

Questionnaire 3D-Cadastres: status November 2014 Israel



This questionnaire is an activity of the FIG working group 3D-Cadastres 2014-2018. 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 (2018). By sharing this information, it should be possible to improve cooperation, learn from each other and support future developments. This is the second 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. The responses have been analysed (van Oosterom et al. 2011, Karki 2013). 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 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 are available on-line at <http://www.gdmc.nl/3DCadastres/participants/>. Inspecting some of the completed 2010 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 a mixed Australian (Rod Thompson/Sudarshan Karki)/Dutch (Jantien Stoter/Hendrik Ploeger/Christiaan Lemmen/Peter van Oosterom) team. 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 Questionnaire 3D-Cadastres, the completed forms will be made available on website of FIG working group on 3D Cadastres.
- Please complete this questionnaire before *1 October 2014* and send it to P.J.M.vanOosterom@tudelft.nl (or Peter van Oosterom, TU Delft, OTB, P.O. Box 5030, 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 2014	Expectations 2018
1.1. Are all 3D parcels (3D spatial units in LADM terminology) constrained to be within one surface 2D parcel?	Yes	Yes
1.2. Are 2D and/or 3D ambulatory ² boundaries permitted?	No	No
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	Yes
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)?	A low proportion of the cases	A low proportion of the cases
1.4. Are disconnected parts of a single 3D parcel allowed?	No	No
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).?	No, closed only	No, closed only
1.6. Are curved surfaces to bound the 3D parcels allowed?	Yes	Yes
1.7. Must the curved surfaces (if allowed) be cylindrical sections, or any other constraint?	No restrictions	No restrictions
1.8. Any other constraints – e.g. all surfaces must be horizontal or vertical?	No	No
1.9. Is there legislation (law and/or regulations) for 3D descriptions of parcels? If so please, mention law and article(s).	No, there is a R&D report which includes a proposal for regulations	Legislation will be available
1.10. Is the legal text available in original language?	yes	yes
1.11. Is the legal text (relevant part) available in English translation?	partially	Still partial but more detailed
1.12. Do you have example descriptions of typical 3D parcels; either ‘prototype’ or ‘operational’?	Yes. In the above mentioned R&D report	

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.

1.13. Is there a formal model for the 3D parcels (UML style); e.g. based on ISO TC211 series (especially LADM, ISO 19152)?	No	Not yet decided
1.14. Are natural resources (groundwater, mining rights) shown in your land administration? If yes, are they considered as 3D parcels (spatial units) with RRRs attached?	No	No
1.15. Are legally restricted spaces, above or below, such as polluted areas considered as 3D parcels?	No	No
1.16. Are spatial plans considered as 3D parcels (as rights or restrictions are related to them)? Sometimes also called spatial development plans, zoning plans or physical plans (land use, urban, regional, environmental,...)	Possible in current version	
1.17. 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 2014	Expectations 2018
2.1. Do you register networks as an entity in the land administration? (e.g. subterranean conduit networks)	No, but now we can see some action in this directions as in roads an railways	Registration will begin in limited form
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- yes b- yes c- yes d- Hopefully
2.3. Does the jurisdiction have private networks? If so please, mention law and article(s).	partially: by the easement order according to Land Law - 1969	Will be more but still in a limited form
2.4. If so, are they registered as 3D property parcels (spatial units)?	no	Accordance with general progress of 3d cadastre
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).	Land Law - 1969	Land Law - 1969
2.6. Is the text of laws and regulations (relevant part) available in English translation?	no	Hopefully
2.7. Do you have example descriptions of typical 3D parcels (spatial units) for networks; either 'prototype' or 'operational'?	Yes. A prototype exists in an R&D report	
2.8. If the network (legal) objects break at the surface parcel, how do you deal with intersecting networks or vertically parallel networks?	We consider them as separate spatial sub-parcels	We consider them as separate spatial sub-parcels
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 2014	Expectations 2018
3.1. Do you register 3D construction/building units?	Yes	Yes
3.2. If so, what are the most important types? E.g. apartment units, or also other buildings or even more general constructions (infra related; such as bridge, tunnel or even other, such as windmills,...)	Apartments ("Condominium registry"), parking lots	Apartments ("Condominium registry"), parking lots
3.3. Does the jurisdiction have construction/building units? If so please, mention law and article(s).	Land law 1969, Mark D	Land law 1969, Mark D
3.4. Is the legal text available in original language?	yes	yes
3.5. Is the legal text (relevant part) available in English translation?	no	Hopefully
3.6. Do you have example descriptions of typical 3D parcels; either ‘prototype’ or ‘operational’?	Yes, though they're not registered as 3D objects	They will be registered fully
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?	It depends on the type of the boundary or wall. Between 2 apartments the boundary is middle of the wall or ceiling. Between apartment and public space the boundary is on the outer side of the wall. Is it mentioned in land law 1969	
3.8. Is common property inside the building registered? If so, how?	Yes as a Condominium	3D registration
3.9. Who owns the common property inside the building?	All the apartment owners collectively	All the apartment owners collectively
3.10. Who owns the land on which the apartment is built?	Usually the state owns the land. Providing long term leasing for the owners of the apartments	Usually the state owns the land. Providing long term leasing for the owners of the apartments
3.11. Do you allow sub-division of apartments or apartment blocks?	yes	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?	yes	yes
3.13. What is the numbering convention for apartments (please	Address and block + parcel + sub-parcel	Same but sub parcels will be spatial

