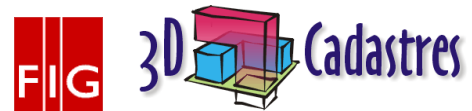


3rd Questionnaire 3D-Cadastral: status December 2018



Greece

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.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 - Greece	Expectations 2022 - Greece
1.1. Are all 3D parcels (3D spatial units in LADM terminology) constrained to be within one surface 2D parcel?	No 3D parcels exist, only spatial units with 3D aspects (e.g. SRPO, mines, and condominium) exist and are registered. These 3D spatial units correspond to 2D land parcels and are constrained to be registered accordingly.	The Hellenic Cadastre is an ongoing project expected to be completed in 2022. 3D aspect and enhancement of current system will be considered after the accomplishment of the project.
1.2. Are 2D and/or 3D ambulatory ² boundaries permitted?	Yes, they are permitted.	-
1.3.a. Is it allowed to have 3D parcels (spatial units) not related to physical constructs or objects? (e.g. airspace, subsurface volumes)	Only the right of superficies (currently applicable only to State owned land) and transfer of the coefficient of building surface do not relate to physical constructs or objects.	-
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)?	There is no quantitative data available for such cases.	
1.4. Are disconnected parts of a single 3D parcel allowed?	Mainly in case of condominium and customary law's cases	
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).?	According to the law the land ownership extends above and below the ground surface. However, the land owner cannot object to the exploitation of the land above and/or below his property, if there is no practical interest in opposing against it. In urban areas, 3D cadastral units are clearly defined within the range of height and depth specified by the building code.	
1.6. Are curved surfaces to bound the 3D parcels allowed?	Not applicable	
1.7. Must the curved surfaces (if allowed) be cylindrical sections, or any other constraint?	Not applicable	

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.

	Status 2018 - Greece	Expectations 2022 - Greece
1.8. Any other constraints – e.g. all surfaces must be horizontal or vertical?	No	
1.9. Is there legislation (law and/or regulations) for 3D descriptions of parcels? If so please, mention law and article(s).	Greek Civil Code Articles 954 (superficies solo credit: ownership of a parcel of land also include ownership of all building that have been constructed on it), 1001, 1002, 1010, 1117 and 1118 (servitudes) Law 3741/1929 (On Horizontal Property) and LD 1024/1971 (On Divided Property): individual ownership of a portion of a building and regulated the property rights of the buildings' co-owners), Law 1024/1971 (the owner of the plot has the right to create and register titles of independent properties that will be erected on the plot in the future) Law 3986/2011 (right of superficies) Supplementary, the following statutes do not directly refer to parcels, but imply (indirect) 2D/3D restrictions: Law 4447/2016 (for spatial planning and sustainable development); Mining Code of 1973 and the Regulation Mining and Quarrying Works of 2011; Greek Aviation code; Regulation about Unmanned Aerial Systems (GG 3152/B/30.9.2016)	
1.10. Is the legal text available in original language?	Yes	Yes
1.11. Is the legal text (relevant part) available in English translation?	No (only unofficial translations in publications)	Not planned
1.12. Do you have example descriptions of typical 3D parcels; either 'prototype' or 'operational'?	As operational 3D parcels SRPOs and condominiums can be considered. There is no prototype.	Not planned
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 planned
1.14. Are natural resources (groundwater, mining rights, geo-thermal extraction and storage) shown in your land	No. Only mines are registered in a separate layer at the current system.	-

	Status 2018 - Greece	Expectations 2022 - Greece
administration? If yes, are they considered as 3D parcels (spatial units) with RRRs attached? What about mining concessions (could be limited in time)?		
1.15. Are legally restricted spaces, above or below, such as polluted areas considered as 3D parcels?	No	Not planned
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, spatial plans and the rights or restrictions related to them are considered as 2D parcels.	Not planned
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?	No, there is not a Marine Cadastre, neither the IHO S-121 is used/implemented. Greece has been involved in the implementation of 2 Maritime Spatial Planning transboundary Projects aimed at the implementation on the EU Directive 2014/89, however Greece also has an overdeveloped regulatory coastal zone management being detailed only at the local scale.	Not planned
1.18. Is there any organised legal instrument for the management of common property?	“Common property” defined as owned and managed in a condominium, is established by deed filed with the notary format (or by court decision), and then transcribed in the competent Land Registry or Cadastral Office.	-
1.19. Which agency is responsible for the recording of titles information?	Hellenic Cadastre (where applicable) according to the Law 4512/2018 (previously National Cadastre & Mapping Agency SA) or the under replacement previous system of property transfers and mortgages.	The Hellenic Cadastre is planned to be operational by 2022.
1.20. Which agency is responsible for recording cadastral transactions?	Greece is currently under a transition period from the system of “Registrations and Mortgages” to the system of “Operative Cadastre”. Therefore, in the areas where the cadastral survey has been completed, the Hellenic Cadastre is responsible for the transactions,	-

