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LEGAL AND TECHNOLOGICAL OBSTACLES ON THE ROAD TO CREATING THE 3D CADASTRE IN POLAND

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ABSTRACT

For a dozen or so years, we have been witnessing an on-going, global discussion, concerning the shape and dimension of the cadastral system. Legal and technical standards are created, regulating the rules of its management, defining both the system itself, and the objects registered in it. From the point of view of building the cadastre in Poland, the most important of these standards include the INSPIRE Directive and the Polish Norm PN EN ISO 19152: 2013-05E. The present research aims to analyse the compliance of national regulations with international requirements, and to verify their applicability in practice. As our research material, we have used the source texts of the most important legal regulations and norms in the field of real estate cadastre, and we have analysed those in terms of legal and technical possibilities for the construction of a 3D cadastre in Poland. In addition, our study is anchored in descriptive data from cadastral databases of the EGiB units located in the Podkarpacie region. Our research concerned the determination of the scale of discrepancy between the data recorded in the land and building registry system (EGiB), and the data from the land and mortgage register (KW). The results of the analyses we have carried out consist in indicating the main obstacles to the construction of a multi-dimensional cadastre in the Polish reality. The last stage of the research work was an analysis of the compliance of spatial data, in terms of the consistency of objects registered in various databases of geodetic character. The graphical elements from surveying materials, originating from the Małopolska region, served as our research material. The absolute compatibility of object topology is a prerequisite for the functioning of the cadastral system. On the basis of the results obtained, the proposal of a multi-purpose system was discussed, that would employ the existing databases, with the possibility of transforming the dimension – from 2D to 3D. Based on a detailed analysis of legal and executive acts – in the field of real estate cadastre in Poland and in the world – as well as a survey of geodetic materials in terms of geometric and topological data compliance, it can be concluded that the cadastre in Poland requires further changes. The presented problem is valid and important in the context of introducing the third dimension of data to the real estate cadastre.

Keywords: multi-purpose cadastre, 2D cadastre, 3D cadastre, cadastral information

INTRODUCTION

For a dozen or so years, we have been witnessing on-going, global discussions, concerning the shape and dimension of the cadastral system. There are a number of scenarios describing the visions for the future cadastral systems, the most important of which are KATASTER 2014 and its continuation – KATASTER 2020. Emerging legal and technical standards regulate in detail the rules of cadastral system operation, defining both the system itself and the objects registered in it. In Poland, the basis for the modernized cadastral system is founded on guidelines contained in national regulations, adapted to the INSPIRE Directive and the Polish norm PN EN ISO 19152: 2013-05E.

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Also, in 2001, concepts emerged for recording spatial, multi-level objects in cadastral databases [Bydłosz 2017]. This issue remains open and valid until this day. In the international context, new solutions are being sought for recording 3D objects in the cadastre [Stoter et al. 2017].

In the literature on the subject, there are evident trends towards building object-oriented databases [Oosterom et al. 2011] as well as suggestions on the use of MDA design methods [Aien et al. 2013]. In Poland, authors dealing with 3D cadastre include, among others, Karabin [2012], Góźdź and Pachelski [2014], Siejka et al. [2015], Mika et al. [2016], Bydłosz [2017]. Maślanka's research [2016] demonstrated the need to modernize cadastral data in Poland, both in the legal aspect and the factual aspect. The real estate cadastre in Poland, modernized in accordance with international requirements, should integrate data from multiple databases [Mika 2017a, b, c]. In the international context, [Ying, Guo et al. 2012] have proven that modern CAD, GIS and DBMS tools allow for quick implementation of information contained in multiple databases, for the purposes of building up a cadastral system. These tools are also applicable in the context of Poland. The problem remains, however, that the aforementioned tools will not automatically verify the flaws and inaccuracies that occur in particular databases, concerning both descriptive and spatial attributes of the cadastral objects. Land and buildings registry, which performs the role of land cadastre in Poland, requires further changes through comprehensive modernization [Noszczyk and Hernik 2016]. The present research is aimed at determining the degree of compliance of national regulations with international requirements, and verifying their applicability in practice. The analyses we have undertaken are supposed to indicate the main obstacles to the application of the abovementioned provisions in the Polish reality.

