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«Smart settlements»: the development concept in a new socio-economic and informatiologic conditions

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Abstract. Strengthen the ties between rural and urban areas is very important for sustainable development: because «Smart Villages» cannot develop in isolation, they should be included in development strategy of regions and territories. In accordance with «Smart Settlement» concept, the existing rural settlements should be not only a place of living: settlements require the improvement of social, pipeline and utility infrastructure, creation vacancies and new business models needed to the integration with the city. The rural settlements potential is not only in social decisions (climate change, food security, etc.), but also in providing employment and investment in rural areas (culture and tourism). The purpose of research is determining the principles of functional-planning settlements organization in compliance with «Smart City» concept. The paper defines the «Smart settlement» idea as a new concept of developing urban/rural settlements and surroundings. The main components of «Smart Settlement» were selected, such as Smart Economy, Smart People, Smart Mobility, Smart Environment, Smart Government and Smart Living. It is important to consider the need of multi-methodology and cooperation between the different policies for enhancing the complementarity and coherence in the new socio-economic and informatiologic conditions.

Key words: Smart City, Smart Settlement, Smart Village, informatiology, sustainable development, rural settlement, developmental model.

1. Introduction

The term «smart city» is widely used in the media since the mid-1990s, while information technologies have been actively used in all spheres of life, including various services. For decades, the smart city remained a project that never got one needs theoretical development or practical implementation. Since the late 2000s, «smart cities» became a promising direction of long-term investments, primarily in information technology. Another direction of smart cities development is a «sustainable development» that include socio-economy, ecological and another aspects. [1]-[5]. Generalization of scientific-technical publications showed that the existing models don't contain comprehensive information service for all components interaction. This justifies the need of including the additional component – informaciological. Take all these points together, smart settlement modelling is relevant today.

2. Materials and methods

Today modeling is prevalent in many knowledge areas and represents:

- General scientific and effective knowledge tool;
- Forecasting engineering method;
- The method of machine simulation of long-term programs and plans in the field of economics, analysis and evaluation of alternatives decisions and its implementation consequences.

Priority goals and objectives are various for different settlements. Thus, all of «smart cities» have three common features [6]:

1. Secure infrastructure of information and communication technologies (ICT). This is a primary goal for the successful new services provision in «smart cities» and new services willingness. On the one hand, an infrastructure must be created for citizens' access to information services anytime and anywhere, on the other hand situational and information centers should be created for «smart city» components. The major purpose of these centers is the integration of various systems and information services depending on user category.

2. «Smart city» must have a well-organized and integrated management system. Numerous «smart city» systems will be coherent only with adherence to uniform standards. It is important to have an effective management and analytical tools for the most accurate determination of possible negative and positive trends. At the same time, it is impractical to do without Business Intelligence tools (BI), particularly in the security sphere.

3. «Smart city» needs smart users. ICT is useless in the absence of competent users. «Smart city» should not only expand smart devices access to all population categories (with different income levels and age groups), but also provide training. Essentially, people, who create the information services content are «smart users» too. Thus, the larger the solution, the more users simultaneously need to be trained, so the process will be more expensive.

In practice there are 8 main components of «smart city» [6]:

- Energy: automated smart grid and flexible distributing system; smart system for metering and demand management; renewable energy integration; hardware-software complex for smart grid management, energy-efficient buildings and structures.
- Water supply: automatic water intake, water reticulation, water removal and leak detection; rainwater and floodwaters management in the city; smart system for metering and demand management; hardware-software complex for water system management.
- Transport: control of traffic stream and road surface quality; road toll collection; electric vehicle charging infrastructure; hardware-software complex for road traffic and public transport management.
- Security: CCTV systems and physical security infrastructure; emergency response services systems; warning systems; hardware-software complex for safety services management.
- Services: e-government, education, health and tourism.
- Integration: «smart city» common information area, that aggregating information from the urban infrastructure, system management and residents.
- Government: decision-support systems for analyzing and forecasting, incident managing, electronic providing public and municipal services, open data publications.
- Residents: infrastructure and information services users; «feedback» information providers.

3. Results

Today traditional forms of management of urban and municipal services is almost exhausted and do not meet modern requirements for logistics, safety and the environment. The concept of «smart city» aimed to solve all these problems. The concept is aimed at providing modern quality of life of people through innovative technologies that provide economical, safe and environmentally friendly use of

urban systems of life. The diverse factors of urban development are combined in a single system with the help of advanced information and communication technologies.

