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### **CONTROL AND ACCOUNTING ASPECTS OF INTRODUCING AGILE-METHODOLOGY FOR SOFTWARE DEVELOPMENT PROJECTS**

**Abstract.** The article considers the Agile methodology, its conceptual principles and studies the main accounting aspects of its implementation in realizing the projects of software development.

In order to meet the modern requirements of the economic environment, the IT companies are turning to Agile-methodologies with accent on iterative and incremental software development. The software development on the basis of a flexible approach has numerous advantages, in particular centering on clients' needs, reducing risks and costs, providing a transparent process. However, using Agile-methodology can make accounting a complicated task. The existing accounting principles involve software development in a long-term perspective and in more discrete phases. The article analyzes the popularity of practical use of Agile approach and determines the advantages from its use as well as defines the accounting related problems. The ways of eliminating the complications of using the flexible approach in project management in financial accounting are defined. The main ideological aspects of Agile Manifesto are considered.

In modern conditions, almost all businesses are in a state of constant change. There are purposeful transformations of both their individual elements and the management system in general, which requires manageability of change, which is difficult to achieve even within individual projects, often unique and innovative. In addition, the world economy has undergone significant changes in the economic environment, due to the globalization of business, informatization of society and the transition to a new model of economic growth.

It is investigated that with modern optimization of financial processes Agile-technologies are built in such a way that changes are welcomed and uncertainty is recognized. And this did not bypass the internal audit. The growing needs of customers, the need to change process technologies, the introduction of new methodologies in the activities of departments adjust the internal audit to change approaches to testing and analysis of materials, as well as active participation in new projects.

**Keywords:** Agile-methodology, Agile-team, Internal audit, value-centered approach, accounting system, costs capitalization.

**JEL Classification** M40, M41, L86

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## **КОНТРОЛЬНО-ОБЛІКОВІ АСПЕКТИ ВПРОВАДЖЕННЯ AGILE-МЕТОДОЛОГІЇ ДЛЯ ПРОЄКТІВ РОЗРОБЛЕННЯ ПРОГРАМНОГО ЗАБЕЗПЕЧЕННЯ**

**Анотація.** Розглянуто сутність методології Agile, її концептуальні основи та досліджено основні облікові аспекти для ефективного її впровадження при реалізації проєктів розроблення програмного забезпечення.

Проаналізовано, популярність практичного застосування Agile-підходу в різних сферах бізнесу та окреслено основні проблеми, що виникають на цьому шляху з боку облікової системи. Визначено напрями усунення проблем на шляху адаптації особливостей гнучкого підходу в управлінні проєктами до потреб фінансового обліку, розглянуто основні ідейні аспекти «Agile Manifesto».

У сучасних умовах практично всі суб'єкти господарювання перебувають у режимі постійних змін. Відбуваються цілеспрямовані перетворення як окремих їхніх елементів, так і системи управління загалом, що вимагає керуваності змін, що важко досягне навіть у межах окремих проєктів, доволі часто унікальних та інноваційних. Окрім цього, у світовій економіці відбулися значні зміни середовища господарювання, що пов'язано з глобалізацією бізнесу, інформатизацією суспільства й переходом до нової моделі економічного зростання.

Досліджено, що за сучасної оптимізації фінансових процесів Agile-технології побудовані таким чином, що зміни вітаються, а невизначеність визнається. І це не обійшло внутрішній аудит. Зростання потреб клієнтів, необхідність зміни технологій процесів, впровадження нових управлінських методологій у діяльність підрозділів налаштовують внутрішній аудит на зміну підходів до контрольних дій і аналізу матеріалів, а також активну участь у нових проєктах базуючись на попередньому досвіді.

В умовах використання гнучких технологій змінам підлягають очікування внутрішніх аудиторів щодо доступу і формату документації. Якщо внутрішній аудит і керівництво компанії прагнуть взаємодіяти один з одним на ранніх етапах переходу до гнучких підходів, внутрішній аудит може стати цінним партнером у забезпеченні високих показників продуктивності, не піддаючи ризику наявності контрольних процедур, і саме такий підхід аналізу облікових записів і описано у статті.

**Ключові слова:** Agile-методологія, Agile-команда, внутрішній аудит, ціннісно-орієнтований підхід, система обліку, система управління, капіталізація витрат.

Формул: 0; рис.: 4; табл.: 0; бібл.: 13.

