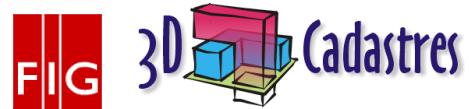


3rd Questionnaire 3D-Cadastral: status February 2019



Australia Victoria

This questionnaire is an activity of the FIG working group 3D-Cadastral 2018-2022. The purpose of the survey is to make a world-wide inventory of the status of 3D-Cadastral at this moment and the plans/expectations for the near future (2022). By sharing this information, it should be possible to improve cooperation, learn from each other and support future developments. This is the third time that the questionnaire on 3D-Cadastral is conducted by the FIG working group on 3D-Cadastral. The first time was in 2010 in order to document the status in 2010 and expectations back then for 2014. This was followed by second questionnaire in 2014 (with status 2014 and expectations 2018). The earlier responses have been analysed and reported on (van Oosterom et al. 2011, Karki 2013, van Oosterom et al. 2014). For more information on the FIG working group on 3D-Cadastral see the website www.gdmc.nl/3DCadastral. Now a few notes and suggestions, which should be helpful when completing the questionnaire:

- The conceptual model used as background for the 3D Cadastres questionnaire is the ISO 19152 standard (ISO, 2012): the Land Administration Domain Model (LADM).
- In this questionnaire the concept of 3D-Cadastral with 3D parcels (or 3D spatial units in LADM terminology) 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, lease or other 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 to be more specific and real world situations are used. Many examples with partial/preliminary answers from 2010 and 2014 are available on-line at <http://www.gdmc.nl/3DCadastral/participants/>. Inspecting some of the completed 2010 and 2014 questionnaires from different other countries might help when formulation 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 spaces of the legal objects and not the registration of the physical objects as such.
- 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).
- The questionnaire has been prepared by Rod Thompson, Sudarshan Karki, Alias Abdul Rahman, Hendrik Ploeger, Christiaan Lemmen, Anna Shnaidman, Peter van Oosterom. The questionnaire is grouped in the number of blocks. This has no meaning in the sense of priority and it is often the case that a question could belong to multiple blocks. Please do not feel disturbed by this.
- Similar to the earlier Questionnaires on 3D-Cadastral, the completed forms will be made available on website of FIG working group on 3D Cadastres.
- Please complete this questionnaire before *15 December 2018* and send it to A.Sznaidman@tudelft.nl (or Anna Shnaidman, TU Delft, OTB, P.O. Box 5043, 2600 GA Delft, The Netherlands).

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.

	Status 2018	Expectations 2022
1.1. Are all 3D parcels (3D spatial units in LADM terminology) constrained to be within one surface 2D parcel?	In the context of a cadastral 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 cadastral plan. 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.	There would be no change.
1.2. Are 2D and/or 3D ambulatory ² boundaries permitted?	Yes. There are natural boundaries in our plans.	There would be no change.
1.3.a. Is it allowed to have 3D parcels (spatial units) not related to physical constructs or objects? (e.g. airspace, subsurface volumes)	Yes.	There would be no change.
1.3.b. If 1.3.a positive: approximately what proportion of new 3D parcels (spatial units) would involve such cases (not related to physical object)?	Minority, we cannot quantify them at this stage.	There would be no change.
1.4. Are disconnected parts of a single 3D parcel allowed?	Yes, car park dwellings are typical examples.	There would be no change.
1.5. Spatial limitation – e.g. must the 3D parcel be related to a closed volume or is it allowed to have ‘open’ or unbounded 3D parcels (e.g. towards the sky).?	It is allowed to have unbounded 3D parcels.	There would be no change.
1.6. Are curved surfaces to bound the 3D parcels allowed?	Yes.	There would be no change.
1.7. Must the curved surfaces (if allowed) be cylindrical sections, or any	No.	There would be no change.

