

TRAINING OF FARMERS V4 IN  
TECHNIQUES FOR ENVIRONMENTAL  
PROTECTION AND SOIL WATER  
MANAGEMENT

PROJECT ID 22020162

# USE OF PROJECT MANAGEMENT TOOLS IN IMPROVING WATER MANAGEMENT IN THE SOIL

E-learning material for the project entitled „Training of farmers V4 in techniques for environmental protection and soil water management”



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2021



## **Introduction**

The issues of project management, process management and modeling have been in the center of attention of the scientific community, especially in the last twenty years, and the beginnings can be traced back to the 1990s, and in the case of project management since the 1950s. What unites these disciplines? What is their characteristic? What is their use in fields such as agriculture? The answers to these questions are the subject of this lecture.

So first I will mention project management in agriculture. Project management is, as already mentioned, a relatively young field, which begins to apply only after the Second World War. At the same time, however, a number of events of a project nature took place in the deep past. And even in those past times, various methods, procedures and techniques began to be developed to manage extraordinary, large-scale and organizationally demanding events. However, compared to the present, we can identify several fundamental differences here. In particular, communication channels were significantly slower and especially large ambitious projects were not limited by financial, material and human resources. When these resources ran out, the army simply activated and the victorious military campaign secured new manpower, finances, and other resources. Also, the time was not particularly limited. The cathedrals of European cities were built for decades, even centuries, by the pyramids of Pharaoh throughout the life of the future user. Today, projects are severely limited both in terms of resources and time. Today's times are fast, dynamic, interconnected. It was too late for many things yesterday.

Organizations, companies, institutions and businesses must adapt very flexibly to ever-changing conditions if they want to survive in the market. That was one of the things that the Western world was taught by the economic crisis of the 1930s. In today's information-based society, in addition to the global coronavirus pandemic COVID 19, this need is much stronger as standard management practices and forms fail. For this reason, the field of project management also began to gradually develop as a tool for implementing the much-needed changes that companies and organizations gradually began to implement. At the same time, it is not only about organizational changes, exchanges of technologies, etc., but also about the development of new products and the achievement of set business goals. This process also concerns the field of agriculture and one of its main problems - water management in the soil.

At present, we are dealing with a whole range of various measures, decrees, norms, standards, etc., behind which there is an effort to standardize various activities of human action. It is no different in the field of project management. However, project management standards are not usually made up of academics and officials not spotted by any practice, but are made up of a team of the best managers and academics with experience, ie personalities who have personal experience in project management.

In connection with the application of the principles of project management in the field of agriculture, we can state that it is primarily the area of development of new technologies and the use of specialized machines in particular. Here, however, we must not forget to distinguish between what is and what is not a project. If the development of agricultural technology is characterized by attributes such as beginning and end, defined output, allocated financial, material and human

resources, increased risk, then we can talk about the project and manage it using techniques and tools of project management.

In order to be able to describe project management in the field of agriculture as successful, then it will be when the project has fulfilled the so-called three imperatives (ie its goal in the allotted time and with the use of allocated resources). However, the reality is a bit more complicated. It may happen that the project fulfills the given three imperatives, but the produced output is unusable. Is it still a successful project? The fact that the original goals of the project have not been achieved does not automatically mean that the project ends in total failure. Therefore, when evaluating a successful project, we rather follow the criteria of success. These criteria can be divided into three basic files:

- criteria of project owners,
- traditional end-operator criteria (time and cost),
- financial criteria.

In general, we can say that a project can be considered successful if:

- the project is functional,
- the customer's requirements are met,
- the expectations of all stakeholders are met,
- the output product of the project is on the market on time,
- is the output product in the planned quality and price,
- the expected return on investment is achieved,
- the impact on the environment and the environment is generally within the limits of the standards.

We also say that project management has a procedural character. The process character of project management results from the system approach. The system (system with system properties) is controlled by a process (phenomena) and thus this style of control is fundamentally different from the concept of functional control. The essence of functional management is the division of labor on the principle of linear (possibly hybrid, ie linear - staff) arrangement of the organizational structure. However, most processes in the project do not respect formal hierarchical flows. Processes take place across the organizational structure.

Each process can be described using inputs, outputs and transformation mechanisms. The process is, in fact, a sequence of actions or operations that transform inputs into outputs through transformation mechanisms. No process (process element) exists in isolation, it must be understood as part of the system. Using links between processes, a project development model can be built. Processes must be systematically identified, not only managed, but also their interaction.

## Lecture

So much for an introduction to the issue. We will now continue with a more detailed introduction to project management. The aim of this part is to get acquainted with the basic concepts of Project Management, especially the definition of the Project and the terms related. We will get acquainted with the definition of the project, its attributes and implementation options. We will also get acquainted with the so-called Three Imperative and the terms Program and Portfolio.

A project can be defined as an activity that is limited in cost and time, and whose goal is to achieve a set of defined benefits (the extent to which the project objectives are met) according to appropriate standards and quality requirements.

If we talk about the orientation of companies to the project, then we describe the fact that organizations focus on project management and the development of project management competencies.

Projects differ significantly from the day-to-day operations and operation of a permanent organization. Organizations usually use project management to effectively focus their attention, to expand or change their competitiveness in the market, while common process functions and operations are managed mainly to achieve performance.

Projects are also characterized by other attributes such as originality, complexity, legal limitations, interdisciplinary teamwork, work sharing as an activity and as a result.

Projects can be divided according to the type into investment, research and development, organizational, ICT projects (information and communication technologies), or according to other criteria, eg internal or external projects, or local or national or international, etc.

There are four typical features of projects that, when found together, distinguish project management from other managerial activities. The projects have:

- three-dimensional target,
- are unique,
- include resources and
- are implemented in an increased risk environment.

