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Information Agency

DIGITAL TWIN. RIGA CITY EXAMPLE

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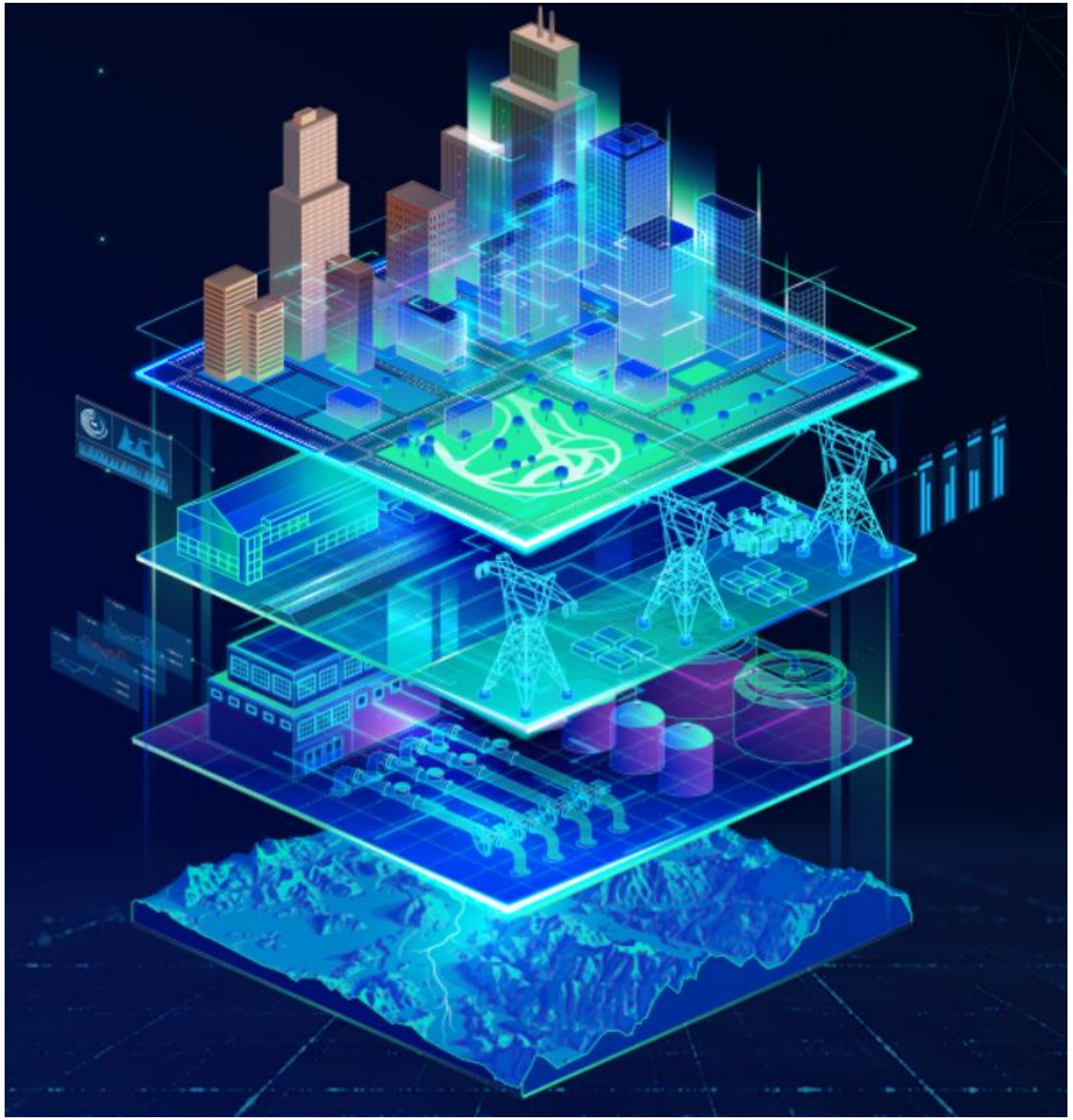
A digital twin is a digital representation of a physical object, process, service or environment that behaves and looks like its counterpart in the real-world



Latvian Geospatial information agency and Riga City

2021 – start of the project, first tests and products

2022 – data processing

2023 – final stages, polishing current products

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Organization structure

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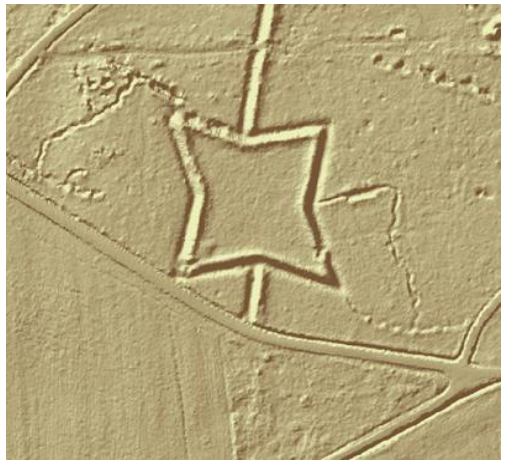
Remote sensing division

