

Let Us speak about the Future of Developed Cadastres

Gyula IVÁN, Hungary

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SUMMARY

Nowadays Fit-for-purpose (FFP) Land Administration is a very popular theme in our profession, but the future of developed cadastres is little discussed. Developed cadastres are working well, satisfy the requirements of clients, and the most important, there is trust in it. New technologies strongly influence the performance of developed cadastres (e.g. blockchain, new data collection techniques), but they are not the cadaster itself. The paper will discuss the different issues, which could affect the future of developed systems, and some open questions which should be solved.

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1. INTRODUCTION

Cadastre is a core element of any Land Administration system. In this case an integrated, multipurpose cadastral system is taking into account, where cadastral mapping and the registration of rights, restrictions and responsibilities (in LADM¹ term RRR) are realized in an integrated system, called Cadastre. Such an integrated system can be developed independently from the institutional or organizational issues, based on the modern IT technology.

Land administration services unfortunately are not available for all people around the world. 70% world's population have no access to formal Land Administration services, while only 25% of the 6 billion land parcels worldwide are formally registered and have robust security of tenure. Therefore UN and its organizations (FAO, HABITAT), FIG, Worldbank and others are focusing on the development of Land Administration (Cadastre) in the countries, where these services are not accessible, and trying to provide secure land tenure for people. (McLAREN-ENEMARK, 2017)

Mentioned activities of these organizations are really important, and it is natural, that they are concentrating on the different tools, which will solve this huge problem (like Fit-for-Purpose Land Administration). Therefore nowadays the issues of developed cadastral systems are less discussed. In this paper these matters, which would influence developed cadastres, will be discussed.

2. LAND ADMINISTRATION AND CADASTRE

In LADM Land Administration is defined as follows:

”Process of determining, recording, and disseminating information about the relationship between people and land”.

Beside this definition there is a very important note in the Standard: ”In many countries, land administration information is determined, recorded and disseminated under the umbrella of cadastre and land registry. Both institutions can be unified in a single (state) organization.”

In this paper this, process based, approximation will be used in the discussion of the future of developed cadastres.

The three main elements of the process of cadastre are the determination, recording and dissemination of information. Determination means the acquisition of geometric and legal information related to the connection between people and land. Geometric information

¹ LADM: ISO 19152:2012 Standard, Land Administration Domain Model

acquisition means the usage of different positioning techniques for determining parcel boundaries, buildings and other objects, which act in the relationship. Legal information acquisition means the analysis of different deeds, contracts and other documents, which should be recorded in the cadaster.

Recording is the core process of cadastres. This process does not mean only the recording of information acquired in determination process, but also relates to the modelling of data constrains, connections and business logic and procedures. Recording is the overall management of information related to the connection between people and land.

The third process is the dissemination of recorded information. This process can be carried out in form of paper-based (printed) and internet-based services.

These three processes together they form the cadastre. The process of determining and disseminating information can not be separated from recording, but easily be isolated from the recording process.

3. THE FUTURE OF DEVELOPED CADASTRES

Following the order of the last section, the determination of information will be discussed first.

Fortunately the fast development in positioning technology strongly helps the determination process of cadastres. Our day's positioning systems – GNSS, UAVs, mobile mapping systems, remote sensing – provide such a huge amount of, and accurate spatial data, of which processing, structuring is a more difficult mission than to observe them. Cadastre needs structured data, and this structuring can be solved outside of cadaster.

Today direct positioning, calculations, algorithms take over the task of field measurement. (STEUDLER, 2016). Smart devices provide more and more accurate position information in the future. This devices need more accurate positioning infrastructure. For example Australia and New-Zealand will introduce a dynamic geodetic datum in 2020 (NEW ZEALAND). Accurate positioning by smart devices enables to take people into the determination of geometric information, which increases the usage of crowdsourced data. The use of crowdsourced data requires the development of validating tools in the recording process. In the future cadaster acts as a validation organization for crowdsourced data as well.

The future of determination of legal information is an important and interesting question. In developed cadastres there are different, premade documents, forms and stylesheets, which can be processed automatically, or semi-automatically. A further solution could be the usage of smart contracts. A smart contract is a computer protocol intended to digitally facilitate, verify, or enforce the negotiation or performance of a contract. Smart contracts allow the performance of credible transactions without third parties. These transactions are trackable and irreversible. (Wiki). One of the implementation of smart contracts was in blockchain

technology, of which usage in land administration is a very popular theme nowadays. With blockchain technology the discussion arrived to the recording process of cadastres. There were successful projects in the usage of blockchain technology in Georgia and Honduras. But there is an open question, blockchain is needed for developed cadastres?

