3D Cadastre Modeling in Russia

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The Project

- Aim and Results
  - Aim: to provide guidance in the development of a prototype and to create favorable legal and institutional conditions for the introduction of 3D cadastre modeling in Russia based on experience of the Netherlands and other countries
  - Results:
    1. 3D cadastral model for data generation, storage and distribution of information about 3D properties;
    2. Prototype (and access portal)
    3. Evaluation of the prototype for objects of a pilot region;
    4. Strategy and action plan for proper institutional embedding. This includes the preparation of legal and organizational guidelines for the long-term development of 3D cadastre in Russia.
- Duration - from May 2010 until May 2012

The Project

- Partners

Federal Service for State Registration, Cadastre and Cartography (Rosreestr), the Federal Cadastre Center (FCC) 'Zemlya' and the Netherlands' Kadaster

With participation of:

Delft University of Technology, and Royal Haskoning BV and Grontmij Netherlands BV

Legal and Administrative setting

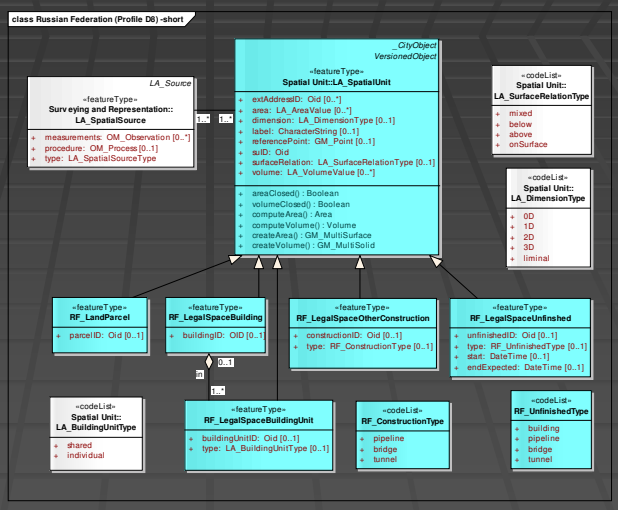
- Legal
  - Types of objects for registration by law
    1. Parcels
    2. Buildings
    3. Apartment Units
    4. Other structures (bridges, pipelines etc.)
    5. Unfinished objects, i.e. objects under construction (buildings, bridges, pipelines, etc.)
  - Applicable laws
  - Mapping and Registers
  - 3D objects

Legal and Administrative setting

- Administrative
  - Rosreestr
  - Pilot area – Nizhny Novgorod

Technical

- LADM



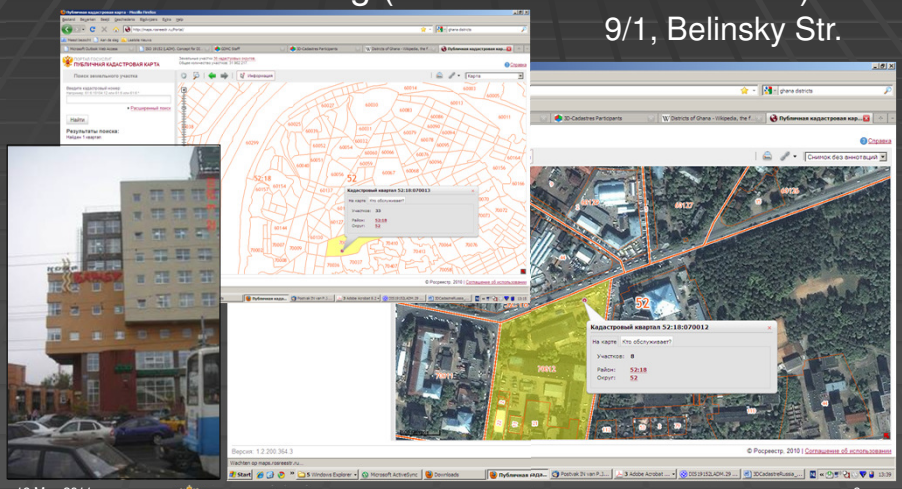
Technical

- Selected cases
  - Basically two types:
    1. 3D normal situations, such as apartments, which are very common and also benefit from a 3D registration
    2. complex 3D situations, which are uncommon, but much to gain from a real 3D registration
  - 5 selected cases

Selected cases - 1

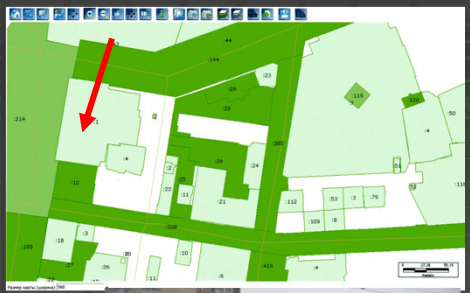
- "Teledom" building (near the television tower)

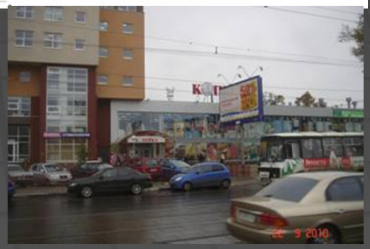
9/1, Belinsky Str.



