leads to a low usage level of the available capabilities [5].

Methods. In order to achieve this goal, the following methods were used in the work: theoretical generalization and systematization; survey and grouping method, balance method, graphic image method - to characterize the state of enterprise's information activity of; Scrum-method - for management of enterprise's information activity.

Management technology involves the consistent implementation of management functions, their transformation into management methods and, eventually, formalization into management decisions. The starting point of application of the influence means of the managing system on the managed is the planning of the enterprise's activity and its individual aspects (supply, production, distribution, marketing activities, etc.), in order to determine the prospects and future status of the organization.

Specific approaches, methods, tools should be applied in order to plan the enterprise's information activity, paying attention to the special nature of information activities, the variety of technological operations to ensure it, the current trends in the growth of information flows. The scrum approach to planning has gained popularity among them, which should be explored in more detail.

Results and Discussion. Scrum is not a process or technique in product development; it is an approach that allows to apply a variety of processes and techniques. It is formed and used by implementing the following basic provisions:

1. The usage of the scrum approach is possible only if the Scrum team is functioning. The scrum approach involves the formation of a special team consisting of a Product Owner, a Development Team, and a Scrum Master. The Product Owner is the leader of projects (tasks) that are implemented with the help of the scrum approach; he or she defines the requirements for the results of the scrum team activities, moreover, is responsible for solving their tasks. Quite often, the product owner is a customer representative or other person who is not part of the executive team, but has clear imagine about the products that he or she should develop. This approach clearly defines the requirements that the product must meet and objectively assess the ability of providing them. The Development Team is a group of people who accomplish tasks by using the scrum approach and all the work principles associated with it. Scrum Master is the chief of the scrum team (project manager), who monitor the execution of tasks and their compliance with the scrum principles.

2. Scrint teams take into account Sprint (the amount of time it takes to complete a set of tasks) and plan it (sprint planning). Accordingly, sprint planning is a kind of managerial activity aimed at developing parameters, measures, budgets, administrative levers in order to fulfill the tasks provided in advance in the sprint. Sprint is the reporting period during which the tasks for

the scrum team must be completed. As a rule, the optimum duration of a sprint for which the most difficult tasks can be accomplished is from 1 week to 1 month. In a shorter period of time there is a risk of losing the quality of the completed tasks. Over a longer period, the likelihood of a decrease in the productivity of employees and a delay in the implementation of projects increases.

3. In order to support the activities of the scrum team the backlog is used - a list of basic tasks. It is a subject field of activity, outlines the reasons for the creation of scrum teams, which are necessary to complete the list of tasks. Accordingly, the set of measures necessary to achieve the goals of the scrum team in a specific project is called - Product-backlog. A number of works for the next reporting period (sprint) are called sprint backlogs.

The usage of the scrum approach is related to the compliance of the scrum principles. These principles include transparency, inspection and adaptation. Transparency is ensured through the formation of a Scrum team to which the Product Owner is involved. Thus, it controls the progress of the scrum team projects. Also, in order to achieve the principle of transparency, it is important to have a common understanding of the tasks of all the team members, as well as the unity of terminology, success criteria etc. Control is achieved by directing the scrum team to the sprint and planning it. During and after each of the sprints implementation, an assessment of the completion of the sprint tasks is usually provided.

Next we propose to consider the usage of the scrum approach in the process of information management of the enterprise. We consider information activity as a set of employees' actions of the information sphere of the enterprise, aimed at ensuring effective information exchange between the management and the controlled subsystems and within them, as well as the information exchange of its management system with the external environment to meet the needs of management personnel and owners of the enterprise in a

timely, reliable, structured, high-quality, legal information for prompt decision-making about the tactics and strategy of the enterprise's effective work. It contains the following technological operations: obtaining information, using information, distribution of information, storing information, removing from circulation and destroying data, etc.

In our opinion, the advantages of applying a scrum approach to information management are the following: flexibility provided by rapid structural adjustment, as well as by the possibility of changing methods of influence in the process of making rational management decisions regarding the actions of employees of the enterprise's information sphere; transparency of information exchange processes, knowledge, experience regarding the implementation of information exchange processes between the management and managed subsystems and within them, as well as its management system and enterprise with the external environment; motivation of enterprise employees through their involvement into management processes, as a result of transparency; reducing the risks of management activities that may result in lowering the productivity of this work, increasing the costs level, etc.; the presence of feedback and the possibility of two-way influence during the management process; reasonable and sufficient level of decentralization of management processes that ensures the formation of favorable psychological climate in the enterprise, etc.

