Questionnaire 3D-Cadastres: status November 2010

Cyprus

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

- In this questionnaire the concept of 3D-Cadastres with 3D parcels is intended in the broadest possible sense. However, what exactly is (or could be) a 3D parcel is dependent on the legal and organizational context in the specific country (state, province). 3D parcels include land and water spaces, both above and below surface.
- A more formal definition: A 3D parcel is defined as the spatial unit against which (one or more) unique and homogeneous[1] rights (e.g. ownership right or land use right), responsibilities or restrictions are associated to the whole entity, as included in a Land Administration system.
- As the definition above is quite abstract, it is tried in the questions below to be more specific and real world situations are used. Also two example sets of partial/preliminary answers are included from Australia, Queensland and The Netherlands, to support the questions and to be of help when 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 3D parcels (spaces of legal objects).
- If a certain question is not relevant or if you have no clue what to respond, do not spend any time on this (and leave the field blank).

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

1. General/applicable 3D real-world situations

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

	Cyprus 2010	Cyprus 2014
1.1. Are all 3D parcels constrained to be within one surface (2D) parcel?	Yes	Yes
1.2. Are ambulatory[2] boundaries permitted?	No	No
1.3. Is it allowed to have 3D parcels not related to physical constructs or objects?" (e.g. airspace, subsurface volumes)		
1.4. Are disconnected parts of a single 3D parcel allowed?	Yes	Yes
1.5. Limitation – e.g. must the 3D parcel be described by a boundary definition?	Yes. In case of apartments a special drawing plan indicates the boundaries of the apartment units. These special plans are made in 2D (for each floor level), and therefore do not give any 3D information on the dimension of the units.	
1.6. Are curved surfaces to bound the 3D parcels allowed?	Yes	
1.7. Must the curved surfaces (if allowed) be cylindrical sections, or any other constraint?	No	
1.8. Any other constraints – e.g. all surfaces must be horizontal or vertical?	No	
1.9. Is there generic legislation (law and/or regulations) for 3D descriptions of parcels? If so please, mention law and article(s).	Not directly. The Cyprus Immovable Property (Tenure Registration and Valuation) Law, Cap 224, article 5 specifies that "Private ownership of any land shall extend to the surface and to the substance of the earth	

[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.

	beneath the surface and to the space above the surface, reasonably necessary for the enjoyment thereof, but not extend to minerals".	
1.10. Is the legal text available in original language?		
1.11. Is the legal text (relevant part) available in English translation?		
1.12. Do you have example descriptions of typical 3D parcels; either 'prototype' or 'operational'?		
1.13. Is there a formal model for the 3D parcels (UML style); e.g. based on ISO TC211 series?	No	
1.14. Are natural resources (groundwater, mining rights) considered as 3D parcels?	Not 3D parcel. They are considered however as immovable property. The Cyprus Immovable Property (Tenure Registration and Valuation) Law, Cap 224, article 5 specifies that "immovable property includes land, buildings, springs, wells, water,.."	
1.15. Are polluted areas considered as 3D parcels (as legal restrictions are associated to these spaces: above and below surface)?	No	
1.16. Are spatial plans considered as 3D parcels (as rights or restrictions are related to them)? Sometimes also called spatial development plans, zoning plans or physical plans (land use, urban, regional, environmental,...)	No	
1.17. Any other geometric issues?		

2. Infrastructure/utility networks

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

	Cyprus 2010	Cyprus 2014
2.1. Do you register network parcels? (e.g. subterranean conduit networks)	In some cases yes, but in most of the cases we registered the passage/channelling easement.	
2.2. If so, can the network structure be traced in the database(s)?	Yes	
2.3. Does the jurisdiction have private networks? If so please, mention law and article(s).	Yes	
2.4. If so, are they registered as 3D property parcels?	In some cases are registered as 2D parcels. In most of the cases as easements.	
2.5. Is the legal text available in original language? If so, give references to relevant document(s).	The Cyprus Immovable Property (Tenure Registration and Valuation) Law, Cap 224, article 11,15	
2.6. Is the legal text (relevant part) available in English translation?		
2.7. Do you have example descriptions of typical 3D parcels for networks; either 'prototype' or 'operational'?		
2.8. If the network (legal) objects break at the surface parcel, how do you deal with intersecting networks or vertically parallel networks?	The DCDB does not record network objects as a network.	
2.9. Any other geometric issues?		