Selected cases - 1

- 'older' type of registration in technical building database (including floor plans)
- building has interesting overhangs, possible above neighbor parcel with shops and above public road/ footpath
- rights various units are individually recorded
  - basement (underground parking) + first 2 floors owned by bank
  - above this multi-floor columns (same at every floor) other owners
  - total 20 units in the building, with 10 different owners
  - non-residential units leased → lease longer than 1 year is registered





Selected cases - 2

- Apartment complex - 66a, Nevzorovykh Str.



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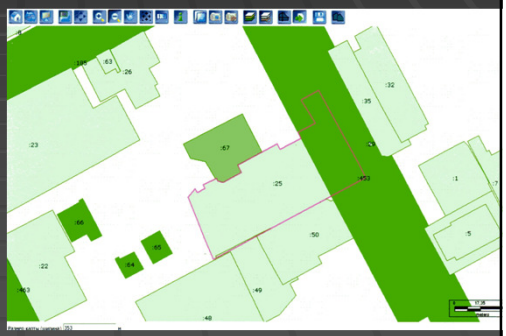
Selected cases - 2

- ownership rights 88 apartments & 7 nonresidential premises
- subterranean parking in common shared ownership
- 6 mortgages are registered for residential units, under both contract and law
- land parcel is common property of apartment complex
- land parcel is registered as unfinished object



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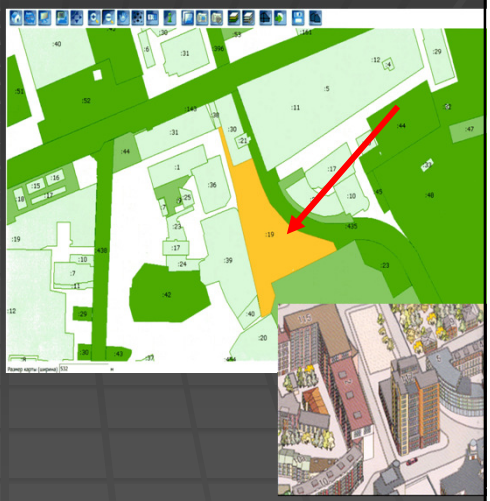
Selected cases - 3

- Business complex "Nizhny stolitsa" – 117, Gorkogo Str.

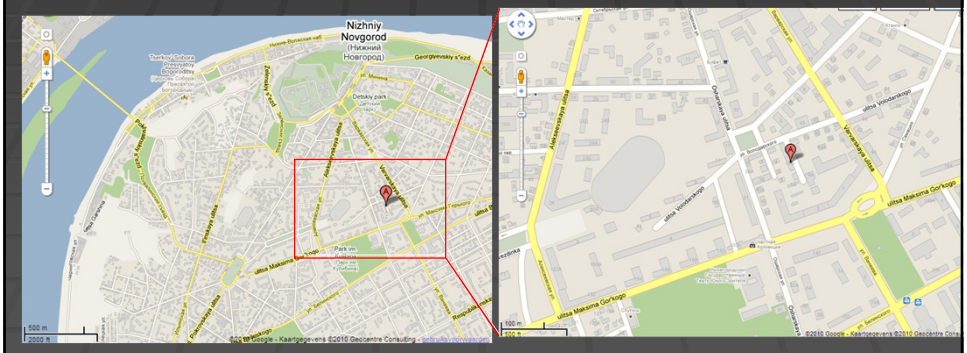
Selected cases - 3

- 14 stores (including a basement)
- 3 parking areas: subterranean, surface, visitor (common)
- common shared ownership 21 offices
- ownership rights 5 nonresidential units
- 1 mortgage
- 15 units are leased (4 – by credit organizations).
- land parcel leased by owners of premises.



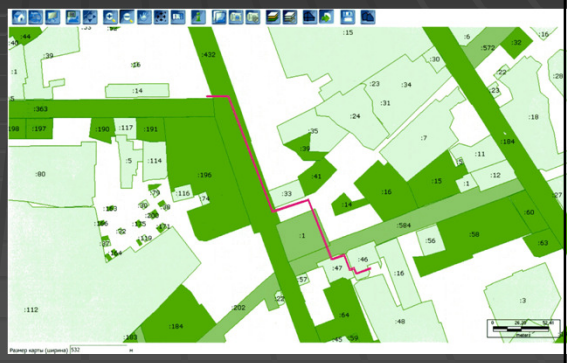
Selected cases - 4

- Short above/below ground gas pipeline, 38 Volodarskogo Str.



