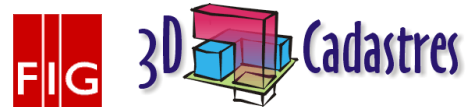


3rd Questionnaire 3D-Cadastral: status January 2019



Australia NSW

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?	3D parcels are currently referenced in the 2D parcel of the DCDB (as SP strata numbers). We do not have LADM terminology for 3D spatial units. 3D parcels are currently bounded by the underlying 2D parcel boundaries, which hold control accuracies. However they do not hold 3D data elements.	Future 3D parcels may overhand the constraints of the current underlying 2D parcel, so future state would not have them contained by 2D parcel. Future state is dependent on the future of surveyor plans and whether control and bearings and distances are incorporated into the strata surveyor plans.
1.2. Are 2D and/or 3D ambulatory ² boundaries permitted?	Yes for 2D horizontal boundaries.	
1.3.a. Is it allowed to have 3D parcels (spatial units) not related to physical constructs or objects? (e.g. airspace, subsurface volumes)	No. However plans can represent buildings that are not yet constructed.	
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)?	Information not available at this time.	
1.4. Are disconnected parts of a single 3D parcel allowed?	Yes. Plans can have various 3D structures which are not connected to the main structure, such as car parks and exterior buildings adjacent to main building, such as in strata plans.	
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).?	Information not available at this time.	
1.6. Are curved surfaces to bound the	Information not available at	No restrictions perceived.

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.

3D parcels allowed?	this time.	
1.7. Must the curved surfaces (if allowed) be cylindrical sections, or any other constraint?	Information not available at this time.	No restrictions perceived.
1.8. Any other constraints – e.g. all surfaces must be horizontal or vertical?	No restrictions perceived.	
1.9. Is there legislation (law and/or regulations) for 3D descriptions of parcels? If so please, mention law and article(s).	Strata Schemes Development Act 2015 No 51 Strata Schemes Development Regulation 2016	
1.10. Is the legal text available in original language?	Yes. English.	
1.11. Is the legal text (relevant part) available in English translation?	Yes.	
1.12. Do you have example descriptions of typical 3D parcels; either ‘prototype’ or ‘operational’?	Only as square metre indications on lots and stratum notes such as “ (A) denotes part lot 1 limited in depth to 3m below and in height to 10m above the upper surface of its respective garage floor”.	
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	
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)?	Information not available at this time.	
1.15. Are legally restricted spaces, above or below, such as polluted areas considered as 3D parcels?	Information not available at this time.	
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,...)	Information not available at this time.	
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?	Information not available at this time.	
1.18. Is there any organised legal instrument for the management of	Management Statement – document that accompanies	

common property?	the strata plan (see new strata for example)	
1.19. Which agency is responsible for the recording of titles information?	Registrar General (RG)	
1.20. Which agency is responsible for recording cadastral transactions?	Land Registry Services (LRS)	
1.21. Are transactions for standard 2D lots and 3D lots done by the same agency or titles office?	Yes	
1.22. Are there any 3D storage permissions recorded (e.g. underground storage of CO2)?	No.	
1.23. Any other geometric issues related to 3D parcels?	No.	

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)	Yes, easements, water supply lines and transmission lines.	
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?	No.	
2.3. Does the jurisdiction have private networks? If so please, mention law and article(s).	Yes for private networks and utilities.	
2.4. If so, are they registered as 3D property parcels (spatial units)?	No.	
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).	English	
2.6. Is the text of laws and regulations (relevant part) available in English translation?	Yes.	
2.7. Do you have example descriptions of typical 3D parcels (spatial units) for networks; either 'prototype' or 'operational'?	Information not available at this time.	
2.8. If the network (legal) objects break at the surface parcel, how do you deal with intersecting networks or vertically parallel networks?	No.	
2.9. Any other geometric issues related to the registration of networks?	No.	

