

Company readiness for digital transformations: problems and diagnosis

Olga I. Dolganova

E-mail: oidolganova@fa.ru

Elena A. Deeva

E-mail: eadeeva@fa.ru

Financial University under the Government of the Russian Federation

Address: 38, Scherbakovskaya Street, Moscow 105187, Russia

Abstract

Digital transformation is one of the current trends of business development in modern economies. This article discusses the main problems faced by Russian companies in the course of digital transformations of their activities, and the tools for preliminary diagnosis of the company's readiness for such transformations.

Based on the analysis and synthesis of information from reports of Russian and international research and consulting companies, and relying on the results of scientific research by Russian and foreign experts, the authors identified seven key typical problems that most Russian companies may encounter in the initial stages of implementing digital transformation. The problems identified are ranked in order of their importance for the successful implementation of digital transformations.

For the effective implementation of digital transformation, the authors propose to use the architectural approach in accordance with the recommendations of the TOGAF standard, which allows managing changes in a comprehensive manner, taking into account the needs, opportunities and constraints of both the business system and the IT infrastructure.

The work substantiates the need for conducting the diagnosis of the company's readiness at the initial stage of digital transformations. Such diagnosis can reveal the existing internal constraints that may become an obstacle to achieving the desired result of digital transformation. To identify the main adverse events, causes and problems of organizations with low levels of digital maturity, a method for constructing a tree of current reality has been implemented - an analytical toolkit for studying cause-effect relationships with undesirable features. Practical recommendations on the classification of causes and problems are provided to assess current readiness and plan for transition to the desired state of business system and IT infrastructure.

The proposed approach will allow organizations to identify their problem areas, drawing on the consolidated experience of other companies, as well as to determine the possibility of their adjustment in order to create favorable conditions for digital transformations.

Key words: digital transformation; digital conversion; architectural approach; readiness assessment; digital transformation issues; current reality tree; TOGAF.

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Introduction

Modern capabilities of information and communication technologies allow companies to radically change their activities, create fundamentally new products and services, and interact more effectively with customers. As noted in various studies of the Digital Business Center at the Massachusetts University of Technology [1], Forbes Insights and Hitachi [2], International Data Group (IDG) [3], to achieve competitive advantages, many companies need to significantly change operational processes, implement IT solutions which allow the transformation of digital interaction with customers, and in some cases change the company's business model. The high level of products and services provided is achieved through personalization, customization, improved functionality, improved logistics, creative models for income, as well as innovative design and applications. This level assumes the use of external elements that the company integrates into its solution to create additional value [4]. All of this is recommended for implementation through digital business transformation (DT), which ultimately allows deriving benefits such as revenue growth and increased profits [5]. Today's IT market provides a wide variety of products and solutions in this area, and each company can choose its own unique transformation path.

By transformation of its activities, a company reaches a strategic turning point when it starts following a new strategic concept [6]. Future growth or failure depends on the choice of one path or another, and on the correct calculation of opportunities and limitations. When seek-

ing to implement digital transformation faster, in order not to miss the opportunity to enter new markets or simply retain existing positions, companies follow the leaders in a given area or implement the most "trendy" IT solutions. However, according to Gartner Hype Cycle [7], most of the new information technologies are developing in a curve that represents a sequence of technology maturity states: Innovation trigger – Peak of inflated expectations – Trough of disillusionment – Slope of enlightenment – Plateau of productivity. Key technologies of digital transformation (block-chain, Internet of things, virtual reality, robotization, digital platforms, big data, machine learning, etc. [3, 8]) currently lie in the phase of "inflated expectations" or "trough of disillusionment."

There are a wide variety of paths to digital development. Some of them are implementing a series of pilot projects rather than large-scale transformation programs that do not yield tangible results. The others choose a wait-and-see attitude and observe the market leaders introducing technologies that are at the Innovation Trigger stage or at the Peak of Inflated expectations. They decide to apply such technologies only when they reach a plateau of productivity. In this option, they miss the moment, and hence the competitive advantage. Any fundamental changes in a functioning business are fraught with great risks, especially when it comes to introducing new solutions that affect the processes of the value chain. As Jeff Kavanaugh, Vice President of Infosys noted, "digital transformation is indeed a journey which requires more than a cookie-cutter plan to execute successfully" [10].