**Introduction.** Effective management requires appropriate accounting and information support able to produce complex analysis of all accounting objects and data summarizing for reporting them to the administration. It is this approach that will enable to establish accounting-informational environment favorable for effective management. Such an approach is difficult to maintain in the conditions of IT enterprises, especially when using flexible approaches in project management.

The investments into software development growing and developer teams are using new methods of production such as Agile-methodologies, the conventional accounting principles fail to meet new challenges. Software development is a quite dynamic sphere employing innovative approaches to management, while the main accounting principles in this sphere rely on the fact that

software development is maintained in a linear way and passes certain phases. Software development employing Agile approach has numerous advantages including centering on clients' needs, reducing risks and costs, providing a transparent process. However, using Agile-methodology can make accounting a complicated task.

**Analysis of the recent research and problem setting.** Project management dates back to the 1970s. Since the very beginning of the methodological development in this sphere, a waterfall model and its interpretations have dominated. Starting from the 1990s, the IT market underwent dramatic changes few big projects for large-scale clients changed into a great number of small-scale or medium-scale projects for all business spheres. Together with accelerating business changes, these causes became the main factors of establishing a flexible or adaptable Agile-methodology of project-management [1].

The analysis of the scientific works shows that the issue of developing and implementing Agile-methodology is in the centre of scientific attention. It was studied by J.Sazzerland, M. Cohn [1], R. P. Bouray, G. E. Richards [2], R. Srinivasan, T. Quan, P. Reed [3], D. Greening [4]. Ukraine has also findings in practical implementation of Agile-methodology into the process of software development, but little is said about theoretical developments and integration of this approach into project management with accounting of its realization.

Therefore, the research of accounting aspects of Agile-methodologies implementation into the sphere of software designing is of topical importance.

The aim of the research consists in studying accounting of software development employing Agile-methodology.

**Description of the main research material.** Nowadays the IT-sphere is a driving device in the economic growth of Ukraine and part of representing our country as a highly technological state at the international level. Since 2013 this sphere has shown a steady export growth than in the first half of year 2018 it occupies the 3rd place by growth of income in foreign currency.

When the present pace is sustained, in 5 years the IT market will occupy the 2nd place in the structure of the Ukrainian export. The export volume of computer and informational services for the last 6 months has grown by 18,3% (to 1,256 billion USD) as compared to the similar period in 2016.

The export volume of software development of Ukraine in 2017 compared to 2016 increased by 20% and amounted to 3,69 billion USD, and the forecast amount of exports for 2018 is \$ 4,5 billion (Fig. 1).

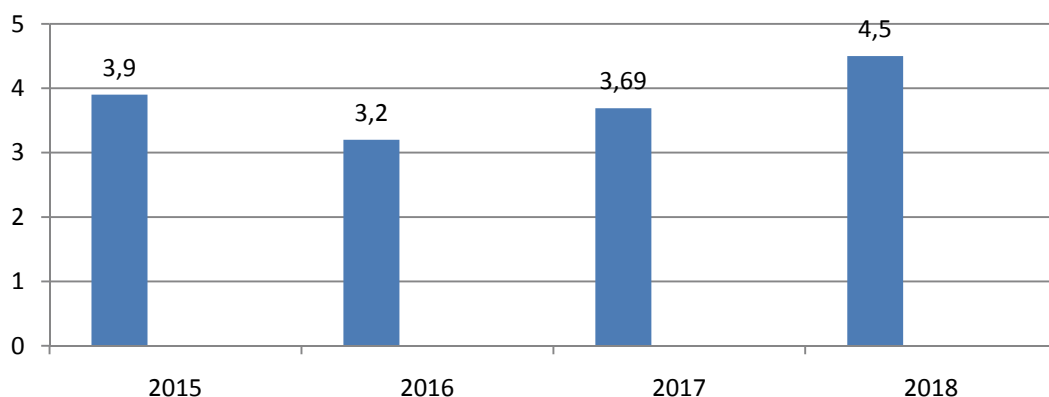


Fig. 1. Export of IT services from Ukraine (billion USD).

Source: made up by the author's on the data [5].

In 2017 IT companies working on the territory of Ukraine, paid 16,7 bln. UAH taxes. Since 2011 the number of employees in this sphere has grown more than by 70 thousand. It is expected to reach about 200 thousand by the year 2020 (Fig. 2).