Orthophoto sector

Height model sector



23 employees work in division

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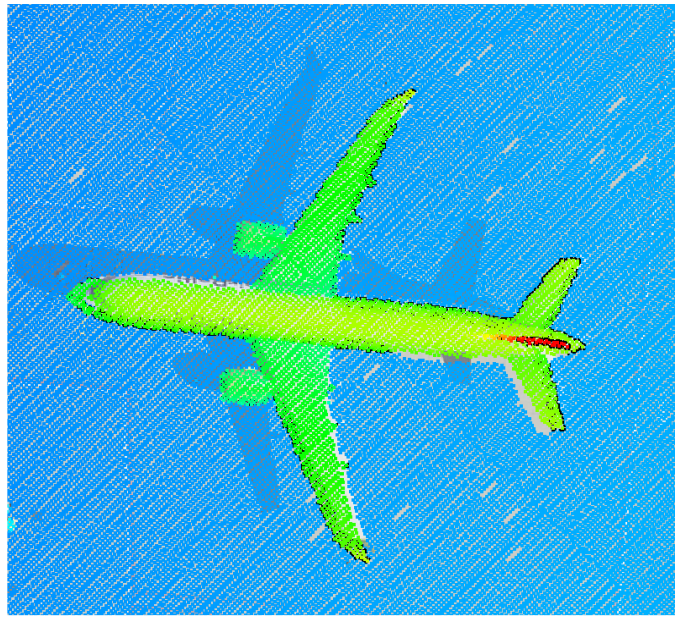
Structure

- Data acquisition and data types
- Software used
- Products produced and current progress
- Problems
- Future plans and actions
- Conclusions
- Data availability



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Data acquisition

- Planed area Planed area 304 km^2, received ~ 500 km^2
- Flights - Oblique imagery + LiDAR
- Image overlap 80/60
- Image resolution 7 cm
- LiDAR point density 20 p/m^2
- Contractor MGGPAERO
- Airplane - Piper PA-31-350 Chieftain
- Data acquisition altitude - ~920 m
- Data acquisition time – 4 days between 02.05.2021. and 12.05.2021.

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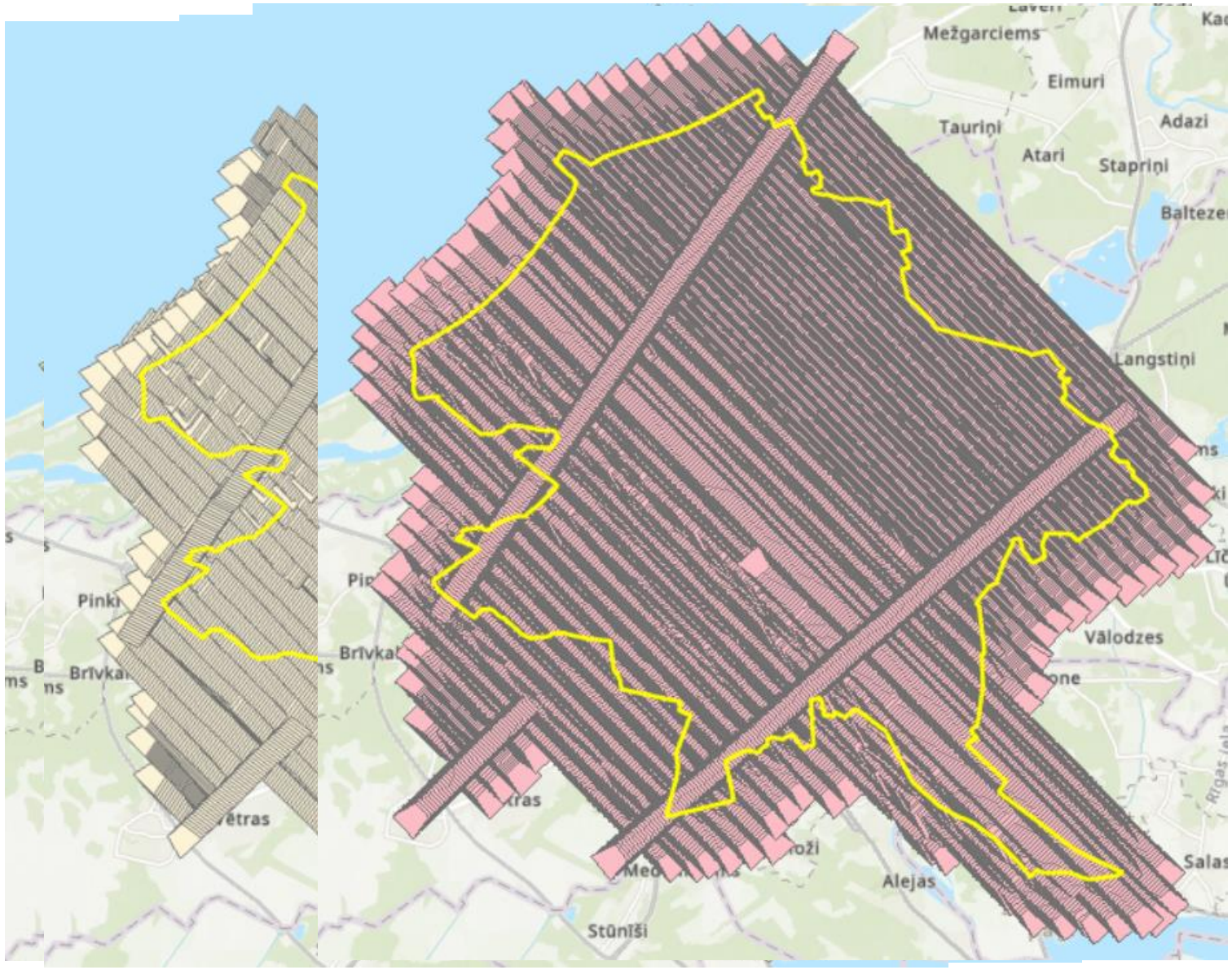
Imagery

