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## INTEGRATED PROJECT MANAGEMENT SYSTEM OF SCIENTIFIC AND TECHNICAL CENTRE IN OIL COMPANY «ROSNEFT»

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*Concept and structure of three level integrated project management system of in project-oriented organization have been suggested and described. Synergetic effect at such system introduction is achieved due to systemic actions in such directions as: increasing organization controllability and transparency of decision making; flow of documentation regulation; formalization and optimization of project activity; development of irredundant and consistent system of normative documents in all directions of organization activity.*

### Introduction

Tendency of enterprises designing objects of oil-and-gas complexes to increase of operating efficiency and competitiveness rise became motive power for introduction of modern methods of project activity management in oil company «Rosneft». Analysis of project management practice in Scientific and technical centre (STC) of the company (Krasnodar) showed that activity of its design organizations does not fully correspond in a number of positions to the world experience and requires improvement on the basis of modern technologies.

Solution of the task of increasing project organization operating efficiency is on the way of structurization and regulation of all control processes of project activity beginning with strategic management and finishing with single project managements. Such structurization may be fulfilled on the basis of integrated project management system (IPMS) which binds restrictedly modern achievements in the field of quality and project management with the existing practice of domestic project organization activity.

In this paper a conceptual framework of multilevel IPMS is described, advantages of using three-level structure of project activity management are analyzed, results of its introduction in STC of oil company «Rosneft» (further it is abbreviated to STC of OC «Rosneft») are given.

### Conceptual framework of integrated project control system

Conceptual framework of IPMS is presented in Fig. 1 where the main technologies which were used at developing IPMS functions in STC of OC «Rosneft» are given. They include: project management system (PMS), quality management system (QMS), knowledge management system (KMS) and strategy management system (SMS) on the basis of balanced indices.

Central idea of selected structure of IPMS is in the fact that to take as a principle of project management the developed and debugged QMS. It is based, on the one hand, on a process approach to organization activity and on the other hand, on powerful information system capable of supporting constant monitoring, visual-

ization and operative report of organization activity results to Top management.

Quality management system in IPMS is an obligatory part of modern control system of project organization. The procedures and structures developed within the bounds of QMS tracing their performance secure development of rated production meeting the consumer requirements which constantly grows. Thus, that which is a minimum requirement of enterprise existence by modern concepts is implemented.

At the same time it does not secure that the design process is not only optimally fulfilled but at least on the level of a good standard practice of project management. QMS standards, in particular, the documentary procedures of QMS and quality manual leave this question for the design organization itself. At the same time this question is the most important for design organizations of oil company «Rosneft» as a rational design of engineering process is capable of increasing organization success and its product demand in the company.

The problem of engineering process rational design may be solved by introducing techniques being not obligatory but reflecting perspective techniques of management in different levels of design activity. Code of knowledge in managing projects and balanced index system which allows tracing the development and implementation of organization strategy at all temporary stages and developing promptly corrective program are in particular such techniques.