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. Strata Plans.	
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,...)	A scheme involves occupation/ownership of more than one strata lot (e.g. units, town houses) in a building or buildings within the one parcel of land, as in the case of retirement villages, rural development concepts and other multiple dwelling developments.	
3.3. Does the jurisdiction have construction/building units? If so please, mention law and article(s).	Information not available at this time.	
3.4. Is the legal text available in original language?	Yes. English.	
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’?	Yes.	
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?	Yes. Strata Schemes Development Act 2015 6 Boundaries of lot <i>(1) For the purposes of this Act, the boundaries of a lot shown on a floor plan are:</i> <i>(a) except as provided by paragraph (b): (i) for a vertical boundary in which the base of a wall corresponds substantially with a base line—the inner surface of the wall, and</i> <i>(ii) for a horizontal boundary</i>	

	<i>in which a floor or ceiling joins a vertical boundary of the lot—the upper surface of the floor and the under surface of the ceiling, or</i> <i>(b) the boundaries described on the floor plan relating to the lot, in the way prescribed by the regulations, by reference to a wall, floor or ceiling in a building to which the plan relates or to common infrastructure within the building.</i>	
3.8. Is common property inside the building registered? If so, how?	Yes.	
3.9. Who owns the common property inside the building?	Information not available at this time.	
3.10. Who owns the land on which the apartment is built?	The owners of the lots from time to time in a strata scheme constitute a body corporate under the name “The Owners—Strata Plan No X” (X being the registered number of the strata plan to which that strata scheme relates). Strata Schemes Management Act 2015	
3.11. Do you allow sub-division of apartments or apartment blocks?	Yes	
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?	No.	
3.13. What is the numbering convention for apartments (please specify in terms of cadastral parcel as well as street addressing)	(1) Each lot in a strata plan must be numbered consecutively in whole numbers without gaps and starting from 1. (2) Each lot in a strata plan of subdivision or a strata plan of consolidation must be numbered consecutively in whole numbers without gaps and starting from the number that is 1 greater than the highest number of any	

	existing lot in the strata scheme. (3) A building alteration plan must not renumber any lot.	
3.14. Any other geometric issues?	Information not available at this time.	

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	
4.2. Are the cadastral database coordinates authoritative?	Information not available at this time.	
4.3. If not, what is the authoritative source of X/Y coordinates?	Information not available at this time.	
4.4. Do you have parcels defined by the walls of a building (with no recorded geometry)?	Yes	
4.5. What is the spatial reference system for X/Y Coordinates?	GDA94, MGA 94 Zone 54,55,56,57	
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.)?	Lot boundary, bearing and distance, survey control, annotations, addresses, RM , RRRs, etc...	
4.7. Have there been any changes made in the way cadastral information is recorded and represented from a historical point of view?	Yes – changes in survey regulations, units of measurements etc..	
4.8. Any other X/Y coordinate issues?	Australia experiences shifting coordinates over time, shifting (7 cm per year N/E).	

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?	No	
5.2. Are height values reduced to a standard datum (absolute)? If so, what is the spatial reference system for this 3 rd ordinate?	AHD	
5.3. In principle possible to store both relative and absolute height values?	Relative (2.5) in practice currently for prototyping. No absolute.	
5.4. Is the earth surface (elevation) explicitly stored (in the DCDB or other accessible register)?	Yes (other accessible location).	
5.5. What is the source of height values for the 2D surface parcel?	Paper DP survey plans have AHD recorded. Height values/ stratum restrictions are included on Strata plans to indicate vertical ownership of property lots.	
5.6. How is elevation information recorded in the cadastral plan or database?	Not in cadastral database.	
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.	
5.8. Any other 3rd dimension ordinate value issues?	Information not available at this time.	

6. Temporal Issues

	Status 2018	Expectations 2022
6.1. Are temporal limits part of the definition of a parcel (2D or 3D)?	Yes.	
6.2. Are moving parcels allowed?	No.	
6.3. Are there any limitations on the range of temporal limits? (e.g. only on 3D apartments).	Information not available at this time.	
6.4. Are there any attempt to integrate 3D space and temporal representations, into a single 4D space/time representation?	Yes.	
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?	Move with redefinition of HWM. accretes or erodes applies	
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.	N/A.	
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)?	In Titling system.	
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, within certain circumstances.	
6.9. For Cadastral transactions, how far in time do buyers need to make a search to ensure the title or deed is legal?	Mainly Torrens title where government guarantees title.	
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 plus stratum height restrictions.	
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	
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	
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.	See reference to Regulations, Act and SSIR 2017	
7.6. Can 3D sub-surface/above-surface parcel be owned by someone other than the person owning the land parcel?	Yes, tunnels, easements, bridges, infrastructure.	
7.7. What applications do you foresee for 3D land administration?	Asset management. Smart Cities. Urban Planning. Disaster and recovery. Modelling. Visualisation. Liveability measures.	
7.8. Are the administrative source documents (source of RRRs) title or deed based?	Title (TORRENS).	
7.9 Who is responsible for the correctness of the specified 3D boundaries in spatial source documents (which authority)?	Registrar General NSW Gov.	
7.10. Is registration of 3D parcels done inside the cadastral mapping agency, the land registry or elsewhere?	Land Registry Services (LRS)	
7.11. Are 3D registrations handled by the same organisation that handles traditional (2D) land administration?	Land Registry Services (LRS)	
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?	Yes: paper based. Depiction of 2D/3D parcel contained in Deposited P, Strata P, Community P.	
7.13. Is the 3D registry separate or	Integrated.	

integrated with the 2D registry?		
7.14. Any other RRR issues?	Information not available at this time.	