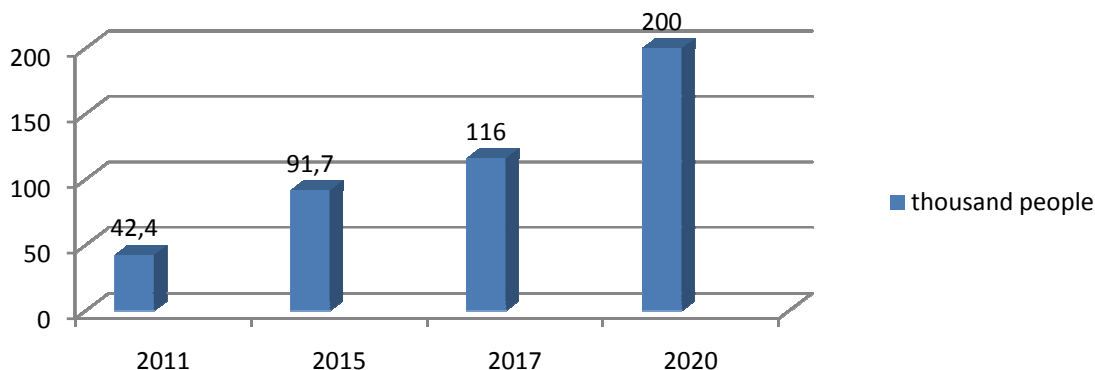


Fig. 2. The number of specialists in IT-industry for the period 2011—2020 (thousand people)

Source: made up by the author’s on the data [6].

In 2018 the growth pace of IT-market is expected to make up about 30%. According to the estimations of association «IT Ukraine», the number of specialists in this sphere will rise from 116 to 145 thousand [6]

For the recent years IT-companies have been introducing Agile-methodologies with the accent on integrative and gradual software development. Agile-methodology of software development has a lot of advantages:

- special focus on clients’ needs;
- constant communications with clients;
- reducing risks;
- reducing costs;
- maintaining greater transparency of development process etc. Fig. 3.

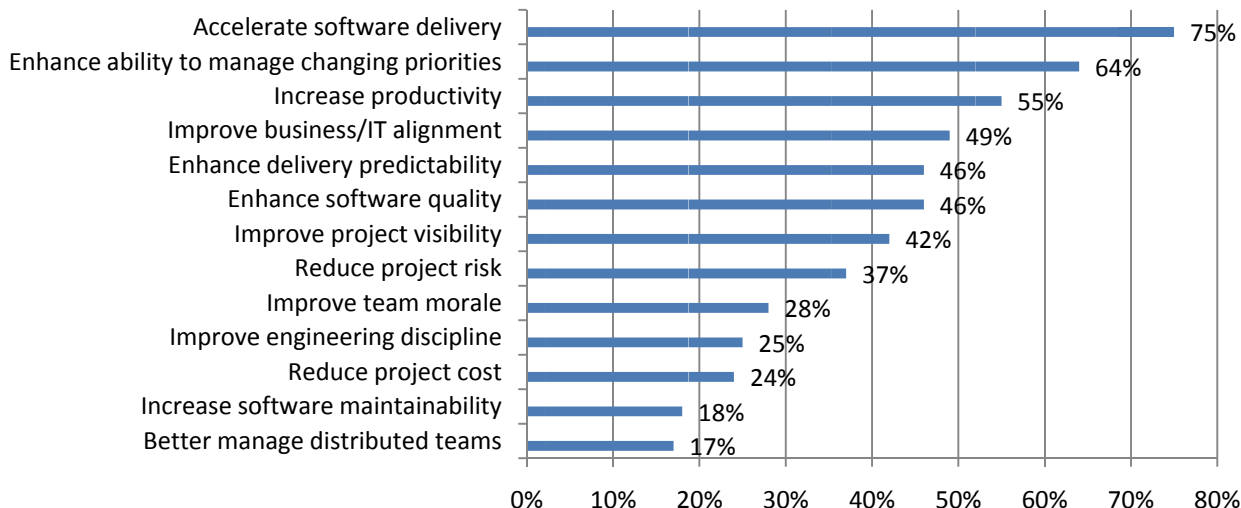


Рис. 3. Reasons for Adopting Agile

Source: made up by the author’s on the data [7].

