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### The main directions of cadastre development in Ukraine taking into account the experience of foreign countries

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#### SUMMARY

State Land Cadastre is a unified state geoinformation system of data on lands located within the borders of Ukraine, their purpose, restrictions on their use, as well as data on quantitative and qualitative characteristics of land plots, their assessment, distribution of land plots between landowners and land users, which provide full information on all land plots, application of a unified system of spatial coordinates and land identification systems, the introduction of the unified system of land cadastral information and its reliability. Cadastral monitoring is carried out, which is an information-analytical system, which due to some scientific-organizational, technical and other factors makes it possible to trace the processes of changes in the data in space that make up the cadastral system. The national cadastral system is now operating successfully and meets the best standards in world practice. One has presented building a cadastre and cadastral system in Ukraine in the review of foreign and Ukrainian publications. One has envisaged that the cadastre of the future will be multi-purpose in 3D or 4D. An important mechanism of economically sustainable development of territories is the cadastral system as an integrated database of various registers: property rights, assessment of land improvements, geospatial data, etc. The country cadastral system is public with access to databases on-line. The report conducts and analyzes cadastres of the future – spatial one with 3D image and multi-purpose cadastre 4d. The change of approaches to cadastral zoning leads to the necessity to transform a great number of the identified land and property units. During the transition to the new system of cadastral zoning of the territory of Ukraine, one has laid the nomenclature division of topographic plans and maps, which exists in Ukraine. Therefore, according to the recommendations of ISPIRE Rule 18, one presents all land plots in the cadastral register and their areas in a vector image, indicates their rights and location, and they are public. The cadastral system of the future will be a highly influential component of tomorrow's lifestyle, a powerful lever for land and property management. One will introduce this system into the social and economic structure – planning of traditional land use and urbanized territories, land use valuation, which will stimulate their effective use and protection. Thus, in the near future in Ukraine, one should construct a cadastral system, which would include a multi-purpose cadastre, registers of property rights, valuations of cadastral objects and other registers.

## **Introduction**

In April 2020, the Supreme Council opened access to the State Service of Ukraine for Geodesy, Cartography and Cadastre. On this basis, the World Bank has expressed a desire to assist in conducting a technical audit of the StateGeoCadastre (The website: Finance.ua., 2020). State Land Cadastre is a unified state geoinformation system of data on lands located within the borders of Ukraine, their purpose, restrictions on their use, as well as data on quantitative and qualitative characteristics of land plots, their assessment, distribution of land plots between landowners and land users, which provide full information on all land plots, application of a unified system of spatial coordinates and land identification systems, the introduction of the unified system of land cadastral information and its reliability (Perovych, Ludchak & Hulko, 2018). Recently, there have been significant institutional changes in industries that have traditionally remained in state ownership and management. Providing regulation and control over the activities of infrastructure facilities, governments transfer them to business for temporary long-term use (Stupen et al., 2014). Cadastral monitoring is carried out, which is an information-analytical system, which due to some scientific-organizational, technical and other factors makes it possible to trace the processes of changes in the data in space that make up the cadastral system. This applies in turn to issues related to the geospatial change of land use, the location of which is fixed by cadastral numbers and geodetic coordinates; in the dynamics of changes in the qualitative parameters of land resources; in the dynamics of changes in property rights to the site (terms of agreements, etc.) ( Perovich, L.M, & Vinarchik, L.V, 2009). The national cadastral system is now operating successfully and meets the best standards in world practice. In the official report for the World Bank, all international experts, who conducted a comprehensive inspection of the newly-introduced cadastral system, made such a conclusion (The website of the State Service of Ukraine for Geodesy, Cartography and Cadastre of Ukraine, 2013). One has presented building a cadastre and cadastral system in Ukraine in the review of foreign and Ukrainian publications. One has envisaged that the cadastre of the future will be multi-purpose in 3D or 4D. An important mechanism of economically sustainable development of territories is the cadastral system as an integrated database of various registers: property rights, assessment of land improvements, geospatial data, etc. The country cadastral system is public with access to databases on-line. The report conducts and analyzes cadastres of the future – spatial one with 3D image and multi-purpose cadastre 4d (Perovich, 2016).