8. DCDB (The Cadastral Database)

	Status 2018	Expectations 2022
8.0. Is database schema LADM based?	No	
8.1. Does the DCDB contain representation of 3D parcels (in any form)?	Indicated by plan type in 2D representation. Attribution value used to identify the 3D nature of the parcel by identifying “strata”.	
8.2. If so, how are they represented (in the DCDB)?	As 2D object, stratum level indicated under attribution in database.	
8.3. If so, how are they presented on cadastral “maps” (including screen presentations)?	As a 2D parcel with a plan number indicating a 3D nature of ownership, “SP” as a strata plan.	
8.4. Are there possibilities to store geometry of 3D parcels in the DCDB?	Not currently.	
8.5. Is it possible to manage a 3D topological structure in the DCDB?	Not currently.	
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?	Not currently.	
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,...)?	Not currently in operation. Currently in prototyping and piloting solutions.	
8.8. What Spatial DBMS software do you use? Any 3D capabilities included and used?	Informix DBMS. Esri Geodatabases.	
8.9. Do you have any validation rules for 3D representation in the database?	Not currently.	
8.10. What (GIS/CAD) software is used for updating, editing, analysis, and visualization of the cadastral data? Any 3D capabilities included and used?	• Esri ARCGIS • QGIS • 3D capabilities of GIS tools are being used for 3D cadastre development testing, analysis and visualisation.	
8.11. What web software is used for remote data access/distribution and visualization? Any 3D capabilities included and used?	Testing and prototyping of 3D development includes. • Esri Portal • Cesium • WFS	
8.12. Is your DCDB organised as	Multilayers	

Multi-Layers or Object Oriented or some other data model?		
8.13. How do you query 3D objects in your DCDB?	Only as 2D representation	
8.14. Is it possible to query neighbourhood parcels to a 3D object, vertically as well as horizontally?	Horizontal only (2D)	
8.15. Any other DCDB issues?	Information not available at this time.	

9. Plans of Survey (including field sketches)

	Status 2018	Expectations 2022
9.1. Do the survey plans carry 3D parcel representations?	Yes but limited to a few architectural plan drawings (rare) and mainly through surveyor notes, however not drawings of 3D vertical heights.	
9.2. If so, how are they represented?	Strata Plans contain statements that define the limited in height and depth statements. No bearing and distance. Plot vertically by using height statements. Internal lot 3D space is not defined in internal spaces. External spaces have height limits in the stratum (slices of vertical space) Limited use of cross sections or drawings of vertical attributes of building structures.	
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.	Strata Schemes Development Act 2015 No 51 Strata Schemes Development Regulation 2016 Surveying and Spatial Information Regulation 2017 (current regs)	
9.4. Is sketch level allowed (low geometric quality, but in principle enough to indicate the 3D object)?	Sketches are allowed, but rarely used.	
9.5. Is it possible to define a 3D parcel by referring to other 3D real world objects/ topography (and not specifying coordinates)?	Defined by the floor and ceiling lines inside building parcels, inferring 3D objects. Stratum notes on plan indicate vertical heights using terminology relating to 'concrete slab' and 'roof line'.	

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....?	Tiff image plan LandXML fromat	
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)?	Volumes are not registered. However from a titling perspective, we do not allow overlaps in strata plans. Exclusive use parcels are created.	
9.8. Do you have examples of (prototype or production) 3D survey plans available?	Yes (prototype)	
9.9. Are any reference objects visible on the survey plan (e.g. real buildings, roads, that is 3D topography)?	Strata plan contain building features and structural features.	
9.10. What form of 3D data acquisition is used (CAD, terrestrial surveying, sketches, stereo/oblique images, laser scanning,...)?	Surveyor plan images through terrestrial surveying. Laser scanning.	
9.11. What software do you use for creating and processing survey plans? Any 3D capabilities included and used?	CAD - into tiff CAD – into LandXML	
9.12. Can 3D parcels be subdivided, consolidated or nullified?	Yes.	
9.13. Is there any existing technical circular or directive to assist Surveyors in 3D data collection in the field?		
9.14. Are the surveyors required to undertake a field survey for 3D cadastral data?	Yes: surveyed, measured, building locations and the areas specified per lot etc Survey control and RM's are used in the surveying, but not depicted on the final registered plan CAD packages contained surveyed data the output tiff is stripped of some surveyed information, control and RM's and bearings and distances Regs and Act controls what we show in the output TIFF	
9.15. Are building construction plans used to compile 3D cadastral	Yes: architectural plans into surveyor CAD data which is	