3. Construction/building units

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

	Cyprus 2010	Cyprus 2014
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,..)	Most common are apartment units.	
3.3. Does the jurisdiction have construction/building units? If so please, mention law and article(s).	Cyprus Immovable Property (Tenure Registration and Valuation) Law, Cap 224, article 38	
3.4. Is the legal text available in original language?	Yes	
3.5. Is the legal text (relevant part) available in English translation?	No	
3.6. Do you have example descriptions of typical 3D parcels; either ‘prototype’ or ‘operational’?		
3.7. What would be typical 3D boundaries in an apartment complex: middle of the wall and floor/ceiling, or walls, floors/ceiling as neutral/shared 3D space?	Typically the unit is defined to the middle of the walls/ceilings, in case of common walls, and to the outer boundary of the wall, in case of external walls.	
3.8. Is common property inside the building registered? If so, how?	Yes , common property is shown on the special plan, it is numbered, and registered.	
3.9. Who owns the common property inside the building?	All apartment owners, in shares, based on the value of each apartment.	
3.10. Who owns the land on which the apartment is built?	All apartment owners in shares, based on the value of each apartment..	
3.11. Any other geometric issues?		

4. X/Y Coordinates

	Cyprus 2010	Cyprus 2014
4.1. Do the plans of survey guarantee X/Y coordinates? (and are they relative or in an absolute spatial reference system?)	Not for the first cadastral plans prepared between 1904 and 1928. Yes for the new plans prepared as a result of a resurvey project.	
4.2. Are the cadastral database coordinates authoritative?	Not for the first cadastral plans prepared between 1904 and 1928. Yes for the new plans prepared as a result of a resurvey project.	
4.3. If not, what is the authoritative source of X/Y coordinates?	The cadastral plans.	
4.4. Do you have parcels defined by the walls of a building (with no recorded geometry)?	No.	
4.5. What is the spatial reference system for X/Y Coordinates?	Cyprus Geodetic Reference System (1993) (WGS 84, Local Transverse Mercator)	
4.6. Any other X/Y coordinate issues?		

5. Z Coordinates/height representation

	Cyprus 2010	Cyprus 2014
5.1. Are the Z coordinates of 3D parcels relative to local ground?	N/A for DCDB. Yes in topographical database.	
5.2. Are Z coordinates reduced to a standard datum (absolute)? If so, what is the spatial reference system for the Z coordinate?	N/A for DCDB. Yes in topographical database (WGS 84 and mean sea level)	
5.3. In principle possible to store both relative and absolute Z coordinate?	No	
5.4. Is the earth surface (height) explicitly stored (in the DCDB or other accessible register)?	Not in DCDB. DTM is stored in topographical database	
5.5. What is the source of elevation for the 2D surface parcel?	N/A	
5.6. Any other Z coordinate issues?		

6. Temporal Issues

	Cyprus 2010	Cyprus 2014
6.1. Are temporal limits part of the definition of a parcel (2D or 3D)?	No	
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).	No	
6.4. Are there any attempt to integrate 3D space and temporal representations, into a single 4D space/time representation?	No	
6.5. In the case of tidal boundaries, what happens to the 3D ambulatory parcel if the 2D land parcel changes extent due to the movement of High Water Mark?		
6.6. Any other temporal issues?		

7. Rights, Restrictions and Responsibilities

	Cyprus 2010	Cyprus 2014
7.1. Range of RRR on 3D parcels.	The Cyprus Immovable Property (Tenure Registration and Valuation) Law, Cap 224, article 5 specifies that "Private ownership of any land shall extend to the surface and to the substance of the earth beneath the surface and to the space above the surface, reasonably necessary for the enjoyment thereof, but not extend to minerals".	
7.2. Are there any limitations on the range of rights? (e.g. subterranean parcels must be owned by Govt).	See 7.1 above	
7.3. Any other RRR issues?		
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.	No	
7.6. Can 3D sub-surface/above-surface parcel be owned by someone other that the person owning the land parcel?	See 7.1	
7.7. What applications do you foresee for 3D cadastre?		