The authors of the present paper define cadastral database as the following public registers and sources of geodetic, legal and planning information: EGiB (Land and buildings registry), Land and Mortgage Register (KW), GESUT (Geodetic records of utility networks), BDOT (Topographic objects database), MPZP (Local Spatial Development Plan, or master plan), and RCiWN (Property Price and Value Register). The selection of these databases is not accidental, because it facilitates collecting comprehensive and reliable cadastral information on cadastral objects and entities, in accordance with the European trends in the construction of cadastral systems. A single database – the EGiB, which performs the role of a real estate cadastre according to Polish regulations – does not provide such information.

RESEARCH MATERIAL AND METHODOLOGY

First and foremost, the source texts of the most important legal regulations and standards in the field of real estate cadastre were used as our research material, and we have analysed them in terms of legal and technical possibilities for the construction of a 3D cadastre in Poland. The research scope of selected legal acts is presented in Table 1.

The legal provisions cited in Table 1 were compared with the FIG requirements [Kaufmann and Steudler 1998] pertaining to the construction of cadastral systems, and in particular, the functions and content of cadastral databases. The content of databases in the scope of the subject and object, required by the European standards of spatial information systems [INSPIRE Directive], was examined in the same context. Based on the aforementioned analysis, a scheme of the system was developed using the existing databases, with the possibility of transforming the format of the data collected in 2D into 3D. The concept of real estate cadastre in Poland, shown in Figure 1, is consistent with the idea of a reference data model [ISO 19152: 2013-05E], dedicated to real estate administration systems – LADM, based on the MDA (Model Driven Architecture) technology.

The next stage of the research is of practical character, and it was carried out on the basis of a case study. The study was based on descriptive data from the cadastral databases of EGiB units, located in the Podkarpacie region [Mika 2017a]. The study concerned determination of the scale of discrepancy between the data entered in the land and building registry system (EGiB), and the data from the land and mortgage register system (KW). These studies confirmed the results of the analyses carried out earlier by Przewięźlikowska and Buśko [2014]. Due to the fact that the demonstrated scale of divergence of the data from the two basic sources is significant, there is a need for