information for apartments?	verified in field by surveyor – stripped when output ot tiff (regs and act)	
9.16. Is 2D/3D field survey done by private licensed surveyors or by government surveyors?	A large majority are performed by Private surveyors, especially in regards to strata plans.	
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.	Yes.	
9.18. Do you show dimensions or isometric views of 3D parcels on survey plans (do you also store this in a database)	Yes on plans. Not in database currently.	
9.19. Do the cadastral survey plans differentiate between different types (e.g. volumetric plans, building plans and standard 2D plans)?	Yes. Deposited plans and Strata Plans, with limited notes on the height or vertical dimensions of ownership.	
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 Marks table Observation table Administrative data Plan face Horizontal dimensions Vertical dimentions	
9.21. Are authoritative cadastral surveys carried out by government surveyors or private licensed surveyors or both?	Both.	
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)?	Lines on the plan and bearing and distance.	
9.23. How much time does it usually take for a subdivision process to complete?	3-12 months.	
9.24. What is the legal source for cadastral representation (e.g. cadastral plans, or DCDB or index plans or descriptive sketch/text etc.?)	Paper plan, size, format, plan elements from regulations.	
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)?	Strata Plan: has no connection to datum Deposited Plan: generally has connection to datum	
9.26. Any other survey plan issues?	Information not available at this time.	

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?	2D: Sixmaps public access map 3D: Currently pending development	
10.2. Are specific file formats or standards used to distribute 3D Cadastral information? (e.g. LandXML, CityGML, BIM/IFC, 3D pdf,...)	Not currently, however in development.	
10.3. Are there specific cartographic styling rules for representing 3D cadastral plans, or to represent 3D cadastral objects on 2D cadastral maps?	Yes: survey regulations for 2D representation.	
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?	Information not available at this time.	
10.5. Is the 3D Cadastral information accessible in integrated manner with the 2D Cadastral information?	Not currently.	
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)?	No	
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.	
10.8. Are 2D/3D cadastral data available to the general public or just to the relevant parties?	2D is available to general public. 3D is only available to relevant parties.	
10.9. Any other 3D cadastral information dissemination issues?	Information not available at this time.	

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?	Smallest Current = 3.88square metres	
11.2. What is the largest 2D and 3D parcel that is present allowed to be registered in the land administration?	No limits.	
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,...)	Footprint of Building Parcels (3D) = Average size of 1,755 Square Metres	
11.4. How many 2D and 3D parcels do you currently have in your land administration?	Base Parcel (2D)= 3221679 Footprint of Building Parcels (3D) = 79650	
11.5. Which year did you start registering 3D parcels in the land administration?	N/A	
11.6. What is the ratio of 3D parcels in rural vs. urban areas?	Information not available at this time	
11.7. Please specify names of cities or towns or suburbs or regions or locations where there are significant numbers of 3D parcels.	Sydney Metropolitan Area	
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) 809,444 km squared (b) 3,221,679 (c) 79,650 (d) 7.544 Million	
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)?	Statistics not available at this time. Parcels with 3D enablement available as 2D parcels are mainly apartment buildings and some factory and commercial properties	
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).	Building Parcels (3D) make up 0.01% of the total surface area of all parcel lots across state.	
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?	
12.2. Same question, but now, which developments did go slower than expected?	
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?	
12.5. In case of not yet fully operational status, were there any 3D Cadastre registration pilots to take steps towards more full implementation?	
12.6. In case of known legal barriers, have there been made progress in creating and adopting new legislation to support 3D land administration?	
12.7. Any other reflections?	

3. 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)	Australia, NSW
13.2. Your name, function/position and your organization	Prudence Lawrence Spatial Technician
13.3. Contact details: address email, telephone	Prudence.lawrence@finance.nsw.gov.au
13.4. Other issues	

References

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