

# *Safe City as Part of the Concept of “Smart City”*

Pavlov Aleksandr

North-West Institute of Management,  
branch of the Russian Presidential Academy of National Economy and Public Administration,  
St. Petersburg, Russia  
pavlov.aleksandr.sbor@yandex.ru

**Abstract**—The article discusses the features of public safety in modern conditions in the framework of the use of the concept of “smart city”. Currently, the Russian Federation is tasked with the formation of sustainable socio-economic development and the growth of the investment attractiveness of the country. In this regard, it is necessary to develop a unified approach in order to ensure public safety, law and order, and environmental safety in conditions where a high level of risks of a technogenic and natural nature is maintained. In modern conditions of increased requirements for the functional fullness of security systems, it is worth noting the lack of a unified approach to solving this issue. All this led to the need to form a unified concept of a safe city, both at the level of the constituent entities of the Russian Federation and at the level of municipalities.

**Keywords**—*smart city; safety; concept; innovation; law and order; warning; monitoring; control.*

## I. INTRODUCTION

In the era of informatization of society, the emergence of new threats and problems of human life has led to the fact that the functional purpose of the city in modern conditions is being rethought and ways of organizing urban space in the interests of citizens are transformed. The ideas of a “safe city”, which are focused primarily on society, are becoming increasingly popular. According to the latest research, the safest cities in the world are: Tokyo, Singapore, Osaka, Stockholm, Amsterdam, Sydney, Zurich, Toronto, Melbourne, New York. Moscow ranks only 43rd in terms of security. A safe city is characterized not so much by a set of high-tech solutions used, but rather by how these solutions help to overcome the challenges that cities face at the current stage of development: a high level of depreciation of the main urban infrastructures, lack of budget resources to solve the problems of the current functioning of cities, deterioration environment, etc. The process of urbanization, as well as the approximation of cities to the limit values of the reliability and functionality of the existing infrastructure, increase the need for the introduction of advanced technologies to improve the safety and efficiency of the functioning of the urban ecosystem. Most of the issues related to overcoming the above challenges can be partially or fully resolved by implementing a digital transformation scenario in Russian cities as part of the most current understanding of the concept of a safe city as part of a smart city. How to ensure a high level of public safety, using the concept of “smart city”? What modern technologies will allow the city to become safe?

## II. RESULTS AND DISCUSSION

Each epoch contributes to the development of cities the idea and content, which become the personification of the main direction of the evolution of society as a whole. In traditional societies, the cities performed, first of all, the function of a “market square”. In the industrial era, the pulsating points of the development of society became single-industry towns – settlements that were located in places of extraction or processing of natural resources. The transition to an information society puts forward the idea and project of a “smart city”. “Smart City” is a urban settlement in which the management of all functions of the city is based on modern information and communication technologies [1].

The implementation of the first projects of smart cities began in the USA, China, Europe, these projects included the development and implementation of individual components included in the intellectual network of urban space. Among these components, in the first place, it is worth noting the engineering systems, which made it possible to use energy sources efficiently, which led to minimization of environmental impact; livability of public areas; innovative systems in education, healthcare, services, etc.

“Smart City” is a multidimensional concept based on smart technologies, structured around several main components: smart mobility, smart environment, smart management, smart life and everything that is aimed at creating the well-being and well-being of people [2]. At the present time, overseas, the active introduction and implementation of the idea of a “smart city” has been reflected in the formation of ratings and the methodology for determining “the smartness degree” of an urban settlement [3]. Studies show that the “cleverness” of a city manifests itself in many aspects of urban life and in urban space. For example, modern urban space needs strategic and tactical planning of the Urban transit system, taking into account not only the convenience of passenger transportation, but also informed support and friendly to the environment [4]; rational use of energy, environmental and climatic resources prompts to reconsider the planning and development of urban areas [5]; saturation of urban space with information systems transforms it into cyberspace, which allows you to create a City profile, model changes and manage them [6], etc.

