

Point Cloud Processing 2018



**Automated rail infrastructure modelling
from MLS point clouds**

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Railway in the Netherlands

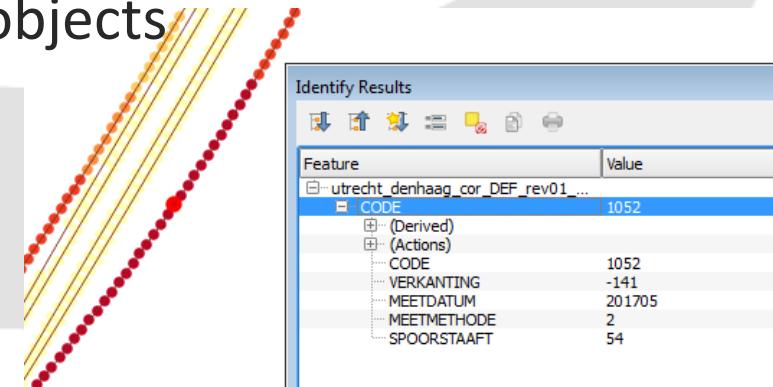


Spoorkaart2017.nl

- About 7,000 km of rail network
 - Busiest rail network in the EU, third-busiest in the world
 - Frequent use and poor soil consistency
- constant maintenance
- Introduction of ERTMS on all lines until 2030

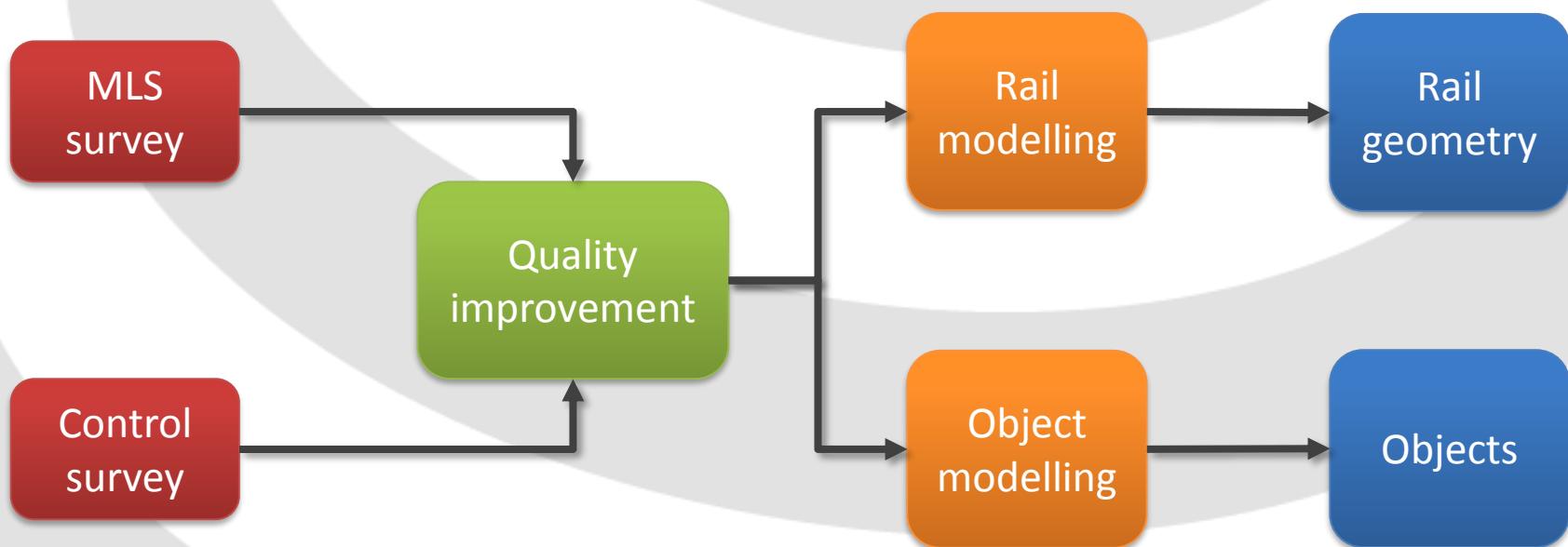
Requirements and uses

- Requirements are defined in ProRail guideline RLN00296
- Absolute accuracy 15mm XY, 7-15mm Z
- Attribute information: cant, rail type, centerline type
- 2.5D modelling of many rail-related objects



