

# Multi-criteria assessment of university readiness for digital transformation

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**Abstract.** This article proposes a methodology for assessing the readiness of a university for digital transformation in four aspects: the architecture of organization, process management, human resources and financing tools. Since each of these areas has its own characteristics, the assessment is carried out using different methods and approaches: TOGAF, CMMI, BPMM, PCF APQC and others. To enable analysis, evaluation and monitoring of changes in the degree of readiness for digital transformation, as well as to facilitate the analysis of available information for each research area or the university as whole, it was proposed to use the dashboard method.

**Keywords:** digital transformation, readiness assessment, university.

## Introduction

As noted in various studies by, for example, Dell, KPMG, PWC and KMDA [1-4], the key problems faced by companies starting to implement the digital transformation are as follows: lack of a consistent digital business vision strategies; insufficient maturity of business processes; lack of necessary skills and knowledge; insufficient funding; outdated technologies; lack of implementation of new technologies; lack of leadership involvement; immature digital culture.

Various approaches to project management, for instance PRINCE2, standards for architectural design and development management (TOGAF, Zachman Model, FEAF, CIMOSA, IAF, etc.) recommend assessing the readiness and maturity of the transformation project in initial phase taking into account existing resources (technological, human, financial and other). The main purpose of this assessment is to prevent the launch of an unsuccessful or too risky project.

In accordance with the recommendations of most approaches, this process should be quick and short, and the conclusions drawn should enable the organization's management to decide on the implementation of the project. Such work can be carried out through the application of a systematic approach to assessing the company's readiness by sequentially exploring its components using a set of complementary methodological approaches, namely: assessment of the company's digital maturity using the MIT

Center method; analysis of organization architecture; assessment of the level of maturity for certain development processes and supporting processes.

Regardless of the chosen path of digital transformation, whether it will be a change in the methods and technologies of communication with customers; radical restructuring of business processes; or transition to a new business model [5], it is important to have a clear idea of the current situation in the company: the level of its informatization and development management capabilities.

The European Research Center for Information Systems (ERSIC) [6] outlines three steps that a company shall make in order to create the necessary conditions for digital transformation, namely: assessing the current level of digital maturity and existing skills for development in this area; determining the level of current and desired digital maturity of the business; determining the plan of actions required to achieve the desired level of digital maturity.

Higher education institutions in Russia are one of the main institutions involved in the digital transformation of the country. However, issues related to the methodological support of a preliminary assessment of their readiness for such transformations have still not been sufficiently studied to date. Available scientific works in this area relate to individual elements and local issues of changing the university's business model, managing the development of IT, reengineering business processes and financing activities. This paper aims at presenting a systematic approach to the analysis and preparation of the Russian universities for digital transformation, which can provide them with competitive advantages and opportunities for sustainable continuous development.

The leaders of digital transformation create value by implementing integrated ecosystems that provide demanded solutions for customers. These ecosystems consist of an operational, technological, and human ecosystem and customer solutions [3]. This article proposes an approach based on an assessment of the readiness of a higher education institution in the following 4 areas: assessment of enterprise architecture and process management, information and technology infrastructure, potential of human resources, and financial instruments. In our opinion, IT shall ensure the coupling of processes in the chain of value creation. An important role belongs to the staff who will use IT to implement business processes, and to the flexible financial instruments used.

## **1 Assessment of the readiness of university architecture for digital transformation**

For targeted management of the evolution of IT infrastructure, the development and analysis of enterprise architecture is a prerequisite, because it allows identifying the weak points, opportunities for improving efficiency, and also ensures synchronization of IT strategy with business strategy. Thus, the enterprise architecture “is a management tool that provides a decision-making process on investments in IT” [7].

To assess the maturity of the university architecture, the CMMI (Capability Maturity Model) scale [8], which is recommended by the META Group in TOGAF, was

taken as the basis. The assessment is carried out by a step-by-step analysis of the compliance of the existing organization architecture with such criteria as:

- correlation with the mission of the university;
- involvement of administration to the process of architecture development;
- participation of business units;
- description of the architecture development process itself;
- development of standards profiles;
- distribution of architecture descriptions for familiarization among organizational units;
- control of the implementation of standards;
- management of the architecture development project;
- availability of the corporate architecture at the scale of educational organization;
- coordination and organization of financing for the development of IT infrastructure.