Traditional organizations that are engaged in digital transformations can make their position worse, creating more and more complex IT systems, deploying new functions and services without a clear roadmap, without understanding the company's operational features. There is a tendency to the opposite effect from implementation of digital changes in such companies [11]. The quality of management of business processes is decreasing, services are used less frequently, while the organization is experiencing great difficulties in managing the existing information systems and business processes. This is due to the lack of digital maturity in a company that is carrying out digital transformations, which do not allow it to increase the market value of the company but complicate its functioning [12].

In practical studies, experts talk about the need to assess the digital maturity of a company [4, 5, 13, 14], because it allows them to identify opportunities, risks, strong and weak points of a company in the field of digital transformations, and also to formulate a list of primary measures that are required to create the conditions for effective implementation of digital transformation.

In existing works on managing digital transformation, there is a tendency to local analysis of digital maturity. Examples include the development of a digital maturity model for manufacturing enterprises that improve the supply chain [15], as well as the assessment of IT department readiness for digital transformation [16]. Approaches to the management of such transformations have not been studied deeply enough, and the issues of preliminary assessment of the company's readiness for digital transformation have not been worked out. The company's unpreparedness for digital transformation is one of the main reasons for failure which may result from such attempted transformations [17].

The analysis of publications in the field of digital transformation has shown that this topic

was mainly investigated by analytical and consulting companies which are experts in the field of IT and business consulting, and by practitioners in a specific industry. Academic literature on this issue is rather limited, and is lacking conceptual and empirical research.

At the same time, the majority of Russian companies, as those in other developing or developed countries (Germany, China, USA) are at a fairly low level of digital maturity [18]. *Table 1* shows data from several countries for the first three levels of digital maturity out of five, indicating that 38% of Russian companies are in the lower two categories: laggards (1%) and slaves (37%). This means that most of them do not have an appropriate strategic plan and are just thinking about digital transformation.

Therefore, the purpose of this work is to identify the key problems that companies may face when starting a digital transformation, and to develop an approach to preliminary diagnosis of their readiness for transformation. In this regard, the following tasks are considered:

- ◆ analysis of international experience and identification of the most characteristic problems that hinder fundamental changes of the business by implementation of information technologies;
- ◆ ranking the problems;
- ◆ determination of cause-and-effect relationships of problems occurring;
- ◆ development of a diagnostic approach for analyzing the company's readiness for digital transformations within the first stage of architectural design.

1. Methods and approaches to the study of digital transformation

To ensure the effectiveness of changes in the IT infrastructure and in the company's business environment, the prioritization and sequencing of projects requires coordination of digital transformation at a strategic level.

Table 1.

The level of digital maturity of different countries¹

Maturity level	Russia	Germany	China	Poland	USA	World average
Laggards (enterprises do not have a digital plan; they have limited initiatives and investments)	1%	9%	9%	3%	8%	9%
Followers (businesses make very little digital investments; preliminary planning for the future)	37%	33%	25%	31%	23%	30%
Evaluator (business is gradually moving to digital transformation, planning and investing in the future)	36%	31%	36%	37%	25%	33%
TOTAL	74%	73%	70%	71%	56%	72%

As noted above, such transformations affect not only the IT area, but also the business processes and the organizational structure of the company. Therefore, the transformation should be coordinated with other initiatives of the company using operational and functional strategies [19]. This analysis is essential for targeted management of IT development since it allows identification of weaknesses, opportunities to increase efficiency and synchronization of a digital strategy with a business strategy (Figure 1). Thus, enterprise architecture is a tool for managing the investments in digital transformation.

A digital transformation strategy has slightly different goals from the traditionally developed IT strategy. The latter is focused on IT management in a company, but almost fails to consider changes in the business environment. The digital transformation strategy focuses on transforming products, services, processes and organizational components through the introduction of information technology. Thus, it combines business strategy and IT strategy.