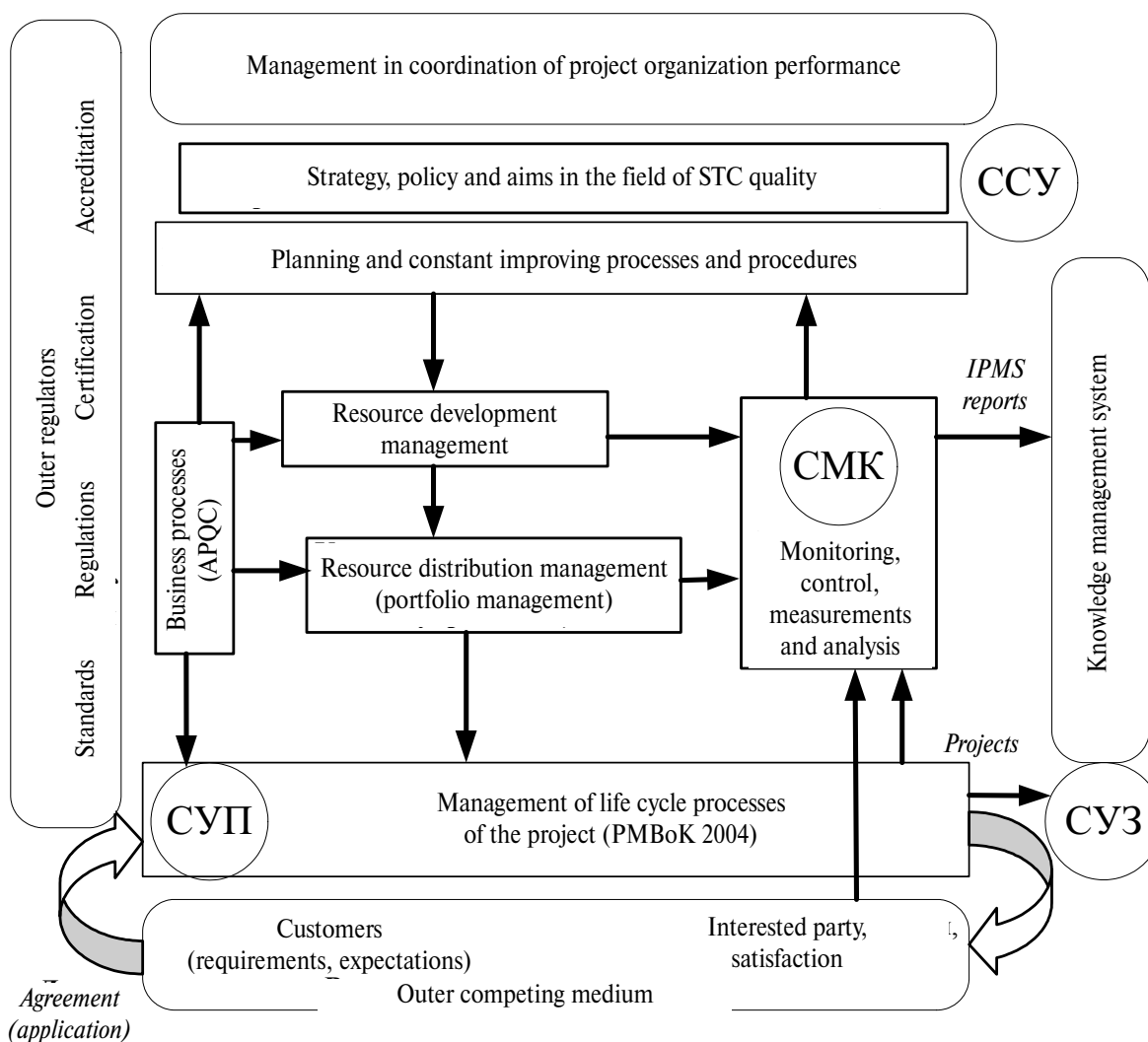
Models of managing design processes within the bounds of IPMS are usually represented by a multilevel management structure of organization design activity in the whole. For design organizations of oil company «Rosneft» as the most suitable one a three-level model was selected (Fig. 2). It includes a level of managing business-process, portfolio (project activity directions) and project management level. Process structure of such model was determine at the high level by recommendations of standards of American Productivity & Quality Center (APQC), at mean stage – Standard for Portfolio Management of Project Management Institute (SPM PMI), at low level – Project Management Body of Knowledge (PMBOK).

**Analyzing three-level structure of project activity management**

Synergistic effect of three-level structure of project activity management is achieved due to horizontal and vertical bonds of business processes. Aims and directions of the whole project activity are specified, its priorities are defined and project resource management is provided through vertical bonds. Resources are planned, distributed and consumed by operational actions. In horizontal bonds chains of processes connected with so-called fields of knowledge at project activity management are formed [1]. Project integration management, human resources management, project content management, project communication management etc. refer to such fields. So, for example, managing human resources of the project the obligatory part of business processes is vertical chain: «development and management of organization human resources as a whole (APQC: development and management of planning, developing policy and strategy in the field of human resources; search, selection and recruitment of personnel; personnel development and training; personnel compensation and

maintenance; management of information about employee) – project leveling (SPM PMI: leveling human resource workload; responsibility assignment) – management of project human resources (PMBOK: planning, recruitment, development, management of project team)». A part of these business processes refers to a higher level, another part to the mean one and the design process proper refers to the lower level. Similar or more or less detailed vertical chains of business processes may be constructed by other fields of knowledge of project management. Thus, three-level structure turns out to be penetrated both with horizontal and vertical bonds that supports necessary manageability and observability of design works according to requirements, given in standard PMI [1].

