Use of Modern Means and Methods in the Organization and Management in Construction

S A Sinenko and I N Doroshin

1National Research Moscow State University of Civil Engineering, 26 Yaroslavskoye shosse, Moscow, 129337, Russia

E-mail: ivandoroshin@rambler.ru

Abstract. In the work below there are considered the instruments of automatized decision of different tasks in organization and management of construction. The main trends of digital economics in Russian Federation in 2018 are indicated. There are considered: cybersecurity; transborder cooperation; creation of common platforms; digitalization of state services; B2B - marketplaces; digitalization; blockchain technology; smart-contracts; ICO; Big data.

1. Introduction

For the successful organization of construction in the times of increasing competition it is necessary to automatize maximally the design and calculation works, saving by this the time and human labor expenses. Automatization can be provided by use of information technologies. The use of information technologies in construction began from decision of calculation problems.

At present time it is the most difficult systems of management for complex projects: beginning from the design of buildings, structures, engineer communications and finishing by automatized means of construction control and exploitation of state inspection objects.

Bringing into practice the integrated systems of management of quality, costs, time parameters of construction of buildings, their resource supplement contributes to improvement of economical situation of construction organizations.

2. Trends of digital economics in Russian Federation in 2018

The most important task of modern Russian economics is its digital transformation. Digitalization gives great possibilities of increasing of effectiveness for business and municipal structures. Project management is the driver that may increase considerably the effectiveness and results of these changes.

Digital economics is activity closely tied with development of digital computer technologies, which includes the offices on providing of online-services, electronic payments, internet trade, crowdfunding and other. Digital economics, and especially the emergence of new possibilities, surely, is positively reflected on the human life. Thanks to the development of digital technologies, customer may obtain faster the services, necessary to him, economize, buying goods in internet stores on lower prices.

So, electronic version of the book will cost greatly cheaper, than its printed analog, on wholesale purchase in the internet, you will save more, than buying in offline trade points. Customer may even begin his business online, become enterpriser, not leaving home.

To other advantages of development of digital economics may be referred:
- increase of labor productivity;
- raising of competitive ability of companies;
- reduction of production cost;
- creation of new working places;
- overcoming of poverty and social inequality.

This is only few examples of how positively digital economics influences our life, giving a number of possibilities to the ordinary user, enhancing by this the possibilities of the market itself.

3. Cybersecurity
Cybersecurity is the realization of measures on protection of systems, nets and program applications from digital attacks. Such attacks are usually directed on obtaining the reach to the confidential information, its changing and destruction, on extortion of money from users and on disturbance of normal work of companies.

Successful approach in the sphere of cybersecurity is expressed in the form of multilevel protection, including computers, nets, programs or data, that it is necessary to secure. Personal, working processes and technologies must complement each other in organizations to provide the effective protection from digital attacks.

In modern "connected" world programs of enhanced cyberprotection serve the good of each client. On the individual level an attack with breaking of the cyberprotection may lead to different consequences, beginning from the steal of private information and finishing by the extortion of money or loss of valuable data, for example, of family photos. Everyone depends on critically important infrastructure, for example, power stations, hospitals and companies, providing the financial services. Protection of these and other organizations is important for supporting of life activity of our society. Practically all large construction companies use advanced technologies of information security. A bright example of company holding the leading positions in Russia and abroad is the Kaspersky laboratory.

4. Transborder cooperation
Transborder cooperation is a specific form of foreign-economic, ecological, cultural and educational activity, performed on the regional level in all its public and private forms. In the limits of European Community transborder cooperation is defined as "cooperation on the internal and external boundaries of EC, in which regions play the leading part".

Russian companies actively intrude into the international alliances, determining the technological standards in the years ahead. For example: In may 2017 the head of company "Russian export" Igor Chayka signed the agreement about cooperation with Alibaba, within the limits of which Chinese trade platform will open the Russian national pavilion for realization of the food production and domestic chemistry.