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.

other constraint?		
1.8. Any other constraints – e.g. all surfaces must be horizontal or vertical?	No.	There would be no change.
1.9. Is there legislation (law and/or regulations) for 3D descriptions of parcels? If so please, mention law and article(s).	• Transfer of Land Act • Schedule 2 subdivision Act • Subdivision (Registrar's Requirements) Regulations 2011	Under investigation.
1.10. Is the legal text available in original language?	Yes.	There would be no change.
1.11. Is the legal text (relevant part) available in English translation?	All legislation is in English.	There would be no change.
1.12. Do you have example descriptions of typical 3D parcels; either 'prototype' or 'operational'?	2D diagrams using cross sections	Under investigation.
1.13. Is there a formal model for the 3D parcels (UML style); e.g. based on ISO TC211 series (especially LADM, ISO 19152)?	No. Land parcels are captured in ePlan data model and supports simple 3D objects, but not complex shapes. www.icsm.gov.au/what-we-do/electronic-lodgement-and-transfer-survey-data-working-group-0	Under investigation.
1.14. Are natural resources (groundwater, mining rights, geo-thermal extraction and storage) shown in your land administration? If yes, are they considered as 3D parcels (spatial units) with RRRs attached? What about mining concessions (could be limited in time)?	Yes. Upon alienation. Crown grant contains conditions.	There would be no change.
1.15. Are legally restricted spaces, above or below, such as polluted areas considered as 3D parcels?	No.	There would be no change.
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.	There would be no change.
1.17. Is there a Marine Cadastre? And if so, are 3D parcels included in this registration. Is the IHO Maritime Limits and Boundaries standard (S121) in use or under implementation?	Yes. There are methods in place in Australia to manage the wide range of spatial rights, restrictions and responsibilities in the marine environment.	There would be no change.
1.18. Is there any organised legal instrument for the management of	Yes. Subdivision Act 1988 and Owners Corporation Act	Under investigation.

common property?	2006 support the creation of owners corporations for the management of common property.	
1.19. Which agency is responsible for the recording of titles information?	Land Use Victoria	Land Use Victoria
1.20. Which agency is responsible for recording cadastral transactions?	Land Use Victoria	Land Use Victoria
1.21. Are transactions for standard 2D lots and 3D lots done by the same agency or titles office?	Yes	Yes
1.22. Are there any 3D storage permissions recorded (e.g. underground storage of CO2)?	No.	No.
1.23. Any other geometric issues related to 3D parcels?	• Unbounded volumes • Filling space with common property. Walls sometimes are common property, but we are not able to show them completely due to the complexity.	Under investigation.

2. Infrastructure/utility networks

This refers to the situation where an infrastructure network is considered to be defined within the land administration. 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.

	Status 2018	Expectations 2022
2.1. Do you register networks as an entity in the land administration? (e.g. subterranean conduit networks)	We usually identify them as easements inside the parcel.	There would be no change.
2.2. If so, then (a) can the network structure be viewed graphically in the land administration? (b) can the network structure be traced in the database(s)? (c) are networks registered by means of a cadastral identifier (such as a 'parcel number')? (d) are RRRs and parties attached to these network objects?	(a) Easements can be viewed graphically. But not in common property and when easements are implied. (b) some of them (c) in ePlan yes. In general, we identify easements with a unique ID per cadastral plan. (d) No.	Under investigation.
2.3. Does the jurisdiction have private networks? If so please, mention law and article(s).	Yes. (Water, Energy, etc.). All utilities have been privatised.	There would be no change.
2.4. If so, are they registered as 3D property parcels (spatial units)?	No.	Under investigation.
2.5. Is the text of relevant laws or regulations (question 2.3) available in original language? If so, give references to relevant document(s).	Yes.	There would be no change.
2.6. Is the text of laws and regulations (relevant part) available in English translation?	Yes.	There would be no change.
2.7. Do you have example descriptions of typical 3D parcels (spatial units) for networks; either 'prototype' or 'operational'?	The DCDB does not record network objects.	Under investigation.
2.8. If the network (legal) objects break at the surface parcel, how do you deal with intersecting networks or vertically parallel networks?	They need to be graphically shown on plans.	There would be no change.
2.9. Any other geometric issues related to the registration of networks?	-	-

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”.

