Spatial Data Support for Building Monitoring

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FIG Working Week 2012
Knowing to manage the territory, protect the environment,
evaluate the cultural heritage
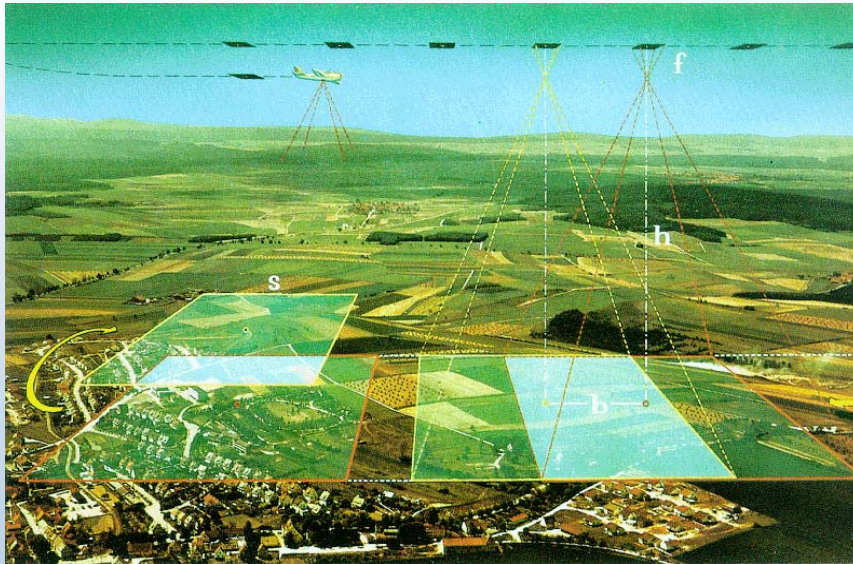6-10 May, 2012 Rome, Italy
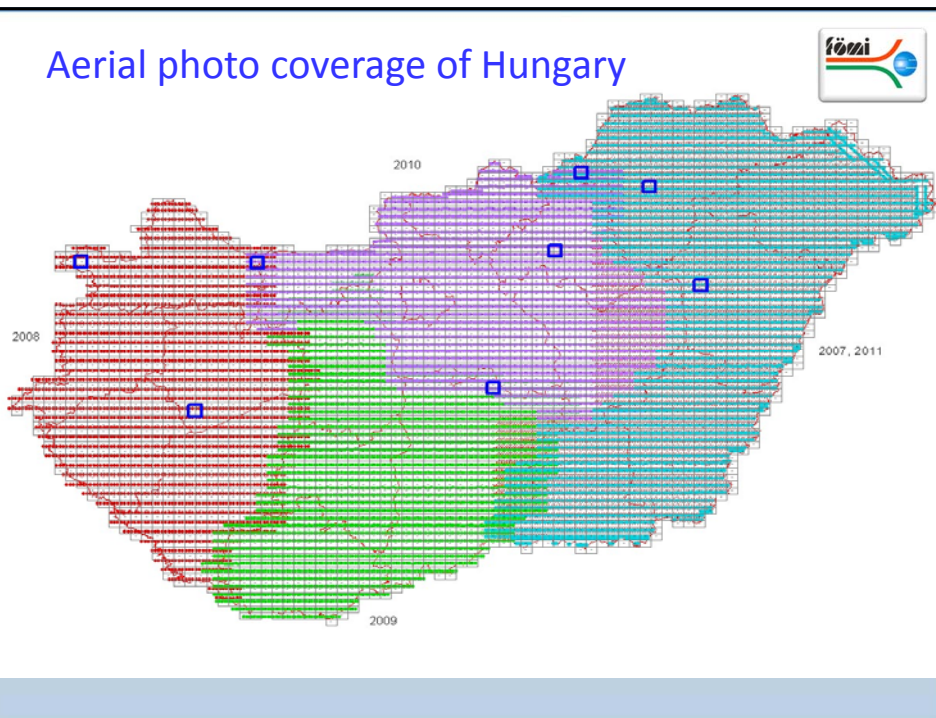

