

Assessing the Maturity of the Digital University Architecture as an Institutional Model for Education Transformation

Natalia Bobro

European University, Ukraine, Switzerland

ABSTRACT: The article examines conceptual and methodological approaches to assessing the maturity of digital university architecture as an institutional model for education transformation. The methodological basis is systemic analysis, a process-architectural approach, and organizational maturity models – Capability Maturity Model (CMM) and Business Process Maturity Model (BPMM). Particular attention is paid to the application of the international benchmarking APQC Education Process Classification Framework, which allows structuring university activities into development processes, core activities, and support processes. The article states that the maturity of IT architecture directly affects the integration of management and educational processes and determines the strategic role of the IT department in the digital transformation of the university. The use of the BCG matrix made it possible to demonstrate the interdependence between the level of technology maturity and the positioning of information systems in the institution's management system. The results obtained prove that achieving at least the third level of process management maturity is a prerequisite for the effective implementation of digital transformation, since it is at this stage that the regulation of key processes, coordination of actions between departments, and implementation of best practices are ensured. Thus, integrated assessment of architecture maturity creates the basis for forming a roadmap for digital transformation and strengthening the university's competitiveness in the global digital economy.

KEYWORDS: digital university, architecture, process maturity, digitalization, digital transformation, IT management.

I. INTRODUCTION

The modern higher education system operates in an environment of profound digital transformation driven by the dynamic development of information technologies, increased global competition, and growing public expectations regarding the quality of educational services. These transformational processes affect not only the content and methods of teaching but also the management mechanisms, organizational structure, and economic model of universities. In such conditions, the digital university emerges as an institutional model capable of integrating educational, scientific, and management processes into a single ecosystem focused on creating added value and long-term competitiveness.

The problem of assessing the maturity of the digital university architecture, which determines its ability to implement new technologies, effectively manage change, and align strategic goals with available resources, is becoming particularly relevant. The architectural approach allows for a systematic view of the university's activities through the prism of business processes, information flows, application systems, and IT infrastructure. This creates a basis for identifying the strengths and weaknesses of the institution, determining development prospects, and forming a roadmap for digital transformation.

Considering international experience and modern methodologies, there is a need for a comprehensive study of the criteria and levels of maturity of digital university architecture. This approach opens up opportunities to improve the effectiveness of management decisions, optimize resource use, implement best practices, and ensure sustainable institutional modernization of higher education.

II. LITERATURE REVIEW

A. Models for assessing the maturity of digital universities

In modern research, considerable attention is paid to the use of maturity models as a tool for diagnosing the readiness of universities for digital transformation. One of the most well-known is the Capability Maturity Model (CMM), which allows determining the level of development of an organization's architecture and its compliance with strategic goals (Paulk et al.,

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1993). In the field of business process management, the Business Process Maturity Model (BPMM), developed by the OMG consortium, is actively used to provide a systematic approach to regulating and improving organizational activities (OMG, 2008). The use of maturity models allows universities not only to assess the current state of digital architecture, but also to form roadmaps for further changes (Tocto-Cano et al., 2020).

B. Educational benchmarking and process classification

An important basis for analyzing university architecture is international benchmarking, in particular, the Education Process Classification Framework developed by the APQC association (APQC, 2014). This framework structures the activities of higher education institutions into groups of processes, allowing for a comprehensive view of educational, scientific, and managerial activities. Similar approaches are used in studies of the digital transformation of universities, where architecture is seen as an institutional model that combines strategic, operational, and support processes into a single system (Safarli et al., 2024; Kolodinska et al., 2022).

C. IT architecture and strategic integration

Scientific research emphasizes the critical importance of IT architecture in the digital transformation process, as the effectiveness of educational and administrative processes depends on its flexibility, scalability, and integration (Verina & Titko, 2019; Bobro, 2025). According to the Boston Consulting Group approach, the degree of IT maturity and its integration determines the role of the IT department, from a performer of technical functions to a strategic partner in managing digital transformations. Thus, universities that synchronize their business and IT strategies gain significantly more opportunities to develop their innovation potential and strengthen their competitive positions (Kubiv et al., 2020).

