

Questionnaire 3D-Cadastres: status November 2010

The Netherlands



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.

	The Netherlands 2010	The Netherlands 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. Yes. It is allowed, but not demanded to record a 3D drawing in the land registers. Such a 3D drawing is linked to the parcel in the Cadastre registration and can be uploaded through the internet in a few minutes	We intend to demand recording of 3D drawings in land registers in specific cases. These cases are described by a working group with two professors of civil law, registrars and representatives of of Royal Dutch Association of Notaries
1.2. Are ambulatory ² boundaries permitted?	No, in case of growth and exit of rivers and of Dunes civil boundaries can change without the recording of a deed. In that case the cadastre boundary follows the legal boundary. The Cadastre parcel number is changed	
1.3. Is it allowed to have 3D parcels not related to physical constructs or objects?" (e.g. airspace, subsurface volumes)	An apartment right consists among else of a right to use a specific part of a real estate. This part could be recorded in 3D on drawings in the land registers (not demanded). The cadastre parcel is always in 2D because Dutch legislation on real rights is 2D based.	We intend to demand recording of 3D drawings in land registers in specific cases. These cases are described by a working group with two professors of civil law, registrars and representatives of Royal Dutch Association of Notaries
1.4. Are disconnected parts of a	No (also not in 2D).	We intend to demand

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.

single 3D parcel allowed?	Disconnected parts are recorded as “mandeligheid” (a common ownership that is linked to the ownership of specific parcels). On demand 3D drawings of a mandeligheid could be recorded in the land register and linked to a 2 D cadastre parcel.	recording of 3 D drawings in land registers in specific cases. These cases are described by a working group with two professors of civil law, registrars and representatives of Royal Dutch Association of Notaries
1.5. Limitation – e.g. must the 3D parcel be described by a boundary definition?	No. Apartment unit boundaries are generally described as Floors, Walls and Ceilings. Other subsidiaries such as car parks need dimensions or reference to physical objects. It is possible to show which volume is affected with the right by indicating boundaries on a drawing added to the deed registered in the public registers. But no guidelines exist for these drawings. In case of apartments it is mandatory to register in the public registers a drawing proofed by a registrar, indicating the boundaries of the apartment units. These drawings in practise are made in 2D (for each floor level). Adding of a 3D drawing is optional	Research is done to examine that possibility to record (in the automated electronic public registers) digital 3 D drawings which give an insight in the relation between -and the location of- the several rights (ownership, lease rights, apartment rights, rights of superficies etc.) and the (3D) object submitted to these rights, which are described in the recorded deed(s). In case of a poor consultability of the database and the (2D) cadastral map, the registrar demands for a 3D drawing. Note: the 3D drawing is to locate the object in the referred space. It is no representation of the exact measurements.
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. No restrictions.	
1.8. Any other constraints – e.g. all surfaces must be horizontal or vertical?	No.	
1.9. Is there generic legislation (law	No.	See above (1.5) if there

and/or regulations) for 3D descriptions of parcels? If so please, mention law and article(s).		has to be further legislation, has to be seen
1.10. Is the legal text available in original language?	No (no legislation on 3D)	
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'?	There are some deeds registered in the public registers which describes 3D objects "in a 2D way". These objects will be regarded in the above mentioned research (1.5).	
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?	No.	
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.

	The Netherlands 2010	The Netherlands 2014
2.1. Do you register network parcels? (e.g. subterranean conduit networks)	Not as a parcel, but as a network (legal object sui generic.) This cadastre network has to be linked to a drawing in the land registers. This could be a 3D drawing, but in practice it is always a 2D drawing. With a line that is the middle of a general plot without exact boundaries. However we do register the ownership of networks, and therefore the networks itself as legal objects.	
2.2. If so, can the network structure be traced in the database(s)?	Yes. As physical objects. Network charts are recorded in the public registers. These charts show the relation between the 'course' of the network and the (2D) cadastral map.	
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?	No. A network is a legal object of its own. It's not to be considered as a 3D property parcel	
2.5. Is the legal text available in original language? If so, give references to relevant document(s).	Yes (regulation).	
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'?	Yes. (but not as a 3D parcel see 2.4)	
2.8. If the network (legal) objects break at the surface parcel, how do	On the network chart different objects can be	

you deal with intersecting networks or vertically parallel networks?	shown by different colours or gray-scales	
2.9. Any other geometric issues?	Networks are registered as lines.	

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”.

