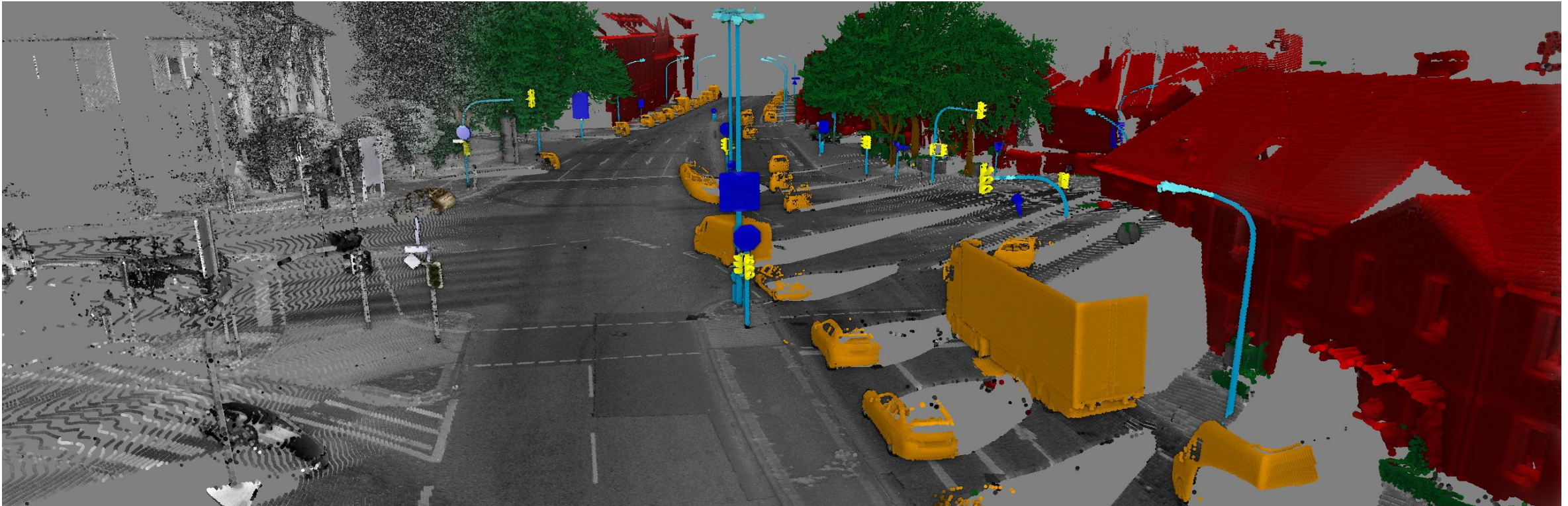


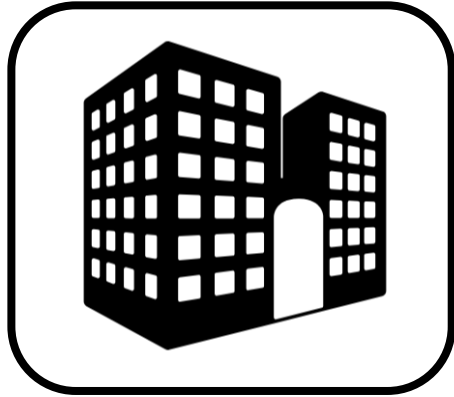
KI-Einsatz bei der Analyse von Punktwolken



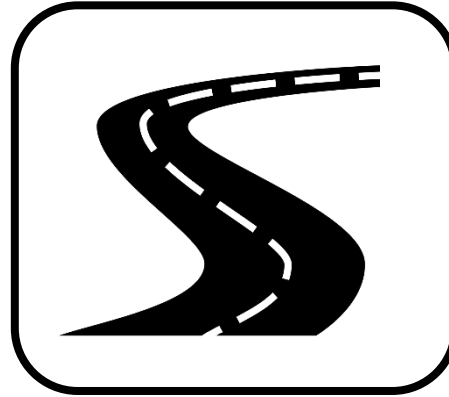
Dr. Rico Richter

30. Fachtagung der Öffentlich bestellten Vermessungsingenieure
und der Vermessungs- und Katasterverwaltung – 12. September 2025

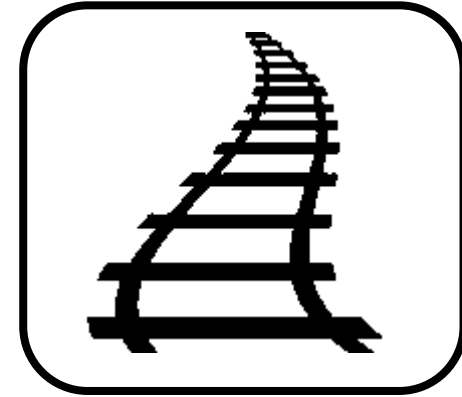
Structures, Objects and Assets Worldwide



1.7 billion¹



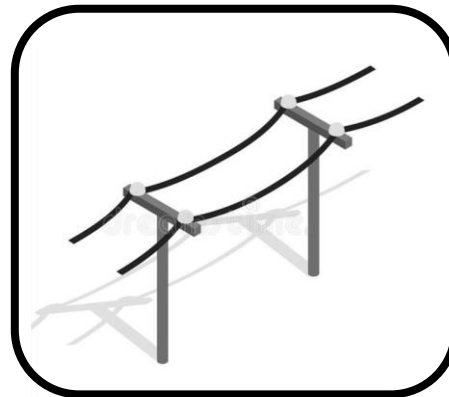
64 million kilometres⁴



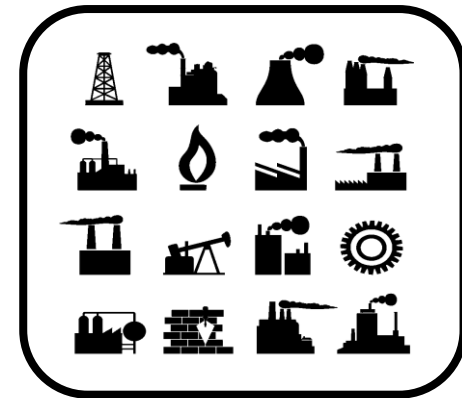
1 million kilometres³



400 billion²



100 million kilometres⁵



...and many more

Sources:

¹ Survey Sampling

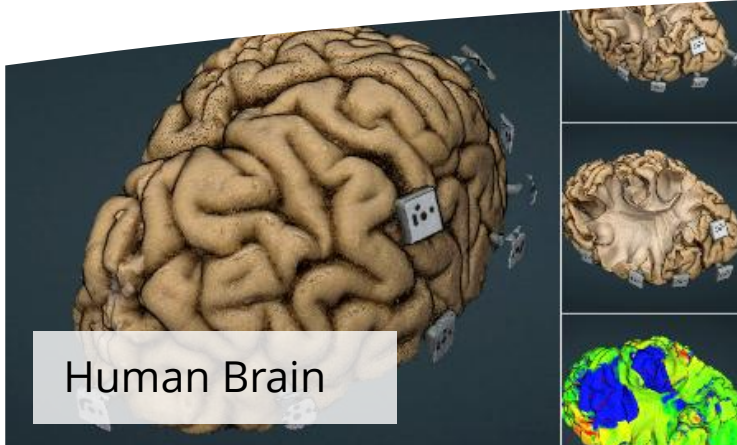
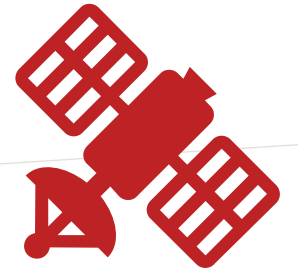
² NASA

^{3, 4} The World Bank

⁵ Siemens survey

Everything Can/Will Become a Point Cloud

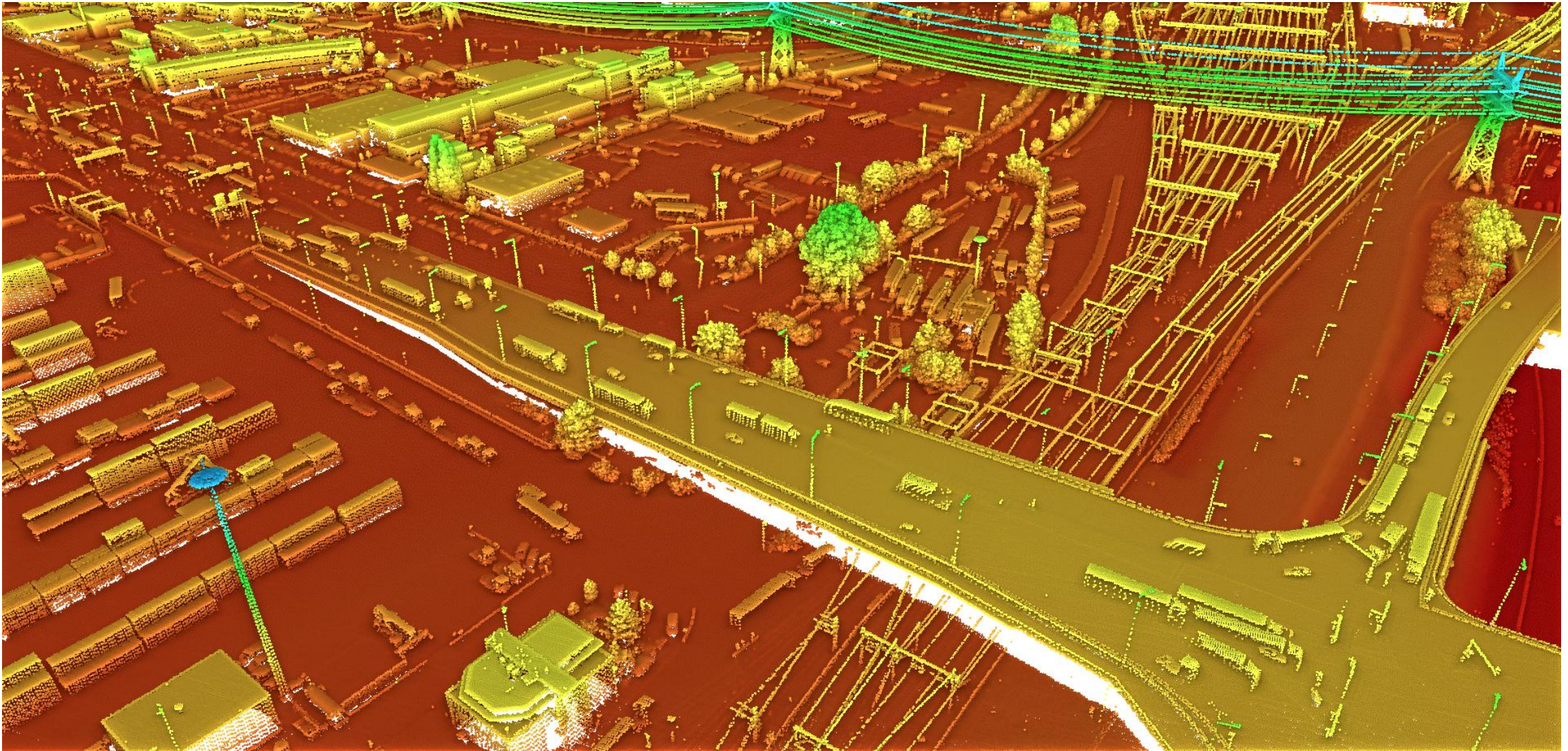
- Point clouds are the most essential category of geospatial data
- There is a strong need to extract information and create insights



