Management of process control in innovative projects

Chapter 4
Creating an organizational structure of the innovation project

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Lecture content

- Basic concepts of structuring an innovative project
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01

Basic concepts of structuring an innovative project

When managing an innovative project, it is necessary to divide it into separate blocks, which are independent objects of planning, accounting, organization, and coordination in building the structure of the project. From the theoretical standpoint of project management, the structure of an innovative project is seen as the organization of connections and relationships between its elements.

To plan the main tasks of the project, such as volumes, deadlines, costs and the project team need to know what types of work to perform, who will perform them, for what funds and resources, and what is the structure of relevant costs. The answer to these questions is given by the structuring of the project, which consists in the formation of the structure of project work, costs, and their coordination with the organizational structure of the project team.

Structuring the project involves the development of:

- work breakdown structure (WBS);
- the organizational structure of the project (Organization Breakdown Structure - OBS);
- Cost Breakdown Structure (CBS).

Definition 1. Structuring (or decomposing) is an effective tool for designing a project as a system that can be effectively managed, it is a means of streamlining the internal environment of the project.

Definition 2. Structuring is the division of a project into hierarchical subsystems/components and the establishment of links and relationships between them, which allows for project management.

The purpose of structuring is to form the organizational basis of the future project management system.

Here are the main tasks of structuring an innovative project:

1. decomposition of the innovative project into separate content blocks;
2. distribution of responsibility for the management of these units, as well as for the performance of individual works or tasks;
3. distribution of resources between individual tasks, works, performers;
4. formation of a base for planning, control, and cost estimation at all stages of the project life cycle;
5. coordination of tasks and responsibilities with the structure of a particular organization;
6. identification of works or their groups (packages) that will be transferred for execution to third parties.

The decomposition process and its results must comply with the basic principles of organizational modeling and design. Such principles are:

- an adequate structural reflection of the process of achieving the goals of the innovation project and the formation of relevant results under them;
- ensuring the completeness of the results, content, and quality of the initial result of the innovation project;
- taking into account the specialization of resources, the specifics of their vertical and horizontal distribution and grouping;
- rationalism of architecture and efficiency of the management system in the complex.

The structuring of the innovation project can be presented as a sequence of the following actions:

1. Definition of the innovative project - its nature, goals, and content, as well as the final product of the project and its characteristics.
2. Determining the levels of detail of plans and the number of elements in the project structure.
3. Preparation of the structure of processes - defining the scheme of the life cycle of the innovation project.
4. Defining the organizational structure, which should cover all departments and individuals who will work on the innovation project.
5. Determining the structure of the output is a scheme of distribution of subsystems and components, including various machines, equipment, software, information software, services, and more.
6. Preparation of a master plan of the project, which is the basis for further detailing in the process of finding a critical path.

7. Preparation of a matrix of distribution of responsibilities - as a result of the analysis of mutual relations between elements of the structure of the project and the organization of its management. A matrix is built in which the elements of the structure of the innovation project are placed in rows, and the elements of the organization in columns or vice versa. The intersection indicates the levels of responsibility of certain persons by means of codes or other symbols.
8. Preparation of the working plan of accounting accounts and sub-accounts.
9. Preparation of a working network schedule - the implementation of the previous points allows you to develop a detailed schedule, which for each work reflects the assessment of time and resources.
10. Development of a system of tasks with a clear time and resources.
11. Development of a reporting and control system.

02

Models of structuring an innovative project

The following models are used to structure the project.

1. The tree of goals

Represents schemes of the purposes, subgoals on levels. The basic rule of division is completeness: each top-level goal must be represented by a complete set of sub-goals.

2. Decision tree

Schemes of tasks for optimizing the multi-step project implementation process. Tree branches reflect events that may take place, and nodes (vertices) - points at which there is a need to choose.

3. Tree of works

It includes two hierarchical schemes, which are interconnected by the hierarchy of products and the hierarchy of works. The lower level of the work hierarchy corresponds to the work packages required when developing a network schedule.