Total image count - 79800
Image size – 100 Mpix
Image sensors:

- 4 Phaseone iXM-100 70mm
- 1 Phaseone iXM-100 50mm



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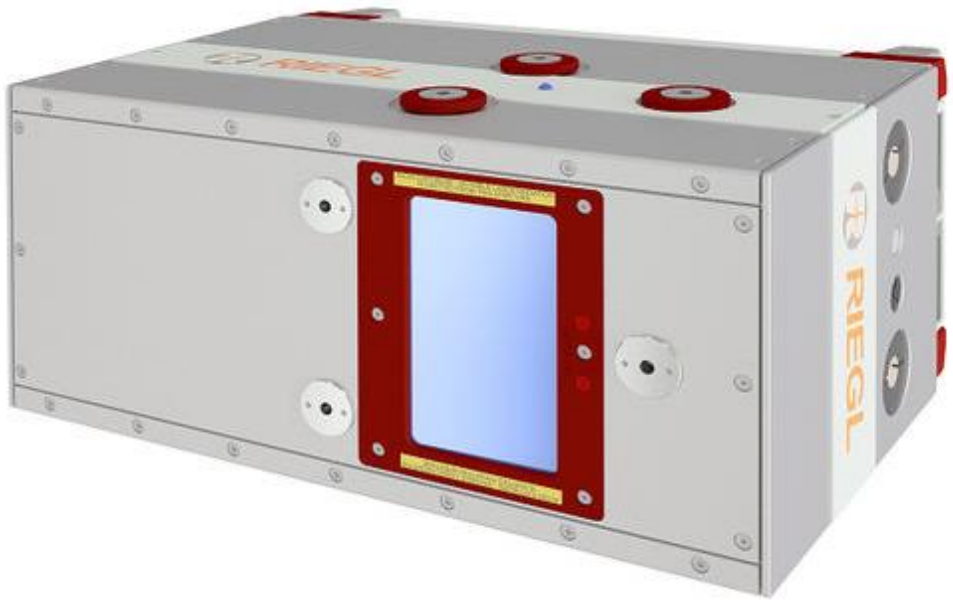
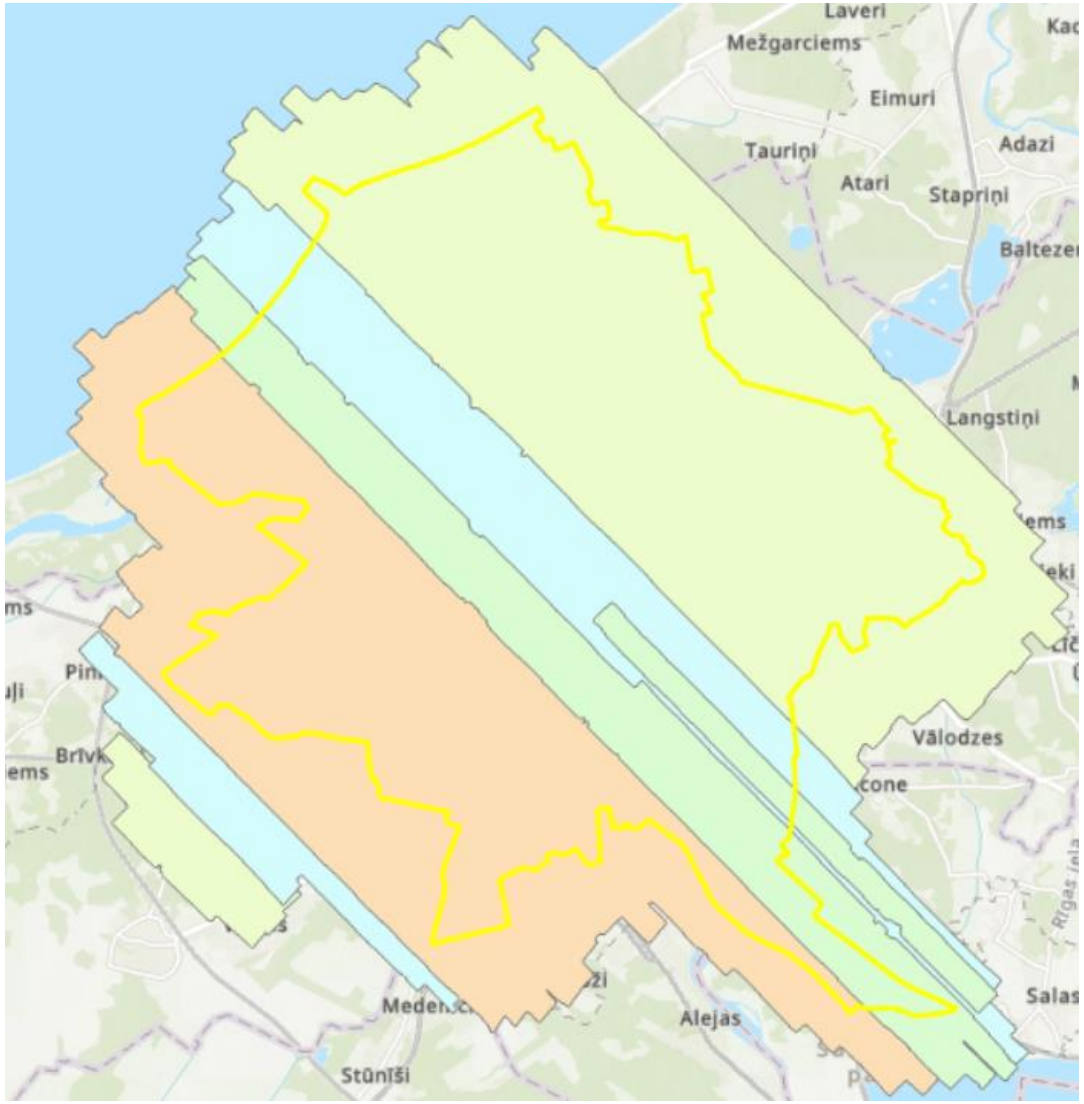
Lidar

