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THE COMMUNICATION ORGANIZATIONAL ROLE MODEL FOR THE INFORMATION SYSTEMS DEVELOPMENT PROCESSES

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Abstract

The authors of this article carried out work to systematize the material described in various sources, as well as the practical experience gained in consulting projects on the implementation of methods for managing the development and implementation of IS. As a result of the work done, an organizational role model of communication was built for the processes of development and implementation of IS. The article presents the practical results of introducing the model into the IS developing and implementing processes of a logistics company and a large television channel of the Russian Federation. The key feature of the model is that it allows switching to the system management of the IT landscape not at the level of individual projects for the development and implementation of IS, but at the level of the enterprise as a whole. This model is a synthesis of knowledge and practical experience fragmentarily reflected in various methodologies and standards.

Keywords: Quality management, information systems, management system.

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1. Introduction

Improving approaches to quality management of the processes of development and implementation of information systems (IS) and the necessary information technologies (IT) is an urgent task that requires an operational solution. This is due to the rapid development of technology, an increase in the share of robotic industries, the spread of artificial intelligence and several other areas built on the basis of digital technologies.

2. Problem Statement

An important element of the quality management system is the model that determines the distribution of responsibility areas and the role structure. As part of the work, an analysis was made of a number of methodologies related to the management of the process of development and implementation of information systems and including approaches to IS quality management: Rational Unified Process (RUP) (Boehm, 1988), Microsoft Solutions Framework (MSF) (Turner, 2006), Dynamic Systems Development Method (DSDM) (DSDM Consortium, 2008), PMI PMBOK (PMI, 2013), Microsoft Operations Framework (MOF) (Microsoft, 2008), The Open Group Architecture Framework (TOGAF) (The Open Group Consortium, 2018). A comparative analysis of these methodologies is described by Zaramenskih (2014), Neborskij (2009), Nikolaenko (2015), Gerkushenko and Tkachenko (2016), but in the framework of this work, the authors did an in-depth study with regards to the distribution models of the responsibility areas and role structures for the processes of development and implementation of IS.

The MSF methodology is designed to build the processes of development and implementation of information systems, while it contains a separate section dedicated to the model of the project team. The project team is divided into role clusters, for each of which a certain area of responsibility is assigned. At the same time, the responsibility of the team for the project result in general and the equality of the role clusters is introduced as a key principle. Despite the practical orientation, the methodology is not without drawbacks. The limitation of its application should be noted as one of the key ones; the provisions of this methodology can be applied when building work in project teams, but it is difficult to apply on the scale of an IT enterprise as a whole. The provisions of this methodology do not disclose the features of building the processes of development and implementation of IS for several parallel projects while maintaining the integrity of the IT landscape.

The RUP methodology focuses on the processes of development and implementation of information systems. At the same time, the aspect related to the role model and their interaction is not taken out as a separate section. A sufficiently detailed description of each of the processes and the stage of the IS development allows forming an idea of what roles should be in the project. The RUP methodology is characterized by the limited enterprise-wide application and inter-project collaboration.

The DSDM has much in common with the RUP methodology, in particular, it is necessary to note the focus of this method on the tasks of project success, but its absence within the framework of a complete IT landscape.

There is a group of methodologies aimed at managing information technology as a set of services, these include ITIL, MOF. These methodologies are more focused on managing the processes of maintaining

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the IT landscape of enterprises as a whole, i.e. not as separate project activities, but the IS support processes. A key drawback of these methodologies is the focus on maintaining the existing IT landscape, while less attention is paid to its development. This fact determines the distribution models of the responsibility and the construction of role structures aimed at the IT providing functions.

The PMI PMBOK is a more general provision on project management, without focusing on the development and implementation of IS. From the point of view of the organizational role model, an important feature is worth noting, which involves making the project manager responsible not only for the organizational component of the project (timelines, resources) but also for the quality of the product. In the development and implementation of information systems, such a combination is not always possible and requires the allocation of a separate role responsible for managing the quality of the product (information system).