8. DCDB (The Cadastral Database)

	Cyprus 2010	Cyprus 2014
8.1. Does the DCDB contain representation of 3D parcels (in any form)?	No	
8.2. If so, how are they represented (in the DCDB)?	N/A	
8.3. If so, how are they presented on cadastral "maps" (including screen presentations)?	N/A	
8.4. Are there possibilities to store geometry of 3D parcels in the DCDB?	No	
8.5. Is it possible to manage a 3D topological structure in the DCDB?	No	
8.6. Are constraints/rules defined for valid 3D objects (closed volume, no overlap, no gap in 3D)? What about rules for a mix of 2D and 3D representations?	N/A	
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,..)?	N/A	
8.8. What Spatial DBMS software do you use? Any 3D capabilities included and used?	Arcstotm, ArcSDE/Oracle	
8.9. Do you have any validation rules for 3D representation in the database?	No	
8.10. What (GIS/CAD) software is used for updating, editing, analysis, and visualization of the cadastral data? Any 3D capabilities included and used?	ArcInfo and ArcGis. 3D capabilities not used.	
8.11. What web software is used for remote data access/distribution and visualization? Any 3D capabilities included and used?	ArcIms, ArcGISServer	
8.12. Is your DCDB organised as Multi-Layers or Object Oriented or some other data model?	Multi-layers	
8.13. How do you query 3D objects in your DCDB?	N/A	
8.14. Is it possible to query neighbourhood parcels to a 3D	N/A	

object, vertically as well as horizontally?		
8.15. Any other DCDB issues?		

9. Plans of Survey (including field sketches)

	Cyprus 2010	Cyprus 2014
9.1. Do the survey plans carry 3D parcel representations?	No.	
9.2. If so, how are they represented?	N/A	
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.	No	
9.4. Is sketch level allowed (low geometric quality, but in principle enough to indicate the 3D object)?	Yes	
9.5. Is it possible to define a 3D parcel by referring to other 3D real world objects/ topography (and not specifying coordinates)?	Yes	
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….?		
9.7. Are the 3D parcels somehow checked for spatial validity; e.g. volume is closed, does not overlap with neighbour volume (and also no unwanted 3D gaps)?	No	
9.8. Do you have examples of (prototype or production) 3D survey plans available?		
9.9. Are any reference objects visible on the survey plan (e.g. real buildings, roads, that is 3D topography)?	No	
9.10. What form of 3D data acquisition is used (CAD, terrestrial surveying, sketches, stereo/oblique images, laser scanning,…)?		
9.11. What software do you use for creating and processing survey plans? Any 3D capabilities included and used?	PenMap, MobileMatrix, LISCAD. 3D capabilities not used	
9.12. Can 3D parcels be subdivided, consolidated or nullified?		
9.13. Is there any existing technical circular or directive to assist Surveyors in 3D data collection in	No	

the field?		
9.14. Any other survey plan issues?		

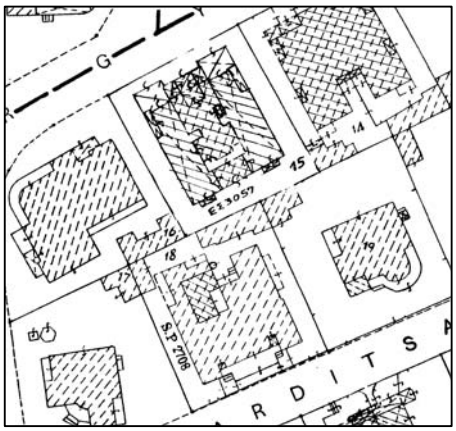
10. Other Issues

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

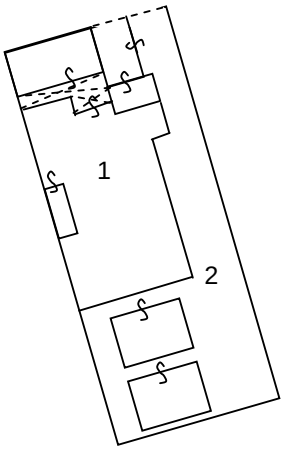
10.1. Country (State, Province)	Cyprus
10.2. Your name, function/position and your organization	Elikkos Elia Senior Lands Officer Department of Lands and Surveys
10.3. Contact details: address email, telephone	29 Michalacopoulou Str. 1455, Nicosia Cyprus Tel. + 357.22402890 Fax. + 357.22304858 E-mail: eelia@dls.moi.gov.cy
10.4. Other issues	

Strata division in the Cyprus Cadastral System

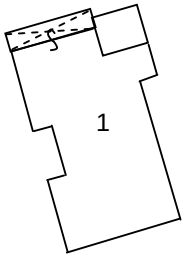
In the case of a horizontal (strata) division special plans are prepared for the ground and the other floors, as well as the terrace. On the cadastral plan a reference number (e.g SP 2708) provides the reference to the special plan.



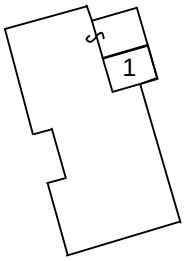
Cadastral plan



Ground



1st floor



Terrace