Final point density - ~39 p/m^2
Vertical accuracy – 5,5 cm (2 sigma with 95% confidence level)
Horizontal accuracy – 22,2 cm (2 sigma with 95% confidence level)
Lidar sensor:

- Riegl LMS VQ780ii





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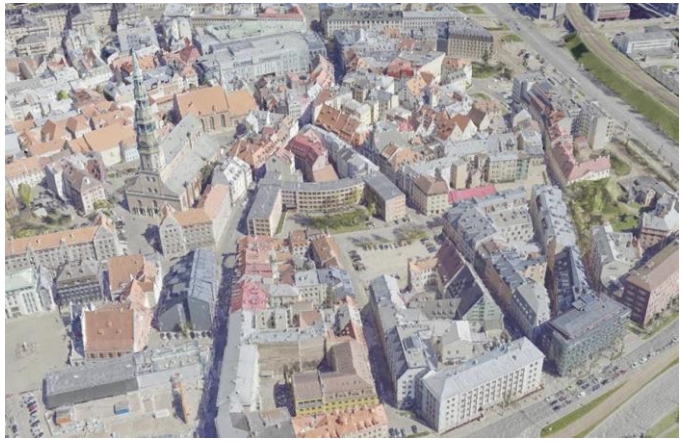
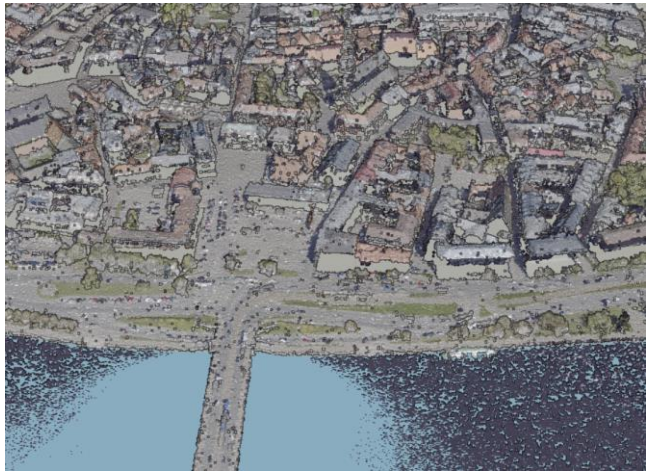
Software





Trimble

inpho

Match- AT (Frame Satelite)
OrthoMaster
OrthoVista
DTMaster Stereo
Match-T DSM
TrueOrthoBOX
Match3DX+Meshing Add-on