Aerial Laserscanning – Rotterdam, Netherlands



POINT CLOUD
TECHNOLOGY



Aerial Photogrammetry – UAV Scan



POINT CLOUD
TECHNOLOGY



3D Point Clouds – Mobile Mapping



POINT CLOUD
TECHNOLOGY



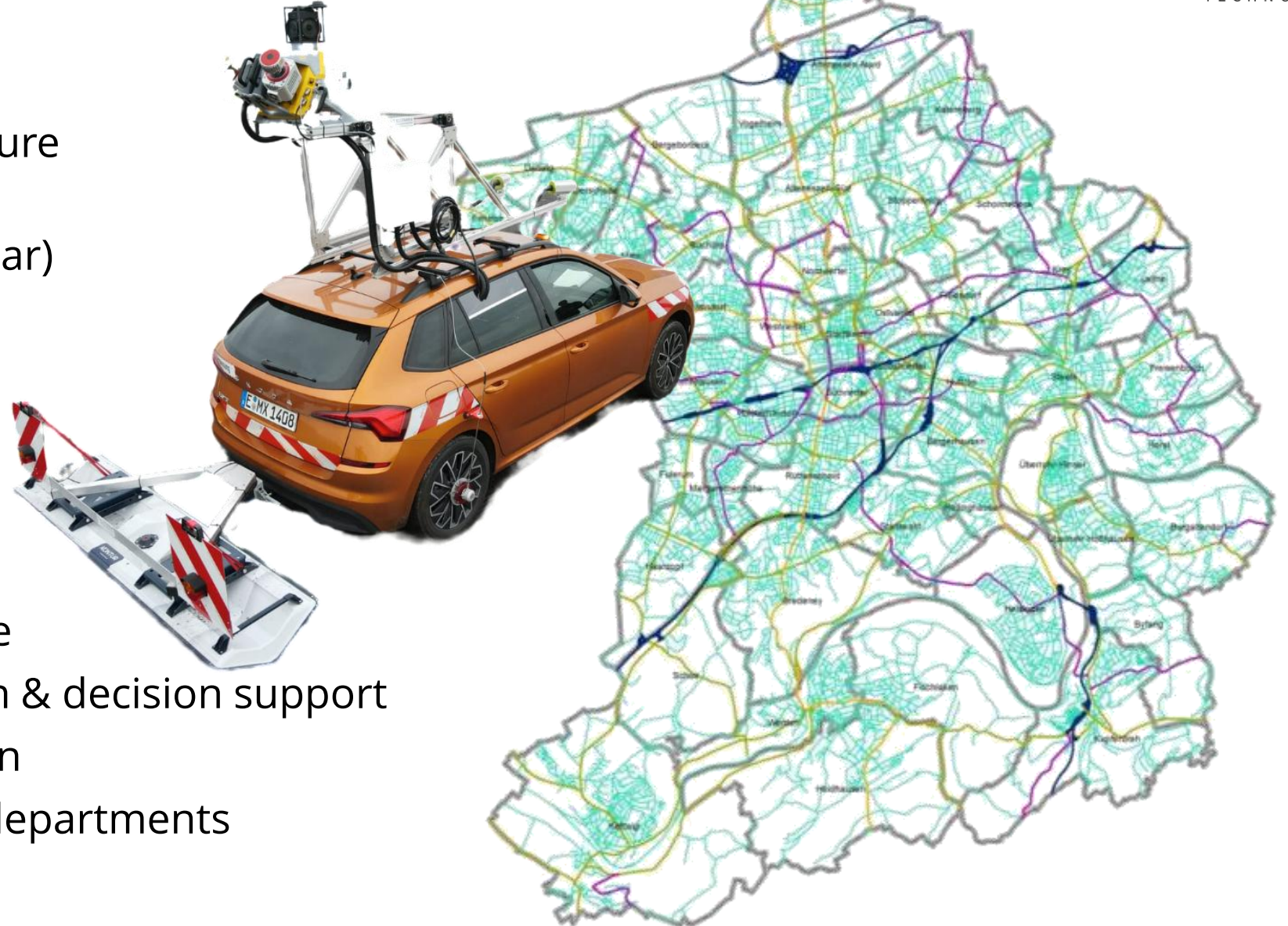
Acquisition Urban Area of Essen

Data acquisition

- 4.000 km road infrastructure
- ~ 40 GB raw data per km (images, point clouds, radar)
- 200 TB per year
- Annual data acquisition

Selected tasks:

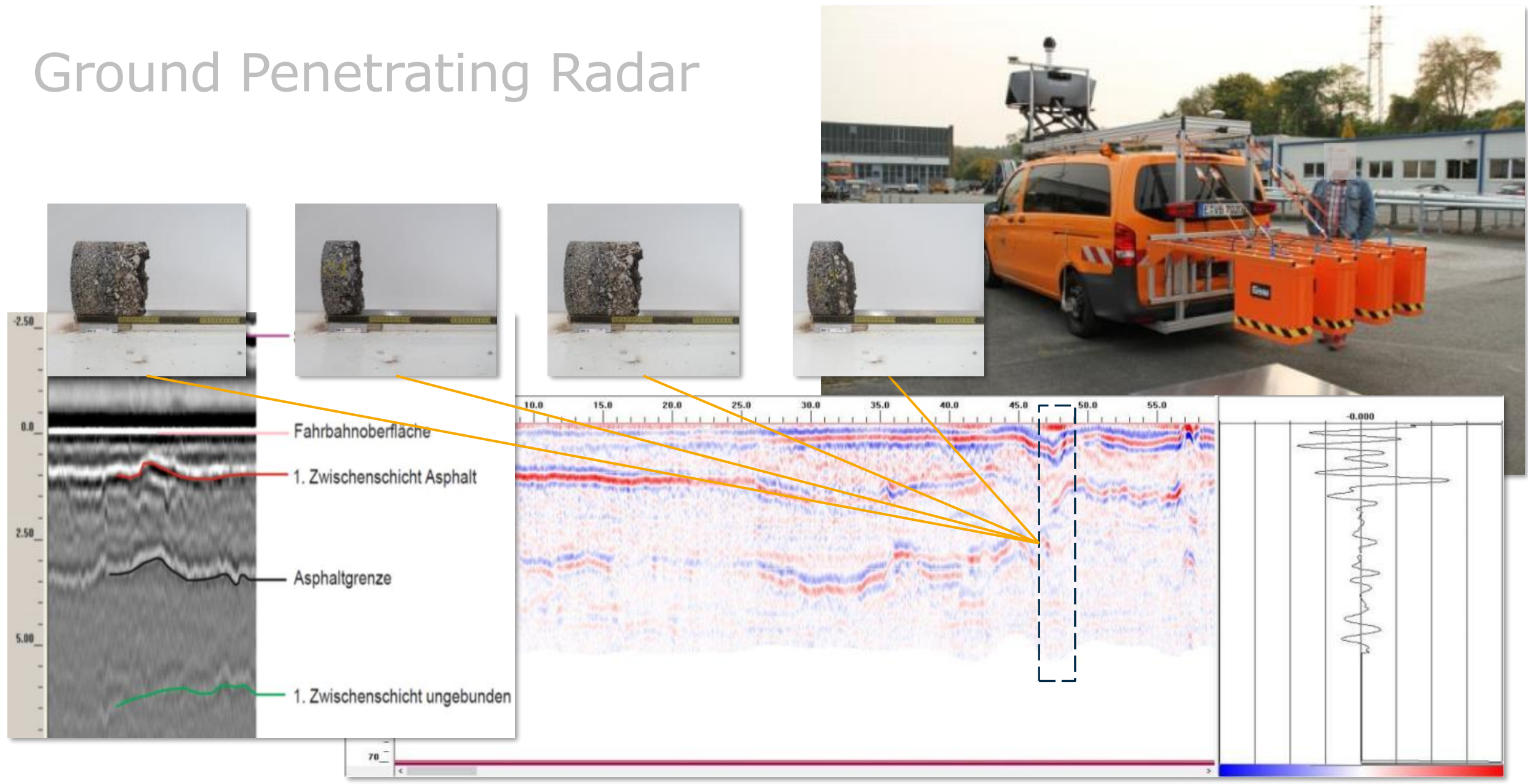
- Visualization & planning
- Inspection & maintenance
- Road condition evaluation & decision support
- Object and asset detection
- Data provision to all city departments
- ...