Perspectivity of such beginnings is evident. So in 2017 by initiative of Russian export center the trading platform Made in Russia of sector B2B began its work. Demands for production from the catalogue come from different parts of the world: Asia, Africa, South America. In result there appear long term partner relationships with the participation of Russian producers.

An example in construction: the company Canam (specializes on production of steel) takes part in projects of construction of Yankee Stadium, City Field, Park Red Bull etc.

5. Creation of common platforms
Creation of common platforms allows to synchronize digital decisions, that stimulates appearance of associations, interested in completely new technological decisions. So, in summer of 2017 "Sberbank" and "Yandex" arranged the creation of common platform of electronic commerce on the basis of the aggregator of goods and services "Yandex.Market". General cost of the renewed project is estimated at 60 milliard roubles.
In the field of construction, in particular, in the organization and management of building production there are expected large scale IT-innovations.

The "road map" of development of the construction industry includes many measures related to the sphere of informatization. For example, the strategy of development of the construction industry, that must be worked out till October of 2018, will foresee its digital regulation. Meanwhile, already till September of 2018 the changes must be brought into the legislation, that must foresee the consolidation of authorities in the creation and exploitation of the information systems of support of the urban development activity for the authorized organs of the executive power of subjects of Russian Federation.

The great part of novelties must be realized till the December of 2018. So the transition must be performed to the automatic collection and analysis of the information about the cost of construction resources with usage of the federal state information system of price formation in construction, that will allow to obtain relevant and direct information about the cost of construction resources in real time.

Examples of the equipment, used for creation of IT-infrastructure for the objects of architecture and construction:

Center of storage DellCompellent_StorageCenter provides efficiency, speed and flexibility to scaling on the common platform and safety of data from refusals and damage thanks to the multiprotocol storage center. Storage centers DELL are known for its functionality, especially for virtualization of storage, dynamic allocation of capacity, automatized keeping of data.

The server HPE ProLiant DL380 Gen10 stands out for the feature of treatment of single files and information, that affects positively on the work of the minor and medium companies. The main advan...

6. Digitalization of state services

Setting course for digitalization, the state motivates companies to develop high-technology resource and sets the certain bar for the introduction of IT. In the limits of the program of "Digital economics" Russia plans to bring the internet to the distant regions of the country, to locate the state documents in the cloud storages, to provide to 2025 year the provision of 80% of state services in digital form.

Also it is planned to create 50 smart-cities, to launch 10 industrial platforms in digital form and to transfer 10 companies in high-technology format. As a comparison, in Denmark the program of digitalization was accepted yet in 2001. The population and business cooperate with the state mostly through online-services, because of which the country saves $136 millions every year.

The main demands to the modern systems of construction project management consist in the organization of common information space for the operative exchange of information, connection of positions of work schedule with objects of digital model and finally binding to financial systems for closing of the forms of work acceptance of contractors for the payment.

Examples of such decisions:

1. Complex solution for the construction process management "Ares Prism" allows to carry out the account of construction in five dimensions: three dimensions are the 3D model, the fourth dimension is time, the fifth is money. The minuses of such system are evident: the complication of the program, that is an obstacle for many firms.

2. The company Elecosoft the special tools for project management PowerProject, for the estimation of BIM-projects - Bidcon. Thanks to such division it was possible to create more laconic interface, comfortable and clear connection with the information model. The absence of mobile application for the operative link doesn't let Elecosoft to declare itself as a complex decision for project management.

3. Danish solution GenieBelt on the contrary, presented completely the mobile application for project management. The decision is made professionally, in a modern way and from the first sight seems the most comfortable from the similar analogs. Geniebelt allows to control works from the work accomplishment schedule, and also to create the current tasks for the operative decision of some
questions. The types of works will be highlighted by bright contrast colors, and icons with the photos of performers will provide the clear understanding of who is responsible for one or another task.

7. B2B-marketplaces
They replace the morally outdated digital platforms, where everybody sells everything. Aggregators of goods and services is a trend of last 10 years, in retail customers used to employ them. Business also needs comfort conditions for online-shopping and variety of ways of payment of goods and services of the special category.