Table 1. Legal acts studied, pertaining to the cadastre

No.	NAME OF THE LEGAL ACT	MAIN RESEARCH TOPICS
1.	**Ustawa z dnia 23 kwietnia 1964 r.** Kodeks Cywilny (tekst jedn. Dz. U. 2017 r., poz. 459) / **The Act of 23 April 1964**, Civil Code (consolidated text: Journal of Laws 2017, item 459)	Definition of real estate, types of real estate properties
2.	**Ustawa z dnia 6 lipca 1982 r**. o księgach wieczystych i hipotece (Dz. U. 2017 r. poz.1007). / **The Act of 6 July 1982** on Land and Mortgage Records (consolidated text: Journal of Laws 2017, item 1007)	The system's definition, method of establishing and maintaining land and mortgage registers (KW), formal and legal principles
3.	**Ustawa z dnia 17 maja 1989 r.** – Prawo geodezyjne i kartograficzne (tekst jedn. Dz. U. 2017 poz. 2101). / **The Act of 17 May 1989** – Geodesic and Cartographic Law (consolidated text: Journal of Laws 2017, item 2101)	Definition, purpose, scope of information, manner of keeping and updating the EGIB reference record (Chapter 4) Definition and scope of information for the purpose of creating geodetic records of the GESUT utilities network, and coordinating the location of these networks (Chapter 5)
4.	**Ustawa z dnia 21 sierpnia 1997r.** o gospodarce nieruchomościami (tekst jednolity Dz. U. 2018r., poz. 121). / **The Act of 21 August 1997** on Real Estate Management (consolidated text: Journal of Laws 20178 item 121)	Definition of real estate and instruments of enforcing property rights. Geodetic processes pertaining to the field of real estate management
5.	**Ustawa z dnia 18 lipca 2001 roku** – Prawo wodne (Dz. U. 2017 r., poz. 1121). / **The Act of 18 July 2001** – The Water Act (Journal of Laws 2017, item 1121)	The possibility of using 3D elements
6.	**Ustawa z dnia 3 lipca 2002 r.** Prawo lotnicze (tekst jedn. Dz.U. 2017 poz. 959) / **The Act of 3 July 2002** – The Aviation Act (consolidated text: Journal of Laws 2017, item 959)	The range of property rights above ground level
7.	**Ustawa z dnia 27 marca 2003 r.** o planowaniu i zagospodarowaniu przestrzennym (tekst jedn. Dz. U. 2017r., poz. 1073). / **The Act of 27 March 2003** on Spatial Planning and Management (consolidated text: Journal of Laws 2017, item 1073)	Spatial elements
8.	**Ustawa z dnia 4 marca 2010 r**. o infrastrukturze informacji przestrzennej (tekst jedn. Dz. U. 2017r., poz. 1382). / **The Act of 4 March 2010** on spatial data infrastructure (consolidated text: Journal of Laws 2017, item 1382)	Harmonisation of spatial data
9.	**Ustawa z dnia 9 czerwca 2011 r**. - Prawo geologiczne i górnicze (tekst jedn. Dz.U. 2017 poz. 2126) / **The Act of 9 June 2011** – Geology and Mining Act (consolidated text: Journal of Laws 2017, item 2126)	The range of property rights below ground level
10.	**Rozporządzenie Ministra Administracji i Cyfryzacji z dnia 2 listopada 2015 r.** w sprawie bazy danych obiektów topograficznych oraz mapy zasadniczej (Dz. U. 2015 r., poz. 2028). / **Regulation by the Minister of Administration and Digitization of 2 November 2015**, on the database of topographic objects and the master map (Journal of Laws 2015, item 2028)	Content of thematic layers in the presentation of 3D data

Table 1. cont

No.	NAME OF THE LEGAL ACT	MAIN RESEARCH TOPICS
11.	**Rozporządzenie Ministra Administracji i Cyfryzacji z dnia 21 października 2015 r.** w sprawie powiatowej bazy GESUT i krajowej bazy GESUT (Dz. U. 2015r., poz. 1938). / **Regulation by the Minister of Administration and Digitization of 21 October 2015** regarding the *poviat*-level GESUT database and the national GESUT database (Journal of Laws 2015, item 1938)	Detailed scope of the GESUT data
12.	**Rozporządzenie Ministra Rozwoju Regionalnego i Budownictwa z dnia 29 marca 2001 r.** w sprawie ewidencji gruntów i budynków. (tekst jedn. Dz. U. 2016r., poz. 1034). / **Regulation by the Minister of Regional Development and Construction of 29 March 2001**, regarding the land and buildings registry (consolidated text: Journal of Laws 2016, item 1034)	Detailed scope of the subject and object EGiB data. Conceptual diagrams included in the Annex
13.	**Directive 2007/2/EC** of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE)	Interoperability of cadastral data. Harmonization of the law
14.	Polish Norm PN EN ISO 19152:2013-05E, Polski Komitet Normalizacyjny (Polish Committee for Standardisation), 2013.	Reference data model in the Polish conditions

[Source: own study]

speedy changes towards the development of mechanisms preventing loss of links (in the 2D dimension) between the public registers examined. In the cadastre evaluation, in the context of introducing a third dimension into the records, the removal of the detected types of non-compliance seems to be indispensable.

The last stage of the study consisted in the analysis of spatial data compliance, in terms of the consistency of the registered objects across numerous geodetic databases. Graphic elements from geodetic studies originating in the area of Southern Poland were used as the research material. The absolute compatibility of object topology is a prerequisite for the very functioning of the cadastral system.