	Status 2018	Expectations 2022
3.1. Do you register legal spaces for 3D construction/building units (separate from the land)?	Yes.	There would be no change.
3.2. If so, what are the conditions for doing so, and what are the most important types? E.g. apartment units (at least 2 or more in building), or also other buildings or even more general constructions (infra related; such as bridge, tunnel or even other, such as windmills,...)	Apartment units, Bridges, tunnels.	There would be no change.
3.3. Does the jurisdiction have construction/building units? If so please, mention law and article(s).	Yes. Subdivision Act 1988 Transfer of Land Act 1958	There would be no change.
3.4. Is the legal text available in original language?	Yes.	There would be no change.
3.5. Is the legal text (relevant part) available in English translation?	Yes.	There would be no change.
3.6. Do you have example descriptions of typical 3D parcels; either ‘prototype’ or ‘operational’?	• Stratum Plans (1950- 1967) • Strata Plans (1967-1988) • Subdivision Act (1988-present)	There would be no change.
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? Is it mentioned in any legislation or is it the convention?	Typically the units are defined by unit boundaries. Boundaries can be interior, median, exterior or in some other locations as set out in the Subdivision (Registrar's Requirements) Regulations 2011, Regulation 10(3).	There would be no change.
3.8. Is common property inside the building registered? If so, how?	Yes, common property is defined as a parcel.	There would be no change.
3.9. Who owns the common property inside the building?	Relevant Owners Corporation.	There would be no change.
3.10. Who owns the land on which the apartment is built?	It depends how it has been registered.	There would be no change.
3.11. Do you allow sub-division of apartments or apartment blocks?	Yes.	There would be no change.
3.12. Can the land on which the building is built be sub-divided or sold or mortgaged without the consent of majority of the apartment owners?	Usually not, but in unique circumstances as long as it meets legislative requirements yes.	There would be no change.
3.13. What is the numbering	There is a numbering	There would be no change.

convention for apartments (please specify in terms of cadastral parcel as well as street addressing)	convention for Australia. States and Territories should be complying with the standard AZ/NZS 4819:2011 Rural and Urban addressing which allocates hotel style addressing for apartments. The Guidelines for Geographic Names 2010 Version 2 also cover basic addressing here in Victoria.	
3.14. Any other geometric issues?	-	-

4. X/Y Coordinates

	Status 2018	Expectations 2022
4.1. Do the plans of survey guarantee X/Y coordinates? (and are they relative or in an absolute spatial reference system?)	No. Parcels are defined by bearings and distances, or structures, or natural boundaries. Surveyors need to connect their measurements to MGA (Map Grid of Australia). Survey marks are used with their coordinates. However, measurements are only bearing and distances.	There would be no change.
4.2. Are the cadastral database coordinates authoritative?	No. The reference marks are only authoritative.	There would be no change.
4.3. If not, what is the authoritative source of X/Y coordinates?	Redefinition from the survey plans	There would be no change.
4.4. Do you have parcels defined by the walls of a building (with no recorded geometry)?	Yes, building subdivisions	There would be no change.
4.5. What is the spatial reference system for X/Y Coordinates?	GDA 2020 Zone 54,55	There would be no change.
4.6. When owners receive or purchase a copy of the plan what can they see on the plan to help them identify their parcel/lot (e.g. bearings and distance, identifying corners or recovery marks, neighbouring lots, coordinates etc.)?	They see plan number, lot identifier, bearings and distance, lineworks, and connections to the control marks.	Under investigation
4.7. Have there been any changes made in the way cadastral information is recorded and represented from a historical point of view?	According to the changes in legislation, methods of presentation and recording have been changed.	Under investigation
4.8. Any other X/Y coordinate issues?	-	-