- Uses
 - Determining tamping parameters (maintenance)
 - As input for design of new construction
 - Verification of proper construction (as-built survey)
 - Monitoring of ride quality

Workflow



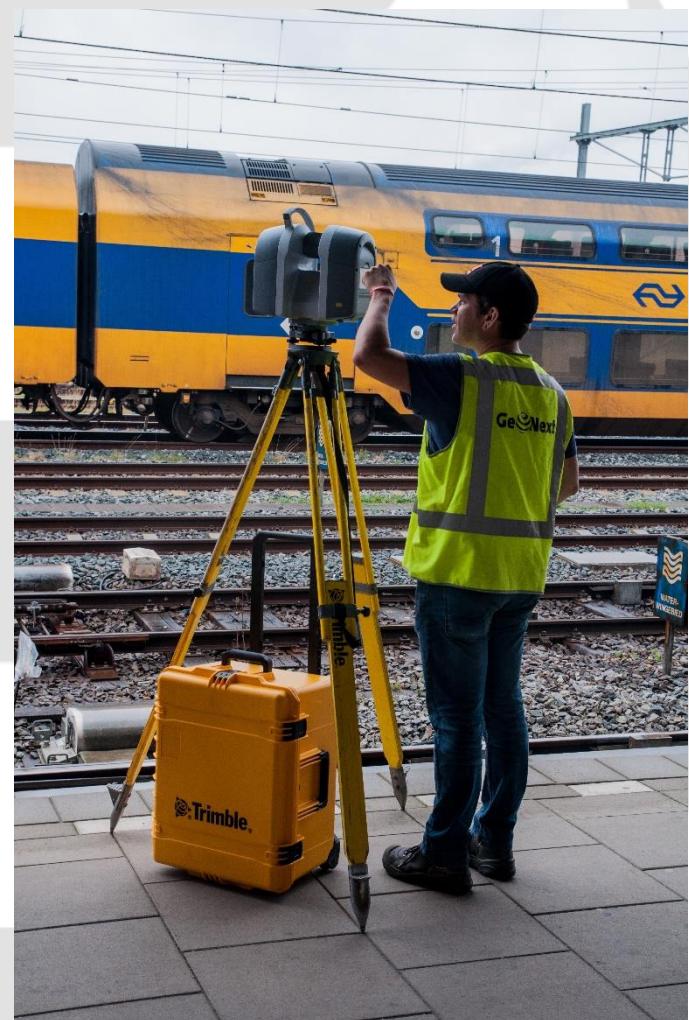
Data acquisition

- MLS survey on train



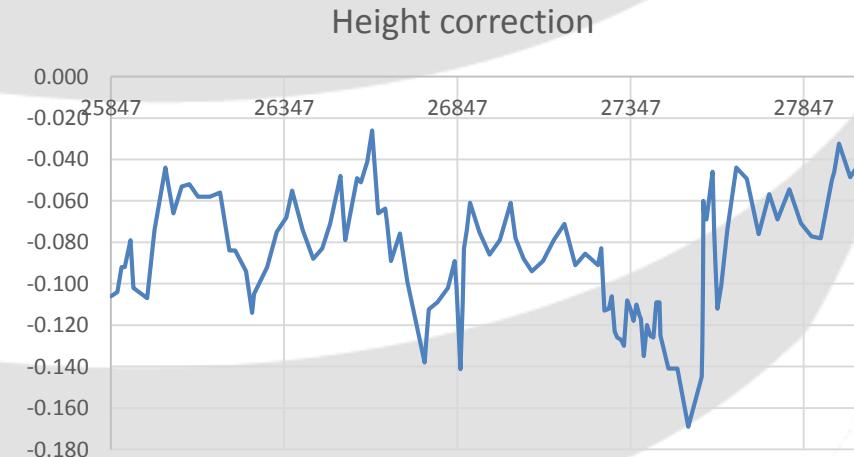
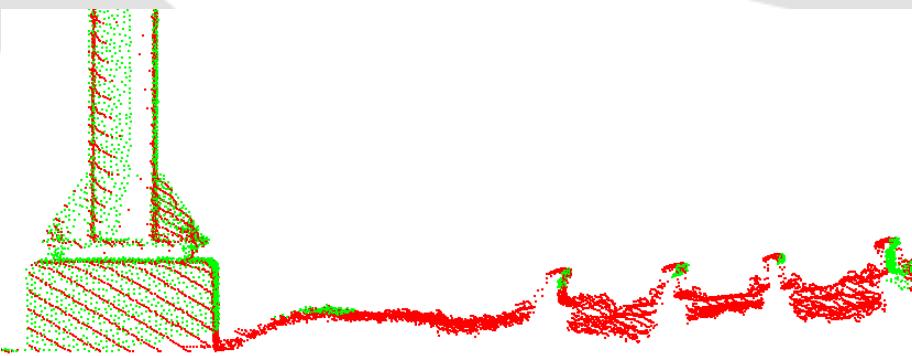
Data acquisition

