Position paper 3
Legal aspects of 3D Land administration

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1. INTRODUCTION

This position paper serves as the basis for discussions at the working session theme Legal aspects of 3D LA, being one of the four working session themes at the 11th International FIG Workshop on LADM (Land Administration Domain Model) /3D Land Administration), in Gävle, Sweden, 11th-13th October 2023.

The intention of the paper is to initiate discussions on the legal framework of 3D land administration, including 3D cadastre and the use of the Land Administration Domain Model (ISO, 2012), and aims at identifying main topics concerning the legal aspects and further future research.

The paper starts by presenting and relating to results from the earlier FIG workshops on land administration and 3D Cadastres and related research on legal issues in order to describe the state-of-the-art in the research field(s). However, what can be considered as legal aspects? In this paper we use the definition provided in Paulsson and Paasch (2013), dividing 3D cadastre research into four categories: Legal, Technical, Registration and Organisational. The legal category is defined to contain "[...]publications on topics such as real property rights, restrictions, responsibilities, real property, superficies solo credit, security of tenure, legislation, subdivision, spatial planning, legal objects and the legal framework." The category is in other words rather wide and allows for a multitude of related legal subjects to be discussed and researched. This can also be noticed by the spectrum of publications addressing a spread of sub themes in legal research on 3D land administration and cadastre. Examples are the FIG 3D cadastre and 3D land administration workshops as well as input from e.g. publications at the FIG working weeks, also addressing legal issues on 3D land administration. They can be classified into different sub themes, such as BIM, 4D cadastre, Marine and water applications, valuation, LADM and other standardisation. Those topics are however also found in the other categories and it depends on the focus of the individual research how a publication should be classified.

The input to the working session is the flow of peer reviewed papers as well as abstract reviewed conference papers on 3D real property research during the last two decades. The purpose of this paper is to in short present a state of the art of the topic legal aspects of land administration, along with key challenges and ideas related to possible solutions to these challenges. The paper continues by presenting some key challenges related to research in this field. Possible ways for how legal research can be increased are presented by providing examples of possible research issues. The concluding part of this paper, finally, presents a possible way forward.

2. STATE OF THE ART

There seems to be an increased interest in a number of different themes of 3D land administration, especially in the context of 3D cadastre, judging from the analysis presented in e.g. Paulsson and Paasch (2013), and Paasch and Paulsson (2023). There has been a relatively constant number of publications annually during the last two decades, but it can also be noticed that the legal topic is one of the lesser researched topics among the above mentioned main categories, counting for example for only 18 % of the publications during 2001 to 2011 (Paulsson and Paasch, 2013) and 15 % of the publications during 2012 to 2021 (Paasch and Paulsson, 2023).

The legal theme is rather small numerically in relation to the technical and registration categories, but a closer inspection shows that legal research focuses on a multitude of subtopics as mentioned in the previous section. Adding topics published in recent years, e.g. in the proceedings of the international FIG Workshop on 3D Cadastres in New York 2021, we find publications on e.g. modelling of 3D underground legal spaces in 3D land administration systems (Ramlakhan, Kalogianni and van Oosterom, 2021), the linking of planning regulations for 3D zoning with 3D cadastre (Emamgholian, Pouliot and Shojaei, 2021), the organisation of rights and responsibilities in complex 3D real property developments (Madsen, Paasch and Sørensen, 2021) and the design and development of a BIM-based 3D property formation process (Sun et al., 2021).

3. KEY CHALLENGES

There are several key challenges concerning legal aspects of 3D cadastre. The legal framework(s) adopted in many countries is frequently to some extent supported by 3D visualisation of 3D objects in cadastral maps. This is often done in a very rudimental way, sometimes supported by simplified textual description of the extension of RRRs (rights, restrictions and responsibilities) in the formal legal documents / dossiers created during the real property formation process. In some cases, a 3D PDF has been registered in the national land register, for example in the Netherlands (Stoter et al., 2017).