TOGAF offers a fundamentally different approach to building the organizational role model in the processes of development and implementation of IS. This methodology is aimed at systemic management of the IT landscape using the provisions of the Enterprise Architecture Management. Introduction to the organizational role model of the essence of the Architecture Board is a distinctive feature which allows representation of various stakeholders in making architectural decisions. The disadvantage of the methodology in terms of the organizational role model is its high level of abstraction, which reduces the potential for its practical application.

The task of differentiating responsibility in the processes of development and implementation of IS is solved by the IT enterprises locally and each time enterprises gain a unique experience that cannot always be used in the future. A number of IT enterprises publish fragments of the role models Arsent'ev (2010), Kajdalov (2005), Kostina (2017), Radzishevskij (2018), Skripkin (2005).

3. Research Questions

The main research question is the development of an organizational role model of communication that can be used to manage IT projects and systematically manage projects and programs to improve the IT landscape.

4. Purpose of the Study

Summing up all of the above, we can note several acute problems identified as a result of the analysis:

- the lack of a model describing the interactions between the roles and the general communication scheme for the systemic management of the IT landscape, not at the level of individual projects, but at the enterprise level as a whole;
- the problem of communication between business managers (customers) and those responsible for the development of the IS. If there is a need to refine the IT landscape function, the business manager should have a sufficient level of competence to determine which component of the IS their requirement relates to, and which of those responsible on the IT side they should contact. In practice, the presence of such a level of competence of business managers is not always

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possible. This problem is often solved either through the inclusion of employees with the relevant competencies in the staff of business units or through the forming a separate unit on the customer side, to prepare the necessary requests for the IS. Both of the described approaches require significant resource investments and cannot provide effective communication between the business and the IT representatives.

The solutions presented in this article are aimed at solving the problems described above.

5. Research Methods

The authors of this article carried out work to systematize the material described in various sources, as well as the practical experience gained in consulting projects on the implementation of methods for managing the development and implementation of IS. As a result of the work done, an organizational role model of communication was built for the processes of development and implementation of IS (Figure 1).