5. Representation of 3rd dimension: height (or depth)

	Status 2018	Expectations 2022
5.1. Are the height values of 3D parcels relative to local ground?	Yes. We can have a parcel defined by height (e.g. car park and its height). However, the based height for control points are AHD (Australian Height Datum).	Under investigation
5.2. Are height values reduced to a standard datum (absolute)? If so, what is the spatial reference system for this 3 rd ordinate?	If there is a height value, it is usually referred to AHD (Australian Height Datum)	Under investigation
5.3. In principle possible to store both relative and absolute height values?	Yes.	Under investigation
5.4. Is the earth surface (elevation) explicitly stored (in the DCDB or other accessible register)?	No.	Under investigation
5.5. What is the source of height values for the 2D surface parcel?	Not recorded.	Under investigation
5.6. How is elevation information recorded in the cadastral plan or database?	Not recorded.	Under investigation
5.7. Do you expect the elevation recorded in cadastral plans to be used for any other purpose (e.g. city models or civil constructions etc.)?	Yes.	Under investigation
5.8. Any other 3rd dimension ordinate value issues?	No.	Under investigation

6. Temporal Issues

	Status 2018	Expectations 2022
6.1. Are temporal limits part of the definition of a parcel (2D or 3D)?	Yes. Easements can be defined with time limits (very rare). All crown land leases are for specific time period. Restrictions are also defined with expiry date.	There would be no change.
6.2. Are moving parcels allowed?	No.	Under Investigation
6.3. Are there any limitations on the range of temporal limits? (e.g. only on 3D apartments).	No.	There would be no change.
6.4. Are there any attempt to integrate 3D space and temporal representations, into a single 4D space/time representation?	No.	Under Investigation
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. Doctrine of accretion and erosion -slow and imperceptible	There would be no change.
6.6. In case 3D Marine Cadastre is present and moving boundaries are allowed, how is this represented? E.g. using 4D geometry and topology.	No.	There would be no change.
6.7. Can time bound rights be created and extinguished in the title? (e.g. temporary titles created for a period and when the time is up it can be extinguished)?	No.	There would be no change.
6.8. Is it possible to identify all the changes made by any operator to the cadastral plans or database and to rollback if there is an error made?	Yes.	There would be no change.
6.9. For Cadastral transactions, how far in time do buyers need to make a search to ensure the title or deed is legal?	Our titling system is Torrens based and ownership is guaranteed.	There would be no change.
6.10. Any other temporal issues?	-	-

7. Rights, Restrictions and Responsibilities

	Status 2018	Expectations 2022
7.1. Range of RRR on 3D parcels.	Same as 2D parcels	There would be no change.
7.2. Are there any limitations on the range of rights related to 3D spatial units? (e.g. subterranean parcels must be owned by Govt).	No.	There would be no change.
7.3. Are there any limitations on the range of restrictions or responsibilities related to 3D spatial units? (i.e. currently in use and related to 2D spatial units, but that would not be applicable to 3D).	No.	There would be no change.
7.4. Are there RRRs that are only allowed in 3D (and not valid for 2D)	No.	There would be no change.
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 Transfer of Land Act	Under Investigation
7.6. Can 3D sub-surface/above-surface parcel be owned by someone other than the person owning the land parcel?	Yes.	There would be no change.
7.7. What applications do you foresee for 3D land administration?	Managing 3D RRRs Urban planning Easy conveyancing Plan examination Asset relationship to strata	There would be no change.
7.8. Are the administrative source documents (source of RRRs) title or deed based?	Folio of the register.	There would be no change.
7.9 Who is responsible for the correctness of the specified 3D boundaries in spatial source documents (which authority)?	Land Registry in Victoria (Land Use Victoria) and the Licensed Surveyor	There would be no change.
7.10. Is registration of 3D parcels done inside the cadastral mapping agency, the land registry or elsewhere?	Yes, inside the Land Registry	There would be no change.
7.11. Are 3D registrations handled by the same organisation that handles traditional (2D) land administration?	Yes.	There would be no change.
7.12. Do you supply paper-based titles or deeds or proof of ownership? If yes, does this contain depictions of the 2D or 3D parcel?	Paper-based titles. Electronic folio contains reference to diagram source for parcel.	Under Investigation
7.13. Is the 3D registry separate or integrated with the 2D registry?	Integrated with the 2D registry.	There would be no change.
7.14. Any other RRR issues?	-	-