RESULTS

The examination of legal provisions shows that in order to obtain full cadastral information on the cadastral objects and entities in Poland, it is necessary to integrate data from several geodetic and legal databases. Spatial information, derived from the registers presented in Figure 1, should be verified in advance as to the compliance with the actual status, whereas the problem of compatibility of graphical data in the 2D dimension should be solved.

Figure 1 presents schematically the sources of cadastral data supply, through graphical and descriptive elements from six different databases. These should include: Land and buildings records of the EGiB, Land and Mortgage Register of the KW, the GESUT Geodetic Records of the Utilities Network, Topo-

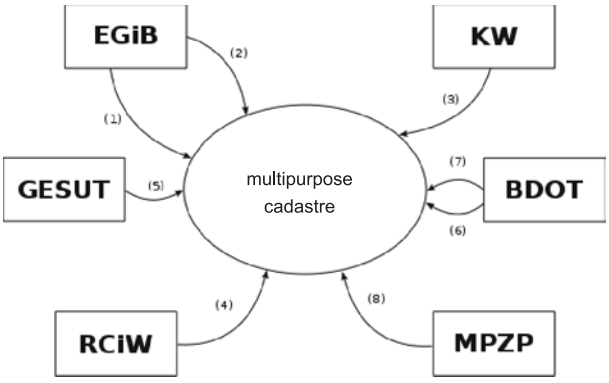

Fig. 1. Diagram showing the application of the existing databases for the needs of multipurpose cadastre in Poland. Source: Mika 2017c

graphic Data Database BDOT, Price and Value Register RCiW, and the Local Spatial Development Plan (master plan) of MPZP. The selection of these databases is not accidental, because this is where the complementary cadastral information comes from. This complementary information includes: (1) – descriptive information about the actual state of the property, (2) – spatial (graphic) information about the property, (3) – information about the legal status of the property, (4) – information about the value of the property, (5) – information about the utilities, (6) – information about the land relief and cover, (7) – information about the spatial location of built structures in the area, (8) – information about land planning designations and master plans. The databases shown in Figure 1 are data registers for spatial objects (real estate properties) in 2D, although they also register certain 3D features. As previous research has shown [Mika 2017b], the system designed in this manner meets the conditions of data interoperability in 2D, subject to the amendment of some legal provisions.

The next stage of the research work was to analyse the degree of compliance of data from cadastral databases collected in the EGiB, and the KW, located in the Podkarpacie and Małopolska regions. A total of 163 errors were detected per 100 examined cases. Up to eighteen types of errors and incompatibilities in the system have been defined. Only 15% of the examined documents were completely free of errors. It can therefore be concluded that the scale of the phenomenon is very broad. The problem is detailed in Table 2.

A separate research thread along the way of indicating legal and technical obstacles to the construction of a 3D cadastre is the demonstration of incompatibility of topological objects in 2D, appearing on maps from the geodetic resources. An example of discrepancy in the surveying materials is presented in Figures 2 and 3.

Table 2. The list of identified discrepancies between the EGiB and the KW data

No.	SPECIFICATION OF THE DISCREPANCY IN THE DATA FROM THE EGIB AND FROM THE KW	NUMBER OF CASES IDENTIFIED
1	Missing personal data of the parents of the entities	42
2	Differences in the land/area names	27
3	Difference in the number of rooms in residential properties	17
4	Incorrect indication of the location of the object	16
5	Discrepancies in the displayed size (area) of land plots	12
6	Missing indication of the body/agency representing the State Treasury for residential properties	6
7	Missing data on the built structures	6
8	Missing or faulty numbering of the building(s)	5
9	Discrepancies in the number of subjects	4
10	Missing designation of land	4
11	Missing listing of integral adjacent premises	4
12	Discrepancies in the assigned property rights	3
13	Incomplete names of the subjects	2
14	Missing entry of the land plot size (area)	2
15	Missing entry of the size of integral adjacent premises for the given property	2
16	Discrepancies in the names of subjects	1
17	Plot with the entered number missing from the EGiB land and building survey	1
18	Discrepancies in the built-up area	1

