

Questionnaire 3D-Cadastres: status September 2012

India



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 (2010/2011) 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.
- 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).
- The questionnaire has been prepared by a mixed Australian (Rod Thompson/Sudarshan Karki)/Dutch (Jantien Stoter/Hendrik Ploeger/Peter van Oosterom) team. 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.
- Please try to fill in this questionnaire and send it to P.J.M.vanOosterom@tudelft.nl (or Peter van Oosterom, TU Delft, OTB, P.O. Box 5030, 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.

	India 2012	India 2014
1.1. Are all 3D parcels constrained to be within one surface (2D) parcel?	yes	Expected as 3D parcel
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	No
1.4. Are disconnected parts of a single 3D parcel allowed?	No	Yes, floor wise flat registry sanction
1.5. Limitation – e.g. must the 3D parcel be described by a boundary definition?	yes	yes
1.6. Are curved surfaces to bound the 3D parcels allowed?	yes	yes
1.7. Must the curved surfaces (if allowed) be cylindrical sections, or any other constraint?	no	no
1.8. Any other constraints – e.g. all surfaces must be horizontal or vertical?	no	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	no
1.10. Is the legal text available in original language?	yes	yes
1.11. Is the legal text (relevant part) available in English translation?	yes	yes
1.12. Do you have example descriptions of typical 3D parcels; either ‘prototype’ or ‘operational’?	Operational;	Operational
1.13. Is there a formal model for the 3D parcels (UML style); e.g. based on ISO TC211 series?	no	It may be created by the concerned organisation(Delhi Geospatial Limited)
1.14. Are natural resources (groundwater, mining rights) considered as 3D parcels?	yes	yes

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)?	Yes, eg. drain	yes
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	Will use digital 3d gis data for spatial planning
1.17. Any other geometric issues?	no	Not known

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.

	India 2012	India 2014
2.1. Do you register network parcels? (e.g. subterranean conduit networks)	yes	Improved form with additional attributes and 3d gis
2.2. If so, can the network structure be traced in the database(s)?	Yes in 2d	Yes with 3d
2.3. Does the jurisdiction have private networks? If so please, mention law and article(s).	yes	yes
2.4. If so, are they registered as 3D property parcels?	no	no
2.5. Is the legal text available in original language? If so, give references to relevant document(s).	yes	yes
2.6. Is the legal text (relevant part) available in English translation?	yes	yes
2.7. Do you have example descriptions of typical 3D parcels for networks; either 'prototype' or 'operational'?	Operational; eg. Electric sub-distribution line; communication lines as utility networks	operational
2.8. If the network (legal) objects break at the surface parcel, how do you deal with intersecting networks or vertically parallel networks?	Coordination among the line departments / utility departments	Same as 2010
2.9. Any other geometric issues?	Yes; requiring overlapping space in 3d or 2d	

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”.

	India 2012	India 2014
3.1. Do you register 3D construction/building units?	Yes	yes
3.2. If so, what are the most important types? E.g. apartment units, or also other buildings or even more general constructions (infra related; such as bridge, tunnel or even other, such as windmills,...)	Residential apartments, industries	Same as 2010
3.3. Does the jurisdiction have construction/building units? If so please, mention law and article(s).	Building bylaws 1983 and master plan delhi 2021	
3.4. Is the legal text available in original language?	yes	yes
3.5. Is the legal text (relevant part) available in English translation?	yes	yes
3.6. Do you have example descriptions of typical 3D parcels; either ‘prototype’ or ‘operational’?	operational	operational
3.7. What would be typical 3D boundaries in an apartment complex: middle of the wall and floor/ceiling, or walls, floors/ceiling as neutral/shared 3D space?	floors/ceiling as neutral/shared 3D space	Same as 2010
3.8. Is common property inside the building registered? If so, how?	Yes; registered as common usage space for each individual stakeholder	Same as 2010
3.9. Who owns the common property inside the building?	Society in case of housing society complex/ stakeholders in individual plot case /government in case of common parks etc.	Same as 2010
3.10. Who owns the land on which the apartment is built?	Individual/ group housing society	Same as 2010
3.11. Any other geometric issues?	Restriction in height & ground coverage	

4. X/Y Coordinates

	India 2012	India 2014
4.1. Do the plans of survey guarantee X/Y coordinates? (and are they relative or in an absolute spatial reference system?)	x/y coordinates are relative since they are based on an assumed local datum by the surveyor	The x/y coordinates will be absolute because of using 3D GIS data for Delhi
4.2. Are the cadastral database coordinates authoritative?	Yes in 2d	Yes; now in 3d
4.3. If not, what is the authoritative source of X/Y coordinates?	NA	NA
4.4. Do you have parcels defined by the walls of a building (with no recorded geometry)?	yes	Not known
4.5. What is the spatial reference system for X/Y Coordinates?	Local coordinate system in autocad	WGS84
4.6. Any other X/Y coordinate issues?	none	none

5. Z Coordinates/height representation

	India 2012	India 2014
5.1. Are the Z coordinates of 3D parcels relative to local ground?	No, it goes according to msl	Yes, it will be 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; msl	Yes according to zero ground level and msl has been reduced to zero level
5.3. In principle possible to store both relative and absolute Z coordinate?	Yes in autocad	Yes in gis
5.4. Is the earth surface (height) explicitly stored (in the DCDB or other accessible register)?	Yes using toposheets	Yes as elevation raster in GIS
5.5. What is the source of elevation for the 2D surface parcel?	toposheets	
5.6. Any other Z coordinate issues?	z coordinates are relative to msl	