D. Digital university as an institutional model of transformation

A digital university is seen not only as an educational institution but also as a center for creating new knowledge that operates in the global digital economy (Kozhyna, 2022; Lopuschnyak et al., 2021). Researchers note that its architecture should include business processes, information systems, application services, and infrastructure integrated into a single environment to achieve strategic goals (Bobro, 2025). It is the systematic assessment of the maturity of such architecture that ensures the alignment of transformation processes and creates the conditions for the sustainable development of higher education.

III. METHODOLOGY

The research has been conducted as an analytical and conceptual one, using an interdisciplinary approach covering economic, managerial, educational, and technological dimensions of the digital transformation of universities. The methodological framework consists of system analysis, process-architectural approach, and methods of comparative assessment of the maturity of organizational structures. System analysis was used to identify the key components of the digital university architecture – business processes, information systems, application services, and IT infrastructure – and to identify their relationship with the institutional development strategy. The process-architectural approach made it possible to structure educational, scientific, administrative, and support processes in accordance with the APQC (Education Process Classification Framework) international benchmarking and integrate them into the university's digital architecture model. Comparative analysis was used to study the effectiveness of various models for assessing organizational maturity (CMM, BPMM) and their adaptation to the specifics of higher education institutions. This made it possible to identify the maturity levels of process management and university architecture and determine the critical conditions for implementing digital transformation.

The main sources of information were scientific publications, analytical reports of international organizations, regulatory documents in the field of digitalization of education, as well as works devoted to the application of maturity models and management of organizational architecture. To verify the results, materials from international empirical studies covering the impact of IT architecture, artificial intelligence, big data, and integrated digital ecosystems on the development of universities were used.

The results are presented in the form of tables, matrices, and the author's diagrams that reflect the possibilities for assessing the maturity level of the digital university architecture and outline directions for its further improvement.

IV. RESULT AND DISCUSSION

The higher education system is undergoing profound technological transformations. The growing competition between educational institutions at the global level is forcing universities to implement new approaches to organizing their activities in order to maintain their positions and develop additional competitive advantages (Bobro, 2025). The decisive factor in the

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development of a modern university is its flexibility and ability to respond quickly to external challenges and meet students' expectations regarding the technological sophistication and quality of educational services. This directly depends on the maturity of its IT infrastructure and human resources. In this context, leading educational institutions ensure added value through the formation of integrated ecosystems. They combine educational, managerial, and research processes into a single environment focused on the needs of students, teachers, and external stakeholders. Such ecosystems encompass operational, technological, and human resources components, as well as a system of services that ensure the comprehensive and effective functioning of the next-generation educational institution – the digital university.

A higher education institution is a complex organizational system with a multi-level structure and a wide range of activities. Although one of its key functions is to provide educational services rather than manufacture products, a university can be compared to large manufacturing companies in terms of the complexity of its processes, multifunctionality, and scale of operations (Khomenko, Paustovska, Onyshchuk, 2024). The use of an architectural approach to describing and managing change (Kolodinska, Skliarenko, and Nikolaievskiy) is a universal tool that can be applied both in business and in the higher education system. This approach ensures coordinated management of the institution's development through the targeted implementation of information technology (hereinafter referred to as IT).

The relationship between the architecture of an organization and its development strategy forms the basis for creating a target architecture for the university that meets its real needs and capabilities. This, in turn, ensures the systematic and effective digitalization of its activities.

The university architecture covers four subject areas:

- business architecture (management and educational processes),
- information architecture (data collection, processing, and storage systems),
- application systems architecture (platforms and services for educational and administrative management),
- IT infrastructure architecture (hardware and software, network resources).

To effectively leverage architectural design and digital transformation management capabilities, it is necessary to assess the extent to which organizational and process changes are synchronized with transformations in the university's information technology infrastructure. A systematic view of the institution's activities – a list of tasks, functions, and their performers, implemented processes, and the nature of IT support – can be obtained by analyzing its architecture.

For strategic management of IT infrastructure development, architecture design and analysis is a prerequisite, as it allows identifying weaknesses and potential areas for improvement, as well as ensuring synchronization of the IT strategy with the university's educational and management strategy. Therefore, architecture emerges as an effective tool for managing the financing of the IT and digital asset development of the institution (Leiva, Matera, Schöning, 2023).