	Status 2018 - Greece	Expectations 2022 - Greece
	while at the rest areas, the Mortgage offices.	
1.21. Are transactions for standard 2D lots and 3D lots done by the same agency or titles office?	Greece is currently under a transition period from the system of “Registrations and Mortgages” to the system of “Operative Cadastre”. Therefore, in areas where cadastral survey has been completed, it’s the Hellenic Cadastre’s responsibility, while in the rest areas the transactions are the Mortgage offices’ responsibility.	-
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?	There is no provision for 3D parcels in the Greek legislation.	-

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 - Greece	Expectations 2022 - Greece
2.1. Do you register networks as an entity in the land administration? (e.g. subterranean conduit networks)	Networks are not registered, only the related servitudes of passage/rights of way are registered.	Not planned
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) No (b) No (c) No (d) Yes (responsibility is not included)	-
2.3. Does the jurisdiction have private networks? If so please, mention law and article(s).	Yes, private overhead and underground cable networks do exist.	-
2.4. If so, are they registered as 3D property parcels (spatial units)?	No	Not planned
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).	Each one of the privately-owned networks is regulated by different Government Gazette (GG).	-
2.6. Is the text of laws and regulations (relevant part) available in English translation?	It depends on the network. Some of them have official translations in English.	-
2.7. Do you have example descriptions of typical 3D parcels (spatial units) for networks; either 'prototype' or 'operational'?	There are no 3D parcels, however descriptions and 3D representations of major underground networks/infrastructures (pipelines, subway lines) exist (usually by the Concessionaires/ Responsible for the major underground networks/infrastructures).	-
2.8. If the network (legal) objects break at the surface parcel, how do you deal with intersecting networks or vertically parallel networks?	At the time there are no such issues because networks are not registered to the cadastral system.	Not planned.

	Status 2018 - Greece	Expectations 2022 - Greece
2.9. Any other geometric issues related to the registration of networks?	Networks are not registered within the cadastral system.	-

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 - Greece	Expectations 2022 - Greece
3.1. Do you register legal spaces for 3D construction/building units (separate from the land)?	Yes as condominium.	Yes
3.2. If so, what are the conditions for doing so, and what are the most important types? E.g. apartment units (at least 2 or more in building), or also other buildings or even more general constructions (infra related; such as bridge, tunnel or even other, such as windmills,..)	Apartment units in condominium schemes.	-
3.3. Does the jurisdiction have construction/building units? If so please, mention law and article(s).	Horizontal Property Law (Law 3741/1929 ‘On Horizontal Property’ and LD 1024/1971)	-
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 (only unofficial translations in publications)	Not planned
3.6. Do you have example descriptions of typical 3D parcels; either ‘prototype’ or ‘operational’?	Apartment units in condominium schemes and vertical ownership.	-
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?	Middle of floors/walls/ceilings stipulated in the Greek Civil Code and Horizontal Property Law (L. 3741/1929)	-
3.8. Is common property inside the building registered? If so, how?	It is not separately registered. The percentage of each apartment unit’s ownership on the surface parcel is included in the deeds. Such data is comprised in the cadastral database.	-
3.9. Who owns the common property inside the building?	Commonly owned by the apartment owners.	-
3.10. Who owns the land on which the apartment is built?	Commonly owned by the apartment owners.	-
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	No	-

	Status 2018 - Greece	Expectations 2022 - Greece
sold or mortgaged without the consent of majority of the apartment owners?		
3.13. What is the numbering convention for apartments (please specify in terms of cadastral parcel as well as street addressing)	Each apartment gets a unique cadastral number encoding (KAEK) – inter alia- building lot code, building code, floor code and apartment code	-
3.14. Any other geometric issues?	-	-