Legal issues are connected to other issues such as technical, registration and organisational issues. The world we live in is three-dimensional, but land administration information has traditionally been treated as two-dimensional. We could, in other words, see it as a paradigm shift from the use of information in two dimensions to three dimensions. The position paper for the 3D cadastre workshop in Dubai 9 years ago (Paasch and Paulsson, 2014, appendix) pointed at 5 questions which were considered relevant to discuss. These questions form the basis for questions no 1-5 in the list of key challenges below. They are relevant also today even if much has been achieved since then, e.g. the registration of 3D legal boundaries of RRRs as 3D PDF (Stoter et al., 2017). Other issues, such as the increased focus on Building Information Modelling and how to implement a 3D land administrations system being in focus in later years, are added to the list of challenges below, see no 7-10.

1. Which types of 3D cadastral objects (3D properties) can be registered? Are these always related to constructions (buildings, pipelines, tunnels, etc.) or could they be any part of the 3D space (both airspace or in the subsurface)?
2. In case of infrastructure objects crossing 2D parcel boundaries, such as long tunnels, and pipelines and cable networks: should these be divided based on the surface parcels or treated as one cadastral object?
3. How to deal with the fact that the legal status of such an object does not have to be the same for all the ground parcels? E.g. a construction located on three real properties on the basis of different types of rights (e.g. easement, restrictive covenant, lease).
4. For the representation (and initial registration) of a 3D cadastral object, is the legal space specified by its own coordinates in a shared reference system (as is the practice for 2D in most countries) or is it specified by reference to existing topographic objects/boundaries?
5. Should the 3D registration and visualisation reflect the actual dimensions? Or is it sufficient to have a visualisation of property units in buildings based on standard floor-to floor heights? What is the legal value of these boundaries? Is an investigation of the source documents (title deed, survey plan) needed to get legal binding information?
6. How are the (national) land administration / property formation digital processes adapted to facilitate effective formation, registration, visualisation and archiving of 3D land administration objects?
7. What is the need for improved visualisation of 3D land information in a nation's real property register?
8. Are there any obstacles within the current legislation to change a nation's real property administrative systems from being based on 2D information to 3D?
9. How can real life implementation of legal aspects research results be achieved to further 3D land administration management?
10. How is the legal digital information to be archived for future use?

4. POSSIBLE SOLUTIONS

Initial ideas to be addressed at the workshop will focus on the key challenges no 1-10 listed above. The LADM is now discussed in the 3D research community and can be used as a tool as well as input, which this conference also indicates by being a joint LADM and 3D land administration workshop. LADM and other standards can be used as an input to further the discussions concerning the future development and implementation of 3D solutions in land administration, for example how to describe the legal boundaries and volumes in the national registration systems.

The results of the most recent questionnaire on 3D land administration from the FIG Working Group 3D Land Administration 2022 will be useful to study in order to understand what is the current situation on the legal aspects, how far each participating country has come in its development of 3D land administration and what issues and challenges that are mentioned in the reflection part of the questionnaire.

Collaboration between researchers from different countries and comparative studies of the different national solutions would provide insights in how a legal framework can be constructed in various ways and a possibility to learn from each other. National studies are of course also needed, and if presented in the national language, the results should preferably also be presented in English for the international audience. The working session on legal aspects of 3D land administration at this current workshop will also hopefully bring forward some useful suggestions for possible ways forward.

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BIOGRAPHICAL NOTES

Jenny Paulsson is professor in real estate planning and land law at the Department of Real Estate and Construction Management of the KTH Royal Institute of Technology, Stockholm, Sweden. She holds a PhD degree in Real Estate Planning and a MSc degree in Surveying, both from the KTH Royal Institute of Technology. Her PhD thesis concerned 3D property rights. She is a member of the FIG joint commission 3 and 7 Working group on Land Administration Domain Model/3D Land Administration (LADM/3D LA).

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