Panorama Images – Mobile Mapping



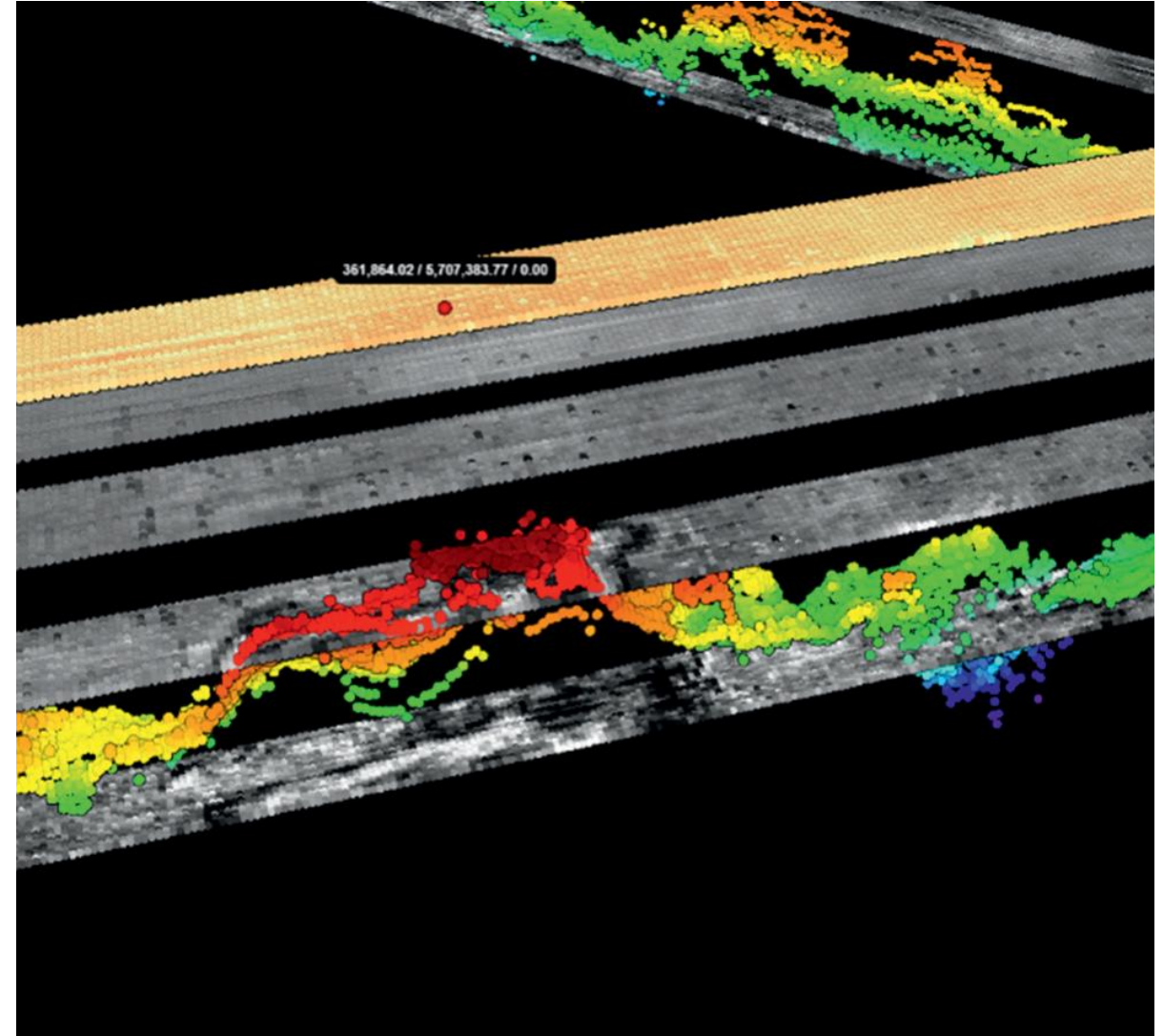
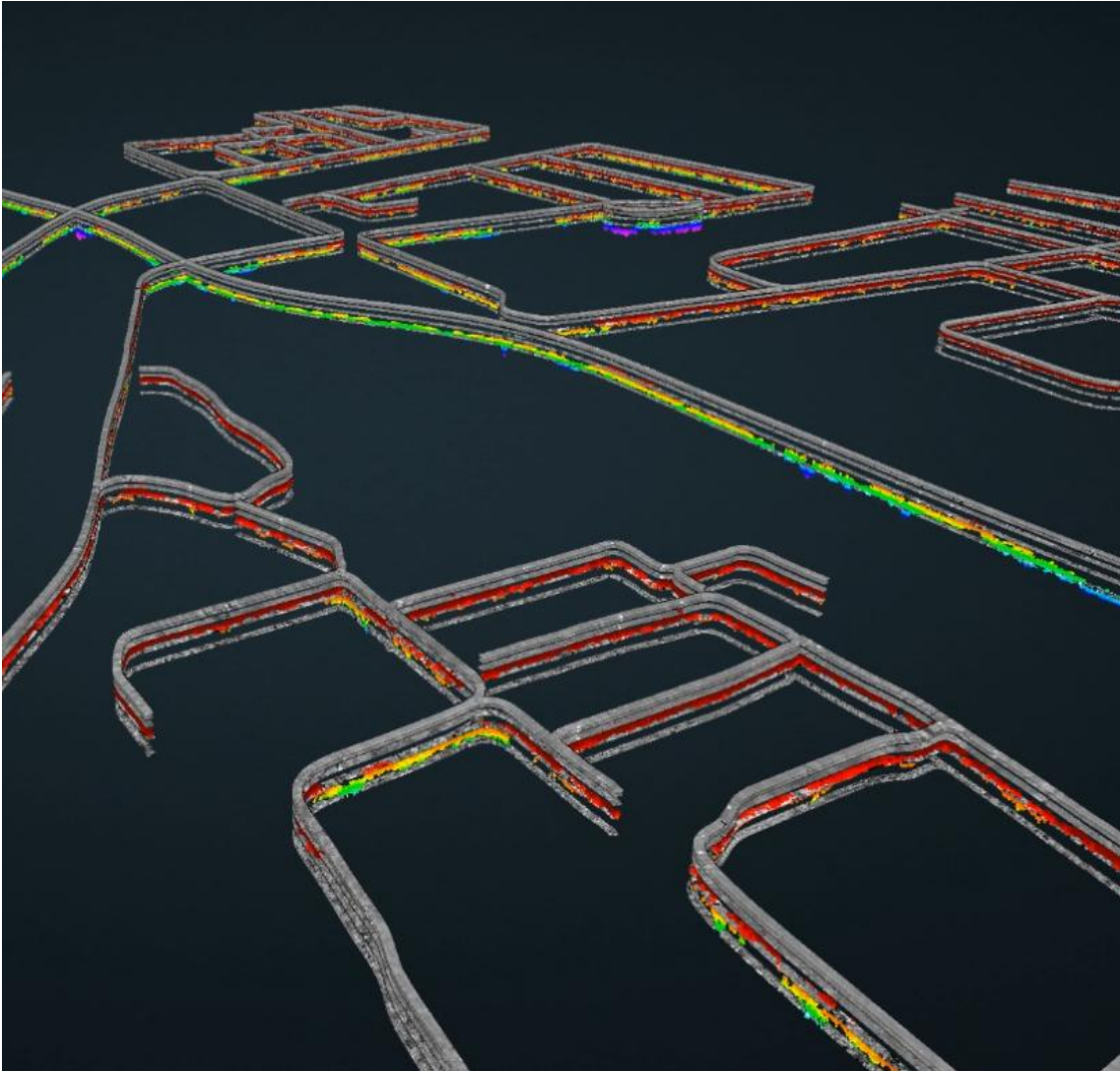
Ground Penetrating Radar