On the one hand, government components [8] can be used as a basis for formulating the smart settlement model:

- Political;
- Legal;
- Economic;
- Environmental;
- Management;
- Business;
- Social.

On the other hand, the main settlement development spheres that must be insulated from «Urban-Studies» model, must be taken into account [8].

- City ecology
- Municipal engineering
- City administration
- City law
- Urban Economics and business
- Strategic planning of urban-system
- City informatiology
- Urban environment perceptual psychology

The main sub-factors for this system are: Housing, Social infrastructure, Transport system, Green city farm, Water supply and Sewerage, Fuel and energy economy, Communications and telecommunications, Underground facility, Waste treatment, City safety, Architectural and aesthetic environment.

According to research [8], programs and projects of development of the settlement include 5 factors:

- Economic;
- Social;
- Political;
- Technological;
- Cultural.

It should be noted, that the main subjects of the management of settlements and urban-system are three governance: city residents, governance and professionals. Complete professional actions are needed for the harmonious settlements development and necessary for the full cities development. The offered authors' model [9] is based on the global experience of urban issues knowledge (figure 1). Without these areas the development of modern settlement and urban system, with their complex of physical, social, cultural, aesthetic, ethnic, technical and other components are unable to fully develop and to be comfortable for residents.

In addition, there are three main features of smart cities:

1) interactivity - interactive services (including public services), allowing the comfort of home, to receive prompt and relevant information about city activities;

2) safety - the safety of any citizen;

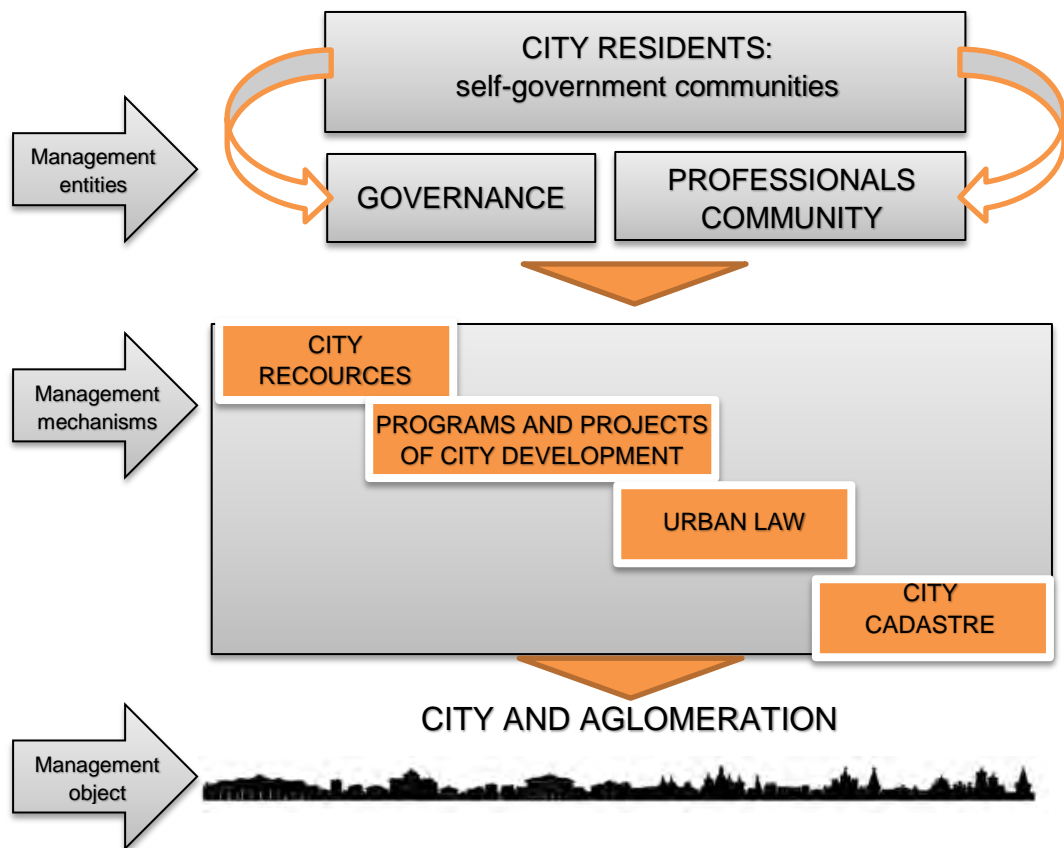3) convenience - ease of interaction with any services.

Figure 1. City management model

Besides, other basic important aspects are presented in details, with sub-factors indication in many urban-planning studies [10]-[15].

