Towards 3D Land Registry in Hungary

Gyula IVÁN – András OSSKÓ

The World Cadastre Summit
Congress & Exhibition

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Institute of Geodesy Cartography and Remote Sensing, Hungary

Hungary

Official Name: Hungary
Founded: 1 000 AD
Population (2014): 9,85 million
Area: 93 030 km^2
GPD/cap (2014): EUR 10 500(29 400 TRY)
Economy (2014):

Agriculture	5%
Industry	26%
Construction	4%
Services	65%

Land Administration:

No. of Cadastral Parcels	7,6 million
No. of Condominium Units	2,3 million
Total No. of Properties	9,9 million

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Hungary's History

Between 1526-1686
in 16th century

Hungarian-Turkish Friendship Park, Szigetvár (Zigetvar), Hungary

I. Süleyman died in Zigetvar, HUNGARY, 6. September 1566
Miklós Zrínyi died in Szigetvár, HUNGARY, 8. September 1566

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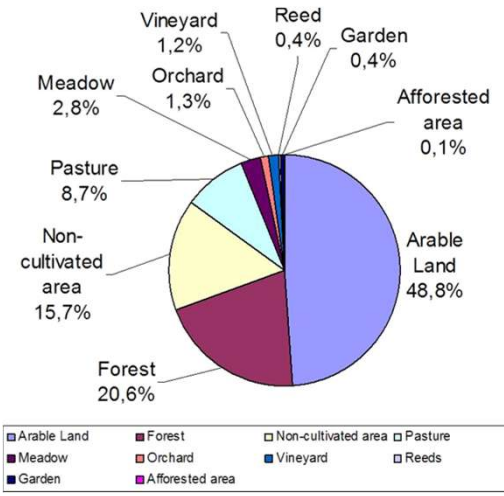
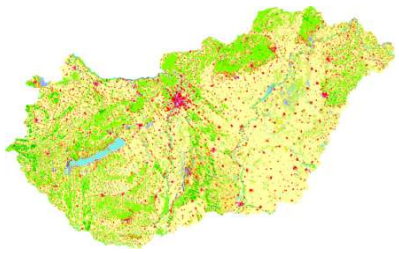
Distribution of Land Use in Hungary





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Land Administration Sector

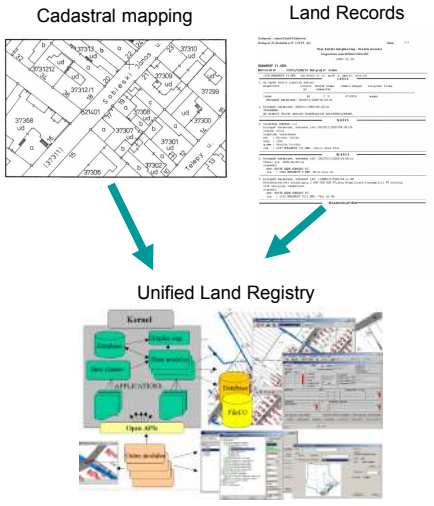
➔ ***Land Administration Sector:*** **overall responsibility**

- land registration (all land parcels, real estates, incl. condominiums) land valuation, use and protection, land consolidation, land lease registration
- cadastral and large scale topographic mapping
- geodesy, land surveying, remote sensing
- unified land registry and cadastre → both technically and organizationally
- infrastructure development: Land Information Systems

➔ **Complex, multipurpose land administration**

Hungarian Unified Land Registry

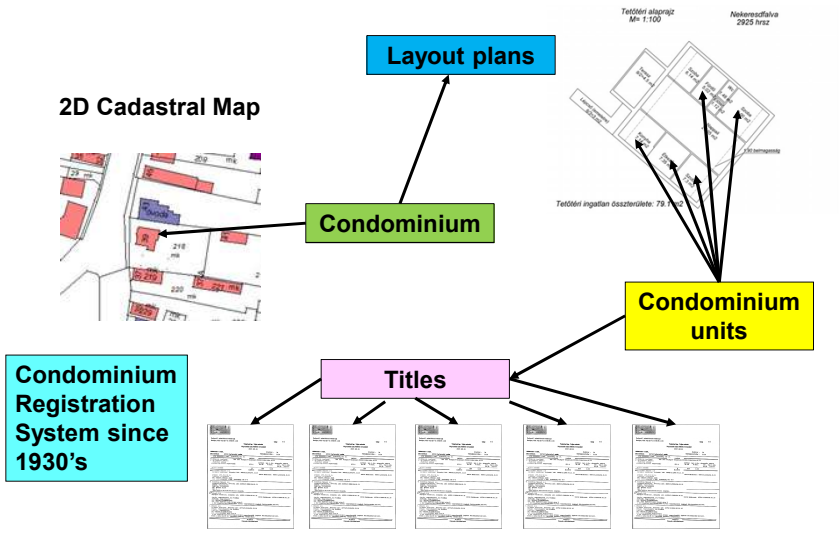
- In 1972 Hungary introduced a Unified Land Registry
- Cadastral Mapping and Land Registry integrated into one institution system (Land Offices)
- Title Registry, Hungarian State guarantees all the rights and facts recorded in Land Registry
- Development, management and operation of IT systems of Land Offices (professionally and technically) is the responsibility of the Institute of Geodesy Cartography and Remote Sensing (FÖMI)