Three-dimensional goal of the project - three imperatives

Projects have a three-dimensional goal, which means meeting the material implementation requirements at the same time, the timetable (they have a beginning and an end) and the budget costs. We call this the "three imperatives". Successful project management requires that these three conditions be measurable (ie concrete and verifiable) and achievable. It is really extremely important that the people working on the project know how to meet the goals of the three imperatives.

Each project is unique because it is carried out only once, it is temporary and (in almost every case) another group of people is working on it.

Although the second "Accounting" project for a farm is very similar to the first such project, there will be some differences, perhaps something as simple as other outputs. The same applies to two identical family houses (terrain and use are different) or the organization of two conferences (place or program are different), etc. Precisely because they are different, there is always a certain lack of understanding of what the project entails, and what it will take to be successful. Because the duration of projects is temporary, there is always a lot of uncertainty about what will be approved (eg when the project will start and the exact scope of the work to be done). Moreover, the project does not last materially. It starts when the first person starts working, and ends when the last person's work is done. Somewhere in between, several or many people are involved. Hiring people to work on a project is similar to finding employees for a company that expects to close down in the near future. Finally, the people working on one project are rarely the same ones who worked on the previous project. This creates friendships or antipathies that can have serious consequences. Strong friendships can lead people not to want to end a project, as this would mean that they will no longer work together. Antipathies, on the other hand, can greatly prevent people from collaborating during a project.

Projects are implemented using human and material resources. The project manager has minimal control over many of the required resources. For example, IT people control the autonomous tractor.

Managing projects means managing people. The project manager must organize human resources well in order to use the available material resources. They then have to deal with various difficulties and emotional problems that naturally result from the use of these resources and at the same time try to meet the requirements of the project sponsor while respecting the time schedule and budget. People management is often the most difficult aspect of project management, especially for inexperienced managers who have a university degree, especially in fields such as engineering, computer technology or even construction management and agriculture. These people are more comfortable working with things and numbers than with people. Therefore, we must avoid the technical expert's natural tendency to focus on quantitative aspects (such as technical analysis or task budgets), even if these are not unimportant, and instead focus more on getting things moving forward by acting on people. Many technical experts are bad project managers because they cannot deal with intangible personnel problems, such as the need to constantly recruit other managers for the project. Some project managers are aware of this need, but are unable to communicate effectively. Conflicts over resources therefore lie in them and, of course, in the risk environment.

Risk usually refers to the value of the probable loss in currency units, described by a continuous or discrete quantity, which can take on a very wide range of different values. In practice, qualitatively quite different, albeit related, phenomena, such as hazards or sources of danger, are often referred to as risks.

Part of project management (and its activities) is risk management. Its purpose is to identify in advance the sources of possible losses and subsequently, through active work with risk, to reduce

the probability of their occurrence and their severity to an acceptable value.

In the event that, despite all the measures taken, damage occurs, a set of corrective measures must be prepared in advance.

The project program consists of a set of interrelated activities, which together achieve a number of goals within one overall strategy. It usually consists of a project of corporate or institutional strategies. To achieve them, the organization establishes a group of interconnected projects to deliver the products and benefits needed to achieve the goals, and defines the organizational changes needed to better achieve this strategic change. The program defines the process of business benefit management and monitoring of business benefits. Typically, the program manager manages the project with the help of project managers, interacts with line managers to make the change, and is responsible for managing the benefits. However, he is not responsible for the realization of benefits, because again it is the responsibility of line management.

Examples of this type of program include breeding a new variety of wine, a national campaign against drug addiction, a new corporate catering system or the standardization of information in a comprehensive area of knowledge. After the agreed time, the program is completely handed over with a result that is in line with the strategy, and the program is terminated. Program management provides a framework for implementing strategies and business.

A portfolio can be defined as a set of projects and programs that do not necessarily have to be merged and that have been merged to manage, coordinate and optimize the portfolio as a whole. The portfolio is usually managed by the portfolio manager, who informs the management of the organization about all important issues at the portfolio level and at the same time states the possibilities of solving these issues. Management can thus decide on a remedy based on specific information. There can be several portfolios in an organization at the same time. For example, there may be a portfolio at the enterprise level, which will consist of several organizational units under the supervision of top management. Similarly, each organizational unit may have its own portfolios, which will be managed by the unit's management.

The portfolio manager is a permanent function within the line management organization. While specific portfolio projects and programs exist for a limited time, the portfolio itself remains. The position of portfolio manager requires extensive competencies in project management.

Portfolio management is dedicated to the coordination of projects and programs of the organization in order to optimize performance, consider portfolio risk management, manage project alignment with the organization's strategy and their transfer within budgetary constraints. At this level, there is already a significant increase in the level, number, complexity, impact of projects and management control needs to be put in place. The portfolio manager has the processes, mechanisms and systems at his disposal to show the management the ways in which the portfolio will achieve the strategic goals of the organization. In professionally developed organizations, the portfolio manager also assesses the effects of changes in vision and strategy on the portfolio. The portfolio contains many projects that are jointly accepted and coordinated, jointly prioritized and jointly managed. Examples of portfolios include: all requirements for large projects within a university, company or institution and all internal ICT projects of a certain company, all projects of a non-

profit organization or all construction projects within one city. The R&D project portfolio can be managed using the same processes.

In many organizations, individual projects take place, which are to a greater or lesser extent managed according to a certain methodology. However, this is not enough to successfully achieve the goals of the organization. There are many issues that go beyond one project. These are in particular:

- management of material dependencies between projects
- data common to several projects
- resources (workers) who are working on several projects at the same time and whose capacities are therefore
- must be shared between them
- mechanism for allocating resources to projects
- creation, maintenance and development of company-wide standards, including sample products
- (project outputs)
- deciding on the launch of specific projects
- development environment and other infrastructure common to several projects

These activities need to be provided with resources that do not belong to a single project, but rather perform a common management and support function for all projects. A so-called project office is being created, which oversees the course of all projects, coordinates them, supports them and ensures the necessary standards.