For the large developer the search of suppliers of construction materials, which often is represented by small contractors, is a long and cost-effective process. In this situation the only way out for us all is to create a normal marketplace. The construction needs a platform, where you can meet and get acquainted. With using of modern technologies. Such platform may be used not only for the search of construction materials. The minor and medium business companies may cooperate effectively with large developers in branches, where they have competitive strength: architecture, information modeling of buildings, erection of niche and club houses.

Examples of such platforms: "All.biz - Russia", "Puls cen", "Sdelki.ru". These platforms aren't single-purpose in construction sphere, but have the corresponding sections in catalogs (among them on different materials and services).

8. Digitalization
Digitalization represents a transition of information into the digital form. Digital transmission of information data, encoded in discrete signal impulses, is applied broadly in modern communication systems. In USA the people see in digitalization the way to information society, further globalization and transnationalization of the information communications on all the planet. In Europe and other parts of the world there exists another point of view on digitalization, tied with protection of the overland broadcast as a mean of keeping of national and local features and interests by own information tools.

The houses, printed on 3D-printer, construction drawings in cloud - the digitalization makes a revolution in the construction industry, but with its development in the future many questions are yet connected. Doubtless is only the fact, that construction industry and digitalization are as if created for each other, and the greatest profit from their union the customer will gain.

"For the construction industry now begins the same critical stage, as for the media-industry 15 years ago. Companies must decide, whether they will forcibly keep for the old methods of work or will bravely step to the world of digital technologies."

Examples:
- The service YIT Plus. The purpose of YIT Plus is to develop the digital services, that will relieve the life to their clients. As an innovator in its branch, the concern finds possibilities to make experiments and to develop the new methods of work. The construction industry and digitalization, by opinion of Ruusk, are merely created for each other. Thanks to this union immaterial digital technologies find their expression in real dimension. And digitalization, from its side, brings to the construction industry the transparency, flexibility and speed, that allows companies to increase its client orientation.

Such radical innovations, as, for example, the whole buildings, created on printers with the help of 3D-technology is the distant future, by opinion of Heimo and Ruusk. The key trend of the nearest future is the development of Internet of Things, IoT. For example, detectors, fastened to the working equipment, will convey in real time the data about its usage and possible defects to the provider. So it will be possible to avoid damage and repair. The data, received in real time, will provide also the possibility of loading of automatic supplements.

The basic directions and instruments of digital economics: Blockchain technology, smart-contracts, ICO. Storage, treatment and analysis of Big Data, digital currencies (bitcoin, the eterium).
9. Blockchain technology
Blockchain is built-up according to the special rules continuous consequent chain of blocks, containing the information. The Blockchain as a perpetual digital distributed journal of economic transactions, that may be programmed for inscription of not only financial operations in the form of cryptocurrency, but practically of everything, that has value.

Blockchain is the universal instrument for creation of different databases, that possesses the next advantages:
- decentralization. The main server for storage of data is absent. All the records are stored by every participant of the system.
- complete transparency. The every participant is able to trace all the transactions, performed by the system.
- confidentiality. All the data are stored in a ciphered form. The customer may trace all the transactions, but cannot identify the receiver or the sender of information, if he doesn't know the purse number. For the carrying out of operations the unique access key is demanded.
- safety. Any attempt of making of illegal changes will be declined because of the contradiction to previous copies. For the legal change of the data the special unique code is necessary, that is given and confirmed by the system.
- compromise. The data, which are added to the system, are checked by other participants. If we have to use the clever words - they recalculate the hash. (There is a special article, dedicated to hash function, but in fact they count apples using the difficult mathematic formulas).

10. Smart-contracts
The smart-contract is an electronic algorithm, that is intended for automatization of process of accomplishment of contracts into blockchain. The main idea of smart contracts is to exclude the difference of interpretations of contract conditions by the concluding sides in construction.
Smart-contracts give the possibility to exchange safely the money, shares, property and other assets directly, with no participation of agents.

