3rd Questionnaire 3D-Cadastres: status January 2019

Malaysia

This questionnaire is an activity of the FIG working group 3D-Cadastres 2018-2022. The purpose of the survey is to make a world-wide inventory of the status of 3D-Cadastres 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-Cadastres is conducted by the FIG working group on 3D-Cadastres. 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-Cadastres see the website www.gdmc.nl/3DCadastres. 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-Cadastres 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 homogeneous[1] 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/3DCadastres/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-Cadastres 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-Cadastres, 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.Shnaidman@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?	No. Volumetric parcels allowed for subsurface parcels.	Volumetric parcels would be allowed for subsurface and air space parcels.
1.2. Are 2D and/or 3D ambulatory[2] boundaries permitted?	No. All boundaries are to be right line boundaries.	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, currently legal 3D parcels of subsurface volumes are allowed	Airspace volumes, Surface land with height and depth limitations to be legally recognised.
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)?	Legally provided but applications are slow.	Applications for air space parcels are expected to be more than subsurface parcels
1.4. Are disconnected parts of a single 3D parcel allowed?	Yes, for strata parcels - car park dwellings are typical examples for strata parcels, but depict as 2D diagrams and cross sections.	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).?	Must be related to a closed volume.	There would be no change.
1.6. Are curved surfaces to bound the 3D parcels allowed?	No. curved surface to be represented by segments	There would be no change.
1.7. Must the curved surfaces (if allowed) be cylindrical sections, or any 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).	• Alienation of underground land through Part Five (A), National Land Code 1965	• Alienation of Airspace through introduction of Part Five (B), National Land Code 1965

[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.

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?	Yes.	There would be no change.
1.12. Do you have example descriptions of typical 3D parcels; either 'prototype' or 'operational'?	2D, Isometric views & cross sections	There would be no change.
1.13. Is there a formal model for the 3D parcels (UML style); e.g. based on ISO TC211 series (especially LADM, ISO 19152)?	Research undertaken for 3D parcels based on LADM, ISO 19152	Operational
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, if they are disposed under the National Land Code. No 3D parcels are issued currently	There would be no change.
1.15. Are legally restricted spaces, above or below, such as polluted areas considered as 3D parcels?	Not sure what the meaning of this sentence is.	Not sure what the meaning of this sentence is.
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	Under investigation by Planning Authorities
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?	Alienated as 2D parcels	With introduction of Part Five (B) of the National Land Code 1965, 3D parcels within each State's Maritime Boundaries would be legally possible
1.18. Is there any organised legal instrument for the management of common property?	Yes. Strata Management Act 2013	There would be no change.
1.19. Which agency is responsible for the recording of titles information?	Land Office	There would be no change.
1.20. Which agency is responsible for recording cadastral transactions?	Department of Survey and Mapping	Department of Survey and Mapping
1.21. Are transactions for standard 2D lots and 3D lots done by the same agency or titles office?	Yes	There would be no change.
1.22. Are there any 3D storage permissions recorded (e.g. underground storage of CO2)?	Legally possible but no application	Legally possible
1.23. Any other geometric issues related to 3D parcels?		

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)	No	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?	-	
2.3. Does the jurisdiction have private networks? If so please, mention law and article(s).	Yes. (Water, Energy, etc.)	There would be no change.
2.4. If so, are they registered as 3D property parcels (spatial units)?	No	There would be no change.
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, they have their own Acts.	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	There would be no change.
2.8. If the network (legal) objects break at the surface parcel, how do you deal with intersecting networks or vertically parallel networks?	NA	
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. • Issued as Strata Titles – Not defined as true 3D parcels. Parcels are defined as 2D with height limitations • 3D volumetric underground parcel	Additionally, 3D volumetric air space parcels.
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,..)	• Subdivided buildings (residential, commercial & industrial). • 3D underground parcel is legally recognised.	Additionally, 3D volumetric air space parcels would be recognized for overlapping developments (e.g. MRT stations over roads, structures connecting opposite buildings across a road).
3.3. Does the jurisdiction have construction/building units? If so please, mention law and article(s).	National Land Code 1965 Strata Titles Act 1985 Strata Management Act 2013	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’?	Strata Plans (1985-present) Stratum Plan (1990-present)	Additionally, Spatium Plan for air space lot
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 boundaries of strata parcel of a subdivided building is the middle wall and floor/ceiling. Exterior wall is possible if for whole block/tower parcel is created. Section 13(3) of the Strata Titles Act 1985	There would be no change.
3.8. Is common property inside the building registered? If so, how?	Stipulated in the legislation as all areas not forming the Parcels or Accessory Parcels within the development area.	There would be no change.
3.9. Who owns the common property inside the building?	Registered in the name of Management Corporation. All proprietors are members	There would be no change.