Elaborated based on Mika 2017a

The analysis of geodetic surveying materials showed that there are significant discrepancies between the data from various sources, which results in a lack of spatial data coherence in the graphical form. Figures 2, 3 and 4 exemplify representative types of inconsistencies. The frequently occurring serious error lies in considerable differences in the course of plot boundaries (see: Figure 2); also, errors in the location of BDOT base objects from current direct measurements were noted, in relation to the existing grid of the base map (see: Figure 3 – mismatch of the well position and the support of the power cable). In addition, topological and geometric errors appear (see: Figure 4), consisting in interrupting the continuity of

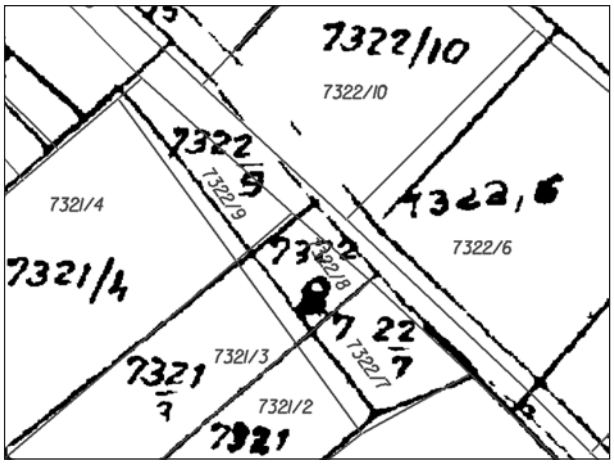

Figure 2. Comparison of numerical data from the cadastral map (in red) with the raster of the EGiB map (in black) before the EGiB modernisation.

[Source: own study]

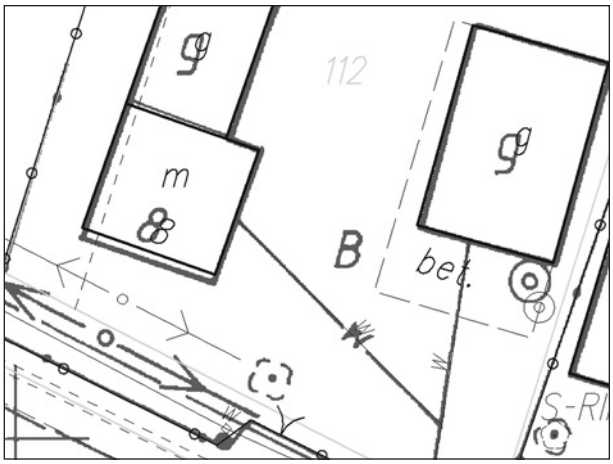

Fig. 3. Comparison of the raster of an analogue base map with a numerical map developed based on direct measurement.