In modern conditions, the basic principles are defined, on the basis of which the model of a “smart city” should be built. These are mainly economic and managerial (budgeting, scientific soundness, consistency and integrity of management actions, honesty and business ethics, etc.); social (priority of

ensuring a high standard of living of the population, ensuring the security of the environment, democracy, etc.); organizational and technical (continuous improvement of the system, modernization of management processes, the inadmissibility of irresponsible areas, etc.); environmental (environmental safety, the unity of the city and nature, etc.) [7].

One of the important requirements and criteria for the concept of "smart city" is to ensure the safety of the population. UN research data showed that the land area occupied by cities accounts for only 2.6% of the total area, but cities provide about 80% of the world's GDP, using about 75% of natural resources and energy, as a result of such activities by cities being thrown into The atmosphere is about 75% of all carbon dioxide and 70% of garbage. With the development of their cities, new threats are threatening: terrorism, an increase in the number of natural disasters, an increase in the level of migration, an increase in the population, an increase in the level of poverty, and further environmental degradation.

City threats are conventionally divided into two levels, the first is "threats in the city", the second is "threats to the city". The first group should include such typical threats as damage to utility systems, crime, etc. The second group should include the risk and danger of the vital activity of the city, for example, the activities of enterprises in the field of industry and energy, etc. [8].

The specificity of the threats, as well as the need to ensure public safety, determined that the "safe city" as a component of the "smart city" concept is a set of organizational and technical measures aimed at creating effective management decisions based on the registration of emergency and extreme situations and events in complex geographically distributed infrastructure, which is integrated with software and hardware tools for intelligent information processing, which coordinate I centrally [9]; it is a system of organizational and technical measures aimed at preventing crime and preventing criminal encroachments on the life and property of citizens, creating a psychological environment for a safe stay on the streets, squares, in places of mass visits and residence [10].

Despite the fact that the real size of the world market for safe city technologies is rather difficult and even harder to predict how they will change in the medium and long term, some attempts are made in this direction. Thus, according to estimates by the research company Markets and Markets, the market volume in 2017 was 424.68 billion US dollars, and by 2022 it will already reach 1.2 trillion US dollars. Another estimate is given by the Frost & Sullivan agency: according to their forecasts, the market for safe city technologies will reach 2.4 trillion US dollars by 2025. The growth of the market is also due to the fact that as it develops, in addition to traditional IT companies and infrastructure giants, new types of players are beginning to emerge - small and medium-sized technology firms, engineering and consulting companies.

Turning to the Russian realities of security, the following levels of security can be distinguished: at the level of the constituent entities of the Russian Federation and at the level of municipalities. The common characteristic of the existing threats in the modern world is their interrelated nature, which

is expressed in the fact that one threat leads to a whole chain of other disasters, and therefore the need to build an integrated approach to ensure public safety and security of the environment is determined.

Russian experience in the development of safe cities can not be attributed to the advanced. In the international rankings of Russia, as a rule, is represented weakly and not in the first positions. Among the key players in the smart city technology markets, there is actually only one company from Russia - Kaspersky Lab, which provides cybersecurity solutions. The projects of a safe city implemented in the country at this stage are mainly related to point digitalization and the intellectualization of individual services and infrastructure elements. In addition, the analysis of patent and publication activity shows that Russia does not have its own technological backlog in most areas of safe city development. Despite this, today in the country the awareness is gradually coming to the realization that the implementation of the concept of a safe city can lead to a cardinal increase in the efficiency of functioning of both individual elements of the city infrastructure and cities (city systems) as a whole.