New Act on Surveying and Mapping Activities

- New Act on Surveying and Mapping Activities came into force at the beginning of 2013
- New concept on mapping (maps->databases)
- Cadastral Map Database+Land Registry Database=Unified Land Registry Database
- Introduction State Remote Sensing Databases (terrestrial, aerial, satellite)
- Introduction the base of 3D Cadastre
- National Spatial Data Infrastructure
- FÖMI became the National Archive of Land Administration and Remote Sensing

3D in Hungarian Land Registry



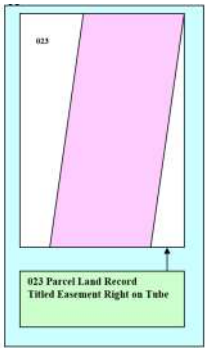
3D issues in New Act

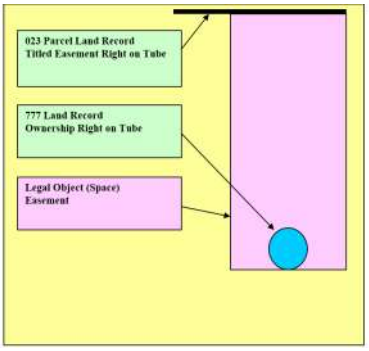
- New Type of Property:
  "Under-ground and above-ground passes, objects, structures, which has homogenous ownership relationships should be taken into account as property and must be registered in Land Registry."
- Versus with some 3D Cadastre solution, the Hungarian concept registers 3D object in space. Connecting legal space of 3D object should be derived from the geometry of the objects itself and other regulations (e.g. spatial planning regulations).
- Legal space required for 3D Cadastre object is defined in different Laws, Regulations related to Land Use and Land Development in Hungary. This means if 3D objects and their legal space should be registered in Land Registry, the required legal space must be modeled based on regulations.

Legal issues in 3D Land Registry

Civil Code of Hungary: "Ownership right on a real-property extends to the air-space above and to the subsurface below it until utilization is possible"

Ownership





Modeling of intersecting, touching, overlapping legal spaces, which generate rights is required

Identification in 3D

In Hungary the 2. solution is supported. The 3D object must be connected to a physical object on the ground, within a cadastral parcel. The ID of the cadastral parcel must be used, with some other identifiers, for the unique identification of the object. This „octopus" method is under construction.

General Solutions

1. intersecting the object with the cadastral parcels, and split it into as many pieces as many cadastral parcels overlapped,
2. no intersection, keep the 3D object as a whole, but some unique identifier should be assigned to it.

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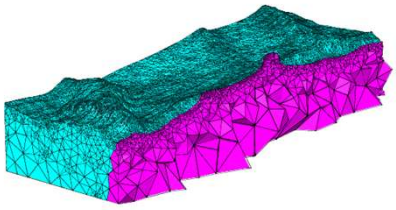
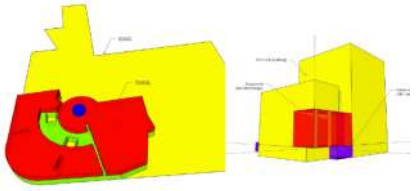
Geometric issues of 3D Land Registry

Tesselation?



See IVÁN, FIG Working Week 2012, Rome, ITALY

Mixed 2D and 3D situations
(e.g. LADM)



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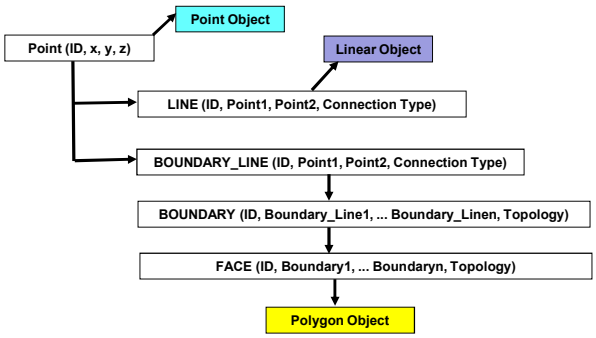
Digital Base Map Standard of Hungary, 1996 (DAT)

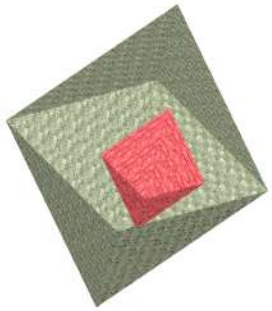
- Standard of Unified Land Registry since the beginning of 1997
- All IT systems of the Land Administration sector are working under this solution



Default is 3D, but only the 2D capacity has been used yet

Extension of geometry for 3D legal space handling

- Boundaries of legal spaces are represented by planes (no curved surfaces are allowed)
- Face class should be used for the definition of planes, with co-planarity constrain
- Two new geometric primitives for legal spaces:
  - Shell
  - Legal Space (composite of shells)
- Strict geometric and topological constrains
- Simple extension of DAT original geometry
- Complex geometric structures (e.g. holes on planes, encapsulated legal spaces) are available
- Mixed usage of 2D and 3D situations can be modeled



Conclusion

- New legislation in Surveying and Mapping activities created the possibilities for further development of Land Administration in Hungary on sustainable way
- Hungarian Unified Land Registry has enough resources for the introduction of 3D Land Registry in Hungary
- Introduction must be very careful, an agenda should be planned, because not only human and IT resources are needed, but a huge financial and surveying capacity are required as well

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Thank you very much for your kind attention

ivan.gyula@fomi.hu
ossko.andras@fomi.hu

See you at:

http://www.fomi.hu

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