With this background, smart settlement model can be represented as a system consisting of 3 components: technology factors, institutional factors, human factors (figure 2). Smart settlement characteristics are the next: Smart Economy, Smart Environment, Smart Government, Smart People, Smart Mobility and Smart Living. Each of characteristics includes matching sub-factors (figure 3). These factors are necessary for sustainable development evaluation and urban planning decision-making.
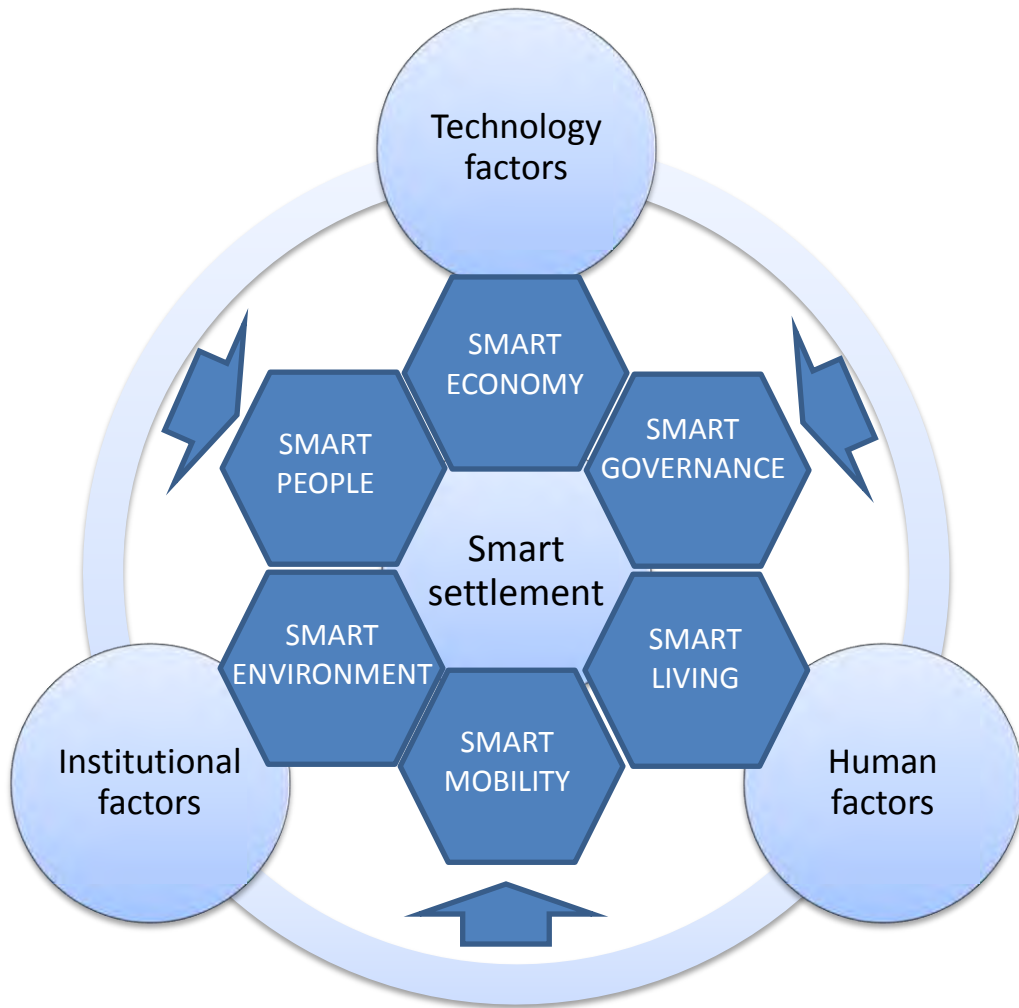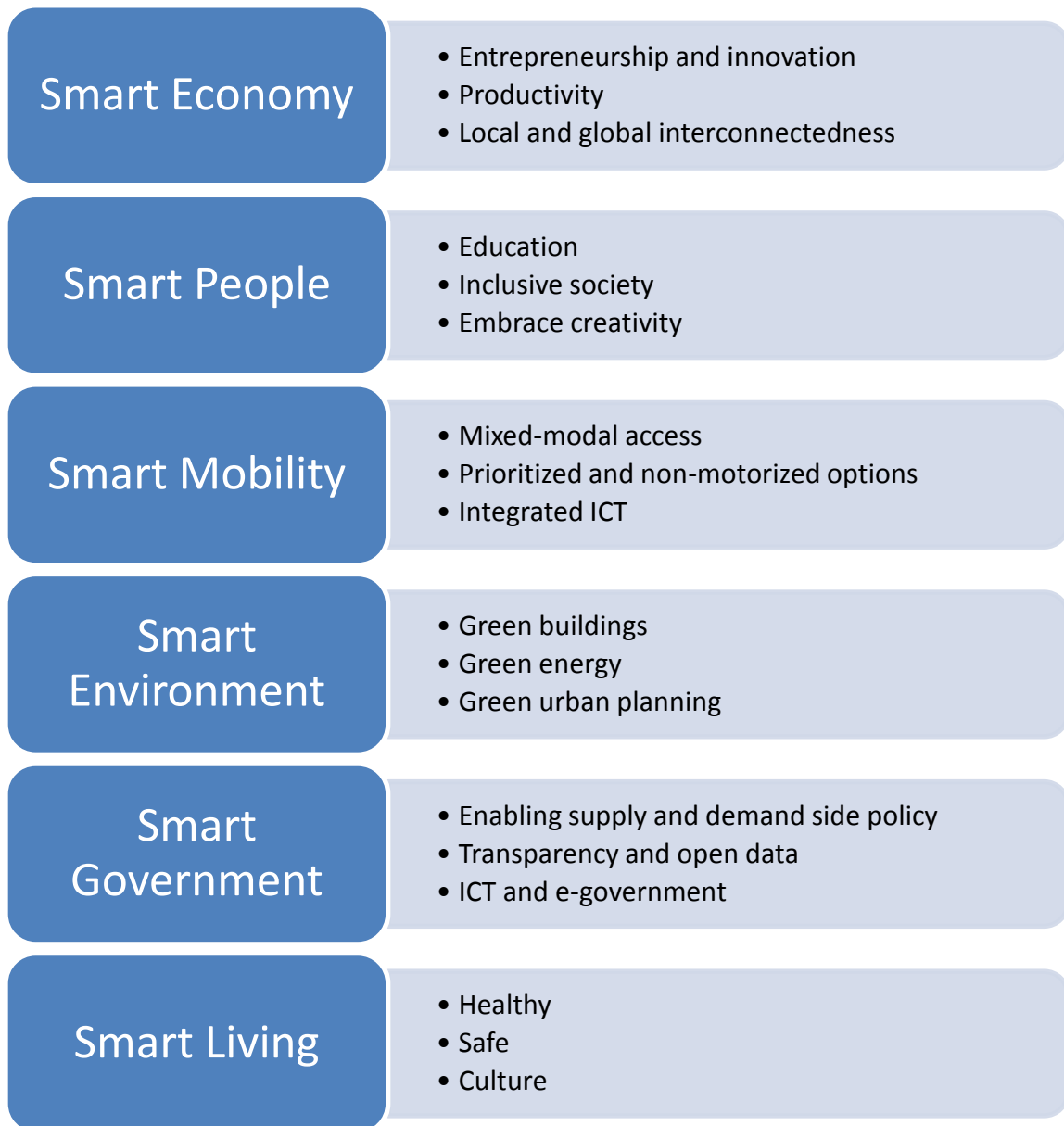
Figure 2. Smart settlement model

