

## Reforms of a real estate cadastre in Poland

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**Abstract:** On May 7, 2010 the act dated March 4, 2010 on the spatial information infrastructure was published which transposes the European Parliament and the European Council Directive No 2007/2/WE dated March 14, 2007 established the spatial information infrastructure (INSPIRE) in the European Community. This act introduced basic changes to the binding Act, i.e. the Law of Geodesy and Cartography and, as the consequence, the demand to develop various administrative decrees occurred.

The authors of the paper present the analysis of the existing conditions of the cadastre, the task of governmental and public government administration, related to demands concerning the cadastral reforms, following the act on the spatial information infrastructure and they discuss possibilities to perform such reforms at the local and national scales.

**Keywords:** cadastre, Spatial Information Infrastructure, INSPIRE, cadastral data

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### 1. Introduction

On May 7, 2010 the act dated March 4, 2010 on the spatial information infrastructure was proclaimed in the Journal of Law of the Republic of Poland (No 76, entry 489). That act (hereinafter referred to as SDI Act) transposes the European Parliament and the European Council Directive No 2007/2/WE dated March 14, 2007, which established the spatial information infrastructure (INSPIRE) in the European Community. This act introduced basic changes to the binding act the Law of Geodesy and Cartography (hereinafter referred to as Geodetic Law) and, as the consequence, the demand to develop various administrative decrees occurred. At present, such decrees are being developed. Some of them have been already published, some will be published soon. Many of these regulations start the revolution in the way of perception and understanding of the cadastre. For average surveyor in Poland, who is involved in activities of the governmental or local government administration, as well as in surveying works, the way of thinking and operating, resulting from the Act on spatial information infrastructure,

creates many problems (Cegielski et al, 2011; Michalak, 2006). The conceptually new terms, which are included in the SDI Act developed in accordance to the INSPIRE Directive, also create many problems.

Spatial Information Infrastructure (SDI), following the INSPIRE directive and the SDI Act is defined as data sets, described by metadata, together with related services, technical means, processes and procedures, which are applied and distributed by leading bodies, other administrative bodies and third persons, who commonly create the spatial information infrastructure. The success or failure of SDI depends on achieved level of interoperability of spatial data sets and services. The term “interoperability” is the next completely new term for Polish surveyors and public authorities. Following the SDI Act, it is understood as *the possibility of combination of spatial data sets and co-operation of spatial data services, without repeated manual intervention, in such a way that results are coherent and the added value of data sets and services is increased.*

As a result, one of the most important articles of the SDI Act reads: *administration bodies, which maintain public registers, containing data sets related to spatial data themes, mentioned in annexes to the act, create and maintain – appropriately to their competencies and responsibility – a network of services concerning spatial data sets and services, including:*

1. discovery services making it possible to search for spatial data sets and services on the basis of the content of the corresponding metadata and to display the content of the metadata;
2. view services making it possible, as a minimum, to display, navigate, zoom in/out, pan, or overlay viewable spatial data sets and to display legend information and any relevant content of metadata;
3. download services, enabling copies of spatial data sets, or parts of such sets, to be downloaded and, where practicable, accessed directly;
4. transformation services, enabling spatial data sets to be transformed with a view to achieving interoperability of spatial data sets and services;
5. services allowing spatial data services to be invoked.

These services should be commonly accessible by means of electronic media.

Resuming, and presenting the above in the simpler way, the spatial data should be: inventoried, – systematised, – standardised, made accessible, and exchanged, assuming the possibly minimum manual intervention in those operations.

Mentioned above regulations significantly influence the way data is stored, maintained and made available to users in all public registers, including cadastre (Bielecka, 2012; Cegielski et al., 2011; Laurent, 2011; Radzio et al., 2011).

## 2. Cadastral systems in Poland

In Poland, there are several cadastral systems. As for now, we have the real estate cadastre, the forest cadastre, the water cadastre, the „cadastre of subsidies for farmers”, the cadastre of roads, developed by the National Directorate of Domestic Roads and Express Ways. Every ministry or other institution has created its own cadastre, someti-

mes using the reference data base of cadastral parcels, but – more often – the cadastral systems were created independently. As a result the same cadastral objects are stored in various reference data sets in a inconsistent and not harmonised way. This results from various source data, methods of development etc.

Except of the real estate cadastre, own sources of data were used in each of the above cadastrals and results of works are usually not transferred to the Geodetic and Cartographic Documentation Centres. Following the opinions of district surveyors, when those documents are transferred to the Centres, their usefulness for data resources is usually low, since they are not developed in accordance with requirements of the geodetic resources. Correlations and legal basis concerning such types of works are missing in developed so far data bases. Probably, these problems will be solved by administrative regulations to the Act on the Spatial Information Infrastructure.