Mean level (portfolio management level) acquires large value in three-level structure as both vertical and horizontal bonds cross in it. Portfolio level is a centralized control of project groups combined by activity directions which supports increasing design activity efficiency due to centralized planning and management of design work, design service life and project documentation.



**Fig. 1.** Conceptual framework of integrated project management system at STC of OC «Rosneft»

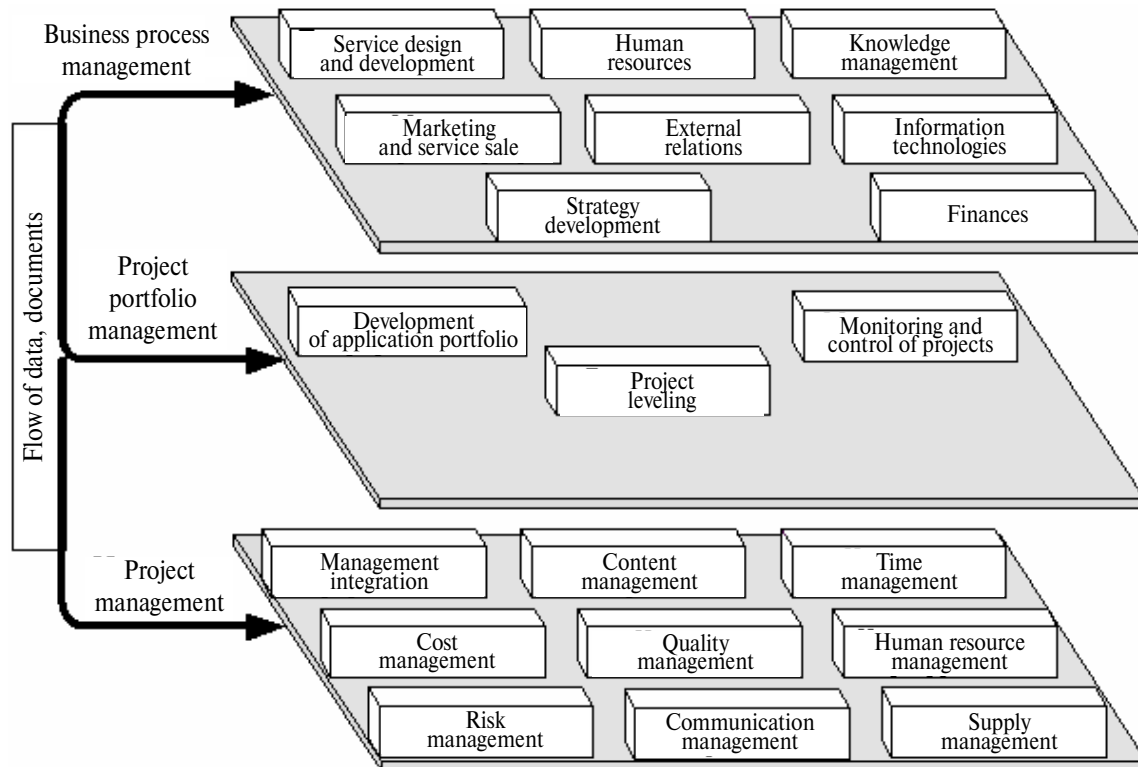


Fig. 2. Three-level management structure of design activity of OC «Rosneft» STC

The necessity of portfolio level management at project management proceeds from a number of general management problems of organization project activity in general such as:

- portfolio project completeness;
- financial volume of application;
- uniformity of staff and production facilities workload;
- correspondence of design works to strategic goals of project organization;
- control of project advancement degree to the established aims;
- regulation of force majeure problems.

Project office is required for portfolio management [2]. It is responsible for technical functions connected with solution preparation by top management by selection and ranking (categorization) of projects and for monitoring of project advancement.

Besides, for regularization of the process of continuous efficiency increase, proper standard documentation, documentary management system for organization design activity as a whole are required.