4. X/Y Coordinates

	Status 2018 - Greece	Expectations 2022 - Greece
4.1. Do the plans of survey guarantee X/Y coordinates? (and are they relative or in an absolute spatial reference system?)	Yes (Hellenic Geodetic Reference System, GGRS'87 is used) but older plans in older or arbitrary systems may exist	-
4.2. Are the cadastral database coordinates authoritative?	Yes	-
4.3. If not, what is the authoritative source of X/Y coordinates?	Not applicable	Not applicable
4.4. Do you have parcels defined by the walls of a building (with no recorded geometry)?	There are cases that parcels are described by text or sketches, with no recorded geometry.	-
4.5. What is the spatial reference system for X/Y Coordinates?	Hellenic Geodetic Reference System 1987	-
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.)?	Neighbouring lots, coordinates of their own parcels, KAEK (unique ID), privately owned space in vertical ownerships (if any), servitudes (if any), mineral or SRPOs boundaries, administrative boundaries, roads' names.	Not planned
4.7. Have there been any changes made in the way cadastral information is recorded and represented from a historical point of view?	At the system of "Registrations and Mortgages" sketches and literally described boundaries in arbitrary coordinate systems were included. At the "Operational Cadastre" topographic diagrams in GGRS'87 are used.	-
4.8. Any other X/Y coordinate issues?	Survey plans in arbitrary or older Greek reference systems may exist or only text descriptions or sketches in deeds may be available	-

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

	Status 2018 - Greece	Expectations 2022 - Greece
5.1. Are the height values of 3D parcels relative to local ground?	Heights are not registered in the current system. However, topographic diagrams use both relative and absolute heights.	-
5.2. Are height values reduced to a standard datum (absolute)? If so, what is the spatial reference system for this 3 rd coordinate?	The Hellenic Geodetic Reference System 1987 is used, although Z coordinates are not stored to the cadastral database.	-
5.3. In principle possible to store both relative and absolute height values?	No.	-
5.4. Is the earth surface (elevation) explicitly stored (in the DCDB or other accessible register)?	It is not stored to the DCDB, although there are DTMs and DEMs available from the Hellenic Cadastre and the Hellenic Military Geography Service.	-
5.5. What is the source of height values for the 2D surface parcel?	Trigonometric points of principle reference network – in most cases elevation source is arbitrarily defined.	-
5.6. How is elevation information recorded in the cadastral plan or database?	In the cadastral plan, the x/y/z coordinates are included in a table. In the database they are not recorded.	-
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.)?	-	Such info could be used for other civil constructions or city models. However, it is not registered in the DCDB, it only exists on the cadastral plans.
5.8. Any other 3rd dimension ordinate value issues?	-	-

6. Temporal Issues

	Status 2018 - Greece	Expectations 2022 - Greece
6.1. Are temporal limits part of the definition of a parcel (2D or 3D)?	Temporal limits do not decisively define land parcels	Not planned
6.2. Are moving parcels allowed?	Yes	Yes
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?	The Hellenic Cadastre project supports temporal data recording.	-
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?	Greek C.C. provides for cases of alluvium that land ownership is passed to the owner the land that is extended.	-
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.	Not applicable	Not planned
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)?	Long-time leases, usufruct, limited real-property rights and right of superficies are considered as time-bound rights and are registered in titles.	-
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, previous cadastral versions are available.	-
6.9. For Cadastral transactions, how far in time do buyers need to make a search to ensure the title or deed is legal?	They have to search till they find the first registered title (the minimum timeframe is considered 30 years before the last transaction to prevent adverse possession).	-
6.10. Any other temporal issues?	-	-

7. Rights, Restrictions and Responsibilities

	Status 2018 - Greece	Expectations 2022 - Greece
7.1. Range of RRR on 3D parcels.	Civil Code stipulates that ownership extends vertically to the space above and below the earth's surface, unless otherwise stipulated by law. However, the land owner may not inhibit an action to a height or depth that has no interest in opposing against it.	-
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).	Only in case of lands where antiquities are discovered, mines and rights of superficies.	-
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).	There are none	-
7.4. Are there RRRs that are only allowed in 3D (and not valid for 2D)	No	Not planned
7.5. Is there specific legislation (laws, regulations) defining 3D RRR types? If so, provide details, e.g. references to documents/articles.	There is no specific legislation defining 3D RRR types although RRRs with 3D aspects exist (servitudes, utility servitudes, rights of superficies, mines, condominium, Public Law Restrictions)	-
7.6. Can 3D sub-surface/above-surface parcel be owned by someone other than the person owning the land parcel?	Only in case of rights of superficies, lease and mines, as there are no 3D parcels registered.	-
7.7. What applications do you foresee for 3D land administration?	The 3D cadastral registration, can clearly define property rights and restrictions within an evolving urban environment, characterized by an increasing number of multilayer infrastructures and economic activities. Applications related to 3D Land Administration mainly comprise decision-making and planning strongly related to the project's scale (e.g. environmental planning, energy consumption, etc.)	More efficient land management through 3D partition of space for instance 3D RRRs, i.e. Public Law Restrictions.