Source: own study

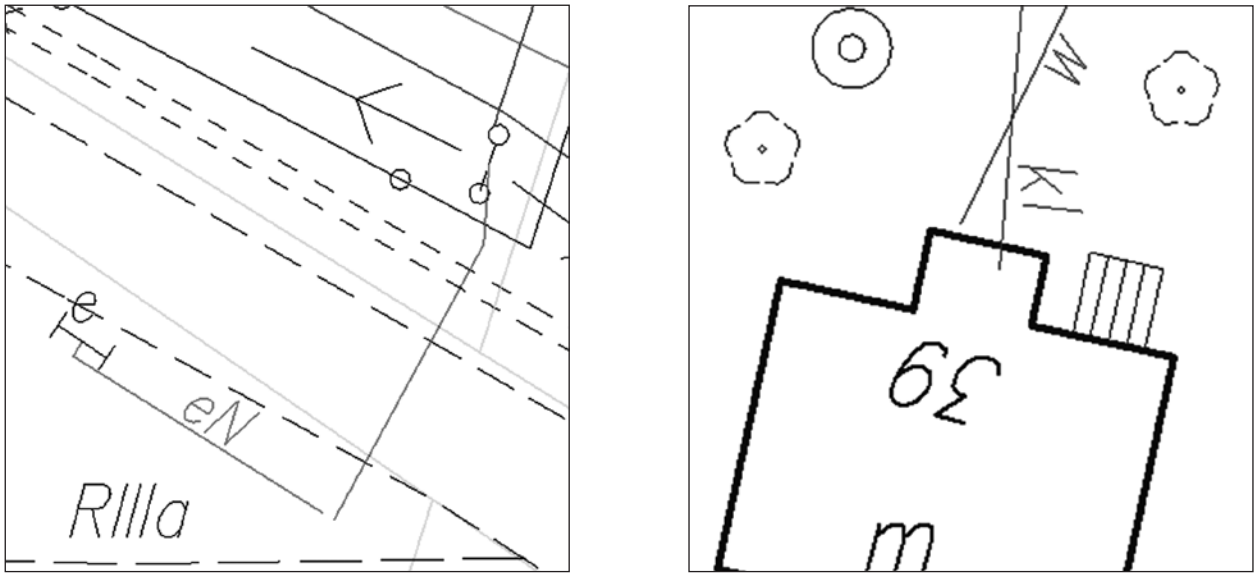

Fig. 4. Sample topological errors. Source: own study

the object (low-voltage underground power network), as well as cutting the GESUT network objects against the building wall or failing to adjust these object towards the wall.

Minimizing the number of topological and geometrical errors is solved gradually, by creating the databases of the objects in the base map. Thanks to this, the aforementioned errors within the scope of one object are captured, and repaired already at the stage of creating the object, and of creating its record.

DISCUSSION

The concept of a multi-purpose cadastral system, supplemented with the third dimension of cadastral objects, is feasible for implementation in the Polish conditions, following the introduction of gradual changes. Building up a multidimensional cadastre should be based on a universal cadastral data model, with data originating from several databases that constitute the sources of geodetic, legal, planning, and statistical information.

Reforms aimed at creating a 3D cadastre should be introduced gradually, in several steps:

STEP 1. Passing and issuing the law: the Act on the Real Estate Cadastre (and within it, the elaboration of organizational structures).

STEP 2. Establishment of the basic object as "land property". This is connected with the necessity to modify the definition of the "plot" towards the definition of "land property".

STEP 3. Solving the problem of the numbering of cadastral objects (one property in the current system may consist of several plots of land, the building may stand on several plots at the same time, etc.).

STEP 4. Verification of inconsistencies between the entries in the KW and those in the EGiB (as well as other components of the real estate cadastre).

STEP 5. Developing the policy of making data available, in a limited scope, depending on the purpose and legal interest of user groups.

STEP 6. Gradual transition towards the3D cadastre, while using all the available databases that meet the accuracy criteria (for instance, the water cadastre).

It would also be reasonable to consider establishing that an entry into the KW (Land and Mortgage Register) can (only) be made for a real estate property with a determined and verified legal status (stabilization of borders in the land). Furthermore, it is important to consider the possibility of using the real-time systems in the cadastral databases. It seems that this will speed up the waiting time for entry into the KW; and in addition, it will ensure the minimization of time delays, and minimization of human error, while facilitating the automation of processes.

CONCLUSION

Based on a detailed analysis of legal and executive acts, in the field of real estate cadastre in Poland and in the world, as well as a study of geodetic materials in terms of geometric and topological data compliance, it can be concluded that the cadastral system in Poland requires further changes. It is particularly true in the perspective of introducing the third dimension of data into it.

The Polish law includes the provision of the standard on Geographic information – Land Administration Domain Model PN EN ISO 19152: 2013-05E, developed by the Polish Committee for Standardization in 2013. In particular, this application concerns the Regulation of the Minister of Regional Development and Construction of March 29, 2001.

At the moment, however, it does not yet seem possible to translate the law into practice. This is mainly due to the defectiveness and incompatibility of the subjective and objective data recorded in many databases, as a result of which the system that is being constructed has no markings of complete reliability.

