

Questionnaire 3D-Cadastral: status November 2010

Australia, Victoria



This questionnaire is an activity of the FIG working group 3D-Cadastral 2010-2014. The purpose of the survey is to make a world-wide inventory of the status of 3D-Cadastral at this moment (fall 2010) and the plans/expectations for the near future (2014). By sharing this information, it should be possible to improve cooperation, learn from each other and support future developments. For more information on the FIG working group on 3D-Cadastral see the website of this working group www.gdmc.nl/3DCadastral. Now a few notes and suggestions, which should be helpful when completing the questionnaire:

- In this questionnaire the concept of 3D-Cadastral with 3D parcels is intended in the broadest possible sense. However, what exactly is (or could be) a 3D parcel is dependent on the legal and organizational context in the specific country (state, province). 3D parcels include land and water spaces, both above and below surface.
- A more formal definition: A 3D parcel is defined as the spatial unit against which (one or more) unique and homogeneous¹ rights (e.g. ownership right or land use right), responsibilities or restrictions are associated to the whole entity, as included in a Land Administration system.
- As the definition above is quite abstract, it is tried in the questions below to be more specific and real world situations are used. Also two example sets of partial/preliminary answers are included from Australia, Queensland and The Netherlands, to support the questions and to be of help when formulating the answers for your jurisdiction.
- A 3D parcel is a 'legal object' describing a part of the space. Often there is a relationship with a real world/physical object, which can also be described in 3D. Please be aware of the difference between these two types of objects and that the focus in the context of 3D-Cadastral is on 3D parcels (spaces of legal objects).
- If a certain question is not relevant or if you have no clue what to respond, do not spend any time on this (and leave the field blank).

¹ Homogenous means that the same combination of rights equally apply within the whole 3D spatial unit. Unique means that this is the largest spatial unit for which this is true. Making the unit any larger would result in the combination of rights not being homogenous. Making the unit smaller would result in at least 2 neighbour 3D parcels with the same combinations of rights.

1. General/applicable 3D real-world situations

This part of the questionnaire refers to the applicable 3D real-world situations to be registered by 3D parcels. It also addressed the types of 3D geometries, which are considered to be valid 3D representations for these parcels.

	Australia, Vic 2010	Australia, Vic 2014
1.1. Are all 3D parcels constrained to be within one surface (2D) parcel?	In the context of a survey plan, the answer is NO. Plans can represent apartments with steps inside. In this case, it is a 3D parcel on two different levels (heights). This situation is represented using cross sections in the survey plan but will not appear on the DCDB. In the context of the DCDB, the answer is NO, We have limited representation of 3D parcels in a layered fashion in our DCDB. Most typical examples are registered tunnels and bridges that are modelled as separate layers on different levels in the DCDB.	
1.2. Are ambulatory ² boundaries permitted?	Yes, but there is no definition for 3D boundaries.	
1.3. Is it allowed to have 3D parcels not related to physical constructs or objects?" (e.g. airspace, subsurface volumes)	Yes.	
1.4. Are disconnected parts of a single 3D parcel allowed?	Yes, car park dwellings are typical examples.	
1.5. Limitation – e.g. must the 3D parcel be described by a boundary definition?	Yes, all the boundaries should be defined, there are various methods:	

² An ambulatory boundary is a boundary of a land parcel which follows the movements of a natural feature such as a river. Its position determined at points of time (when a survey is carried out), but between such "fixes", the definition of the property is the position of the real world natural feature.

	By structure By Projection Height above a particular surface Reference to a level datum	
1.6. Are curved surfaces to bound the 3D parcels allowed?	Yes, There is no limitation.	
1.7. Must the curved surfaces (if allowed) be cylindrical sections, or any other constraint?	No.	
1.8. Any other constraints – e.g. all surfaces must be horizontal or vertical?	No.	
1.9. Is there generic legislation (law and/or regulations) for 3D descriptions of parcels? If so please, mention law and article(s).	Transfer of land (Stratum Estate) Act 1960 Strata Title Act 1967 Subdivision (Procedure) Regulations 2000	
1.10. Is the legal text available in original language?	Yes.	
1.11. Is the legal text (relevant part) available in English translation?	All legislations are English.	
1.12. Do you have example descriptions of typical 3D parcels; either ‘prototype’ or ‘operational’?	2D diagrams using cross sections and 3D envelop definition.	
1.13. Is there a formal model for the 3D parcels (UML style); e.g. based on ISO TC211 series?	No.	
1.14. Are natural resources (groundwater, mining rights) considered as 3D parcels?	Yes, Mining would have some restrictions.	
1.15. Are polluted areas considered as 3D parcels (as legal restrictions are associated to these spaces: above and below surface)?	No.	
1.16. Are spatial plans considered as 3D parcels (as rights or restrictions are related to them)? Sometimes also called spatial development plans, zoning plans or physical plans (land use, urban, regional, environmental,...)	No.	
1.17. Any other geometric issues?		

2. Infrastructure/utility networks

This refers to the situation where an infrastructure network is considered to be defined within the cadastre. For example in some jurisdictions, an underground network might be privately constructed for the purpose of leasing space in it for other organisations to run cabling. In this case, a network, or part of that network may be considered to be a real estate object.