	Status 2018 - Greece	Expectations 2022 - Greece
7.8. Are the administrative source documents (source of RRRs) title or deed based?	Current administrative source documents are deed based, while they are gradually replaced by titles where “Operational Cadastre” is established.	After completion of the Hellenic Cadastre project (expected 2022), title-based registration will be implemented.
7.9 Who is responsible for the correctness of the specified 3D boundaries in spatial source documents (which authority)?	All the checks are implemented by the Hellenic Cadastre, however, 3D boundaries are not recorded.	-
7.10. Is registration of 3D parcels done inside the cadastral mapping agency, the land registry or elsewhere?	(2D) Cadastral registration is done by private cadastral surveyors and verified by Hellenic Cadastre	-
7.11. Are 3D registrations handled by the same organisation that handles traditional (2D) land administration?	Both the Mortgage Offices and the Cadastral Offices are responsible, depending on the implementation of the Hellenic Cadastre project in the relevant area.	After the completion of the Hellenic Cadastre project will be handled by the same organisation (Hellenic Cadastre).
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?	In the previous system (“Registrations and Mortgages”) proof of ownership is provided by the deeds (where a surveying diagram is attached), while in the ongoing cadastral system, legal information is included in the database and provided in the form of cadastral extract (both as descriptive information and cadastral plan).	-
7.13. Is the 3D registry separate or integrated with the 2D registry?	There is no 3D registry.	Not planned
7.14. Any other RRR issues?	-	-

8. DCDB (The Cadastral Database)

	Status 2018 - Greece	Expectations 2022 - Greece
8.0. Is database schema LADM based?	No, it is not. Current DCDB is compatible to INSPIRE	-
8.1. Does the DCDB contain representation of 3D parcels (in any form)?	There are separate 2D layers in case of SRPO, mines, which have 3D aspects.	Not planned
8.2. If so, how are they represented (in the DCDB)?	They are not represented.	Not planned
8.3. If so, how are they presented on cadastral “maps” (including screen presentations)?	Only the building footprint is presented on the cadastral maps	-
8.4. Are there possibilities to store geometry of 3D parcels in the DCDB?	No	Not planned
8.5. Is it possible to manage a 3D topological structure in the DCDB?	No	Not planned
8.6. Are constraints/rules defined for valid 3D objects (closed volume, no overlap, no gap in 3D)? What about rules for a mix of 2D and 3D representations?	No	Not planned
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, ..)?	As only the building footprints are represented, there are not such functionalities needed and supported.	Not planned
8.8. What Spatial DBMS software do you use? Any 3D capabilities included and used?	RDBMS Oracle 10g	-
8.9. Do you have any validation rules for 3D representation in the database?	No	Not planned
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	-
8.11. What web software is used for remote data access/distribution and visualization? Any 3D capabilities included and used?	A custom made web software application is used. Cadastral offices (Web clients) are using the application through VPN connection for all the stages of the cadastral process. Established GIS Server (ArcSDE, ArcIMS) and IIS Server (.NET Application)	-

	Status 2018 - Greece	Expectations 2022 - Greece
	which is connected to the Oracle DB.	
8.12. Is your DCDB organised as Multi-Layers or Object Oriented or some other data model?	Object oriented data model.	-
8.13. How do you query 3D objects in your DCDB?	No	Not planned
8.14. Is it possible to query neighbourhood parcels to a 3D object, vertically as well as horizontally?	No	Not planned
8.15. Any other DCDB issues?	-	-