However, for the companies using Agile-methodology accounting may become a complicated task. The existing accounting principles are meant for long-term and phase software development, and are not adjusted to flexible management and rapid advance.

The popularity of this methodology among the world leading companies is proved by the survey data produced by the companies «Version One» [1], Fig. 4. 79% of the surveyed companies have experience of working with Agile-methodology.

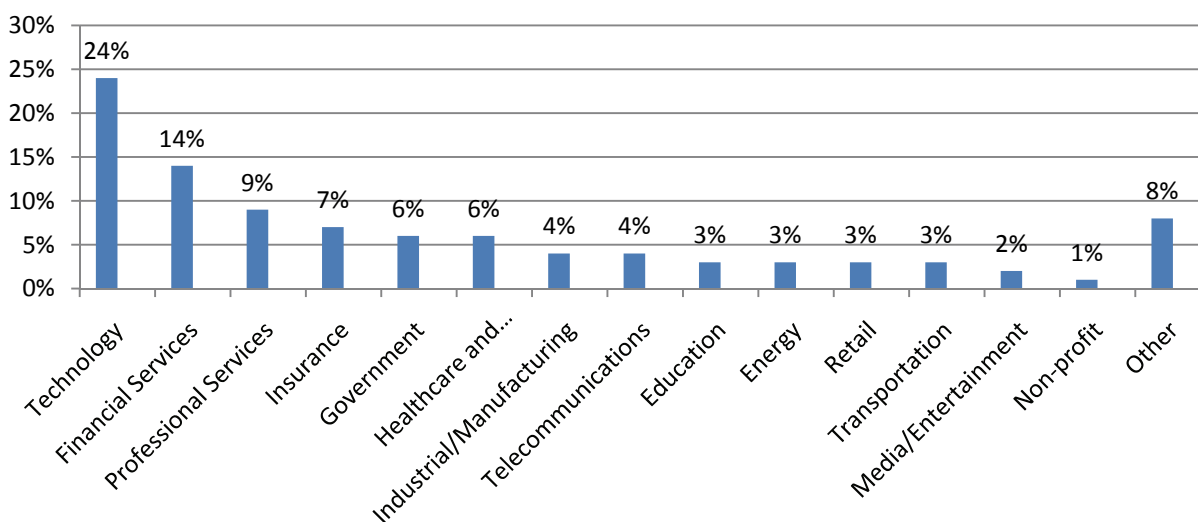


Fig. 4. Spheres of using Agile-methodology by the world companies

Source: made up by the author's on the data [7].

Traditionally software is developed in stages. According to the classical approach, software is considered to be developed in case of passing 3 stages: initiating, planning and development, monitoring, controlling and completion. This long-term stage approach is called a waterfall model of the life cycle of software development.

This approach makes provision that all the requirements to software are known at the first stage, but the product will be ready only after the completion stage. Taking into consideration the requirements at the first stage, the plan of the project development is made, the timetable and resource inputs are distributed, but the software can be ready in a rather long-term perspective.

The waterfall model of life cycle of software development corresponds to the 3 phases of accounting:

- preliminary planning (1);
- software product development (2);
- after realization maintenance (3).

The feasibility and economic analysis corresponds to the phase of preliminary planning; Requirements analysis, architecture and design, as well as coding and testing conform to the development phase (incurred and capitalized costs); and the implementation and maintenance (at cost) corresponds to the stage after implementation.

In many industries, the traditional model of stage development of software cannot satisfy the clients' needs and expectations. Companies cannot invest large amounts into software which at the moment of its implementation does not conform to modern requirements or does not perform certain important functions. It is primarily explained by the fact that modern software products must be tightly connected with the Internet and various mobile platforms.

In order to increase mobility and reduce the risks, companies are increasingly turning to methods of development based on Agile-methodology. These methods are integrative and gradual, based on the principles described in Agile Manifest [8].

The Agile-based product starts with statute endorsement and defining the main requirements. However, unlike the traditional cascade model approach, the product requirements are not final and rigid; some of them may already arise during software development and testing. The development is carried out using short iterations (sprints), aimed to create a basic version of the product, obtain the customer's feedback, on the basis of which tasks for the next iteration will be defined.

As practice shows, Agile-methodology can be connected with two accounting problems.

First, at the stage of planning it is rather difficult to estimate the value of the future product since the list of requirements to it is adjusted during the whole development process.