Terra solid

Bentley Powerdraft
TerraSolid TerraScan
TerraSolid TerraModeler
TerraSolid TerraPhoto

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Products - orthophotos

Final resolution – 8 cm
RGB 1:2000 tiles
File format – TIF (possible other)

True orthophotos (for some parts)

Fast orthophotos

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Products – reality model

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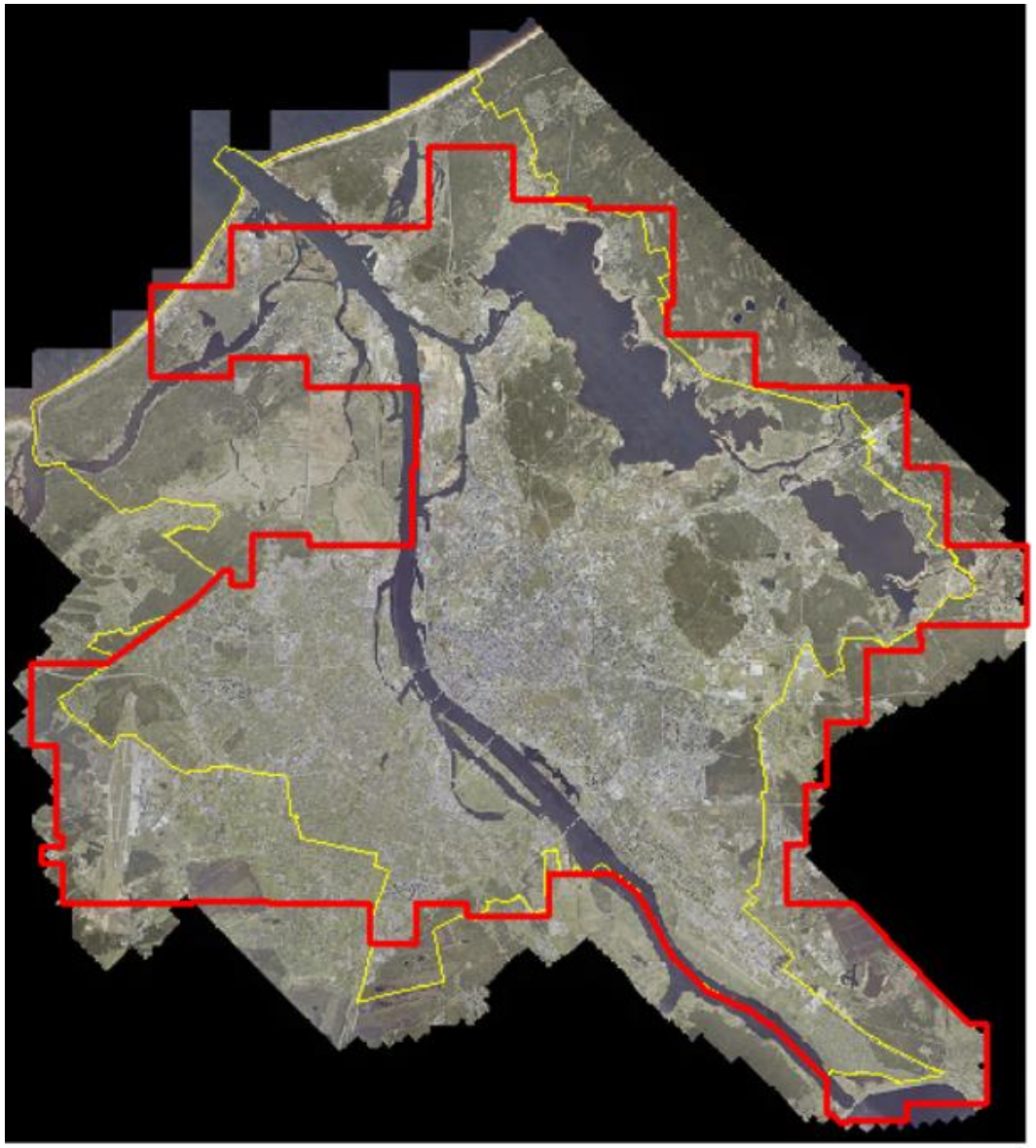
3D data progress - reality model

Created using acquired images

Available in formats:

- cesium
- lod_dae
- lod_obj
- obj
- osgb
- slpk



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Products – lidar data

1:2000 tiles
Automatically classified
Manually classified
Classes:

- Ground
- Vegetation (low, middle, high)
- Buildings
- Noise (high and low points)
- Overlap
- Water
- Bridges
- Other features (doesn’t belong anywhere else)