Most educational organizations in Russia today are at the first or second level of maturity. This is consistent with general trends in the design of enterprise architecture in Russia. Various studies show that this situation has developed due to a lack of understanding of the need to consider digitalization throughout the company, its strategic goals, operational capabilities and needs.

In addition, it is important to pay attention to assessing the skills of IT departments, the maturity of IT processes, analyzing the principles, approaches and methods that are used to develop and implement IT projects [9]. The following requirements for the university's internal IT competencies can be distinguished:

- the ability to assess the needs of the university in IT support of its activities and quickly respond to the changes of needs;
- using IT to ensure the effective functioning of business units;
- ensuring the integration of new technologies into the existing IT infrastructure of the company;
- managing the implementation of digital transformation in the part related to the changes in IT infrastructure and its services;
- finding the optimal way to implement digital transformations, taking into account the requirements of information and data security, as well as target indicators of transformation efficiency.

Thus, it is proposed to analyze the readiness of the organization's architecture in two directions: 1) the maturity of the organization's architecture; 2) organization of IT activities.

The organization's architecture is considered as ready for a successful transformation if, according to all criteria, the architecture indicators correspond to at least the 3rd level of maturity, in accordance with the adapted CMMI model.

To assess the organization of IT activities, the method of expert judgements is recommended. It is proposed to use the following main criteria:

- IT budgeting is flexible, there is the possibility of changing priorities;

- marketing and information technologies are consolidated in order to create a single roadmap for digital transformation;
- applying a flexible iterative approach to the development and implementation of new IT solutions;
- applying modern types of architectures;
- the results of activity carried out by business units using appropriate IT solutions are considered when evaluating the activities of IT departments;
- obtained data on customer experience (internal and external) are used to improve information and technology support for the activities of the university and its interaction in the external environment;
- digital tools are widely used to ensure collaboration, interaction with students and potential customers, as well as to ensure the mobility of all participants in the organization and the implementation of the educational process.

## **2 Assessment of the readiness of university's IT infrastructure for digital transformation**

For the technological solutions that are planned for implementation as part of the digital transformation could assure the desired results, it is important to first create the necessary IT infrastructure and interfaces for them. This will ensure their effective functioning, the required performance, as well as external and internal relationships [10]. Thus, the basic requirements for the information technology of digital transformations of a university can be conditionally splitted into two groups: 1) requirements for IT architecture and 2) requirements for interfaces.

The IT architecture of the university, which prefers following the way of digital transformation, meets the following requirements:

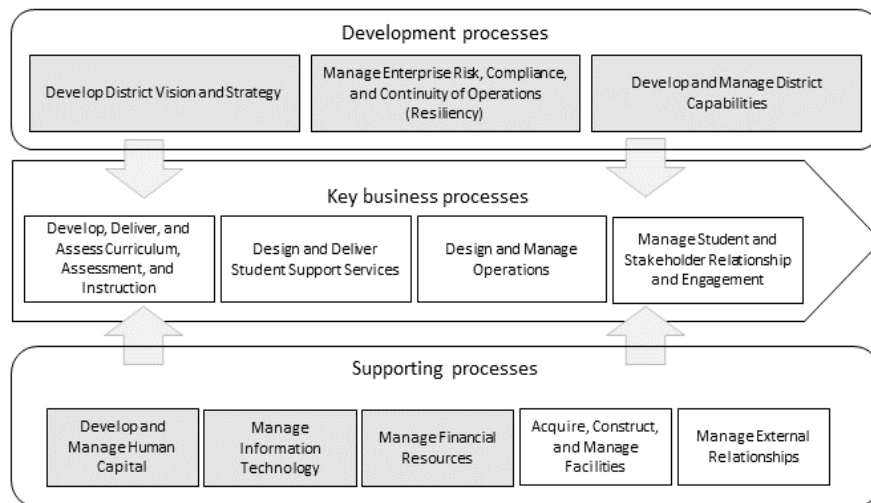
- use of ERP and CRM systems;
- use of integrated solutions for planning and managing the educational process;
- absence of isolated (local) technological solutions;
- provided access to the corporate network and the Internet throughout the university; remote access to the university's IT resources;
- the use of cloud and peripheral computing, if they are more effective than common;
- security of information;
- the decision to introduce information technology is taken depending on the real needs of the university.

