The use of information technology in the field of construction began with the automation of tasks from various calculations. Today it has moved to the level of management systems for very complex projects, from projects of ordinary buildings, communication systems to automated management systems for state supervision. Practically integrated quality management systems, costs, construction time, supply of necessary materials, which significantly stabilize the economic condition of construction companies, are already used.

The growth of cities and population, as well as the increasing level of competition requires the optimization of the construction process to use automated design systems, which reduces construction costs and reduces lead time. An excellent tool for this is information technology. This article presents the main information technologies used at different stages of the life cycle of building structures.

**Keywords:** BIM-technologies, BIG DATA, information modeling, artificial intelligence, building constructions.

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In the future, this will allow you to improve the quality of construction projects, reduce the cost of materials, and increase the efficiency of the use of construction equipment. The use of information technology in the field of construction will help to create more efficient and sustainable buildings, and will be a key factor in the development of the construction industry in the future.
In addition, the very speed of technology development leads to large-scale digitization of the construction industry. And the question of the application of IT technologies is already a question of competitiveness. Innovations in construction are changing the construction site and increasing profits, as well as helping to win project tenders.

Because it is IT that brings economic benefits and increases the competitiveness of a particular construction company, as well as ultimately implement customer demand with maximum efficiency.

Among the main tasks to be solved by IT are the following: collection and registration of input data; entering data into memory and the possibility of their further transfer to all project participants; processing, accumulation and storage of information data; making the optimal decision on the problem; analysis of results and forecasting of future decisions [2].

The main IT technologies that can be used to solve problems are presented in Figure 1.

BIM-technologies (Building information modeling) become the basis of modern design and the main technology that is planned to be used for construction of objects. BIM technology is not just a virtual modeling of a building, it is a complex digital representation of the physical and functional characteristics of the object [3, 4]. BIM - technology takes into account not just the construction, but also equipment, management, operation of the object, the prospect of repair or demolition, ie covers the entire life cycle of the object in the complex. All components and nuances in the design that are relevant to the object, must be taken into account and considered in a single project. When you remove or replace an item or add-on, the entire model is listed with these adjustments.

Thanks to BIM-technologies the created virtual model of object allows experts: to see all problems and inconsistencies; approve the expected benefits of the object; provides an opportunity to use the model to all project participants; make adjustments; calculate estimates; control the work process; anticipate the risks of future design; calculate resources.

In this way, BIM-technologies reduce material costs, design errors and construction time.

The introduction of the BIM model implies the connection of cloud services for the exchange of data and information in real time. Clouds can contain a wide variety of segmented information and tools, from tools for architects to project management systems that are available to any project participant at any time from any mobile device - the effect of collaboration increases.

Cloud services provide the following benefits [5]:
- high mobility. All information is available from any device with an Internet connection;
- the amount of information stored in the cloud is not limited, as well as the computing power of servers where data is stored;
- scaling according to the needs of the construction project - flexibly adjusted to the needs that do not use unnecessary information, productivity does not fall;
- affordable services - creating your own IT infrastructure is much more expensive than using a cloud service provider;
- instant access to information of all project participants, the whole team;
- simplification of communications and collaboration in real time;
- the ability to manage multiple construction sites without losing the quality of control - the cloud helps to synchronize construction information;
- the ability to reduce the cost of large offices - hosting on third-party servers, do not need to service their own;
- maximum data protection.

Fig. 1. IT in construction
Artificial intelligence (AI) methods are used to solve the problems of planning and processing of construction information [6]. There is a special area of AI - machine learning, it is based on the collection of statistics, on the basis of which conclusions are drawn. New construction technologies will not do without machine learning and AI. In fact, it is an invisible helper that analyzes terabytes of data for problems. This can be a routine filtering of unnecessary information, and vice versa, the search for specific data.

Programs that use AI are used to:
1. Intelligent security threat forecasting analytics based on past data; recognition of important attributes and elements in construction; control of the territory, the number of people on the site.
2. Project planning and design collected and simulated data will help avoid budget overruns; tracking and reducing risks, setting priorities.
3. Robotization of mechanisms, automation of processes of routine, simple, but time-consuming operations on construction, replacement of human strength; optimization of works where high productivity is required [7].

The advantages of using artificial intelligence in BIM-technologies are as follows:
Most projects go beyond the budget, despite the use of the best project teams. Therefore, artificial neural networks are used in projects to predict overspending based on factors such as project size, contract type and level of competence of project managers.

Along with other advanced technologies, it can be an important optimizer of construction processes. Huge data sets and disparate variety of information are structured and analyzed, which results in certain patterns and facts that can be used in a number of tasks that reduce costs, anticipate risks and predict the effectiveness of certain works. Big Data is understood as various facts, data, information not only from people, but also from various sensors, systems and programs together with AI (artificial intelligence), machine learning and Internet of Things - this data becomes a serious tool management. You can identify patterns of weather or climatic conditions (and other conditions) in the proposed construction site to calculate the best time to start construction and predict the smooth running of the project.

Conclusions. Building information modeling is a process based on the creation of a three-dimensional building model that enables architects, designers and builders to effectively plan, design, construct and manage construction sites and infrastructure. To plan and design a construction site, 3D models must take into account the plans of architecture, design, mechanics, electricity, plumbing and the sequence of actions of the respective groups. The task is to ensure that different models at different stages do not conflict with each other. The industry is trying to use machine learning in the form of generative design to detect and mitigate conflicts between different models created by different teams at the planning and design stage.

Each construction project involves a certain risk, which manifests itself in many forms, such as risk of quality, safety, time and cost. The larger the project, the greater the risk, as several subcontractors work in parallel at the workplaces. Today, there are artificial intelligence and machine learning solutions that general contractors use to monitor and prioritize workplace risks, so the project team can focus their limited time and resources on the highest risk factors. AI is used to automatically prioritize problems. Subcontractors are assessed on the basis of a risk assessment, so construction managers can work closely with high-risk groups to reduce it.

References