To conclude any bargain you have to address to a notary or advocate, to pay for the documents and to wait for their registration. Often many points of these documents contain references to certain legislation articles, that one can interpret for himself, avoid. In the case of nonfulfilment of the bargain conditions, in reality people must address in court, spend money on the process again and prove their rightness. At conclusion of such bargains the confidence of the contract sides is out of the question.

The principle of work. The smart contracts are based on the blockchain technology. It is a distributed register, that represents a decentralized system, that exists thanks to multitude of computers, united in one net. The blockchain lets users to perform transactions, to communicate information and material value without banks and agents.

11. ICO

ICO is a form of attraction of investments in the shape of selling to investors the fixed number of new units of digital currency, obtained by single or accelerated emission. The form of "primary supply of tokens" is also met. Beside that the term ICO is often replaced with the word "crowdsale".

The analytic group Smith + Crown asserts, that in 2017 the quantity of ICO was practically doubled in comparison with 2016 (from 1,5 allocations a week to 2,75). Meanwhile the amounts of borrowed funds increase considerably: together with hundreds of projects, attracting from several hundred thousand to several million dollars, the companies enter the market, the allocations of which attracted hundreds million dollars. For example, Status Research & Development GmbH, Switzerland placed tokens of Status Network Token (SNT) for the sum of 95 million dollars, the more successful became the allocations of tokens of EOS and Bancor.

The concept of ICO is tied closely with cryptocurrencies and blockchain technology, that is a replicated distributed database. ICO is realized in a form of preliminary emission by a company of its cryptocurrency without the procedures of mining or forging and of distribution of this emission between the interested persons.

The units of the sold cryptocurrency in the professional community are called coins as well as tokens. Before the emitted digital currencies were exchanged principally for bitcoins. Later to a bitcoin as a mean of payment for tokens there was added the broadcast of the blockchain platform Ethereum. Bitcoins and ethers possess great liquidity that a new cryptocurrency usually has not. So, for receiving the means on its project it's not necessary for the issuer to achieve popularity for the new cryptocurrency, it is enough to persuade the investors in the effectiveness of its project and to guarantee the ransom from them the new cryptocurrency in some time.

12. Big data

In the modern world the Big data is a socio-economic phenomenon, that is tied with the appearance of new technological possibilities for the analysis of vast amount of data. The vast numbers of data are handled for a man to obtain the concrete and necessary results for their further effective application.

The decisions on the basis of Big data: "Sberbank". For the "Sberbank" it is the system, that analyzes the photographs for the identification of the bank clients and prevents fraud. The system was introduced yet in 2014, in the base of the system lies the comparison of photographs from database, which get there from the webcams on the stands thanks to computer vision. The base of the system is a biometric platform. Because of that fact, the cases of fraud decreased in 10 times.

References
[1] Ragoulin P G 2004 Informacionnye tekhnologii Electronic textbook (Vladivostok) URL: http://window.edu.ru/resource/007/41007/files/dvgu128.pdf
[2] Informacionnye tekhnologii v stroitelstve i upravlenii territoriyami Russian Public Organization «Delovaya Rossiya»
[3] «TADVISER. Gosudarstvo, Biznes, IT» http://www.tadviser.ru
[4] https://talent.mos.ru/about/news/129294381/
[5] Portal of Management of Civil Service and Personnel of the Moscow Government https://mguu.ru/upravlenie-v-tsifrovoj-ekonomike/
[6] https://rb.ru/opinion/ekonomika-rossii/
[7] https://mining-cryptocurrency.ru/blockchain/
[8] https://rb.ru/howto/chtotakoe-big-data/
[9] https://www.cisco.com/c/ru/ru/products/security/what-is-cybersecurity.html
[10] http://www.fingramota.org/teoriya-finansov/item/2198-chtotakoe-tsifrovaya-ekonomika