Therefore, every cadastre has become an independent cadastre, maintained by particular sectors. Cadastral data, available from the real estate cadastre, are reference data according to the European and national regulations (INSPIRE, SDI), thus means that the data should be harmonised and published in spatial data services in an interoperable way (Bielecka, 2011; Cegielski et al., 2011). This will not be an easy task, since the same object, such as a road, are geometrically described in various ways. Additionally, depending on the data base, the coordinate reference systems differ, as well as attributes, and identifiers. Such discrepancies in describing real objects in the data bases do not allow for explicit determinations of its identity, and, therefore, implementation of procedures resulting from the SDI Act will not be possible without utilisation of repeated manual interventions.

### **3. Challenges for the reform of real estate cadastre**

The Act on the Spatial Information Infrastructure introduced the regulation to the Law of Geodesy and Cartography, requires that, in the binding legal regulations, the cadastral documentation consists of:

- a data base, maintained by means of a tele-information system, which ensures, in particular:
  - a. appropriately secured data storage and updating,
  - b. data distribution and common utilisation, basing on rules specified in regulations concerning the spatial data infrastructure,
  - c. data visualisation in the form of registers, records and lists and a cadastral map,
- a set of documents, which justify particular entries to the data base.

Information included in the cadastral documentation, among others, in the form of computer files, is formatted according to the standard of cadastral data exchange.

The General Surveyor of Poland, together with district starosts, voivodes and marshalls of provinces and with the Minister of Justice, the minister appropriate for public administration issues, the minister appropriate for public finances, the ministry appropriate for environmental issues, the President of the Main Statistical Office and the President of the Agency for Restructuring and Modernisation of Agriculture, creates

and maintains the integrated real estate information system, being the tele-information system, which, in particular, allows for data exchange between the lands and buildings registration of lands and building (the real estate cadastre) and other public registers, in the form of electronic documents.

The above bodies are to ensure, in co-operation with the General Surveyor of Poland, technical solutions allowing for access, by means of the integrated real estate information system, to data included in public registers, which are maintained by those bodies. It is an important task, which imposes the obligation to co-operate, lead to harmonised data bases, which may be inventoried, standardised and then made accessible and exchangeable in binding formats.

The legal acts, technical guidelines and exchange formats of descriptive and spatial data do not follow the correlation between data bases, as well as the technological development which may be observed in the field of the real estate cadastre and in sectors, for which data from the real estate cadastre are the bases for further elaborations (such as Topographic Data Bases). In general, integration of cadastral data with the basic map and topographic data bases is missing as far as common objects are concerned; however it should be added, that first initiatives aiming at such integration, have been already undertaken (Radzio et al., 2011, Parzyński, 2012; Andrzejewska et al., 2011 ). Additionally, explicit standardised definitions that describe a given spatial object that are also missing as well as systems of unique identifiers allowing object identification and referencing other objects. Some of described problems are already solved in implementing rules and other regulations to the Act on the Spatial Information Infrastructure (Radzio et al., 2011).

Spatial data, included in the cadastral documentation, should meet the basic requirements, i.e. they should be:

- easily accessible by possible users,
- appropriate for particular demands, with respect to information content,
- reliable,
- sufficiently accurate, depending on applications,
- updated,
- complete with respect to the area and the content scope of a given system.

Cadastral data standardisation should result in the easy and fast data exchange, leading to minimisation of data transfer costs, elimination of expensive, repeated acquisition or processing of such data, which have been already transferred to other systems and may be easily collected from those systems (Enemark and Williamson, 2011; Kaufmann and Steudler, 1998; Williamson et. al, 2010).

Implementation of such data standardisation for existing data is extremely difficult, since:

- objects are not integrated in particular data bases,
- object generalisation has been performed many times at the data base level; as a result geometric descriptions – and also attributes of objects have been modified (such as the acreage of built-up areas), what results in creation of an object, which is differently described in the space,

- every system has different objects identifiers and codes, and libraries of codes are mutually incompatible,
- the same object does not have the same basic code on technical guidelines, which might be developed according to the demands, with the same basic part of the code, left unchanged.