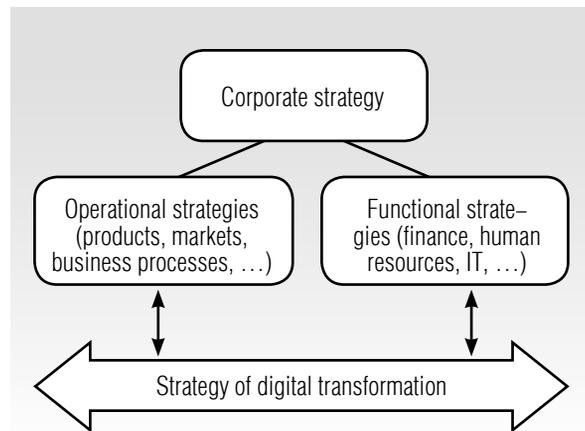


Fig. 1. A relationship between digital transformation strategies and other corporate strategies

The application of the architectural approach assures the creation of structured, extensible knowledge about the company in three projections: the business architecture, information systems architecture and the technology architecture. Therefore, to ensure compliance with the constantly changing business needs, it is appropriate to build an enterprise architecture

¹ Developed by the authors on the base of the Dell global research

and use it for change management [20]. The architectural approach allows building the current and target enterprise architectures, thereby determining the best transition option and ensuring proper management of this transition, with consideration of opportunities and needs of the business system, the information systems and IT infrastructure [21].

In the literature that we have examined similar approaches are suggested to manage implementation of digital strategies, we found similar approaches, pointing to the need for sequential execution of actions such as development of vision, readiness assessment, defining the target state, development of the transition plan, implementation transition and evaluation of the effectiveness of changes [4, 22, 23].

The state-of-the-art principles and methods for managing enterprise architecture are defined by many frameworks, standards and methodologies [24], for example: Zach-

man Model, TOGAF, FEAF, CIMOSA, IAF, Gartner (GEAF), McKinsey, META Group, Microsoft methods [24, 25]. With account for the specifics of each of these approaches, their characteristics, as well as their public accessibility, we suggest the use of the TOGAF standard [23]. It is based on the benchmarking of a large number of practical cases, and supports various levels of abstraction, has a formalized description language and notation system, contains a detailed description of the Architecture Development Method (ADM), as well as recommendations for managing the architecture. A detailed description of this framework is provided in the public domain on the official website of the company, the developer of the Open Group.

In the ADM TOGAF method, one of the major phases that should be performed for any company independently of its specific points, is the “Architecture Vision” [26]. It includes the operations presented in *Figure 2*.

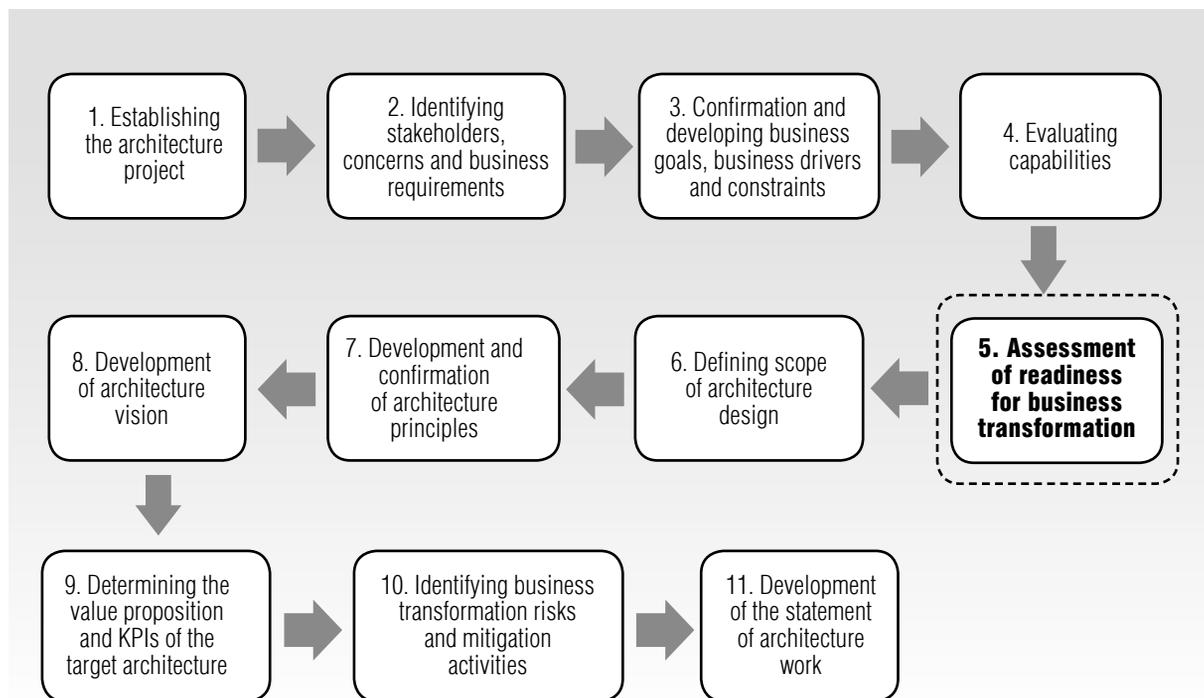


Fig. 2. The sequence of steps at phase A “Architecture vision”