4. Organizational structure of performers

In this scheme, the leader is zero. At lower levels - departments required for the functional management of works. The purpose of this structure is to determine the contractors responsible for the work.

5. Responsibility matrix

Connects work packages with implementing organizations. Used to control the compliance of the distribution of roles to the objectives of the innovation project.

6. Network model

It is based on the models of the work tree and the organizational structure of the performers so that they form a network schedule of nodal events. This provides an opportunity for effective control.

7. Structure of resource consumption

A hierarchically constructed graph that captures the resources required at each level. Used to analyze the tools needed to achieve the goals and sub-goals of the project.

8. Cost structure

A hierarchical graph that records the cost of project elements at each level.

Decomposition is the creation of a threefold structure: the result of an innovative project (product/service), process, and organization (management). Elements of the project structure are systems, subsystems and their components (project structure), phases and stages of the life cycle (process structure), resource groups (organizational structure).

Today, the two most common main approaches to decomposition are:

- creation of only WBS (structuring is carried out in one section);
- creation of WBS and OBS (structuring is carried out in two sections of the project and organizational units).

In addition, these approaches sometimes use:

1. CBS cost structure or equipment structure;
2. multilevel approach for multinational innovation projects.

There are also the following structural models of the project:

- RBS (resource brake down structure) is a type of OBS that determines which works are assigned to individual performers;
- BOM (bill of materials) - a hierarchical view of the composition of materials used to create the result (product) of the project;
- PBS (project brake structure) - project structural breakdown is fundamentally identical to WBS, except for some areas, such as software development.

When planning a project, the process structure is transformed into a work structure (WBS), a product structure into a resource structure (RBS), and a management structure into a structure of responsibilities and powers (OBS).

Valuation of works and resources, grouped according to a certain principle, allows to obtain cost structures of the project – CBS.

03

Basic principles of creating the organizational structure of the innovation project

Management is purposeful coordination of social production. The most important place belongs to the management of people and their relationships that arise in the production process.

The success of an innovative project largely depends on its organizational structure. The concept of organizational structure covers organizational structures of project management and organizational forms.

Definition 3. Under the organizational structure of project management means a set of interdependent governing bodies at different levels of the system, and under the organizational form - the organization of interaction and relationships of participants in the investment process.

The project always involves a different number of people (depending on the scale of the project) of different professions to perform different functions. On the one hand, they belong to the project team, and on the other hand, they can be subordinated to the “external” structures of the project. These can be departments or divisions of the organization implementing the innovation project or a team of start-ups.

There are two ways to establish a group:

1) functional when specialists of one profession, specialty, function are combined into functional units;

2) target, when performers of different specialties or functions, work together on a task or stage of the project.

Such groups tend to be semi-independent, closed, they are called "mixed organizational units".

Thus, from the people involved in the project, groups, functional units, or organizational units are formed.

One of the first steps in forming an organizational structure is the distribution of the required amount of work between these groups, departments, organizational units, and companies. Since the functioning of groups and the performance of work requires a relationship between them, the integration of people and work involves the establishment of a structure of power, coordination, and communication between members and groups of the project team.

The implementation of large innovative projects requires a more complex organizational structure, more levels of government than is the case with small projects.

A structure with a large number of levels is called "high". It is associated with the centralization of decision-making functions and strict control over the activities of employees. Structure with a small number of levels - "flat" - is associated with decentralized decision-making, a high degree of delegation, and less supervision from the center.