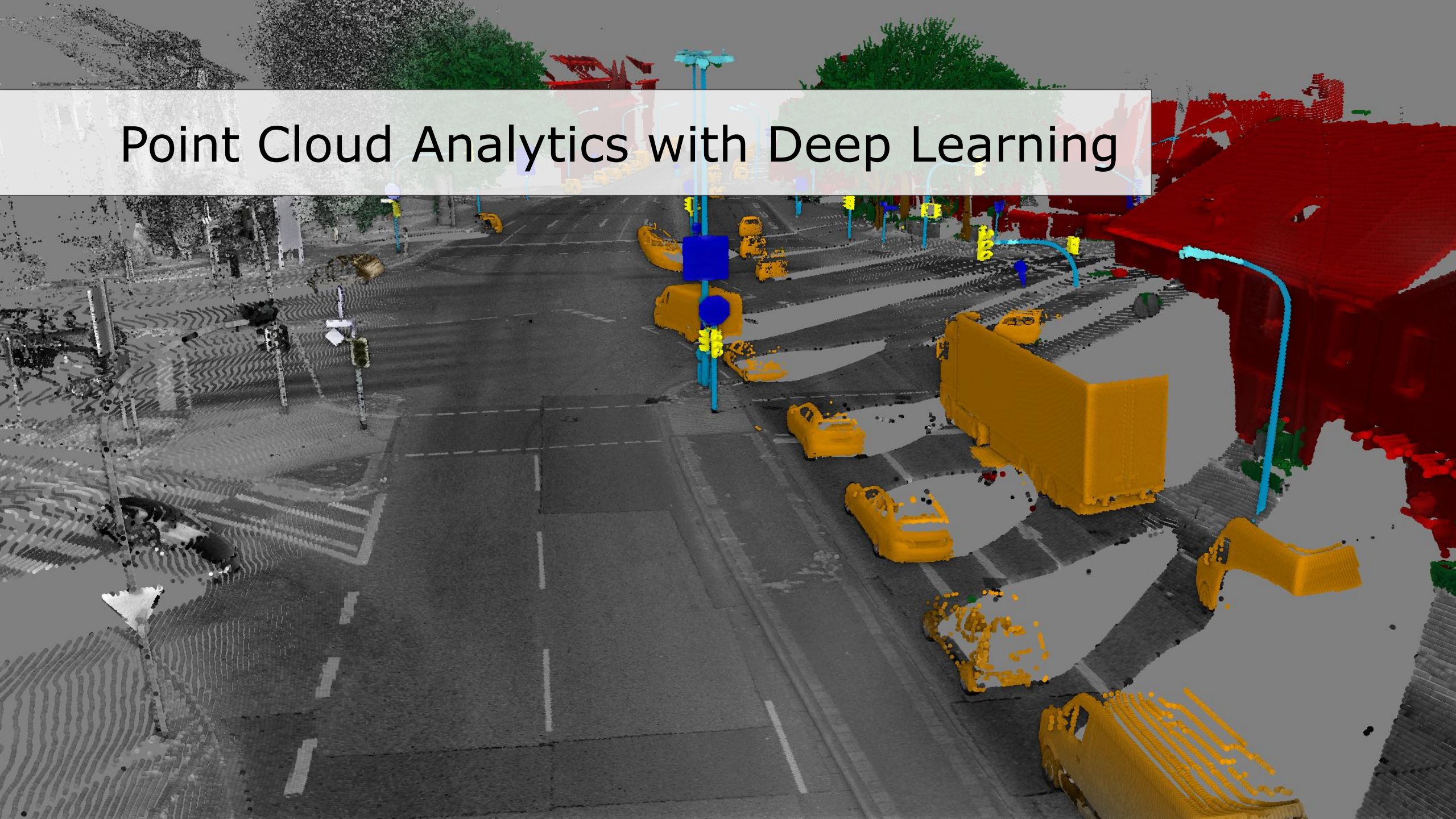
Ground Penetrating Radar



POINT CLOUD
TECHNOLOGY



Point Cloud Analytics with Deep Learning



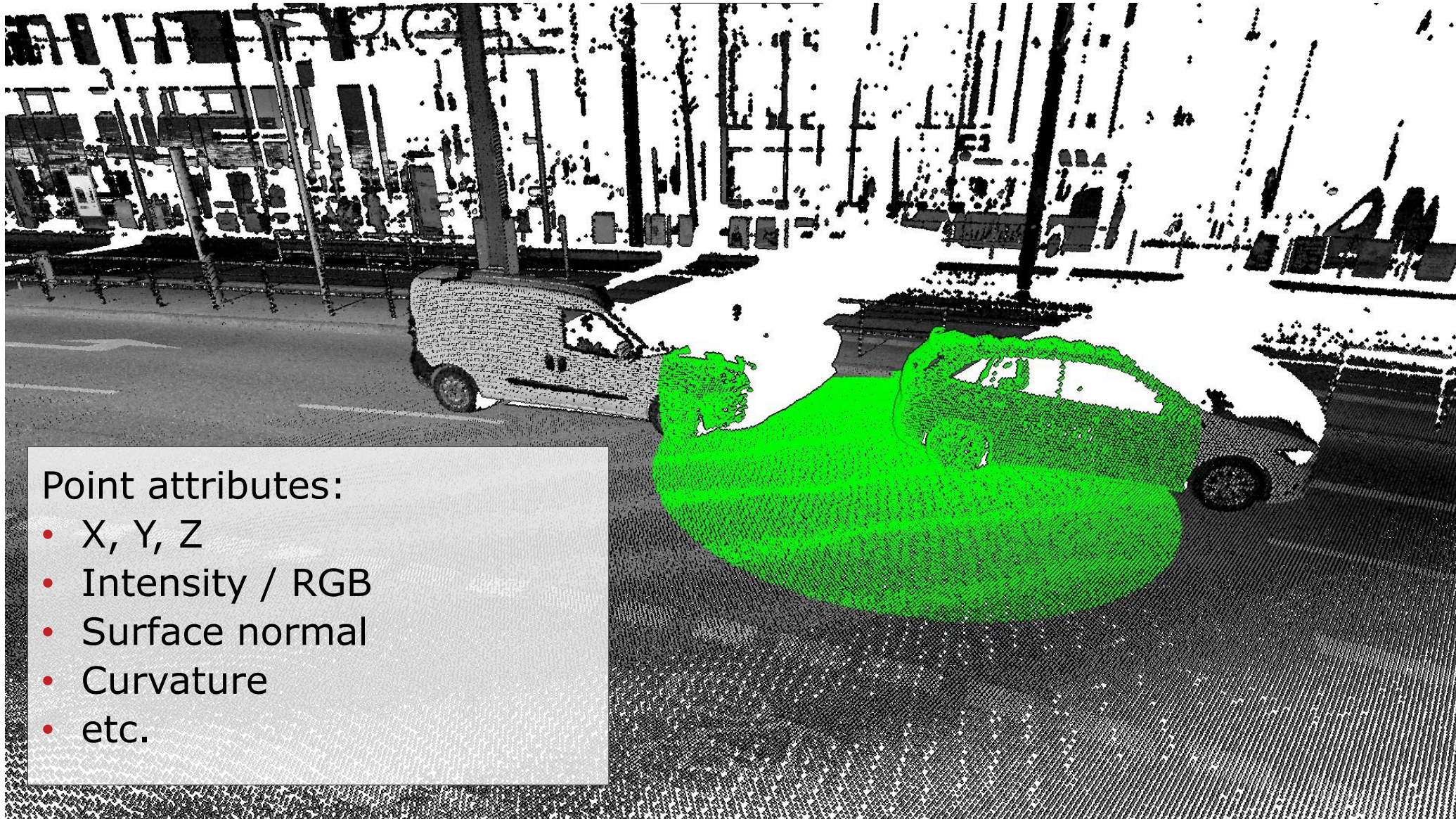
3D Point Cloud – Deep Learning



