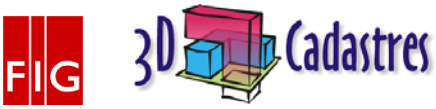
Questionnaire 3D-Cadastres: status September 2014 Hungary



This questionnaire is an activity of the FIG working group 3D-Cadastres 2014-2018. The purpose of the survey is to make a world-wide inventory of the status of 3D-Cadastres at this moment and the plans/expectations for the near future (2018). By sharing this information, it should be possible to improve cooperation, learn from each other and support future developments. This is the second time that the questionnaire on 3D-Cadastres is conducted by the FIG working group on 3D-Cadastres. The first time was in 2010 in order to document the status in 2010 and expectations back then for 2014. The responses have been analysed (van Oosterom et al. 2011, Karki 2013). For more information on the FIG working group on 3D-Cadastres see the website www.gdmc.nl/3DCadastres. Now a few notes and suggestions, which should be helpful when completing the questionnaire:

- The conceptual model used as background for the 3D Cadastres questionnaire is the ISO 19152 standard (ISO, 2012): the Land Administration Domain Model (LADM).
- In this questionnaire the concept of 3D-Cadastres with 3D parcels (or 3D spatial units in LADM terminology) 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, lease or other 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 to be more specific and real world situations are used. Many examples with partial/preliminary answers from 2010 are available on-line at http://www.gdmc.nl/3DCadastres/participants/. Inspecting some of the completed 2010 questionnaires from different other countries might 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 spaces of the legal objects and not the registration of the physical objects as such.
- 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/Christiaan Lemmen/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.
- Similar to the Questionnaire 3D-Cadastres, the completed forms will be made available on website of FIG working group on 3D Cadastres.
- Please complete this questionnaire before *1 October 2014* 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.

PREFACE

IT system of Hungarian Unified Land Registry is operating in an object oriented environment called DATR. DATR data structure is based on MSZ 7772-1:1996 Hungarian Standard on Digital Base Map, Conceptual Model. DATR integrates geometric and legal part of the Land Registry, both on data and business procedure level. DATR is a self-developed IT system by the Institute of Geodesy Cartography and Remote Sensing (FOMI). The development of the system has been independent from LADM development, but the result (DATR itself) is compatible with LADM.
DATR's geometry is 3D as default. 3D Cadastre developments has started on this base, since the new Act on Surveying and Mapping activities (Act XLVI. 2012.) has defined the legal base of 3D Cadastre in Hungary. Development of legal and technical issues of 3D cadastre is going on, the results will be published probably in the middle of 2015.

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.

	Status 2014	Expectations 2018
1.1. Are all 3D parcels (3D spatial units in LADM terminology) constrained to be within one surface 2D parcel?	Not	Not
1.2. Are 2D and/or 3D ambulatory[2] boundaries permitted?	Not, but the changes in natural features are taken into account as parcel boundaries' changes	As in 2014
1.3.a. Is it allowed to have 3D parcels (spatial units) not related to physical constructs or objects? (e.g. airspace, subsurface volumes)	Not yet	Probably yes
1.3.b. If 1.3.a positive: approximately what proportion of new 3D parcels (spatial units) would involve such cases (not related to physical object)?	No measures	No measures
1.4. Are disconnected parts of a single 3D parcel allowed?	Not	Not
1.5. Spatial limitation – e.g. must the 3D parcel be related to a closed volume or is it allowed to have 'open' or unbounded 3D parcels (e.g. towards the sky).?	Yes, it is needed for the mathematical handling of 3D situations	As in 2014
1.6. Are curved surfaces to bound the 3D parcels allowed?	Not	Probably not
1.7. Must the curved surfaces (if allowed) be cylindrical sections, or any other constraint?	Not	Not
1.8. Any other constraints – e.g. all surfaces must be horizontal or vertical?	No	No
1.9. Is there legislation (law and/or regulations) for 3D descriptions of parcels? If so please, mention law and article(s).	Act XLVI. 2012. on Surveying and Mapping Activities	Not needed
1.10. Is the legal text available in original language?	Yes	-
1.11. Is the legal text (relevant part) available in English translation?	Not yet	Yes
1.12. Do you have example descriptions of typical 3D parcels; either 'prototype' or 'operational'?	Not yet	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.