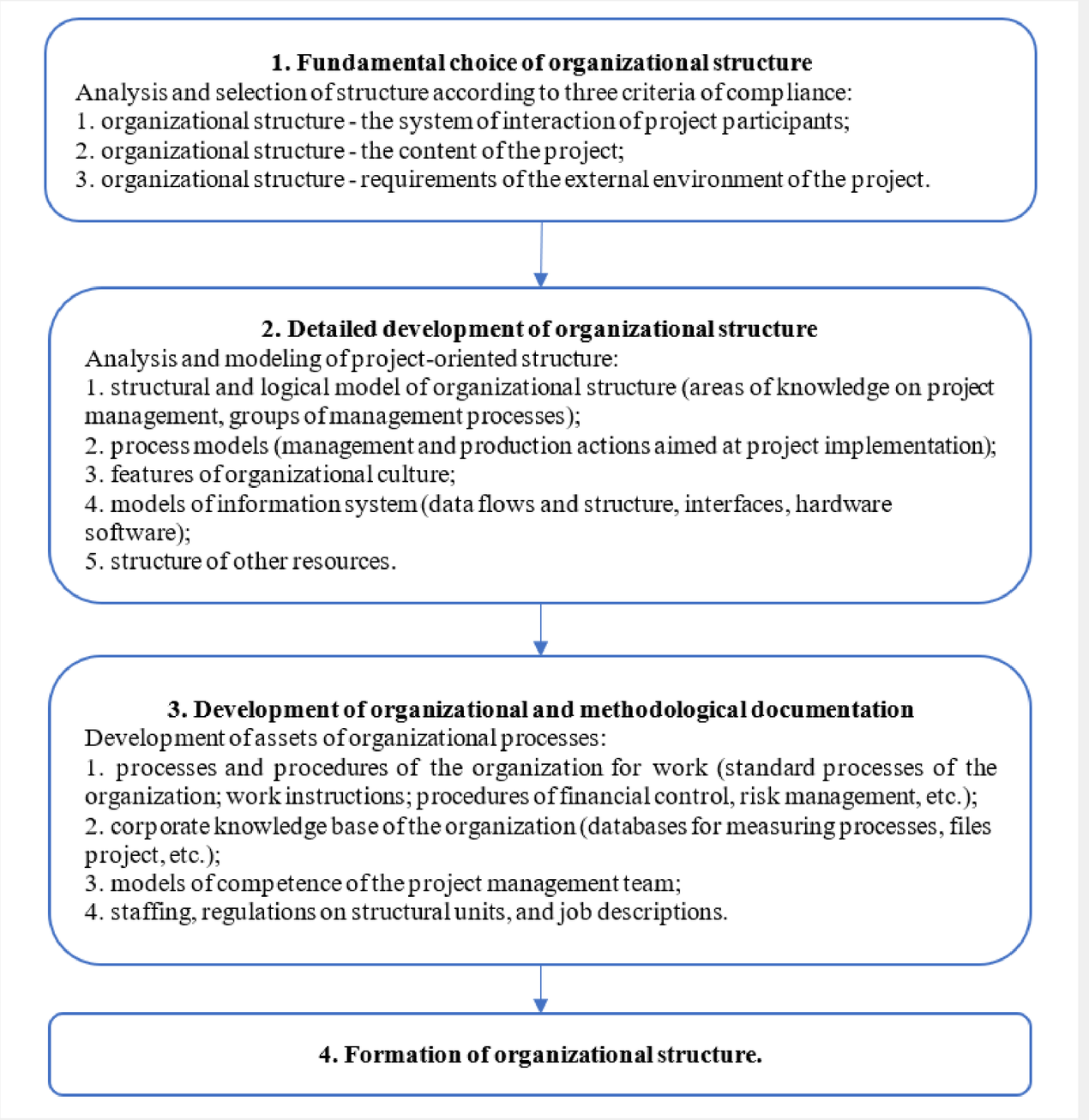
The organizational structure for the project is built taking into account:

- management systems of organizations involved in the project (functional, matrix, project);
- project characteristics (powers of the project manager, availability of resources, etc.);
- relationships between stakeholders (customers/users, sponsor, executive organization, project management office, etc.).

Interested project participants have varying degrees of responsibility and authority in the project, which may change during the life cycle of the innovation project. An important task for the project manager is to "maintain a balance of interests" of interested project participants.

When creating an organizational structure for the project should take into account the peculiarities of the organizational culture of the executive organization, as it is reflected in the general corporate norms, principles, procedures of business communications.