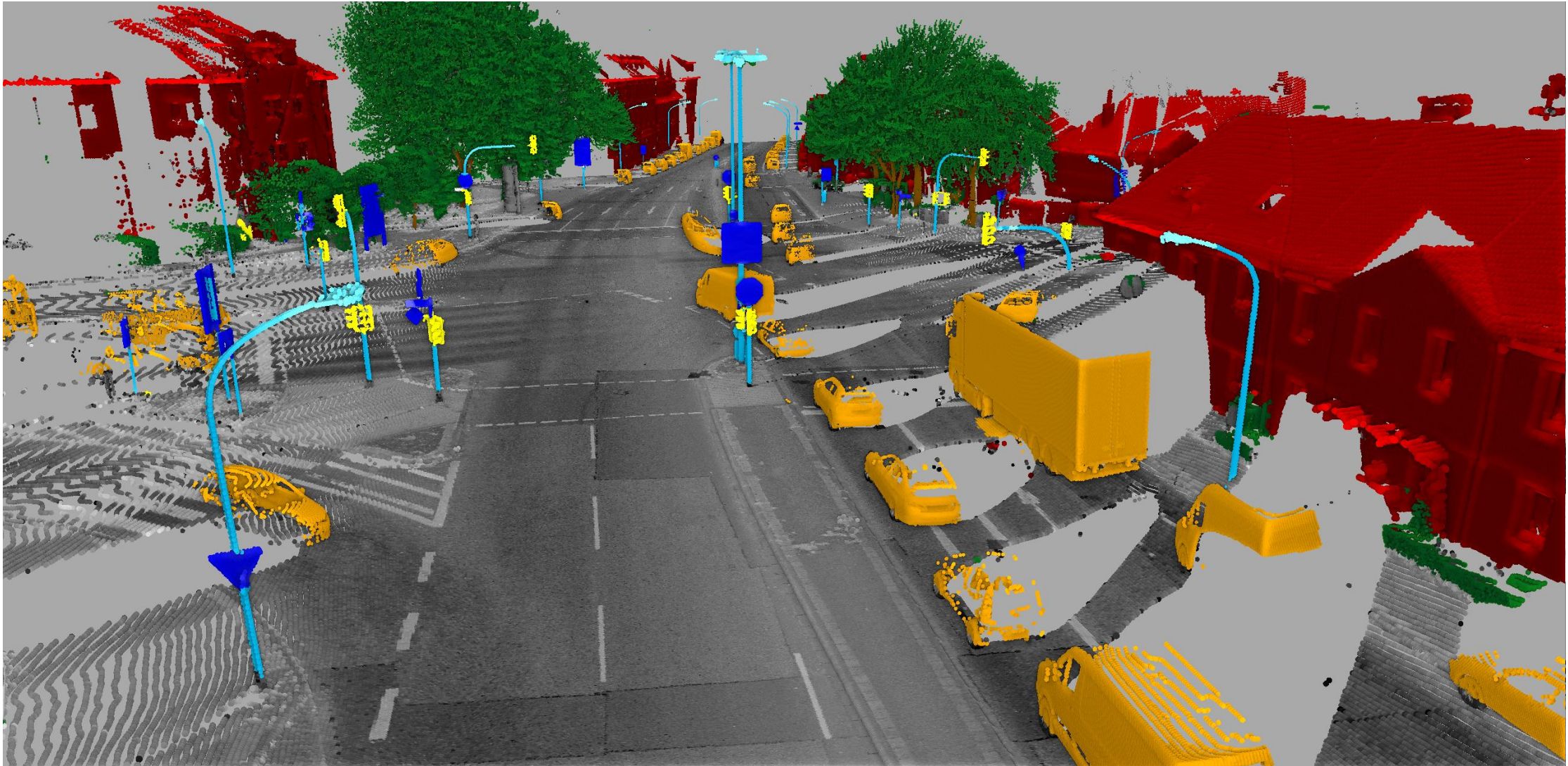
POINT CLOUD
TECHNOLOGY



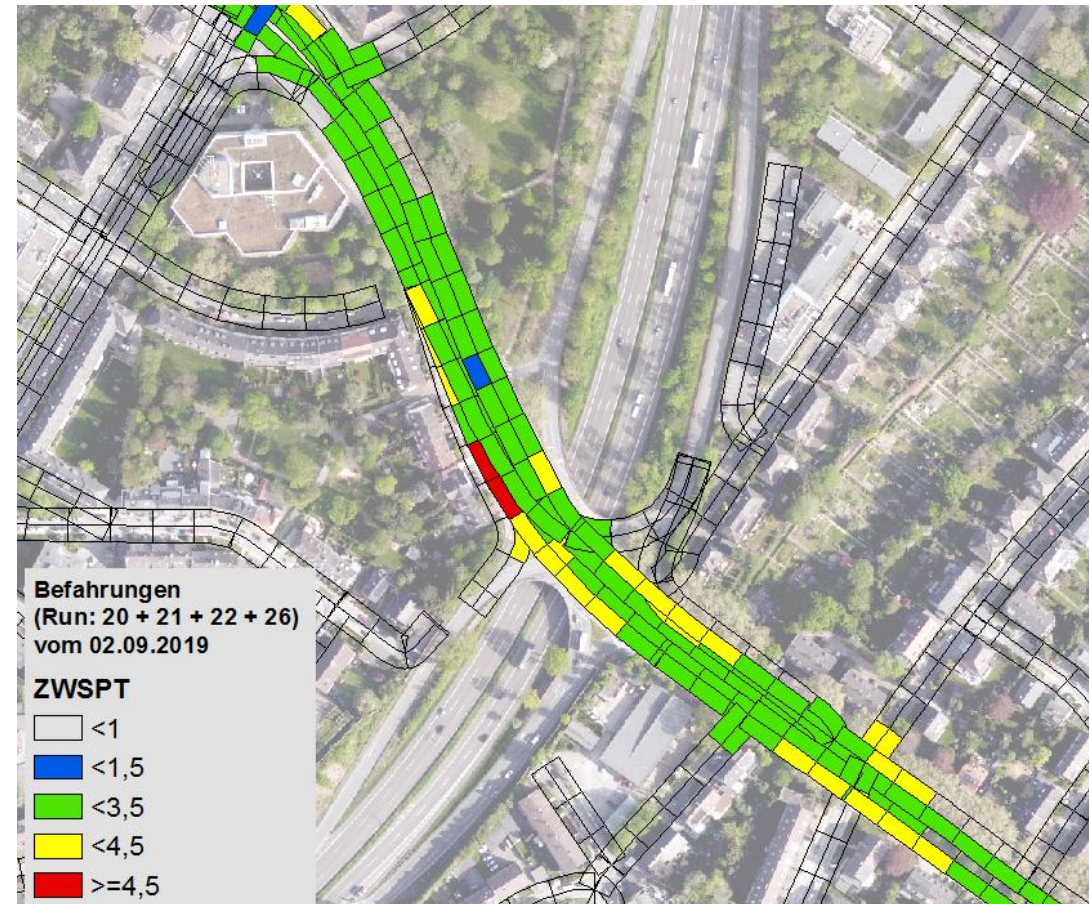
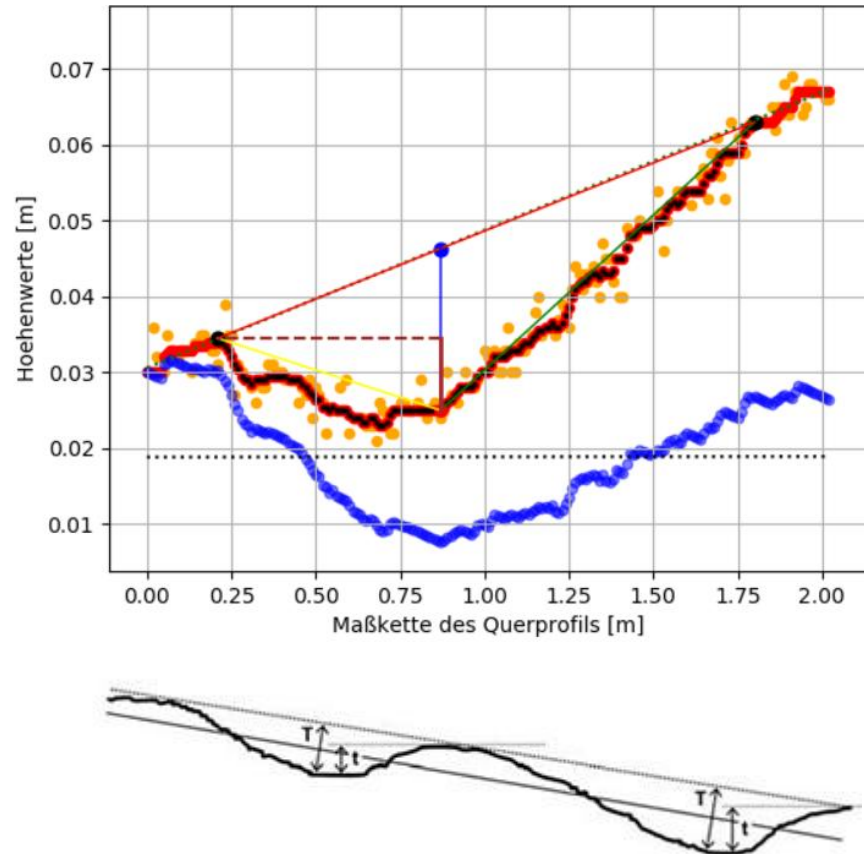
Deep Learning – Sampling Strategies