One of important problems concerns issuing of cadastral data for various purposes, without maintaining the most important attributes in the process of distribution of those data, is being reference data sets for many systems. The following information is lost in the process of data distribution:

- source of data (e.g. the basis of establishing the cadastre, whether cadastral data or modernisation of the cadastre were performed basing on the documentation, which is stored at the state resources of geodetic and cartographic data, whether data has been digitised etc.).
- The accuracy of distributed data.
- Date of creation, updating or modification of cadastral data, and, therefore, the data timeliness. Such data, for example issued by the system, in which lands and buildings registration is maintained, are received, for example, by the Topographic Data Base or the basic map system and almost all above information and attributes is missed; therefore, data of poor characteristics (sometimes all what is known about the data is that they exist) are transferred to another system. It is not possible to evaluate the data timeliness and reliability in such cases.
- Objects within the same system (e.g. lands and buildings registration) have attributes, defined in various ways (e.g. the object area), in the geometric and descriptive parts. Thus, one legally defined object is represented by two (or more) different objects (e.g. a building, a parcel, land use in its geometric and descriptive parts).
- In the case of the integrated cadastral system (integrated geometric and descriptive parts) the date of disclosure of the object in the cadastre and on the map is the same, but it rarely refers to the legal status of the cadastral object.

Therefore, the substantial and legal values of the obtained object are not known. We only know, that the lands registration is the source of knowledge about the object. But data included in the lands registration has various status, i.e. they may originate from modernisation or digitalisation, performed for various purposes, characterised by diversified technical and substantial values etc.

The Act on the Spatial Information Infrastructure, together with administrative regulations, will improve the above situation.

#### **4. Required reforms of the real estate cadastre**

##### *4.1. Reforms at the national level*

In order to perform cadastral reforms, the following should be ensured:

- The uniformity of maintenance of the real estate cadastre at the level of the entire country, by creation of a uniform administration at the country, voivodship (province) and local levels.

- Harmonisation of spatial data, including, first of all, cadastral data as the basic reference data sets, by achieving the appropriate legal status and appropriate dates of creation, or modification, providing that those data are not missed in other systems, by which those objects are commonly used and for which they are harmonised.
- Standardisation of cadastral data, consideration of the legal status of objects in object attributes, i.e. the date when the object received the correct legal status, resulting from legal regulations (e.g. as a result of modernisation). For objects, which are the subjects of procedures resulting from the Act on the Spatial Information Infrastructure, including the necessity to standardise those objects, to harmonise and distribute them, such attributes should be introduced to administrative decrees to the Act, which are being developed, as well as to the Law of Geodesy and cartography, or to the new Geodetic and cartographic Law.
- In data bases which are listed in the act on the Spatial Information Infrastructure, the issue of legal status of objects, as well as the dates of object creation or modification should be solved; those attributes should be made unchangeable in the process of population of other systems.
- All works performed within the frames of various governmental programmes, which are stored at Geodetic and Cartographic Documentation Centres, should be included in the geodetic and cartographic data resources; they should be systematised, they should be assigned appropriate attributes (e.g. the method of acquisition, timeliness etc.) and then, they should be standardised and distributed to other sectors (e.g. for the needs of physical planning at the country level), in order to harmonise them and distribute for other purposes, related to development of the national economy.
- Lands and buildings registration systems should be urgently integrated with land registers, since the same rights to real estate's are recorded twice now – both, in land registers and in lands and buildings registration systems (real estate cadastres).
- Sets of documents existing in land registers should be computerised in land registers. At present, four basic sections of land registers were migrated, without computerisation of existing sets of documents, what makes utilisation of those data sets very difficult.
- Data existing on the real estate cadastre should be gradually amended with new objects, useful for other purposes of the national economy, including for appropriate administration of the real estate market.
- Responsibility for the data quality at particular levels of data creation or modification should be determined in legal regulations.
- Data with errors should be eliminated from the public register, such as the real estate cadastre; the quality of some data sets should be increased.

It is necessary to unify the rules of maintaining the cadastral data bases, using a tele-information system, which ensures:

- appropriately secured storage and updating of data;
- distribution and common utilisation of data, following the rules, which are specified in regulations concerning the spatial information infrastructure;
- visualisation of data in the form of registers, records and lists, as well as the

- cadastral map, as well as distribution of extracts from those registers, records and lists, and extracts from the cadastral map to all interested parties;
- development and implementation of legal regulations, allowing for utilisation of the 3D cadastre, together with works aiming at the future preparation to utilise the 4D cadastre.

Management of the 3D and 4D cadastres is possible assuming the developed technology

- it is limited by the lack of sufficient funds only (Uitermark et al, 2010).