One of the most important feature of developed cadaster is the trust. A cadastral system is successfully operating, if all parties acts in the cadastral processes (people, banks, notaries, lawyers etc.) have trust in the system (TWAROCH-MUGGENHUBER, 1997). The trust is independent from any technical or legal solutions, the organizational and institutional issues should be taken into account to obtain this trust. The trust in cadaster is the most important characteristic of developed cadastral system.

This trust, as it was mentioned, is independent from the type of cadaster (deed or title system). For example in Hungary, which runs a unified, title cadaster, the Hungarian State guarantees the RRRs registered in cadaster, it is an authentic registry.

Blockchain is using the practice “shared single source of truth”, which provides the trust in the system by using computer algorithms (VOS). Such a solution is needed for developed cadastres?

Blockchain does not modify the core process of cadastres, the recording of information. If a cadaster is using blockchain or not, the same information must be recorded. Blockchain is a technology, which should be very useful in the development of new cadastral systems, or improving of existing, low performance cadastres. Introduction of blockchain into developed cadastres could be dangerous as well, because it risks the trust in the system, which is independent from any technology.

Another issue in the recording process is the digital case handling. Where digital case handling can be used in cadastral processes? At the input (filing) and the output (services) side of cadastres digital case handling could be widely used, because many processes easily be formalized and automatized. In the case of business processes it is different. Business process in deed registries is simpler than in title ones. Theoretically in deed registries only the transaction is registered by registering the deed. In title registry a pre-investigation of deed is required and based on the result of this study, the titles will be registered. This pre-investigation process can be automated or not in the future? This question will be opened for a long time.

The author believes that the technology, which will revolutionize the recording process of developed cadastres, is the implementation of 3D cadastres.

3D Cadastre is not only the extension of traditional, 2D cadaster to height information (3D), but the handling, managing and registration 3D RRRs as well. This extension will deeply change the recording process of traditional cadastral systems. 3D Cadastre also defines huge amount of new procedures, new constrains and new procedures, which strongly influences the future of developed cadastres.

Implementation of 3D Cadastre includes many legal challenges as well. Boundaries of legal spaces (volumes) are not always coincide with the physical boundaries of the objects. Legal spaces could be defined by other legislation than cadastral laws, which must be taken into account. It is possible, that a legal space is realized, but cannot be connected to any physical object. For example in the case of a building permit. The building permit defines a legal space, which is allocated by the permit, but physically the building does not exists (it is not built yet).

Another legal challenge is the relative positions of different legal spaces. These legal spaces can intersect, reach or overlap each other. These intersections, overlaps and other can generate other RRRs. The generated rights can be registered automatically or not?

The definition of cadastral parcel is also changed in 3D Cadastre. The parcel become a prism, of which sides are defined by vertical planes, intersect the 2D cadastral parcel boundaries. Therefore the 3D parcel can be infinite in 3D space (unbounded 3D parcel).

All in all the greatest challenge in the further development of developed cadastres is the introduction of 3D Cadastre.

Dissemination of cadastral information is mainly realized in the forms of internet services. Thanks for the WEB 2.0 technology, nowadays these services are interactive, so clients actively participate in the service processes. In the future the number, the range and the quality of services will be increased. The next generation of the services are the “Computer ecosystems” (STEUDLER, 2016). These metaplatfroms are providing reliable, flexible and customizable services for clients, which should be implemented in governmental sector, in cadaster, as well.

4. CONCLUSION

In this paper the ideas on future of developed cadastres were summarized. Developed cadastral systems were discussed from the processes, realized in cadaster, point of view. As concluded the greatest challenge, and revolution in cadastral systems would be the implementation of 3D Cadastre. In the determination and dissemination of cadastral information the technological development causes real, huge changes, but this fact does not influence the essence of cadaster, the recording process.

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BIOGRAPHICAL NOTES

Gyula IVÁN (53): has a master degree in civil engineering (faculty of surveying and geodesy) from Technical University of Budapest, HUNGARY. He is currently the Chief Adviser on Lands at the Department of Geodesy, Remote Sensing and Land Offices within the Government Office of the Capital City Budapest (former Institute of Geodesy, Cartography and Remote Sensing, FÖMI). He was the vice-chair of administration in FIG Commission 7 (Cadastre & Land Management) between 2006-2010, and vice-chair within the period 2015-2018. He is the Vice-Secretary General of Hungarian Association of Surveying, Mapping and Remote Sensing, member of FIG.

CONTACTS

Gyula IVÁN
Department of Geodesy, Remote Sensing and Land Offices
Government Office of the Capital City Budapest
5. Bosnyák tér
Budapest
HUNGARY
Tel. +36-1-460-4081
Fax + 36-1-222-5112
Email: ivan.gyula@bfkh.gov.hu
Web site: http://www.ftf.bfkh.gov.hu/portal_en/