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## ПРОМЫШЛЕННОЕ И ГРАЖДАНСКОЕ СТРОИТЕЛЬСТВО И ЭКОНОМИКА

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### ANALYSIS OF THE REGULATORY FRAMEWORK FOR DIGITALI- ZATION OF THE CONSTRUCTION INDUSTRY IN RUSSIA

**Abstract.** The article analyzes the regulatory documents published in Russia since the beginning of the digitalization process of the Russian economy, which define the regulatory framework for the digital transformation of the construction industry approved by the government. The process of formation of the digital economy leads to changes in the field of architectural and construction training of students in Russian higher education institutions, putting forward new requirements for the quality of education, and universities - the requirements of new priority goals and objectives for the development of modern education. The urgency of the issue increases in the context of sanctions challenges, when the task of the domestic economy is to activate industry sovereignty. Knowledge of the regulatory framework for the digital transformation of the construction industry in Russia is a methodological foundation for rethinking the importance and essence of technical and technological processes occurring in the industry, which modern graduates of architectural and construction universities should know and understand. The object of the study is the process of digital transformation of the construction industry in Russia. Subject of the study is the analysis of the Russian regulatory framework related to the introduction of digital technologies in the construction industry.

**Key words:** digital transformation, construction industry, regulatory framework

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### АНАЛИЗ НОРМАТИВНОЙ БАЗЫ ЦИФРОВИЗАЦИИ СТРОИТЕЛЬНОЙ ОТРАСЛИ В РОССИИ

**Аннотация.** В статье проанализированы нормативные документы, опубликованные в России с момента начала процесса цифровизации российской экономики, которые определяют утвержденные правительством нормативную базу цифровой трансформации

строительной отрасли. Процесс становления цифровой экономики приводит к изменениям и в сфере архитектурно-строительной подготовки студентов в российских высших учебных заведениях, выдвигая новые требования к качеству образования, а вузам – требования новых приоритетных целей и задач развития современного образования. Острота вопроса возрастает в условиях санкционных вызовов, когда задачей отечественной экономики становится активизация отраслевого суверенитета. Знание нормативной базы цифровой трансформации строительной отрасли в России является методологическим фундаментом для переосмысления важности и сущности технических и технологических процессов, происходящих в отрасли, знать и понимать которые должны современные выпускники архитектурно-строительных университетов. Объект исследования – процесс цифровой трансформации строительной отрасли в России. Предмет исследования – анализ российской нормативной базы, связанной с внедрением цифровых технологий в строительную отрасль.

**Ключевые слова:** трубчатая балка, двутавровая балка, гидравлическая балка, жидкий наполнитель, полость

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## 1. Introduction

The transformations taking place in Russia associated with the formation of the digital economy lead to changes in the field of education, presenting graduates of higher education institutions with new requirements for the quality of education, and universities with requirements for new priority goals and objectives for the development of modern education [1]. The urgency of the issue increases in the context of sanctions challenges, when the task of the domestic economy is to activate industry sovereignty.

The digital economy presupposes such a level of development of information technologies (growth of wireless networks, spread of cloud technologies, development of robotics and use of drones, work with "big data", development of artificial intelligence systems, widespread introduction of radio frequency tags, improvement of machine-to-machine interaction technologies), which allows remote control of the subject environment [3]. Obviously, such control is provided by the corresponding software interfaces that allow connecting objects of the subject world to the network, as well as the operation of sensors that monitor the func-

tioning of objects in real time, and IT specialists should implement the development of such software. However, among the existing problems, there is currently a shortage of IT specialists adapted to a particular sector of the economy, capable of developing highly specialized computer programs and applications. At the same time, there is a shortage of specialists with the knowledge, skills and practical experience in the use of industry-specific software. And the success of the entire process of digitalization of various sectors of the Russian economy largely depends on how quickly and competently these issues are resolved. It is obvious that for the successful development and implementation of the digital economy, it is necessary for specialists in various sectors of the economy to have competencies that would allow them to effectively use software implemented on the basis of digital technologies. Therefore, the national Program "Digital Economy" indicates the need to "...improve the education system, transform the labor market, create a motivation system for mastering the necessary competencies and participation of personnel in the development of the digital economy ..." [2].

The above applies equally to the construction industry, which determines the relevance of the topic of this article, related to the analysis of the Russian regulatory framework related to the process of digital transformation of the construction industry.

The object of the study is the process of digital transformation of the construction industry in Russia.

The subject of the study is the analysis of the Russian regulatory framework related to the introduction of digital technologies in the construction industry.

## **2. The main regulatory documents on digitalization the construction industry in Russia**

The first regulatory document that served as an impetus for the beginning of the digital transformation of the construction industry was published back in 2004 [1]. It was the Urban Development Code of the Russian Federation, presented in the form of a Federal Law, and defining the basic concepts and principles of digitalization of construction. Chapter 7 of this document provides a list of Federal state information systems that support all types of urban development activities of the constituent entities of the Russian Federation, starting with the Unified Information System (UIS), which includes state information systems for supporting urban development activities related to territorial planning, pricing, creating an urban development plan for a land plot, with a register of requirements, with the development of an information model of a capital construction project, as well as with a classifier of construction information.

Since then, for fifteen years, construction organizations have been trying to start developing and implementing this or that software in order to somehow meet the requirements of the Urban Development Code of 2004. And only starting in 2020, the process of industry digitalization began to occur more intensively. In 2020, [2] the RF Government Resolution of September

15, 2020 No. 1431 “On approval of the Rules for the formation and maintenance of an information model of a capital construction project” was published. According to this resolution, the composition of information, documents and materials included in the information model of a capital construction project, their list in the form of electronic documents and requirements for their formats, as well as a list of changes related to the Regulation on the implementation of engineering surveys for the preparation of design documentation, construction, reconstruction of capital construction projects were determined. Thus, the requirements for the execution of documents and the description of objects in information models were specified, and the procedure for working with models was determined, which was aimed at introducing digital technologies into construction.

By the end of September 2020, the State Information System for Urban Development Support (GISUDS) [3] was developed, which defined the main element of the digital vertical in construction. In December 2020, the Classifier of Construction Information (CCI) [4] was published, which is the State system for classifying data required for information modeling of construction projects.

In March 2021, the Decree of the Government of the Russian Federation of 05.03.2021 No. 331 comes into force, according to which «...cases are defined in which the developer, technical customer or person providing or carrying out the preparation of investment justification and / or the person responsible for the operation of the capital construction project must ensure the formation and maintenance of an information model of the capital construction project» [5]. At the same time, documents confirming the developer's activities may not be submitted for inclusion in the unified register of developers. This resolution is aimed at simplifying management procedures in the construction industry and increasing work efficiency.

In 2022, departmental orders and regulations of the Ministry of Construction of Russia are published, such as Order No. 851/pr, which determine the structure and composition of the construction information classifier, as well as calculation methods and other aspects of the industry digitalization process [6]. This order is followed by the Order of the Government of the Russian Federation of 10/31/2022 No. 3268-r, which approves the Strategy for the Development of the Construction Industry and Housing and Utilities Sector until 2030 and with a forecast until 2035. The strategy generally addresses the digitalization of construction processes, simplification and transfer to electronic form of administrative procedures and other management issues [7].

In May 2023, the Order of the Ministry of Construction and Housing and Communal Services of the Russian Federation dated 16.05.2023 No. 344/pr was published, which approved the composition and procedure for maintaining executive documentation during the construction, reconstruction, and major repairs of capital construction projects [8]. According to this order, it is permitted to maintain executive documentation, including general and special work logs, in electronic form without duplicating it on paper.

By mid-2023, a list of XML schemes of the Unified Information System "Stroykompleks.RF" was developed and published, which determine the format for exchanging data between participants in the construction process carried out within its framework [9].

By the end of the third quarter of 2023, Russian Government Resolution No. 1529 will be issued, which establishes the terms and conditions for the transition to information modeling technologies (TIM) in construction [10].

In May 2024, the RF Government Resolution No. 614 was published, which entered into force on September 1, 2024 and should be valid until September 1, 2030.

According to this resolution, capital shared construction must be carried out using an information model, and all construction data and construction documentation must be stored and processed using digital information systems [11].

The conducted analysis of the emergence of regulatory documents aimed at the digital transformation of the construction industry suggests that the legislative framework for this complex process is in the process of formation, and the actual implementation of digital technologies in the practice of designing construction projects is significantly lagging behind. Scientific publications note a number of reasons that slow down this process. To activate the process of digital transformation in the construction industry, it is necessary [12, 13, 14]:

- to increase the low level of digital literacy of the population;
- to increase the number of IT infrastructures;
- to carry out professional training of IT specialists focused on the construction industry;
- to transform the "traditional" consciousness of specialists working in the construction industry, focused on working with material, rather than digital objects;
- to increase the organizational flexibility of existing construction structures incapable of quickly adapting to new technological realities;
- to carry out a radical restructuring of industry business models and management paradigms in the construction sector;
- to activate the solution of educational tasks in the field of industry digitalization in the process of training graduates for the construction industry, related to:
  - understanding what digitalization is;
  - developing the ability to effectively develop and successfully implement industry digital transformation projects;

- developing skills and practical experience in working with corporate projects related to optimizing business processes, processing big data, machine learning, the Internet of Things and others implemented in the construction industry.

digitalization of the construction industry in Russia, should be known to students receiving professional architectural and construction education in order to understand the importance and prospects of their profession in the process of digital transformation of the Russian economy.

### 3. Conclusion

The regulatory framework discussed in the article, which determines the stages of

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