All points colored using orthophotos

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Products – lidar data

Available in formats:
- LAS
- LAZ

Other products
- DEM
- DSM
- nDSM
- Conturs

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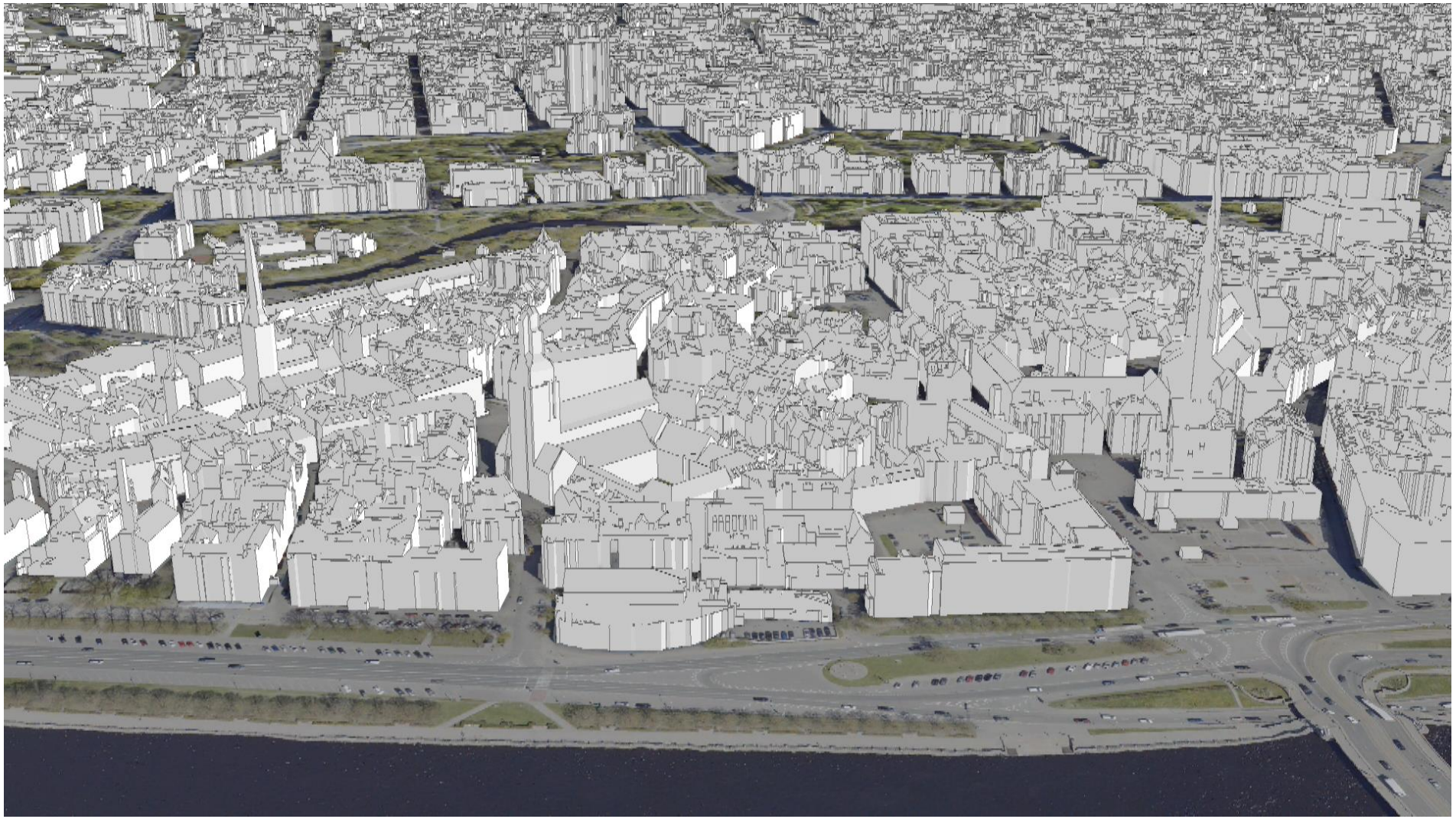
Products – LOD2 model