A project office often does not yet exist in the relevant organization. Its establishment, construction and commissioning is a relatively long and demanding procedure, which means an intervention in the functioning of the organization. The creation of a project office must therefore be addressed as a specific project.

First, it is necessary to define what the mission of the project office will be in the organization - ie to define the meaning of the project office, its focus and scope. These decisions must be approved by the organization's senior management. Then it is possible to occupy the project office with a certain minimum number of employees who will work on the preparation of its introduction into company-wide practice. Necessary plans must be made to ensure this preparation for the operation of the project office.

The mission of the project office is based on a vision that describes the future functioning of projects in the organization and how they are managed. The vision is not yet an accurate list of required activities or goals. From the agreed vision, it is then possible to derive specific goals and also an organizational structure that will support their achievement. The organizational structure describes the position of the project office within the entire organization and sets the rules of communication. The project office must have sufficient authority and should be considered as a separate organizational unit at the same level, such as finance, marketing and production. The project office should therefore be headed by a person directly subordinate to the head of the organization. However, the project office provides some of its activities through experts who are

not its members. The project office usually communicates with the steering committee, which is chaired by the head of the organization and in which its managers are represented.

The creation of the project office infrastructure includes the development of procedures and best practices that will contribute to the effective implementation, start-up and subsequent operation of the project office. Operational procedures include the specific processes needed to select, monitor and manage projects in the project office's work system. Examples of project office procedures are:

procedures for the purchase, development and implementation of software provided by the project office

- procedures for the acquisition of HW provided by the project office
- safety procedures
- procedures for financing the project office
- communication procedures
- procedures for the allocation of human resources for the needs of the project office
- procedures for measuring and monitoring the efficiency of the project office operation
- reporting and consultation procedures
- procedures for managing historical project data
- criteria for deciding on the launch of projects
- procedures for allocating the necessary project resources

The organization should not be satisfied only with the isolated management of individual projects, but should create the conditions for the projects to contribute to its overall effectiveness in the maximum way. This is the basis for the requirements for project selection and prioritization. Project managers should not invent already invented ones, but use the developed standards and type procedures and contribute to their improvement. This results in another area of the project office's mission, which is the creation and development of company-wide standard project procedures and standards. The project office has a dual role: as an executive tool of the steering committee for monitoring and coordinating projects in the organization, and as a place where project leaders can get support to solve their problems. The introduction of the project office thus represents a fundamental change in the position of projects in the organization, which cease to be a local matter of individual departments and become the subject of company-wide interest. This, of course, has implications for the ways in which resources are allocated, budgeting and project launching, and leads to some weakening of the autonomy of the various departments of the organization, which can provoke resistance. The procedure of setting up a project office presented above takes this into account and is based on the fact that it is a matter of introducing more organizational than technological change in the company.

In the following explanation, we will get acquainted with the so-called technical competencies of the project manager. These are a kind of knowledge standards that a project manager should master so that the project he manages is successfully and successfully completed.

When explaining this issue, after getting acquainted with the introduction to project management, you will get acquainted with some techniques and methods of project management. Project

management talks about the technical competencies of the project manager, which the project manager must acquire and, depending on the complexity of the managed projects, further deepen during his career. In this lecture you will get acquainted with the basic information related to these competencies.

As stated in the previous explanation, project management is characterized by, among other things, a clearly defined beginning and end and the uniqueness of the managed projects. These facts practically exclude the possibility of routine management, repetition and correction of previous erroneous decisions.

It is therefore necessary to be very aware of the purpose of project management, which lies in the benefits that project management represents for a company that implements and uses it in its practice.

These are the following benefits:

- Increasing certainty in achieving goals
- Cost reduction
- Shortening deadlines
- Effort saving
- Access to loans
- Possibility to participate in foreign contracts
- Access to finance from European Union programs

Nowadays, we require many changes and big actions in a very short time, with limited costs and limited resources. At the same time, the rapid course of life in today's society does not allow us to achieve our goals through many repeated attempts. The method of trials and errors is almost unusable in a market competitive environment, because the market economy usually does not give us another opportunity for a subsequent attempt, even better.

Fierce competition forces companies to reduce costs and adhere to planned costs. The same applies to deadlines. In the V4 countries, where large domestic available investments are still not available, funds are still being "saved" with subsequent time delays. In developed western countries, however, time is a critical success factor. For example, a company that comes to the market first will gain this market with its product, and other companies that supply a product to the market over time are often difficult to promote their product at a lower price.

Project management is an aid in overcoming the problems that today bring the classic line hierarchical organizational structure, which still prevails both in our country and abroad. It is about overcoming such problems as:

- long communication chains

- time lost in complex communication
- distortion in internal company communication
- the occurrence of a ping-pong effect, where the units pass on each other when solving problems unsolved problem constantly among themselves.

Teamwork and sophisticated methods of project management enable the rapid development of even complex products or the implementation of complex actions, which can then bring them a decisive competitive advantage. Many progressive Western companies have reorganized their existing organizational structures into project structures or matrix structures, and together with the definition of corporate projects, they have switched to a management method called Management by Project.

The current turbulent times, full of rapid changes, mean that the classical regulation of company processes according to the deviations is no longer suitable. Targeted change through project management is the possible alternative that solves this problem. Project management is a tool for the implementation of a modern way of managing MBO (Management by Objectives) - management by objectives.

