

Questionnaire 3D-Cadastres: status November 2010

Denmark



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 homogeneous¹ 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.

	Denmark 2010	Denmark 2014
1.1. Are all 3D parcels constrained to be within one surface (2D) parcel?	Rights referring to the use of a limited space will be registered in the cadastre on a 2D parcel. However the right registered might refer to a construction or space on several 2D parcels ore crossing a public road. Yes.	There are discussions today whether 3D parcels should be registered in the cadastre on a 2D parcel illustrated as a footprint on the cadastral map. However the right registered might refer to a construction or space on several 2D parcels. Yes.
1.2. Are ambulatory ² boundaries permitted?	Yes	Yes
1.3. Is it allowed to have 3D parcels not related to physical constructs or objects?" (e.g. airspace, subsurface volumes)	No. But it is allowed to have 3D properties (condonominiums) below the surface-level.	Probably no.
1.4. Are disconnected parts of a single 3D parcel allowed?	No 3D today.	Probably yes. A property may consist of several parcels.
1.5. Limitation – e.g. must the 3D parcel be described by a boundary definition?	Both horizontal and vertical boundaries is described in the documentation (condonominiums map in the Land Book, not in the Cadastre) with lines and words.	
1.6. Are curved surfaces to bound the 3D parcels allowed?	No 3D modelling today – only by 2D drawn maps in the Land Book)	Probably 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 3D today.	Probably not

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.

1.9. Is there generic legislation (law and/or regulations) for 3D descriptions of parcels? If so please, mention law and article(s).	No	Yes, there will probably be formed regulation for this.
1.10. Is the legal text available in original language?	N/A.	--
1.11. Is the legal text (relevant part) available in English translation?	N/A.	--
1.12. Do you have example descriptions of typical 3D parcels; either 'prototype' or 'operational'?	N/A.	--
1.13. Is there a formal model for the 3D parcels (UML style); e.g. based on ISO TC211 series?	No 3D today.	Probably yes
1.14. Are natural resources (groundwater, mining rights) considered as 3D parcels?	3D property rights objects can be described and modelled on maps in the Land Registry	
1.15. Are polluted areas considered as 3D parcels (as legal restrictions are associated to these spaces: above and below surface)?	No.	Probably not
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.	Probably not
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.

	Denmark 2010	Denmark 2014
2.1. Do you register network parcels? (e.g. subterranean conduit networks)	No. However there do exist a national register where network owners voluntarily can register their “areas of interest”.	Probably not, but development might be underway as GML-files to determinate place for servitudes registering the network objects.
2.2. If so, can the network structure be traced in the database(s)?	No	--
2.3. Does the jurisdiction have private networks? If so please, mention law and article(s).	No	Probably not
2.4. If so, are they registered as 3D property parcels?	No	Probably not
2.5. Is the legal text available in original language? If so, give references to relevant document(s).	Yes Lov om registrering af ledningsejere - Lov nr. 119 af 24. februar 2004 og Lov om ændring af lov om registrering af ledningsejere - Lov nr. 112 af 26. februar 2008	--
2.6. Is the legal text (relevant part) available in English translation?	No	--
2.7. Do you have example descriptions of typical 3D parcels for networks; either ‘prototype’ or ‘operational’?	No	--
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	--
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”.

	Denmark 2010	Denmark 2014
3.1. Do you register 3D construction/building units?	Not in the Cadastral Database or the The Cadastral Map. It is done in the Land Registry. But they are registered in the Land Registry (Min.Justice) as Condominiums with maps, words. And the Height of the building registered in the Building registry (Min.Housing).	
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,...)	Mostly apartment units for living and for business purposes. Windmills can be registered in the Land Registry as a certain property. (3D and coordinate)	Mostly apartment units for living and for business purposes. Windmills can be registered in the Land Registry as a certain property. (3D and coordinate)
3.3. Does the jurisdiction have construction/building units? If so please, mention law and article(s).	No. It is done in the Land Registry	No. It is done in the Land Registry
3.4. Is the legal text available in original language?	Yes, see here .	--
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’?	No. They are not registered as 3D, but as an address and a 2D plan.	--
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 and the or the floor separation	--
3.8. Is common property inside the building registered? If so, how?	Yes. The size of the area is registered in the land registry under each body corporate	Yes. The size of the area is registered under each body corporate
3.9. Who owns the common property inside the building?	Usually the body corporate.	Usually the body corporate.
3.10. Who owns the land on which	Usually the body	Usually the body

the apartment is built?	corporate.	corporate.
3.11. Any other geometric issues?	--	--

4. X/Y Coordinates

	Denmark 2010	Denmark 2014
4.1. Do the plans of survey guarantee X/Y coordinates? (and are they relative or in an absolute spatial reference system?)	No	No
4.2. Are the cadastral database coordinates authoritative?	No, because of the rules of adverse possession	No, because of the rules of adverse possession
4.3. If not, what is the authoritative source of X/Y coordinates?	None. You have to check in the field.	None. You have to check in the field.
4.4. Do you have parcels defined by the walls of a building (with no recorded geometry)?	Yes – “Building Unit Plans” registered in the land registry. Units usually defined by centre of floors, walls and ceilings.	Yes – “Building Unit Plans” registered in the land registry. Units usually defined by centre of floors, walls and ceilings.
4.5. What is the spatial reference system for X/Y Coordinates?	There exist two systems. An older national system (system 34), and a new one based on UTM/ETRS89.	There exist two systems. An older national system (system 34), and a new one based on UTM/ETRS89.
4.6. Any other X/Y coordinate issues?	--	--