specify in terms of cadastral parcel as well as street addressing)		
3.14. Any other geometric issues?		

4. X/Y Coordinates

	Status 2014	Expectations 2018
4.1. Do the plans of survey guarantee X/Y coordinates? (and are they relative or in an absolute spatial reference system?)	Yes in an absolute (national) coordinate system	
4.2. Are the cadastral database coordinates authoritative?	The DCDB cadastral point positions at any time are the best estimate based on survey information and control point data. As such, point positions can change with time	Hopefully they will be authoritative
4.3. If not, what is the authoritative source of X/Y coordinates?	In general computations based on the original field measurements	Hopefully, optimal coordinates will be declared as legal evidence
4.4. Do you have parcels defined by the walls of a building (with no recorded geometry)?	No	No
4.5. What is the spatial reference system for X/Y Coordinates?	IL 2012	
4.6. Any other X/Y coordinate issues?	Cadastral measurements have been done in 5 different coordinate systems	

5. Z Coordinates/height representation

	Status 2014	Expectations 2018
5.1. Are the Z coordinates of 3D parcels relative to local ground?	No. Legal plans are still 2D.	
5.2. Are Z coordinates reduced to a standard datum (absolute)? If so, what is the spatial reference system for the Z coordinate?		Z coordinates will be relative to the national vertical datum
5.3. In principle possible to store both relative and absolute Z coordinate?	Yes	Yes
5.4. Is the earth surface (height) explicitly stored (in the DCDB or other accessible register)?	Yes. With a limited accuracy (2 meters), insufficient for 3D cadastral applications	An improvement of accuracy
5.5. What is the source of elevation for the 2D surface parcel?	Currently 2D parcels don't store z coordinates	Various sources
5.6. Any other Z coordinate issues?		

6. Temporal Issues

	Status 2014	Expectations 2018
6.1. Are temporal limits part of the definition of a parcel (2D or 3D)?	No	No
6.2. Are moving parcels allowed?	No	No
6.3. Are there any limitations on the range of temporal limits? (e.g. only on 3D apartments).	No	No
6.4. Are there any attempt to integrate 3D space and temporal representations, into a single 4D space/time representation?	In academic studies	Practical applications will be examined
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?	Registered 2D parcels don't change, unless there is a re-parcellation	
6.6. Any other temporal issues?		