The main requirements for the interfaces are as follows: ease of application by users having different levels of IT training (including disabled people); mobile access to the university's IT resources; customization of the interface to individual preferences of the user and features of application; the use of modern means of interaction and data collection.

To assess the compliance of IT-architecture with the above criteria, it is recommended to recur to experts in this field.

### 3 Assessment of the readiness of the university process management for digital transformation

The architecture model of the university describes its functioning, including the key processes which allow achieving the specified goals. In accordance with the classification of processes in a high education institution proposed by the APQC association [11], all processes are divided into 12 categories (see Fig. 1).



**Fig. 1.** Top-level structure of processes in a high education institution

Digital transformation is often followed by large time constraints on the development and implementation of IT systems and the implementation of organizational changes. In this situation, the process groups controlling these transformations begin to play an important role. These include: «Develop District Vision and Strategy», «Manage Enterprise Risk, Compliance, and Continuity of Operations», «Develop and Manage District Capabilities» (see Fig.1).

In addition, the implementation of the planned transformations requires appropriate resource support: IT infrastructure, financing and staff. Thus, it is also necessary to consider the following groups of auxiliary processes: «Develop and Manage Human Capital», «Manage Information Technology», «Manage Financial Resources» (see Fig.1).

It is proposed to evaluate the maturity of process management in a high-educational institution using the BPMM methodology [12] adapted to the specific features of the university. This kind of assessment may be carried out through the answers to a following list of questions:

Question 1. How is implemented the management of processes and their improvement at the organization level?

Question 2. How is performed the strategic and tactical management?

Question 3. How are the key processes managed?

Question 4. How are the key processes implemented?

Question 5. How are the supporting processes implemented?

The received answers are weighed and summed up, which allows to determine the final level of maturity of process management. As shown below, each level of maturity corresponds to a certain number of final points: Level 1 corresponds to 5-8 points; Level 2 to 9-12 points; Level 3 to 13-16 points; Level 4 to 17-20 point; Level 5 to 21-22 points.

The next step in the assessment is to evaluate the maturity of development processes, for example, focusing on ISO / IEC 33002: 2015 [13]. The process shall correspond to a maturity level 3.

#### **4 Assessment of the competence of university staff to digital transformation**

To date, no single system of digital competencies exists for professors in high education institutions. Based on the list of the most demanded competencies in 2020, which was proposed by L.V. Lapidus [14], the basic competencies of the university employees that are necessary for the implementation of the digital transformation were formulated. These competencies include: analytical skills in working with information and Big Data, Creativity, Digital Skills, High Hume Technology & Tech Friendly, hybrid competencies, Fast Thinking & Reaction, Multitasking, Multi-team, Transdisciplinary, on-line communication and SMM promotion skills, Health Skills.

The criteria for assessment were conditionally divided into two blocks:

1) assessment of competencies: knowledge, practical skills;

2) performance evaluation: comparison between the tasks planned and completed.

It is assumed that each professor will be assessed in this way. This will allow to analyze the current possibilities of applying IT and readiness for digital transformation, as well as formulate an educational plan and monitor the developing the necessary skills and competencies among university employees.

#### **5 Evaluating the effectiveness of application of the university financial instruments when implementing the digital transformation**

The main income of state educational institutions in Russia is formed from the budgetary funds allocated for students who came to budget positions and from tuition fees for students who came to charged positions, including foreign students. However, for the implementation of digital transformation, it is necessary to use other available financial sources and instruments. An educational institution is considered ready for digital transformation in terms of the effectiveness of the use of financial instruments if more than 50 % of the following criteria comply with generally accepted standards:

assessment of investment costs, allocation of funds by project stages, allocation of budget and extrabudgetary funds, repayment period, timeliness and completeness of financing, refund mechanism, financial risk of the project, profitability.