The general sequence of development of organizational structures for the implementation of the innovation project is as follows.

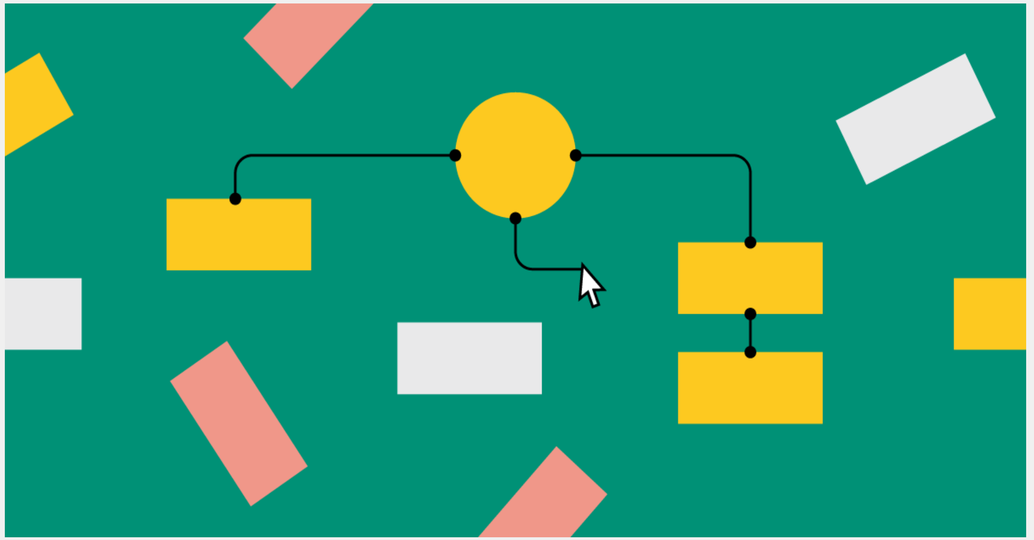

1. Fundamental choice of organizational structure
Analysis and selection of structure according to three criteria of compliance:
1. organizational structure - the system of interaction of project participants;
2. organizational structure - the content of the project;
3. organizational structure - requirements of the external environment of the project.
2. Detailed development of organizational structure
Analysis and modeling of project-oriented structure:
1. structural and logical model of organizational structure (areas of knowledge on project management, groups of management processes);
2. process models (management and production actions aimed at project implementation);
3. features of organizational culture;
4. models of information system (data flows and structure, interfaces, hardware software);
5. structure of other resources.
3. Development of organizational and methodological documentation
Development of assets of organizational processes:
1. processes and procedures of the organization for work (standard processes of the organization; work instructions; procedures of financial control, risk management, etc.);
2. corporate knowledge base of the organization (databases for measuring processes, files project, etc.);
3. models of competence of the project management team;
4. staffing, regulations on structural units, and job descriptions.
4. Formation of organizational structure.

The optimal solution to the problem of choosing an organizational structure for an innovative project (which is characterized by a high level of uncertainty), possibly using expert evaluation methods, such as hierarchical analysis or matrix multiplication - is used as a means of reducing uncertainty in decision support. Such methods are based on mathematical planning of experts' work and processing of examination results. The implementation of such methods makes it possible to obtain balanced expert assessments that take into account all the criteria for a particular problem.

For example, the method of hierarchy analysis is based on decomposing the task into simpler components (hierarchical representation of the elements that determine the nature of the problem) and further processing the judgments of the decision-maker (or group of experts) by pairwise comparisons. After performing the procedure of synthesis of multiple judgments, the result is - the priority of criteria and making the best decision.

04

Forms of organizational structure of innovative projects



Before starting a project, senior management must decide which of the three organizational structures will be used to link the project to the organizational structure of the firm: a separate, matrix, or functional project.

A separate project is a joint management of labor, financial, material, and energy resources necessary to ensure the implementation of the project in a timely manner, within the planned estimated cost, and with appropriate quality.