	Australia, Vic 2010	Australia, Vic 2014
2.1. Do you register network parcels? (e.g. subterranean conduit networks)	They are recorded in the utility maps. But some plans make reference to infrastructure as part of common property	
2.2. If so, can the network structure be traced in the database(s)?	N/A.	
2.3. Does the jurisdiction have private networks? If so please, mention law and article(s).	Yes. (Water, Energy, etc.)	
2.4. If so, are they registered as 3D property parcels?	No.	
2.5. Is the legal text available in original language? If so, give references to relevant document(s).	No.	
2.6. Is the legal text (relevant part) available in English translation?	N/A	
2.7. Do you have example descriptions of typical 3D parcels for networks; either 'prototype' or 'operational'?	The DCDB does not record network objects.	
2.8. If the network (legal) objects break at the surface parcel, how do you deal with intersecting networks or vertically parallel networks?	The DCDB does not record network objects.	
2.9. Any other geometric issues?		

3. Construction/building units

This refers to 3D properties that are related to constructions and apartment (condominium) buildings. The individual units are often defined by the actual walls and structure of a building, rather than by metes and bounds. E.g. “unit 5 on level 6 of ... building”.

	Australia, Vic 2010	Australia, Vic 2014
3.1. Do you register 3D construction/building units?	Yes.	
3.2. If so, what are the most important types? E.g. apartment units, or also other buildings or even more general constructions (infra related; such as bridge, tunnel or even other, such as windmills,...)	Apartment units. Strata buildings.	
3.3. Does the jurisdiction have construction/building units? If so please, mention law and article(s).	Subdivision Act 1988 Land Act	
3.4. Is the legal text available in original language?	Yes.	
3.5. Is the legal text (relevant part) available in English translation?	Yes.	
3.6. Do you have example descriptions of typical 3D parcels; either ‘prototype’ or ‘operational’?	Subdivision plans. Strata plans. Limited representation of 3D parcel in DCDB.	
3.7. What would be typical 3D boundaries in an apartment complex: middle of the wall and floor/ceiling, or walls, floors/ceiling as neutral/shared 3D space?	Typically the units are defined by the inner boundaries, otherwise it should be mentioned.	
3.8. Is common property inside the building registered? If so, how?	Yes, They are registered under Owner Corporations management system.	
3.9. Who owns the common property inside the building?	Owner Corporations	
3.10. Who owns the land on which the apartment is built?	Owner Corporations	
3.11. Any other geometric issues?	Making sure what the boundaries relate to.	

4. X/Y Coordinates

	Australia, Vic 2010	Australia, Vic 2014
4.1. Do the plans of survey guarantee X/Y coordinates? (and are they relative or in an absolute spatial reference system?)	No. Usually they are relative, but there are X/Y coordinates on some subdivision plans as well.	
4.2. Are the cadastral database coordinates authoritative?	No. The coordinates are not absolute in the DCDB but users refer to the DCDB.	
4.3. If not, what is the authoritative source of X/Y coordinates?	Redefinition from the survey plans	
4.4. Do you have parcels defined by the walls of a building (with no recorded geometry)?	Yes, building subdivisions	
4.5. What is the spatial reference system for X/Y Coordinates?	MGA 94 Zone 54,55	
4.6. Any other X/Y coordinate issues?	Transformation from one coordinate system to another	

5. Z Coordinates/height representation

	Australia, Vic 2010	Australia, Vic 2014
5.1. Are the Z coordinates of 3D parcels relative to local ground?	No, it refers to Australian Height Datum (AHD), but there may be a local origin.	
5.2. Are Z coordinates reduced to a standard datum (absolute)? If so, what is the spatial reference system for the Z coordinate?	Yes, AHD.	
5.3. In principle possible to store both relative and absolute Z coordinate?	No.	
5.4. Is the earth surface (height) explicitly stored (in the DCDB or other accessible register)?	No.	
5.5. What is the source of elevation for the 2D surface parcel?	Not recorded in the DCDB.	
5.6. Any other Z coordinate issues?		

6. Temporal Issues

	Australia, Vic 2010	Australia, Vic 2014
6.1. Are temporal limits part of the definition of a parcel (2D or 3D)?	Yes. There are examples with car stackers and car stacker titles. Also easements which cannot be car parks unless they have got time limits.	
6.2. Are moving parcels allowed?	Yes, house boats could be considered.	
6.3. Are there any limitations on the range of temporal limits? (e.g. only on 3D apartments).	Yes, it can be imposed by owner corporation.	
6.4. Are there any attempt to integrate 3D space and temporal representations, into a single 4D space/time representation?	No.	
6.5. In the case of tidal boundaries, what happens to the 3D ambulatory parcel if the 2D land parcel changes extent due to the movement of High Water Mark?	All ambulatory boundaries change in accordance with the movements.	
6.6. Any other temporal issues?	Adverse possession	