7. Rights, Restrictions and Responsibilities

	Status 2014	Expectations 2018
7.1. Range of RRR on 3D parcels.	RRR in space belong to the "owner" of the surface parcel, and are restricted laws (minerals, archaeology, infrastructural networks, air/space corridors etc.)	Depends on future legislation
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	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).	All the limitations, restrictions and responsibilities that apply to 2D parcels will apply to 3D parcels as well	
7.4. Are there RRRs that are only allowed in 3D (and not valid for 2D)	The ownership spatial sub parcels can be different	The ownership spatial sub parcels can be different
7.5. Is there specific legislation (laws, regulations) defining 3D RRR types? If so, provide details, e.g. references to documents/ articles.	No	
7.6. Can 3D sub-surface/above-surface parcel be owned by someone other than the person owning the land parcel?	Yes	
7.7. What applications do you foresee for 3D land administration?	In general, accelerated development of the subsurface/ above-surface space	In general, accelerated development of the subsurface/ above-surface space
7.8. Are the administrative source documents (source of RRRs) title or deed based?	Registration of title (Torrence method)	Registration of title (Torrence method)
7.9 Who is responsible for the correctness of the specified 3D boundaries in spatial source documents (which authority)?	SOI and Ministry of Justice	SOI and Ministry of Justice
7.10. Is registration of 3D parcels done inside the cadastral mapping agency, the land registry or elsewhere?	Ministry of Justice – Land registry and settlement of rights department	Ministry of Justice – Land registry and settlement of rights department
7.11. Are 3D registrations handled by the same organisation that handles traditional (2D) land administration?	Yes	Yes
7.12. Do you supply paper-based titles or deeds or proof of ownership? If yes, does this contain depictions of the 2D	Yes we provide registration order signed by "Ministry of Justice – Land registry and	Hopefully the registration order will contain reference to spatial sub parcels, too.

or 3D parcel?	settlement of rights department". It contains block\parcel\sub parcel and area and owners. The relevant geography is saved in SOI and can be purchased.	
7.13. Any other RRR issues?		

8. DCDB (The Cadastral Database)

	Status 2014	Expectations 2018
8.0. Is database schema LADM based?	No	No
8.1. Does the DCDB contain representation of 3D parcels (in any form)?	No	We are gearing up to it
8.2. If so, how are they represented (in the DCDB)?	Not represented	Not yet decided (please refer to 8.15)
8.3. If so, how are they presented on cadastral “maps” (including screen presentations)?	Not represented	Not yet decided (please refer to 8.15)
8.4. Are there possibilities to store geometry of 3D parcels in the DCDB?	Technically Yes	Not yet decided (please refer to 8.15)
8.5. Is it possible to manage a 3D topological structure in the DCDB?	Technically Yes	Not yet decided (please refer to 8.15)
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 yet	Not yet decided (please refer to 8.15)
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 yet	Not yet decided (please refer to 8.15)
8.8. What Spatial DBMS software do you use? Any 3D capabilities included and used?	ESRI ArcGIS, SDE. 3D capabilities are supported, not yet utilized for 3D cadaster	Probably the same
8.9. Do you have any validation rules for 3D representation in the database?	Not yet	Not yet decided (please refer to 8.15)
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, SDE	Probably the same
8.11. What web software is used for remote data access/distribution and visualization? Any 3D capabilities included and used?	ESRI ArcGIS server, SDE	Not yet decided (please refer to 8.15)
8.12. Is your DCDB organised as Multi-Layers or Object Oriented or some other data model?	Multi-Layers	Multi-Layers
8.13. How do you query 3D objects in your DCDB?	Not yet	Not yet decided (please refer to 8.15)
8.14. Is it possible to query neighbourhood parcels to a 3D object, vertically as well as horizontally?	Not yet	Not yet decided (please refer to 8.15)

8.15. Any other DCDB issues?	Since the land registration law in Israel currently does not dealing with 3D cadastral registration, the implementation of 3D spatial cadastral DB is not in first priority. Further development and implementation is planned to be completed at time when the law will be close to be approved. We'll design our solutions based on the most relevant technology available at that time.	
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9. Plans of Survey (including field sketches)

	Status 2014	Expectations 2018
9.1. Do the survey plans carry 3D parcel representations?	Engineering survey plans - yes	Both engineering and cadastral
9.2. If so, how are they represented?	By discreet height points or contour lines	By discreet height points or contour lines
9.3. Is there specific legislation (regulations) describing the requirements for Plans of Survey in 3D? If so, please give link to the relevant documents.	Survey regulation draft (in Hebrew)	Approved survey regulation
9.4. Is sketch level allowed (low geometric quality, but in principle enough to indicate the 3D object)?	No	No
9.5. Is it possible to define a 3D parcel by referring to other 3D real world objects/ topography (and not specifying coordinates)?	No	No
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....?	No 3D parcel registration were submitted yet.	Not yet decided (please refer to 8.15)
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)?	In principle spatial validity will be checked through the spatial coordinates of the sub-parcel boundaries.	Hopefully it will be in practice as well
9.8. Do you have examples of (prototype or production) 3D survey plans available?	Yes. Several pilot projects have been completed in the last decade	
9.9. Are any reference objects visible on the survey plan (e.g. real buildings, roads, that is 3D topography)?	Yes – in the R&D report	
9.10. What form of 3D data acquisition is used (CAD, terrestrial surveying, sketches, stereo/oblique images, laser scanning,...)?	In the pilot projects two main methods were used : LIDAR scan and terrestrial surveying	
9.11. What software do you use for creating and processing survey plans? Any 3D capabilities included and used?	Cad software	ArcGIS, SDE
9.12. Can 3D parcels be subdivided, consolidated or nullified?	Theoretically yes	Yes
9.13. Is there any existing technical circular or directive to assist Surveyors in 3D data collection in the field?	The R&D project can be used as a basis for such directives	3D cadastre will be fully covered by survey regulations