Deep Learning – Classification Results



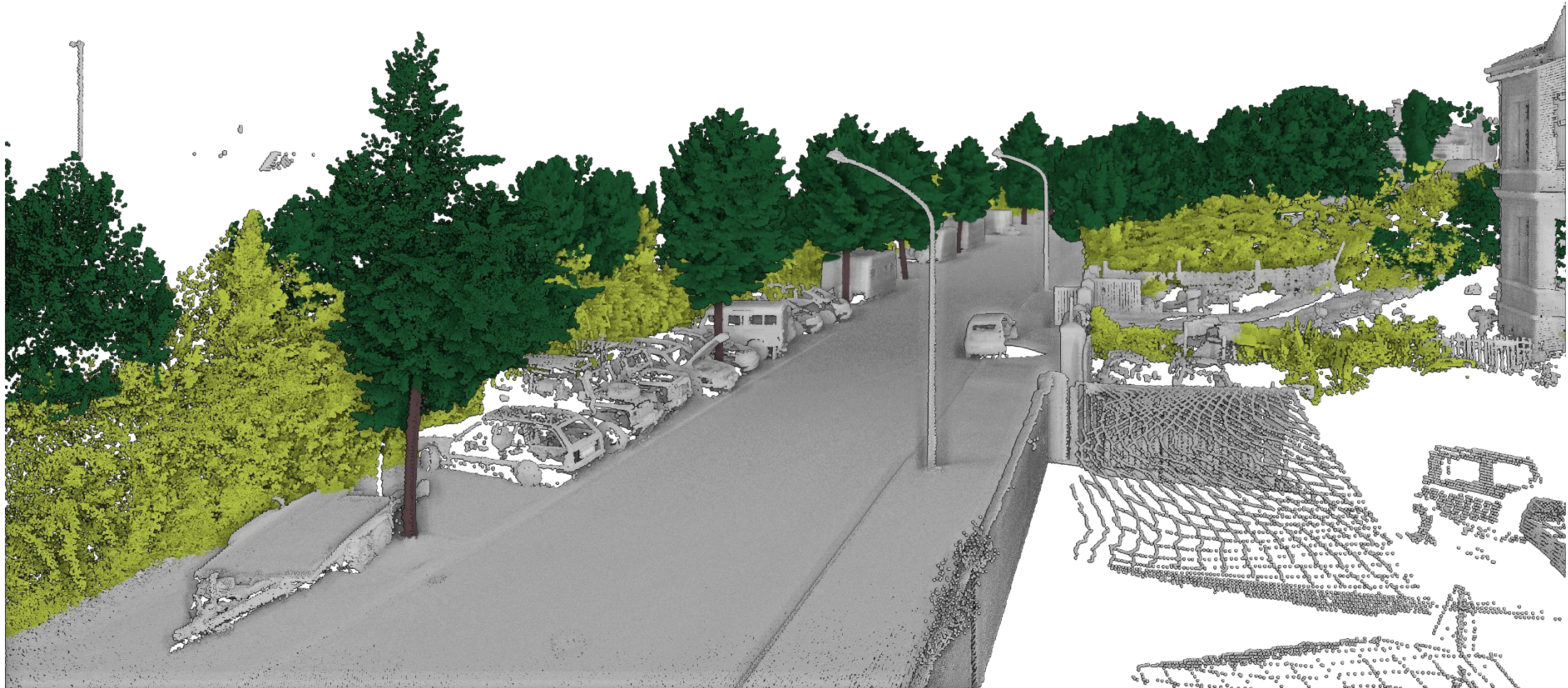
Road Quality Evaluation



Tree Monitoring



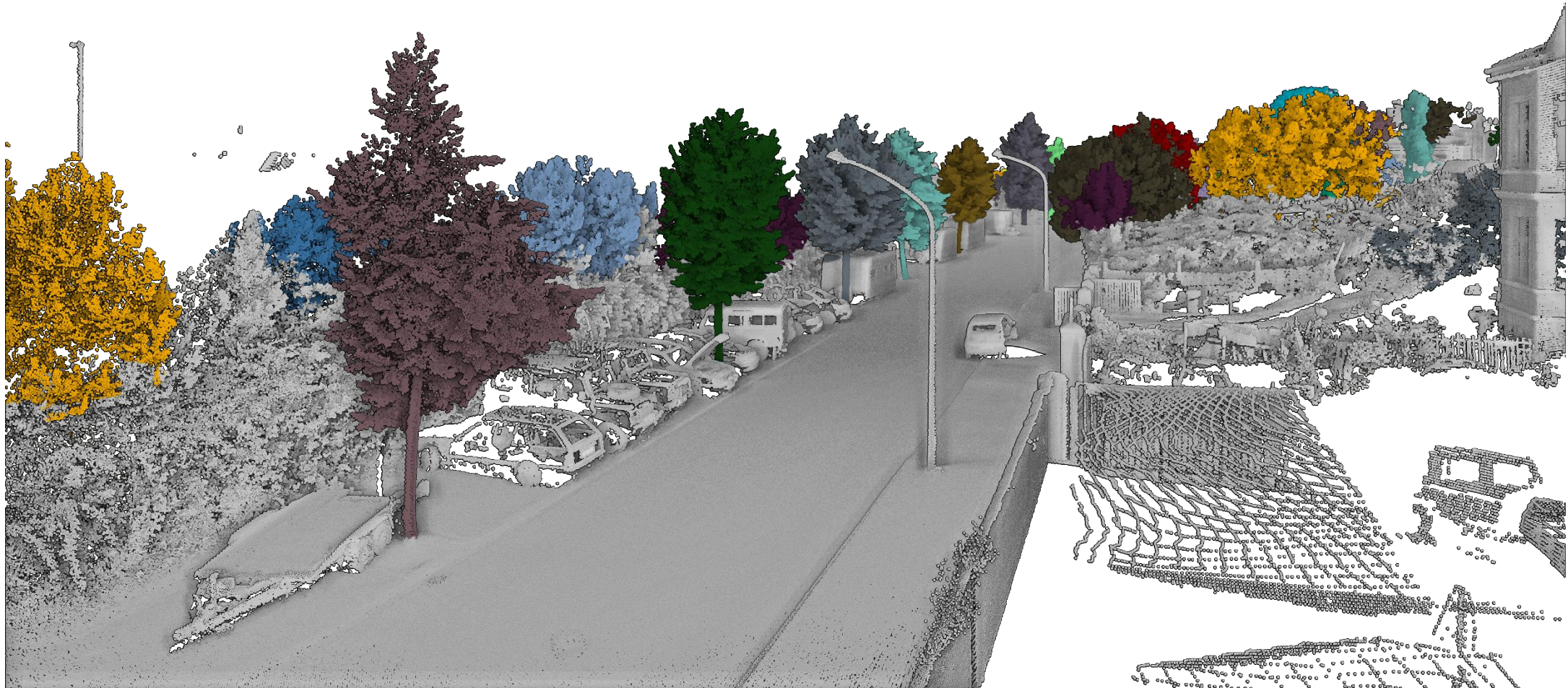
POINT CLOUD
TECHNOLOGY



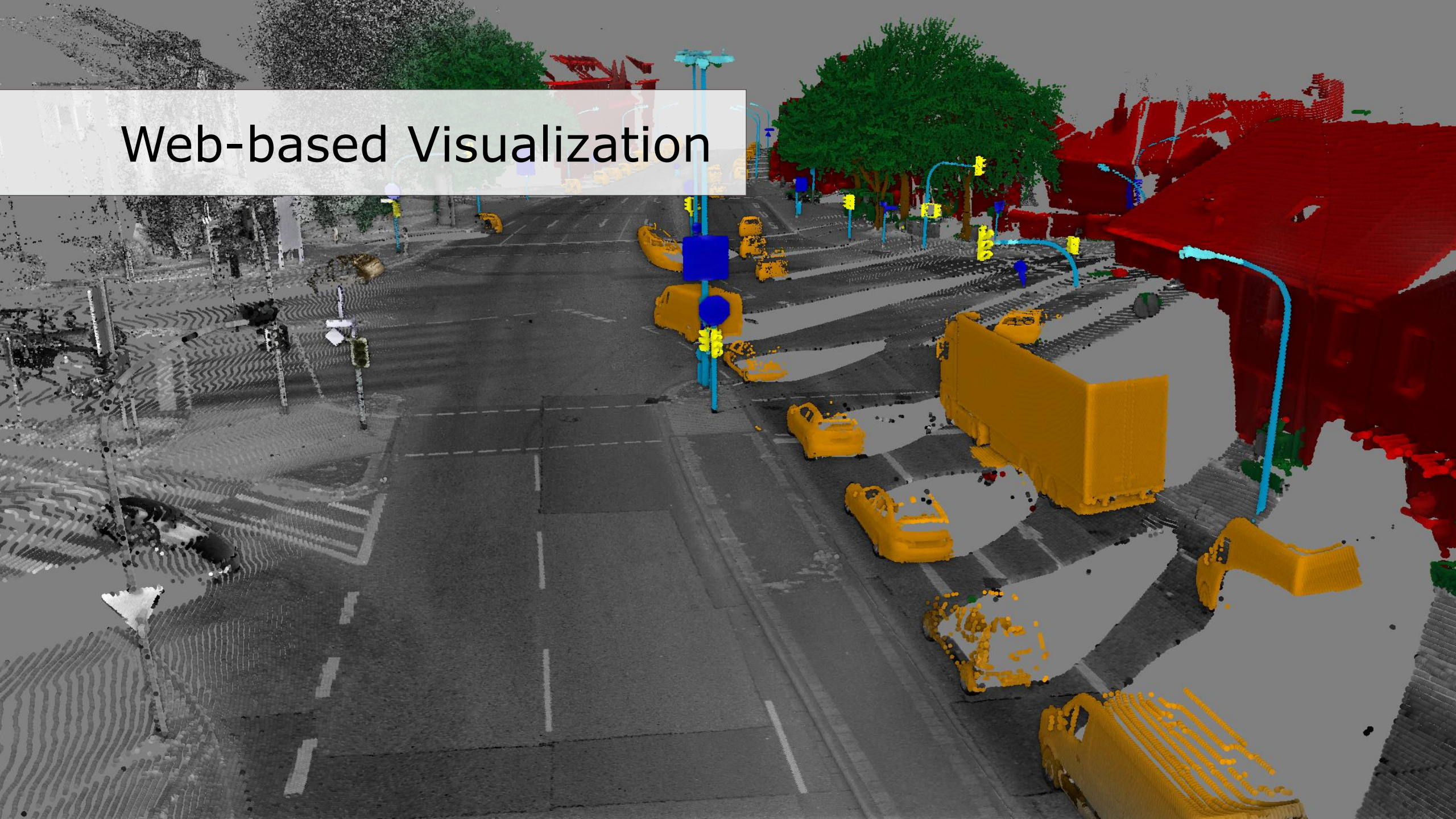
Tree Monitoring



POINT CLOUD
TECHNOLOGY



Web-based Visualization



Web Platform for Visualization & Collaboration

Home

🗺️ 📄 📁 Pro Seite: 20 Sortieren nach: Datum ↑↓

☐ Nach Teilprojekten gruppieren

Punktwolken

Punktwolkenfusionen

Diese Liste zeigt nur Punktwolken an, die auf der Übersichtskarte sichtbar sind. Wenn du die Karte bewegst oder zoomst, aktualisiert sich die Liste automatisch. Es werden nur georeferenzierte Punktwolken angezeigt.



7.85 Mrd. Punkte

15_Ardeyschule_str...

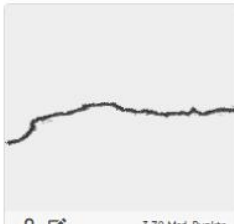
📅 07.12.2023 👤 adrian.holfter
👥 Essen Schulen
📁 Mit Panoramas



6.87 Mrd. Punkte

65_Bonificiusschule

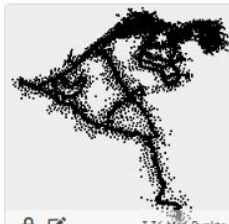
📅 07.12.2023 👤 adrian.holfter
👥 Essen Schulen
📁 Ohne Panoramas



3.70 Mrd. Punkte

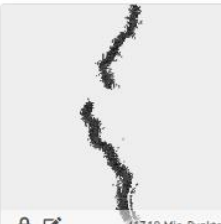
T4R Straßen.NRW M...

📅 01.12.2023 👤 adrian.holfter
👥 Twin4Road
📁 Modellgebiete



3.36 Mio. Punkte

T4R Essen MG4 202...



1719 Mio. Punkte

T4R Straßen.NRW M...