	of the Management Corporation.	
3.10. Who owns the land on which the apartment is built?	Registered in the name of Management Corporation. All proprietors are members of the Management Corporation.	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?	No.	There would be no change.
3.13. What is the numbering convention for apartments (please specify in terms of cadastral parcel as well as street addressing)	Unique parcel identifier for strata parcel complying to the UPI code structure published by the Malaysian Centre for Geospatial Data Infrastructure (MaCGDI)	There would be no change.
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?)	Parcels are defined by bearing and distances or natural boundaries. Surveyors need to connect their measurements to State Geocentric Cassini-Soldner. 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 for 2D parcel	
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. Subdivision of building	There would be no change.
4.5. What is the spatial reference system for X/Y Coordinates?	Geocentric Datum 2000	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.)?	2D parcel – bearing and distances 3D parcel - coordinates	There would be no change.
4.7. Have their been any changes made in the way cadastral information is recorded and represented from a historical point of view?	Coordinate reference system change from Kertau Ellipsoid: Modified Everest to Geocentic Datum of Malaysia (GDM 2000)	There would be no change.
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.	There would be no change.
5.2. Are height values reduced to a standard datum (absolute)? If so, what is the spatial reference system for this 3rd ordinate?	Yes. Peninsular Malaysia Geodetic Vertical Datum (PMGVD)	There would be no change.
5.3. In principle possible to store both relative and absolute height values?	Yes.	There would be no change.
5.4. Is the earth surface (elevation) explicitly stored (in the DCDB or other accessible register)?	Explicitly stored in Certified Plans	Yes. A prototype DCDB has been established.
5.5. What is the source of height values for the 2D surface parcel?	Bench Mark MSL and Othometric Height from Geoidal Correction.	There would be no change.
5.6. How is elevation information recorded in the cadastral plan or database?	Tabulated in cadastral plan	Tabulated in cadastral plan and stored in 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.)?	-	Planning and civil constructions
5.8. Any other 3rd dimension ordinate value issues?	-	-

6. Temporal Issues

	Status 2018	Expectations 2022
6.1. Are temporal limits part of the definition of a parcel (2D or 3D)?	Titles can be issued for a specific time period (lease)	There would be no change.
6.2. Are moving parcels allowed?	No.	There would be no change.
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.	There would be no change.
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?	We do not have ambulatory parcel. Leading principle is that after every change of boundary the parcel will have a new number	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.	-	
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)?	Yes. Registrable private lease.	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?	The land titles Register in Land Office contains all the information, where all transfers of land are recorded in the register.	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)	-	
7.5. Is there specific legislation (laws, regulations) defining 3D RRR types? If so, provide details, e.g. references to documents/ articles.	Part Five (A), National Land Code 1965	Additionally, Part Five (B), National Land Code 1965
7.6. Can 3D sub-surface/above-surface parcel be owned by someone other that 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	There would be no change.
7.8. Are the administrative source documents (source of RRRs) title or deed based?	Title based.	There would be no change.
7.9 Who is responsible for the correctness of the specified 3D boundaries in spatial source documents (which authority)?	Department of Survey and Mapping Malaysia	There would be no change.
7.10. Is registration of 3D parcels done inside the cadastral mapping agency, the land registry or elsewhere?	Land Registry in Land Office	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?	Yes. 3D parcel	There would be no change.
7.13. Is the 3D registry separate or integrated with the 2D registry?	-	
7.14. Any other RRR issues?	-	

8. DCDB (The Cadastral Database)

	Status 2018	Expectations 2022
8.0. Is database schema LADM based?	Partially.	Yes.
8.1. Does the DCDB contain representation of 3D parcels (in any form)?	Yes.	Yes.
8.2. If so, how are they represented (in the DCDB)?	Layered.	3D LADM database schema.
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 isometric views and cross sections.	Digital 3D drawings.
8.4. Are there possibilities to store geometry of 3D parcels in the DCDB?	No.	Yes.
8.5. Is it possible to manage a 3D topological structure in the DCDB?	No.	Yes.
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?	Closed Volume.	Closed volume, no overlap, no gap in 3D.
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,..)?	NA	Under investigation.
8.8. What Spatial DBMS software do you use? Any 3D capabilities included and used?	Oracle Spatial.	Oracle Spatial / PostgresSQL PostGIS & 3D
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?	MapInfo Cesium.	Under investigation.
8.11. What web software is used for remote data access/distribution and visualization? Any 3D capabilities included and used?	Map Extreme with 3D visualisation of Strata Parcels but not 3D Parcels.	Under investigation.
8.12. Is your DCDB organised as Multi-Layers or Object Oriented or some other data model?	Multi-layered.	Under investigation.
8.13. How do you query 3D objects in your DCDB?	There are no 3D objects in DCDB to query them.	Under investigation.
8.14. Is it possible to query neighbourhood parcels to a 3D object, vertically as well as horizontally?	NA	Under Investigation.
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	Yes.
9.2. If so, how are they represented?	2D diagrams, cross sections and isometric views	Digital 3D Drawings.
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. https://www.jupem.gov.my/v1/wp-content/uploads/2016/07/PEKELILING_KPUP_2-2006.pdf https://www.jupem.gov.my/v1/wp-content/uploads/2016/07/PEK.-KETUA-PENGARAH-UKUR-DAN-PEMETAAN-BIL.-5_1999-Garispanduan-Mengenai-Ukuran-Stratum-Tanah-Bawah-Tanah-TBT.html	There would be no change.
9.4. Is sketch level allowed (low geometric quality, but in principle enough to indicate the 3D object)?	No.	There would be no change.
9.5. Is it possible to define a 3D parcel by referring to other 3D real world objects/ topography (and not specifying coordinates)?	No.	There would be no change.
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 tiff format, StrataXML	Under Investigation.
9.7. Are the 3D parcels somehow checked for spatial validity; e.g. volume is closed, does	Yes	There would be no change.

