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塑造智慧变革

北京
国家会议中心
2018年
9月10-12日
2018.hexagonchina.com.cn

Mobile Mapping Product Line

Alessandro Nuzzo – Product Line Manager Mobile Mapping

2018, September 11th

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World Population
7.5 Billion and Counting

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3 million People move to Cities each Week

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90% of all Data in the World was created in the last 3 yrs

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Car OEMs announced first Autonomous Vehicles for 2023

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Data Ownership is the new Oil

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- Topography X,Y,Z
- Topology

- Database completeness
- Information obsolescence

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Speed of Change

- After decades spent to map, now we have to control ***dynamic realities***
- The data collection and processing must be faster than the speed of changes of the reality
- ***Accuracy*** is referred to accurate information, ***not just and only X,Y,Z***…. a slow system cannot be accurate

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Pegasus:Two

- Vehicle independent System
- Asset Management
- Road Analysis
- Rail Infrastructure Survey
- Survey Grade Accuracy

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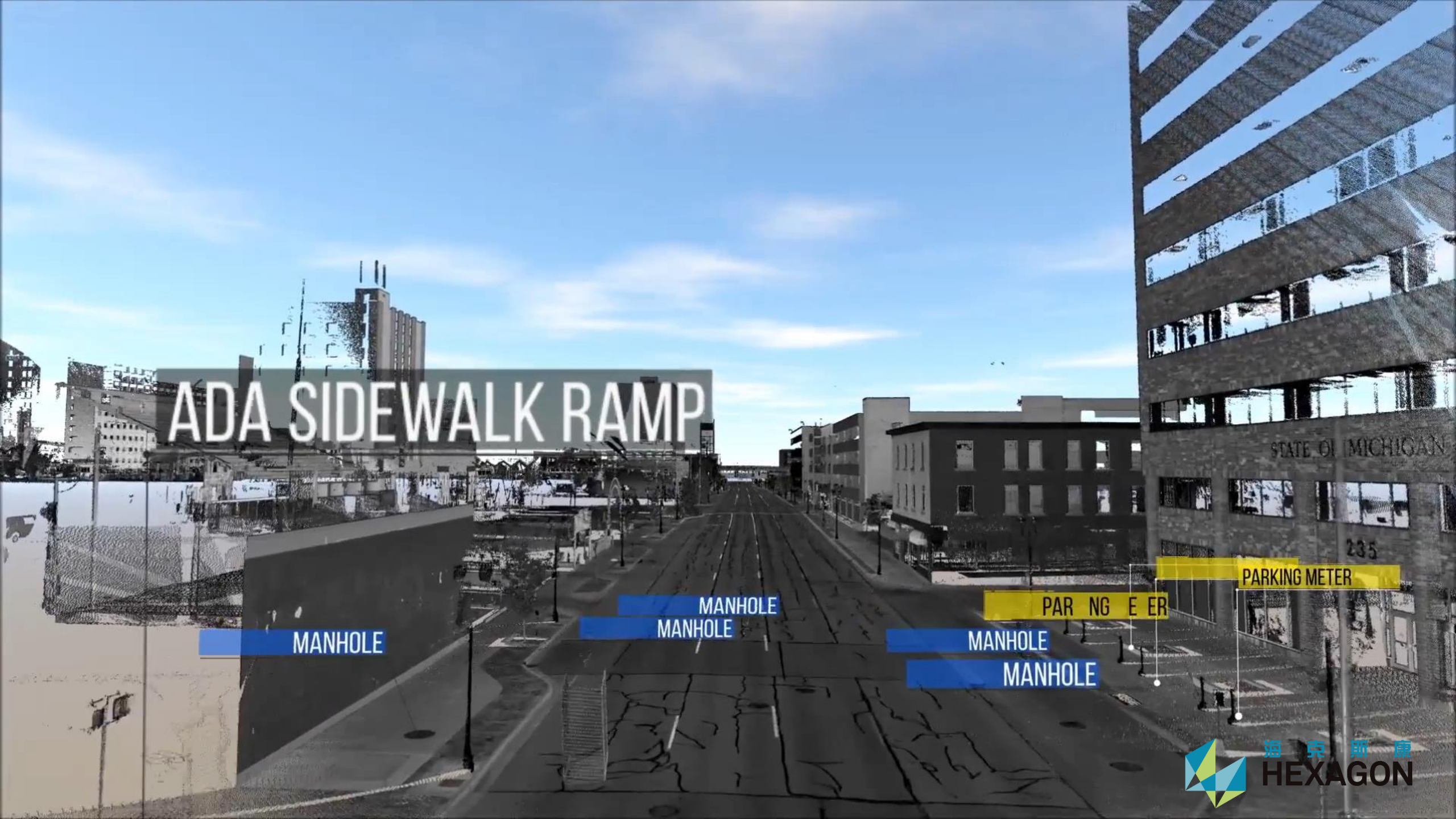
ADA SIDEWALK RAMP
MANHOLE
MANHOLE
MANHOLE
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STATE OF MICHIGAN
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Boat Application