It is at the initial stage of the analysis of the company's readiness for digital transformation, when this project has not yet been launched, that the use of preliminary diagnostic methods is optimal. It allows establishing the cause-effect relationships of the identified problems and to find possible measures to eliminate the causes of these obstacles.

The proposed diagnostic approach will identify possible problems that hinder effective digital transformation and identify the ways to eliminate them. By diagnosis, we mean the establishment and study of features and factors characterizing the state of an object in order to identify possible deviations, their causes and to prevent major disturbances of normal functioning of the object [26].

The information for diagnosis was collected through analyses of the results obtained by Russian and international research and consulting companies, as well as by studying the scientific research of Russian and foreign specialists.

A set of factors proposed in the BTEP methodology [26] has been used as a basis for the list of problems that we have identified as hindering the efficiency of the digital transformation of Russian companies. These factors were further adapted to Russian specifics which were demonstrated in the studies of Dell, MTI, KPMG, Docflow and PwC, and KMDA [18, 28–31].

Ranking of problems according to the degree of importance for successful implementation of transformation was carried out using the method of priority problems. In order to bring the data analyzed into a unified system of evaluation, rationing was used (the results of surveys of managers and top managers of Russian organizations in the framework of the above-mentioned research reports).

To determine the causes and relationships between the factors that lead to the problems of implementing a digital transformation project, we used an analytical tool that Goldratt suggested to study the cause-effect relation-

ships having undesirable features – the current reality tree [32]. Using this tool, we studied the characteristics of companies having a low level of digital maturity. Correction of characteristics helps solving the key problems.

2. Identifying key issues specific to Russian companies starting digital transformation

Any organization, even one having a high digital maturity, encounters obstacles that it shall overcome. This is especially true for companies that are not yet starting their digital transformation. As a result of analyzing different research reports, the most common problems encountered by Russian companies during the implementation of digital transformation projects were identified and ranked (*Table 2*).

2.1. Insufficient maturity of business processes

By insufficient maturity of business processes, we understand a low level of process management in a company, where

- ◆ the main and auxiliary processes are not defined and regulated;
- ◆ automation of business processes is carried out randomly and locally;
- ◆ processes are not adapted to the new technologies which are planned for implementation [33].

The transparency and clarity of the distribution of duties and responsibilities among the participants of a transformation project attracts stakeholders, thereby ensuring the necessary interactions and joint activities aimed at achieving strategic goals. In addition, the definition of metrics to measure the expectations across all areas of responsibility may introduce clarity in the results. One of the main problem areas is the inability to involve employees who work in the back office, i.e. directly with clients and partners, in the work on digital trans-

Table 2.

Ranking of problems in Russian companies during digital transformation

Rating	Problems	Dell	PWC	KMDA	Docflow	KPMG	Number of replies	Average value
1	Insufficient maturity of business processes	n/a*	0.82	n/a	0.75	1.00	3	0.86
2	Lack of required IT skills and knowledge	0.58	1.00	1.00	0.74	0.84	5	0.83
3	Lack of coherency between digital strategy and business vision	0.42	0.96	0.83	1.00	n/a	4	0.80
4	Insufficient funding	1.00	n/a	0.61	n/a	0.50	3	0.70
5	Outdated technologies, lack of integration of new and existing technologies	0.46	0.68	n/a	n/a	0.55	3	0.56
6	Low involvement of management	0.42	n/a	0.49	0.61	n/a	3	0.51
7	Insufficient digital culture	0.54	n/a	n/a	0.39	0.55	3	0.49

* n/a – data not available

formation [34]. The greater the involvement of employees in the transformation, the higher their motivation to evolve in line with the introduced technologies, and the more successful are the transformations.