#### Description of integrated management system of the projects of OC «Rosneft» STC

According to IPMS concept the documentary system of supporting STC activity processes is formed so that minimally required number of new managerial documents are established by each separate project and all template documents, regulations constant for typical

projects are separated to the upper level of design part (project portfolio) of IPMS. Document updating, changing and tracing whether they are used or not in project manager work; project executor consulting in documentation is fulfilled by design office or a group of specialist of this office in this direction (portfolio).

Such template documents are combined in the system of standards of PMS TSS developed in OC «Rosneft» STC. This system covers with its requirements practically all fields of knowledge ascertained by the standard of project management PMI.

For the lower level (project level) PMS TSS includes documents regulating management of a concrete project and including the existing practice of project implementation in centre. A list of such documents for concrete projects may be different. So typical projects may be completely based on standard documentation of STC QMS. It is connected with the fact that they have no serious individual features. It is enough for them to develop the plan of operating activity quality. Algorithm of their constant improvement is Deming cycle «*plan-do-check-act*». For very major projects it is necessary to form actually virtual organizations with regulations, budget and staff separated for performance of work and their own QMS. The example of solving such task is documentary procedures, developed in STC, of QMS by the project connected with Vankor deposit development. The instrument of assurance of work performance high quality is a code of knowledge in management of project PMBoK.

It should be kept in mind that the majority of projects in STC are repetitive as a rule and implemented by

a typical sample. They have a limited amount of financing and time of performance. Their peculiarity is the fact that these projects are mass-produced and the process itself is logical to be considered as a certain conveyor production of repeated project services.

In standards for portfolio management level listed above the problems of forming the required volume of project applications, project leveling are included according to strategic goals and limitation of resource, monitoring and management of project advancement to the planned goals according to the approved marks and MS Project-schedule plan.

The key task of portfolio management is reduction of more number of projects to the completion stage and decrease of average project execution period owing to optimal use of the existing resources.

The main problem of such management is the fact that for project-oriented organizations [3] the obligatoriness of achieving stated goals of design works at the end of the year does not follow from optimization condition of resource use schedule when planning the whole amount of work at the beginning of the year. Performing the projects in any case the unforeseen events occur as with the result that some projects are corrected, suspended and even withdraw from the approved portfolios. The method of getting over these difficulties is a management of project performance priority on the basis of two-contour portfolio planning. One control contour uses so-called mark (event) schedule of portfolio project performance. Date of achieving proper marks form a schedule (prediction) by marks. Metrics of this control contour is consciously desensitized per the worst case that occurs in practice according to «Murphy's law». The second contour uses MS Project-project management schedule the metric of which is adjusted monthly by a design office.

At plan performance the portfolio management always separates and controls a group of projects of special priority which should be performed certainly in time and entirely and solves the problem of achieving project portfolio manageability by Deming. Complete work breakdown structure by projects, work packages and works of single executors is carried out for supporting detailed planning. Participant work is coordinated by the design office by discussing original plans with their further change and concordance of questions of interaction and interrelation of participant works.

Owing to IPMS the portfolio management allows:

- scheduling projects and forming report on their fulfillment;
- managing project portfolio including tracing workload distribution, controlling state of projects and plans of their updating, predicting threats and risks each month;
- having global priority model between current and planned projects;
- preparing solution of the Board on project management in the area of project priority;
- training project managers, rendering methodological aid.

Portfolio management cycle includes a stage of forming application portfolio, a leveling stage and a stage of monitoring.

*At the stage of forming application portfolio* applications are collected, transfer projects are analyzed, information is gathered, selection criteria are formed and applications are identified. The aim of this process group is in analyzing transfer projects, controlling collection of new applications for design work performance, project identifying and developing documentary application portfolio for their performance by activity directions. Key actions within this process include:

- collection of all available information required for estimating and comparing applications at selection of portfolio components;
- detection of continued projects and identification of new suggestions for correspondence to organization strategy and certain key indices;
- formation of project selection criteria in each portfolio;
- formation of project portfolios.

Information is collected and completed for each component of portfolio by classes (portfolio, project type, program, and other works).

Basic criteria for selecting applications are cost, stated date of performance, resource loading, uniqueness/complexity of projects, innovative appeal. Additional criteria are positive/negative historical work experience with this customer, degree of portfolio completeness, customer financial competence, correspondence of application for the project to organization strategic goals.