- Damage Inspections
- Deformation Analysis
- Coastal Erosion
- Harbour inspection

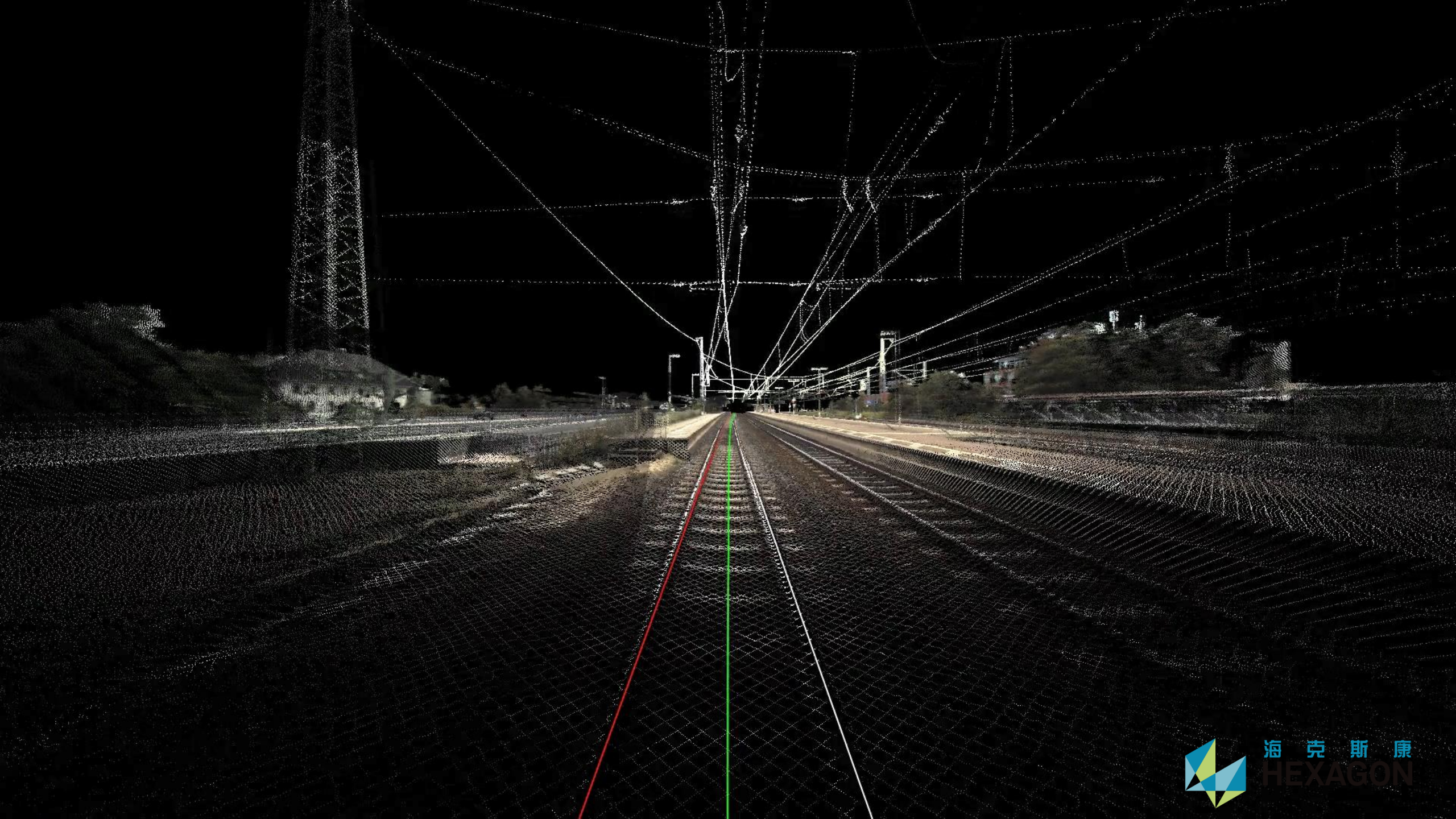
BBC

Rail Application

Leica Pegasus:Two