## **Materials and methods of investigation**

The research materials are land and cadastral data based on methodological techniques of scientific abstraction, synthesis, and analysis of certain elements (Tykhenko, 2018). The change of approaches to cadastral zoning leads to the necessity to transform a great number of the identified land and property units. During the transition to the new system of cadastral zoning of the territory of Ukraine, one has laid the nomenclature division of topographic plans and maps, which exists in Ukraine. One applied a similar approach to the division of territory as in the United States of America. When Ukraine enters the European space, there is the need of compliance with European standards and requirements as to land relations. ( Hubar, Yu.,2020). Therefore, according to the recommendations of ISPIRE Rule 18, one presents all land plots in the cadastral register and their areas in a vector image, indicates their rights and location, and they are public.

## **Initial and geological data**

In the 21st century, the use of maps and obtaining paper documents on land is no longer relevant because this process takes a lot of time and resources for the state and land users. One has stopped using these procedures after creating the cadastral map of Ukraine in 2013. The adoption of the law on cadastral maps forced to change the situation and start systematizing the data. However, this task was not easy. Considering the State Service of Ukraine for Geodesy, Cartography and Cadastre data, one has approximately digitized 17 million land registers and acts. The World Bank donor-funded project has allowed surveying the lands of Ukraine for 7 years, which is the most accurate in recent decades. The major feature of the cadastre is operational efficiency, which is created to guarantee the protection of land ownership. People do not need to go to certain authorities to get information, as it is

stored in the public domain. One enters, checks, systematizes, and organizes the information in this database according to the unified, clearly defined rules (The website of AGGEEK, 2017). According to the State Service of Ukraine for Geodesy, Cartography and Cadastre of Ukraine, one has carried out the State Land Cadastre, taking into account the best world standards. There has been a reduction in the cost of registration of plots by 2/3, while one has significantly reduced the registration time. This fact has led to a decrease in such phenomena as corruption. This set of the State Land Cadastre makes it possible to obtain the necessary information about plots throughout our country quickly. The structure in the cadastral system of our state should be based on the best studies of all cadastral systems in world leading countries, taking into consideration such factors as legislation, available material and technical base, technological approaches as well as national traditions, which are not less important. The conducted research shows that most European countries have developed and improved a multipurpose cadastre in order to restore property rights. They argue that the successful practice of implementing this cadastre in other countries allows identifying various strengths and weaknesses for these statements. (Tykhenko, O. 2018).

### **Results of investigation**

At the end of 2019, the content of the State Land Cadastre was 73% of the total land plots. In Ukraine, there is a two-component cadastral registration system, where the system of state land cadastre has the function of cadastral accounting of land plots, and the State Register of Rights – registration of rights. Legal functions are of vital importance among the main functions of the cadastral registration system, as they ensure the registration of the legal state of land plots. The most common types of cadastral registration systems are act and title ones. Considering the cadastral registration system Deeds recording, one enters a record of a contract for the transfer of property rights into the register as any private agreement (for instance, by a notary). The state does not hold any responsibility for these agreements. The essence of this system for the registration of acts is in the receipt and recording of documents certifying such a thing as a separate transaction (purchase or sale). In this situation, insurance is conducted in parallel. Cadastral registration system Title registration ("registration of rights or titles") is a system that registers the facts of the agreement itself, as well as the rights and restrictions that were the subject of this agreement, and the property is depicted on special cadastral maps. The main purpose of the title registration system is to provide legal confirmation of ownership and facilitate the transfer of rights from one owner to another.

In world practice, there are three key cadastral systems:

- is a classic title land registration system of Torrens, introduced in 1858 in South Australia to protect the interests of landowners, which operates in the United States, Canada, and other Latin American countries.
- Napoleonic (French), expressed by France and its former colonies.
- Prussian, or German – Germany and other countries of Central and Northern Europe.