6. Temporal Issues

	India 2012	India 2014
6.1. Are temporal limits part of the definition of a parcel (2D or 3D)?	Yes, it changes as per ownership as well as redevelopment plan	Not known
6.2. Are moving parcels allowed?	Rivers & wetlands	Not known
6.3. Are there any limitations on the range of temporal limits? (e.g. only on 3D apartments).	Maximum 99 years lease for residential and commercial units but not for utilities and services	Same as 2010
6.4. Are there any attempt to integrate 3D space and temporal representations, into a single 4D space/time representation?	no	May be possible
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?	Yes it will change as per the change in 2D extent	
6.6. Any other temporal issues?	Temporal disputes over the boundary	

7. Rights, Restrictions and Responsibilities

	India 2012	India 2014
7.1. Range of RRR on 3D parcels.	Rights: full government control Restriction: full government control Responsibility: shared between individual/group owner with government	Same as 2010
7.2. Are there any limitations on the range of rights? (e.g. subterranean parcels must be owned by Govt).	Under land revenue act 1901, as per record-of-rights to be made for notified areas.	
7.3. Any other RRR issues?	Pending record-of-rights	
7.4. Are there RRRs that are only allowed in 3D (and not valid for 2D)	Restriction: Need to leave 2 meter land from each side of the plot if owner wants to create a basement for the building	Same as 2010
7.5. Is there specific legislation (laws, regulations) defining 3D RRR types? If so, provide details, e.g. references to documents/ articles.	no	no
7.6. Can 3D sub-surface/above-surface parcel be owned by someone other than the person owning the land parcel?	yes	yes
7.7. What applications do you foresee for 3D cadastre?	Buildings, services, utilities, taxation	Same as 2010

8. DCDB (The Cadastral Database)

	India 2012	India 2014
8.1. Does the DCDB contain representation of 3D parcels (in any form)?	No DCDB Exists	Yes
8.2. If so, how are they represented (in the DCDB)?	NA	Polygon and lines
8.3. If so, how are they presented on cadastral “maps” (including screen presentations)?	Not on maps but in textual format	Polygon and lines
8.4. Are there possibilities to store geometry of 3D parcels in the DCDB?	NA	yes
8.5. Is it possible to manage a 3D topological structure in the DCDB?	NA	
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?	NA	Not known
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,...)?	NA	Using gis 2D and 3D environment
8.8. What Spatial DBMS software do you use? Any 3D capabilities included and used?	No such software was used	Oracle
8.9. Do you have any validation rules for 3D representation in the database?	NA	Not known
8.10. What (GIS/CAD) software is used for updating, editing, analysis, and visualization of the cadastral data? Any 3D capabilities included and used?	Autocad with no 3d capability	ArcGIS with 3d capability
8.11. What web software is used for remote data access/distribution and visualization? Any 3D capabilities included and used?	NA	Not known
8.12. Is your DCDB organised as Multi-Layers or Object Oriented or some other data model?	NA	Multi-layers in gis
8.13. How do you query 3D objects in your DCDB?	NA	Based on attributes
8.14. Is it possible to query neighbourhood parcels to a 3D	NA	Not known

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

9. Plans of Survey (including field sketches)

	India 2012	India 2014
9.1. Do the survey plans carry 3D parcel representations?	no	yes
9.2. If so, how are they represented?	NA	polygons and lines
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	Yes, legislation implemented since September 2011
9.4. Is sketch level allowed (low geometric quality, but in principle enough to indicate the 3D object)?	yes	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	Not sure
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....?	2d drawings and text	May be possible in commercial gis format
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	no
9.8. Do you have examples of (prototype or production) 3D survey plans available?	no	Yes; prototypes with validation in progress
9.9. Are any reference objects visible on the survey plan (e.g. real buildings, roads, that is 3D topography)?	Yes, eg. Historical places, religious places, infrastrucutural landmarks	
9.10. What form of 3D data acquisition is used (CAD, terrestrial surveying, sketches, stereo/oblique images, laser scanning,...)?	CAD, terrestrial surveying, sketches,	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?	Cad; no	Cad with 3d; gis with 3d
9.12. Can 3D parcels be subdivided, consolidated or nullified?	Yes; 3d residential or commercial unis	yes
9.13. Is there any existing technical circular or directive to assist Surveyors in 3D data collection in	no	Yes, act / notification 2011

the field?		
9.14. Any other survey plan issues?	Absence of 3d representation in maps	

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)	India, Delhi
10.2. Your name, function/position and your organization	Mr. Pradeep Khandelwal, Chief Engineer, East Delhi Municipal Corporation
10.3. Contact details: address email, telephone	A-105, UDYOG SADAN, 419, PATPARGANJ INDUSTRIAL AREA, NEW DELHI-110092; Email: pradeepkhandelwal100@gmail.com Mobile: +91-9717788004; office: +91-11-22165874
10.4. Other issues	Capacity Building regarding 3D cadastral systems on institutional and individual levels.