Questionnaire 3D-Cadastres: status February 2011

Nepal

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 homogeneous[1] 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).

[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.

	Nepal 2010	Nepal 2014
1.1. Are all 3D parcels constrained to be within one surface (2D) parcel?	yes	
1.2. Are ambulatory[2] boundaries permitted?	No	
1.3. Is it allowed to have 3D parcels not related to physical constructs or objects?" (e.g. airspace, subsurface volumes)		
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?	Based on boundary 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 constraints	
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?	Yes, for 2D	
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'?	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, Not yet	
1.15. Are polluted areas considered	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.

as 3D parcels (as legal restrictions are associated to these spaces: above and below surface)?		
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,...)	Not yet	
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.

	Nepal 2010	Nepal 2014
2.1. Do you register network parcels? (e.g. subterranean conduit networks)	No	
2.2. If so, can the network structure be traced in the database(s)?		
2.3. Does the jurisdiction have private networks? If so please, mention law and article(s).	No	
2.4. If so, are they registered as 3D property parcels?		
2.5. Is the legal text available in original language? If so, give references to relevant document(s).	Only for 2D	
2.6. Is the legal text (relevant part) available in English translation?	N/A	
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?	N/A	
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”.

	Nepal 2010	Nepal 2014
3.1. Do you register 3D construction/building units?	No	
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,..)		
3.3. Does the jurisdiction have construction/building units? If so please, mention law and article(s).	No	
3.4. Is the legal text available in original language?	No	
3.5. Is the legal text (relevant part) available in English translation?	N/A	
3.6. Do you have example descriptions of typical 3D parcels; either ‘prototype’ or ‘operational’?	No	
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?	Middle of the ceiling	
3.8. Is common property inside the building registered? If so, how?	Yes	
3.9. Who owns the common property inside the building?	Appartment owner	
3.10. Who owns the land on which the apartment is built?	Land owner	
3.11. Any other geometric issues?		

4. X/Y Coordinates

	Nepal 2010	Nepal 2014
4.1. Do the plans of survey guarantee X/Y coordinates? (and are they relative or in an absolute spatial reference system?)	No, but coordinate can be derived from the cadastral maps for more than 50% area	
4.2. Are the cadastral database coordinates authoritative?	Yes	
4.3. If not, what is the authoritative source of X/Y coordinates?	UTM (3degree Zone)	
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?	UTM	
4.6. Any other X/Y coordinate issues?		

5. Z Coordinates/height representation

	Nepal 2010	Nepal 2014
5.1. Are the Z coordinates of 3D parcels relative to local ground?	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	
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)?	No	
5.5. What is the source of elevation for the 2D surface parcel?	GPS controls and Triangulation	
5.6. Any other Z coordinate issues?		

6. Temporal Issues

	Nepal 2010	Nepal 2014
6.1. Are temporal limits part of the definition of a parcel (2D or 3D)?	N/A	
6.2. Are moving parcels allowed?		
6.3. Are there any limitations on the range of temporal limits? (e.g. only on 3D apartments).	N/A	
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?	N/A	
6.6. Any other temporal issues?	No	

7. Rights, Restrictions and Responsibilities

	Nepal 2010	Nepal 2014
7.1. Range of RRR on 3D parcels.	N/A	
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?	No	
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.	Not yet	
7.6. Can 3D sub-surface/above-surface parcel be owned by someone other that the person owning the land parcel?	Not defined	
7.7. What applications do you foresee for 3D cadastre?	Security of Land Rights and for multipurpose use	

8. DCDB (The Cadastral Database)

	Nepal 2010	Nepal 2014
8.1. Does the DCDB contain representation of 3D parcels (in any form)?	No	
8.2. If so, how are they represented (in the DCDB)?		
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?	Yes	
8.5. Is it possible to manage a 3D topological structure in the DCDB?	Yes	
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	
8.8. What Spatial DBMS software do you use? Any 3D capabilities included and used?	Oracle	
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?	Arc Info, Arc View, Cad	
8.11. What web software is used for remote data access/distribution and visualization? Any 3D capabilities included and used?	N/A	
8.12. Is your DCDB organised as Multi-Layers or Object Oriented or some other data model?	Yes, just started as pilot by Survey department	
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?		
8.15. Any other DCDB issues?		

9. Plans of Survey (including field sketches)

	Nepal 2010	Nepal 2014
9.1. Do the survey plans carry 3D parcel representations?	No	
9.2. If so, how are they represented?	No	
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….?	N/A	
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)?	Yes	
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)?	Yes	
9.10. What form of 3D data acquisition is used (CAD, terrestrial surveying, sketches, stereo/oblique images, laser scanning,…)?	Terrestrial	
9.11. What software do you use for creating and processing survey plans? Any 3D capabilities included and used?	Arc View and CAD	
9.12. Can 3D parcels be subdivided, consolidated or nullified?	Yes	
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)	Nepal
10.2. Your name, function/position and your organization	Babu Ram Acharya Ex-Director General of NMO and Secretary of the Ministry of Land Reform and Management. Recently as a Land Professional
10.3. Contact details: address email, telephone	P.O.Box 10304 Kathmandu, Nepal lamachourbabu@yahoo.com + 977-1-4359089, 977-98510-03374 (mobile)
10.4. Other issues	The details presented in this questionnaire are based on my personal experience and study but not represent the view of the Survey Departmnet Nepal (NMO)