1.13. Is there a formal model for the 3D parcels (UML style); e.g. based on ISO TC211 series (especially LADM, ISO 19152)?	Not yet	Yes
1.14. Are natural resources (groundwater, mining rights) shown in your land administration? If yes, are they considered as 3D parcels (spatial units) with RRRs attached?	Natura 2000, Mining easement rights are registered. Not as 3D parcels. RRRs are attached.	Probably yes and considered as 3D parcels with RRRs
1.15. Are legally restricted spaces, above or below, such as polluted areas considered as 3D parcels?	Not	Probably 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,...)	Not yet.	Probably yes
1.17. Any other geometric issues related to 3D parcels?		In case of 3D parcels the geometric construction of MSZ 7772-1 Standard will be used

2. Infrastructure/utility networks

This refers to the situation where an infrastructure network is considered to be defined within the land administration. 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.

	Status 2014	Expectations 2018
2.1. Do you register networks as an entity in the land administration? (e.g. subterranean conduit networks)	Not	Probably yes
2.2. If so, then (a) can the network structure be viewed graphically in the land administration? (b) can the network structure be traced in the database(s)? (c) are networks registered by means of a cadastral identifier (such as a 'parcel number')? (d) are RRRs and parties attached to these network objects?	Not	a) yes b) yes c) yes d) yes
2.3. Does the jurisdiction have private networks? If so please, mention law and article(s).	Yes. Act on water utility services CCIX. 2011. Act on gas supply XL. 2008. Act on electric energy LXXXVI. 2007.	
2.4. If so, are they registered as 3D property parcels (spatial units)?	Not	Probably yes
2.5. Is the text of relevant laws or regulations (question 2.3) available in original language? If so, give references to relevant document(s).	Yes, http://net.jogtar.hu	-
2.6. Is the text of laws and regulations (relevant part) available in English translation?	Not yet	Probably yes
2.7. Do you have example descriptions of typical 3D parcels (spatial units) for networks; either 'prototype' or 'operational'?	Not yet	Yes
2.8. If the network (legal) objects break at the surface parcel, how do you deal with intersecting networks or vertically parallel networks?	It is not a question now.	Will be handled
2.9. Any other geometric issues related to the registration of networks?	-	-

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”.

	Status 2014	Expectations 2018
3.1. Do you register 3D construction/building units?	Condominium registration is a part of the Unified System. Directly not in 3D yet. In the case of condominiums registration is a quasi 3D registration, because layout plans and individual property units (flats, shops etc.) are registered	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,..)	Condominium units (flats, shops etc.), cellar direct access to public areas, underground garages etc.	Bridges and infrastructure related objects will be registered as individual property units.
3.3. Does the jurisdiction have construction/building units? If so please, mention law and article(s).	Act on Surveying and Mapping Activities XLVI 2012. Act on Land Registry CXLI. 1997. Act on condominiums, CXXXIII. 2003.	New legislation is needed for infra related objects
3.4. Is the legal text available in original language?	Yes	Not yet
3.5. Is the legal text (relevant part) available in English translation?	Not yet	Not yet
3.6. Do you have example descriptions of typical 3D parcels; either ‘prototype’ or ‘operational’?	Not yet	Yes
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? Is it mentioned in any legislation or is it the convention?	It is a convention, that the inner edge of the walls are the boundaries of the condominium units..	Not decided yet in 3D situations
3.8. Is common property inside the building registered? If so, how?	Not	Not
3.9. Who owns the common property inside the building?	Shared ownership among all the owners	As in 2014
3.10. Who owns the land on which the apartment is built?	Shared ownership among all the owners	As in 2014
3.11. Do you allow sub-division of apartments or apartment blocks?	Yes	Yes
3.12. Can the land on which the building is built be sub-divided or sold	Not	Not

or mortgaged without the consent of majority of the apartment owners?		
3.13. What is the numbering convention for apartments (please specify in terms of cadastral parcel as well as street addressing)	There is no convention for numbering, it is the responsibility of the local government	-
3.14. Any other geometric issues?	-	-

