

Questionnaire 3D-Cadastres: status November 2010

Kazakhstan



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.

	Kazakhstan 2010	Kazakhstan 2014
1.1. Are all 3D parcels constrained to be within one surface (2D) parcel?	Yes	
1.2. Are ambulatory ² boundaries permitted?	Theoretically they are	
1.3. Is it allowed to have 3D parcels not related to physical constructs or objects?” (e.g. airspace, subsurface volumes)	Yes	
1.4. Are disconnected parts of a single 3D parcel allowed?	Yes	
1.5. Limitation – e.g. must the 3D parcel be described by a boundary definition?		
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).	No	
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’?	No	
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	

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.

1.15. 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.

	Kazakhstan 2010	Kazakhstan 2014
2.1. Do you register network parcels? (e.g. subterranean conduit networks)	No. However we do register the ownership of networks, and therefore the networks itself as legal objects. The property rights in land (e.g. right of superficies or easements) are still related to the surface parcels that overlap with the network.	
2.2. If so, can the network structure be traced in the database(s)?	Yes. As physical objects.	
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	
2.5. Is the legal text available in original language? If so, give references to relevant document(s).		
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'?	No	
2.8. If the network (legal) objects break at the surface parcel, how do you deal with intersecting networks or vertically parallel networks?	All networks above the surface are registered. Certain land parcel is allotted for its facilities. If this land parcel intersects with another land parcel with different owner the owner of the land parcel will have real burden. Concerning the networks below the surface, they are not registered but only shown on the maps	

2.9. Any other geometric issues?	Networks are registered as lines.	It is planned to show the networks as 3D objects or at least to show all underground networks on cadastral maps and register their dimensions.
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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”.

	Kazakhstan 2010	Kazakhstan 2014
3.1. Do you register 3D construction/building units?	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 buildings and apartments.	
3.3. Does the jurisdiction have construction/building units? If so please, mention law and article(s).		
3.4. Is the legal text available in original language?		
3.5. Is the legal text (relevant part) available in English translation?		
3.6. Do you have example descriptions of typical 3D parcels; either ‘prototype’ or ‘operational’?	They are 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?	Typically the unit is defined to the middle of the walls/ceilings.	
3.8. Is common property inside the building registered? If so, how?	As a condominium.	
3.9. Who owns the common property inside the building?	The owners of the apartments collectively.	
3.10. Who owns the land on which the apartment is built?	Municipal body	
3.11. Any other geometric issues?	Apartment units are related to one or several surface parcels.	

4. X/Y Coordinates

	Kazakhstan 2010	Kazakhstan 2014
4.1. Do the plans of survey guarantee X/Y coordinates? (and are they relative or in an absolute spatial reference system?)	Yes	
4.2. Are the cadastral database coordinates authoritative?	Yes	
4.3. If not, what is the authoritative source of X/Y coordinates?		
4.4. Do you have parcels defined by the walls of a building (with no recorded geometry)?	Yes	
4.5. What is the spatial reference system for X/Y Coordinates?	Gauss–Krüger coordinate system (Pulkovo 1942), Gauss–Krüger coordinate system (Pulkovo 1963), Krasovsky ellipsoid Local spatial reference system	
4.6. Any other X/Y coordinate issues?		

5. Z Coordinates/height representation

	Kazakhstan 2010	Kazakhstan 2014
5.1. Are the Z coordinates of 3D parcels relative to local ground?		
5.2. Are Z coordinates reduced to a standard datum (absolute)? If so, what is the spatial reference system for the Z coordinate?	Yes. Mean sea level of the Baltic Sea determined from long-term observations at Kronshtadt (Kronshtadt zero depth gauge)	
5.3. In principle possible to store both relative and absolute Z coordinate?	Yes	
5.4. Is the earth surface (height) explicitly stored (in the DCDB or other accessible register)?	It can be stored, but usually it is not.	
5.5. What is the source of elevation for the 2D surface parcel?	The heights can be taken from the plans of land surveys, but usually they are not recorded in cadastral database. In order to get elevation data (for example if we need to calculate the slope) we use topographic plans or other available sources (aerophoto, the data of tacheometric survey etc.)	Various sources. (Levelling, GPS, largescale photogrammetry, laser scanning.
5.6. Any other Z coordinate issues?		

6. Temporal Issues

	Kazakhstan 2010	Kazakhstan 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).		
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?	This is not determined yet.	
6.6. Any other temporal issues?		

7. Rights, Restrictions and Responsibilities

	Kazakhstan 2010	Kazakhstan 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?	Yes	
7.7. What applications do you foresee for 3D cadastre?		

8. DCDB (The Cadastral Database)

	Kazakhstan 2010	Kazakhstan 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)	
8.2. If so, how are they represented (in the DCDB)?	As 2D polygons.	
8.3. If so, how are they presented on cadastral “maps” (including screen presentations)?	They are presented in different layers or by different colours.	
8.4. Are there possibilities to store geometry of 3D parcels in the DCDB?	Not yet	
8.5. Is it possible to manage a 3D topological structure in the DCDB?	Now it is impossible	Probably it will be possible
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	
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,...)?		
8.8. What Spatial DBMS software do you use? Any 3D capabilities included and used?	Oracle and ESRI	
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?	ArcGIS, MapInfo No 3D capabilities used at the moment.	
8.11. What web software is used for remote data access/distribution and visualization? Any 3D capabilities included and used?	ArcGIS Server, No 3D capabilities included or used	
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	As all other objects,	

in your DCDB?	(but with only the 2D footprint returned).	
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)

	Kazakhstan 2010	Kazakhstan 2014
9.1. Do the survey plans carry 3D parcel representations?	Survey plans can carry 3D parcel representation. But cadastral plans don't.	
9.2. If so, how are they represented?	As a tabulation of corner positions, associated with plan, and isometric views (on paper). Each floor is represented on a separate diagram. Heights are given for corners of non horizontal surfaces. Sometimes the 3D multi-layers map can be created. But usually it doesn't.	
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.		
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....?	3D parcels are not submitted for registration 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)?	Only visually at present.	
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	No	

topography)?		
9.10. What form of 3D data acquisition is used (CAD, terrestrial surveying, sketches, stereo/oblique images, laser scanning,...)?	Terrestrial surveying	
9.11. What software do you use for creating and processing survey plans? Any 3D capabilities included and used?	Credo, ArcGIS, MapInfo, Trimble Geomatic Office No 3D capabilities used	
9.12. Can 3D parcels be subdivided, consolidated or nullified?	It can be subdivided if it is defined as divisible. It also can be consolidated and nullified.	
9.13. Is there any existing technical circular or directive to assist Surveyors in 3D data collection in the field?	Not 3D data exclusively. But there are a lot of documents and regulations on preparation of survey plans to assist the surveyors.	
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)	Kazakhstan, Ust-Kamenogorsk
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10.4. Other issues	