At the same time, eliminating the disadvantages of using the scrum approach in managing information activities requires a solution at the expense of ensuring the high qualification of employees of the scrum team. This is especially true for the Scrum Master.

The work of scrum teams is associated with a high level of authority and responsibility of their participants, which links the success of the scrum approach with the competence of the project manager (Scrum Master). Applying a scrum approach to managing large projects is time consuming. This is due to

the need to detail and structure many of the tasks for the implementation of these projects. This complicates the control, regulation of their implementation processes, etc.

The scrum approach takes a lot of time to formulate, adjust plans, hold meetings, and as a result evaluate project connection. Therefore, its main disadvantage is the high cost of time in order to comply with the scrum principles described above.

For effective implementation of the scrum approach, a number of prerequisites in the enterprise management system should be fulfilled, among which are: developed social interaction, a functioning communication system, declared corporate values, etc. Moreover, the application of the scrum approach has a range of limitations, which are related to the number of members of the scrum team, their roles in the project implementation process, transparency of information regarding its implementation dates and budgets, etc. It should be mentioned that the scrum approach requires a clear specification of the tasks that should be combined into the backlog, which is a kind of limitation to the application of this approach.

The above groups of advantages (strengths) and disadvantages (weaknesses) in the use of the scrum approach in the management of enterprise information activity necessitates the creation of SWOT-analysis, which, in turn, identifies the opportunities of the enterprise to use the strengths of the scrum approach and the presence of threats that are caused by its weaknesses (Table 1).

Table 1

SWOT-analysis of the scrum approach in the process of information management of the enterprise

Strengths	Weaknesses
Transparency Flexibility Motivation of employees through their involvement into management processes, etc. Reduce management risks when using the scrum approach Feedback Decentralization of management processes	The need to ensure the high qualification of employees High time-consuming scrum approach The need to provide a number of prerequisites in the enterprise management system The complexity of using scrum approach when managing large projects Limitations during the applying process of the scrum approach
Opportunities	Threats
Increasing the level of technical support in managing information activities and using the scrum approach in the process of its implementation Raising the educational level of employees Improving the financial position of the enterprise and strengthening its position in the market Increase in the stability of enterprise activity due to timely response to changes in the external environment	Increasing the input flow of information and managing it during the implementation of a scrum approach Increase in staff turnover Increase of administrative costs of the enterprise Dependency on innovative technologies, cloud-based platforms for storing information, as well as providers, etc.

Source: author's development

Increasing the level of technical support in managing information activities and using the scrum approach in the process of its implementation were considered as opportunities of the external environment. That is, the means intended for the collection, processing of information, protection of databases, providing its storage, etc. One of the opportunities for improving the motivation of the personnel of the enterprise during the usage of the scrum approach will lead to the increase of educational level of the employees of the enterprises. As a result of using the scrum approach, it is possible to develop information activities of the enterprise, in particular, the sale of information to others or the effective usage for the needs of the enterprise. This in turn creates the prospect of improving the financial position of the enterprise and strengthening its

position on the market. Adequate level of information support for the activity of the enterprise and the process of managing it allows to ensure the stability of its activity and timely response to changes in the external environment. In the future, the scrum approach can be used to manage different areas of the enterprise. The approach is universal, based on the principles mentioned above, and, their observance, in turn, ensures the presence of the outlined strengths and their comprehensive effect on the enterprise. Moreover, the introduction of the provisions of the scrum approach to various aspects of the enterprise forms a single approach to management, which is a prerequisite for the effectiveness of the general management system in the enterprise.

At the same time, a unified approach involves identifying all the required elements at the enterprise level, which, as a result, provide a purposeful impact on various aspects of its activities in order to achieve its goals and accomplish its objectives. The prerequisites of this are laid out in a scrum approach, based on the usage of such categories as: sprints, backlogs, appropriate team (Scrum team).