Sensor Platform to combine Ground Penetrating Radar and Thermal Imagery

- Clearances
- Asset / GIS / PTC Mapping
- Track Geometry
- Change Detection
- Catenary Mapping
- Vegetation Mapping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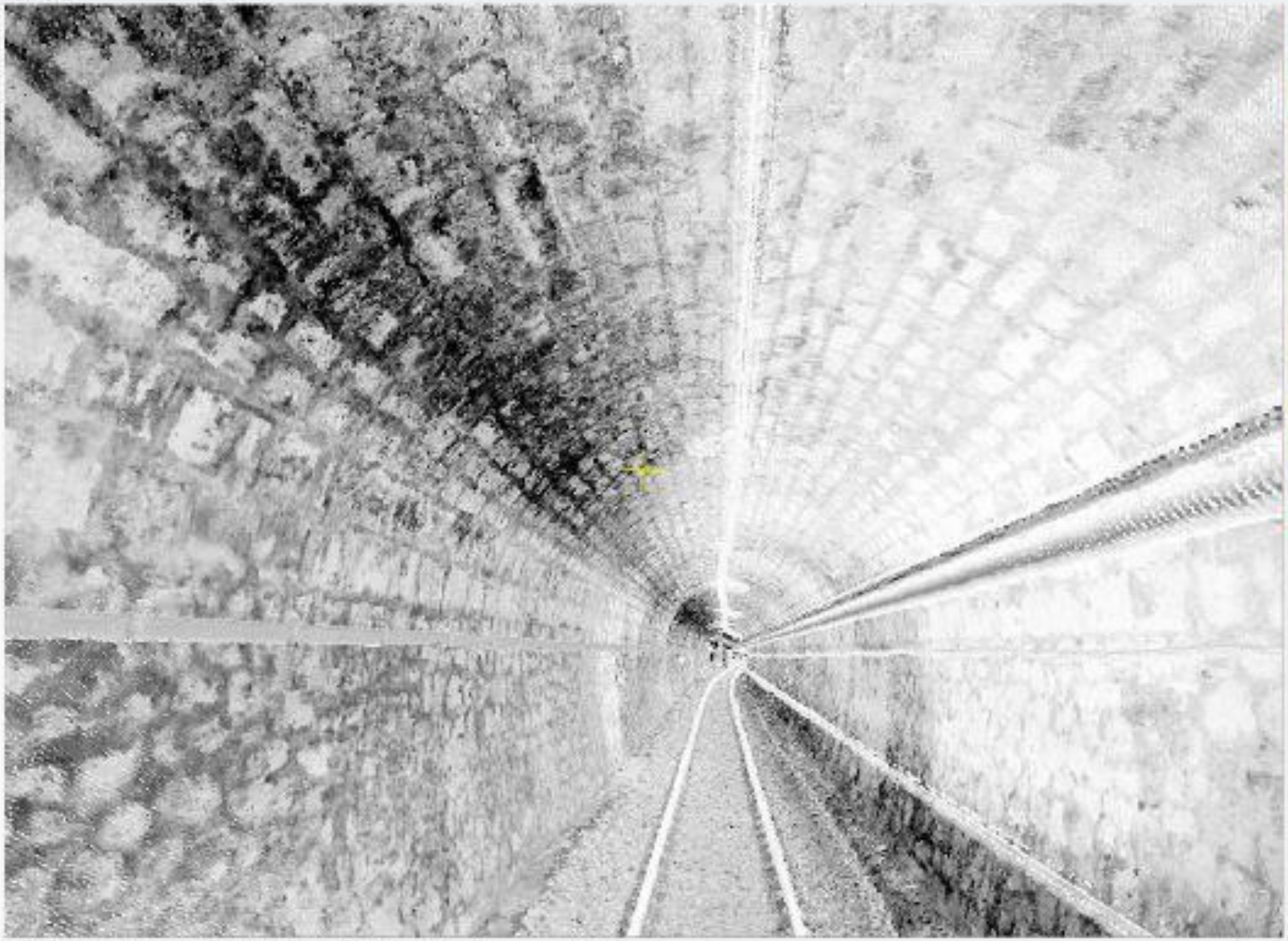
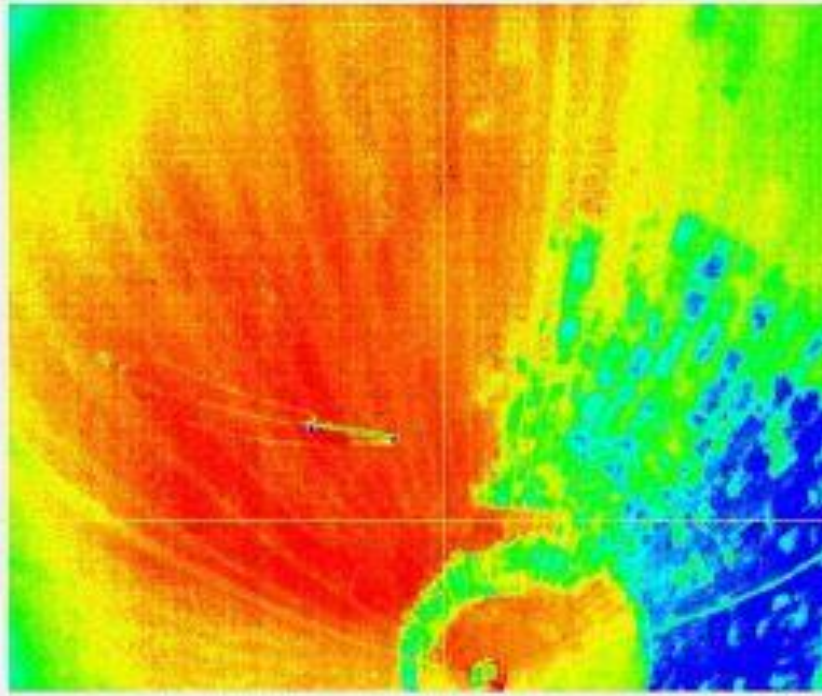
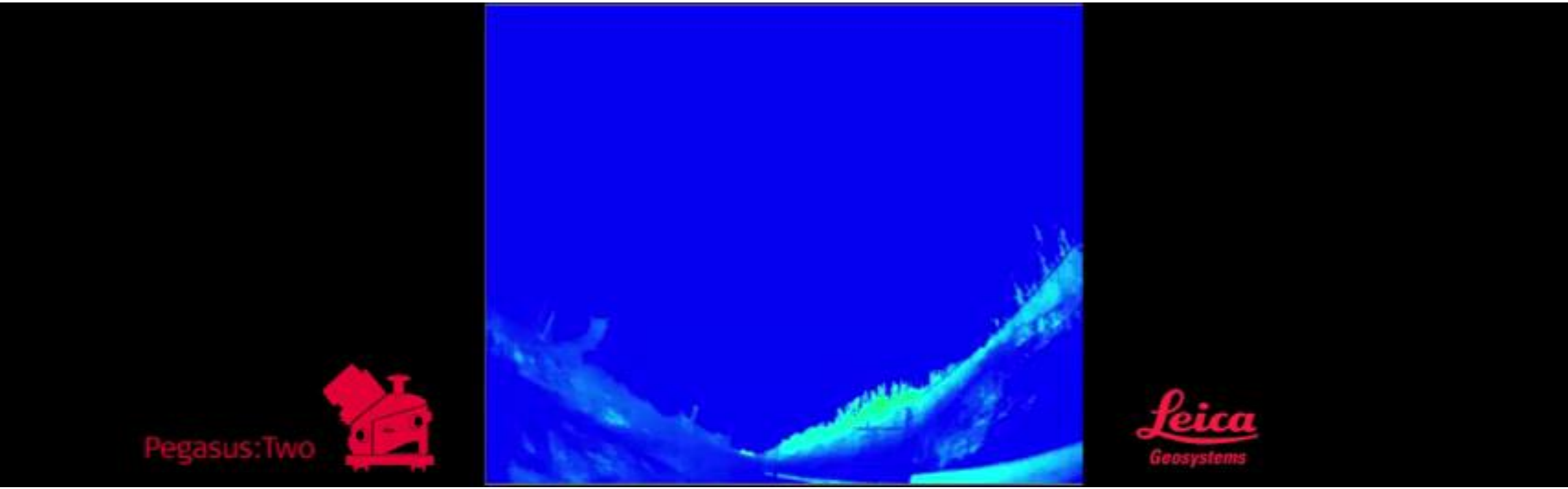




