



# Chosen aspects of innovative projects management

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## Abstract

Any company willing to maintain its market position has to search and implement innovative products and services. Integrated development of enterprise's innovative activity requests a constant search for new technologies and new organizational forms. Ability of effective management of innovative projects becomes a crucial issue. The paper presents a characteristic of innovative projects accordingly to OECD standards. Project management concepts based on Project Management Institute (PMI) and International Project Management Association (IPMA) procedures have been discussed. Key success factors have been defined, i.e.: obtaining assumed project outcome (range), project implementation conform to planned schedule (deadline), maintaining project costs under a certain limit (budget), quality (are the customers satisfied?), resources (team losses and interpersonal relations). Tables comparing product innovativeness with fields of requested know – how for particular product innovativeness levels have been elaborated. Finally, SCRUM method of adaptive project management aiming at providing possibly optimal outcome has been described.

**Keywords:** innovative projects, project management, analysis of innovation, evaluation indicators

## 1. Characteristics of innovation

According to the recommendations of the OECD (Organisation for Economic Co-operation and Development [7]) technological innovation within the products and processes (TPP) (Technological Innovations product and process) include products already implemented as well as new processes in terms of technology and the significant improvements of these products and processes. TPP innovation has been implemented if it had been placed on the market or had been used in production process (innovation within the process). TPP innovations involve a group of scientific, technological, organizational, financial and commercial activities.

Technologically new product is a product, whose technological characteristics or intended use differ significantly from those of previously manufactured products. Innovations of this kind may

be entirely new technologies based on a combination of existing technologies in new applications or on the use of new knowledge.

Technologically improved product is an existing product, whose activity has been substantially improved. Simple product can be improved (the better performance or lower costs) through the use of new components or materials that provide better performance. By contrast, a complex product, consisting of a number of integrated technical subsystems can be improved by making partial changes to one of these subsystems.

Technological process innovation is the introduction of technologically new or significantly improved production methods including ways to reach (supply) with the product to customers. These methods may include making changes in devices or in the organization of production, may also be a combination of these two types of changes or be the result of the use of new knowledge. They can be designed to produce or to provide a technologically new or improved products, which could not be

produced / delivered by the methods used so far. The aim of these methods may also be increasing the efficiency of production or delivery of existing products.

Organizational innovation within the company include: introduction of significant changes in organizational structures, implementation of advanced management techniques e.g. in the financial system, staff management, implementation of new or significantly revised strategies e.g. in the field of supply or industrial marketing.

Organizational changes are considered as innovations only if the results of these changes are the tangible effects e.g. a higher performance or higher turnover are achieved. However setting clear boundaries between innovative and not innovative, organizational changes is quite difficult.

Innovative activity of TPP is the set of scientific, technological, organizational, financial, trade activities and also investment in new knowledge, which lead or are supposed to lead to the implementation of technologically new or improved products or processes. Some of them may be innovative by themselves, while others have no news value, but are an essential element for the implementation.

In a given period the company can take three types of TPP innovation activities:

- activity successfully completed, leading to the implementation of technologically new or improved product or process;
- activity discontinued before the implementation of a new or technologically improved product or process, because of the encountered difficulties during the project or due to the sale / disposal of ideas and know-how to another company, or due to changes in the market;
- ongoing activity which means the actions in progress that have not led yet to the implementation phase. Such activities can be undertaken in conjunction with concrete, new or improved product or process or also with a view to less clearly defined objectives, as happens in the case of basic or general research in the field engineering and technology.

Therefore the innovation is special business tool, by which the change in the company becomes an opportunity to take a new economic activities or the provision of a new type of service. These changes open new prospects of action for many businesses, including co-operating, e.g. in the development of new product, provided that these operators are able to effectively use the innovative orientation of its development strategy.

Innovation is an ongoing process. It requires a readiness for changes as an opportunity to more efficient company's activity on the products market and capital market.

Innovation gives a company, regardless of its size, the chance to distinguish its products from competitors' offers, the opportunity to adapt its products to specific customer requirements and market niches and the chance of achieving the threshold of competitiveness at relatively low cost as well as industrial design [4].

To achieve the imperative level of competitiveness, the proper management of the design and development of new product is necessary, which means the integration of project activities with all business development operations (*design management*).

