3D Cadastre Development in Hungary

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SUMMARY

Geometric part of the Unified Hungarian Land Registry (Cadastral maps) has been operating in standardized environment since 1996. MSZ 7772-1 Standard on Digital Base Map (developed by Institute of Geodesy Cartography and Remote Sensing, FÖMI) — based on the pre ISO and CEN standards on Geographic Information — defines a 3D relational database model for cadastral maps and linked attributes. Till now 3D capacity of Cadastral Map Databases has not been utilized.
In Unified Hungarian Land Registry the seeds of 3D Cadastre have been planted since the establishment of the Unified System in 1972. This base was the registering of condominiums, and other special 3D objects.
Main Acts, which strongly influence Land Registry, (Act on Surveying and Mapping Activities from 1996, and Act on Land Registry from 1997), have been elaborated for the Land Registry situations in the mid of 90's. Technical and infrastructure developments during the last 15 years force the change on not only the technical, but on the legal environment, as well. The paper deals with the present situation, the proposed, new legislation and technical solutions in Unified Land Registry, which all of them points to a real 3D Cadastre in Hungary.

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1. INTRODUCTION

Hungarian Land Administration has old tradition in Land Management based on the establishment of Cadastre-Land Registry in the ages of Austro-Hungary, at the end of the XIX. Century. Management of Cadastre-Land Registry of Hungary has been continuous during the Communist era as well, counter to other Socialist Countries.

In 1972 a new restriction on Land Registry was introduced, which established the Unified Hungarian Land Registry. In Unified Land Registry both Cadastral Mapping and Land Registry are the responsibilities of the same institutional system, the Land Office Network. Institute of Geodesy, Cartography and Remote Sensing (FÖMI) is a part of this system, like the overall responsible institution of research and development, maintenance and data service.

In the mid of the 90's two, new acts has taken into force, which determine Land Administration activities, Act on Surveying and Mapping activities, and Act on Land Registry. These two acts contain some 3D Cadastre solution (e.g. registering of condominiums, cellars etc.), but real 3D cadastre issues has not been regulated.

Technical development of Land Administration sector has been started at this time as well. At first step the legal part of the Unified Land Registry has been developed (TAKAROS system), then the Network of Land Administration Sector (TAKARNET) and its services were introduced and at the end of 2009, a new integrated IT system, DATR (both the legal and cadastral part) were introduced. In 2010 a new data service system, TAKARNET24 were established and has been operating since June, 2011. All these IT systems are the result of FÖMI's development work.

This paper deals with the renewed legal framework of Hungarian Unified Land Registry and technical solutions related to 3D Cadastre.

2. LEGAL FRAMEWORK OF HUNGARIAN UNIFIED LAND REGISTRY

Mainly two Acts determine the activities of Hungarian Land Administration, but naturally there are other legislations, which influence them (e.g. Act on Arable Land, Act on Forest etc.). These two Acts are:

- Act on Surveying and Mapping Activities (Act LXXVI. 1996) and
- Act on Land Registry (Act CXLI. 1997).

These two Acts has came in force 15 and 14 years ago, and elaborated into an analogue (paper based) physical environment. During the last one and a half decade many important and

successful technical developments has been completed in Hungarian Land Administration, but the changes in legal environment did not follow the results of them.

In 2011 Ministry of Rural Development (responsible for Land Administration) decided the modification of these two Acts for to make a new legal environment, which satisfied the technical requirements, including 3D Cadastre issues as well.

2.1. New concept on Surveying and Mapping Activities and Land Registry

The goal of this Act is to determine the tasks of the State in Surveying and Mapping and to establish a condition system, which provides maps in a cost-effective way for the whole economy.

The main issues, which handled in this Act are the following:

- State works and State Data
  - State Databases
  - Data Services,
  - Control Networks
- State Databases
  - Database of State Boundary
  - Database of Control Points,
  - State Cadastral Map Databases,
  - State Topographic Databases,
  - State Remote Sensing Databases,
  - Databases for State Defence,
  - Gazetteer
  - Archive Databases.
- Surveying and Mapping Activities
  - Mounting and measuring surveying marks
  - Ownership of surveying marks,
  - Protection of Surveying Marks
- Ownership of Surveyed Data
- Institutional Issues in Surveying

New concept on Surveying and Mapping activities changed from the old, map-based regulation to database fundament. State Cadastral Map Database is the geometric part of the Unified Land Registry Database, which has been defined in the Act on Land Registry.