9.14. Are the surveyors required to undertake a field survey for 3D cadastral data?	Not currently (A completed pilot project can be used as a basis)	Yes
9.15. Are building construction plans used to compile 3D cadastral information for apartments?	Not currently	Yes
9.16. Is 2D/3D field survey done by private licensed surveyors or by government surveyors?	Mostly private licensed surveyors	Mostly private licensed surveyors
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 - for each new parcel	Yes - for each new parcel
9.18. Do you show dimensions or isometric views of 3D parcels on survey plans (do you also store this in a database)	Not currently	yes
9.19. Any other survey plan issues?		

10. Dissemination of 3D Cadastral information

	Status 2014	Expectations 2018
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 : http://www.govmap.gov.il/ It does not contain 3D data	3D data will be included as well
10.2. Are specific file formats or standards used to distribute 3D Cadastral information? (e.g. LandXML, CityGML, BIM/IFC, 3D pdf,...)	Not yet	Not yet decided (please refer to 8.15)
10.3. Are there specific cartographic styling rules for representing 3D cadastral plans, or to represent 3D cadastral objects on 2D cadastral maps?	Not yet	Will be developed
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?	Not yet	Will be developed
10.5. Is the 3D Cadastral information accessible in integrated manner with the 2D Cadastral information?	Not yet	Will be developed
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)?	Not yet	Will be developed
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)	The relevant legal framework is still in development	Hopefully, the relevant legal framework will be developed
10.8. Are 2D/3D cadastral data available to the general public or just to the relevant parties?	2D for General public	3D as well
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 2018).

	Status 2014	Expectations 2018
11.1. What is the smallest 2D and 3D parcel that is present/ allowed to be registered in the land administration?	No minimal size (limited by parent block scale)	No minimal size (limited by parent block scale)
11.2. What is the largest 2D and 3D parcel that is present allowed to be registered in the land administration?	No maximal size (limited by parent block scale)	No maximal size (limited by parent block scale)
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,...)	~ 500 sqm in urban areas ~ 1000 sqm in rural areas Further research required	~ 500 sqm in urban areas ~ 1000 sqm in rural areas Further research required
11.4. How many 2D and 3D parcels do you currently have in your land administration?	~ 800K 2D parcels	
11.5. Which year did you start registering 3D parcels in the land administration?	Not started yet	Will be started
11.6. What is the ratio of 3D parcels in rural vs. urban areas?	Further survey required	
11.7. Please specify names of cities or towns or suburbs or regions or locations where there are significant numbers of 3D parcels.	Pilot projects completed in: Akko, Tel-Aviv, Haifa, Modiin	Potentially in Tel-Aviv, Jerusalem and Gush Dan District
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 - ~22K sq km b- ~800K c- none d- ~8.2 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)?	Further survey required	
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).	Potentially most major urban areas and areas with transportation network development	
11.11. Any other interesting statistical fact(s)?		

12. Reflection

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

	Remarks
12.1. Compared to the 2010 expectations, which 3D land administration developments did go faster than expected?	None
12.2. Same question, but now, which developments did go slower than expected?	All
12.3. If some (limited) form of 3D Land administration functionality has become available, what are the observed benefits? And for who?	There was a principal progress in the Carmel tunnels project (legal precedent)
12.4. What are the (top-3) challenges of issues to be addressed to realize further 3D Land administration progress?	The major obstacle are the development of appropriate legal framework
12.5. 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)	Israel
13.2. Your name, function/position and your organization	Joseph Forrai, Orit Marom
13.3. Contact details: address email, telephone	Lincoln 1, Tel-Aviv, Israel forrai@mapi.gov.il marom@mapi.gov.il 03-6231900
13.4. Other issues	

References

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