To determine the maturity level of the university architecture, it is advisable to use the CMM (Capability Maturity Model) approach, adapted to the specifics of higher education institutions. It provides a comparison of the current state of the architecture with the characteristics of one of the five maturity levels according to specific criteria (Table 1). This approach allows not only diagnosing the current state of the university's digital architecture, but also identifying areas for improvement, which is critically important in the process of building a digital university as an institutional model for education transformation.

TABLE 1. CRITERIA FOR ASSESSING THE READINESS OF THE DIGITAL UNIVERSITY ARCHITECTURE

Assessment criteria	
for university architecture maturity	for IT activity organization
Alignment of architecture with the university's mission and strategic goals	Flexible IT budgeting with the ability to change priorities
Involvement of senior management in the architecture development process	Consolidated use of marketing and information technologies to create a unified roadmap for digital transformation
Engagement of business units and structural units of the university	Application of a flexible iterative approach to the development and implementation of new IT solutions
Description of the architecture creation and development process	Taking into account business unit outcomes when assessing the effectiveness of IT departments
Development of standard profiles	Using customer experience data to improve IT support for the university's activities and its interaction with the external environment
Distribution of the architecture description among university departments	Active use of digital tools to enable collaboration and

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Monitoring compliance with standards Management of the architecture development project Availability of university-wide enterprise architecture Coordination and organization of IT infrastructure development funding	interaction with students and potential customers
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IT architecture is a critically important foundation for the implementation of new technologies in the activities of a modern university (). The effectiveness of digital technologies largely depends on their flexibility, ability to integrate solutions, and scalability. According to the approach proposed by The Boston Consulting Group (BCG), the level of IT maturity and the degree of its integration determine the positioning of information technologies in the development of an organization, especially in the context of digital transformation (DT). The BCG matrix, presented in Table 2, demonstrates the possible effects of the maturity of the technologies used on educational activities and management decisions in the field of strategic development of a digital university.

TABLE 2. INTEGRATION OF UNIVERSITY MANAGEMENT WITH IT, DEPENDING ON TECHNOLOGY MATURITY

IT maturity	Type of business/management integration with IT	Characteristics of the role
Pilot projects	Weak integration	The IT department acts as a technology researcher; its role is to track trends and preliminarily assess the need to combine educational and management processes with digital solutions.
	Strong integration	The IT department becomes the leader of digital transformation; its role is to ensure the efficiency and flexibility of the university's operations.
Corporate replication	Weak integration	The university as an organization is the leader of change. Its role is to ensure the implementation of digital transformation in the corporate IT infrastructure.
	Strong integration	The IT department acts as an advisor to the university management on digital transformation issues; its role is to advise on the safe and effective implementation of changes.

The university business architecture model describes its activities through the prism of key processes, the implementation of which ensures the achievement of strategic goals. This research uses the results of international benchmarking, which are reflected in the Education Process Classification Framework of the APQC association (APQC, 2014). According to this framework, all processes are conditionally divided into 12 categories. Figure 1 presents the author's vision of their generalized division into three groups: development processes, core activity processes, and support processes.