In many cases, large international projects, costly government events, special contracts for space research or defense can even be obtained in many cases (in Western countries) only after the company has demonstrated the ability to manage project quality.

The Western world considers project management knowledge to be the standard knowledge that managers need to have, and considers the use of project management to be a best practice that successful companies apply to ensure good competitiveness.

If our companies want to succeed in the global world market, even the European market, they must learn to use project management well.

Project management uses the following principles to ensure a successful project:

□ Principle of system approach. We consider a systemic approach to be a way of thinking, a way of solving problems or a way of acting in which phenomena are understood comprehensively in their internal and external contexts. The systems approach is used mainly in solving complicated problems that affect several different fields of human cognition and knowledge (so-called interdisciplinary problems). At the same time, the design and implementation of management systems using project management is just such a problem, in which it is necessary to solve at the same time a number of intertwining partial problems.

- The principle of a systematic approach. This approach is the opposite of chance and haste. Project management uses a variety of sophisticated methods to find the best possible solutions.
- The principle of teamwork, which uses the human potential of effectively cooperating, motivated internal and external employees who participate in the preparation and implementation of the project in the company.

- The principle of computer support, which uses the features of current computers to support all activities during the project.

The key goal of project, program or portfolio managers is to achieve success in their efforts and avoid failure. They want to be sure that they know the criteria considered to determine success or failure, and that they know how to evaluate them. From the outset of the effort, the essential goal of the effort is to define these criteria accurately and clearly. The overall definition of success is to achieve the objectives of the project, program or portfolio within the agreed limits.

### Interested parties

The term "interested parties" is an officially defined ISO term (ČSN EN ISO 14000 series). The term "stakeholders" is synonymous with the term "Interested parties". The terms "client" and "customer" are also commonly used to identify stakeholder subgroups, which are people or groups who are interested in the performance or success of a project, or who are affected or limited by the project.

The task of the project manager is to identify all stakeholders, identify their interests and determine the order of importance of both in relation to the project.

Each project is formulated, evaluated, created and implemented in a certain environment, otherwise also the environment, which affects either positively or unfavorably the process of its preparation, implementation and further use of its results after achieving the planned goals.

The environment of the project changes over time, and therefore it is necessary to ensure cooperation in proportion to the duration of the preparation and implementation of the project and the use of its results. The effectiveness of cooperation with the environment is also significantly affected by other projects, which are being prepared, implemented or intended in parallel. Therefore, it is important to define the relationship not only to the current changing environment, but also to projects in the environment simultaneously intended, prepared or implemented.

Outputs to the surroundings and inputs from the surroundings of the prepared or implemented project or to the further use of its results may have the character of:

- Material (hardware) such as material supplies, but also energy, transport performance, etc.
- Intangible (software), such as rights or obligations to someone, something, but also documentation or documents, etc.
- Communication or information, in the concept of learning about something, knowing something or even in another concept

But they can also have a difficult form of influencing (the influence of someone or something on someone or something).

Early anticipation and systematic monitoring of a wide range of positive and negative influences due to the impact of the environment is one of the criteria for the success of the project. It must always be the subject of analysis by stakeholders. Its outputs are a prerequisite for achieving the

project goals. In this way, deviations from planned or assumed states that could occur at inputs or outputs can be prevented by forward information binding.

The process of transformation between inputs and outputs is of primary importance in project management. However, the outputs of the project are crucial for assessing the success of achieving the set goals. Outputs and inputs must be provided in relation to the environment (surroundings) in a timely manner, with an appropriate degree of accuracy and complexity, by the action of a human factor. The impact of the project in all its phases (including the use of its product) on the environment and vice versa on the project, ie on timely, sufficiently accurate and comprehensive definition and provision of outputs and inputs, is fundamentally influenced by human factors. Therefore, in the assessment of influences, methods and procedures, it is necessary to carefully examine and influence the selection and operation of persons (both legal and natural) working in them.

Stakeholders have a special status, persons or groups of persons who significantly participate in the project, are directly interested in its implementation, have feedback on the project, or have or do not have a legally guaranteed interest in the success of the organization and the environment in which this organization works. These are, for example, owners (procurers), contractors (suppliers), leaders and team members, end users and financing banks. But also about representatives of public administration, the press, residents, promoters, etc.

#### Project requirements, strategies and goals

Project requirements are always based on customer needs. These are formulated by their needs. A project plan is created, from which a business case, project and project strategy will develop. It is often too common for the customer not to be able to precisely specify their needs and define their project requirements. If we build the project on foggy requirements, it will lead to permanent changes in the better case, to the suspension of the project in the worse case.

Requirements management then consists in identifying, defining and agreeing on a project in a way that meets the needs and expectations of stakeholders (especially customers and users).

The strategy is a summary of all the decisive intentions within the project. From the very beginning, it must reflect all internal and external aspects that affect the feasibility of the project:

- marketing, financial, technical-technological,
- organizational, quality, procurement and contractual relations, information
- term, cost, resource (including human resources)
- security, cultural influences, etc.

The strategy must be developed at an early stage of the project and should be as binding as possible. If the strategy is not sufficiently clear and evaluable (or not at all), the project will start in an

unexpected direction after two to three changes. The strategic characteristics of the project can only be changed last, when other changes do not lead to "project maintenance". As part of project change management, the project strategy must be continuously updated, in the extreme case then revised (if required by the nature and size of the deviations). Of course, with full awareness of the impact of such a step on the risks, costs, deadlines and quality of the project product.

