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Organizational and Technical Problems of Developing the Integrated Information System for Monitoring, Forecasting and Managing a Smart City

Elena Georgievna Balenko[a]
DON STATE Agrarian University, 24 Krivoshlykova St., Persianovsky Village, Oktyabrsky District, Rostov Region, Russian Federation
Department of Natural Sciences, DON STATE Agrarian University, Persianovsky Village, Oktyabrsky District, Rostov Region, Russian Federation
Balenko2008@mail.ru

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Abstract: The article analyzes the peculiarities of the construction and development of the Safe City hardware and software complex in the process of analyzing and processing big data. Theoretical aspects of integration of complex system of monitoring, forecasting and management of smart city with information systems of other organizations are considered. Based on the results, separate recommendations were proposed to improve the use of the Safe City hardware and software complex, taking into account the processing of unstructured information of large volumes. Taking into account the strategy focused on the introduction of digital technologies in cities, which directly affects all areas of public activity, it should also be noted that for the most effective analysis of information, it is necessary to use not only information systems of organizations and departments, but also systems for analyzing and forecasting a smart city.

1 INTRODUCTION

The implementation of a unified systematic approach to ensuring public safety, law and order and environmental safety while maintaining a high level of technogenic and natural risks is one of the important elements of creating smart cities based on the use of digital technologies. The lack of a unified system approach and increased requirements for the functional content of security systems led to the need to form an integrated multi-level system for ensuring public safety, law and order and environmental safety in the Russian Federation.

The relevance of measures to ensure public safety, law and order and the safety of the city is determined by the presence of various kinds of threats (natural, man-made, biological-social, environmental and other nature) for the entire habitat of the population (residential, public and administrative buildings, industrial and agricultural production facilities, transport, communications, broadcasting, television, technical structures and utilities systems, drainage systems, natural resources).

Natural threats are natural phenomena or processes that can lead to emergency situations, as well as disruption of the life of the population (dangerous geophysical, geological, meteorological phenomena, hydrological phenomena).

Man-made threats are dangerous situations provoked by human economic activity, carrying the threat of harmful physical, chemical and mechanical impact on the population and habitat.

Biological and social threats are situations of violation of normal living conditions of people, the existence of farm animals and plant growth, the emergence of a threat to human life and health, the widespread spread of infectious diseases, and losses of farm animals.

Environmental threats are situations caused by the critical state of atmospheric air, water and soils.

Threats in the field of transport security are conditions and factors that can lead to a decrease in the level of transport security.

[a] https://orcid.org/0000-0002-4046-1317

Conflict threats are situations in which social explosions, criminal and terrorist threats, escalation of extremist activities, and the incitement of national and religious conflicts are possible.

Threats to information security are a set of conditions and factors that create a danger of violation of information security.

Management (operational) risks are situations that threaten disruption of the vital activity of the population due to the low efficiency of control and interaction of operational services, state executive bodies.

2 METHOD OF RESEARCH

A common feature of threats at the present stage is their interconnected nature, which is expressed in the fact that one implementation of a threat can cause a whole chain of other catastrophic processes, which determines the need for an integrated approach to ensuring the safety of habitats and public safety of smart cities.

Currently, the Safe City hardware and software complex is being actively introduced in the Russian Federation. The hardware and software complex allows you to use a single information environment that ensures effective and immediate interaction of all forces and services responsible for ensuring public safety, law and order and environmental safety. This complex is a combination of hardware and software that allows you to effectively control and respond to various threats and crimes in an urban environment. Thus, Safe City is a comprehensive information system that provides opportunities for forecasting, monitoring and management, as well as preventing and eliminating potential hazards, monitoring the elimination of the consequences of emergency situations and violations through the functioning and dispatchers who carry out their work for the fastest response.

The purpose of building and developing the Safe City hardware and software complex is to increase the overall level of public safety, law and order and environmental safety by significantly improving the coordination of the activities of the forces and services responsible for solving these problems. The implementation of an integrated information system based on cities ensures forecasting, monitoring, prevention and elimination of possible threats, as well as control over the elimination of the consequences of emergencies and offenses.

The main tasks of building and developing the Safe City complex are:

formation of a communication platform for local governments in order to eliminate the risks of ensuring public safety, law and order and the safety of the living environment on the basis of interdepartmental interaction;

development of unified functional and technical requirements for hardware and software tools focused on identifying potential points of vulnerability, forecasting, responding and preventing threats to the security of the city;

ensuring information exchange between participants in all existing programs of the relevant federal executive bodies in the field of security through a single information space, taking into account the delimitation of access rights to information of a different nature;

ensuring information exchange at the federal, regional and municipal levels through a single information space, taking into account the differentiation of access rights to information of a different nature;

creation of additional tools on the basis of municipalities to optimize the operation of the existing system for monitoring the state of public safety;

construction and development of systems of situational analysis of the causes of destabilization of the situation and forecasting of existing and potential threats to ensure the safety of the population of the municipality.