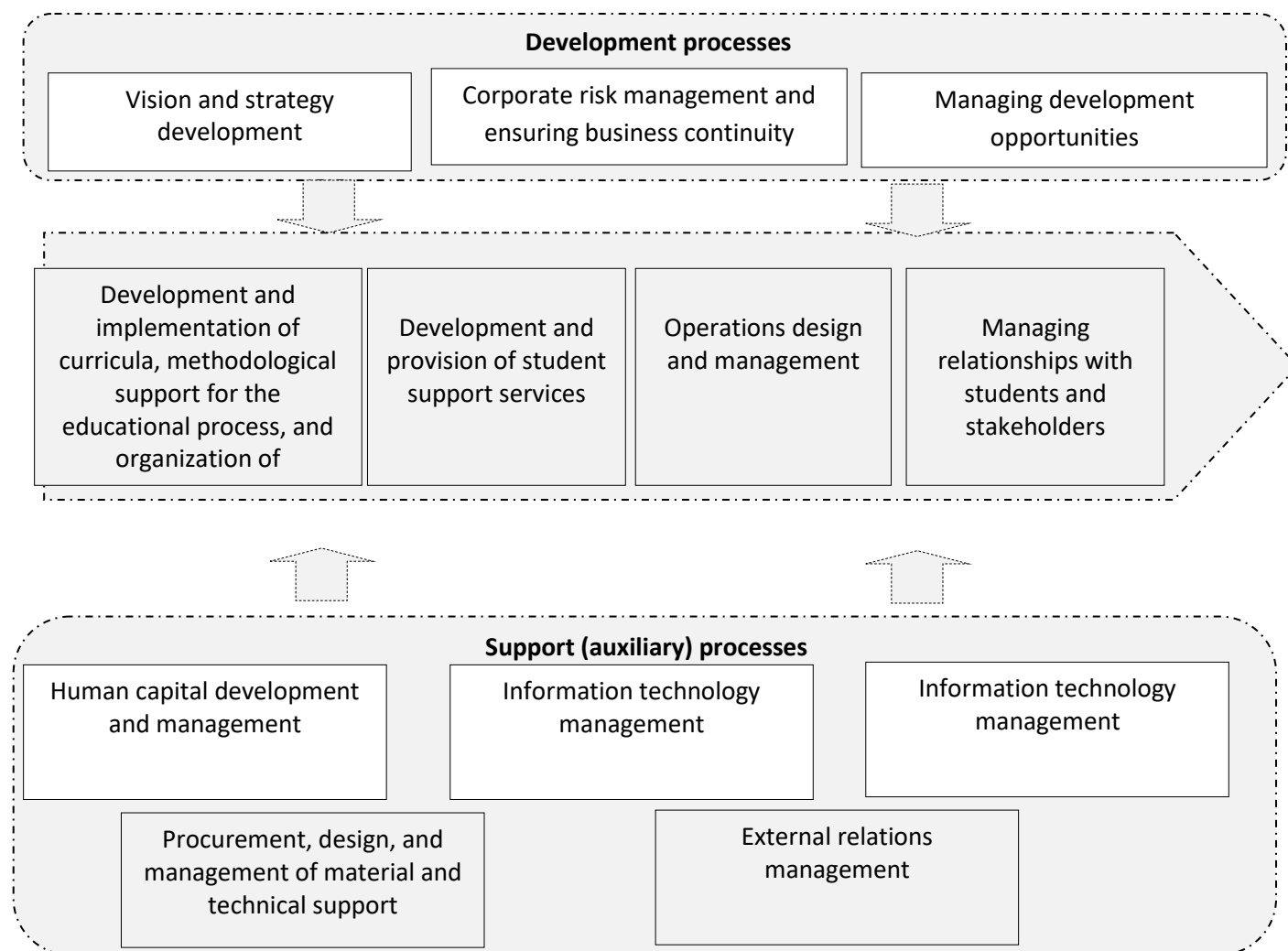


FIGURE 1. UNIVERSITY PROCESS SYSTEM

The digital transformation of universities often takes place under significant time constraints for the development and implementation of IT systems and organizational changes. In such a situation, the decisive role is played by development processes, which include: vision and strategy development; corporate risk management and ensuring business continuity; and managing development opportunities. For the successful implementation of the planned transformations, it is necessary to have the appropriate resources, which will enable the university to quickly adapt to changes in the needs of the internal and external environment. That is why special attention should be paid to the support processes, namely: human capital development and management; information technology management; and financial resource management. Each of the core activity processes has the potential to increase the added value of educational products and services, making them strategically important in the context of digital transformation.

Therefore, when describing the university architecture in order to identify the opportunities and limitations of digital transformation, special attention should be paid to the analysis of key processes (Tocto-Cano et al., 2020). Other categories of processes, the implementation of which is aimed at ensuring the effective functioning of the main process chain and managing the development of a higher education institution, also have a significant impact on the effectiveness of digital transformations.