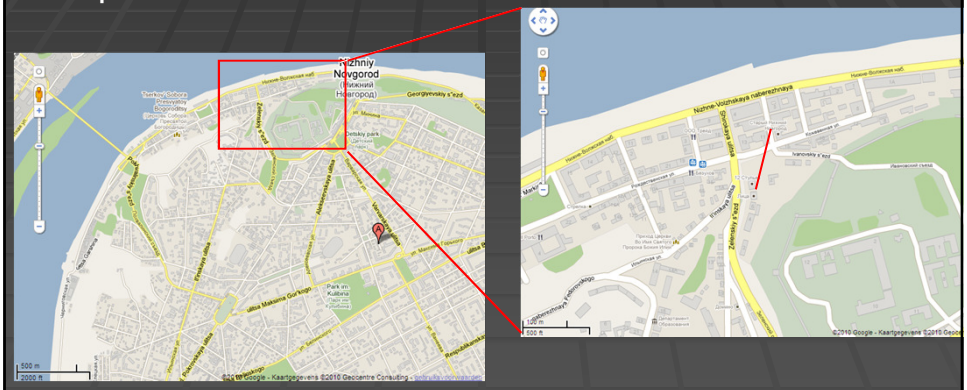
Selected cases - 4

- from tie-in to boiler installation (on Ulutsa Volodarskogo, 38)
- object has one owner (Nizhegorodoblgaz Co.)
- crossing multiple parcels/different owners
- structure (intermediate-pressure pipeline) length 285.7m:
  - surface (12.5m)
  - subsurface (273.2m)



Selected cases - 5

- Short above/below gas pipeline, 3 Kozhevenny pereulok



Selected cases - 5

- from tie-in (Kozhevenny pereulok, 3) to input to a furnace (Zelensky s'ezd, 8)
- object has one owner (Nizhegorodoblgaz Co.)
- crossing multiple parcels/different owners
- structure (intermediate/low-pressure pipeline) length 183.24m:
  - 2 parts surface (8.7 m and 2.4 m)
  - subsurface (172.14m)

Technical

- Pilot and Prototype
  - Pilot – goals:
    - Testing of the prototype: does the prototype work, and is it possible to implement it within the client's setting, and does the prototype perform as anticipated?
    - Obtaining experience: stakeholders (within and outside of Rosreestr and FCC Zemlya) know the implications of 3D cadastre through hands on experience.
  - Prototype
    - Increment 1: very limited functionality; particularly aimed at the technical testing of the selected technologies and components
    - Increment 2: more functionality and is more user-friendly

Technical

- Results and Findings so far
  - Measuring the overlap of 2D plots with 3D object
  - Legal versus physical object
  - Validity of the 3D-legal object
  - Selection of best option for the 3D-cadastre
  - Guidelines for registration of 3D Parcels

Technical - Guidelines for registration of 3D Parcels (1/2)

- 3D plot narrative as well as PDF (for easy visualization) and 3D data (according to LADM / CityGML model for supporting the cadastral registration process) should be supplied;
- For normal parcels a 3D polyhedron is a sufficient description;
- For 3D linear plots (including pipeline) an additional option would be the following: an attached (multi-) polyline diameter or height and width;
- New 3D plot that crosses multiple land parcels is a transfer of ownership (or other right of these plots at a single new 3D plot);
- A 3D plot gets a (temporary) ID, volume (m3), and surface water system board (m2);

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Technical - Guidelines for registration of 3D Parcels (2/2)

- A 3D plot gets a (temporary) ID, volume (m3), and surface water system board (m2);
- For reference, the following topographic objects are required: 3D buildings (rooms), roads, pipelines and cables and relevant surface with height;
- Accuracy of a 3D object is equal to 2D object (15 cm). One side face must be within 15 cm of a flat plane.
- For horizontal and vertical reference the standard of Oblast Nizhny will be used
- Height (z) coordinate: absolute (vertical reference) required and relatively (compared to Earth's surface) is optional;
- Curved surfaces will be approached by multiple flat edges (this model is relatively easy to implement);

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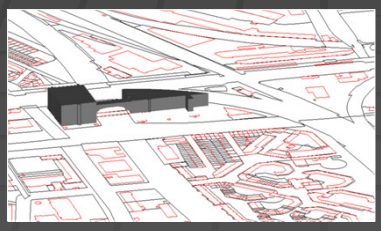
Conclusion

- The Project
- Legal and Administrative setting
- Technical
- Conclusion



Thank you for your attention