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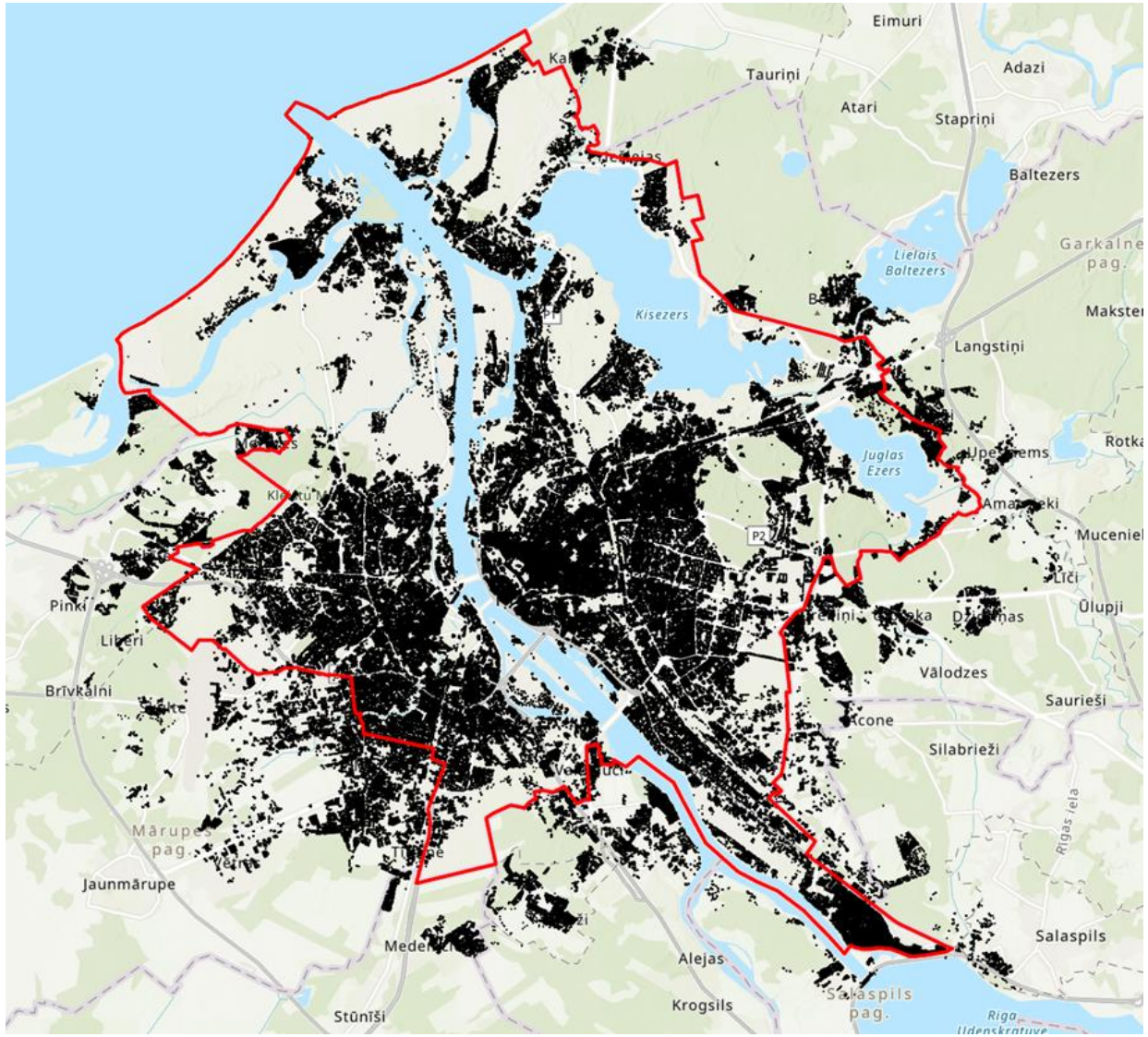
3D data progress - LOD2

Available in formats:
.txt
.shp
.dgn
.CityGML



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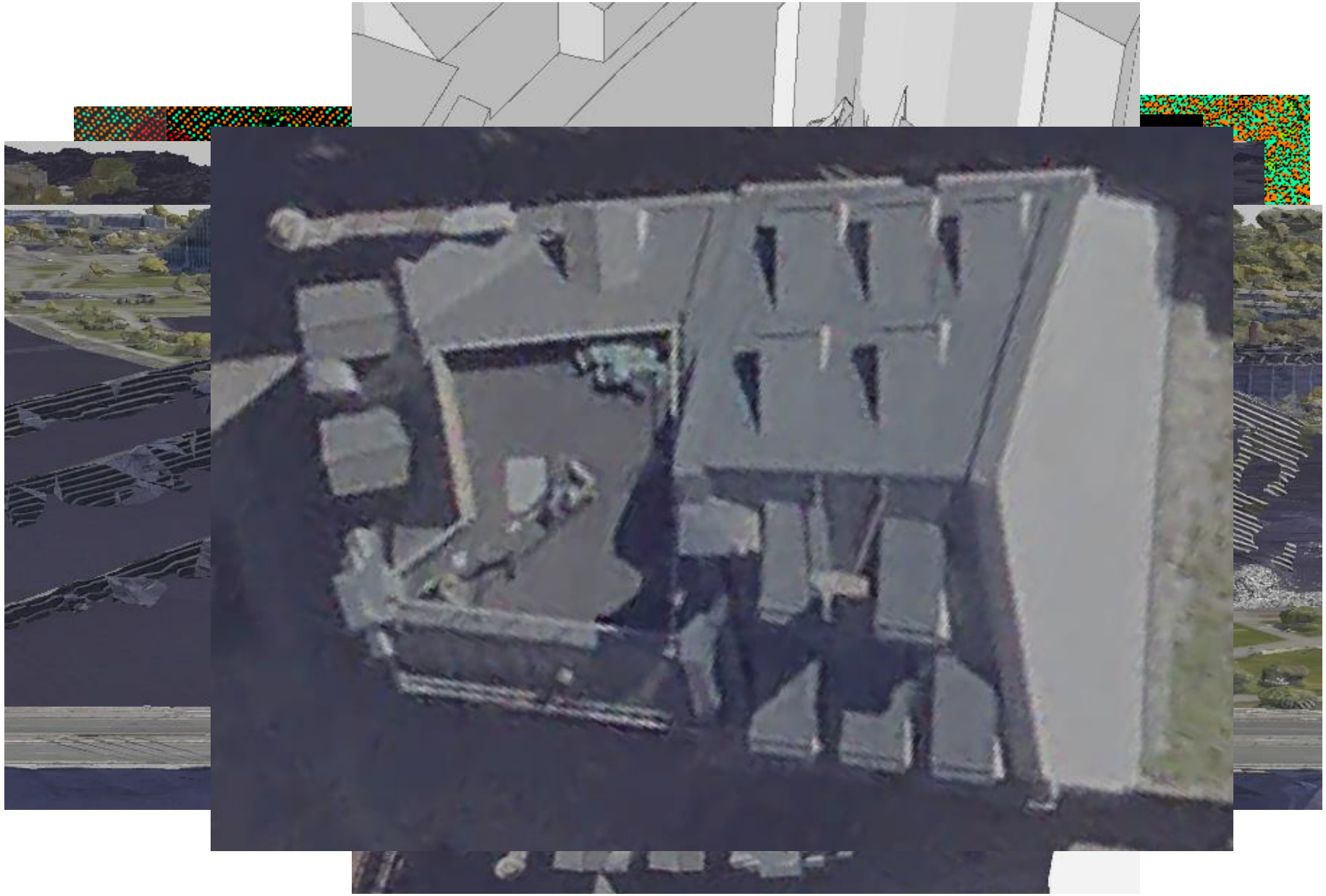
Problems