	The Netherlands 2010	The Netherlands 2014
3.1. Do you register 3D construction/building units?	Yes. (but in practice not as 3D objects)	See 1.5
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 apartment units and superficies rights	
3.3. Does the jurisdiction have construction/building units? If so please, mention law and article(s).	Dutch Civil Code, Book 5, Article 106, Cadastre Act, Article 20 and instructions related to the Cadastre Act (5 en 6 Uitvoeringsregeling Kadasterwet)	
3.4. Is the legal text available in original language?	Yes.	
3.5. Is the legal text (relevant part) available in English translation?	Civil code: Yes / Cadastre Act: No	
3.6. Do you have example descriptions of typical 3D parcels; either ‘prototype’ or ‘operational’?	Prototype (they are in practice not registered in 3D).	
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?	In general the unit boundaries will be defined in the deed to the middle of the walls/ceilings.	
3.8. Is common property inside the building registered? If so, how?	Yes. They are shown with different boundary indications.	
3.9. Who owns the common property inside the building?	All the apartment right owners (communal ownership). Governed by a mandatory ruling	
3.10. Who owns the land on which the apartment is built?	See 3.9	
3.11. Any other geometric issues?	Apartment units are related to one or several surface parcels.	

4. X/Y Coordinates

	The Netherlands 2010	The Netherlands 2014
4.1. Do the plans of survey guarantee X/Y coordinates? (and are they relative or in an absolute spatial reference system?)	Yes of 2D parcels. According to decisions of our Supreme Court the intention of parties , as described in a recorded deed prevails over X/Y coordinates	
4.2. Are the cadastral database coordinates authoritative?	Not legal, see before	
4.3. If not, what is the authoritative source of X/Y coordinates?	In case of a boundary dispute it provides the court with a presumption of the intention of the parties. Without evidence of the contrary this will be decisive	
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?		
4.6. Any other X/Y coordinate issues?		

5. Z Coordinates/height representation

	The Netherlands 2010	The Netherlands 2014
5.1. Are the Z coordinates of 3D parcels relative to local ground?	No guidelines.	
5.2. Are Z coordinates reduced to a standard datum (absolute)? If so, what is the spatial reference system for the Z coordinate?		
5.3. In principle possible to store both relative and absolute Z coordinate?		
5.4. Is the earth surface (height) explicitly stored (in the DCDB or other accessible register)?		
5.5. What is the source of elevation for the 2D surface parcel?		
5.6. Any other Z coordinate issues?		

6. Temporal Issues

	The Netherlands	The Netherlands 2014
6.1. Are temporal limits part of the definition of a parcel (2D or 3D)?	A temporal right could be recorded in the land registers and published in the Cadastre registration, but in practice this does not happen.	
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, is not demanded by our clients	
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?	See before. We do not have ambulatory parcel. Leading principle is that after every change of boundary the parcel will have a new number.	
6.6. Any other temporal issues?	NO	

7. Rights, Restrictions and Responsibilities

	The Netherlands 2010	The Netherlands 2014
7.1. Range of RRR on 3D parcels.	No specific rules.	
7.2. Are there any limitations on the range of rights? (e.g. subterranean parcels must be owned by Govt).	No.	
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 than the person owning the land parcel?		
7.7. What applications do you foresee for 3D cadastre?		

8. DCDB (The Cadastral Database)

	The Netherlands 2010	The Netherlands 2014
8.1. Does the DCDB contain representation of 3D parcels (in any form)?	No. Attribute values of parcels may indicate a 3D situation (i.e. pollution; mining; right of ease; underground construction).	See 1.5
8.2. If so, how are they represented (in the DCDB)?	Always related to the 2D parcels and represented through the geometry of 2D parcels. Exceptions are the networks (line representations).	
8.3. If so, how are they presented on cadastral “maps” (including screen presentations)?		
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.	See 1.5
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.	
8.8. What Spatial DBMS software do you use? Any 3D capabilities included and used?	Oracle. No 3D used at the moment.	
8.9. Do you have any validation rules for 3D representation in the database?		
8.10. What (GIS/CAD) software is used for updating, editing, analysis, and visualization of the cadastral data? Any 3D capabilities included and used?	Fingis (future Intergraph Geomedia). No 3D used at the moment.	
8.11. What web software is used for remote data access/distribution and visualization? Any 3D capabilities included and used?		

8.12. Is your DCDB organised as Multi-Layers or Object Oriented or some other data model?		
8.13. How do you query 3D objects in your DCDB?		
8.14. Is it possible to query neighbourhood parcels to a 3D object, vertically as well as horizontally?		
8.15. Any other DCDB issues?		

9. Plans of Survey (including field sketches)

	The Netherlands 2010	The Netherlands 2014
9.1. Do the survey plans carry 3D parcel representations?	No, but in theory it would be possible.	
9.2. If so, how are they represented?	Fully depends on the surveyor.	
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.	See 1.5
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....?	As 2D drawings registered in the public registers. Not on the cadastral map nor cadastral surveys.	
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. Mostly relate to existing physical constructions or constructions to be built.	
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?		
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 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)	The Netherlands
10.2. Your name, function/position and your organization	Benedict van Dam/Jantien Stoter/Hendrik Ploeger bewaarder van het kadaster en de openbare registers/ Kadaster onderzoekers/TU Delft
10.3. Contact details: address email, telephone	Kadaster Concernstaf, Rechtszekerheid Materiebeleid / ORK Apeldoorn, The Netherlands benedict.vandam@kadaster.nl Tel. +31 88 183 30 11, Fax +31 55 355 94 81
10.4. Other issues	