Pegasus:Two and Thermal Imagery



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Pegasus:Stream

- Below and Above Ground
- Asset Management
- Buried Objects
- Cavities Detection
- Massive Data Capturing

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CITY DIGITISATION FOR AUTONOMOUS VEHICLE REFERENCE BASE MAPS

Reality Capture

World Wide Road Digitalisation

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OpenDrive

Intersection in OpenDrive including complete object information

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YIELD
MSC Software

80% of our Living Space is Indoor

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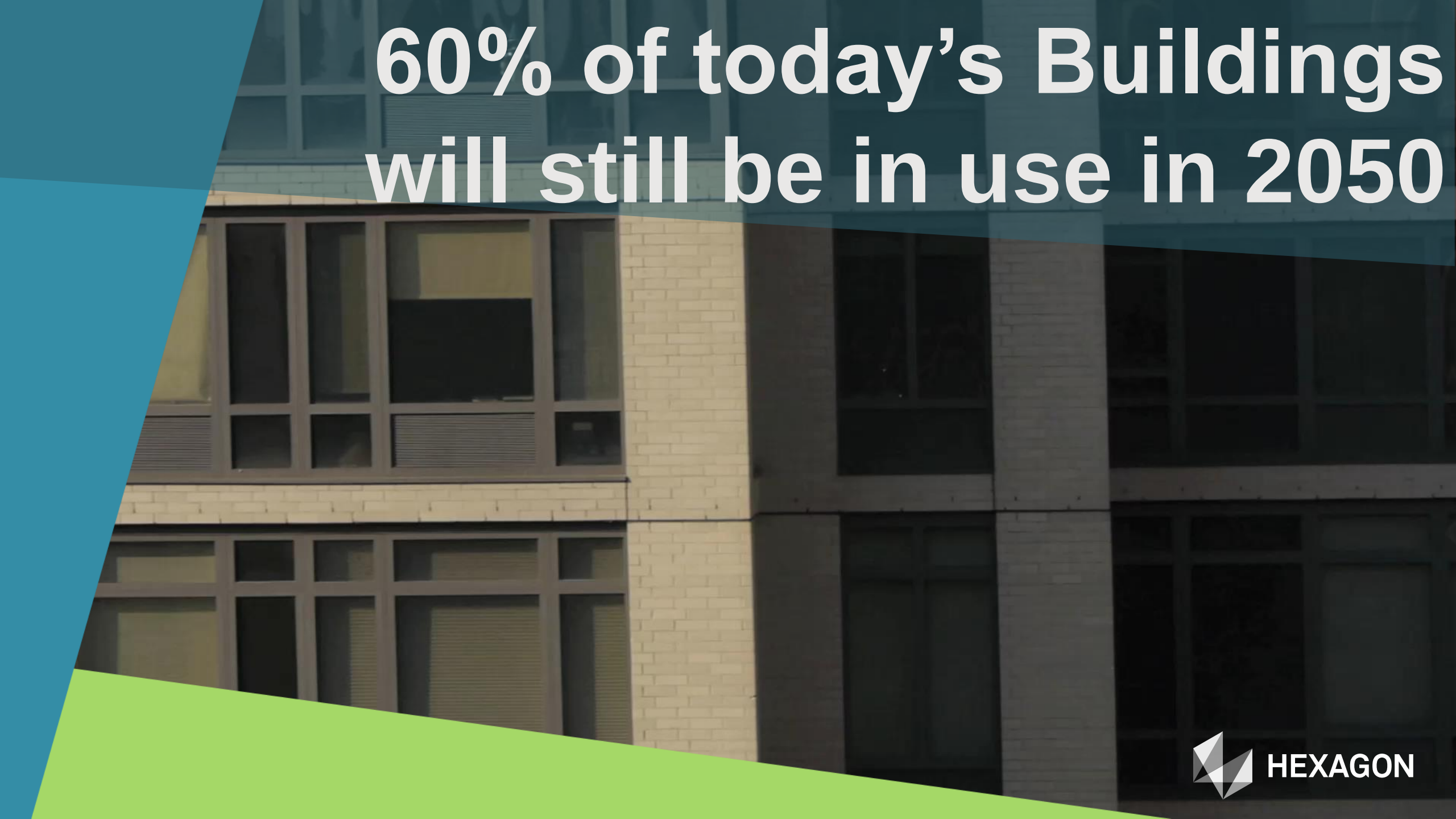
60% of today's Buildings will still be in use in 2050



