Analysis of project implementation concepts Smart city

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Abstract. The article is devoted to the analysis of the characteristic features, the experience of introducing the technologies of the Smart City, which allow for the sustainable development of modern cities, improve the efficiency of urban management, improve the quality of life of the population in all spheres, including economic, social and environmental. A study was conducted to determine the principles of transition from the traditional model of city management to the model of "Smart City". Successive stages of this transition are proposed.

1. Introduction

The largest urban population growth that has ever occurred on the planet requires significant efforts to ensure the sustainability and quality of life of the urban population. Modern reality has a significant impact not only on approaches to urban development and urban governance, but also ultimately affects the competitiveness of the country as a whole. So in developed countries, the urban population is already 65 percent or more, and according to forecasts, by 2050, urban residents will make up more than 75 percent, that is, three-quarters of the population will live in cities Fig. 1. In addition to increasing the urban population, there is a tendency for the cities themselves to grow; the number of megacities in the world is constantly growing. Russia is particularly characterized by insufficient growth and development of small and medium-sized cities compared with large cities.

2. Problems of development of modern cities.

The most important problem that all states will have to solve in the current century will be the successful management of cities, based on a balance of economic and technological capabilities and minimizing environmental damage. Thus, the experience of introducing Smart City technologies shows that it is possible to increase the emergency response by 20–35%, reduce the average time to and from work by 15–20%, reduce the incidence by 8–15%, and reduce mortality by 8–10%, as well as reduce greenhouse gas emissions by 10–15%.

Urban development is primarily associated with meeting basic human needs, such as infrastructure, energy, jobs, housing, health and education, sanitation, transportation, mobility, security and safety; equally important basic needs are also communication and relaxation; among other things, it is necessary to ensure economic efficiency and environmental friendliness.

Solving these problems requires an evolution of management and decision making, as well as more efficient wise use of resources. The whole concept of the modern Smart City is focused on solving and satisfying the needs of its residents in the best way, using unique innovative tools, including artificial intelligence.
A smart city is a city that, along with traditional tools, primarily uses information and communication technologies (ICT) to ensure sustainable development, improve the quality of life, improve the efficiency of urban management and service delivery, increase competitiveness, while ensuring satisfaction of economic, social and environmental needs of not only the existing but also the future generation of residents. It creates attractive and safe conditions for life, work, entrepreneurship, creativity and relaxation of people. Such a city not only guarantees economic and social well-being, but also ensures the rational use of resources for a long life and successful development.

The concept of “Smart City” implies that technology is a key factor in its existence and development, they contribute to the transformation of society, but nevertheless they are only a tool for improving management, planning, careful spending of resources, creating infrastructure and must meet the expectations and needs of the population. The goal of smart cities is to make the lives of citizens more convenient and safer, as well as save city funds and space.

3. **The main features of the Smart City.**

The use of digital technologies [2], allowing to reduce costs and optimize the consumption of resources, including the use of renewable energy sources.

The presence of direct communication channels of communication with residents of the city, the provision of open data, which makes management transparent and allows you to control financial flows.

Provision of adaptive urban infrastructure, providing demanded jobs, innovations, competitiveness, safety, environmental friendliness and development.

Effective and quick access to public services and continuous improvement of the standard of living of citizens.

An analysis of the use of digital technologies for the management of the Smart City showed that the most popular technologies are such as situation modeling, data analytics, geographic information systems (GIS) [3]. An example of the successful application of software modeling can be the optimization of city traffic and the work of traffic lights, the creation of warning systems about traffic...
changes through mobile applications. By creating and implementing such solutions it is possible to reduce traffic congestion and improve the urban transport system and, as a result, reduce air pollution in the city by reducing downtime of vehicles, reduce the number of people who are late for work, and reduce travel time from home to work and vice versa while reducing transportation costs.

In addition, it is very important to get the possibility of operational traffic control in case of emergencies and natural disasters, providing a green street for emergency services.

The next important stage is the digitalization of public services - which allows us to accelerate the transition to Smart City. The creation of Internet portals allows residents to request and receive documents and services, make online payments. This is an example of the computerization of municipal services.