8. DCDB (The Cadastral Database)

	Status 2018	Expectations 2022
8.0. Is database schema LADM based?	No.	Under Investigation
8.1. Does the DCDB contain representation of 3D parcels (in any form)?	Yes, in limited circumstances, tunnel, bridges ...	Under Investigation
8.2. If so, how are they represented (in the DCDB)?	Layered.	Under Investigation
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.	Under Investigation
8.4. Are there possibilities to store geometry of 3D parcels in the DCDB?	No.	Under Investigation
8.5. Is it possible to manage a 3D topological structure in the DCDB?	No.	Under Investigation
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.	Under Investigation
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,...)?	There’s no way currently to do this.	Under Investigation
8.8. What Spatial DBMS software do you use? Any 3D capabilities included and used?	Oracle Spatial	There would be no change.
8.9. Do you have any validation rules for 3D representation in the database?	No.	Under Investigation
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 web services and applications for visualisation and validation, but not in 3D. LISCAD, LAASI, LASSI-SPEAR, GeoCivil, AutoCAD	Under Investigation
8.11. What web software is used for remote data access/distribution and visualization? Any 3D capabilities included and used?	LASSI, LASSI-SPEAR, SPEAR. No 3D capabilities.	Under Investigation
8.12. Is your DCDB organised as Multi-Layers or Object Oriented or some other data model?	Multilayer.	Under Investigation
8.13. How do you query 3D objects in your DCDB?	There are no 3D objects in DCDB to be queried.	Under Investigation
8.14. Is it possible to query neighbourhood parcels to a 3D object,	Query on layers that are indexed to plans.	Under Investigation

vertically as well as horizontally?		
8.15. Any other DCDB issues?	-	-

9. Plans of Survey (including field sketches)

	Status 2018	Expectations 2022
9.1. Do the survey plans carry 3D parcel representations?	Yes.	Under Investigation
9.2. If so, how are they represented?	As cross-section diagrams on 2D plans.	Under Investigation
9.3. Is there specific legislation (regulations) describing the requirements for Plans of Survey in 3D? This could cover: a. accuracy/quality, b. 3D survey method, c. conceptual information model survey plan, d. portrayal rules for graphic representation, e. format or encoding for submission. If so, please give link to the relevant documents.	Yes. Subdivision (Registrar's Requirements) Regulations 2011	Under Investigation
9.4. Is sketch level allowed (low geometric quality, but in principle enough to indicate the 3D object)?	Yes. Basic representation through cross-section. But all boundaries must be defined.	Under Investigation
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 walls, floors, ceiling, etc above and below ground level.	Under Investigation
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....?	3D parcels are submitted in paper, 2D PDF, or LandXML with no 3D capabilities.	Under Investigation
9.7. Are the 3D parcels somehow checked for spatial validity; e.g. volume is closed, does not overlap with	No. Usually a visual check is performed to define overlaps on cross sections.	Under Investigation