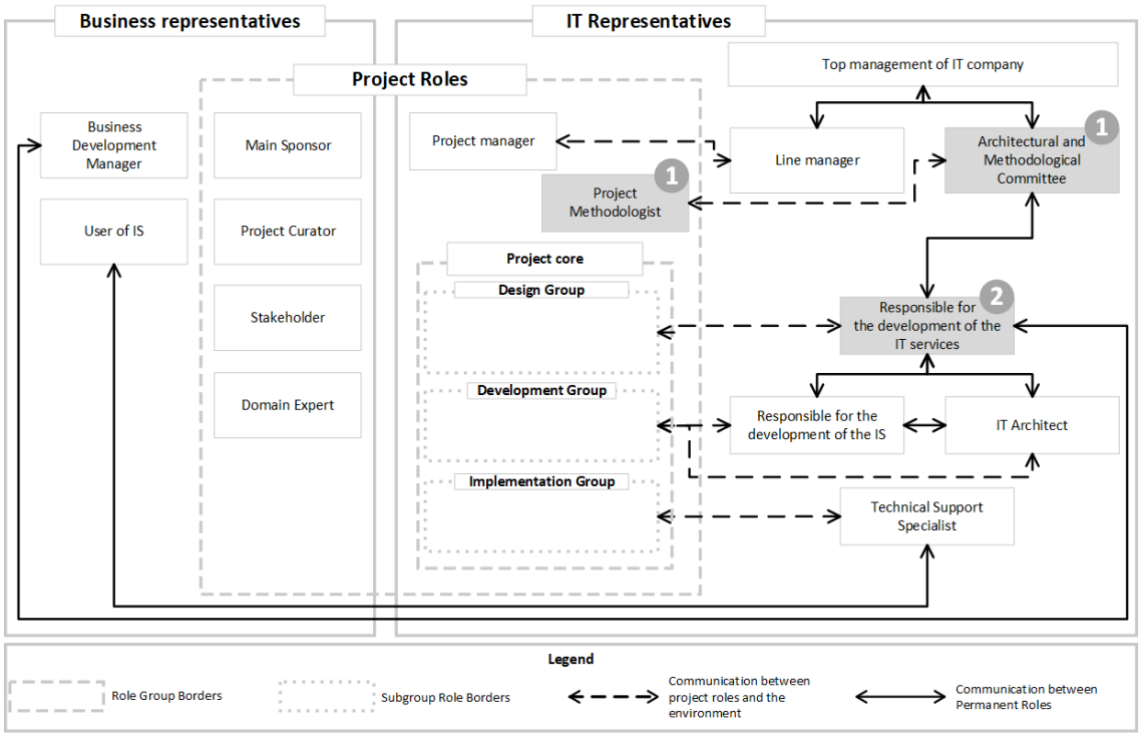

Figure 01. The organizational role model of communication for the processes of development and implementation of IS

The basis of the upper-level grouping of roles is laid on the principle of belonging of a specialist, assigned to a role, to a specific department. The roles for which, as a rule, the representatives of business units are assigned, are shown in the group “Business Representatives”. The roles for which the IT specialists are assigned, are shown in the group “IT Representatives”.

The roles from the “IT Representatives” group are performed by the specialists of the IT department if the development and implementation of the IS is carried out by the enterprise independently. If an enterprise engages an external IT enterprise to support and develop the IS, the roles in this group are performed by the specialists of the engaged enterprise.

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A separate group “Project Roles” contains the roles that exist during the implementation of the project on the development and implementation of the IS or on the refinement of the functionality of the existing IS.

The project roles group consist of the subgroups: “Design Group”, “Development Group”, “Implementation Group”, in accordance with the typical IS life cycle in projects.

The arrows denoting communication between the roles can be assigned to one of the two types:

- the first type is communication between the project and constantly existing roles. This type of communication is necessary to synchronize the decisions made in the project regarding the resource management, conceptual and technical features of the IS;
- the second type is communications that can be implemented without the IS development projects. Thus, this type of communication is aimed at maintaining the IT landscape, as well as the generation of proposals for its development and subsequent launch of projects.

The presented model includes two key authors’ proposals; they are marked with numbers in the diagram.

The first proposal is to add such roles as the “Architectural and Methodological Committee” and the “Project Methodologist” to the model. The appearance of these roles complies with the principles of the Quality Management System (QMS), recorded in ISO 9001. In particular, through this role, the top management can implement a part of their quality management functions:

- development of quality policies and goals;
- systematic management of projects and initiatives aimed at improving the quality of products and processes;
- introduction of a process approach and risk-based thinking.

The “Architectural and Methodological Committee” is a collective body that should include specialists performing tasks in the process of development and implementation of IS (analysis, design, development, testing, etc.). The committee’s area of responsibility includes the development and implementation of various tools to improve the quality of the processes of development and implementation of IS. The committee also manages the end-to-end development and implementation processes, ensuring their continuous improvement.

The second proposal involves the introduction of the role “Responsible for the development of the IT services”. The concept of the “IT service” is reflected in many standards and methodologies (TOGAF, ITIL, etc.). An IT service means a certain functionality (a set of the IS functions) of one or more IS components. An IT service has a set of interfaces that govern how a service is provided.

The presented organizational role model of communications was introduced into the processes of development and implementation of IS of a large logistics company, which occupies a leading position on the market of the Russian Federation and the CIS countries. The use of this model allowed achieving a number of practical results:

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- due to the introduction of the roles “Project Methodologist” and “Architectural and Methodological Committee”, it was possible to reduce the number of errors made in the design of the IS, to develop a unified approach to documenting the program code and introduce a knowledge base. The use of the knowledge base, in turn, had a positive effect on the efficiency of decisions taken regarding the design of the IS;
- introduction of the role “Responsible for the development of the IT services” allowed increasing the potential for the development of the enterprise due to the emergence of new proposals and initiatives for the development of the IT services.