9. Plans of Survey (including field sketches)

	Status 2018 - Greece	Expectations 2022 - Greece
9.1. Do the survey plans carry 3D parcel representations?	No, only height points are recently being registered.	-
9.2. If so, how are they represented?	Point heights or contours.	-
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.	The legislation includes regulations for height recording but there is no provision for 3D.	Not planned.
9.4. Is sketch level allowed (low geometric quality, but in principle enough to indicate the 3D object)?	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	-
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....?	Condominium/ apartments are described in deeds (text) and the building comprising the condominium is submitted in .dxf and .pdf. Building's footprint, mines and SRPOs is submitted in paper format or electronically (.dxf and .pdf).	-
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 (validation checks apply only for 2D parcels).	-
9.8. Do you have examples of (prototype or production) 3D survey plans available?	No	-
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,	Different forms and techniques are used for data acquisition	-

	Status 2018 - Greece	Expectations 2022 - Greece
stereo/oblique images, laser scanning,...)?	(terrestrial surveying, sketches, drawings and orthophotos).	
9.11. What software do you use for creating and processing survey plans? Any 3D capabilities included and used?	Autodesk AutoCAD (or other similar applications) with custom-made plugins (for error validation and topological checking), ESRI ArcGIS and QGIS (no 3D capabilities are used)	-
9.12. Can 3D parcels be subdivided, consolidated or nullified?	No	Not planned
9.13. Is there any existing technical circular or directive to assist Surveyors in 3D data collection in the field?	Only for collection of height data for 2D survey plans (Technical Requirements by the Hellenic Cadastre)	Not planned
9.14. Are the surveyors required to undertake a field survey for 3D cadastral data?	No	Not planned
9.15. Are building construction plans used to compile 3D cadastral information for apartments?	Building drawings and plans are used only to separate a building to horizontal properties (condominium). Not necessarily construction plans.	-
9.16. Is 2D/3D field survey done by private licensed surveyors or by government surveyors?	By 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.	Plans of survey are created for each new parcel and are used to update the DCDB.	-
9.18. Do you show dimensions or isometric views of 3D parcels on survey plans (do you also store this in a database)	Dimensions are shown on survey plans. No provision of isometric views, nor stored in the database.	-
9.19. Do the cadastral survey plans differentiate between different types (e.g. volumetric plans, building plans and standard 2D plans)?	No	-
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.?)	The following are shown: Neighbouring lots' boundaries, coordinates of the parcel, KAEK (unique ID), privately owned space in vertical ownerships (if any), servitudes (if any), mineral or SRPOs boundaries, administrative boundaries, roads' names, north arrow.	-

	Status 2018 - Greece	Expectations 2022 - Greece
9.21. Are authoritative cadastral surveys carried out by government surveyors or private licensed surveyors or both?	By private licensed surveyors	-
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 and points on the cadastral plan accompanied by their coordinates in GGRS'87.	-
9.23. How much time does it usually take for a subdivision process to complete?	It depends on the parcel that will be subdivided, the restrictions within the area that the parcel is located and the involved parties.	-
9.24. What is the legal source for cadastral representation (e.g. cadastral plans, or DCDB or index plans or descriptive sketch/text etc.?)	Deeds or titles or any other legal documentation.	-
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)?	Relative positional accuracy. For urban areas: $RMSE_x \leq 0.50m$; $RMSE_y \leq 0.50m$; $RMSE_{xy} \leq 0.71m$ and for rural areas: $RMSE_x \leq 1.00m$; $RMSE_y \leq 1.00m$; $RMSE_{xy} \leq 1.41m$	-
9.26. Any other survey plan issues?	-	-

10. Dissemination of 3D Cadastral information

	Status 2018 - Greece	Expectations 2022 - Greece
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?	The Portal of the Hellenic Cadastre for the public and for professionals. No 3D data provisions included. Recently, a new portal has been created to upload the topographic diagrams being created by licensed surveyors. This is open only to professionals.	-
10.2. Are specific file formats or standards used to distribute 3D Cadastral information? (e.g. LandXML, CityGML, BIM/IFC, 3D pdf,...)	There is no specific format, since there is no 3D cadastral information.	-
10.3. Are there specific cartographic styling rules for representing 3D cadastral plans, or to represent 3D cadastral objects on 2D cadastral maps?	Rules exist only for 2D plans and especially for .dxf formats.	-
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?	There are no 3D cadastral maps.	-
10.5. Is the 3D Cadastral information accessible in integrated manner with the 2D Cadastral information?	3D property entities (condominium, mines SRPO) are registered to the 2D DCDB	-
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)?	Polygons or points are used to depict the presence of 3D cadastral objects (in case of SRPOs and mines).	-
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)	It is available through the 2D Web Portal of the Hellenic Cadastre but with restricted access (only professionals).	-