A characteristic feature of modern innovation processes resulting from knowledge-based economy is [11]:

- combination of intellectual elements with material ones with the increasing involvement of these first ones, as well as the increasingly complex links between them;
- The risk and uncertainty during the implementation process to achieve the desired characteristics of innovation;
- leading share of the possibly best in given system cells of human resources and physical capacity of sector R & D in making innovative changes
- increasingly pronounced correlation between the degree of maturity of innovation processes and the dynamics of development of economy and society. Any failure of this system results in a waste of effort and resources, which is a brake on economic development [11].

In summary, it can be concluded that modern innovation process is characterized by features that distinguish it from regular industrial production, because:

- innovation is an interactive process;
- in most cases, a source of innovation, next to the R & D, are also acquired specific experiences and knowledge, contacts with users, suppliers, competitors, etc.;
- innovative processes are generally located and take place in a particular area, which is associated with the occurrence of high-quality development of this space and other factors resulting from the processes of agglomeration and urbanization;
- innovation is the process of integration of the objectives, tasks and functions involving all areas of business, which means that it requires high skills in business management;
- innovation is a learning process, using internal and external sources of knowledge;
- the innovation process has a relatively long life cycle which is difficult to determine;
- innovations are always associated with costs and risks.

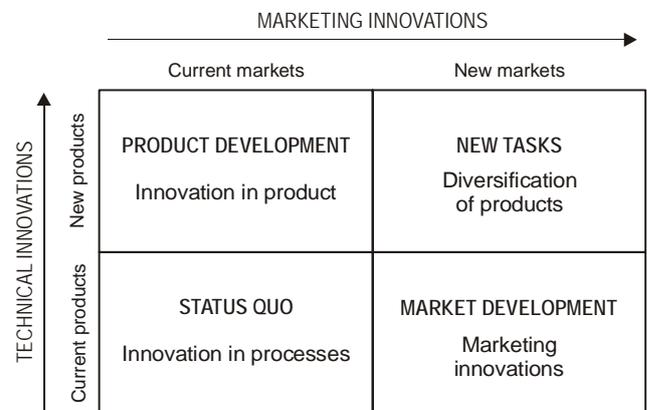


Fig. 1. Integrated development of innovative activities in the enterprise (on the basis of [4])

Decisions on research and development (R & D) and marketing, as well as state of the market impact on sales of the new product. Effectiveness of innovations introduced by the company depends on several factors, and the results of innovative activities should be considered both in the short and long term. Effective, innovative activity should be integrated (fig.1) and this is associated with a innovative project management.