Second, the feedback about the software being developed is extremely important and it is decisive in defining the terms of the project. In this approach, it's quite difficult to separate the phases of software product development (2) and its maintenance after introduction (3).

The presence of such problems often leads to one of the following negative consequences:

- blocking certain events resulting from the use of Agile-methodology by the accounting department;
- companies choose not to register certain events to avoid complications;
- the realization of detailly described processes leads to extra costs and reduces the efficiency of cooperation between the accounting department and software developers.

First, flexible processes have a positive impact on developer productivity and overall business performance, but there are situations where such processes do not comply with the requirements to financial documentation, and in this case are blocked by the financial department

The second set of negative consequences is almost exactly opposite to the first one. Instead of adapting the accounting system to the Agile methodology-based management needs, the accounting department ignores the features of such management system and does not reflect them in accounting. This approach leads to the autonomous work of different departments of one enterprise, which restricts the enterprise's opportunities.

In the third variant, the administration of an IT company sets a detailed time schedule for the developers with time frames often difficult to stick to. They have to classify their tasks and time for their completion, these must be entered into the Excel chart, where these data are exported while making financial reports. In the better case, this puts extra load on employees, causes some inconveniences and leads to accounting faults. Besides, as a result, it leads to time losses and produces a bad impact on cooperation between the departments.

The first step towards preventing these above mentioned negative effects is to clearly define the situation in which they arise.

The provisions published by the American Institute of Certified Public Accountants SOP 98-1 «Accounting for the Costs of Computer Software Developed or Obtained for Internal Use» about the cost accounting for developed or obtained for internal use software contain information about the three stages of software development; the preliminary stage of the project, the stage of applications development and after-implementation or maintenance stage. The first stage (1) — is alternatives evaluation and drawing up the work schedule. The second one (2) — is software development, efforts and capital spent for the development of a new software product. The third one (3) — is technical maintenance, training and other after sale costs. According to the provisions, the costs must be regarded as costs at stages 1 and 3, but in fact the software functionality is formed at stage 2, and these costs can be capitalized, included into the nominal value of the intangible assets. The same vision lies at the basis of the cascade (waterfall) model of the life cycle of software development.

However, the main problem arises when clear boundaries between the stages disappear and it becomes quite difficult to separate the costs for different stages, in particular, this situation arises with flexible methods of managing the software development process. As a rule, these concerns one of the negative effects listed above (especially one of the first two).

One of quite easy solutions that can simplify the accounting process in terms of Agile-methodology is chronological revision of the process of creating software product versions and allocating evaluation and maintenance steps after its implementation. The product developer's team should classify the work in each iteration (sprint) and separate work on different versions of the same product in the following steps:

- order X — coordination and evaluation;
- order X — development (versions 1.0, 1.1, 2.0, etc.);
- order X — service.

Thus, fully understanding the process of flexible management, we have a fairly simple way to classify costs. Such detailed description may require additional time, but at the same time, improve communication between departments and prevent from many problems. However, since

flexible management methodologies are applicable to different industries, not only in IT industry, we consider it necessary to harmonize the issues of the relationship between the management and accounting system at the methodological level. Such problems remain unsolved both in international practice and in domestic realities.

In domestic practice, enterprises can order or develop software products, depending on their functional purpose, in one of four ways:

- the program is systemic and necessary for the computer to perform its functional tasks, in this variant it can be accounted as an object of fixed assets;
- acquisition of property rights for an application that is included in intangible assets;
- the licensee company buys the right to use the software without the right for its sale (or in other words — alienation), the terms of software use are not limited to its functional purpose, but the rights to the reproduction of the program in a certain number of copies, the fee for using such a program or royalty, and the software itself belong to the developer;
- maintenance or updating of an existing software product is paid, such a fee is considered as payment for services.

Modern Ukrainian enterprises leading active economic activity do not always have enough free available funds. To solve this problem, economic agents take loans, issue bonds etc., thus bear financial costs.