The strategic process sets the intention (focus), in the spirit of which organizational management structures are created and other project processes are governed. In determining the intent of the project, the following concepts must be taken into account, which determine the successful management of the project:

- the project is implemented as a set of planned and interdependent processes;
- to meet the project objectives, it is necessary to focus on both processes and the product;
- Relationships need to be established and responsibilities and powers clearly divided between permanent (contracting) organization and project (transitional) organization as well as mutual relations with other stakeholders,
- is responsible for creating an environment for successful management and for its continuous improvement responsibility of the management of the contracting organization
- the satisfaction of the required (agreed) needs of the customer is of paramount importance and other stakeholders;

The project strategy is linked to the project objectives, selected "seductive" criteria, provided with a set of metrics that the project must meet in order to be considered successful. The objectives are to describe what is to be achieved in relation to deadlines, costs and features and product quality and what is to be measurable in this sense. They should therefore include, as a minimum, cost, time and quality indicators. Formally, the objectives of the project should be expressed in the form of attributes (eg costs), units of measurement (CZK, Euro, etc.) and absolute values. Unmeasurable goals (eg customer satisfaction) carry great risks. However, it is often necessary to approach this alternative for some important reason. However, this should only be an additional alternative.

The objectives of the project should be defined in such a way that their fulfillment clearly ensures the purpose of the project, and they should be formally (and, if necessary) and materially improved during the project as needed. They usually form a hierarchy of objectives, but should be completely transparent to all project participants.

## Risks and opportunities

Risks and opportunities within the project are defined as uncertain cases or possible situations with a negative impact on the overall success of the project, partial results of the project or events

provided by it, which may cause unpredictable damage. They occur in all projects, regardless of their scope and complexity, in the segments of industry, construction, financial investment, as well as in the segments of education, services or socio-political. Risk and opportunity management in the project is one of the decisive factors that distinguishes a systematic approach to the process as opposed to an intuitive approach. The process of managing risks and opportunities occurs in all phases of the project.

In general, the risks and opportunities associated with acyclic (non-recurring) events and their management are always greater than for cyclical (recurring) events. The risk of damage associated with the late launch of a product or the operation of an infrastructure element with excessive budgetary costs, reflected in their price, in a low quality and unintended class is more complex, complex and mediated and deferred.

Projects are a distinct specificity both in terms of management and opportunities, as well as business processes. The output of projects is a product, an individual, mostly unique work, created to order on the basis of an individual order, supported by complex individual documentation. This work itself is not usually the final product, it is intended to produce "goods", such as products, services, socio-political programs, etc. The product of projects is not sold "over the counter" or in the form of a "network of sellers", or "consignment warehouses" or "commodity exchanges".

Usually, the term risk refers to the value of the probable loss in currency units. Part of the management of either general activities or project management in particular is called Risk Management. Its purpose is to identify in advance the sources of possible losses and subsequently, through active work with risk, to reduce the probability of their occurrence and their severity to an acceptable value. In the event that, despite all the measures taken, damage occurs, a set of corrective measures must be prepared in advance.

We recognize the following types of risks:

a) **Business risks.** If business is defined as the process of entering into contractual relationships and subsequent management of the implementation of accepted commitments, then business risks are primarily related to the quality of contractual obligations and the creditworthiness of contractual partners. Their source is mostly insufficient legal awareness, lack of references about creditworthiness and the ability to meet the contractual obligations of both parties. Another significant factor here is the change in demand for a product, service or other product of the project in the relevant market. There is also a direct link to the group of risks from human failure and force majeure. Business risks have an immediate effect on financial risks.

b) **Technical - technological risks.** They cover the whole range of risks associated with innovations (especially higher levels), up to common failures in operation and subsequent deliveries, for various reasons (eg incompatibility, operational unreliability, etc.). A common feature of these risks is the possibility of failure of technical means, equipment, technologies and technological processes, recipes, selected procedures, etc. As with business risks, they result in financial risks.

c) Force majeure risks (Force major), which include, for example, the risk of natural disasters (disasters), but also other, such as emergency situations (sinking of a ship, plane or truck accident), sometimes (abroad) also referred to as the "act of God."

d) Risks of people's failure (responsibility) due to objective difficulties (eg health, family problems, etc.), negligence, lack of expertise, imperfection in expressing contractual obligations (coherence with business risks), mental differences between ethnic and social groups, but also intent to harm (crimes), etc. Above all, this includes failing to play the role of project manager.

e) Security risks such as war conflicts, social, ethnic and religious upheavals. Recently, terrorism has become increasingly important, and in many cases is directly focused on specific, major projects of a transnational nature, the collapse of which expects a significant policy impact.

f) Financial risks, which should be considered as primary (own) and secondary (transferred). From this point of view, the primary risks are credit, interest rate, exchange rate, inflation, liquidity, arising from developments in financial markets. As a consequence, all the above-mentioned risks become secondary financial risks if we want or need to convert them into financial form in order to be able to work with them on a monetary basis.

Risk and opportunity management is part of the management of all general activities, as well as project management in particular. Its purpose is to know in advance the sources of possible damages (losses) and subsequently, through active work with risk, to reduce the probability of risks and the severity of their impact on the monitored group of interests to an acceptable value, through preventive measures. If the risks actually materialize, have a set of corrective measures prepared in advance that would reduce the actual damage. These are the following processes:

- Hazard identification - ie determining which hazards could affect the project, processing of hazard scenarios - ie determining what adverse events may occur and then documenting their characteristics.
- Hazard assessment - assessment of hazards and their links in order to determine their impact (extent of consequences in the project) and the probability of their occurrence.
- Creation of anti-risk measures - creating a response to defined risks and to others support for the likelihood of adverse events.
- Risk monitoring - responding to changes in risk during the project.

These processes are interconnected with processes in other professional areas. Each process usually occurs at least once in each phase of the project. Although processes are presented here as separate elements with a well-defined interface, in practice they can often overlap and influence in many ways.