neighbour volume (and also no unwanted 3D gaps)?		
9.8. Do you have examples of (prototype or production) 3D survey plans available?	Yes. Building subdivision plans. Prototype for 3D Cadastre: https://www.spear.land.vic.gov.au/spear/pages/eplan/3d-digital-cadastre/land-victoria-3d-eplan-prototype.shtml	Under Investigation
9.9. Are any reference objects visible on the survey plan (e.g. real buildings, roads, that is 3D topography)?	Yes. Roads, buildings, lifts, balconies, stairs, etc.	There would be no change.
9.10. What form of 3D data acquisition is used (CAD, terrestrial surveying, sketches, stereo/oblique images, laser scanning,...)?	There is no 3D data acquisition.	Under Investigation
9.11. What software do you use for creating and processing survey plans? Any 3D capabilities included and used?	AutoCAD Microstation Liscad GeoCivil No 3D capabilities are used.	Under Investigation
9.12. Can 3D parcels be subdivided, consolidated or nullified?	Yes.	Under investigation.
9.13. Is there any existing technical circular or directive to assist Surveyors in 3D data collection in the field?	Yes. Building subdivision guidelines.	Under investigation.
9.14. Are the surveyors required to undertake a field survey for 3D cadastral data?	Surveyors do not collect 3D data for cadastre.	Under investigation.
9.15. Are building construction plans used to compile 3D cadastral information for apartments?	Yes.	Under investigation.
9.16. Is 2D/3D field survey done by private licensed surveyors or by government surveyors?	By both private licensed surveyors and government surveyors.	There would be no change.
9.17. Are plans of survey created for each new 2D/3D parcel or are they updated in an index map or a cadastral database.	Both. Plans are created and index map is updated. Survey only for original title.	There would be no change.
9.18. Do you show dimensions or isometric	Yes, in 2D plans and not in field notes.	Under investigation

views of 3D parcels on survey plans (do you also store this in a database)		
9.19. Do the cadastral survey plans differentiate between different types (e.g. volumetric plans, building plans and standard 2D plans)?	Yes. We have plans including 2D land subdivisions and building subdivisions.	Under investigation
9.20. What are the usual elements shown on the plan (e.g. North Arrow, Marks table, Observation table, Administrative data, Plan face and dimensions etc.?)	North Arrow, Administrative data, lineworks, dimensions, Owners Corporation schedule, Restrictions, Easements	Under investigation
9.21. Are authoritative cadastral surveys carried out by government surveyors or private licensed surveyors or both?	Both	There would be no change.
9.22. What is the legal description of a cadastral boundary (e.g. coordinates or bearing and distance or lines on plan or any other)?	bearing and distance	Under investigation
9.23. How much time does it usually take for a subdivision process to complete?	Processing time for a subdivision is on average 12 months	Under investigation
9.24. What is the legal source for cadastral representation (e.g. cadastral plans, or DCDB or index plans or descriptive sketch/text etc.?)	Cadastral plans	Under investigation
9.25. What is the positional accuracy of the cadastral plans (e.g. boundaries may be accurate but may not be referenced in datum properly)?	Boundaries are accurate but may not be connected to datum.	Under investigation
9.26. Any other survey plan issues?	-	-

10. Dissemination of 3D Cadastral information

	Status 2018	Expectations 2022
10.1. Is there a general purpose web-based dissemination of 2D cadastral (graphical or text) information (e.g. a portal for the public or for professionals)? If yes, does it include 3D data?	LASSI, LASSI-SPEAR. No 3D capabilities.	Under investigation
10.2. Are specific file formats or standards used to distribute 3D Cadastral information? (e.g. LandXML, CityGML, BIM/IFC, 3D pdf,...)	No.	Under investigation
10.3. Are there specific cartographic styling rules for representing 3D cadastral plans, or to represent 3D cadastral objects on 2D cadastral maps?	Yes. Surveying handbook has defined some styling rules for preparing 2D plans. -Building subdivision guidelines (on line).	Under investigation.
10.4. Are there specific cartographic styling rules for 3D cadastral maps (models; e.g. as disseminated in 3D pdf)? If yes, are there 3D specific cartographic rules developed or being developed?	No.	Under investigation.
10.5. Is the 3D Cadastral information accessible in integrated manner with the 2D Cadastral information?	No.	Under investigation.
10.6. Are there specific symbols on the 2D cadastral map (paper, digital or web-based) indicating the presence of 3D Cadastral objects (and in web-context perhaps even linked)?	Lot numbers are presented for individual parcels on LASSI.	Under investigation.
10.7. Is the legal information (RRRs and Parties) available in integrated manner in dissemination portal with the 3D Cadastral objects? (even if source of legal data may be a different organization, but then use information infrastructure approach)	No. Folio search	Under investigation.
10.8. Are 2D/3D cadastral data available to the general public or just to the relevant parties?	2D data is available to the general public.	Under investigation.
10.9. Any other 3D cadastral information dissemination issues?	-	-

11. Statistical information

This part of the questionnaire refers to statistical information (and is most relevant for jurisdictions with parts of 3D Cadastre registration operational, but all are encouraged to complete this section, and especially the expectations for 2022).