Advantages:

1. Concepts such as team pride, motivation, and dedication are very important.
2. The project has a holistic horizontal orientation, which is provided by the broad powers of the project manager.
3. Direct subordination of employees to the project manager, the purposefulness of staff efforts. They do not have to worry about showing loyalty and loyalty to the functional manager.
4. Short communication between the staff and the project manager (The procedure of exchanging opinions is significantly reduced, as a result of which decisions are made much faster.), And from him to the parent company.
5. Flexibility in project management, common decision-making, and management.

Disadvantages:

1. Duplicate functional responsibilities and reduce resource efficiency.
2. The project manager usually forms an additional stock of resources that is not used.
3. Inconsistency in the implementation of organizational procedures and general principles of operation.
4. In the case of simultaneous implementation of several projects, there may be negative competition between the projects and the teams implementing them.
5. As team members do not have a "home" functional area, they are concerned about what they will do after the project is completed, which often leads to delays.

Functional project - is characterized by the fact that the project is implemented in existing functional units.

Advantages:

1. Project team members can work on several projects at the same time.
2. Technical experience is retained within a specific functional area, even if the project participant leaves the group or resigns from the organization.
3. The functional area remains "native" for the project team members even after the project implementation. Functional specialists can move up the service.
4. Stimulates business and professional specialization.
5. Reduces duplication of effort and increases resource efficiency.
6. Improves coordination in functional areas.
7. Helps to increase the technological performance of operations in functional areas.
8. Employees have a clear prospect of professional growth.

Disadvantages:

1. Stimulates functional independence.
2. Increasing the number of cross-functional conflicts reduces the effectiveness of achieving common goals.
3. Increases the number of relationships between participants in the process, thus reducing the effectiveness of communications.
4. Reduces the effectiveness of solving complex problems.
5. Reduces the motivation of employees involved in the project.

Matrix project - a classic matrix organizational form is characterized by the fact that it combines the qualities of structures of both separate and functional projects. People from different functional areas are involved in each such project.

The Project Manager (PM) decides what tasks should be performed and when, and functional managers decide which people will do the work and which techniques should be used.

Advantages:

1. The project and its goals are at the center of attention.
2. All the advantages of functional structures when using resources for several projects are preserved.
3. The relationship between the various functional units is growing.
4. The project manager is responsible for its successful implementation.
5. Duplication of resources is minimized.
6. The functional area remains "home" for project team members even after the project is completed, so they are less concerned about their fate after its completion than with an organizational structure such as a separate project.
7. Project implementation activities are consistent with the policy of the host organization, which strengthens project support.
8. It is possible to change the structure from weak to strong matrix (functional to design).

Disadvantages:

1. There are conflicts between design and functional structures.
2. There is a need to coordinate activities on several projects in such issues as resource allocation.
3. There is a problem of division of powers between the project manager and the heads of functional units.
4. The principle of unified leadership is violated, which creates many conflicts.

Forms of organizational structure should be considered at two levels, external and internal:

1. The external level presupposes the existence of a certain structure of connections and relations between individual executors and groups involved in the implementation of the project, and their parent units, departments, companies.
2. The internal level reflects the relationship between the individual contractors and the groups implementing the project. This structure is considered regardless of external relations. The internal structure exists inside the external.

05

Forms of external organizational structures of innovative projects

Among the external organizational structures are the following main forms: the form of the project team; matrix organization; hybrid organizational structure; modular communication structure.

I. Project team

From the point of view of the project manager, this is the most attractive form of organizational structure. The executors are identified, the groups are formed and fully attached to the project for its entire life cycle, that is during the project they lose contact with their parent organization or department and are completely subordinate to the innovation project manager, who has full authority. This establishes a separate dedicated unit of the company to implement the project with its functional services. The project manager may have management problems with other companies involved in the project. This means that in projects involving many companies, the project team can only exist within each individual company and, therefore, form only part of the entire project organization.