Introduction

- Base datasets
- Methods
- OBIA
  (Object-Based
   Image Analysis)
- OBIA + DSM
- Results
- Data service
- WMS

Aerial photography

Aerial photo coverage of Hungary

Orthophoto

DSM-DEM

DSM-DEM

DSM-DEM and Orthophoto
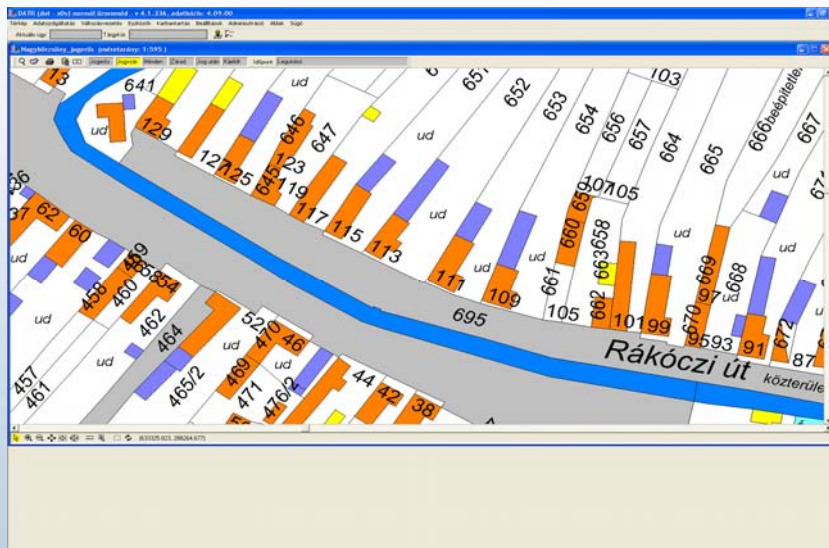
Cadastral Map Database

Image analysis problems

- Detect buildings on remote sensed datas
- Problems
  - there is no typical definition for buildings
  - shades, hided parts
  - need an automatic method for the whole country
- Solution: Object based image analysis (OBIA)
  - main goal: to model
    human visualition (textural
    and geometrical contexts)
  - creating meaningful
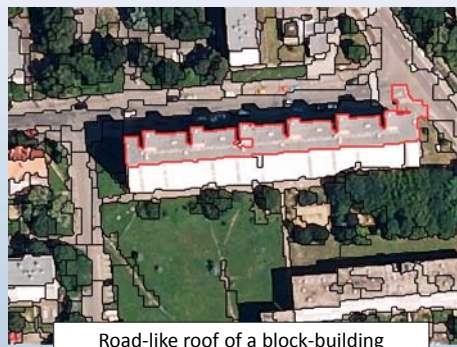   image-object
    by segmentation

Meaningful objects

Objects – geometric measures

Typical road-object

Road-like roof of a block-building

- Using geometric measures
  - spatial density:
    filament-like objects
      has a lover density value

Methods

1. Pararell pixel- and object-based analysis
   - without height information
   - intersection of the results: good result but causes non-
     systematic errors
   - need height informations for a better result

2. DSM-supported OBIA analysis
   - CIR ortophoto and the DSM-DEM difference
   - NDVI, height and geometric features
   - better result but
     DEM's lover resolution causes some mistakes