- Control survey with GNSS and static laser scanning



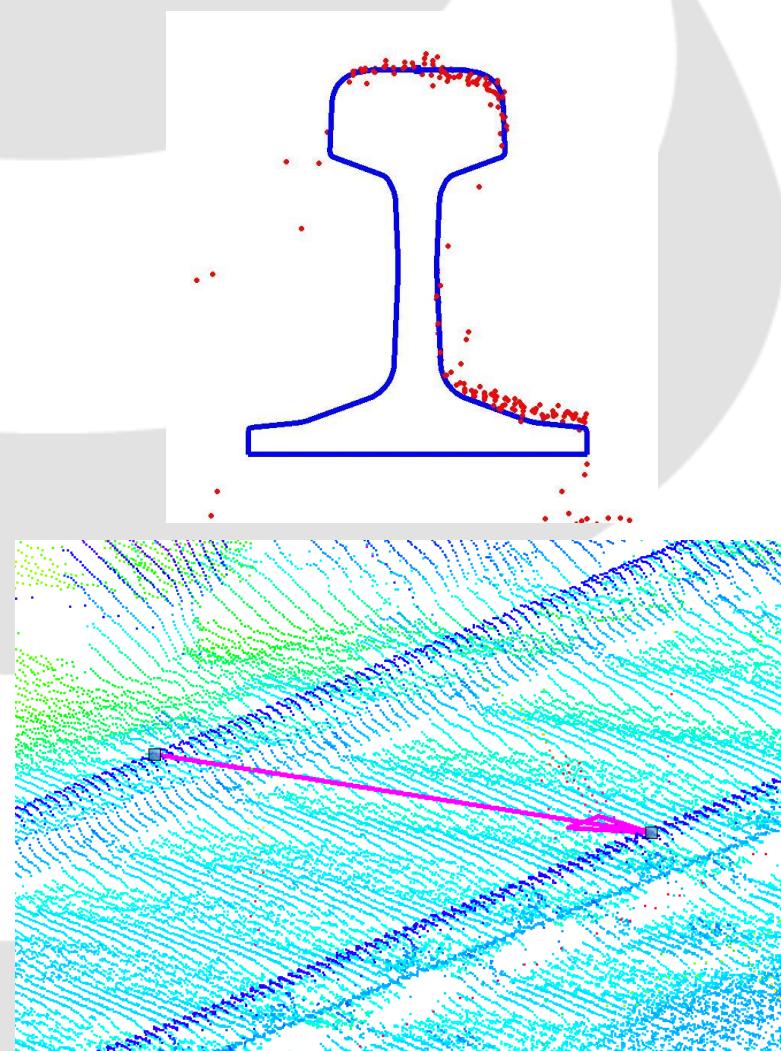
Quality improvement

- Absolute accuracy of MLS data is not sufficient
- Control scans are connected to ProRail point network
- Accuracy of control scans 5mm X/Y/Z
- Cloud-to-cloud adjustment for computation of corrections to MLS trajectory
- Corrections are applied to point clouds based on timestamps