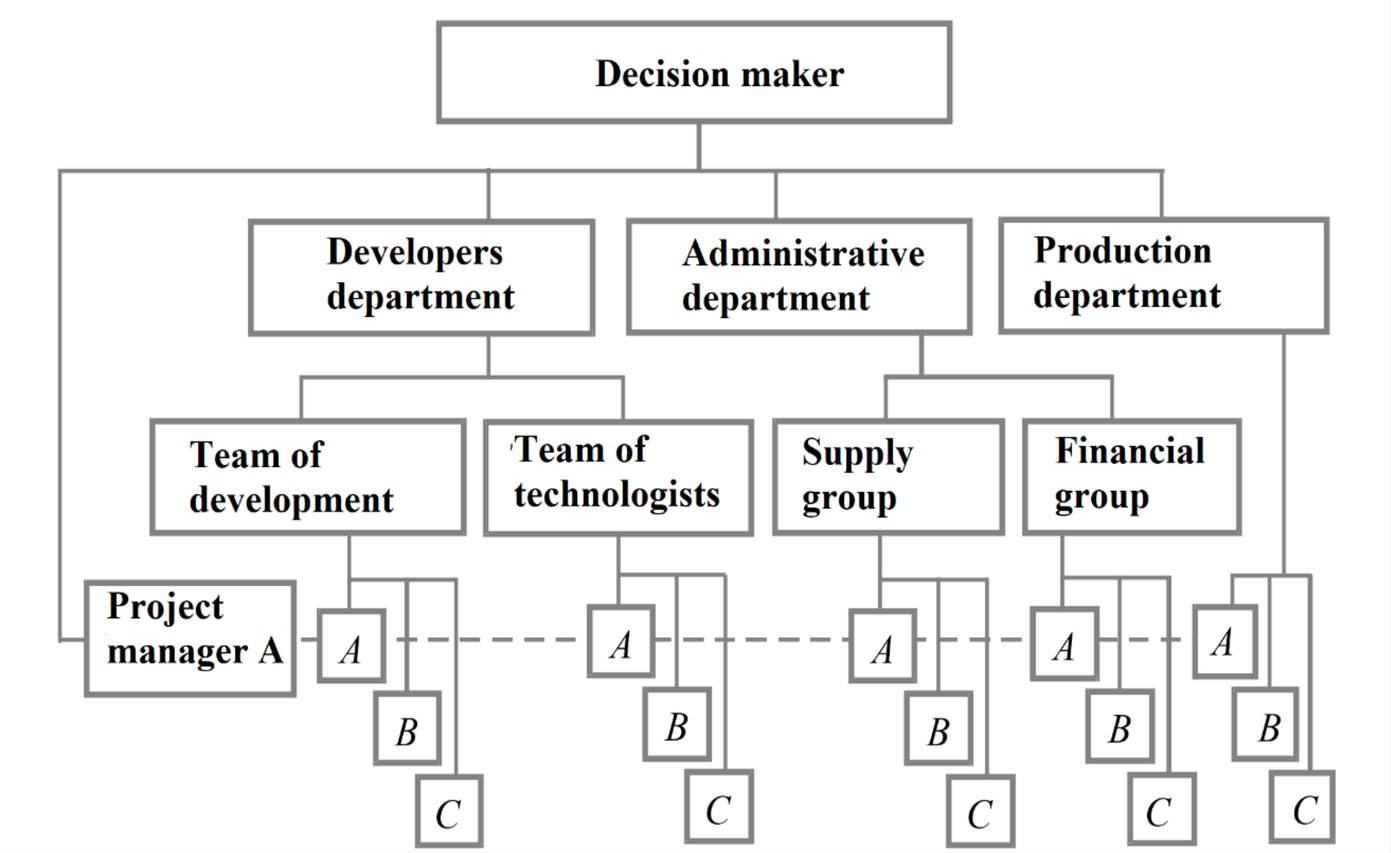
II. Matrix form of project organization

This form was first used in project activities, and then it became widespread in general management due to its flexibility and ability to meet complex organizational requirements.