The consistency of the IT department with other structural units of the company is also a criterion of maturity of business processes in the digital transformation. The importance of this factor is pointed out by 1 business representative out of 4 [3, 18, 28].

2.2. Lack of required IT skills and knowledge

In assessing this problem, it is recommended that you pay attention to the skills of the IT department, the maturity of IT processes, analysis of principles, approaches and methods that are used to develop the projects of digital transformation. Difficulties associated with

IT management cause concerns among many representatives of Russian and foreign companies [35].

It is important to have internal IT competencies for:

- assessing the business needs for IT and quick response to their changes;
- ensuring the effective functioning of business units through IT;
- ensuring the integration of new technologies into the existing IT infrastructure of the company;
- management of digital transformation in the part which is related to changes in IT infrastructure and its services;
- determination of the optimal way to implement digital transformations taking into account the requirements for security of information and data, as well as for target indicators of transformation efficiency.

2.3. Lack of a coherent digital strategy with a business vision

A clear definition of the company's strategic goals which can be achieved through implementation of digital transformation demonstrates the company's maturity in this area. Since, as noted above, IT plays the role of a tool to address the business needs, digital initiatives and an approach to transformation should be clearly defined at the strategic level. However, from 33 to 53% of companies that initiate digital transformation do not have such a strategy and vision [3, 30, 31].

Companies that have a low digital maturity implement local digital initiatives to support specific business goals, and usually this is carried out within the IT strategy [36]. Thus, these initiatives do not represent the basis of the company's business strategy and rarely turn into solutions that directly affect business performance. If we consider the analysis of the digital maturity of Russian companies, many respondents (34%) note that the lack of a digital transformation strategy represents an important problem for the implementation of this kind of projects. Quite often, Russian companies decide on the introduction of technologies for business transformation without consideration of business needs [4]. In accordance with the ADM TOGAF, this work should be carried out at the preliminary phase. By the time of maturity assessment, the potential opportunities and lost benefits should already be formulated, so that further work could be performed with consideration of these indicators.

Another important criterion for the company's readiness for digital transformation is the ability to manage digital competencies and coordinate DT projects at the company level [29].

2.4. Insufficient funding

As it was noted above, companies that are quite young in terms of digital maturity imple-

ment IT projects in a patchwork manner, without reference to corporate strategy. Financial resources are available on request, without long-term planning. This indicator, in our opinion, is directly related to the factors considered above. It is impossible to plan the investments in transformation projects if their implementation is not carried out through a single roadmap. This is confirmed by the results of foreign and Russian companies, which indicate insufficient funding as one of the main problems [5, 18, 28].

2.5. Outdated technologies, lack of integration of new and existing technologies

The efficiency of implementation of new solutions largely depends on the flexibility of IT architecture customization, the ability to integrate solutions, and scaling. Classic solutions for point-to-point integration or data integration buses do not allow full use of the capabilities of technologies that can fundamentally change the company's activities and give it a competitive advantage. To achieve this, the IT architecture shall be implemented on the principles of API, providing a microservice architecture and integration, both inside the company and with external partner resources [5, 37].

2.6. Insufficient involvement of company management

The involvement of senior management in the transformation process and its direct interest shows how serious the company's intentions are to implement digital transformation. This is a serious problem that arises on the way to achieving the efficiency of DT in Russian companies [17, 31]. Both the success of the entire project and its completion, and also the confidence that the company is moving in the right direction depend on it.

It is also important to determine whether the

top manager assumes the functions of a participatory (participating) inspirational leader to ensure the implementation of the project in accordance with the strategic goals of the company [5].

2.7. Insufficient digital culture

The decision making process accelerates the promotion of cultural innovation through the creation and application of interdisciplinary teams, the creation of training groups bringing together the digital generation and experienced staff, and the existence of horizontal hierarchies that facilitate flexible work [5]. More than a third of companies that are beginning or that are already actively involved in the process of digital transformation pay great attention to this problem. Every second leader of digital transformations is already doing all the necessary to form such a corporate culture. Corporate culture should contribute to the continuous development of the company and each of its employees. The presence of horizontal hierarchies, continuous training of employees in order to increase the level of digital culture, close intracorporate cooperation and interaction, a flexible motivation system, high speed of decision making and a results-oriented team will allow the company to more quickly overcome the difficulties of the transition period faster and reach the effective application of new technologies.