7. Rights, Restrictions and Responsibilities

	Australia, Vic 2010	Australia, Vic 2014
7.1. Range of RRR on 3D parcels.	Same as 2D parcels.	
7.2. Are there any limitations on the range of rights? (e.g. subterranean parcels must be owned by Govt).	No.	
7.3. Any other RRR issues?	Recording increasing number of RRRs.	
7.4. Are there RRRs that are only allowed in 3D (and not valid for 2D)	No.	
7.5. Is there specific legislation (laws, regulations) defining 3D RRR types? If so, provide details, e.g. references to documents/ articles.	Marine Act Utility Acts Subdivision Act Land Act	
7.6. Can 3D sub-surface/above-surface parcel be owned by someone other than the person owning the land parcel?	Yes.	
7.7. What applications do you foresee for 3D cadastre?	Managing 3D RRRs Urban planning Easy conveyancing Plan examination Asset relationship to strata	

8. DCDB (The Cadastral Database)

	Australia, Vic 2010	Australia, Vic 2014
8.1. Does the DCDB contain representation of 3D parcels (in any form)?	Yes, in limited circumstances , tunnel, bridges ...	
8.2. If so, how are they represented (in the DCDB)?	Layered.	
8.3. If so, how are they presented on cadastral “maps” (including screen presentations)?	Layered in the GIS which is indexed to survey plans with cross sections.	
8.4. Are there possibilities to store geometry of 3D parcels in the DCDB?	No.	
8.5. Is it possible to manage a 3D topological structure in the DCDB?	No.	
8.6. Are constraints/rules defined for valid 3D objects (closed volume, no overlap, no gap in 3D)? What about rules for a mix of 2D and 3D representations?	No.	
8.7. How can internal and external user query and visualize the 3D content supporting rotating, slicing, transparency, perspective (3D web/view service, 3D pdf documents,...)?	Query on layers.	
8.8. What Spatial DBMS software do you use? Any 3D capabilities included and used?		
8.9. Do you have any validation rules for 3D representation in the database?	No.	
8.10. What (GIS/CAD) software is used for updating, editing, analysis, and visualization of the cadastral data? Any 3D capabilities included and used?	Internal, LASSI.	
8.11. What web software is used for remote data access/distribution and visualization? Any 3D capabilities included and used?	Internal, LAASI.	
8.12. Is your DCDB organised as Multi-Layers or Object Oriented or some other data model?	Multilayer.	
8.13. How do you query 3D objects in your DCDB?	Query on layers that are indexed to survey plans.	

8.14. Is it possible to query neighbourhood parcels to a 3D object, vertically as well as horizontally?	Query on layers that are indexed to survey plans.	
8.15. Any other DCDB issues?	Accuracy, completeness and temporal aspects.	

9. Plans of Survey (including field sketches)

	Australia, Vic 2010	Australia, Vic 2014
9.1. Do the survey plans carry 3D parcel representations?	Yes, by 2D plans with cross sections.	
9.2. If so, how are they represented?	As cross-section diagrams on 2D plans.	
9.3. Is there specific legislation (regulations) describing the requirements for Plans of Survey in 3D? If so, please give link to the relevant documents.	Yes. Subdivision (Procedure) Regulations 2000	
9.4. Is sketch level allowed (low geometric quality, but in principle enough to indicate the 3D object)?	Yes.	
9.5. Is it possible to define a 3D parcel by referring to other 3D real world objects/ topography (and not specifying coordinates)?	Yes. Referring to floors ceiling, above and below grand level.	
9.6. In what format are the 3D parcels submitted for registration; attached to legal document in a single pdf (which has good 3D capabilities) or in an extension of (city)GML for 3D parcels, or....?	On paper and PDF but will be submitted in "LandXML".	
9.7. Are the 3D parcels somehow checked for spatial validity; e.g. volume is closed, does not overlap with neighbour volume (and also no unwanted 3D gaps)?	No. Usually a visual check overlaps on cross sections	
9.8. Do you have examples of (prototype or production) 3D survey plans available?	Yes. Building subdivision plans.	
9.9. Are any reference objects visible on the survey plan (e.g. real buildings, roads, that is 3D topography)?	Yes. ramps, walls...	
9.10. What form of 3D data acquisition is used (CAD, terrestrial surveying, sketches, stereo/oblique images, laser scanning,...)?	ImageSpace	
9.11. What software do you use for creating and processing survey plans? Any 3D capabilities included and used?	AutoCAD Microstation Liscad	
9.12. Can 3D parcels be subdivided, consolidated or nullified?	Yes	
9.13. Is there any existing technical circular or directive to assist	Yes	

Surveyors in 3D data collection in the field?		
9.14. Any other survey plan issues?	Data translation, representation	

10. Other Issues

Please include any other issues that may be of interest in an international context. For example, in some foreign jurisdictions 3D parcels can only be separated by horizontal planes.

10.1. Country (State, Province)	Australia, Victoria
10.2. Your name, function/position and your organization	Mohsen Kalantari (ePlan coordinator, Land Victoria, Department of Sustainability and Environment and Research Fellow, Centre for SDIs and Land Administration the University of Melbourne) Ali Aien (PhD candidate , Centre for SDIs and Land Administration the University of Melbourne)
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10.4. Other issues	