4. X/Y Coordinates

	Status 2014	Expectations 2018
4.1. Do the plans of survey guarantee X/Y coordinates? (and are they relative or in an absolute spatial reference system?)	Yes (both absolute and relative is used)	Yes, as in 2014
4.2. Are the cadastral database coordinates authoritative?	Yes	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)?	Not	Not
4.5. What is the spatial reference system for X/Y Coordinates?	HD-72 (Hungarian Datum 1972) and Unified Hungarian Projection System (Oblique Transverse Mercator system)	As in 2014
4.6. Any other X/Y coordinate issues?	-	-

5. Z Coordinates/height representation

	Status 2014	Expectations 2018
5.1. Are the Z coordinates of 3D parcels relative to local ground?	Not yet	Yes and absolute as well
5.2. Are Z coordinates reduced to a standard datum (absolute)? If so, what is the spatial reference system for the Z coordinate?	Yes, Baltic Mean Sea Level	Yes, Baltic Mean Sea Level
5.3. In principle possible to store both relative and absolute Z coordinate?	Yes	Yes
5.4. Is the earth surface (height) explicitly stored (in the DCDB or other accessible register)?	Yes	Yes
5.5. What is the source of elevation for the 2D surface parcel?	HUNDEM-5, 5m resolution DEM of Hungary	DCDB
5.6. Any other Z coordinate issues?	-	-

6. Temporal Issues

	Status 2014	Expectations 2018
6.1. Are temporal limits part of the definition of a parcel (2D or 3D)?	Not	Not
6.2. Are moving parcels allowed?	Not	Not
6.3. Are there any limitations on the range of temporal limits? (e.g. only on 3D apartments).	Not	Not
6.4. Are there any attempt to integrate 3D space and temporal representations, into a single 4D space/time representation?	Not	Not, it is not needed
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?	No sea	No sea
6.6. Any other temporal issues?	-	-

7. Rights, Restrictions and Responsibilities

	Status 2014	Expectations 2018
7.1. Range of RRR on 3D parcels.	Not yet	Full range of RRRs
7.2. Are there any limitations on the range of rights related to 3D spatial units? (e.g. subterranean parcels must be owned by Govt).	Not yet	Probably yes, under construction
7.3. Are there any limitations on the range of restrictions or responsibilities related to 3D spatial units? (i.e. currently in use and related to 2D spatial units, but that would not be applicable to 3D).	Not yet	Probably yes, under construction
7.4. Are there RRRs that are only allowed in 3D (and not valid for 2D)	Not yet	Probably yes, under construction
7.5. Is there specific legislation (laws, regulations) defining 3D RRR types? If so, provide details, e.g. references to documents/ articles.	Not yet	Yes
7.6. Can 3D sub-surface/above-surface parcel be owned by someone other that the person owning the land parcel?	Not yet	Probably yes
7.7. What applications do you foresee for 3D land administration?	Not yet	Own solution
7.8. Are the administrative source documents (source of RRRs) title or deed based?	Title	Title
7.9 Who is responsible for the correctness of the specified 3D boundaries in spatial source documents (which authority)?	Not yet	Licensed Surveyor and/or Land Offices
7.10. Is registration of 3D parcels done inside the cadastral mapping agency, the land registry or elsewhere?	Yes	Yes
7.11. Are 3D registrations handled by the same organisation that handles traditional (2D) land administration?	Yes	Yes
7.12. Do you supply paper-based titles or deeds or proof of ownership? If yes, does this contain depictions of the 2D or 3D parcel?	Yes	Yes
7.13. Any other RRR issues?	-	-