3. Definition and classification of cause-and-effect relations of digital transformation problems

As a result of a more detailed study of the cause-effect relationships of the problems that hinder the effective digital transformation, we identified the causes and adverse characteristics that accompany the main problems of such projects. They were systematized using the current reality tree. An example of a current reality

tree is presented in two interrelated and complementary *Figures 3 and 4*.

To display the cause-and-effect relations in *Figures 3 and 4*, the arrows directed from cause to effect are used.

4. Determination of complexity and possibility of eliminating the problems revealed and the reasons of their occurrence

Using the Gordratt method [32] to determine the ways of improving the system being investigated it is advisable to determine to which of the following three areas the identified causes and problems refer: 1) the control area; 2) the sphere of influence; 3) outside the sphere of influence.

If adverse events and causes lie within the control zone, we can influence them in any way. If the problem and the reasons provoking its occurrence are inside the sphere of influence, then, since this area of activity is not directly under our jurisdiction, it is only possible to persuade the decision maker to try to solve the problem. Problems and causes that are outside the sphere of influence cannot be resolved directly or via the person who makes a decision. In this case, it is recommended to focus on solution of feasible tasks.

By classifying causes and problems in this way, it is possible to determine which of them can be addressed or how their impact on the outcome of transformation can be reduced. It is also possible to determine how many problems fell outside the sphere of influence, and how important they are. Often such problems are the lack of interest of the company's management to DT, low maturity of process management, outdated IT infrastructure. In case a large number of quite important problems get in this category, it is necessary to recognize that the company is not ready for such a transformation and the probability of failure is rather high.