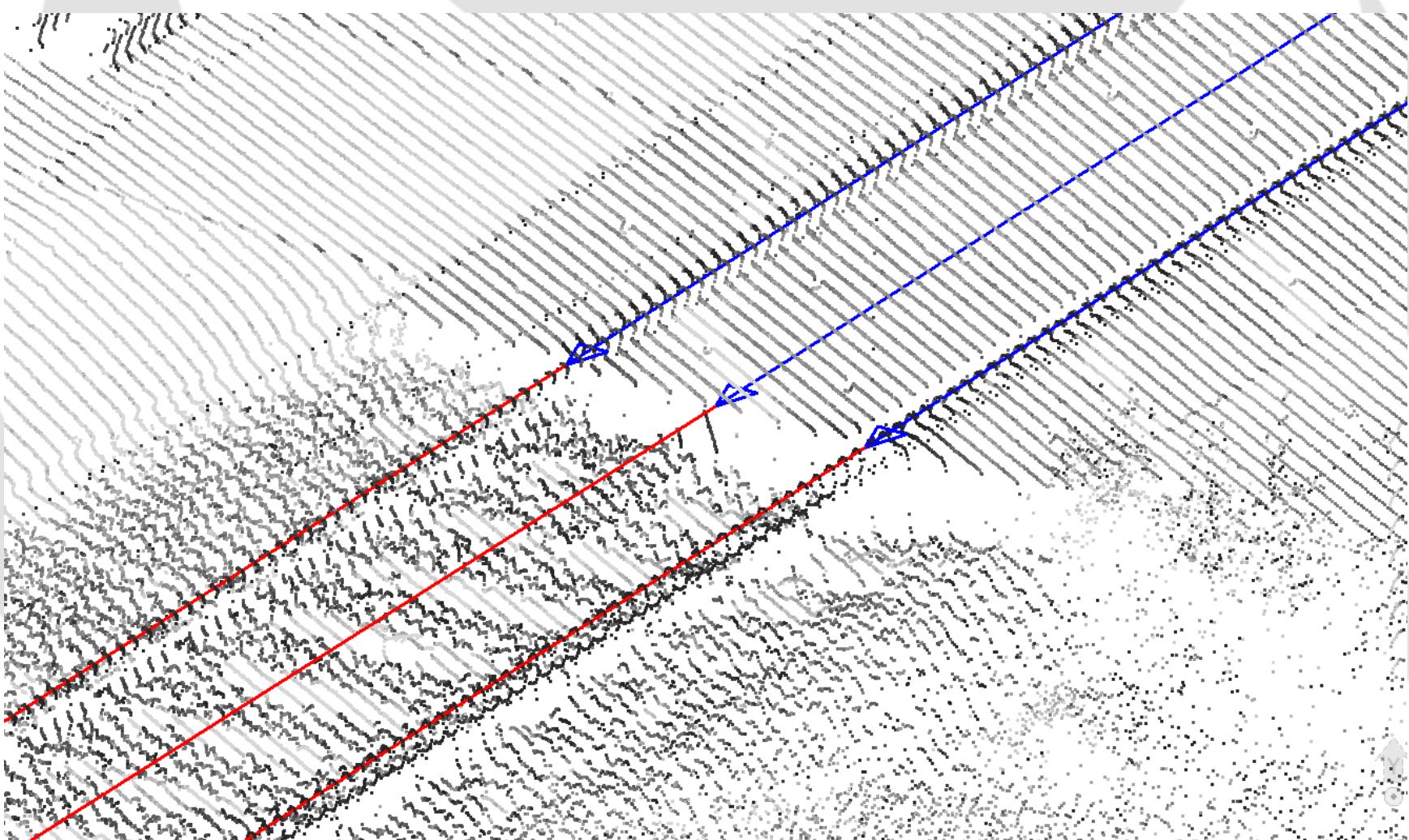


Track modelling

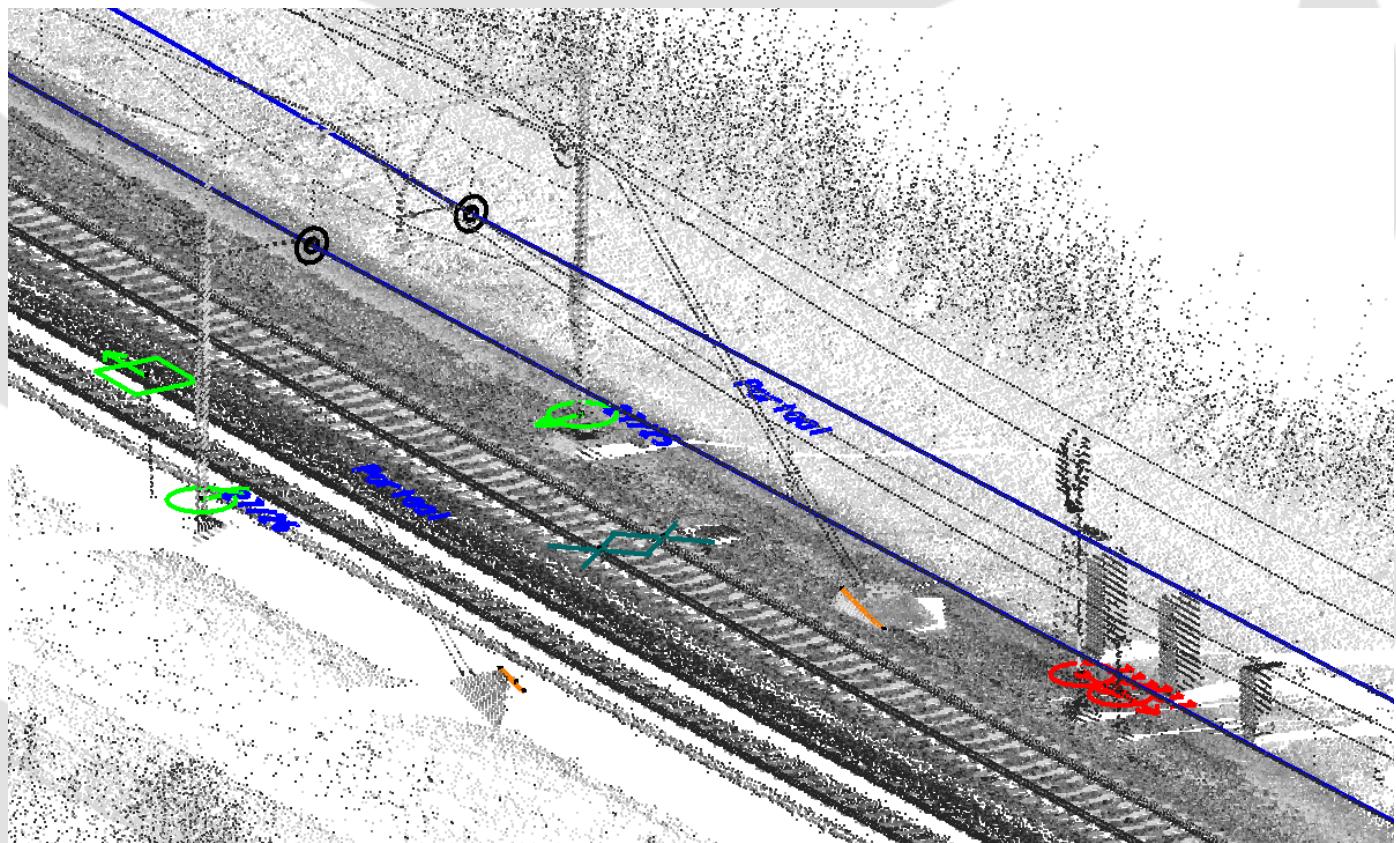
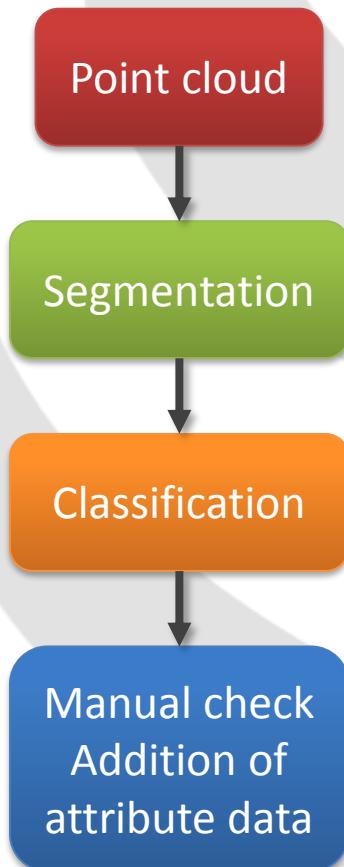
- LS fitting of rail template to cross section
- Works for driven and neighboring tracks
- Kalman filter for quality control
- Automatic detection of rail type
- Manual selection of starting point
- No prior point cloud classification required
- Can be run in batch or interactively from CAD