## Quality

The term quality is defined as a set of characteristics of an entity that affect its ability to satisfy defined and anticipated needs. Quality is a ubiquitous feature of any object, phenomenon, process and activity. The quality of products and services not only affects consumer satisfaction, but also has more serious consequences for the prosperity of businesses and the overall standard of living in society.

Quality is generally understood as synonymous with a high standard. From a technical point of view, however, it is expressed as the level of measurable technical parameters of the evaluated phenomena or the level of applied technology. Quality is considered to be what optimally meets the needs and sometimes the taste of the consumer. From the point of view of market value, the aspect of quality is expressed as well as the price, which is influenced by the degree of usability. In most cases, we measure quality only on the result of production or creative activity, but we decisively influence it in the phase of our own preparation. The more complex the evaluated result and the more complex the processes of its creation, the more important are for its final quality the preparatory activities and technologies of production or creation.

Quality can also be expressed on the basis of a number of sub-characteristics of a general product (whether tangible or intangible product or service) that contribute to its overall quality, the so-called quality features, which can be divided into several other groups, containing mainly features: technical -functional, reliability, safety, ecological, economic, aesthetic, ergonomic, other.

Any shortcomings of the product or service provided are always associated with an increase in costs on the one hand and a decrease in profit on the other. Insufficient quality of the product or provided service significantly worsens the economy of the company or institution. It is known from practice that both quality management and economic management have very large interfaces and similar stages. For this reason, quality management applies in practice the same management procedures as are used for economic management.

At present, the advantage on the quality side represents a possible advantage that the manufacturer can present to the customer, but only with a comprehensive view of the quality of the process as a whole. However, quality issues must become an essential part of all management activities.

Customer requirements are specified in their orders, specifications or assignments. This in itself does not ensure optimal fulfillment of customer requirements if shortcomings occur in the entire organizational process of manufacturing a product or service. Finding a way to eliminate these shortcomings has led to the development of standards for the creation and provision of a quality management system and guidelines that complement the relevant requirements for the product or service. The international standards of the ISO 9000 quality management system thus form the core of the standards for systems applicable to many areas of fields and activities.

At this point, we are interested in a project as a human activity, which is a very complex process with extremely serious consequences in the implementation of your product and its use. By gradually creating the coordinated cooperation of many actors active in parallel and subsequently, the management of this process becomes one of the decisive components of future quality.

Quality management is generally defined as a set of systematic activities necessary to obtain sufficient assurance that necessary and desirable products or services will perform a function with specified or generally recognized quality parameters.

In processes of material production, where the theory and practice of quality management is relatively well developed, where quality management activities are largely based on detection and control of physical quantities, from composition and properties of input components, through ensuring optimal technology, to control parameters characterizing qualitative properties of intermediates and the final product. Most of the monitored characteristics will therefore be quantifiable, the data will be measurable.

Otherwise, for processes where the result is a theoretical solution, it will basically be a documented idea, such as software. These are processes based on creative, inventive activity, although these activities also include technical, mechanical or technical-administrative operations, sometimes of a large scale. It is obvious that the creative component is decisive for the quality, the routine component will rather condition the quality. The above definition of quality management can therefore be modified for intellectual creative project processes as follows:

"Intangible project quality management is a set of systematic activities to obtain sufficient assurance that processes produce a project information model in a cost-effective manner, documenting the concept of equipment that effectively and safely meets the needs of the future user."

It follows from this definition that the quality management of project activity will be primarily about methods and tools influencing the behavior of subjects as bearers of intellectual potential and the creation of conditions for their ability to produce ideas in the process of project activity. It is obvious that traditional technical control will not be the basis, but only one of the partial means of quality management systems.

### Organizing project management

Organizing is one of the basic tasks of management, and therefore project management. It is logical that the specifics of project management are evoked by the specifics of organization. Both in the narrower concept of project management and in the broader concept of project management. The organization of corporate departments means the optimal organization of people, things and intangible components of socio-economic activities into socio-technical structures. The tangible, intangible and personal components of a company or institution are organized in such a way that, through their activities, performances or activities, they get into optimal mutual interaction, in the interest of fulfilling all functions and for the benefit of their main mission.

The organization of the project is temporarily the most suitable solution of the organizational structure for the project. It must take into account, in particular, the legal, economic and cultural context of the project and may vary according to needs during the life cycle of the project. Adequate organizational structure is a very important criterion for the success of the project.

It is an organizational structure with a distinctly problem orientation. The basic organizational elements of the project are problem-oriented working groups with an assigned area of tasks, with

precisely defined competence, ie responsibility and authority. The organizational structure in the project is non-authoritative. The task of the project manager is not to unite the team with commands, but to create creative well-being, a democratic working atmosphere and effective motivational tools.

In general, organization restricts freedom of behavior (people and the actions of people and things). The degree of organization must therefore be proportionate to the necessary degree of freedom of behavior of people, which is related to the condition of the optimal relationship of people, things and intangible components of the company or institution. In general, it can be stated that cyclical events correspond to a significantly greater degree of organization than acyclic events.

Each project is a completely unique activity, during which, for time and material reasons, several entities will cooperate on parallel tasks. Their cooperation and communication must be developed inside and outside the project team according to pre-established and proven procedures. Is part of them:

- identification and classification of activities, performances, activities and their bearers (people, things) needed to achieve the objectives,
- organization of activities, performances and activities and their bearers for the target action (determination of responsibilities and delegation of powers),
- assignment of managers (leaders, directors) with powers (authority) for supervision and regulation,
- ensuring horizontal and vertical coordination in the organizational structure, including coordination with the environment,
- setting the principles of communication within the project team,
- specification of the project team leadership style.