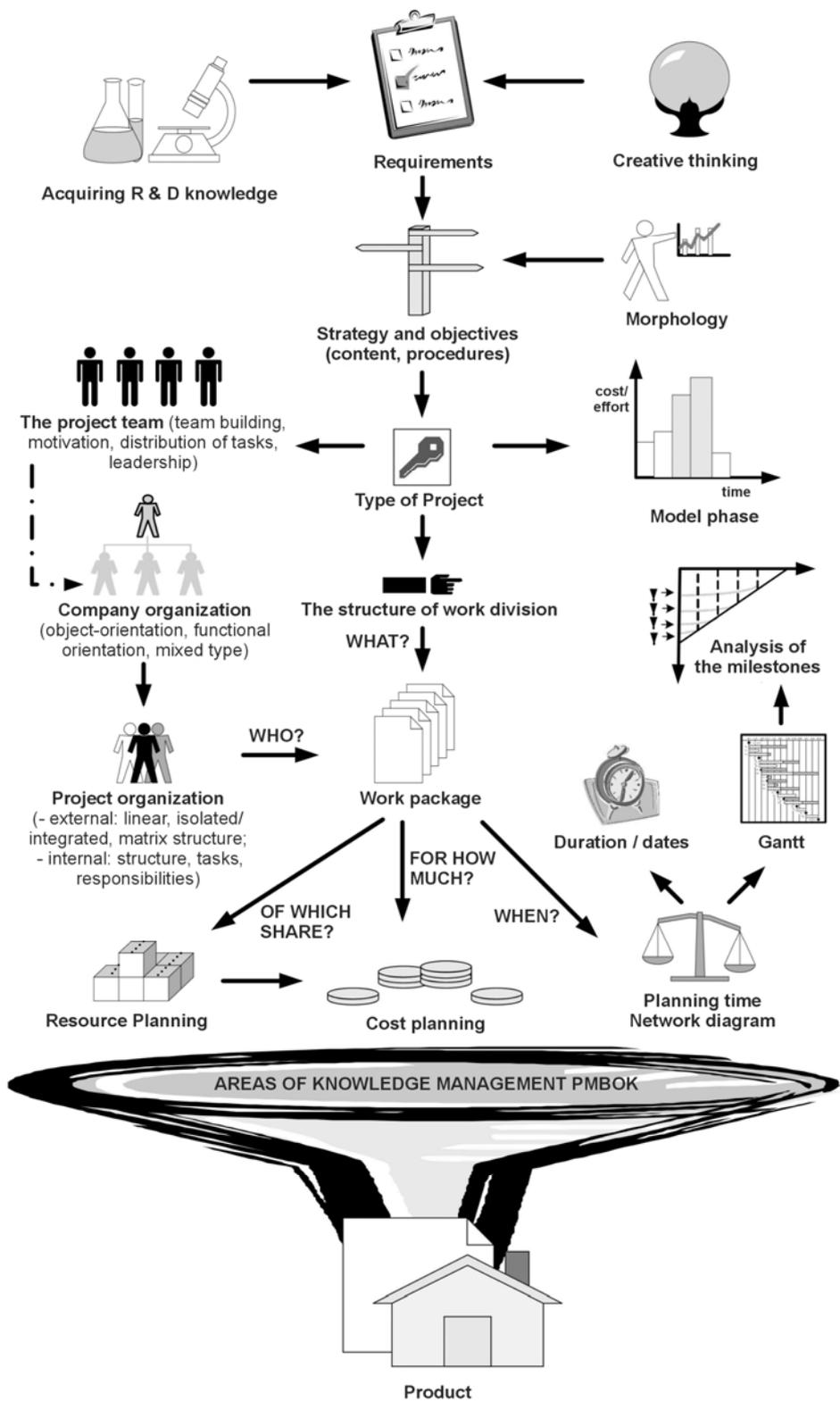


Fig. 2. The concept of project management

## 2. Project management

Currently, for the long-term business development, projects are an important part of their activity. Increase in number of projects and their increasing complexity, while reducing the availability of resources, puts on the organizations higher requirements for the competence as well as methods for monitoring and coordination of multiple projects. Therefore, it is necessary to seek methods and ways of efficient and effective management of various projects. In the nineties, the general theory of management identified a new science: project management – **PM**. Recognized, world-wide organizations preparing the formal guidelines and generally accepted standards of project management are *Project Management Institute (PMI)* and *International Project Management Association (IPMA)*.

### 2.1. The concept of project management (PM)

PMI defined the project as “*time-limited action taken to create a unique product or service*”. However, among the Polish PM practitioners, we can meet the determination that the project is a single, multipurpose order, with a specific range (the specification), budget (projected and planned costs), execution time with the established performance and quality. Thus, characteristic features of the project are: uniqueness, one-off, close statement of purpose, timeframe, budget and limit the consumption of resources.

*The Project Management Body of Knowledge (PMBoK)* presented the range and complexity of knowledge in project management as nine areas identified in the logical sequence, from which 37 processes were identified. Identified areas are: integration management, range of operations management, time management, cost management, quality management, human resource management, communication management, risk management, supply management.

Thanks to their application we can, in an orderly manner, analyze and manage the process and also, through a better understanding of existing conditions of the project, take appropriate corrective action in case of emergency for its realization.

In fig. 2 the algorithm in project management is presented. For the evaluation of the implementation process and outcomes of the project the measures of success are introduced.

### 2.2. Measures of success

Project management is a branch of management dealing with using available knowledge, skills, tools and methods to achieve the objectives of projects in an efficient and effective way, i.e.:

- obtainment the assumed results of the project (range)
- implementation of the project on time (deadline)
- maintaining project costs within the prescribed limit (budget), through appropriate interaction of the participants and other stakeholders of the project.

Often the additional measures of the project are cited, which are:

- quality (whether customers are satisfied?)

- resources (if there were no losses in the team or the relationships among employees?).