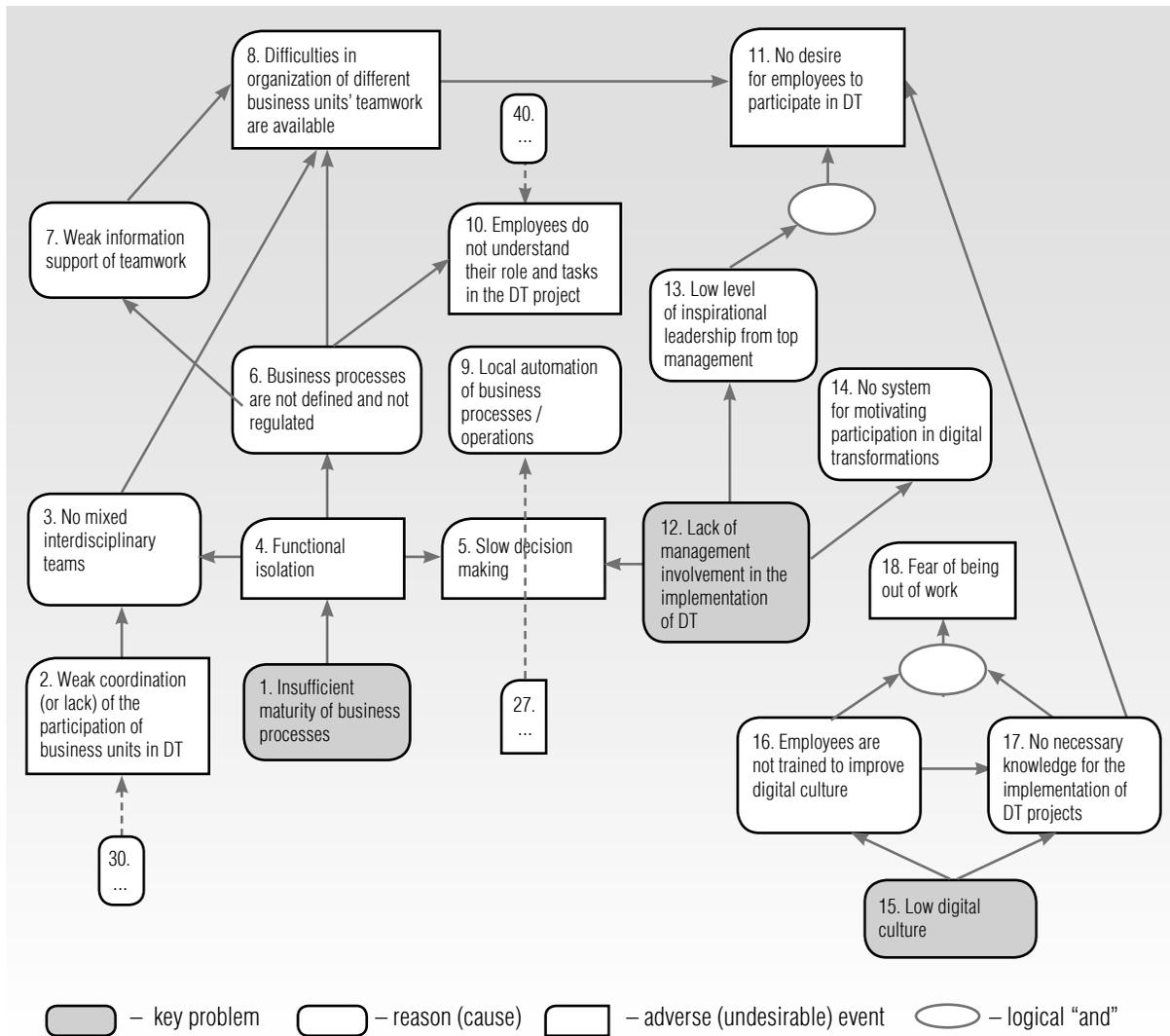


Fig. 3. The current reality tree of the problems of digital transformation (part 1)

On the basis of the above analyses we propose the following approach to diagnose the company’s readiness for digital transformation at the preliminary stage of the implementation of an architectural project:

Stage 1: Identification of key obstacles to digital transformation based on a ranked list of typical problems of Russian companies with a low level of digital maturity;

Stage 2: Identification of causes and organizational characteristics of the company’s activities that lead to these problems, adapting the current reality tree to the business specifics;

Stage 3: Determining the difficulties and possibilities of eliminating the causes of problems by classifying them into three groups: the control zone, the sphere of influence, and outside the sphere of influence.

Conclusion

As a result of the study, the need is shown for a preliminary diagnosis of the company’s readiness for digital transformation. This will allow organizations to assess their capabilities and limitations which are imposed by the current