Track modelling



Object modelling

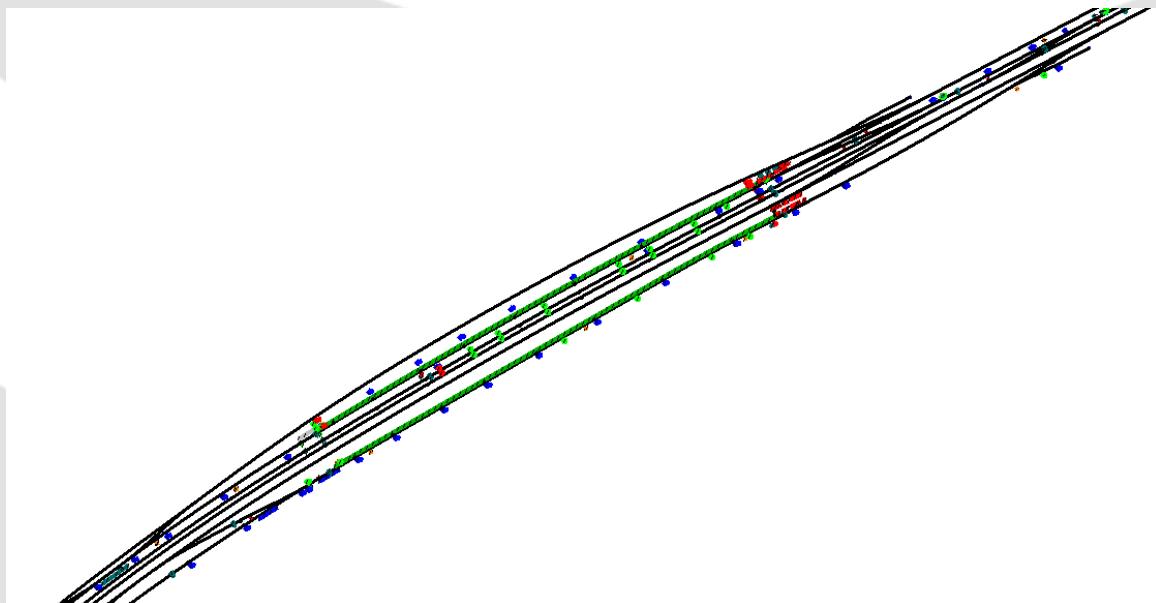


Translation to 3D



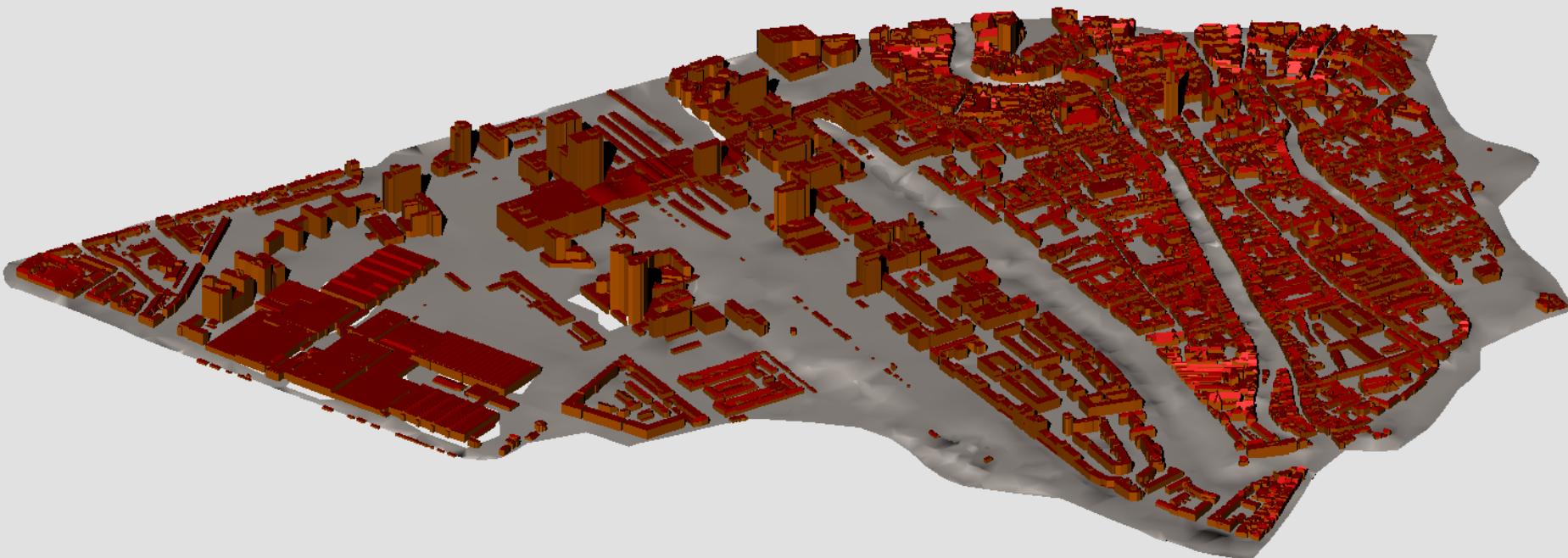
Results

- In daily productive use (2017: >700km)
- At least 50% cost savings compared to traditional methods
- Upcoming publication in *Zeitschrift für Vermessungswesen*



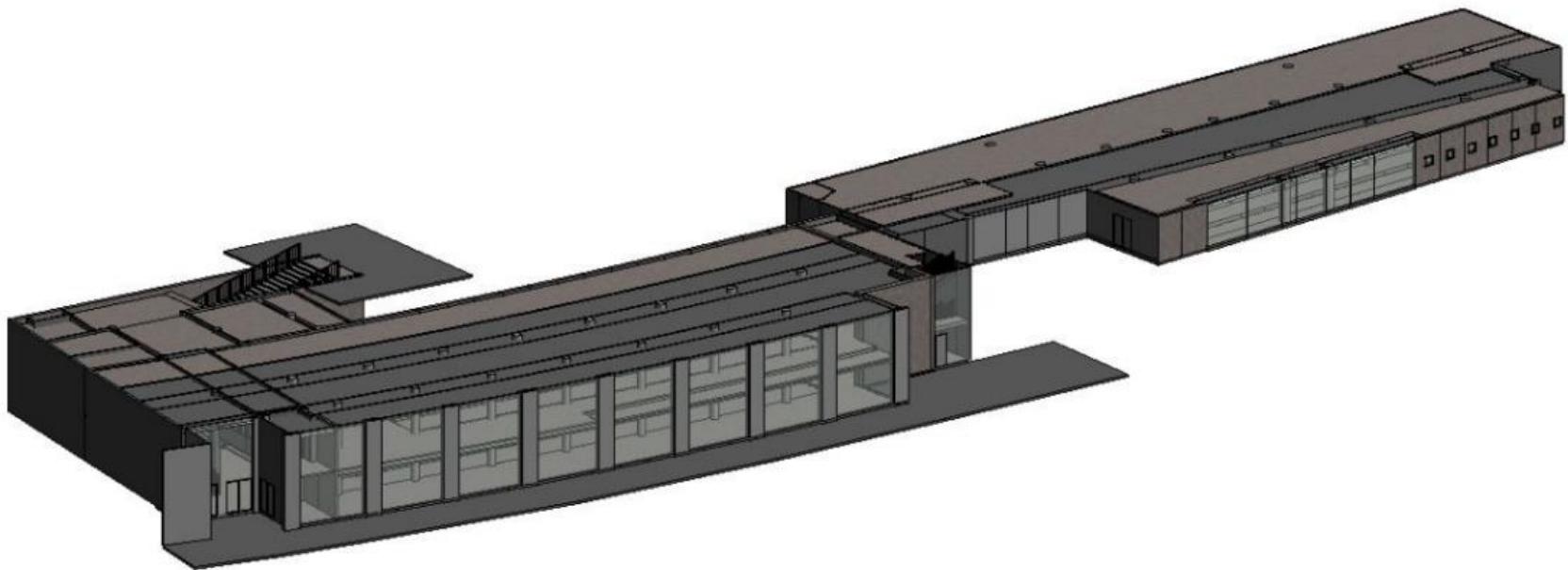
Other activities at GeoNext

- LOD2 city models



Other activities at GeoNext

- LOD2 City models
- BIM from terrestrial point clouds



Other point cloud activities at GeoNext

- LOD2 City models
- BIM from terrestrial point clouds



Other activities at GeoNext

- LOD2 City models
- BIM from terrestrial point clouds
- LOD3 city models