## 6 Dashboard for visualizing the results of assessing the readiness of a university for digital transformation

It is proposed to use the dashboard as a tool for visualizing the results of assessing the current readiness of a university to digital transformation, as well as for planning and formulating a target state. The structure of this dashboard can be represented in the form of 5 tabs: organization architecture, IT infrastructure, process management, digital competencies, financing tools. A separate tab provides a summary of the university's readiness for digital transformation. It should be noted that each tab may contain subsections and detailed information, its own tabs, which allow studying in more detail the problem areas for each investigated aspect and criterion.

Each tab demonstrates the results of evaluating each studied aspect according to previously defined criteria. The result and the degree of readiness for digital transformation of the studied element is also displayed. For example, the contribution "Architecture Organization" provides information on the readiness of the architecture of the university (see Fig. 2). The results of the analysis are displayed on the dashboard in a somewhat visualized form, where the obtained points and the corresponding maturity level in two directions are shown. After summing up the results, the system formulates a conclusion on whether the enterprise architecture is ready for digital transformation or not.

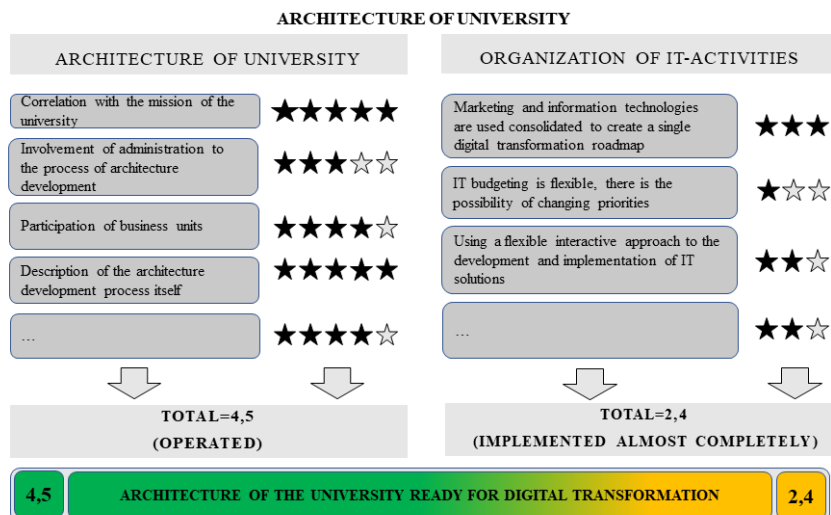
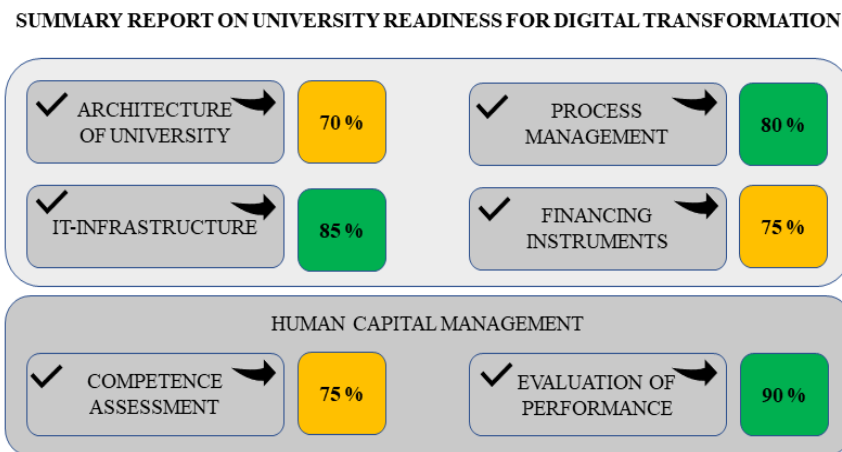


Fig. 2. Layout of the tab "Architecture of university"

In the window with a summary report on the dashboard (Fig. 3), the concluding information on the university's readiness for digital transformation is represented in the areas under study. This allows getting a general idea on the potential of enterprise architecture and process management, information and technological infrastructure, human resources and financial instruments, their readiness to digital transformation, to solution of new strategic issues and the prospects for further development.