The stage of application portfolio formation is completed by preparing application portfolio, informing portfolio managers about the criteria of their selection, preparing presentation for discussing preliminary annual plan.

*At the stage of leveling project* of portfolio specifying information is collected for project estimating; project priorities are defined according to organization strategic goals (OSG) and strategic goals of business-projects (SGB); projects are balanced; risks are preliminary estimated; projects are categorized; responsibility for project performance is appointed; annual (prediction) and quarterly plans of portfolio works are prepared; MS Project-schedules of performing design works (year, quarter) are prepared; resource conflicts are solved and new projects are included to portfolios; design works are planned for a month; projects are started up. The aim of this group of processes is to develop portfolio composition possessing the highest potential from the point of view of collective support of strategic initiative and achievement of STC strategic goals.

Key actions within this process are: project leveling according to OSG and SGB as well as operating goals of design works such as cost, dates, working hours, expenses, staff and equipment workload.

Criteria of portfolio leveling are:

- balanced and full load of staff and manufacturing resources;
- reaching agreement with interested parties;
- portfolio leveling by directions of OSG and SGB;
- excluding task crossing between projects.

Limitations are:

- limited resources;
- risk level;
- parent company limitations;
- communication limitations.

The stage of project leveling is completed by their production startup. The result of performing this group of processes is project portfolio proper structured by directions of STC activity with set component priorities and distributed resources. The results are documented in the form of annual, quarterly and monthly plans and schedules.

This group of processes is the most active at the moments when organization updates its strategic goals, forms short-range budgets and plans. Usually these actions occur in the period of annual budgeting. Such actions may be quarterly or may be connected with changes in external or internal environment, business climate.

Indices of project investment appeal such as dividends, net present value, pay-off period and others may be leveling criteria on the basis of which the expert solutions by priority set should be made.

To control resource distribution in project portfolio the project priorities are used. Priority defining allows project managers to modify correctly their schedule charts. This information is essential for decreasing time and force when resolving conflict around resources.

Depending on priorities the strategic solutions connected with project resource support; experience of project team are determined as well as solutions about approval or refusal of application for new projects, suspension or cessation of works over single projects are made.

Project priorities are the most important but not the only factor in balancing procedures. Besides priority arrangement leveling assumes optimization of portfolio performance plans for supporting qualitative load of staff and production facilities.

*At the stage of monitoring and management of portfolio* the report by the results of project performance at a stated time is collected, the degree of project advancement is analyzed by criteria, the degree of resource use is analyzed by criteria, force-majeure consequences are managed, operating (corrective) actions by portfolio are controlled. The goal of this group of processes consists in managing with specified frequency project advancement to set key marks and estimating the degree of using portfolio resource.

The group of these processes forms actions necessary for guaranteeing the fact that portfolio in whole is performed according to specified dates and within metrics determined by organization.

Metrics describe advancement to the determined goals and quality of this advancement. Advancement is estimated by financial indices as well as achieving key marks (results). Quality of portfolio performance is connected with indices of budget performance and observance of the planned date of project performance and may include the degree of client satisfaction and other indices.

Criteria of monitoring and management are focused on minimization (maximization) of:

- project performance date;
- stage pay;
- percent of project performance;
- efficiency of responsibility performance;
- design work quality.

Dates, ratio of budget to real costs, degree of client satisfaction, efficiency key indices may be key marks.

The peculiarity of portfolio management in comparison with operating management of project activity is the fact that the instrument of managing is, first of all, project priority change in portfolio and resource redistribution connected with it.

Metric of operation of this group of processes may be controlled through categorical or integral indices. In some cases individual components of portfolio may be traced.

Actions in this process includes:

- examination of component priority, abilities, expected return, risks, and financial indices taking into account portfolio management criteria and investment criteria;
- analysis of resource use and limitations for portfolio performance;
- decision-making about continuation, addition or completion of certain portfolio components or their repeated ranking by priorities and reconstruction according to strategic goals;
- recommendations on Board support with portfolio components;
- motivational decisions (punishment/encouragement);
- decisions on supplement, suspension or review of project performance date;
- decision on completion of design work.