In our opinion, to create conditions for the effective informatization of university activities, it is necessary to manage organizational changes, taking into account potential risks and ensuring sustainable development. It is important that the university transformation is purposeful and controlled, as this determines the possibility of achieving strategic goals. To assess the current state of process management at the university, it is advisable to use the Business Process Maturity Model (BPMM) developed by the OMG consortium (OMG, 2008). This organization is a leading developer of methodologies, frameworks, and standards for modeling, managing, and automating business processes.

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An analysis of the characteristics of process management in a digital university can be carried out by seeking answers to the following questions:

- B.1. How are processes and their improvement managed at the university level?
- B.2. How are strategic and tactical management implemented?
- B.3. How is the management of key processes organized?
- B.4. How are the main processes implemented?
- B.5. How are auxiliary processes implemented?

The answers to these questions are evaluated on the scale shown in Table 3, after which the scores are added up. Based on this, the level of maturity of process management at the university can be determined: 5–8 points – 1st level, 9–12 points – 2nd level, 13–16 points – 3rd level, 17–20 points – 4th level, over 20 points – 5th level.

TABLE 3. ANSWER OPTIONS FOR ASSESSING THE MATURITY OF PROCESS MANAGEMENT

No.	1 point	2 points	3 points	4 points	5 points
B.1	Process management is not implemented	At the level of individual departments	At the organizational level	Management and improvement at the departmental level	Management and improvement at the organizational level
B.2	Manual control	Defined rules for the functioning of departments	Resource management at the organizational level	Management of capabilities and efficiency at the organizational level	Efficiency alignment at the organizational level
B.3	Manual control	Management at the level of structural departments	Product and service management	Service quality management through quantitative indicators	—
B.4	Implementation with defects, dependence on “heroes”	Performance management at the department level	Management of business unit performance within the core process chain	Service quality management through quantitative indicators	Continuous improvement
B.5	In manual mode	Service quality management	Development management to improve quality	Resource management at the organizational level	—

It should be noted that according to the BPMM methodology, for effective implementation of digital transformation, process management must reach at least the 3rd level of maturity. In this case, standard processes for management, implementation, and support of core activities are regulated, and the actions of structural units are coordinated at the organizational level. At the same time, the best practices accumulated at the university are used and implemented within the framework of business process improvement.

The results of the analysis show that assessing the maturity of the digital university architecture is a key tool for strategic management of transformation processes in higher education. The combination of an architectural approach, maturity models (CMM and BPMM), and IT integration and management decision tools (BCG matrix) allows not only identifying weaknesses and determining potential areas for development, but also forming a comprehensive roadmap for digital transformation. Ensuring that the university’s architecture is consistent with its mission, flexible resource management, and the implementation of best practices creates the conditions for improving the effectiveness of educational processes, developing human resources, and increasing the competitiveness of the university as an institutional model for education transformation.

V. CONCLUSIONS

The research showed that the digital university architecture is a key institutional basis for its transformation, as it integrates business processes, information flows, application services, and IT infrastructure into a unified whole. The ability of a higher education institution to quickly adapt to external challenges, ensure the effectiveness of management decisions, and improve the quality of educational services depends on the maturity level of this architecture.

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The proposed use of architecture maturity assessment models – CMM and BPMM – allows for a comprehensive diagnosis of a university's readiness for digital transformation, identification of the strengths and weaknesses of its organizational and IT processes, and the formation of a roadmap for development. It has been established that for effective digital transformation, a university must achieve at least the third level of process management maturity, when all key processes are regulated, coordinated, and supported by accumulated best practices.

An analysis of the university's business architecture showed that the balanced development of core activities, support processes, and development processes creates added value for educational products and services, creates conditions for sustainable institutional modernization, and strengthens the university's competitiveness in the global education market. In this context, the application of the BCG matrix confirmed that the growth in the maturity of IT systems directly affects the positioning of the IT department, from a performer of individual tasks to a strategic partner of management in the implementation of digital transformation.

Thus, an integrated approach to assessing the maturity of the digital university architecture not only identifies the current state but also determines development prospects, synchronizes educational and IT strategies, and optimizes management decisions and resource provision. This creates the basis for the formation of a digital university as an institutional model for education transformation that meets the requirements of modern society and contributes to the sustainable development of the education system.

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