**Fig. 3.** Layout of a summary information in a dashboard

The panel helps to identify leaders among departments in terms of more positive values in the dynamics of talent management, allows highlighting the most successful activities to increase the competencies of employees, highlighting the best tools for financing the organization, determining at what stage of development the organization is in terms of university architecture and process management, information technology infrastructure. Using a tool such as a dashboard, the university can constantly analyze and, based on the information obtained, make decisions on adjusting the path to achieve tactical and strategic goals during the implementation of digital transformation.

## Conclusion

The article provides recommendations on a complex assessment of the readiness of a high education institution for digital transformation. It is proposed to evaluate the level of maturity of the organization's architecture using a CMMI model adapted to the specifics of the university. It is determined that for a successful digital transformation, the architecture shall have a maturity level of at least 3. To assess the maturity level of process management, the BPMM methodology is recommended. If the organization of process management corresponds to maturity level 3 at least, then it may be concluded that the process management will not be an obstacle to the effective im-



plementation of digital transformation. Within the guidelines for assessing human resources, it is proposed to analyze the competencies of the main employees of the university, relying mainly on digital knowledge and skills. The criteria are formulated that determine how efficiently the existing methods, approaches and tools are used for financial support of digital transformation.

## References

1. Bourne V.: Measuring business transformation progress around the world. Dell Technologies, <https://www.delltechnologies.com/en-us/perspectives/digital-transformation-index.htm#>, last accessed 2019/09/10.
2. Ustyugova Ye., Danilina M.: Tsifrovyye tekhnologii v rossiyskikh kompaniyakh (Digital Technologies in Russian Companies). KPMG. Electronic journal <https://assets.kpmg/content/dam/kpmg/ru/pdf/2019/01/ru-ru-digital-technologies-in-russian-companies.pdf>, last accessed 2019/09/10.
3. PwC: Digital champions. Global study of digital operations in 2018. PwC (2018).
4. Ryzhkov V., Chernov Ye., Nefedova O., Tarasova V.: Analytical report: Digital Transformation in Russia 2018, Moscow (2018), [http://www.interface.ru/iarticle/files/39873\\_50679725.pdf](http://www.interface.ru/iarticle/files/39873_50679725.pdf), last accessed 2019/10/23.
5. Westerman G., Bonnet D., McAfee A. The nine elements of digital transformation. MIT Sloan Management Review, <https://sloanreview.mit.edu/article/the-nine-elements-of-digital-transformation/>, last accessed 2019/10/23.
6. Maturity Model and Best Practice Skill Development for Digital Transformation, SAP SE (2017).
7. Danilin A., Slyusarenko A. Arhitektura i strategiya. «In' I Yan» informatsionnykh tekhnologiy predpriyatiya (Architecture and strategy. "Yin and Yang" information technology enterprise). Moscow: Internet-Universitet Informatsionnykh Tekhnologiy (2017).
8. OpenGroup: TOGAF v.9.2, <https://pubs.opengroup.org/architecture/togaf92-doc/arch/> Last accessed 2019/11/04.
9. Shchetinin S.: Global trends in digital transformation, The Boston Consulting Group, <https://sapland.ru/file/panelinaya-diskussiya-vizovi-i-vozmozhnosti-dlya-cio.pdf>, last accessed 2019/11/03.
10. Williams K.C.: Top Five Business Trends Impacting K-12 Education in 2018, Gartner, <https://www.gartner.com/doc/3847265>, last accessed 2019/11/04.
11. APQC: Education process classification framework (v.7.2.1), Houston: APQC, URL: <https://www.apqc.org/pcf>, last accessed 2019/11/17.
12. OMG: Business Process Maturity Model (BPMM). Version 1.0, OMG (Object management group) (2008).
13. ISO / IEC 33002: 2015 Information technology — process assessment — requirements for performing process assessment, ISO / IEC JTC 1 / SC 7 (2015).
14. Lapidus L.V.: Competence Center of the Digital Economy, MAKO - Association of Citizens and Organizations to Promote the Development of Corporate Education, <http://www.makonews.ru/centr-kompetencij-cifrovoj-ekonomiki/>, last 2019/11/19.