The restructuring of the work of all city divisions and departments is not an easy task of transforming a traditional city into a smart city and requires the joint efforts of many different departments and services.

An analysis of the experience and practice of implementing Smart City projects allowed us to formulate the main stages for the successful implementation of the project for the transition to Smart City.

To identify the main problems of the city and municipal authorities, it is necessary to conduct a preliminary study, then analyze the existing experience in solving the identified problems and develop options for possible solutions. To attract technical specialists from different fields of knowledge to develop and make decisions, assess the need for resources necessary for the implementation of the proposed projects, determine the strategic direction of development and stages of implementation, as well as sources of financing.

It is extremely important to take into account the human and material resources required for the implementation of the project. To form teams of trained and motivated specialists capable of implementing the project [4, 5].

It must be borne in mind that Smart cities cannot be considered as a project of the distant future. Their implementation is associated with the use of continuously improving technologies, such as stationary and mobile high-speed broadband communication networks, data collection and processing of smart sensor networks, analysis of large data arrays, mobile applications, social networks and web portals and other modern technological solutions.

Mobile Internet is gaining more and more widespread use due to the massive distribution of smartphones and mobile data networks, thereby creating urban connectivity with a large information space, which brings city management capabilities to a new level. In addition to promptly informing the population, the use of mobile applications for smartphones enables citizens to take part in the management of the city, as it allows them to send data to control centers and quickly receive information from regulatory authorities.

According to studies, in the coming years, 70 percent of the world's population will own smartphones and will be responsible for the production of 80 percent of all mobile data in the world. This leads to the transformation of the city's traditional infrastructure into a vibrant and sustainable ecosystem that works like a two-way street, collecting data and benefiting the people and businesses that live and work in the city.

Vivid examples of informatization of services are smart bus stops, which provide users with real-time bus schedules, parking lots, which determine the presence of vehicles using a combination of motion sensors and wireless communications, and provide the driver with real-time information about the availability of parking spaces. Modern devices distributed throughout the city provide real-time data on human flows, noise levels and environmental pollution, road traffic and weather conditions.

All of the above will optimize the operation of urban services and urban transport, reduce air pollution, and ensure economic and social stability. Connected to the data transmission network of urban lighting, it will significantly save energy due to the dynamic control of lighting levels in accordance with the real situation.
The most important urban problem is waste management. Wirelessly connected and equipped with sensors, trash bins that control the amount, humidity, temperature and even type of waste sending information to waste collection companies and environmental services will optimize collection routes by updating real-time truck driver location information, thereby reducing waste disposal costs.

In a traditional city, security is provided by police patrolling the streets. In Smart City, affordable technologies help maintain security through surveillance cameras and a face recognition system, which, in addition to detecting suspicious activities, prevent crime, thereby saving human resources and significantly reducing response time. In addition, the binding of data from cameras to the area allows you to analyze the crime rate in various urban areas and contributes to more effective police work, and also allows the authorities to take preventive measures. For example, to pay more attention to youth living in disadvantaged areas, to develop educational and cultural events and programs aimed at improving the future of socially disadvantaged groups.

To date, there are two strategies for implementing smart city projects: from scratch, laying in them urban ecological transport systems, water recycling, and others. Examples are the cities of Tianjin Eco City, a joint project between China and Singapore and Masdar in the UAE: another way that has proven to be much better is to implement smart technologies in existing cities. The most striking example is Singapore with its intelligent solution to the problems of urban transport. On the streets of the city-state, road sensors are installed everywhere that measure traffic density and smart traffic lights to minimize congestion, and there is a network of smart car parks that record the number of occupied and available seats. A virtual 3D simulation has also been created, allowing you to simulate various situations, including the evacuation of the city in case of emergency. Smart technologies for street lighting have been implemented, based on the data on the busy streets and highways, the optimal operating mode is selected.

4. **The principles of transition to the Smart City model.**

The above study makes it possible to formulate the principles of transition from the traditional model of city management to the model of “Smart City”.

