

# Initial Registration of 3D Parcels

## Position paper 2

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### 1. INTRODUCTION

This paper is intended as a basis for discussion on a working session "Initial Registration of 3D Parcels" to be held at the 2nd International FIG Workshop on 3D Cadastre. The working session will focus on the various ways in which a 3D parcel comes into existence within a cadastre, and whether there are significant differences from the 2D cases.

As land in urban areas becomes more valuable, there is a trend towards subdivision in 3D (for example, units in a high-rise building). This means that at some point in time, instead of thinking about rights to an area of land, we start considering rights to a volume of space. There may in fact be no physical "real world" change (if construction has not started), but a change of legal definition occurs from 2D to 3D. Another way of thinking about this is that a prism of space above and below a 2D land parcel (and defined by it) is now redefined into discrete 3D volumes.

The way this re-definition comes about, and thus how 3D parcels come into existence, is the subject of this working session.

### 2. STATE-OF-THE-ART

The actual legal and technical techniques used to effect this creation of 3D entities varies from jurisdiction to jurisdiction (Van Oosterom, Stoter, Ploeger, Thompson and Karki 2011), and the issues likewise vary. The degree to which authorities use a spatial database to administer or record their cadastre also varies. It is the aim of this session to explore some of these approaches and solutions.

### 3. KEY ISSUES

Cases or situations to be considered include:

- The subdivision of a 2D parcel into 3D parts.
- The excision of a 3D parcel from a standard 2D parcel (leaving the remainder).
- Partial road closure (e.g. by overhangs).
- Subdivision of an existing 3D parcel.
- Conversion of unit definitions based on the building walls to 3D parcels.
- Amalgamation of 3D parcels (or mixed 2D and 3D parcels).
- Network parcels crossing above/below many 2D parcels.

- Speculative construction of networks (to create conduits for commercial rental).
- Microwave airspace / view sheds / other “airspace” issues.
- Historic cases (e.g. Greece, Utrecht). (In the past it has been permissible to dig under another property, for example on a steep hillside).
- Underground parcels bearing minerals (e.g. landowner sells land “to the depth of”, but retains the lower level – so as to get royalties on the minerals there).
- Depth restricted parcels – not horizontal boundaries, but parallel to ground surface.

Questions for consideration include:

- Is initial registration of 3D parcels different from 2D?
- Can building models be used? (to supplement / become 3D parcel complexes)
- How do secondary interests transfer from existing parcels to new 3D parcels?
- Is the owner of a 2D parcel inconvenienced or restricted in future dealings due to (say) a tunnel below his property?
- Any conversion proposed between building format plans and 3D metes and bounds?
- What processes needed/used to prevent encroachment in 3D?
- What rules/regulations/laws govern the process of registering a 3D parcel?
- What workflow is involved, and how is it documented?

#### **4. POSSIBLE SOLUTIONS**

The future of 3D parcel registration:

- Are current rules and procedures working well? (Or how to improve them)?
- Is there a best practice for 3D parcel registration? What alternate procedures are used in different countries?
- Digital submission of 3D geometry definition: in use? planned? desirable?
- Format for digital submission (GML, LandXML, other XML?), and are 2D and 3D covered in the same standard/guideline?

#### **REFERENCES**

Van 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, Marrakech, Morocco.

## **BIOGRAPHICAL NOTES**

**Rod Thompson** has been working in the spatial information field since 1985. He designed and led the implementation of the Queensland Digital Cadastral Data Base, and is now principal advisor in spatial databases. He obtained a PhD at the Delft University of Technology in December 2007.

## **CONTACTS**

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## APPENDIX

As a background, and to assist with interpreting the issues and questions, a sample of the situation in Queensland, Australia is included.

### KEY ISSUES:

- The subdivision of a 2D parcel into 3D parts.
  - ◊ In QLD this is a common way of creating 3D parcels.
- The excision of a 3D parcel from a standard 2D parcel.
  - ◊ Also common in Qld
- Partial road closure.
  - ◊ Also common in Qld
- Subdivision of an existing 3D parcel.
  - ◊ Not common yet – may become more common.
- Conversion of descriptive “strata title units” to 3D parcels.
  - ◊ Not yet common, but possible.
- Amalgamation.
  - ◊ Rare so far.
- Network parcels crossing above/below many 2D parcels.
  - ◊ Not permissible in Queensland when the 3D parcel is created, but may occur as a result of subdivision of the 2D ground parcel.
- Speculative construction of networks.
  - ◊ Not yet an issue.
- Microwave airspace / view sheds / other “airspace” issues.
  - ◊ Not yet an issue.
- Historic cases.
  - ◊ Not applicable in Qld
- Underground parcels bearing minerals.
  - ◊ Not common, but does happen.
- Depth restricted parcels – surface parallel to ground surface.
  - ◊ There are a significant number of these.

### QUESTIONS:

- Is initial registration of 3D different from 2D?
  - ◊ In Queensland, no. The form of titling in use in Queensland was quite robust in its form, and the rules and legislation that were designed initially for 2D cadastre carried over to the 3D situation.
- Can building models be used?
  - ◊ In Qld, the building models are not registered as plans of survey, but the (older) form of 3D plans (known as Building Format Plans) define the 3D parcels in terms of the physical building. The Building model, if it exists, may be considered to be additional information in visualising the parcels, but not an official definition.
- How do secondary interests transfer from existing parcels to new 3D parcels?

- ◇ Secondary interests carry forward as usual. For example, if there is a 2D easement over a 2D lot which is subdivided, if the easement is not redefined in any way, or extinguished, it remains over the new parcels (with no limit on its height or depth). If the easement is to become 3D in nature, it would have to be extinguished and replaced by a 3D parcel.
- Is the owner of a 2D parcel inconvenienced or restricted in future dealings due to (say) a tunnel below his property?
  - ◇ In Queensland, this is minimized by legislation which considers a parcel with subterranean exclusions as effectively a 2D parcel. Thus if it is to be subdivided, and that does not involve any new 3D components, a normal plan of survey can be done (not needing re-measurement of the underground parcel, and not needing special surveying skills)<sup>1</sup>. This does not apply if there is any 3D underground component to the subdivision.
- Any conversion between building format plans and 3D metes and bounds?
  - ◇ There are no plans in Australia to allow building format plans to be submitted using the electronic lodgement systems (EARL). Thus new 3D plans will by nature be in the volumetric form. This may have the effect of converting existing Building Format Plans to true volumetric plans if they need to be re-surveyed.
- What processes needed/used to prevent encroachment in 3D?
  - ◇ In Queensland, this is the same as in 2D. The surveyor, in defining the parcels on the plan (whether 2D or 3D) verifies that there is not encroachment.
- What rules/regulations/laws govern the process of registering a 3D parcel?
  - ◇ <http://www.derm.qld.gov.au/property/titles/rdpp/index.html>
- What workflow is involved, and how is it documented?
  - ◇ <http://www.derm.qld.gov.au/property/titles/rdpp/index.html>

#### **THE FUTURE:**

- Are current rules and procedures working well? (Or how to improve them)?
  - ◇ Apparently
- Is there a best practice for 3D parcel registration? What alternate procedures are used in different countries?
- Digital submission of 3D geometry definition: in use? planned? desirable?
  - ◇ Planned in next phase of EARL
- Format for digital submission, and are 2D and 3D covered in the same standard/guideline?
  - ◇ LandXML., defining both 2D and 3D

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<sup>1</sup> This plan would carry the details of the 3D underground parcel, as taken from the original plan.

Working group 2 chair: Rod Thompson  
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