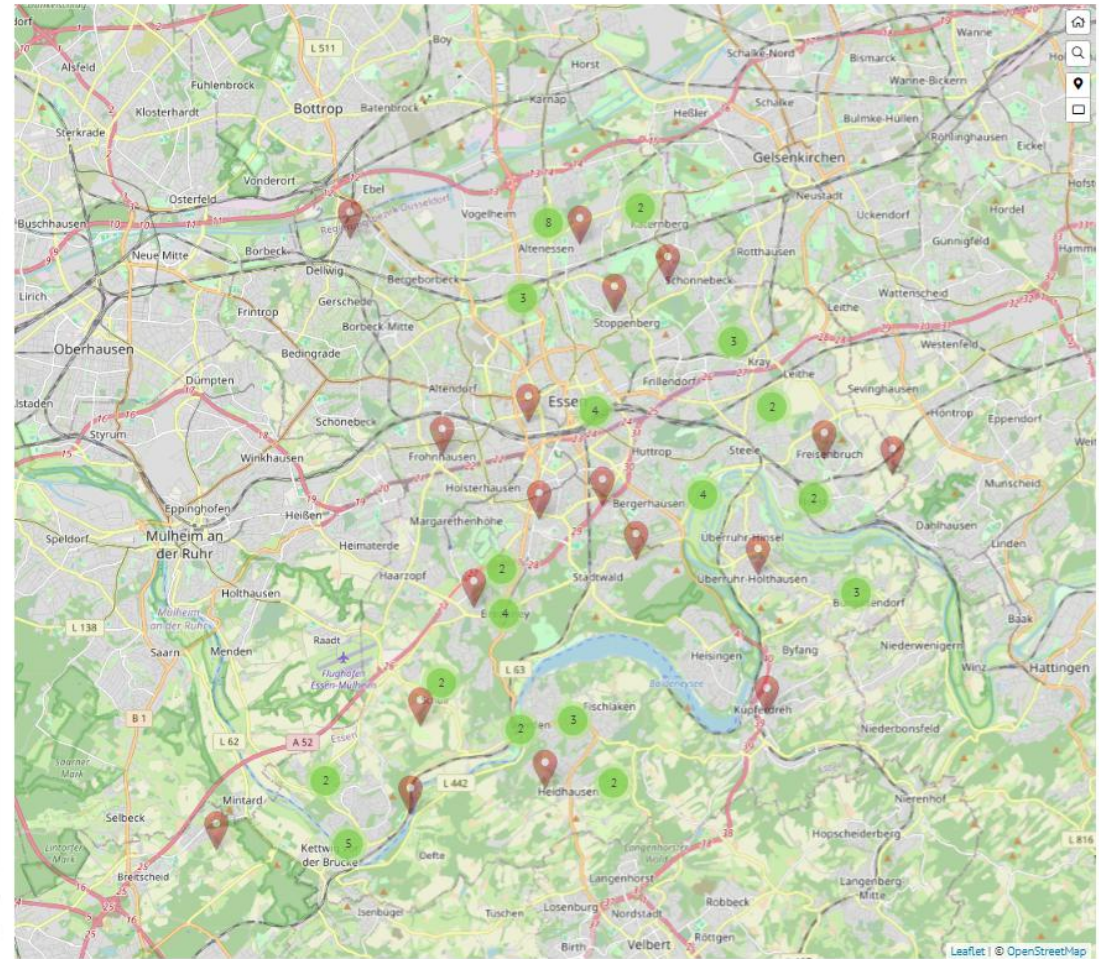
2.09 Mio. Punkte

2023-08-21_UK_50f

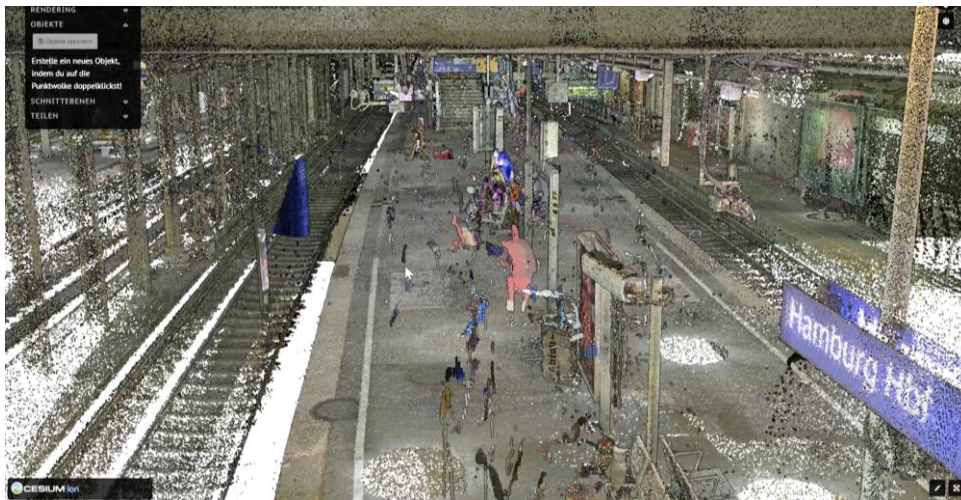
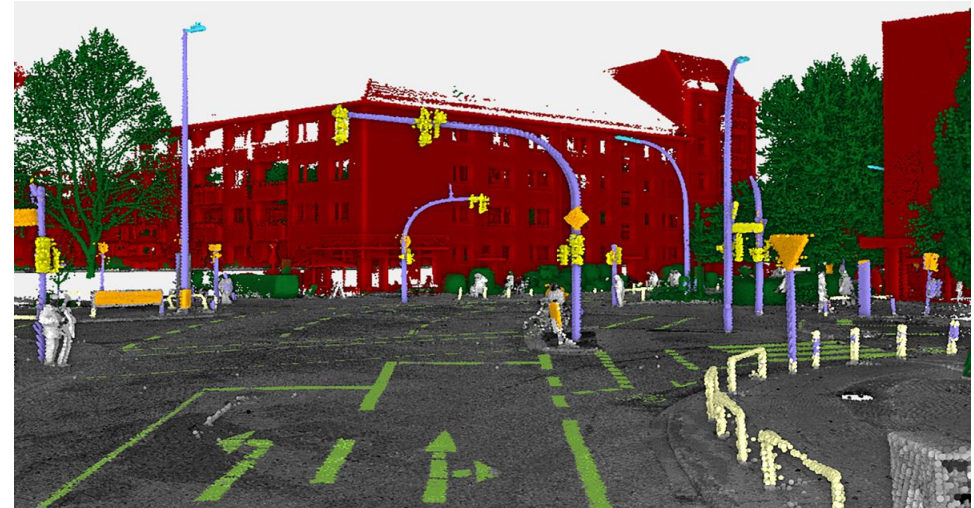
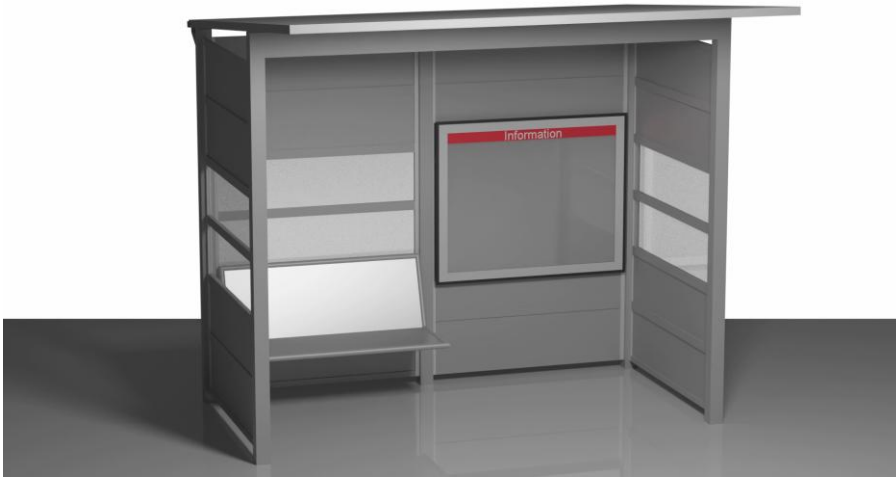
<Vorherige