not overlap with neighbour volume (and also no unwanted 3D gaps)?		
9.8. Do you have examples of (prototype or production) 3D survey plans available?	Yes	There would be no change.
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,…)?	CAD, Terrestrial surveying	There would be no change.
9.11. What software do you use for creating and processing survey plans? Any 3D capabilities included and used?	MapInfo without true 3D capabilities.	Under investigation
9.12. Can 3D parcels be subdivided, consolidated or nullified?	Yes	There would be no change.
9.13. Is there any existing technical circular or directive to assist Surveyors in 3D data collection in the field?	Yes	There would be no change.
9.14. Are the surveyors required to undertake a field survey for 3D cadastral data?	Yes	There would be no change.
9.15. Are building construction plans used to compile 3D cadastral information for apartments?	Yes	There would be no change.
9.16. Is 2D/3D field survey done by private licensed surveyors or by government surveyors?	2D by private and government surveyors, 3D by private surveyors	There would be no change.
9.17. Are plans of survey created for each	Both. Plans are created and index map is updated. Survey	There would be no change.

new 2D/3D parcel or are they updated in an index map or a cadastral database.	only for original title.	
9.18. Do you show dimensions or isometric views of 3D parcels on survey plans (do you also store this in a database)	2D plans with isometric views and cross sections, stored as Certified Plans in tiff format	Under investigation
9.19. Do the cadastral survey plans differentiate between different types (e.g. volumetric plans, building plans and standard 2D plans)?	Yes.	There would be no change.
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.?)	Refer to link in 9.3	There would be no change.
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)?	2D by bearing and distances 3D by coordinates	There would be no change.
9.23. How much time does it usually take for a subdivision process to complete?	Depends on the complexity/size of the subdivision. Usually within 6 months.	There would be no change.
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.	Survey accurate	There would be no change.

boundaries may be accurate but may not be referenced in datum properly)?		
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?	Yes. JUPEM eBIZ SmartKADASTER Interactive Portal (SKIP)	Under investigation.
10.2. Are specific file formats or standards used to distribute 3D Cadastral information? (e.g. LandXML, CityGML, BIM/IFC, 3D pdf,…)	StrataXML	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. Refer to link in 9.3	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?	Yes. Issued as Director General Circulars for preparing Certified Plans.	Under investigation.
10.5. Is the 3D Cadastral information accessible in integrated manner with the 2D Cadastral information?	Partially	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)?	Yes. UPI code structure	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 in Land Ofice	Under investigation
10.8. Are 2D/3D cadastral data available to the general public or just to the relevant parties?	Available to general public	There would be no change.
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?	$1m^2$ & $1m^3$	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. Between 50 to 100 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?	8 million 2D parcels	More than 8 million
11.5. Which year did you start registering 3D parcels in the land administration?	1960s – subdivision of buildings 1990 – subsurface parcel	1960s
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.	Kuala Lumpur, Georgetown, Johor Bahru, Subang Jaya, Petaling Jaya, Sunway, Cyberjaya.	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) 198,160 square kilometres (Peninsula Malaysia only) b) 8 million parcels c) Nil d) Current population 32 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)?	-	
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).	-	
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?	Mass Rapid Transit
12.4. What are the (top-3) challenges of issues to be addressed to realize further 3D Land administration progress?	Legislation, collaboration between land related agencies and 3D Database structure
12.5. In case of not yet fully operational status, were there any 3D Cadastre registration pilots to take steps towards more full implementation?	Mass Rapid Transit
12.6. In case of known legal barriers, have there been made progress in creating and adopting new legislation to support 3D land administration?	Redefinition of minimum depth for surface parcels
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)	Malaysia
13.2. Your name, function/position and your organization	Chan Keat Lim Director of Survey (Cadastral Legislation) Cadastral Division Department of Survey and Mapping Malaysia
13.3. Contact details: address email, telephone	klchan@jupem.gov.my
13.4. Other issues	

References

ISO 19152:2012 'Geographic information - Land Administration Domain Model (LADM), http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=51206

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