Smart Economy	• Entrepreneurship and innovation • Productivity • Local and global interconnectedness
Smart People	• Education • Inclusive society • Embrace creativity
Smart Mobility	• Mixed-modal access • Prioritized and non-motorized options • Integrated ICT
Smart Environment	• Green buildings • Green energy • Green urban planning
Smart Government	• Enabling supply and demand side policy • Transparency and open data • ICT and e-government
Smart Living	• Healthy • Safe • Culture

Figure 3. Smart settlement characteristics and sub-factors

4. Conclusions

Smart settlements transformation is a worldwide trend, but it is also a real perspective for many Russian settlements. At the same time, a reorientation of settlement systems development implies a radical reconstruction of municipal government system. At the same time, it is necessary changing goals and objectives as well as efficiency and effectiveness indicators. The main motivating force is the active citizens' participation in city life and management, using intelligent information systems. All residents are the end-users of intelligent information systems. Therefore, the additional requirements should be required to the functional components and user interface.

Given that the city engaged in the automation of their own, they will have to spend ten times more budget for solving the same task. Systematization of the process of creating smart cities is necessary to minimize the cost of the solution of similar tasks. To do this, simply select several types of cities to develop standard urban solutions and unified software. The solution to this problem can only be

initiated at the state level in the form of Federal target programs. To achieve a sustainable development, new approaches in urban planning are the must.

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