1 2 3 4

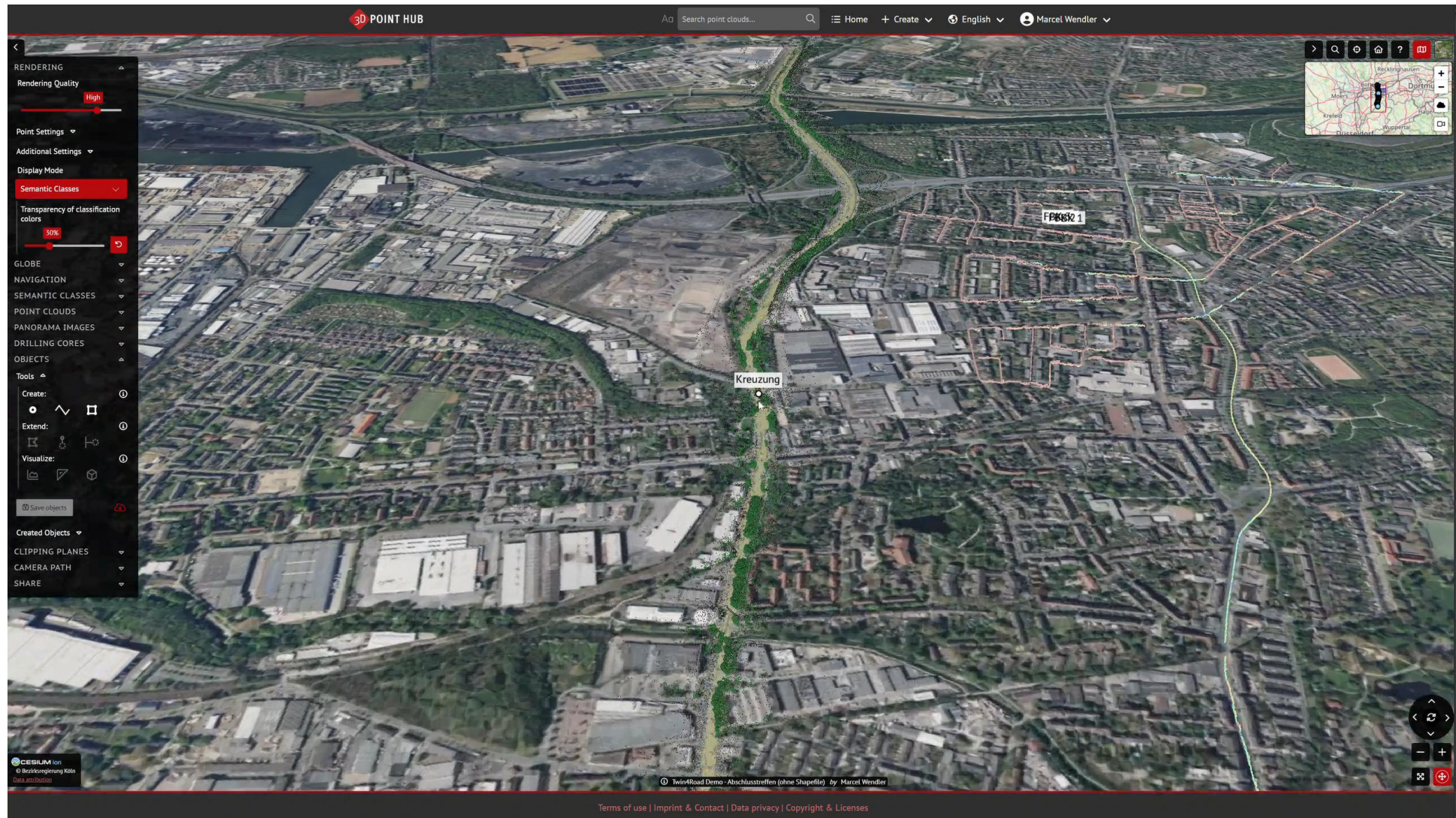
Nächste >



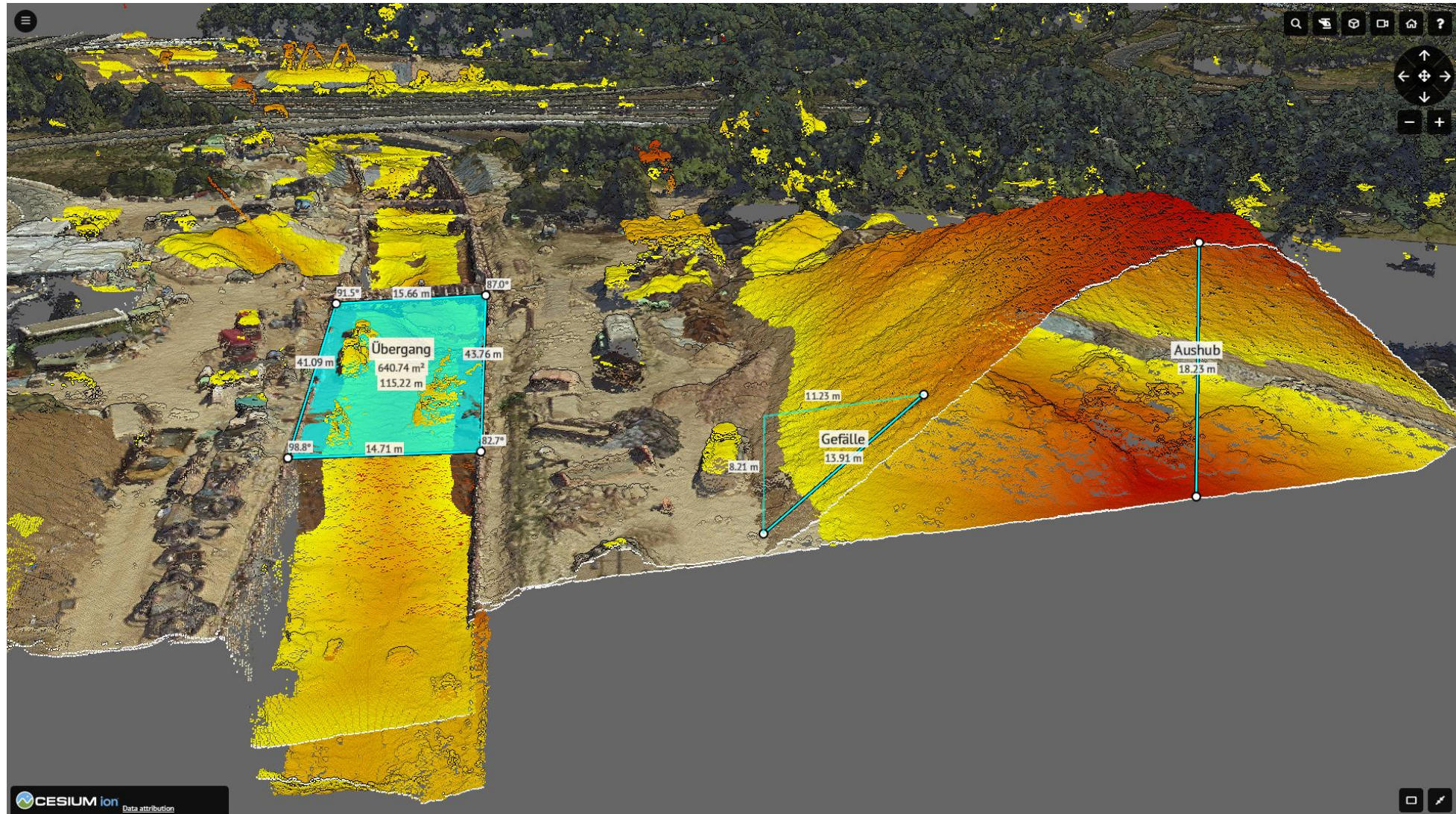
Web Platform for Visualization & Collaboration



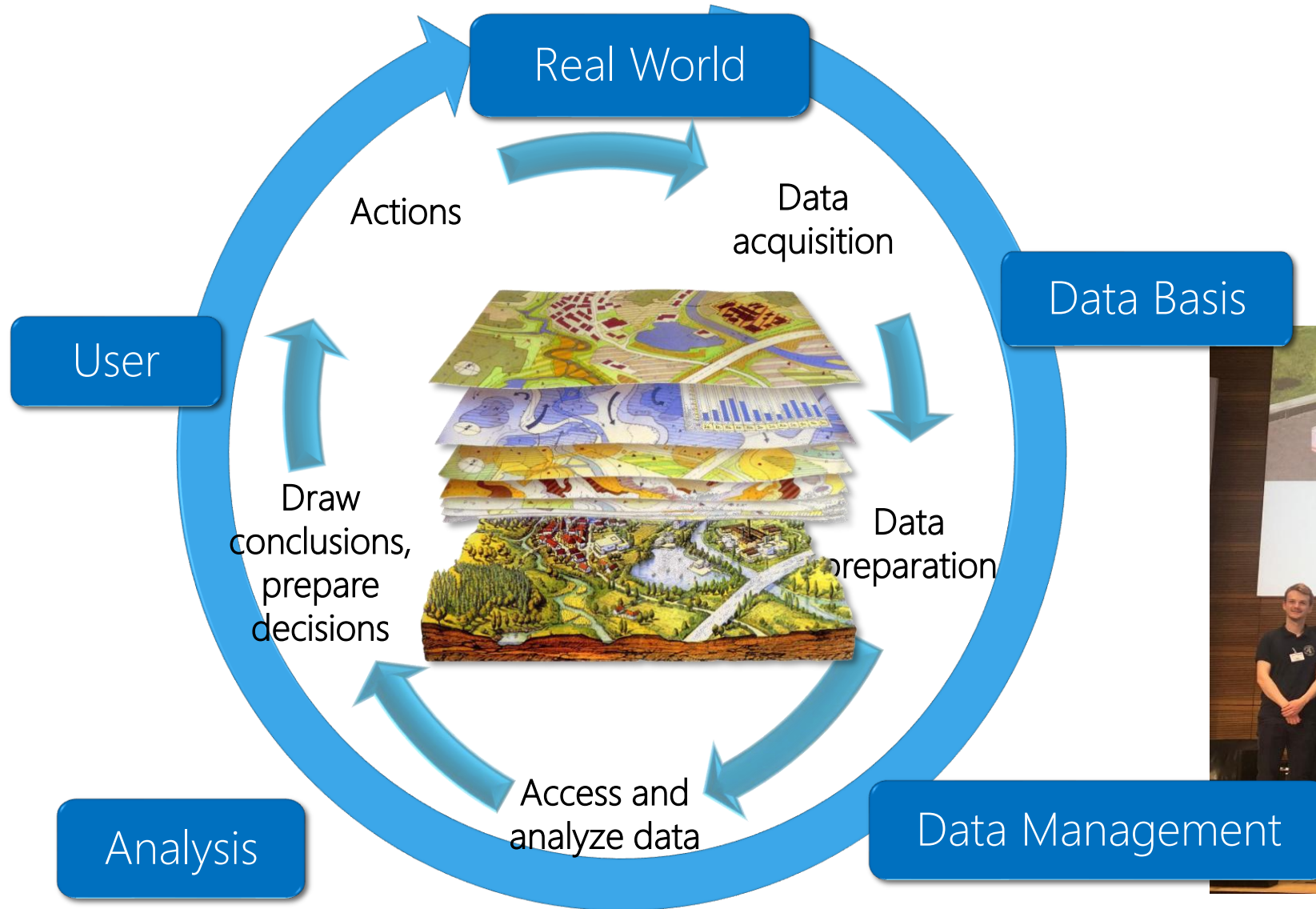
Web-based Visualization



Change Detection – Construction Sites



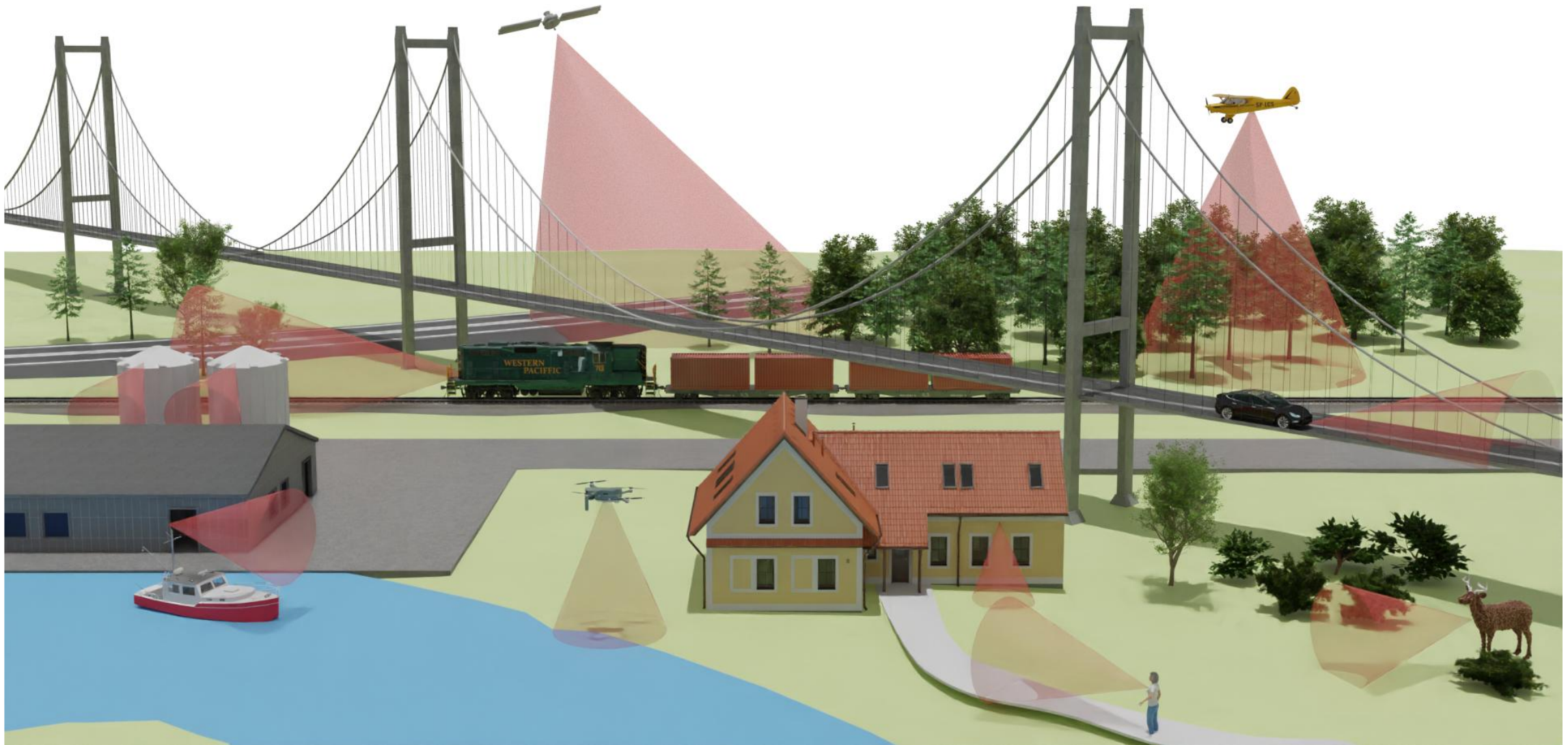
Research Project: "Twin4Road"



Future Data Acquisition



POINT CLOUD
TECHNOLOGY



“Data availability, accuracy, density, and massivity of 3D/4D point clouds will vastly increase within the next years”

- **Point cloud analytics** is important for domain-specific applications.
- **Multi-temporal point clouds** enables selective updates and offer new insights.
- **Scalable infrastructures, GPU-based algorithms, AI-based processing strategies** are required to handle massive, dense, and large-scale point clouds.
- **Cloud infrastructures** are required to provide point clouds for different scales.
- **On-demand processing** and **analysis** is a key challenge.

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Data (among others) provided by:

