

Complex measures to develop informatization and automation of construction and technical expertise

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Abstract. Using an information model of a capital construction object greatly simplifies the interaction within the construction and technical expertise framework, eliminates redundant procedures, and reduces the duration, labor intensity, and cost of construction and technical expertise (judicial, pre-trial, corporate). In this regard, the article provides a complex of measures for the development of informatization of construction and technical expertise, which can be represented as a combination of three components: theoretical, methodological, and practical. Using the capital construction object's information model significantly simplifies the interaction within the construction and technical expertise framework, eliminates redundant procedures, and reduces the duration, labor intensity, and cost of construction and technical expertise (judicial, pre-trial, corporate). In this regard, the article presents a set of measures for the development of informatization of construction and technical expertise, which can be represented as a combination of three components: theoretical, methodological, and practical. From the point of view of practical value, the proposed set of measures indicates the main directions for the digitalization of construction and technical expertise, which can be projected onto other aspects of investment and construction activities.

1 Introduction

Modern construction is characterized by a permanent complication of technical and managerial decisions, the need to attract an increasing number of specialized contractors for their implementation, and, as a result, an increase in the number of conflict (controversial) situations that require timely, adequate, and objective resolution. A legitimate approach to damping and overcoming conflict situations is the claim work of construction organizations, the main tool of which can be designated construction and technical expertise (CTE).

According to their institutional affiliation, CTEs can be classified as:

- pre-trial, conducted by the competent authorities as part of investigative measures or by the parties to the conflict in preparation for trials;
- judicial, appointed by the court;

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- corporate, conducted by an economic entity as part of an inventory, preparation of negotiations, etc.

Information models of capital construction objects (IM CCO) can be used to conduct construction and technical expertise. Within the framework of this article, the organizational aspect of informatization of construction and technical expertise (CTE) is considered.

2 Materials and Methods

For rational functioning and timely response to conflict (controversial) situations, the processes of construction and technical expertise (CTE) must be identified and organized. This is ensured, firstly, by the separation of the subject activities of experts and the cooperation of their activities within the framework of the CTE, and secondly, by the integration and interaction of performers with the information model of the capital construction object.

In this regard, the development of an organizational method of informatization of construction and technical expertise implies the presence of two aspects:

1. The content side, within which the structure and composition of the IM CCO are linked to the content of the CTE and the rationale for the conclusions in the expert opinion.
2. The procedural side associated with the development of organizational and technological solutions for informatization of the CTE, which is a constantly improving complex process that establishes, within the framework of the construction and technical expertise, the requirements for the work of experts with the information model of the capital construction object.

Thus, the organization of construction and technical expertise on the principles of informatization in these areas involves:

- substantiation of the typical composition of activities (procedures) of CTE;
- determination of the rational organization of CTE informatization, taking into account the qualifications of the performers;
- regulation of the interaction of performers and the implementation of measures of construction and technical expertise using the information model of the capital construction object;
- establishing the procedure for implementing CTE activities and evaluating the effectiveness of using IM CCO.

In this regard, we can especially note the typical composition of measures and procedures for construction and technical expertise, including using the information model of a capital construction object, which is identified, first of all, by the functions assigned to specific performers (experts), and should be aimed at forming objective and independent result of CTE fully reflecting the essence of the conflict (controversial) situation.

In the future, such typification within the framework of the CTE can be continued and extended to all claim work, which will make it possible to establish:

- a typical set of measures (decisions) for each disputable situation with verification of a set of procedures for damping negative consequences;
- link standard solutions with the implementation of an investment project at certain stages of the life cycle of a capital construction object.

3 Results and Discussion

As already noted in previous studies [1-6], for such a typification, unification of organizational decisions of claim work and construction and technical expertise, it is necessary to analyze characteristic, often arising (typical) disputes between business entities, paying special attention to the manifestation of these situations on unique, dangerous and technically complex objects with their distribution by life cycle stages.

Depending on the completeness of the involvement of the information model of the capital construction object in the CTE or the feasibility of its use, organizational solutions for the informatization of construction and technical expertise can be classified:

- 1) fully automated;
- 2) partially automated;
- 3) not automated.

It can be argued that the informatization of construction and technical expertise is a multi-level and multi-factorial task that affects all aspects of its activities. In this regard, a set of measures for the development of CTE informatization can be represented as a combination of three components: theoretical, methodological, and practical (Figure 1).

1. The theoretical component of the development of informatization of construction and technical expertise. It assumes the following areas in which research activities can be implemented:
 - 1.1. The study of interactions and organizational structures within the framework of informatization of investment and construction activities in general [7-12] and construction and technical expertise in particular.

Modern investment and construction activity is undergoing a qualitative transformation, including its organizational and technological foundations. It's caused by:

- firstly, spasmodic changes in the scientific and technical sphere (the so-called change in the technological order);
- secondly, the complication of construction tasks, as well as their practical implementation;
- thirdly, the simultaneous manifestation of such phenomena as the deepening of specialization, the strengthening of cooperation, and, on the other hand, convergence (territorial, organizational, technological).

The superposition and interaction of these factors led to the emergence of new organizational schemes for managing investment and construction activities and new approaches to the operation of a capital construction facility [13, 14]. This, in turn, causes transformations in the interactions of participants at the stages of the life cycle of a capital construction object, including in the event of conflict (controversial) situations. This circumstance and the complication of construction tasks can cause progress in the organization of CTE, which is also stimulated by the use of BIM technologies.

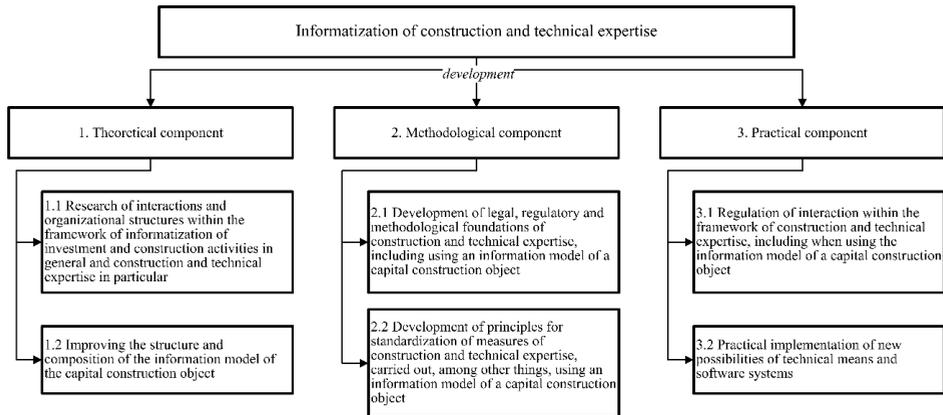


Fig. 1. Components of the development of informatization of construction and technical expertise

1.2. Improving the structure and composition of the information model of the capital construction object.

The subject area of construction and technical expertise, which determines its nature and the range of works and activities as part of the CTE, indicates the need for a certain structure and composition of information models of capital construction objects used for these purposes.

Taking into account the specifics of the CTE, it is advisable to note the features of the formation of the IM CCO, which should contain such components as normative, basic, and real. For the construction and technical expertise, a real information model is important, which, unlike the normative and basic one, is currently not so developed in theoretical, methodological, and practical terms. In this regard, it is necessary to establish the nomenclature of documentation for the formation of a real model [15-21], as well as the estimated parameters for the entire claim work and construction and technical expertise.

In [1-4], it was noted that there is a close correlation between the elements of CTE and building control, which in some cases could complement themselves in information models. The huge potential of IM CCO, including within the framework of construction and technical expertise, is associated with the formation of blocks of multi-D display [5,6], augmented and virtual reality, which should reduce labor intensity or even exclude measurement and research work.

2. Methodological component of the development of informatization of construction and technical expertise.

Within the framework of this direction, activities related to the formulation and solution of the fundamental tasks of using information models of the CCO can be carried out.

2.1. Development of legal, regulatory, and methodological foundations of construction and technical expertise, including using IM CCO.

Having huge prospects in the construction industry and housing and communal services, information models of capital construction objects are at the beginning of their history. What causes, firstly, the underdevelopment and, consequently, the limited use of IM CCO, and secondly, the unresolved issues of legitimacy and applicability of information models in construction and technical expertise.

Thus, legal identification and normative and methodological support of CTE informatization acquire a methodological priority and require priority consideration and implementation.

Changing the nature and procedure for the implementation of construction and technical expertise using the IM CCO will lead to the need for additional regulation of both external and internal interactions, as well as the development and implementation of new professional standards for the specified subject area. Formed based on informatization, new requirements for the standardization of professional activities will contribute to a quantitative and qualitative change in the characteristics of the CTE, such as labor intensity and cost.

2.2. Development of principles for standardization of measures of construction and technical expertise, carried out, including using the information model of a capital construction object.

Establishing the effectiveness (external, internal) of using IM CCO and determining the labor intensity and cost of CTE and its activities are directly related to regulation. To identify the construction and technical expertise's quantitative and qualitative characteristics, you can use analogs (analog objects, analog works) and norms (elemental and enlarged). In this regard, about the construction and technical expertise, a methodology for the selection and use of analogs, the development, and the application of elemental and aggregated norms is necessary. At the same time, the calculation of norms should be carried out following the current procedure for technical and estimated rationing. To do this, it is necessary to identify components such as the range of work, the cost of time, resources, staffing, and the procedure for performing activities [17,18,19].

In turn, an adequate and objective reflection of these components involves collecting, structuring, and updating statistical and other data, the necessary measurements of time and resources, and establishing conditions conducive to the normal course of work and activities (the so-called normal).

3. The practical component of the development of informatization of construction and technical expertise. Practical activities can be grouped into the following areas.

3.1. Regulation of interactions within the construction and technical expertise framework, including when using the information model of a capital construction object.

In the study, two groups of interactions (external and internal) were established concerning the expert organization, which fall within the scope of state and corporate regulation.

State regulation of this subject area involves the development of guidelines for conducting CTE using an information model of a capital construction object, as well as establishing in this regard the required level of competencies of performers of construction and technical expertise through the introduction of professional standards for this type of activity (leading expert, expert, etc.).

Corporate regulation is associated with the regulation of internal interactions of an expert organization. It is a logical continuation and reflection at the level of an economic entity of the requirements given in the federal, sectoral and territorial regulatory documents, but taking into account the conditions and nature of the CTE by a specific contractor (expert organization). Such corporate documents should be corporate regulations for using IM CCO in construction and technical expertise, regulations on the expert group, and job descriptions.

Thus, it can be argued that internal regulation is associated with the organizational and staffing of an expert organization, and the regulation of external interactions correlates with the regulation of construction and technical expertise. These components, in turn, also fall within the scope of regulation and require development

3.2 Practical implementation of new possibilities of hardware and software systems.

The development of a post-industrial society, the change in the technological order, and the concept of the digital economy create favorable conditions for the ever-increasing renewal of the technical and software components of informatization, which affects all aspects of public life, all sectors of the global and national economy. These circumstances indicate an undoubtedly significant potential for informatization of construction and technical expertise, which has not yet experienced the possibilities of using information models of capital construction objects, multi-D design, and augmented and virtual reality. Further progress in technical means and improvement of software systems will create additional opportunities to reduce the costs and time of the CTE, increase its objectivity and completeness, and at the same time give competitive advantages to expert organizations and performers who use them in their professional activities. However, this will require experts to constantly update their qualifications to take advantage of the full potential of scientific and technological progress.

4 Conclusions

The above set of measures for the informatization of construction and technical expertise should become a component of the general trend in the development of modern post-industrial society - digitalization. The use of information models of capital construction objects in as wide a range of aspects of investment and construction activities as possible, including such a sensitive direction as conflict resolution, should lead to more rational and transparent interaction between participants in the construction of buildings and structures, and construction technical expertise contribute to their objectivity, adequacy, and impartiality. The authors consider it appropriate that when solving a purely technical component of CTE informatization, it is necessary to pay due attention to the organizational side and work out the issues that fall into its contour.

The presented grouping of measures is not complete. It can be supplemented with other components or decomposed with a more detailed identification of measures that can be spaced along the time scale of the life cycle of a capital construction object.

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