Software development requires a certain period of time, sometimes it is a rather long-term perspective. In accounting terminology, an asset that requires significant time to create is recognized as a qualifying asset [9; 10]. The criterion of time significance of is set by the accounting policy of the enterprise that maintains accounting for IFRS. And enterprises that keep records in accordance with UAS, are suggested to consider the period above 3 months as significant/essential [11]. Although companies may also establish another term more appropriate to their activities. Qualifying assets include:

- capital investments in the construction or production of fixed assets — buildings, constructions;
- capital investment into production of intangible assets;;
- expenses for the reconstruction of investment real estate, which are capitalized, if such property in accordance with the accounting policies of the enterprise is estimated at prime cost;
- stocks as incomplete manufacture of products with a long operating cycle [9; 11].

Generally, financial expenses are recognized as expenses of the reporting period in which they are accounted. The right to do so (item 4 UAS 31 «Financial expenses») have the following agents:

- sole proprietors, private entrepreneurs — legal entities, representatives of foreign economic agents, legal entities not involved in entrepreneurship (except budget institutions). They include financial expenses to the expenses of the reporting period no matter if they create qualification assets or not;
- other legal entities, but provided that the rules UAS 31 «Financial expenses» do not require capitalization of financial expenses. Sole proprietors or subjects of small business, accounting according to IFRS, do not capitalize financial expenses but write them off as expenses in the reporting period when they are accrued.

Capitalization of financial expenses begins, if:

- preparatory technical and administrative measures are completed (for example, a permission for the construction of a building has been obtained and a land plot for the construction has been acquired);
- work has been done on the creation of a qualifying asset and the costs associated with such work have been recognized (capital investment in the CA has been made in the form of payments of funds, transfer of assets or accepted bonds);

– financial costs have been born [9; 11; 12].

It goes without saying that for some Ukrainian IT companies the issue of capitalization of financial costs is not of topical since they are established as subjects of small business, some deal with developing software and the development period must not exceed 3 months. However, in 2018, it is especially important to review all these issues and accurately reflect and describe them in the Order «On Accounting policies», since in 01.01.2018 the Ukrainian Parliament adopted the Law «On Accounting and Financial Reporting in Ukraine» in the new wording revising classification of enterprises by size and scope of activities.

Nowadays the most important topics for discussion are ways to facilitate work and automation processes. Thus, the word «e-gail» immediately turned from a very specific term into a common concept applicable in all areas of banking system, including internal audit. But what exactly does it mean? How are Agile technologies used in audit?

In English, «agile» means «lively, mobile,» but is more commonly translated as «flexible» [13]. In February 2001, 17 specialists developed «the Manifest of flexible methodology of program software» – Agile Manifesto. Since then, «agile» means a set of approaches to «flexible» software development.

Agile Manifesto is based on 4 key ideas:

1. People and their interaction are more important than processes and tools.
2. The finished product is more important than the documentation for it.
3. Collaboration with the customer is more important than tight contractual restrictions.
4. Responding to change is more important than conforming to a plan.

Let's take a closer look at how Agile technologies are used in audit.

It so happens that we are operating in a climate of high uncertainty and constant changes. With the modern optimization of banking processes, Agile technologies are built in such a way that changes are welcomed and uncertainty is recognized. And this has not been avoided by internal audit. Growing customer needs, the need to change process technologies, the introduction of new methodologies in the operations of the divisions are setting up internal audit to change approaches to validation and material analysis, as well as actively participate in new projects.

**Conclusions.** Consequently, both international and domestic practices involve capitalization of financial costs only on the stage of software development, while the costs associated with the stages of coordination, evaluation and maintenance after implementation are related to other expenses and are not included into the asset cost. To allocate such costs using Agile-methodology, we offer a system of analytical accounts that involves allocating the costs on development of a single software product together with its versions and, simultaneously allocate costs on approval, evaluation and after-sales maintenance of this product.

Some aspects of bringing accounting in accord with flexible management approaches require special attention since this industry is surging and in the Ukrainian practice this mechanism is only partially elaborated.

Agile transformation for the audit team is a unique opportunity for the projects to develop and implement audit indicators. With Agile transformation and flexible methodologies in place, internal audit units will be able to focus on the needs of internal clients and improve communication between departments. In addition, it will be possible to concentrate on the product instead of supplying the customer with overloaded materials and clarifying customer needs.

Naturally, there is certain discussion regarding updating existing standards and adjusting them to a more flexible environment. However, such upgrading involves several years of planning, discussions, proposals and specialists' feedback. It means that in the close future companies using flexible management models will have discuss the rules of work with accounting departments prior to product developing in order to choose an appropriate variant of bringing accounting requirements in accord with the principles of flexible management.



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