#### ***4.2. Required local reforms in the real estate cadastre***

The following works should be performed in order to introduce reforms at local level:

- To support the awareness of the system users, as well as operators, in the field of correct and legally approved maintenance and distribution of resources.
- To achieve the possibility to implement small local systems (such as district or municipal systems) in – for example – voivodship (province) systems.
- To aim at the unification of the system in order to settle the data and to assign the data status resulting from legal regulations, unchangeable in the process of data distribution, following the Act on the Spatial Information Infrastructure.
- To remember about the systematic improvements of the cadastral data quality.
- To urgently transfer the lands and buildings registration into a reliable real estate cadastre, what is important for correct functioning of the state, for business activities performed by companies and for the secure real estate market.

### **5. Conclusions**

The real estate cadastre (lands and buildings register) is one of public registers, which create the state information infrastructure. For many works and elaborations, it has the primary and reference nature. Considerable parts of cadastral data, which, in particular, concerns cadastral parcels, outlines of land use categories and location of buildings, is of primary and reference value for other public registers. Considering this, as well as due to the requirements of the Act on the Spatial Information Infrastructure, it is necessary to accelerate works related to its modernisation and adaptation to the rules of interoperability, which have been introduced by that act.

The future cadastre should register, in the real time, all rights, limitations and obligations. This requires the involvement of many sectors and institutions - such obligation is imposed by the Act on the Spatial Information Infrastructure.

Following the authors' opinion, the current lands and buildings registration, after introduction of small amendments, will become the complete real estate cadastre with information, which will often exceed the vision of the Cadastre 2014, developed by FIG (Kaufmann and Steudler, 1998). We think, that FIG should commence the development of the CADASTRE 2014 Plus, considering the technological development, development of cadastral systems and existing trends in legislation of particular countries.

In our country, we are aiming at unification of maintaining the real estate cadastre, although various data, resulting from the past annexations, utilised for development and modernisation of the cadastre, exist. Vector cadastral maps, developed for the needs of the Land Parcel Identification System (LPIS), in particular for arable lands, should be useful for faster unification of the cadastre. Utilisation of documents, which have been developed for the LPIS system differs in particular parts of the country, due to existing diversified input materials, which were used for creation of the vector map.

Finally, the cadastre should be developed and modernised basing on unified standards only (which were developed by the Head Office of Geodesy and Cartography and which are agreed by interested sectors and approved by professional organisations of surveyors), for the entire country; therefore a uniform organisation dealing with the cadastre in Poland, should exist. The past experiences point to the need of organising the cadastre at the state administration. Maintenance of the cadastre – being the state resource – by more than 400 local government units results in considerable difficulties in coordination of those tasks. As the authors, we suggest that this situation should be changed for the sake of the cadastre.

The resources should also receive various works, the wide information of which should be utilised by sectors and other users for, e.g. physical planning, crisis management etc., although such works themselves could not be the bases for introducing changes in the cadastre.

Following the Act on the Spatial Information Infrastructure, such data should be received by the state resources and inventoried; appropriate attributes should be assigned to such data, which will not be lost in processes of issuing and distribution of data. Then such data should be distributed for various purposes.

In order to achieve such data, the following components are required time, – funds, and organisational opportunities.

As it may be noticed, it is difficult to separate reforms at national and local levels. Reasonable and correctly implemented legal regulations will allow for implementation of appropriate national reforms, but mainly local operations will decide about their effectiveness.

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**Reformy katastru nieruchomości w Polsce****Ludmiła Pietrzak<sup>1</sup>, Andrzej Hopfer<sup>1</sup>, Stanisław Cegielski<sup>2</sup>**

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**Streszczenie**

W dniu 7 maja 2010 r. weszła w życie ustawa a dnia 4 marca 2012 r. o infrastrukturze informacji przestrzennej dokonująca transpozycji dyrektywy Parlamentu Europejskiego i Rady nr 2007/3/WE ustanawiającej infrastrukturę informacji przestrzennej w Europie. Ustawa to wprowadziła zasadnicze zmiany do obowiązującej ustawy prawo geodezyjne i kartograficzne, i w konsekwencji powstała konieczność opracowania nowych rozporządzeń wykonawczych. W chwili obecnej większość rozporządzeń jest już opracowana, część jest jeszcze konsultowana z organizacjami zawodowymi geodetów.

W artykule autorzy dokonują analizy stanu istniejącego, zadań administracji rządowej i samorządowej związanych z koniecznością modernizacji katastru oraz podają zakres koniecznych do przeprowadzenie reform w skali kraju oraz w skali lokalnej.