The organizational structure of the project is represented by a complex system of coordination / integration of individual organizational elements, tasks and tasks in the entire scope of the project, especially in the parent company (institution) and its surroundings. Defacto answers the questions "who?" and "what?" (who and what tasks will be solved). It is not possible to identify it on a flat-rate basis with object structuring (OBS). The organizational structure of the project is hierarchically superior to the OBS.

The object structure of the project (OBS), as part of a broader organizational structure, is determined in connection with the structuring of the project into activities (Working Brekdawn Structure) so that, if possible, its elements in the third or fourth level are subject to the responsibility of one person (legal or natural). ). Then it is possible to create an accountability / Responsibility Matrix (ARM). The item structure of the work is connected to the organizational structure. This ensures that each material element of the project is assigned to one responsible person. The OBS (Object Brekdawn Structure) itself is a graphical expression of responsibility in the project.

The design of the organizational structure in the project depends on the following factors:

- On the working structure of the project, its phases and the scope of the solved problems. From the specific WBS (Work Break Structure) is developed by individual working groups responsible for managing them.
- The way in which the organizational structures of the project participants are involved, ie the owner, contractors, future users, etc. Existing structures can take over some functions of the project structure (economic, procurement, etc.).
- The degree of institutionalization of the project management entity. It is important if it is a specialized company with an established project structure, or a small consulting company without its own background. It depends on who is formal within the company or institution project initiator. CEO, director of a professional department at the holding level, the director of a division or subsidiary, or a professional director at the division level.
- On legal, economic and other restrictions and forms. Also a system of custom standards create important conditions for the selection of the organizational structure of the project.
- The potential of the collaborators available to the project manager or which can get.
- The degree of willingness of the partners to cooperate (including the customer).
- On information databases of partners (including the customer) and willingness to connect their own information sources on information databases of the solved project.

#### Functional models of project structures

Unlike "line structures", functional structures (used in projects) are characterized by a lower vertical concentration of decision-making. Only decisions of strategic importance are entrusted to top management. Tactical decision-making competencies are delegated to middle management. The scope of entrusted competencies varies according to the type of functional structures. The tasks that the middle level of management focuses on can be very narrowly specialized, as in the case of a classical functional structure, or vice versa, they can be highly complex, as in the case of an autonomous structure. The structures most frequently used in projects are usually classified into a group of functional structures.

The autonomous (project) organizational structure is created solely for the purpose of project management. The basic responsibilities and powers are concentrated in a single person, ie the project manager. Its activities must be supported by integrated planning and operational management. Competence disputes over project management make it impossible to manage it effectively. Any separate or only logic-based planning of a sub-activity precludes competent activity management.

The project organization is flat, in comparison with the line-staff organization less hierarchical, with a lower organizational level. Mostly two-stage, only for large projects, disaggregated into subprojects, three-stage. It is open, it is not a complex of precisely defined tasks and corresponding groups.

Problems and advantages of the project structure:

- the line manager feels disabled with the removal of the subordinate,
- the line manager seeks to influence the attitudes of his subordinates, delegated to project team,
- staff resist delegation (for fear that during the project their position in permanent structure for organizational reasons),
- the structure is conditioned by the sufficient scope of the project to make it worthwhile for the company to relax full-time experts, if possible,

the permanent linear organization must have such a large number of experts that their long-term release without compensation will not jeopardize its effective functioning,

- own employees are much better oriented in the issues of the company and motivated

The matrix organizational structure is a mixed organizational structure in which, in addition to the usual line (vertical) hierarchy, there is a certain form of horizontal authority (which cannot be identified with a common methodological relationship) with varying degrees of influence. The vertical hierarchy blends with the horizontal hierarchy. It is a compromise that preserves the advantages of the line-staff organization as well as the advantages and flexibility of the project organization. The introduction of a matrix organizational structure requires a very sensitive assessment of all the pros and cons. It is recommended to carefully consider the social climate. The condition for its functioning is a priori cooperation of line managers and their support of project managers and employees in double subordination.

The advantages and disadvantages of the matrix structure are:

- effective use of creative potential,
- flexibility, creativity, technical excellence,
- ability to reconcile conflicting goals,
- relief of top management,
- opportunities for personal development of individuals,
- conflicts between linear and horizontal structure,
- low sensitivity to interdependence,
- increased administration and communication costs,
- less power of project managers (compared to line managers).

In the case of the form of organic structures, it is no longer a functional structure and it is problematic to consider it as a structure at all. These are actually independent, unconnected elements, without a hierarchy, connected only by a common interest. This type of organizational

structure has the character of a discussion group. The bearer of specializations is the lowest level in the structure, ie executive employees in comparison with functional structures, where the bearers of this competence are middle managers.

Organic structures are used in project management, especially in the start-up stages, in the conceptual phases and in research and development projects also in the research phases. Their advantages are the absence of hierarchical relationships, full application of the expertise of each member, immediate rapid communication, an atmosphere based on complete voluntariness.

The disadvantage is the limited applicability and the fact that only "ready-made specialists" will find employment. Experts in the initial phase of their development do not find employment (there is no one to lead them).

### Scope and outputs (deliveries) of the project

Completion of work on the project in principle means achieving its goals. It systematically combines two processes:

- ensuring tangible and intangible project outputs and their acceptance by the client,
- documenting and passing on all knowledge from the course of the project life cycle.

The scope of the project defines the boundaries of the project. If the boundaries of the project, program or portfolio are not properly identified, and if additions or unfinished work are not properly documented, the situation around the project tends to spiral out of control. From the point of view of stakeholders, the scope of the project includes all outputs and deliveries of the project. Defining the scope of the project is helped by the project structuring technique - WBS (Work Break Structure). The project solution gradually develops within the scope of the project from the initial concept of the project to the final deliveries, and this development is captured in documents that define the project outputs in greater and greater detail as the knowledge gradually deepens during the project. The scope and outputs of the project represent, from the point of view of the stakeholders, the overall content (functional, technical and user interface characteristics) included in the project. The project must deliver in its deliveries and outputs everything that is described in its scope. For some types of projects, it is necessary to include geographical or user environment where new systems created by the project or changes in existing systems will be implemented. When defining the scope of a project, it is also important to specify what does not fall within the scope of the project.