Despite the legal and technical barriers identified in this publication on the way to the construction of a 3D cadastre in Poland, the modernization of the existing system towards world standards should be sought. Technical progress in the field of construction, the development of urban agglomerations, and increasingly common, complex architectural structures, all combine to motivate the development of formal and legal solutions towards the introduction of newly created objects to the cadastral databases. This is related to the proper documentation of the extent of rights to these properties, taking into account mutually overlapping legal structures resulting from the existing regulations.

LITERATURE

Aien, A., Kalantari, M., Rajabifard, A., Williamson, I., Wallace, J. (2013). Towards integration of 3D legal and physical objects in cadastral data models. Land Use Policy, 35, 140–154.

Bydłosz, J. (2017). Przyszłe obiekty katastru 3D w Polsce. (Future objects of 3d cadastre in Poland) Acta Sci. Pol., Administratio Locorum, 16(4), 231–237

Góźdź, K., Pachelski, W. (2014). The LADM as a core for developing three-dimensional cadastral data model for Poland. 14th International Multidisciplinary Scientific GeoConference SGEM 2014. SGEM2014 Conference Proceedings, June 19–25, 2014, 2(1), 841–848.

Noszczyk, T., Hernik, J. (2016). Kompleksowa modernizacja ewidencji gruntów i budynków Acta Sci. Pol., Formatio Circumiectus, 15(1), 3–17.

Karabin, M. (2012). Registration of untypical 3D objects in Polish cadastre – do we need 3D cadastre? Geodesy and Cartography, 61(2), 61–71.

Kaufmann, J., Steudler, D. (1998). Cadastre 2014 a vision for a future cadastral system. FIG – Commission 7 Working group (1994–1998) „Vision Cadastre".

Maślanka, J. (2016). Koncepcja modernizacji ewidencji gruntów i budynków w aspekcie potrzeb harmonizacji i interoperacyjności baz danych ewidencyjnych (The concept of modernization of land and building registry in the aspect of the needs of harmonization and interoperability of registry databases). Doctoral dissertation AGH, unpublished text, pp. 290.

Mika, M. (2017a). Analysis of Data Consistency Between Land and Buildings Registry and Land and Mortgage Register in order to Create Real Estate Cadastre. Geomat. Environ. Engin., 11(1), 79–88.

Mika, M. (2017b). Interoperability cadastral data in the system approach. J. Ecolog. Engin., 18(2), 150–156.

Mika, M. (2017c). Proposed model for data security protection of cadastral information in Poland. Geomat., Landmanag. Landscape, 1, 81–91.

Mika, M., Siejka, M., Leń, P., Król, Ż. (2016). The concept of using the water cadastre databases components for the construction of multidimensional cadastre in Poland. Survey Review, 1–11, https://doi.org/10.1080/00396265.2016.1263180.

Oosterom, P., Stoter, J., Ploeger, H., Thompson, R., Karki, S. (2011). World-wide inventory of the status of 3D Cadastres in 2010 and expectations for 2014, FIG Working Week. Bridging the Gap between Cultures. Marrakech, Morocco, 18–22 May 2011.

Przewięźlikowska, A., Buśko, M. (2014). The analysis of the updating time of subject and object data due to the information flow between the systems of the real estate cadastre and the land and mortgage register. [In:] 14th International Multidisciplinary Scientific Geoconference (SGEM), 17–26 Jun 2014, Albena, Bulgaria. Geoconference on informatics, geoinformatics and remote sensing, vol. III. Book Series: International Multidisciplinary Scientific GeoConference-SGEM, 933–940.

Siejka, M., Ślusarski, M., Zygmunt, M. (2014). 3D+time Cadastre, possibility of implementation in Poland. Survey Review Ltd., 46(335), 79–89.