Firstly, when implementing the Smart City project, it is important to combine the efforts of the administrative and executive authorities of the city, as well as all the services responsible for its life support. This will create an integrated project of a diversified management model.

Secondly, the created group, led by the project manager, must correctly plan and control the phased transition. It is preferable to begin implementation with the implementation of the pilot phase, which will allow for monitoring, evaluation, training and presentation of specific and measurable results for comparison with traditional management models.

Thirdly, the Smart City project should be implemented in stages, without strictly violating the sequence, implementing one or more pilot projects in accordance with the financial capabilities of the city. The most affordable is the project of digitalization of services for citizens, because it contributes to the internal organization of management and at the same time helps to reduce costs and increase revenue.

Fourth, the digitization and integration of urban transport systems, and the implementation of projects related to improving security are necessary. They are well accepted by the population, as they solve the urgent problems of citizens. The introduction of these technologies immediately gives a tangible visible positive effect and demonstrates to the public the advantages of a smart city.

In Russia, the Smart City project is being implemented in the framework of the national project Housing and Urban Environment and the national program Digital Economy. So in 2019, the Ministry of Construction of Russia approved the Smart City Standard, a set of basic and additional measures that all participating cities will have to carry out with the departmental smart city digitalization project, Smart City, by 2024 Fig.2.
The standard includes measures in the following eight areas: urban management, “smart” utilities, innovations for the urban environment, “smart” urban transport, intelligent public and environmental safety systems, communications network infrastructure, tourism and service [6].

![Figure 2. Areas of implementation of the Smart City standard.](image)

5. **Action plan.**

The presented article is an attempt to develop a plan for the implementation of the Smart City, taking into account the practical experience of successfully implemented projects of modern cities that have taken this difficult path. As a result of the study, the following five successive stages of implementation were formed.

1. **Team building.**

The first step towards creating a “smart city” is to organize a multidisciplinary team consisting of specialists from different directions, headed by a leader with the authority to implement the project.

2. **Diagnosis and analysis of problems.**

Understanding the current and potential problems that may arise during the implementation of the Smart City project in each specific situation, taking into account local conditions and restrictions of a particular city, is crucial. Building Smart City is a gradual process consisting of several small steps. The first step is to identify the most pressing urban problems that need to be addressed immediately. It is very important to conduct a thorough analysis of the existing technological infrastructure in the city itself and in the state institutions that provide services, to assess the human resources, which will eliminate possible restrictions at the very beginning of the process.

3. **The implementation plan.**

After diagnosing the problems and opportunities of the city, it is necessary to prepare a plan for the implementation of the “Smart City” with an assessment of costs and benefits, taking into account technological problems, the regulatory framework, sources of financing for the implementation and support of planned actions. The financial sustainability of the project is crucial. Proper planning of the stages of the project allows you to predict the need for financial resources.

4. **Search for partners.**

Smart City projects can be implemented both at the expense of state funds and with the involvement of private capital, therefore, an important step is to establish partnerships with the private sector, academia, non-governmental and other organizations. These partnerships are interesting, both from a technical and financial point of view. In addition, the smart city will need technology or service providers. In practice, this means that cities can start by investing in joint technologies, discuss problems and their solutions with involved partners, using online tools that allow people to discuss ideas and decide which ones are worth implementing.

5. **Monitoring results**
Monitoring and evaluation of the results of the implementation of the Smart City project is very important for choosing the right vector for subsequent development. It is necessary to evaluate the results of the implementation of the project to provide services that improve the lives of people, and evaluate the changes in the dynamics of the city.

It is extremely important to provide feedback to various governing bodies with an analysis of successes and failures and use the results to adjust processes in management.

6. Conclusion
The basis of the economic and social development of modern societies are cities. The use of modern information and communication technologies for their effective development solves a complex problem, not only ensures the speedy provision of public services and helps to improve the quality of life, but also increases the financial return on investment, and also helps to involve the population in the management process.

A Smart City plan will only succeed if it establishes well-defined project cycles.

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