The handover of the material outputs of the project usually takes place according to a certain procedure, agreed by the customer and the supplier in the work contract or proposed by the project manager. The goal is:

- submission of product documentation, test reports, inspection reports,
- final assessment of the financial situation (final calculation),

- final report and project documentation,
- list of open questions and finishing works,
- list of claims, requirements, items.

#### Documenting knowledge from the project

There should always be a process for gathering, classifying and evaluating knowledge for the purpose of continuously improving existing projects and for creating a database from which to draw when preparing new projects of a similar type. The process includes:

- creation, verification and confirmation of all relevant data on material outputs project, such as data sheets, final configuration, etc.,
- important events, such as faults, regulatory measures, etc.,
- establishment of a database of knowledge (experience) for the management of type-related projects (lessons),
- determining the satisfaction of the customer and members of the project team,
- evaluation of the project solution and the degree of achievement of parameters from the setting of objectives,
- gathering recommendations and suggestions for improvement.

In all its phases, the project is subject to the disturbing influences of the environment, as well as its own internal disturbances. As a result, each project tends to deviate from the project plan and subsequently the goals set for it. Hence the concept of deviation. The reasons why projects tend to deviate from the set objectives are basically of two kinds:

#### a) external:

- incomplete and additional customer specifications,
- change in the economic environment,
- change of professional administrative regulations (permitting procedures).

#### b) internal:

- knowledge of all decisive factors only at a certain stage of project development (ie inaccurately determined resource requirements, inaccurately budgeted costs, inaccurately calculated time courses of activities,
- poor project decomposition,
- knowledge based on systematic control and investigation of one-off errors,
- insufficient professional qualifications of managers and team members,
- dysfunctional teamwork without sufficient motivation of individuals.

An active response to the detected deviations are interventions in the project in the form of changes in processes and products, the so-called configuration. Changes can be requested by any stakeholder in the project. They lead to reassessment of deadlines, regrouping, possibly securing additional resources, modeling expected cash flow, the emergence of new risks and reassessment of the agreed quality. Both required and approved changes must be considered as a potential (external or internal) addition to the valid contracts. Eventually, the changes may affect the area of the project's strategy and goals, and in the extreme case they lead to the termination of the project.

In practice, it is necessary to analyze the impact of the proposed changes in relation to the working (item) structure, ie to the individual autonomous tasks defined by the structural decomposition of the WBS. Subsequently, it is necessary to identify those tasks that are not directly related to the changes, but are associated with them in their consequences. The analysis of the consequences must also be performed in relation to them. This is the only way to prevent unpleasant collisions.

The basic assumptions of change management include:

- the change must take place in a controlled manner,
- amendment processes must take place as soon as possible,
- the organization of the project must be adapted so that the possibility of bureaucratizing changes is minimal and changes do not ultimately become a tool of delay, instead of order and transparency.

## **Conclusion**

The implementation of the project takes place either in the sense of its conscious use, systematization and improvement of existing practices, or it is a new implementation associated with a reorganization towards a project-oriented organization. In a particular company or institution, it is appropriate to understand this intention as a project of an organizational nature, which will be implemented in standard steps. It should include, among other things, the implementation of a selected pilot project, on which the introduction of project management should be fine-tuned.

When deciding on the introduction of project management, it is always a broader, systemic process. In a company or institution, it belongs to the competence of top management and should always be supported by a sufficiently deep analysis of the issue. The most suitable form is a study of the implementation of project management, in which the documents for the final decision are prepared for the top body.

A permanent organization finds its justification in a long-term perspective and survives in changing conditions. Its structure ensures the long-term perspective of the company. The organizational structure of each organism is created by a combination of horizontal (staff, functional, functional) and vertical (line) ties. Accordingly, we distinguish between organizational structures with a steep organization (predominance of vertical ties) or organizational structures with a flat organization (predominance of horizontal ties).

Line structures form the basis of the organization of most companies and institutions. However, the term "linear" refers to the whole group of structures. Usually, a line-staff hybrid structure is used. Line structures are characterized by the interconnection of all functions up to the top control.

When implementing project management, the condition of creating a suitable implementation environment applies. The aim is to introduce the effective coexistence of a permanent, usually line-staff organizational structure and some of the functional structures used for project management.

If we want project management to be truly efficient and effective, it must fit well into the business environment in which it is conducted. Project management must be linked to the overall strategy of the organization. This management is actually designed to enable the implementation of the organization's strategy. Project management must be in accordance with the standards and guidelines in force in the given social area. These standards include organizational, legal, financial and economic aspects, human resources, sales and marketing aspects, as well as information and communication technologies (ICT). It is said that how we launch a project or program makes up about 30% of its success.

Human resources is one of the tasks of managerial work. However, each manager performs a wide variety of work activities, which are not only personnel, but can be planned or unplanned, technical, administrative, etc.

The content of the work of the manager and thus also the project manager is distinguished into managerial functions and managerial roles. We recognize five managerial functions: planning, organizing, human resources, leadership and control. Human resources is one of the managerial functions that can significantly contribute to the success and prosperity of a company or project, but also decide on their failure.

The performance of the function of project manager requires the synthesis of knowledge from a number of fields, which undoubtedly also include economics, financial management and financial law.

The purpose and mission of financial management is to lead the relevant management object (company, project) to profitability (profitability), but also to liquidity, ie solvency.