Topographic mapping activities are shared between the public (FÖMI) and military mapping agencies. Large scale (1:10 000) topographic mapping is the responsibility of public, while smaller scale topographic mapping belongs to the military mapping agency.

State Remote Sensing Databases are Orthophotos, Satellite Images, LIDAR (including Terrestrial LIDAR technics), Photogrammetric products, which elaboration financed by the State.

New concept also includes 3D Cadastral issues, which determine that 3D objects, related to Land Registry, should be stored in State Cadastral Map Databases. Because of the importance of 3D Cadastre solution, new Act on Surveying and Mapping Activities modifies the Act on Land Registry as well.

Act on Land Registry defines a Unified Land Registry, which means the legal and geometric (cadastral map) part of the Land Registry compose one system. All geometric characteristics of Land Registry components (parcel boundary, area etc.) are derived from the State Cadastral Map Database. The Database of Land Records and State Cadastral Map Database compose one Database, Unified Land Registry Database.

Principles of Hungarian Unified Land Registry have not been changed, which are the follows:

- Title and its effect
- Publicity
- Authenticity
- Application
- Rank and
- Deed.

Title and its effect defines, that all rights and facts are derived from registering them.
Publicity means that the data, registered in Hungarian Unified Land Registry are public (except some special data, e.g. Personal Identifier).
Authenticity means that all data, registered in Land Registry are authentic.
If anyone wants to change or register anything in Land Registry, he must make an Application for it.
The principle of rank defines, that all actions in Land Registry should be carried out based on the time of registration of Application.
If any rights or facts should be registered, it must be based on a Deed, defines the principle of Deed.

This Act defines cadastral parcel, which is a continuous part of the Earth's surface, on which the ownership and/or handler relationships are homogenous. There are other types of real properties beside cadastral parcels, which are the components of Land Registry (e.g. buildings, condominiums, flats, shops etc.).

Former Act defined some 3D Cadastre issues. These are the registering of condominiums, flats, shops, other areas within the condominium, cellars of which entry on public parcels etc. Registering of these 3D situations, based on the 2D cadastral map. For example flats, shops are not the part of Cadastral Map Database, these are described by the floor-plans of them, which act as Cadastral Map of flats. Therefore change management of them is a very hard work. Cellars are described only by the entry line of them in Cadastral Map Database.

Because of the above situation, and introducing a real 3D Cadastre in legislation, the renewed Act on Land Registry defines a new type of property, which opens the doors to 3D Cadastre.

This new type of property is defined by the follows:
"Under-ground and above-ground passes objects, structures, which has homogenous ownership and/or handler relationships should be taken into account as an independent property, which must be registered in Land Registry."

By this action utilities, overcrossings and other objects should be registered as an individual property and 3D legal relationships should be modeled in Hungarian Unified Land Registry.

Versus with some 3D Cadastre solution, the Hungarian concept registers 3D object in space. Connecting legal space of 3D object should be derived from the geometry of object itself.

Legal space required for 3D Cadastre object is defined in different Laws, Regulations related to Land Use and Land Development in Hungary. This means if 3D objects and their legal space should be registered in Land Registry, the required legal space must be modeled based on regulations.

The Act authorizes FÖMI to elaborate the required legal and technical regulations for the implementation of 3D Cadastre in Hungarian Unified Land Registry. Therefore 3D elements of the Act will not come into force immediately, if the Act voted by the Parliament, only after these regulations and technical conditions are ready.

The new Act now is under discussion among the Ministries and will be published to the Parliament at the of this year. If Parliament voted the Act it will be come into force next spring.

3. TECHNICAL ISSUES

Hungarian Unified Land Registry is operating in a self-developed IT environment DATR, which is a FÖMI developed system en-bloc. This IT system is based on Hungarian Standard MSZ 7772-1 Digital Base Map, Conceptual Model. The Standard defines a 3D space as default, but 3D geometric and topological primitives and structures are not included.