	Status 2018	Expectations 2022
11.1. What is the smallest 2D and 3D parcel that is present/ allowed to be registered in the land administration?	1cm X 1cm X 1cm	There would be no change.
11.2. What is the largest 2D and 3D parcel that is present allowed to be registered in the land administration?	No practical limit.	There would be no change.
11.3. What is the typical (or average) size of 2D and 3D parcels which are registered in the land administration? Subdivide by nature of 3D parcel when relevant (e.g. related to building, apartment, airspace, tunnel,...)	Varies significantly. Around 250 square meters would be average.	There would be no change.
11.4. How many 2D and 3D parcels do you currently have in your land administration?	Near 5 million.	There would be no change.
11.5. Which year did you start registering 3D parcels in the land administration?	1950s	There would be no change.
11.6. What is the ratio of 3D parcels in rural vs. urban areas?	More in urban areas.	There would be no change.
11.7. Please specify names of cities or towns or suburbs or regions or locations where there are significant numbers of 3D parcels.	Melbourne metropolitan area, Geelong	There would be no change.
11.8. Please provide the following data: (a) Size of jurisdiction in square kilometres (b) Current number of 2D parcels (c) Current number of 3D parcels (d) Current population	(a) 227,416 km ² (b) 3,345,312 (c) 3,897,339 (d) 6,359,000	(a) 227,416 km ² (b) ... (c) ... (d) ...
11.9. Approximately what are the proportions of various types of the 3D parcels (related to apartments, subsurface parking, subsurface shopping centres, bridges, tunnels, airspace, utility networks, etc)?	-	-
11.10. Approximately what surface area of the jurisdiction is affected by 3D parcels (the total area of all the footprint of all 3D parcels).	Quite low though.	-
11.11. Any other interesting statistical fact(s)?	-	-

12. Reflection

This section is only relevant in case also in 2010 and/or in 2014 the 3D cadastres questionnaire for your jurisdictions was completed (otherwise skip this section).

	Remarks
12.1. Compared to the 2010 and 2014 expectations, which 3D land administration developments did go faster than expected?	The DCDB modernisation project.
12.2. Same question, but now, which developments did go slower than expected?	3D cadastre development.
12.3. If some (limited) form of 3D Land administration functionality has become available, what are the observed benefits? And for who?	-
12.4. What are the (top-3) challenges of issues to be addressed to realize further 3D Land administration progress?	Legal and institutional changes Developing a 3D data model Developing 3D data capturing and editing tools
12.5. In case of not yet fully operational status, were there any 3D Cadastre registration pilots to take steps towards more full implementation?	No.
12.6. In case of known legal barriers, have there been made progress in creating and adopting new legislation to support 3D land administration?	Not yet. But this is under investigation.
12.7. Any other reflections?	-

13. 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.

	Remarks
13.1. Country (State, Province)	Victoria, Australia
13.2. Your name, function/position and your organization	• Davood Shojaei (ePlan Senior Project officer, Department of Environment, Land, Water and Planning) • Hamed Olfat (ePlan Coordinator, Department of Environment, Land, Water and Planning) • Mark Briffa, (Electronic Subdivisions Unit Manager, Department of Environment, Land, Water and Planning))
13.3. Contact details: address email, telephone	davood.shojaei@delwp.vic.gov.au hamed.olfat@delwp.vic.gov.au mark.briffa@delwp.vic.gov.au Level 9, 2 Lonsdale St, Melbourne, Victoria 3000, Australia
13.4. Other issues	-

References

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