8. DCDB (The Cadastral Database)

	Status 2014	Expectations 2018
8.0. Is database schema LADM based?	Not, but compatible	Not, but compatible
8.1. Does the DCDB contain representation of 3D parcels (in any form)?	Not yet	Yes
8.2. If so, how are they represented (in the DCDB)?	-	Under construction
8.3. If so, how are they presented on cadastral “maps” (including screen presentations)?	-	Yes
8.4. Are there possibilities to store geometry of 3D parcels in the DCDB?	Yes	Yes
8.5. Is it possible to manage a 3D topological structure in the DCDB?	Not yet	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?	Not yet	Yes. Mixed representation will be needed, under construction
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 yet	Via Web Services
8.8. What Spatial DBMS software do you use? Any 3D capabilities included and used?	No Spatial DBMS	We do not plan the use
8.9. Do you have any validation rules for 3D representation in the database?	Not	Yes, under construction
8.10. What (GIS/CAD) software is used for updating, editing, analysis, and visualization of the cadastral data? Any 3D capabilities included and used?	Any, the input to DCDB is standardized	Any, the input to DCDB is standardized
8.11. What web software is used for remote data access/distribution and visualization? Any 3D capabilities included and used?	Not yet	Any browser
8.12. Is your DCDB organised as Multi-Layers or Object Oriented or some other data model?	Object Oriented DBMS	Object Oriented DBMS
8.13. How do you query 3D objects in your DCDB?	Not yet	Under construction
8.14. Is it possible to query neighbourhood parcels to a 3D object, vertically as well as horizontally?	Not yet	Yes, under construction
8.15. Any other DCDB issues?	-	-

9. Plans of Survey (including field sketches)

	Status 2014	Expectations 2018
9.1. Do the survey plans carry 3D parcel representations?	Not yet	Yes
9.2. If so, how are they represented?	-	Under construction
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.	Not yet	Yes
9.4. Is sketch level allowed (low geometric quality, but in principle enough to indicate the 3D object)?	Not	Not
9.5. Is it possible to define a 3D parcel by referring to other 3D real world objects/ topography (and not specifying coordinates)?	Not	Not
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….?	Not yet	In a standardized format, under construction
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)?	Not	Yes
9.8. Do you have examples of (prototype or production) 3D survey plans available?	Not yet	Yes
9.9. Are any reference objects visible on the survey plan (e.g. real buildings, roads, that is 3D topography)?	Not yet	Yes
9.10. What form of 3D data acquisition is used (CAD, terrestrial surveying, sketches, stereo/oblique images, laser scanning,…)?	Not yet	Any
9.11. What software do you use for creating and processing survey plans? Any 3D capabilities included and used?	Not yet	Probably self-developed software
9.12. Can 3D parcels be subdivided, consolidated or nullified?	Not yet	Yes
9.13. Is there any existing technical circular or directive to assist Surveyors in 3D data collection in the field?	Not yet	Yes
9.14. Are the surveyors required to undertake a field survey for 3D	Not yet	Yes

cadastral data?		
9.15. Are building construction plans used to compile 3D cadastral information for apartments?	Yes	Yes
9.16. Is 2D/3D field survey done by private licensed surveyors or by government surveyors?	Both	Both
9.17. Are plans of survey created for each new 2D/3D parcel or are they updated in an index map or a cadastral database.	For each new parcel	For each new parcel
9.18. Do you show dimensions or isometric views of 3D parcels on survey plans (do you also store this in a database)	Not yet	Yes
9.19. Any other survey plan issues?	-	-

10. Dissemination of 3D Cadastral information

	Status 2014	Expectations 2018
10.1. Is there a general purpose web-based dissemination of 2D cadastral (graphical or text) information (e.g. a portal for the public or for professionals)? If yes, does it include 3D data?	Yes, it does not include 3D data	Yes, it will include 3D data
10.2. Are specific file formats or standards used to distribute 3D Cadastral information? (e.g. LandXML, CityGML, BIM/IFC, 3D pdf,…)	Not yet	Yes, but we do not know yet
10.3. Are there specific cartographic styling rules for representing 3D cadastral plans, or to represent 3D cadastral objects on 2D cadastral maps?	Not yet	Yes, under construction
10.4. Are there specific cartographic styling rules for 3D cadastral maps (models; e.g. as disseminated in 3D pdf)? If yes, are there 3D specific cartographic rules developed or being developed?	Not yet	Yes, under construction
10.5. Is the 3D Cadastral information accessible in integrated manner with the 2D Cadastral information?	Not yet	Yes
10.6. Are there specific symbols on the 2D cadastral map (paper, digital or web-based) indicating the presence of 3D Cadastral objects (and in web-context perhaps even linked)?	Not yet	Yes
10.7. Is the legal information (RRRs and Parties) available in integrated manner in dissemination portal with the 3D Cadastral objects? (even if source of legal data may be a different organization, but then use information infrastructure approach)	Not yet	Yes
10.8. Are 2D/3D cadastral data available to the general public or just to the relevant parties?	Yes to the general public	Yes to the general public
10.9. Any other 3D cadastral information dissemination issues?	-	-

11. Statistical information

This part of the questionnaire refers to statistical information (and is most relevant for jurisdictions with parts of 3D Cadastre registration operational, but all are encouraged to complete this section, and especially the expectations for 2018).