	Status 2018 - Greece	Expectations 2022 - Greece
10.8. Are 2D/3D cadastral data available to the general public or just to the relevant parties?	Data is available only to involved parties.	-
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 - Greece	Expectations 2022 - Greece
11.1. What is the smallest 2D and 3D parcel that is present/ allowed to be registered in the land administration?	Urban planning regulations define the smallest 2D parcel suitable for construction, while smaller parcels may exist. No provisions regarding 3D parcels.	-
11.2. What is the largest 2D and 3D parcel that is present allowed to be registered in the land administration?	There are no limitations for 2D parcels. No provisions for 3D parcels.	-
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,...)	-	-
11.4. How many 2D and 3D parcels do you currently have in your land administration?	12-15 million 2D parcels.	-
11.5. Which year did you start registering 3D parcels in the land administration?	Only units with 3D aspects (e.g. SRPO, mines) are recorded since 2010	-
11.6. What is the ratio of 3D parcels in rural vs. urban areas?	Due to the fact that the Hellenic Cadastre is now ongoing, there is no statistical data about this ratio, as the regions that are currently under cadastral survey or the cadastral survey has been completed are mainly urban, while the regions where the cadastral survey started this year mainly refer to rural areas.	-
11.7. Please specify names of cities or towns or suburbs or regions or locations where there are significant numbers of 3D parcels.	Islands on the Aegean Sea (SRPO), urban areas around the Greek territory (with condominium units).	-
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) 131.944 sq.km (b) & (c) 12-15 million 2D parcels (including the 2D parcels with 3D aspects). (d) 10.815.197 (census 2011)	-

	Status 2018 - Greece	Expectations 2022 - Greece
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)?	There is no data available to calculate the proportion of the various types of units with 3D aspects.	-
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).	There is no data available to calculate the surface area affected by the various types of units with 3D aspects.	
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?	No
12.6. In case of known legal barriers, have there been made progress in creating and adopting new legislation to support 3D land administration?	No
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)	Greece
13.2. Your name, function/position and your organization	Efi Dimopoulou, Dr Surveyor Engineer NTUA, Professor NTUA Dimitrios Kitsakis, Surveyor Engineer NTUA, PhD Candidate NTUA Eftychia Kalogianni, Surveyor Engineer NTUA, MSc PhD Candidate TUDelft
13.3. Contact details: address email, telephone	efi@survey.ntua.gr School of Rural & Surveying Engineering 9, Iroon Polytechniou, 15780 Zografou, GREECE tel. +302107722679, fax +302107722677 Mob.+30 6937424666 demetrio@central.ntua.gr School of Rural & Surveying Engineering 9, Iroon Polytechniou, 15780 Zografou, GREECE Mob.+306949725897 E.Kalogianni@tudelft.nl Delft University of Technology, Faculty of Architecture and the Built Environment Department 10 Monis Petraki, 11521, Athens, GREECE Mob.+306944325903
13.4. Other issues	In Greece there are currently no legal provisions regarding 3D Cadastre. 3D real property features are managed and influenced mostly by Horizontal Property Law, Civil Code, Mineral Code, Aviation Code as well as by the relevant Laws regulating archaeological and environmental protection and spatial planning zones. The Law on Cadastre regulates registration of the SRPOs and the mines, which do have 3D aspects, and provides only for their depiction on the 2D cadastral map. Additionally, it does not provide for any other 3D property entities that exist in Greece (such as condominiums and underground networks) regulated by specific law and codes. Restrictions due to archaeological, environmental and urban planning laws are to be incorporated to the Hellenic Cadastre, although such procedure is to be put in force after the completion of the cadastral survey process (expected in 2022).

References

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Sudarshan Karki (2013). 3D Cadastre Implementation Issues in Australia. MSc Thesis, University of Southern Queensland (Master of Spatial Science Research), 162 p., http://eprints.usq.edu.au/23560/1/Karki_2013_whole.pdf

Peter van Oosterom, Jantien Stoter, Hendrik Ploeger, Christiaan Lemmen, Rod Thompson, Sudarshan Karki (2014), Initial Analysis of the Second FIG 3D Cadastres Questionnaire: Status in 2014 and Expectations for 2018, In: Proceedings 4th International Workshop on 3D Cadastres, pp. 55-74, http://www.gdmc.nl/publications/2014/Second_FIG_3D_Cadastres_Questionnaire.pdf