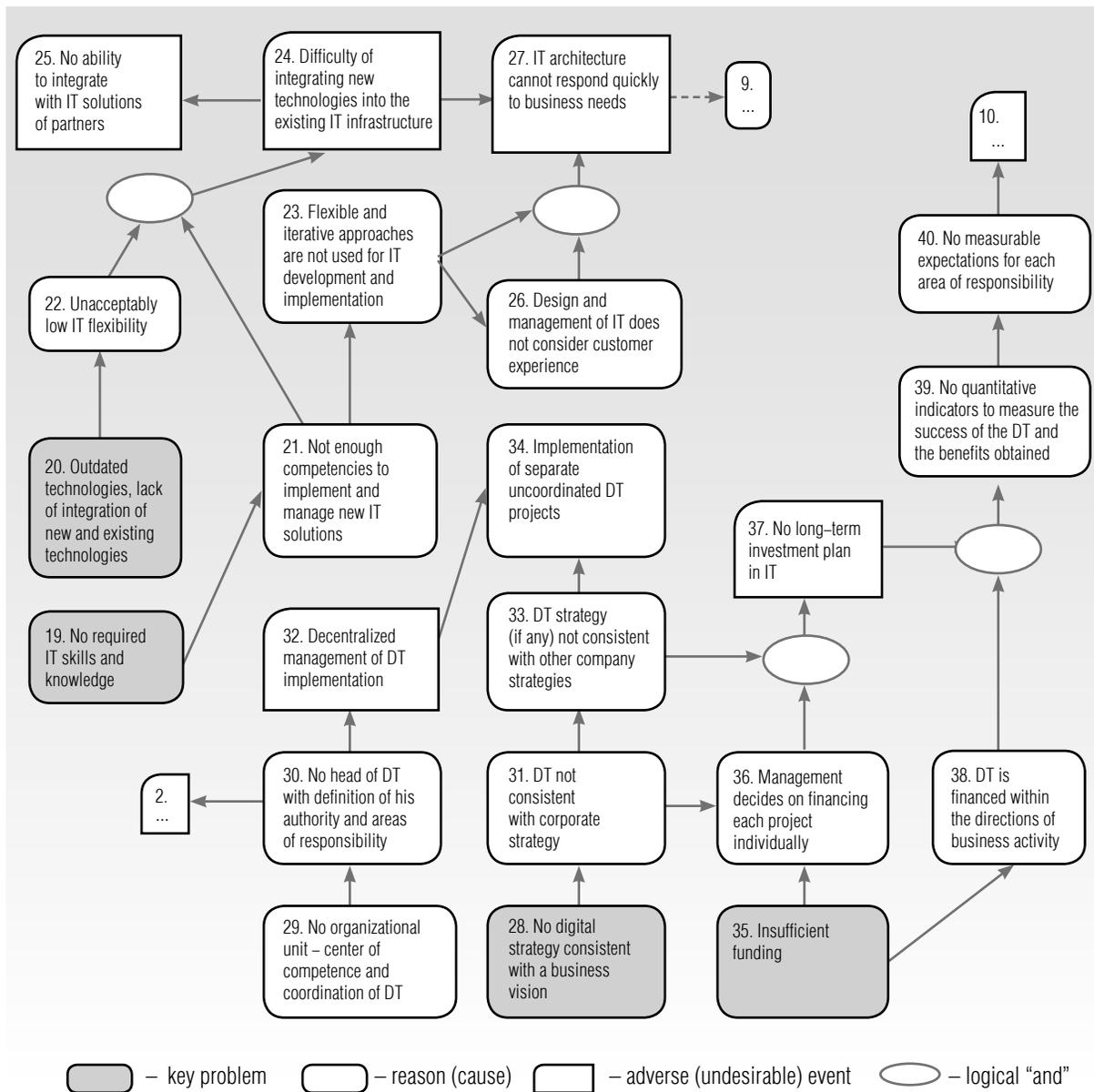


Fig. 4. The current reality tree of the problems of digital transformation (part 2, continued)

organizational structure, management principles, financial, human and IT resources. The efficiency of the application of the architectural approach to the design and implementation of digital transformation of the company's activities has been justified. In this approach, the organization is considered as a set of elements of business architecture, information and technological architectures. At the stage

of preliminary analysis of the company's readiness for transformations, this approach makes it possible to comprehensively investigate the features of the current state of organization, to formulate a target model and a plan for migration from the present to target state.

Through analysis of different studies, the main problems that Russian companies are facing when starting or already implement-

ing digital transformations are identified and ranked. This rating allows assessing the importance of a particular problem when diagnosing the readiness of a company for transformation.

Using the method of problem analysis, the authors identified 21 causes of problems typical for many Russian companies. The tree of current reality constructed in this manner summarizes the experience of Russian and foreign companies in identifying a causal relationship between the business practices of companies having a low level of maturity and the problems they are facing when changing their activities by integrating the new information technologies. The list of interrelations of undesirable phenomena, causes and problems, as well as the TTR itself can be used in the diagnosis of the current state of company as a starting point for building its own unique list of features that prevent effective transformation.

The proposed subsequent division of causes and problems into three categories by the possibility of their elimination allows for a more detailed analysis of the company's current readiness for transformation, and identification of measures for adjusting the organization's architecture in accordance with the requirements of transformation process.

Thus, the authors propose an approach to preliminary diagnosis of the company's readiness for digital transformations, which, in accordance with the recommendations of TOGAF standard, should be carried out in line with formation of the company's architectural vision at the initial stage of transformation project.

The results that the authors have obtained, and the formulated proposals are of significant practical importance, since they allow for a preliminary comprehensive assessment of the organization's activities in terms of its readiness to implement digital transformation in order to achieve positive economic effects. The approach to diagnosis which we developed can be applied to any organization, including one that only considers some fundamental changes via IT integration. Using this approach, the company may determine what problems it encounters, how these problems will impact on the result, and what efforts should be applied to create optimal conditions for digital transformation. ■

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About the authors

Olga I. Dolganova

Cand. Sci. (Econ.);

Associate Professor, Department of Business Informatics,
38, Scherbakovskaya Street, Moscow 105187, Russia;

E-mail: oldolganova@fa.ru

Elena A. Deeva

Cand. Sci. (Econ.);

Associate Professor, Department of Business Informatics,
38, Scherbakovskaya Street, Moscow 105187, Russia;

E-mail: eadeeva@fa.ru