Most companies, focus primarily on the first three - time, budget and range - neglecting the other two. While in the short term it will not cause adverse consequences, the more long-term effect of such a procedure can generate losses. Triangle of project management (fig.3) provides the graphical representation of relationship between the five mentioned measures of the success [5]. Side of the range represents the agreed project activities and requirements, side of the cost means the overall cost of the project in cash, while the side of time is the project duration. Inside the triangle, the quality is the degree of satisfaction of customer expectations and resources relate to people and equipment necessary during the project.

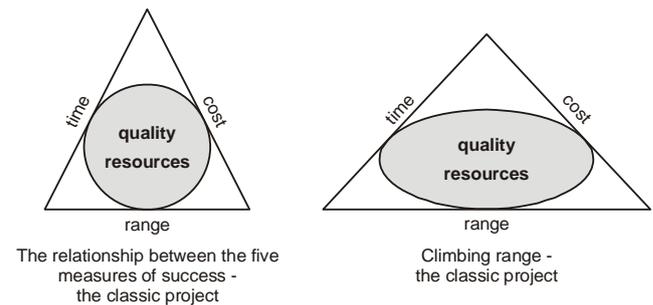


Fig. 3. Classic project management triangle [5]

Analyzing fig. 3 resource overload can be observed leading to the loss or decline in quality and customer dissatisfaction. If, in similar conditions, time and cost of the project remain unchanged and the range begins to expand (due to continuous addition of unscheduled work done in the project), its impact on other factors is very negative.

In the case of innovative projects, because of their different nature, the range was placed inside a circle inscribed in triangle (fig.4). If, in similar conditions, time and cost of the project remain unchanged and resources begin to expand, the range is narrowed. Among the measures of success of innovative projects costs are not included because of the large and steadily growing during the project funding in innovation.

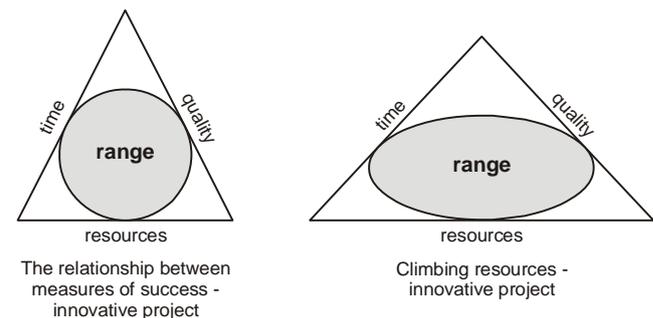


Fig. 4. Triangle of innovation project management

### 3. Levels of project innovation

Innovation determines the degree of knowledge of the product by the buyer and user, shows its advantages and usage patterns. Innovation hides a certain level of market uncertainty and external uncertainty, entered in the project objective. Therefore this information is an indication to what extent the results and the purpose of the project can be defined. Creating new products, three categories describing the company's project portfolio and creating a project plan are used: derivative projects, platforms and breakthrough points [10].

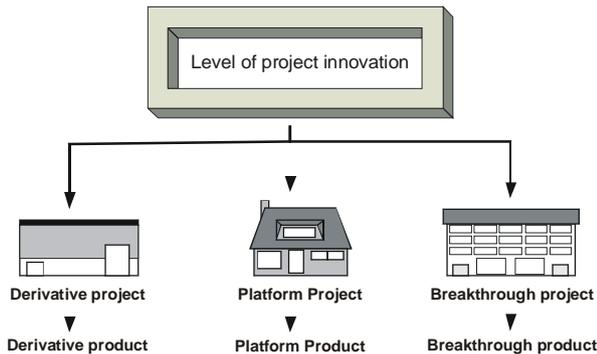


Fig. 5. Division of innovative projects

Each of the three levels of innovation projects (Fig. 5) affects, in varying degrees, the process of defining the requirements of the product and the activities related to the market. In particular, product innovation allows to obtain answers to questions: what to do, what to build and how to advertise your product to buyers. These tasks include the main aspects of project management [9]:

- how we can rely on data related to market research?,
- how well we can define the product requirements and objectives of the project?,
- what time is needed to freeze the requirements for the product?,
- what marketing techniques and market analysis should be applied?.

