The new methods of visualisation of the cadastral data in Poland

MARCIN KARABIN, ROBERT OLSZEWSKI, DARIUSZ GOTLIB, KRZYSZTOF BAKUŁA, ANNA FIJAŁKOWSKA
The results of researches concerning the study of new ways of geovisualisation of the cadastral data in Poland
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Ph.D. D.Sc. Marcin Karabin (Department of Cadastre and Land Management) – leader of grant
Ph.D. D.Sc. Robert Olszewski, prof. WUT (Department of Cartography)
Ph.D. D.Sc. Paweł Pędzich, prof. WUT (Department of Cartography)
Ph.D. D.Sc. Katarzyna Sobolewska-Mikulska, prof. WUT (Department of Cadastre and Land Management)
Ph.D. Robert Łuczyński (Department of Cadastre and Land Management)
Ph.D. Magdalena Karabin-Zych (Department of Cadastre and Land Management)
Ph.D. Krzysztof Bakuła (Department of Photogrammetry and Remote Sensing)
Ph.D. Sebastian Różycki (Department of Photogrammetry and Remote Sensing)
M.Sc. Anna Fijałkowska (Department of Photogrammetry and Remote Sensing)
M.Sc. Sylwia Marczak (Department of Photogrammetry and Remote Sensing)
M.Sc. Miłosz Gnat (Department of Cartography)
The new methods of visualisation of the cadastral data in Poland

- modification of methods of data geo-visualisation concerning boundary lines and points,
- defining new cadastral maps combining vector and raster data (aerial photographs) and the terrain relief model,
- geo-visualisation of data concerning premises,
- geo-visualisation of data concerning untypical objects in the cadastre – e.g. subway tunnels
Modification of methods of data geo-visualisation concerning boundary lines and points

The boundary point is defined in Poland by the following attributes:

- **STB** – the stabilisation code,
- **ZRD** – source of data on the location of the boundary points,
- **BPP** – the mean error of the boundary point in relation to the 1st class control points network.

The Polish cadastral maps present the status of the boundary point, but to the limited extent.

Diversification in the cartographic space concerns the attribute of the point stabilisation (stable/unstable) only; however diversification related to the attribute which characterises the accuracy of the location of a boundary point does not occur.
All boundary’s points are presented in the same way…

Why?

All of them are not marked on the ground

But …

attribute which characterises the accuracy of the location of a boundary point BPP is different for points

Modification of methods of data geo-visualisation concerning boundary lines and points

Boundaries of parcel 193/1 (subdivision plan)

Boundaries of parcel 193/2 (demarcation documents)

Boundaries of parcels 198/1, 198/2, 198/3 (subdivision plan)

Boundaries of parcel 196 (delimitation documents)

Rest of the boundaries showing on cadastral map – digitalisation of the raster

Defining new cadastral maps combining vector and raster data (aerial photographs) and the terrain relief model

Semitransparent map of slopes imposed on orthophotomap and cadastral data

Cadastral data on the background of DTM from ISOK project (ALS) about 6 points/sqm (mh<=0,15m)
Defining new cadastral maps combining vector and raster data (aerial photographs) and the terrain relief model

Cadastral data on the background of hypsometric map

Cadastral data on the background of DTM from ISOK project (ALS) about 6 points/sqm (mh<=0,15m) with colour-coded elevation
### Accuracy of the area of parcel depending on BPP attribute

*(BPP – the mean error of the boundary point in relation to the 1st class control points network)*

<table>
<thead>
<tr>
<th>Area Sqm.</th>
<th>BPP</th>
<th>mean error of the area of parcel depending on shape of parcel:</th>
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<tr>
<td></td>
<td></td>
<td>1:1</td>
</tr>
<tr>
<td>1000</td>
<td>0.10 m</td>
<td>3</td>
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<tr>
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<tr>
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<td></td>
<td>10</td>
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<td>1000</td>
<td>0.60 m</td>
<td>19</td>
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<tr>
<td>1000</td>
<td>3.00 m</td>
<td>95</td>
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<tr>
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<td>212</td>
</tr>
<tr>
<td>10000</td>
<td></td>
<td>300</td>
</tr>
</tbody>
</table>

The area of parcel registered in cadastre vs. surface determined by means of 3D analyses

Source: by R.Olszewski

Bar Chart of obszar1
- 0.68 to 2.72 (8)
- 0.24 to 0.68 (11)
- 0.11 to 0.24 (19)
- 0.06 to 0.11 (7)

Source: by R.Olszewski
Geo-visualisation of data concerning premises

- It should be possible to present the geometry of premises in a unified coordinate system together with other cadastral data and to develop the correct cartographic visualisation.

- The developed model should be an element of a building data model, utilised for different purposes: management of a building, crisis management, indoor navigation systems, the real estate cadastre.

- It is proposed to enter data at least at two accuracy levels: with representation of whole premises and with representation of rooms.
**Geo-visualisation of data concerning premises**

- The boundary line of premises (which is the outer wall) is drawn along its external edge (at the floor level). Lines being boundaries between two premises are drawn on the axis of the separating wall.

- Boundary lines of rooms are drawn on internal edges of wall at the floor level.

- Rooms are separated into sub-spaces due to the different method of calculation of the useful space (in Poland another coefficient is applied for calculated room sizes for the room height above 2.20 m (100%), the height between 1.40m and 2.20m (50%) and for some rooms of the heights lower than 1.40m (0% - not considered in calculations).

- Data is acquired and recorded in the coordinate system applied in the given cadastral system (in order to achieve the full compliance with data for the building surrounding areas).
Generation of 3D models of premises, using the architectural projections of premises

Architectural projections of premises
Local Coordinate System

3D models of premises
State Coordinate System

BUILDING OUTLINE ACQUIRED AS A RESULT OF FIELD MEASUREMENTS
- verified whether the geometric features of object is compliant with the building design documentation
- appropriate corrections
- Set of the data in Local Coordinate System e.g. according to BISDM Standard

VARIANTS OF MATCHING INTO STATE COORDINATE SYSTEM
- Helmert transformation
- transformation based on splines.
- the bilinear transformation
- basing on one corner of the building and the azimuth of one wall

Geo-visualisation of data concerning premises

Source: authors

Source: authors
Geo-visualisation of data concerning premises

Source: authors

Source: authors
Geo-visualisation of data concerning untypical objects in the cadastre – e.g. subway tunnels

Karabin M.: „Rules concerned registration of the spatial objects in Poland in the context of 3D cadaster’s requirements” 2nd International Workshop on 3D Cadastres, 16-18 November 2011, Delft, the Netherlands

NO LAYER APPROACH IN CADASTRE !!!

IT IS NOT POSSIBLE TO SELL PARCEL ABOVE SUBWAY TUNNEL !!!

IF WE SELL PARCEL – THE SUBWAY WILL BE ALSO SOLD!!!
Geo-visualisation of data concerning untypical objects in the cadastre – e.g. subway tunnels

Laser scanning of subway tunnels
Two tunnels - length 950m each one
970 sections generated every 0.2-1.5m => 8 points generated

ALS from ISOK project - about 12 points/sqm (mh<=0.10m)
3D City Model from classified cloud of points (buildings class)
CityGML standard LoD2, level of detail of objects approx 0.5 m.

Source: by K. Bakuła and A. Fijałkowska
THANK YOU FOR YOUR ATTENTION