The use of the scrum team provides a motivational impact through professional development, training, employee incentives, etc. Together, these categories define the content and features of the scrum approach, none of which can be overlooked (simplified or replaced).

At the same time, threats from the outside environment when using the scrum approach is an increase in the input flow of information, which is managed using a scrum approach, which will lead to an increase in the number of scrum projects regarding information management.

This threat necessitates the usage of "cloud" platforms in order to store information, as well as a careful and rational approach to the choice of enterprise providers, which in turn increases the dependence of the enterprise on them. This also means additional costs for managing the scam projects. These costs can be attributed to the costs of maintaining an enterprise management apparatus

(administrative costs). The novelty of this approach in the activities of engineering enterprises can lead to staff resistance and increased staff turnover.

Based on the information mentioned above, the features of the scrum approach to information management of the enterprise will be outlined below. First, scrum project teams related to enterprise information management are formed from employees of the enterprise such as: Product Owner, Scrum Master, Development Team. Scrum Backlog has a number of tasks, which in turn are limited to the tasks of employees of the information sphere of the enterprise in providing information exchange in order to meet the needs of management staff and business owners for information, and, eventually, to make rational management decisions on the enterprise.

When using the scrum approach in the process of managing the information activity of the enterprise, proper technical and information support, usage of special databases and information repositories are necessary. This makes the information management process using the scrum approach dependent on innovations. Also, under conditions that require a timely response to changes in the progress of the scrum projects and timely feedback, the process of controlling the activities of the scrum teams becomes more complex.

The diversity of information management tasks of the enterprise and the increased qualification requirements of participants in the scrum team, their wide powers and responsibilities make it necessary to look for specific form organizations and types of functional interaction between the participants of the scrum team. The Fig. 1 shows a generalization of the features of the scrum approach to information management of the enterprise.