Results

Without height information

With height data
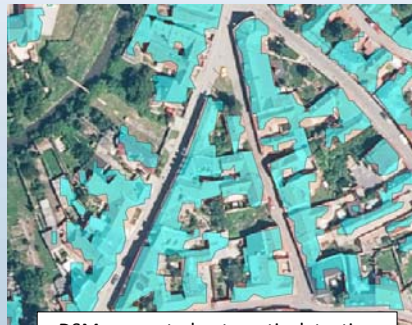
Results

- Evaluation
    - Visual interpretation as reference data
    - Pixel-wise accuracy by the Kappa-measure:
        - Without height: 68%
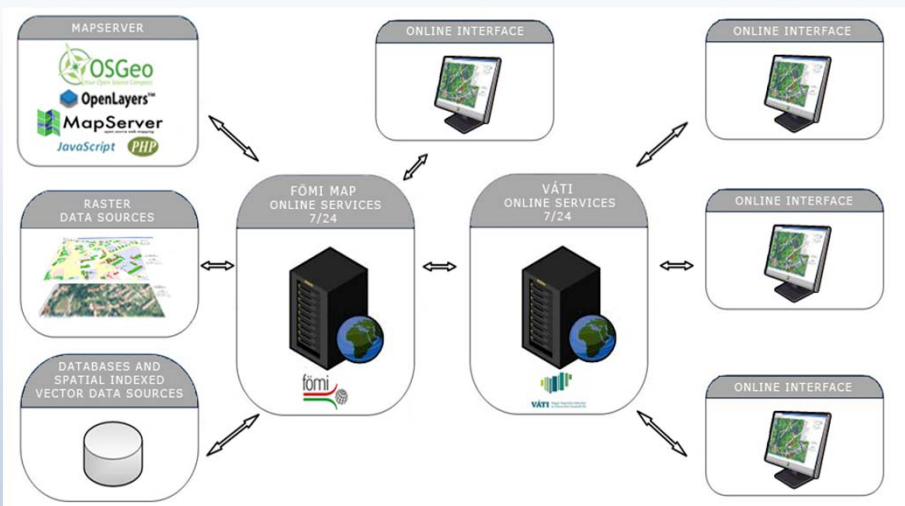   - With height: 88,3%
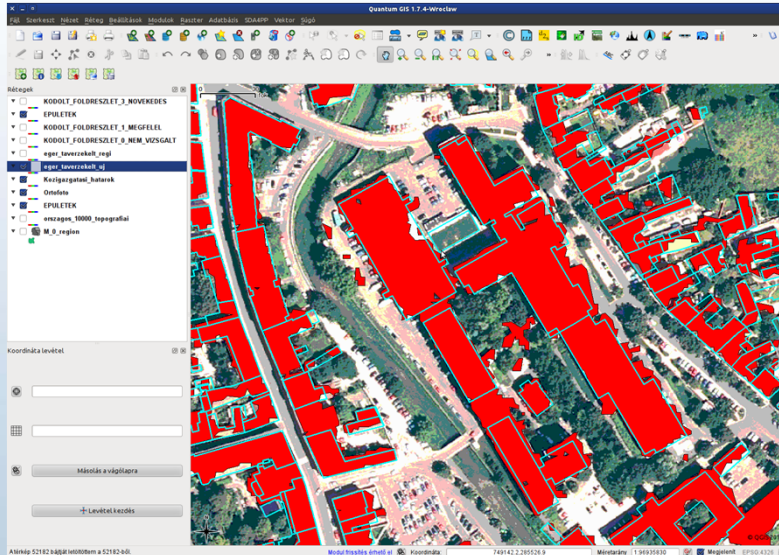

Visual interpretation

DSM-supported automatic detection

Data services

WMS

Conclusion

• Digital Image Processing, Image Analysis and GIS functions are very useful techniques for building monitoring

• Successful execution of pilot project for 19 settlements of Hungary showed, that FÖMI and Hungarian Land Administration have a lot of opportunities for increasing of spatial data services

• Nation-wide extension of Building Monitoring project requires more human and financial sources, but the technology has been developed
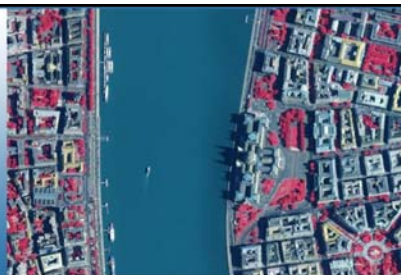
Thank you for your attention

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