For the establishment of the technical background of the above-mentioned new legal environment, a lot of development and modeling work must to do. FÖMI, as the developer of IT systems of Hungarian Unified Land Registry, plans to expand MSZ 7772-1 Standard by introducing 3D geometric and topological primitives, 3D objects and legal spaces and their spatial relations. Since all source codes of IT systems are available at FÖMI, coding of models would not be a real problem. FÖMI do not plan using other (e.g. OGC, ISO) Standards in the implementation of 3D Cadastre, interfaces to and from such standards will be developed.

Beside the IT development of 3D Cadastre the Surveying of 3D objects and its regulations would be a harder work, which is the responsibility of FÖMI. In the case of Utilities, in the planned regulation, utility companies should register their pipelines in Land Registry based on their own registration system. This means the geometry of utility pipelines and other objects

derived from the technical registry of utility companies. Land Registry just uploads their data into Land Registry IT system and then registers them as properties. In the case of other 3D Cadastre objects (e.g. tunnels, bridges, deep-level garage) different surveying technics should be taken into consideration (such as LIDAR) and must be regulated in Surveying related laws.

4. CONCLUSIONS

In this paper the technical and legal situation in Hungarian Land Administration Sector was described. Technical developments, carried out in the last decade, enforce the changing of legislation in the Land Administration Sector. Beside the technical developments force a legal constraint is arisen, which is the handling of 3D legal issues, the 3D Cadastre.

Changing in the definition of properties, opening to a real 3D Cadastral system, also extends the productivity of the Hungarian Land Administration Sector.

These changes are under construction, the proposal will be sent at this autumn to the Ministry of Rural Developments and we hope, that our concept will be accepted by the Parliament, for a new, more effective Land Administration in Hungary.

REFERENCES

Act on Land Registry (1997). Act CXLI.

Act on Surveying and Mapping Activities (1996). Act LXXVI.

Iván, G., Doroszlai, T., Szabó, G., Weninger, Z. (2009). TAKARNET24 project, towards e-Land Administration in Hungary. Open Symposium on "Progressing towards u-Cadastre", Kuala Lumpur, Malaysia, 15 October 2009.

Iván, G., Mihály, S., Szabó, G., Weninger, Z. (2004). Standards and new IT developments in Hungarian Cadastre. "Standardization in the Cadastral Domain". Joint workshop of "FIG Commission 7" and "COST Action G9", 9-10 December, 2004, Bamberg, Germany.

Iván, G., Szabó, G, Weninger, Z. (2006). Expansion of Land Information Services in Hungarian Land Administration. Proceedings of "Shaping the Change" XXIII FIG Congress, Munich, Germany, October 8-13, 2006.

Iván, G., Szabó, G., Weninger, Z. (2006). Object Oriented Unified Real Estate Registry for a Good Spatial Data Management. FIG Workshop on e-Governance, Knowledge Management and e-Learning, 27-29 April, 2006, Budapest, Hungary

Iván, G., Szabó, G., Weninger, Z. (2007). Integrated Land Information Services in Hungarian Land Administration. Proceeding of "Strategic Integration of Surveying Services", FIG Working Week, Hong Kong SAR, China, 13-17 May, 2007.

Iván, G., Szabó, G., Weninger, Z. (2008). A Complete, Free Solution for Cadastral Map Management. Proceedings of "Integrating the Generations", FIG Working Week, Stockholm, Sweden, 14-19 June, 2008.

Iván, G., Szabó, G., Weninger, Z., Zalaba, P. (2010). DATR-Towards e-Land Administration in Hungary. Proceedings of "Facing the Challenges-Building the Capacity" FIG Congress 2010, Sydney, Australia, 11-16 April 2010.

Mihály, S., Iván, G., Weninger, Z. (2009). Land Administration Standards and their implementation in practice. Proceedings of Surveyors Key Role in Accelerated Development, FIG Working Week, Eilat, Israel, 3-8 May, 2009.

BIOGRAPHICAL NOTES

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