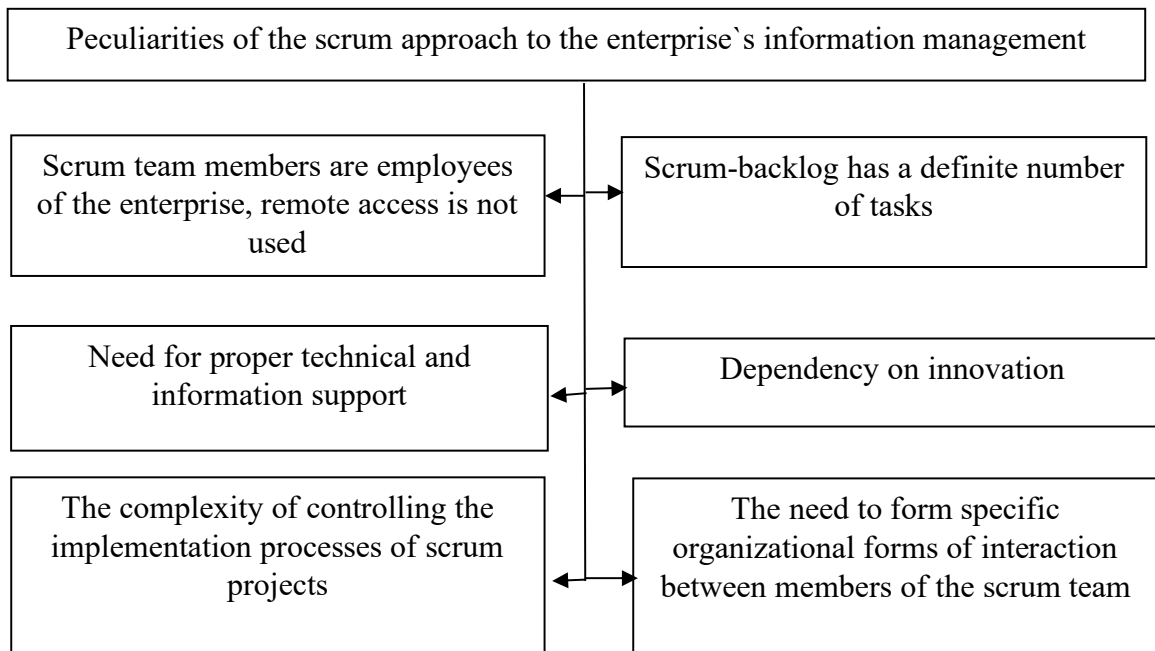


Fig. 1. Peculiarities of the scrum approach to information management

Source: author's development

Planning the information activity of the enterprise using the scrum approach can be divided into a number of stages: the formation of information policy for the enterprise; scrum information support; selection and formation of target parameters; formation of a scrum-backlog; formation of product-backlog of the enterprise's information activity; determining the duration of the sprint and the required number of sprints in the backlog tasks; sprint planning (the formation of sprint backlogs, which is recommended by splitting, decomposing, identifying priority tasks); choice of administrative levers to achieve Sprint backlog; distribution of sprint backlogs by the centers of performance among participants of the scrum team.

Let's look at each of these aspects in more detail. Formation of information policy of the enterprise involves the development of theoretical and applied provisions for information activity of the enterprise. This is the first stage in the enterprise's information process, which must also be taken into account when planning to use a scrum approach. Scrum information planning

consists of the following stages: selection, classification, processing of information, which is necessary for planning information activity of the enterprise with the usage of scrum approach.

The main information during the usage of the scrum approach is the data of strategic and current planning of the enterprise, a comprehensive description of the main provisions and principles of scrum, which we have already described above.

The choice and formation of target parameters involves the development of indicators that characterize the information activity of the enterprise. Evaluation process regarding the information activity of the enterprise can be carried out generally, or by separate technological operations.

In the first case, we use information cost indicator, staff performance indicator, computerization indicator, etc.

Formation of a Scrum backlog of enterprise's information activity we have presented above. As it has been already mentioned, scrum backlog contains the main tasks that must be performed in the process of information activities of the enterprise. This stage is important as a basis for planning information activities in different aspects of enterprise management. Information management does not always include a complete cycle of operations, from the collection of information to the destruction of information. Thus, the main task of this stage is to document the main tasks that can be implemented during the process of managing the information activity of the enterprise.

Formation of a Product backlog with regard to information activity of the enterprise is based on the previous stage and consists in the definition of those tasks of information activity management of the enterprise, which are relevant taking into account the goals of the enterprise activity. This process has been reflected before.

It should be mentioned that on the basis of Scrum backlog, the range of Product backlog in different types of activities and areas of the enterprise's

activity can be developed. This will determine the aspects of Scrum team formation for their implementation. Let's consider this process in more detail.

Sprint duration is determined using the peer review method, based on the total duration of the enterprise information tasks, as well as the number of Product backlog tasks and the expected composition of the Development Team. The recommended optimal sprint duration is 2 weeks during the implementation of the scrum approach. Based on the identified duration of the sprint and the total duration of the Product backlog tasks, the required number of sprints can be calculated.

After determining the duration and number of sprints, the next step is to plan them, which involves decomposing the Product backlog tasks, ranking them, and forming a Sprint backlog. This is carried out using expert methods, taking into account the goals and objectives of managing information activities of the enterprise.

The next step is to ensure that Sprint backlogs are completed by discussing them at meetings, assessing the level of task completion, and even adjusting the sprint. Sprint adjustment is a feedback element that changes the duration and number of sprints, refines the product backlog of the enterprise information activity, scrum backlog, etc.

As it has been already stated, managing an information activity using a scrum approach requires some organizational forms and types of interaction between members of the scrum team. Let's design the structure of the enterprise's information management using the scrum approach.

Taking into account the peculiarities of the scrum approach, the executors of tasks in the field of the enterprise's information activity when using the scrum approach is a Development Team, which is headed by a Scrum Master. Scrum master cooperates with the product Product owner, who is the main consumer of the results of the scrum projects implementation, as well as sets requirements for their implementation and specifies the finished products of the scrum team

activities. Therefore, in order to provide information activities based on the usage of a scrum approach under the responsibility of the director of the enterprise, it is necessary to ensure the creation of a unit headed by Scrum Master, who will manage the work of the development team.

When forming such an organizational management structure, the question of determining the Product Owner, who, according to the peculiarities of the scrum approach, is also an employee of these enterprises remains unresolved. According to the recommended organizational support procedure, the Product Owner will vary depending on which scrum project is to be implemented by the Scrum Master. In particular, during the process of engineering enterprise activity there is a need to upgrade assets and introduce new technologies into production. The entity may obtain leasing services for this purpose as an alternative to the purchase of machinery and equipment.