There are the following types of matrix organizational structure:

1. functional;
2. balance sheet;
3. project;
4. contractual.

1. Functional matrix. The project manager with limited authority coordinates the implementation of the project, which involves various functional units. Functional managers have power and responsibility in the narrower specific segments of the project:



When using the functional matrix, most of the power and responsibility for the project is concentrated in the hands of the functional manager. The role of the project manager is reduced to communication, coordination, integration, he becomes the center of information about the project but has little direct power. Therefore, it is advisable to talk about project coordination rather than project management. The project manager only observes the processes, he depends on the goodwill of functional managers, acts as a petitioner for the latter. He cannot influence events, change their course, directly give instructions to members of the project team. It is difficult to effectively manage a project in this form, and control is mostly weak.

Therefore, this type of matrix structure is acceptable for small innovative projects carried out in non-project-oriented firms, or if the functional units are very strong and inaccessible.

2. Balance matrix. According to this matrix, the project manager equally shares power and responsibility for project implementation with functional managers.

3. Design matrix. When using this organizational the structure project manager manages the project, has power, and bears primary responsibility for the completion of the project in accordance with it tasks. Functional managers, if necessary, select staff and conduct technical expertise. This type is close to the project team, or divisional form of organization, it is the project matrix - rather than functional - is preferred by project managers. It is most acceptable in project-oriented firms, where the main activity is the implementation of projects and where project managers are recognized as line managers.

4. Contract matrix. When implementing an innovative project, especially a large one, you need to unite all companies into one organization; since each of them (customer, contractor, consultant, supplier) can affect the success of the project, the project manager must consider them as part of the organizational structure. All his actions - communication, coordination, planning, control - should extend to all these companies, combine them into one organization.

The power of a project manager depends on the form of contracts. Therefore, this form of organizational structure is called the contract matrix. It can exist in any basic matrix form and depends on the power of the project manager, which is determined by the following factors:

- the terms of the contract used;
- abilities and skills of the project manager;
- dominance of the company to which the manager belongs;
- implemented technologies and systems;
- staff composition;
- features of the project.

III. Hybrid organizational structure of an innovation project

The hybrid form is quite common, it is a mixture of the above basic forms. It can exist for small projects within one firm, as well as for a large project involving many companies.

In a separate company, a hybrid organizational structure combines full-time people into a project team. The rest, who cannot be used effectively full time or whose professional opportunities are limited, remain in functional units and work partly on a matrix basis.