Implementation of the proposed organizational role model in the activities of a large television company of the Russian Federation allowed:

- providing the centralized architectural management of projects and development processes, which allowed reducing the risks of suboptimization in the implementation of individual projects and programs;
- maintaining the consistency and integrity of the company architecture (including the IT architecture), which will reduce the total cost of ownership of the IS.

6. Findings

The separation of roles within the project team allows explicit differentiation of the responsibility in terms of resources and organization of work (responsibility lies with the “Project Manager”) and the substantive aspect related to the quality of decisions made during the development and implementation of IS (responsibility lies with the “Project Methodologist”).

The IT service allows not only connecting the two layers of architecture: the business architecture and the information system architecture but can be used to redefine the areas of responsibility for the development of the IT and the business as a whole. The introduction of such a role as the “Responsible for the development of the IT service” allows concentrating the IT service competencies within one team of specialists, collecting the entire pool of business requests for the development and completion of functional interfaces related to this IT service in one place, as well as creating the potential for the further development of the IT services.

7. Conclusion

The organizational role model of communication presented in the article can be used as a reference model when building a quality management system. The key feature of the model is that it allows switching to the system management of the IT landscape not at the level of individual projects for the development and implementation of IS, but at the level of the enterprise as a whole. This model is a synthesis of knowledge and practical experience fragmentarily reflected in various methodologies and standards. The authors made a number of proposals, the application of which will significantly improve the quality of the processes of development and implementation of IS, as well as the quality of communication between the roles in projects.

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References

Arsent'ev, A. (2010). IT-proekty: roli i otnosheniya [IT projects: roles and relationships]. https://navicongroup.ru/press-room/publication/2842/ [in Rus.]

Boehm, B. (1988). A Spiral Model of Software Development and Enhancement. *IEEE Computer, 21*(5), 61-72.

DSDM Consortium (2008). *DSDM Atern The Handbook Paperback*. DSDM Consortium.

Gerkushenko, G. G., & Tkachenko, A. V. (2016). Sravnitel'nyj analiz metodologij razrabotki programmnogo obespecheniya [Benchmarking Software Development Methodologies]. *Nauka, tekhnika i obrazovanie, 3*(21), 109-113. [in Rus.]

Kajdalov, A. (2005). Komanda IT-proekta: kak izbezhat' problem (IT project team: how to avoid problems). http://www.realcoding.net/articles/komanda-it-proekta-kak-izbezhat-problem.html [in Rus.]

Kostina, I. (2017). Roli v IT proektah. Te, kto vse eto sozdaet [Roles in IT projects. Those who create it all]. http://blog.rocketbrain.ru/it-roles/ [in Rus.]

Microsoft (2008). Microsoft Operations Framework (MOF) 4.0. https://www.microsoft.com/ru-ru/download/details.aspx?id=23221

Neborskij, S. N. (2009). Model' rolej komandy razrabotchikov programmnyh sredstv na osnove gibkih metodov [Flexible Software Development Team Role Model]. *Doklady BGUIR, 2*(40), 73-79. [in Rus.]

Nikolaenko, V. S. (2015). Razrabotka principov upravleniya IT-proektom [Development of IT project management principles]. *Vestn. Tom. gos. un-ta, 390*, 155-160. [in Rus.]

PMI (2013). Project management body of knowledge (PMBOK®). Institute for Project Management, Inc.

Radzishevskij, A. (2018). Arhitektura IT reshenij. CHast' 2. Arhitektory [The architecture of IT solutions. Part 2. Architects]. https://habr.com/ru/post/347452/ [in Rus.]

Skripkin, K. (2005). IT-proekty: processy i roli v komplekse [IT projects: processes and roles in the complex]. https://www.osp.ru/cio/2005/10/379666/ [in Rus.]

The Open Group Consortium (2018). TOGAF version 9.2. http://pubs.opengroup.org/architecture/togaf9-doc/arch/index.html.

Turner, M. (2006). *Microsoft Solutions Framework Essentials (Developer Reference).* Microsoft Press.

Zaramenskih, E. P. (2014). *Upravlenie zhiznennym ciklom informacionnyh sistem* [Information Systems Life Cycle Management]. CRNS. [in Rus.]