	Status 2014	Expectations 2018
11.1. What is the smallest 2D and 3D parcel that is present/ allowed to be registered in the land administration?	No limit (only in 2D)	No limit (in 2D and 3D)
11.2. What is the largest 2D and 3D parcel that is present allowed to be registered in the land administration?	No limit (only in 2D)	No limit (in 2D and 3D)
11.3. What is the typical (or average) size of 2D and 3D parcels which are registered in the land administration? Subdivide by nature of 3D parcel when relevant (e.g. related to building, apartment, airspace, tunnel,…)	2D = 1,25675 ha, including rural areas 3D = Not available	2D = probably no changes 3D = no data yet Subdivision of 3D parcels by its nature could be relevant
11.4. How many 2D and 3D parcels do you currently have in your land administration?	2D = 7,4 million + 2,4 million condominium units 3D = Not available	2D = No big changes 3D = No approximation
11.5. Which year did you start registering 3D parcels in the land administration?	Not yet	2015 could be the starting year
11.6. What is the ratio of 3D parcels in rural vs. urban areas?	Not available	No approximation
11.7. Please specify names of cities or towns or suburbs or regions or locations where there are significant numbers of 3D parcels.	Not yet	Budapest Capital, Larger cities, towns, wine-growing regions (cellars), highways etc.
11.8. Please provide the following data: (a) Size of jurisdiction in square kilometres (b) Current number of 2D parcels (c) Current number of 3D parcels (d) Current population	a) 93 000 b) 7 400 000+2,4 million condominium units c) Not available d) 9,9 million (2013)	a) 93 000 b) 7 500 000 c) No approximation d) We hope at least the same as in 2013
11.9. Approximately what are the proportions of various types of the 3D parcels (related to apartments, subsurface parking, subsurface shopping centres, bridges, tunnels, airspace, utility networks, etc)?	Not available yet	No approximation, but the number of condominium units if 2,4 million
11.10. Approximately what surface area of the jurisdiction is affected by 3D parcels (the total area of all the footprint of all 3D parcels).	Not available	No approximation, but 10-15 % of the territory could be
11.11. Any other interesting statistical fact(s)?	-	-

12. Reflection

This section is only relevant in case also in 2010 the 3D cadastres questionnaire for your jurisdictions was completed (otherwise skip this section).

	Remarks
12.1. Compared to the 2010 expectations, which 3D land administration developments did go faster than expected?	Unfortunately only the new Act on Surveying and Mapping activities has come into force, but no other fast activities
12.2. Same question, but now, which developments did go slower than expected?	Looks like every 3D cadastre related activities
12.3. If some (limited) form of 3D Land administration functionality has become available, what are the observed benefits? And for who?	Stimulation of Land Market and Investments (e.g. mortgage market). Better functionality of Land Administration, which drives to better economy and better life for all
12.4. What are the (top-3) challenges of issues to be addressed to realize further 3D Land administration progress?	Modelling 3D legal situations, their influence to the business procedure, modelling new rules and business procedures, defining 3D surveying requirements
12.5. Any other reflections?	-

13. 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.

	Remarks
13.1. Country (State, Province)	Hungary
13.2. Your name, function/position and your organization	Gyula IVÁN Chief Professional Adviser Institute of Geodesy Cartography and Remote Sensing (FOMI)
13.3. Contact details: address email, telephone	5. Bosnyák tér, Budapest, HUNGARY, H-1149 ivan.gyula@fomi.hu +36-1-4604081
13.4. Other issues	-

References

ISO 19152:2012 'Geographic information - Land Administration Domain Model (LADM), http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=51206

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Sudarshan Karki (2013). 3D Cadastre Implementation Issues in Australia. MSc Thesis, University of Southern Queensland (Master of Spatial Science Research), 162 p., http://eprints.usq.edu.au/23560/1/Karki_2013_whole.pdf