- Large data quantity – slow data loading and processing;
- Automatic algorithms for LIDAR not precise enough or we used too bold parameters;
- Meshing addon slow and lacking polishing tools (earlier versions);
- Visual problems in 3D meshes;
- How much points is enough?



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Geo RIGA

Riga city municipality data publishing portal:

- LOD1 model for Riga's neighborhoods
- LOD2 model for Riga's neighborhoods
- Riga reality model
- Much more

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The future

- Finalizing product creation;
- Reaction from users:
  - More data;
  - Better quality
  - Different products
  - Different formats
- Is it usable?
- New data acquisition – regular intervals?
- Other cities?

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Summary

- Data acquisition is not cheap, it is not easy and it is not fast (depending from quality);
- Old tricks in productions stage don’t always work, but new ones require time and polish;
- New products, new problems;
- Many questions about future;
- Will this projects be the base for Riga City Digital Twin?

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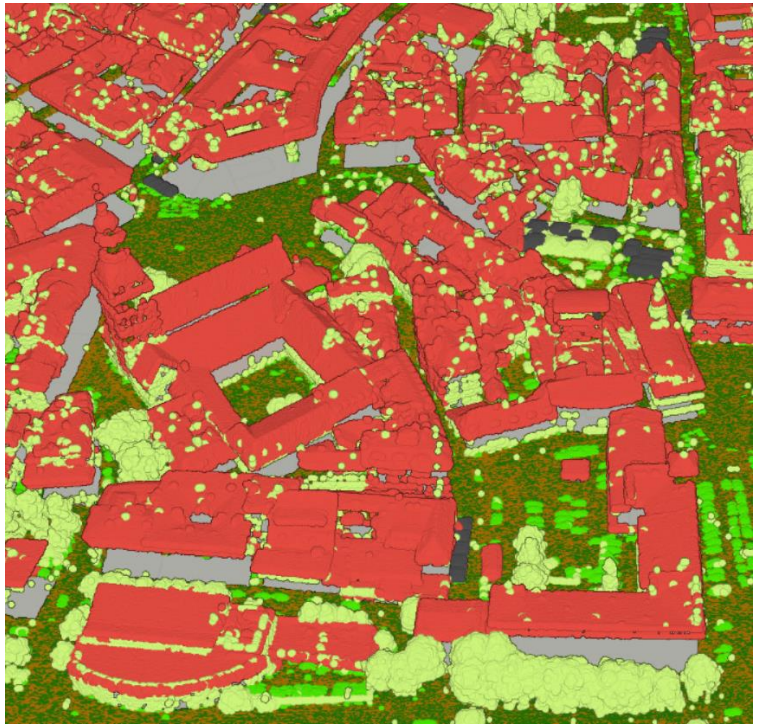
Data availability

Orthophotos and lidar data for a price according to price list (no raw data)



LGIA e-applications

https://e-pieteikumi.lgia.gov.lv/

Reality model meshe’s and LOD2 (LGIA) free of charge

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Thank you for your attention!

Please visit:
www.lgia.gov.lv
http://kartes.lgia.gov.lv/karte/?lang=en

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