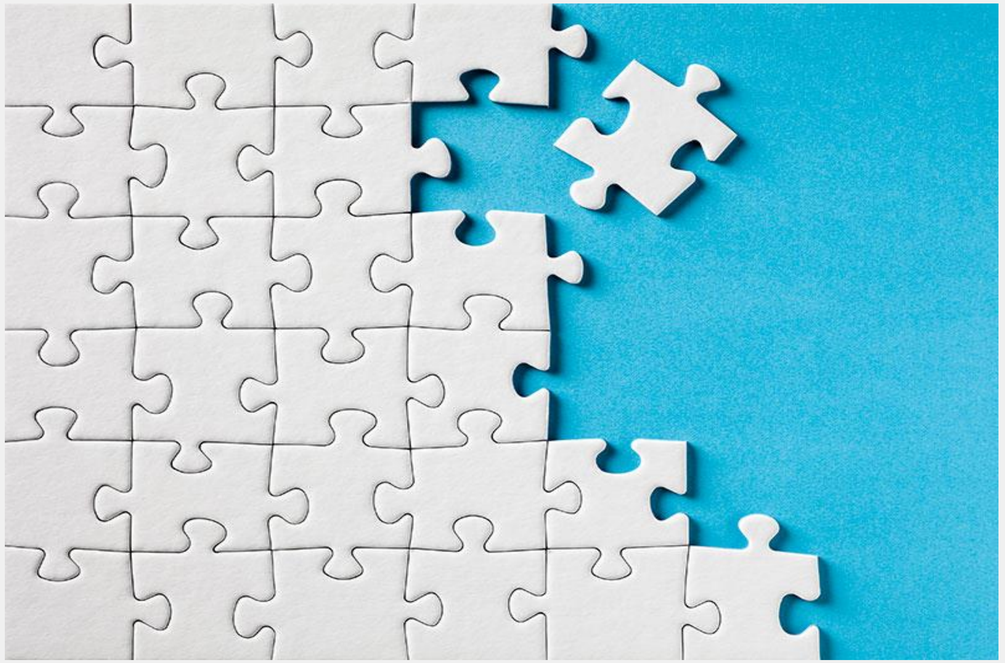
IV. Modular communication structure

This structure is used to provide flexibility in companies, especially those that are project-oriented. It operates on the basis of modules that are input and output from the project as needed, combined, and recombined into different communication systems depending on the project objectives. All involved performers are full members of the project team, only involved in it for a certain period of time.

Consulting and software development companies often and successfully use this organizational structure, which allows flexible use of intellectual capabilities of staff.

06

Forms of internal organizational structures of innovative projects



The internal organizational structure of a project is a system of connections between individual executors and groups working on the project as separate organizational units within the project team. In this case, the external relations of performers and groups with the "parent" units or companies are not taken into account.

In small projects, the organizational structure includes one or two companies and one or two divisions of each.

Hundreds of companies and organizations are sometimes involved in the implementation of large projects, so it is very important to establish not only their external but also internal organizational structure. This structure can be created according to different schemes, taking into account the general structure of the project, the size of organizational units, the degree of centralization or decentralization.

Such internal organizational structures include:

- internal functional structure;
- internal matrix structure;
- divisional structure;
- centralized / decentralized.

As the size of the project increases, functional groups are formed from employees of functional units with their own head or group manager. Thus, internal functionalization develops. However, this organizational structure avoids some problems inherent in a functional system, as there is a project manager. It connects the group, directs it to work effectively, helps to break down functional barriers.

When using it, as well as for small organizational units, the high potential of group work and motivation of the involved specialists is provided, the probability of conflicts is low, but it is more difficult to manage such a team than in small groups.

Matrix internal organizational structure.

In this structure, matrix relationships are superimposed on the functional structure in order to improve the interaction at the level of basic groups. Matrix organizational units - subprojects are formed, and each subproject manager combines the interactions of different functional groups in order to implement their subproject.

Divisional organizational structure - an innovative project is divided into three subprojects and each of them has a functionally mixed project team. The role of decentralization is growing, which may be weakened by a strong central administration, planning, control, and financial functions from the center.

Centralized/decentralized form of organization of large projects. Different combinations of the above basic organizational structures can take place during the implementation of large projects. First, in the divisional form, individual divisions may have:

- functional structure inherent in medium-sized projects;
- functional units and matrix structure;
- project teams, this is the further divisional division into subprojects.

Within the matrix organizational structure there may be another matrix structure, inside it - another and so on.

Conclusions

Structuring (or decomposing) is an effective tool for designing a project as a system that can be effectively managed, it is a means of streamlining the internal environment of the project.

The following models are used to structure the project: goal tree; decision tree; work tree; organizational structure of performers; responsibility matrix; network model; resource consumption structure and cost structure.

The success of an innovative project largely depends on its organizational structure. The organizational structure of project management is understood as a set of interdependent management bodies located at different levels of the system, and the organizational form - the organization of interaction and relationships of participants in the investment process.

Conclusions

Before starting a project, senior management must decide which of the three organizational structures will be used to link the project to the organizational structure of the firm: a separate, matrix or functional project. Among the external organizational structures are the following main forms: the form of the project team; matrix organization; hybrid organizational structure; modular communication structure.

The internal organizational structure of a project is a system of connections between individual executors and groups working on the project as separate organizational units within the project team. Internal organizational structures include: internal functional structure; internal matrix structure; divisional structure; centralized/decentralized form of organization of large projects.

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Thank you!