5. Z Coordinates/height representation

	Denmark 2010	Denmark 2014
5.1. Are the Z coordinates of 3D parcels relative to local ground?	No guidelines.	N/A
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	N/A
5.3. In principle possible to store both relative and absolute Z coordinate?	N/A	Probably
5.4. Is the earth surface (height) explicitly stored (in the DCDB or other accessible register)?	No	N/A
5.5. What is the source of elevation for the 2D surface parcel?	Surface elevations are not recorded in the DCDB.	Surface elevations are not recorded in the DCDB.
5.6. Any other Z coordinate issues?	--	--

6. Temporal Issues

	Denmark 2010	Denmark 2014
6.1. Are temporal limits part of the definition of a parcel (2D or 3D)?	Yes. It is possible to register a building on a rented parcel in the land registry. A registration which can last no longer than 30 years.	--
6.2. Are moving parcels allowed?	No – but it is recognized in system than some border are non permanent, e.g. coastal lines.	No – but it is recognized in system than some border are non permanent, e.g. coastal lines.
6.3. Are there any limitations on the range of temporal limits? (e.g. only on 3D apartments).	N/A.	N/A.
6.4. Are there any attempt to integrate 3D space and temporal representations, into a single 4D space/time representation?	N/A.	Probably not
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?	N/A.	N/A.
6.6. Any other temporal issues?	--	--

7. Rights, Restrictions and Responsibilities

	Denmark 2010	Denmark 2014
7.1. Range of RRR on 3D parcels.	No 3D parcels. However, RRRs are registered in a special register that can display whether a RRR are over or under ground.	No 3D parcels. However, RRRs are registered in a special register that can display whether a RRR are over or under ground.
7.2. Are there any limitations on the range of rights? (e.g. subterranean parcels must be owned by Govt).	No.	No
7.3. Any other RRR issues?	--	--
7.4. Are there RRRs that are only allowed in 3D (and not valid for 2D)	No.	No.
7.5. Is there specific legislation (laws, regulations) defining 3D RRR types? If so, provide details, e.g. references to documents/ articles.	Yes, in Danish only.	--
7.6. Can 3D sub-surface/above-surface parcel be owned by someone other than the person owning the land parcel?	No 3D parcels.	Probably
7.7. What applications do you foresee for 3D cadastre?	--	--

8. DCDB (The Cadastral Database)

	Denmark 2010	Denmark 2014
8.1. Does the DCDB contain representation of 3D parcels (in any form)?	No.	Probably as a footprint
8.2. If so, how are they represented (in the DCDB)?	--	Probably as 2D polygons in a layer above (below) the base layer.
8.3. If so, how are they presented on cadastral "maps" (including screen presentations)?	--	Probably as polygons is a contrasting colour to the base parcels.
8.4. Are there possibilities to store geometry of 3D parcels in the DCDB?	No.	Probably
8.5. Is it possible to manage a 3D topological structure in the DCDB?	No.	Probably not
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	Probably only as a map with the presence of 3D parcels indicated in colour.
8.8. What Spatial DBMS software do you use? Any 3D capabilities included and used?	Oracle. No 3D used.	--
8.9. Do you have any validation rules for 3D representation in the database?	N/A	--
8.10. What (GIS/CAD) software is used for updating, editing, analysis, and visualization of the cadastral data? Any 3D capabilities included and used?	Geomedia. No 3D used	--
8.11. What web software is used for remote data access/distribution and visualization? Any 3D capabilities included and used?	Geomedia webmap, arc gis server	--
8.12. Is your DCDB organised as Multi-Layers or Object Oriented or some other data model?	Object Oriented in an Oracle database	--
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 object, vertically as well as horizontally?	N/A	--
8.15. Any other DCDB issues?	--	--

9. Plans of Survey (including field sketches)

	Denmark 2010	Denmark 2014
9.1. Do the survey plans carry 3D parcel representations?	No	Probably yes
9.2. If so, how are they represented?	--	Not planned yet
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)?	No	--
9.5. Is it possible to define a 3D parcel by referring to other 3D real world objects/ topography (and not specifying coordinates)?	Only in the case of a building unit plan.	--
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....?	N/A	Not planned yet
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)?	N/A	Probably not
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)?	N/A	--
9.10. What form of 3D data acquisition is used (CAD, terrestrial surveying, sketches, stereo/oblique images, laser scanning,...)?	N/A	--
9.11. What software do you use for creating and processing survey plans? Any 3D capabilities included and used?	It varies according to the specific survey company.	--
9.12. Can 3D parcels be subdivided, consolidated or nullified?	N/A	--
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)	Denmark
10.2. Your name, function/position and your organization	Christian Thellufsen Project manager, Department of Cadastre and Legal Authority Danish National Survey and Cadastre
10.3. Contact details: address email, telephone	Rentemestervej 8 2400 København NV chcla@kms.dk +45 72545248
10.4. Other issues	