To fulfill managerial actions in STC the decision was made to supplement the service of project engineers (PE) with project office. Responsibility division of these services is given in Fig. 3.

Such separation allows keeping positive operational experience of PE service in STC on the one hand and on the other hand increasing project manageability on the hand of company management through the design office.

### Conclusion

Three-level integrated structure of project management allows increasing efficiency of activity of any project organization due to management systemic actions in

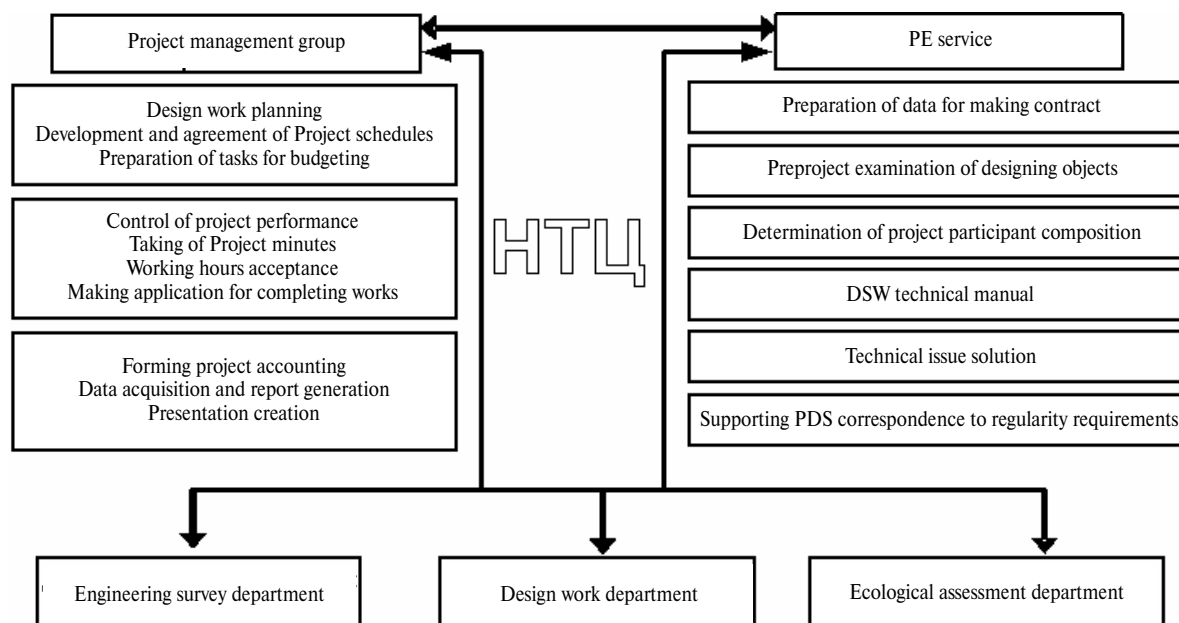


Fig. 3. Management of a project in OC «Rosneft» STC

such directions as: increase of company manageability and transparency of decision-making; regulation of documentation flow; formalization and optimization of project activity; development of irredundant and consistent system of normative documents in all directions of activity.

As a result of development and introduction of IPMS into STC of OC «Rosneft»:

- the concept and structure of three-level integrated system of project management in project-oriented organization is suggested and described;
- a set of problems solved on the level of project portfolio management is examined;
- normative documents on design and survey works (DSW) are prepared and stated;
- normative documents on product designing are prepared;

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- obligatory documents of quality management system are prepared;
- DSW processes in the medium of package ARIS are described;
- format of monthly and operational report for needs of project managers and portfolio curator are developed and introduced.

Including two-contour system of planning and performance into portfolio management allowed increasing efficiency of project organization activity, achieving project manageability by Deming owing to revealing system problems in project management at earlier stage of their formation use of system means of solving these problems.

Portfolio management within IPMS is the efficient control lever in the hands of top management at solution of both strategic and operational problems.

3. Archibald R.D. Management of high-technology programs and projects / Translated from English by E.V. Mamontova; Ed. by A.D. Bazhenov, A.O. Arefiev. - 3<sup>rd</sup> issue, revised and supplemented – Moscow: «AiTi» company; DMK Press, 2004. – 472 p.

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