Cadastral reform in Australia is covered in the program "Vision of Cadastre 2034", which does not reveal the main directions of cadastre development. These vectors can be valuable for our country. According to this program, the cadastre, which is multifunctional, is easy to visualize and easy to use. In order to maximize the potential of the cadastre, it is necessary to create more options for the use of cadastral information. Continuous access to a multi-purpose inventory will increase usability by creating an efficient service base that can be the basis for creating new products and services. Easily visualized digital cadastre will create a stronger foundation for understanding land and real estate ownership. In the United States, there is no classical land cadastre system and there is a Public Land Survey System (PLSS), which works closely with the General Land Office (GLO). The Bureau of Land Management (BLM), which administers more than 1 million km<sup>2</sup> and is part of the PLSS Public System, operates to solve essential governmental issues on the creation of energy, transport and other engineering communications corridors, mineral resource development, etc. The German cadastral system has two components: automated property register (ALB) and automated cadastral map (ALK). The ALB maintains a digital property register, which indicates the plot number, owner, street names,

etc. Automated cadastral maps (ALK) also indicate plots, owners, and topography. One applies assessment maps at a scale of 1: 1000. The cadastre in France does not determine the accuracy of the boundaries of land plots, but it is a legal confirmation of the establishment of property boundaries. One sets the boundaries of land plots based on land cadastral surveys. Access to cadastral plans and registration data is provided on-line. The cadastral zoning in Ukraine is based on the territory of certain accounting and property units (land plots) within the administrative-territorial formations (village–city (settlement)–region).

Cadastral, geographic, and satellite systems are also based on the monitoring. The application of these systems allows receiving information requests and timely place on its cartographic basis, to assess the state of the ecological and economic system and forecast its development (Perovich & Hulko, 2019).

The carried out experiments have revealed various aspects of cadastral systems, which provide the opportunity to formulate the major trends in cadastre development for the future:

- automation of cadastral processes;
- digitization of information received in diverse periods and in different coordinate systems;
- self-sufficiency of the cadastre.

The above-mentioned principles are fundamental but do not lessen other principles to which the cadastre corresponds. From a functional point of view, the cadastre of the future will need a 3D spatial image because urbanization of territories, development of mountain recreational areas require, on the one hand, determining the location and size of underground structures (tunnels, transport interchanges, parking lots, service facilities, etc.) and, on the other hand, construction of various facilities, such as ski slopes, tourist routes, etc. The cadastre of the future puts on the agenda the problem of direct transfer of the results of field measurements to the cadastral database in real time (on-line), which will automate the process of processing field cadastral information (On approval of the Procedure for the State Land Cadastre, 2012). It will stop duplication of cadastral works and resolve a number of controversial issues regarding the establishment of the geospatial position of cadastral objects. This cadastre is called 4d. Thus, the cadastre of the future is a multi-purpose cadastre 4d. The cadastral system of the future will be a highly influential component of tomorrow's lifestyle, a powerful lever for land and property management. One will introduce this system into the social and economic structure – planning of traditional land use and urbanized territories, land use valuation, which will stimulate their effective use and protection. Thus, in the near future in Ukraine, one should construct a cadastral system, which would include a multi-purpose cadastre, registers of property rights, valuations of cadastral objects and other registers.

Considering the marked difference between the desired and the achieved level of development and production efficiency, one can consider that the solution to this problem is relevant and timely (Stupen et al., 2016).

## **Recommendations and conclusions**

Based on the analysis of international experience and prospects for the impact of scientific and technological progress, one has stated that the cadastre of the future should be multi-purpose in 3d or 4d form. The 3d form will provide the image on cadastral schemes, plans, and maps of such important objects as tunnels, underpasses, parking lots, aerial ropeway, etc. The 4d form is essential, which in real time will allow controlling the quality of field cadastral works, ensuring the elimination of their duplication and preventing poor quality determination of the coordinates of boundary markers. Cadastral systems, which will be publicly available on-line play an important role in public life. One will integrate databases of other information registers, in particular, registers of property rights, property estimation, and others into such systems. One has proposed three methodological approaches to improve the existing cadastral zoning system in Ukraine. Classification and codification of administrative-territorial units and land use are performed in accordance with the existing international standards ISO 3166-2 and NACE. For the near future in our country the cadastral system which contains the multipurpose cadastre, registers of property rights has to be formed. As a result of the above, the following are the main factors for the cadastral system in the future:

- the right of inviolability of property should be taken as a basis of cadastral system;
- cadastral information must be in digital format 3D or 4D;
- the cadastral system should be public and provide legal entities and individuals with on-line access to the necessary information;

Every year the number of requests for on-line access to various resources of the cadastral system will increase, so we should expect greater processes of various forms of activity. Ambiguity due to time changes, unstable approaches at the legislative and regulatory level in defining the functions of the cadastre and, in particular, cadastral zoning leads to significant material and physical costs, which requires harmonization of the requirements of a number of departmental acts and documents.

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