Stoter, J., Ploeger, H., Roes, R., Van der Riet, E., Biljecki, F., Ledoux, H., Kok, D., Kim, S. (2017). Registration of Multi-Level Property Rights in 3D. [In:] The Netherlands: Two Cases and Next Steps in Further Implementation. ISPRS Int. J. Geo-Inf., 6(6), 158.

Ying, S., Guo, R., Li, L., He, B. (2012). Application of 3D GIS to 3D Cadastre in Urban Environment. 3rd International Workshop on 3D Cadastres: Developments and Practices, 25–26 October 2012, Shenzhen, China.

Legal regulations:

Dyrektywa 2007/2/WE Parlamentu Europejskiego i Rady z dnia 14 marca 2007 r. ustanawiająca infrastrukturę informacji przestrzennej we Wspólnocie Europejskiej (INSPIRE). Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) [online], [cited 15 April 2016]. Available from Internet: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2007:108:0001:0014:en:PDF

Informacja geograficzna – Katastralny model administrowania terenem (LADM). (Geographic information – Land Administration Domain Model) PN EN ISO 19152:2013-05E, Polski Komitet Normalizacyjny, 2013.

Mika, M., Jurkiewicz, M. (2018). Legal and technological obstacles on the road to creating the 3d cadastre in Poland. Acta Sci. Pol., Formatio Circumiectus, 17(2), 135–143. DOI: http://dx.doi.org/10.15576/ASP.FC/2018.17.2.135

BARIERY PRAWNE I TECHNICZNE NA DRODZE BUDOWY KATASTRU 3D W POLSCE

ABSTRAKT

Od kilkunastu lat na świecie trwają dyskusje nad kształtem i wymiarem systemu katastralnego. Powstają normy prawne i techniczne regulujące zasady jego prowadzenia, definiujące zarówno sam system, jak i obiekty w nim rejestrowane. Z punktu widzenia budowy katastru w Polsce do najważniejszych z nich należy zaliczyć Dyrektywę INSPIRE oraz PN EN ISO 19152:2013-05E. Niniejsze badania mają na celu analizę zgodności przepisów krajowych z wymogami międzynarodowymi oraz weryfikację możliwości zastosowania ich w praktyce. Jako materiał badawczy, wykorzystano teksty źródłowe najważniejszych przepisów i norm prawnych z zakresu katastru nieruchomości, analizowane przez autorki pod kątem możliwości prawnych i technicznych dla budowy katastru 3D w Polsce. Ponadto badania oparto na danych opisowych, pochodzących z baz katastralnych jednostek EGiB, położonych w województwie podkarpackim. Dotyczyły one określenia skali rozbieżności danych rejestrowanych w systemie ewidencji gruntów i budynków (EGiB) z danymi pochodzącymi z systemu ksiąg wieczystych (KW). Efektem przeprowadzonych analiz jest wskazanie głównych przeszkód na drodze budowy katastru wielowymiarowego w realiach polskich. Ostatni etap prac badawczych stanowiła analiza zgodności danych przestrzennych pod względem spójności obiektów rejestrowanych w wielu bazach danych o charakterze geodezyjnym. Jako materiał badawczy posłużyły elementy graficzne z materiałów geodezyjnych, pochodzące z obszaru województwa małopolskiego. Całkowita zgodność topologii obiektów stanowi warunek konieczny funkcjonowania systemu katastralnego. Na bazie uzyskanych wyników poddano dyskusji propozycję systemu wielozadaniowego z wykorzystaniem istniejących baz, z możliwością przekształcenia wymiaru 2D na 3D. W oparciu o szczegółową analizę aktów prawnych i wykonawczych, z zakresu katastru nieruchomości w Polsce i na świecie, jak również badania materiałów geodezyjnych pod kątem zgodności geometrycznej i topologicznej danych, można stwierdzić że kataster w Polsce wymaga dalszych zmian. Przedstawiony problem jest aktualny i ważny w perspektywie wprowadzenia w katastrze nieruchomości trzeciego wymiaru danych.

Słowa kluczowe: kataster wielozadaniowy, kataster 2D, kataster 3D, informacja katastralna