Each project with different levels of innovation is characterized by a unique elements that strongly differentiate it from other projects. Project managers need to understand these differences and adapt their activities to the level of innovation project.

**Derivative projects** are modified, expanded and improved existing products. These changes may result in lowering product costs, product improvement, product modification, or additions to existing lines. For this kind of products prediction of costs and other requirements may be relatively accurate. A marketing strategy can be based on the advantages of the product compared to previous models, and should be addressed to both existing customers and potential new customers indicating the new features and product differentiation.

**Platform projects** require more time than derivative projects because of the need to define the requirements for product. This

work should be done on the basis of thorough market research and data from the previous product generation. Products known as platform products are new generations of existing products for new or existing markets and customers

**Projects that build new platform products** often create new product families, which are the basis for derivative products. Such products are replacing previous ones in well-established market sector. Companies should study the market intensively, analyze the data for previous product generations and carefully plan the price of the product. The final determination of the requirements for the product is made when the project is well advanced.

For breakthrough projects, market research is usually ineffective and the product definition must be based on projections, intuition and market trials and errors. Therefore, the requirements must remain flexible until the product is placed on the market and customers feedback reviews are received. The breakthrough products represent radical innovation in the market (which means a departure from well-known markets and well-known technology or solutions). Projects forming such products convert new concepts or ideas into products, which are not known to customers. An example of a breakthrough project could be the first package of enterprise resource planning (ERP), the first microwave oven, exploration of space.

Marketing research is inefficient and the product definition must be based on predictions, intuition, trials and errors [3]. That's why the requirements must remain flexible until the product is placed on the market and customers feedback reviews are received. Therefore, it is important to create prototypes quickly before determining the final requirements. Breakthrough project management organizations are forced to work closely with customers who are testing the first prototypes and help them in determining the final requirements for the product. New product advertising often involves the sale below cost of production, and even their distribution in order to understand the widest group of customers. Often a new product becomes the new standard in the industry – such as the IBM PC. Ability to positioning the technology as the industry standard is a critical element of long-term competitiveness and success [9].

### 4. Project innovation and traditional project management

Traditional project planning begins with the definition of its range (fig.2), which defines the work that should be done. This range is divided into components called work packages that are embedded in a hierarchical way in so-called Work Breakdown Structure – WBS. Next the Organizational Breakdown Structure – OBS and a network diagram are built and then the required resources are allocated, budget is prepared and many other parts of the plan are determined. Thus, each project contains at least a declaration of the WBS and OBS range, schedule and budget. Some projects may also have a risk management plan and a plan to solve possible problems. The main aim of a conventional project plan is to complete the project on time, within budget and in accordance with the requirements.

Table 1.  
Product innovation and knowledge areas PMBoK [9]

Knowledge areas PMBoK	Levels of projects innovation		
	derivative	platform	breakthrough
<b>Integration</b>	Simple integration based on past experiences; focus on values added to the previous products, rapid action and sales	Intensive customer participation and functions interaction; focus on new elements and possibilities in the new generation; intensive testing during the iteration	Integration focused on basic functions to demonstrate the correctness of the concept; The use of feedback reviews from the customer due to the rapid prototyping integration of organizational functions in order to create market awareness
<b>Range</b>	Focus on the work needed to implement the value-added to the product	Redefine the action in a descending; strict control of range to enable the smooth introduction of the product	Flexible range management to allow development based on market reaction and testing
<b>Time</b>	Dealing with rapid time control, to ensure quick entry	Planning for the appropriate time to maximize product opportunities and elimination of error; time to enter the market is important because of the competitiveness	Permission to execute as many versions of the product that the end product was well-defined; flexibility in considering new ideas; contingency plans in case of any difficulties
<b>Costs</b>	Designing with strict control of costs and time, improving cost-effectiveness	Detailed planning and careful control; budget allocation for the detailed testing; attention to possible cross caused unnecessary additives	Flexible cost control until the final definition of the product; allocation of resources for prototypes and testing market
<b>Quality</b>	Focus on continuous incremental improvement of product quality	Intensive planning and quality assurance; removing errors throughout the duration of the project	The quality is less critical because the product is new; in the later stages of the project a little bit of planning quality
<b>Human resources</b>	People aware of the effectiveness; without further action; strict management style	A well-organized team members performing different functions; people who comprehend the whole project, partially limited management style	Creative person wanted with the ability to innovate in various areas; freedom of expression and testing new ideas, a very flexible style of management
<b>Communication</b>	Quick and fast communication channel, the minimum degree of formality	Intense and varied channels of communication in various areas of functioning; formal communication, documentation supplemented by informal contacts	Intensive and frequent informal communication, where possible co-location, formal documentation of the final decision
<b>Risk</b>	Minimal risk, risk management focuses on the changes in production	Rich risk management plan, early identification of potential areas of risk; development of contingency plans and redundancy to protect the project from failure	High risk due to large uncertainties, different approach to the design together with contingency plans;
<b>Orders</b>	If possible, using ready-made elements; using multiple sources to reduce costs and avoid delays	Delivery must be taken into account in the definition and design of basic components and subsystems; the use of multiple sources for other components	The use of all available sources, including trial versions to guarantee the essential features of the product in the first prototypes, providing sources of supply to the final version