The solution to this problem, namely making a purchase or lease decision, requires special market research. Thus, information activities take place at the enterprise, which is provided by the information activities department (Development Team), which is led by the head (Scrum Master). In the course of the research, the collection or acquisition, accumulation of information, as well as the production of the new information, its use for making management decisions, etc. are carried out.

In this case, the Product Owner will act as Production Director. He needs information to make a management decision in order to achieve the set goal. Thus, the Deputy Director of Production (Product Owner) defines certain requirements for information (carries out its specification) and to the team of executors, defines the tasks that must be performed by the team of executors, coordinates the process of their implementation, determines priorities, etc. He is responsible for the results of information activities related to solving this problem on the enterprise. In order to do this, the Product Owner interacts with the Scrum Master, Development Team and with the CEO of the enterprise. The

functions of employees in accordance with the recommended organizational structure of information management of the Product Owner, Scrum Master and the team of executors (Development Team) of the enterprise on the basis of the usage of the scrum approach are represented in Table 2.

Table 2

Functions of employees of organizational structure regarding the information management activity of the enterprise on the basis of the scrum approach usage

Employees of the organizational structure of the enterprise's information management	Functions
Product Owner	Defines the requirements for the tasks and activity results of the Scrum Master and the Development Team, as they are the main consumer; interacts with the scrum master, the team of executors (coordinates the task execution process, prioritizes) and with CEO during the implementation process of the tasks, etc.
Scrum Master	Manages the work of the executives team, monitors the Scrum principles in the work of a team, provides processes of tasks' planning and implementation during the process of information activities in the enterprise by participating in the processes of planning, holding meetings, monitoring progress, budgeting, etc.
Development Team	They carry out processes of acquisition, accumulation of information, production of their own new information at the enterprise; ensure the usage of this information by management and business owners and transfer to direct executors in order to implement the tasks assigned to them; publish information among employees of the enterprise or in information sources of the external environment; ensure the information reliability by maintaining the proper status of the information and its material carriers; eliminate irrelevant or used and unnecessary information in the further activity of the enterprise.

Source: author's development

In order to form a rational organizational structure for managing information activities, a certain sequence of organizational planning should be created.

Summarizing from the material mentioned above, the stages of organizational planning of information activities using the scrum approach are the following: distribution of different work types by functional unit for management of the enterprise's information activity; establishing its relationships with other enterprise units; defining job responsibilities, assigning them to certain employees of the organizational structure of enterprise's information management, which are determined based on the usage of the scrum approach (Table 2) and through the formation of job descriptions.

Conclusions. It is recommended to use a scrum approach to plan enterprises' information management systems, which in turn will provide a rapid structural adjustment, the ability to change the influence methods on the process of making rational management decisions regarding the actions of employees involved into the information sphere of the enterprise; transparency of information exchange processes; reduction of management activity risks; the presence of feedback and the possibility of two-way influence on the processes regarding the information management; reasonable and sufficient level of management processes decentralization, which in turn ensures the formation of favorable psychological climate on the enterprise, etc. The SWOT-analysis of the scrum approach regarding information management was carried out during the study. In our opinion, applying the scrum approach to information management has the following range of advantages: transparency, flexibility, motivation of employees through their involvement into management processes, reduced management risks when using the scrum approach, as well as decentralization of management processes.

At the same time, the application of the scrum approach has several disadvantages, which are the following: the need to ensure the high qualification of the scrum team members, the complexity of the application of the scrum approach in terms of labor costs, high costs of time, etc.

The certain possibilities of the external environment were also defined, such as: increasing the level of technical support in the activities of the units, improving the motivation of the personnel, the opportunity to develop the information activities of the enterprise, etc.

Also, the features of the scrum approach to information management were outlined: the inability to use remote access, since the members of the scrum team must be employees of the enterprise; the need for quality and sufficient technical and information support; complexity of controlling processes for implementation of scrum projects; determined number of backlog tasks that in turn characterize the technological operations of information management; dependence on innovations; the need to create specific organizational forms and types of interaction between the scrum team members.

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