As part of the construction and development of the Safe City complex, it is planned to achieve a single level of informatization of municipalities, the degree of technical equipment of all local governments with telecommunications infrastructure and information resources must meet the recommended technical requirements of the Safe City complex.

At the regional level, aggregated information from municipalities is consolidated on the basis of an information and communication platform that provides the executive authorities of the constituent entities of the state with the ability to:

control over the operational situation in the region;

coordination of interagency cooperation at the regional level;

ensuring operational management of services and departments in case of regional emergencies and in critical situations.

At the federal level, the relevant federal executive bodies have full access to all information in the general information environment, and have the opportunity to use it in full, in accordance with the access rights established by the relevant regulations.

The Safe City complex is based on an integration platform and provides end-to-end information transfer and processing, ensures the integrity and consistency of information flows and procedures within the framework of interdepartmental interaction, taking into account restrictions on access rights in accordance with the regulatory documents of the relevant departments. The introduction of the Safe City agro-industrial complex in various regions of the country contributes to improving the quality of life of the population and improving public safety. The system today includes subsystems: video analytics, a recognition system (including biometric identification) and detection, a geographic information platform, photo and video capture, a security system using sensors, and other complexes of automated subsystems. Automated systems are already integrated into the monitoring, forecasting and control system under consideration:

"Forecasting and providing support for the adoption of

management decisions ";

"City Video Surveillance Center";

"Data processing using a technological intelligent system";

"Organization of control of duty service in the city";

"Monitoring the movement of vehicles";

"Integrated Security Monitoring Reliability Platform"

and other information systems.

Cameras of other video surveillance systems are also integrated into the city video surveillance system, which are installed at various important social facilities.

3 DISCUSSIONS

In the above systems, a heterogeneous, different-time array of spatial information circulates. The "Safe City" system operates with the specified information in large volumes.

Based on this, the key aspect of the development of the system under consideration is the methodologies, methods and tools of spatial analysis, which interpret the set of topological, geometric, attributive, geographical and time components of spatial information circulating in the hardware and software complex.

Monitoring tools and analysis of open sources of information allow you to process large data collected from sources such as television, radio, video conferencing, print and electronic media, Internet sites, including social networks. It should be noted that this information is predominantly unstructured, has the form of texts of arbitrary content, sound or visual form.

Primary processing of such information by means of monitoring and analysis of open sources of information makes it possible to:

Collect and integrate heterogeneous information from multiple sources

primary processing of geospatial information;

monitoring of open sources of information;

tracking references and messages about companies, persons, organizations, geographical objects, events;

automatic determination of subject, geography and nature of messages;

collecting data on the social portrait of groups of people based on their behavior, statements, profile data in different social networks and analysis of its connections.

Analytical processing in a comprehensive system for monitoring, forecasting and managing a smart city is aimed at obtaining new information about objects, analytical processing of unstructured and structured information. Based on classification methods, clustering, analysis of causes and relationships, factographic analysis, the system allows you to carry out:

comparison of information on references and messages about persons, organizations, geographical objects, events;

analysis of data on the social portrait of groups of people based on their behavior, statements, profile data in different social networks;

scenario modeling of the development of crisis situations based on the identification of favorable trends and problem situations, development of recommendations, assessment of the results of the actions taken.

A comprehensive information system for monitoring, forecasting and managing a smart city processes big data, which can significantly increase the level of situational awareness of decision makers.

At the same time, it is necessary to note a number of disadvantages of the development of the hardware and software complex.

The volume of large data of heterogeneous spatial information does not allow the operator to understand and analyze the entire amount of data that the Safe City hardware and software complex is able to provide. Part of the information interaction between operators of various information systems is carried out in an automated form, which requires manual processing or interpretation. Thus, obtaining the required information by the operator can take a significant amount of time.

Information systems of various organizations and departments connected to the Safe City hardware and software complex use disparate information models and incompatible regulatory reference information.

Processed data in various organizations and departments are duplicated, which can lead to a low level of reliability of the information received.

Information interaction of departmental information systems that process personal data is complicated due to additional restrictions on the security system and the delimitation of access rights to use this information.

These shortcomings can lead to an increase in the time to obtain the required information, difficulty in analyzing and predicting crisis situations.

The elimination of these shortcomings will make it possible to organize information interaction between departments and organizations of the city and thereby:

promptly adapt a comprehensive system for monitoring, forecasting and managing a smart city to new emerging crisis situations;

ensure the required relevance and reliability of data used in decision-making, including through the possibility of direct access to data;

Increase utilization of collected big data across organizations

significantly increase the efficiency of decisions made by increasing the number of decisions made using an integrated system for monitoring, forecasting and managing a smart city;

reduce the time spent on organizing access to the required data, in cases where sources and consumers have different departmental affiliations.

4 CONCLUSIONS

In connection with the above, it is necessary to clarify the existing approaches to solving the issues of building and developing the Safe City hardware and software complex at all levels of the organization with the implementation of appropriate scientific and methodological measures.

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