One of the traditional Russian problems is the lack of coordination of activities, including services involved in ensuring public security (the Security Council of the Russian Federation, internal affairs bodies and internal troops of the Ministry of Internal Affairs of the Russian Federation; organs of the Federal Security Service of the Russian Federation; organs of the Foreign Intelligence Service of the Russian Federation; organs of the Federal Control Service drug trafficking, the Federal Security Service agencies, the customs authorities of the Federal Customs Service, the Ministry of Justice of the Russian Federation, the Federal Service of the National Guard troops of the Russian Federation (Rosgvardiya), the Russian Federation Ministry of Civil Defense, Emergencies and Elimination of Consequences of Natural Disasters). To improve the city's security level at the local government level, it is advisable to create a system of operational interaction of services, their joint participation using modern digital technologies will allow creating an integrated information system for forecasting, monitoring, preventing threats and eliminating consequences, controlling elimination of emerging emergencies.

For the formation of an effective integrated information system "safe city" at the level of municipalities it is necessary:

1. Develop uniform functional and technical requirements related to hardware and software tools that are focused on the possibility of forecasting, quick response to the threat, and the possibility of preventing threats to ensure a high level of security at the local level.
2. Creating a single information space in the framework of addressing the issue of security and monitoring the level of public security.
3. Development of a modeling and forecasting system, using a situational analysis to identify existing threats to ensure public safety, the reasons for their occurrence, possible ways to eliminate them.
4. The use of innovative public safety systems: space navigation systems, hydrometeorological and topographic and

geodetic space support, as well as other geographic information systems.

5. It is necessary to create new software and hardware domestic means of maintaining and ensuring public safety.

Many studies show that for the further development of the concept of a safe city, it is necessary to effectively use the already existing infrastructure, as well as the results of research and previously existing state programs conducted earlier in this field. The basic level of implementation of changes in the field of public security should be the municipal level.

The implementation of measures to ensure a high level of public security should include the possibility of modeling possible directions for the emergence of threats to public safety, modeling the system to eliminate identified threats, calculating the response time to emerging threats, and controlling the elimination of emerging threats. It is necessary to form an effective workflow system. All this will make it possible to increase the efficiency of local governments, as well as to form an effective system of interaction between authorities at all levels, to build a coordinated work of all public safety services, to optimize transport flows, to build an effective system of interaction between the population and local governments, to draw up work plans for prevent the occurrence of possible threats, create an effective information system to ensure public safety.

At the same time, there is every reason to believe that the implementation of the concept of a safe city can be accepted by Russian cities as a target. There are several prerequisites for this. Firstly, in Russian cities (especially large ones) there was a request for the introduction of technologies and products of the new generation, contributing to the effective solution of the most pressing problems. Secondly, the transition to safe cities is perceived as one of the elements of a larger-scale initiative to form a digital society and economy in Russia. Finally, thirdly, the state's position on the institutionalization of the topic of smart and safe digital cities is being actively shaped.

### III. CONCLUSION

In the conditions of the technological revolution unfolding in the world, the intellectualization of urban development processes is carried out within the framework of the actively developing concept of smart cities. The coalescence of the concept of a smart city and the processes of safe transformation occurring in Russia and the world is a reality that has already happened. The "safe" characteristic has recently been the key for the modern generation of smart cities. This means that a long-term development strategy for Russian cities is inevitably linked to the implementation of this approach.

Under these conditions, there is a gradual revision of approaches to managing urban development, which increasingly relies on new technological solutions, digitalization and platformization. For the conceptual understanding of such a transition, the term smart city is increasingly used. A safe city is one of the main components of a "smart city".

The active institutionalization of the concept of safe cities (the emergence of profile standards, the emergence of national and international associations and ratings, the increasing dissemination of the term in political discourse, etc.) is closely linked to the formation of a specialized market of relevant technologies at the global level. As various groups of technological solutions scale up, this niche becomes more and more attractive for investments from a number of players (business, government, local communities, etc.).