Each of the three types of levels of project innovation, in varying degrees, affects the classical process of project management based on nine different areas of knowledge PMBoK. The higher the innovativeness of the product, the more confusion at the beginning of the project and therefore estimates are less accurate and the risk is higher. In this case, greater flexibility and creativity are needed to complete the project successfully. Table 1 shows how different levels of product innovation affect the areas of knowledge: integration, range, time, cost, quality, human resources, communications, risk and orders.

## 5. SCRUM method

The use of appropriate methods and tools of project management influences the risk reduction of project failures. The two methods are very popular: PRINCE2, focused on process and expenditure control and PMI method presented in PMBoK, containing nine defined areas of project management, which is mainly based on defining the range and construction of the schedule and budget.

Both methods are based on a similar philosophy: an extensive planning phase is the most important while the realization is "putting the plan into force" with an appropriate level of control and change management. This means, that both methods are suitable for predictable projects, but not always appropriate for projects with a high degree of innovation.

One of the methods provided to management of complex projects with a high degree of innovation is SCRUM method (fig. 6). Its principal goal is to create value at every stage of preparation and implementation of the project, taking into account changes in the environment and human resources. This method relies on innovation and interaction, consists in adapting to change and works in cooperation with the customer. This method is customer-oriented method. It is also focused on effective communication between people involved in the project, oriented [6], [8].

SCRUM method is based on a 30-day cycles (sprints), which provide a complete business ideas. It forces to test and integrate the experiments and encourages to release them for the production to have the full, teaching cycle every 30 days. Its essence lies in the iteration. The team looks at the requirements, consider possible technology and develop their skills. Then a shared decision on how to prepare the functionality is taken and an approach if you encounter problems and difficulties is modified. The team decides what is to be done and choose the best way to achieve this objective. The creative process is the essence of SCRUM method productivity.

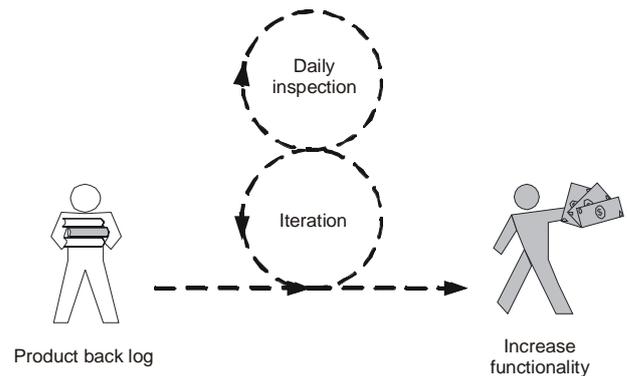


Fig. 6. The structure of SCRUM method

## 6. Summary

The innovative projects management is a complex, organizational endeavor, requiring interdisciplinary knowledge and teamwork skills. Success of the project, from the development phase until the implementation, depends largely on the efficiency of this team. It is difficult to identify a clear procedure to be useful for all types of projects. Therefore, taking an innovative project, it is worth to look for other method already proven in other projects that could be useful to carry out the own project. In general, known methods require some modification. The analysis and observations presented in this paper may help to modify these known methods. It should be noted that finding a fully effective innovative project management methods is still an open problem because of the diversity and wide area of potential issues.

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