The main barriers to the digital transformation of Russian cities are, on the one hand, barriers to the development of new technological solutions (for example, in terms of standardization of new technologies, features of working with data, including with large ones, attracting alternative sources of financing technological projects). On the other hand, legal, organizational and technological barriers to the implementation of safe city technologies by municipalities and businesses play a significant role (for example, outdated requirements in SNIPs, features of public procurement, lack of complete, automatically verified and reliable spatial urban data, etc.).

Given these barriers, the first step towards creating conditions for the technological transition of urban ecosystems should be a significant improvement in the regulatory framework. At the same time, the most productive at the initial stage is the application of special legal regulation aimed at stimulating the introduction of appropriate technological solutions.

Particular attention should be paid to the establishment of financial instruments that provide resource support for the implementation of safe city projects. This primarily concerns tax breaks, subsidies and grants in the framework of relevant government programs, support for initiatives in the field of public-private partnership.

The basic technological solutions in the field of intelligent security for modern cities are centralized monitoring stations, digital surveillance systems, predictive detection technologies, as well as systems that provide a coordinated response to situations involving security breaches, etc. From fixing damage or wrongdoing, security complexes are increasingly moving towards analytics in real time and predictive analytics. Based on statistical models and data from smart devices, they are able to calculate the likelihood of accidents at work or the commission of crimes at a specific place and time. In addition to direct effects (increasing the speed of response to incidents, the increase in detection of crimes, reducing their number, etc.), the introduction of smart security technologies also improves the business climate and the overall socio-economic situation in the city.

Thus, intellectualization and digital transformation of the city is not a single-moment process. To achieve a high level of security, cities need to go through a series of successive stages from a technological and organizational point of view, which correlate with the technological and project basis of generations of a smart city. The formation of a smart city, data-driven, with a single integrated infrastructure, is a natural result of a phased and consistent intellectualization of urban sectors and digital transformation.

## References

- [1] V.A. Il'ichev, "Biosphere compatibility: Technology innovation. Cities that develop people". The publishing house LIBROCOM, 2011, pp. 112-114.
- [2] E.J. Tomaszewska, A. Florea, "Urban smart mobility in the scientific literature - bibliometric analysis" *Engineering Management in Production and Services*, vol. 10, Iss. 2, pp. 41-56, 2018.
- [3] S. Escolar, F.J. Villanueva, M.J. Santofimia, D. Villa, X. Toro, Xavier, J.C. López, "Multiple-Attribute Decision Making-based approach for smart city rankings design", *Technological Forecasting & Social Change*, 2017.
- [4] K. Lu, B. Han, X. Zhou, "Smart Urban Transit Systems: From Integrated Framework to Interdisciplinary Perspective", *Urban Rail Transit*, vol. 4, Iss. 2, pp. 49-67, 2018.
- [5] A. Barresi, "Urban densification and energy efficiency in Smart Cities - the VerGe project (Switzerland)" *Techne: Journal of Technology for Architecture and Environment*, Iss. 1, pp. 28-32, 2018.
- [6] Y. Ma; G. Li; H. Xie; H. Zhang, "City profile: using smart data to create digital urban spaces", *ISPRS Annals of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, vol. IV-4-W7, pp. 75-82, 2018.
- [7] T. Shade, "Urban Science: Putting the Smart in Smart Cities", *Urban Science*, vol. 2, Iss. 4, pp. 94, 2018.
- [8] A.V. Koskin, O. P. Arkhipov, O. A. Ivashchuk, O. V. Pilipenko, O. A. Savina, "Basic principles of building an automated control system for a safe smart city and mechanisms for their implementation," *Construction and reconstruction*, No. 2, pp. 63-68, 2012.
- [9] V. Chvanov, "From a safe facility to a safe city", *Security. Reliability. Information*, No. 70, pp. 26-29, 2007.
- [10] V.A., Dulenko, V.A. Pestrikov, "Analysis of approaches to security in urban territorial objects in the framework of the concept of safe city", *Vestnik VEG*, No. 4, pp. 22-27, 2011.