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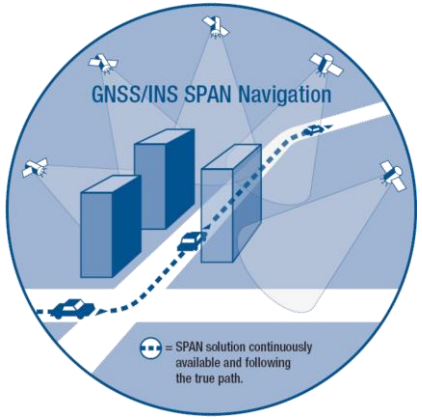
New positioning methods are needed

GNSS/INS Navigation

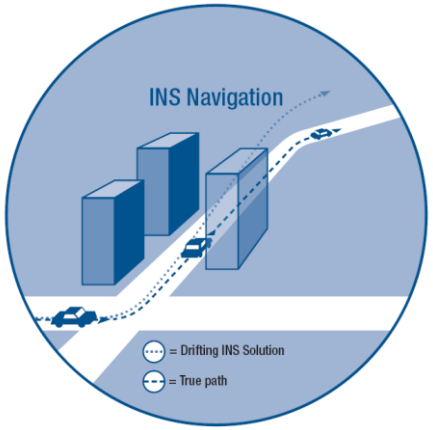


Satellite based positioning systems is the backbone of all mobile mapping

Requires a direct line-of-site to the satellites

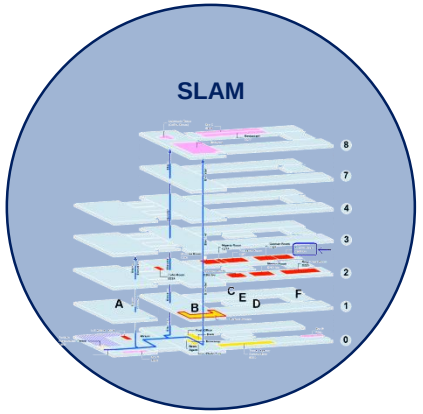
Need Orientation information

INS Navigation



Adding an Inertial Navigation System allows us to determine orientation and navigate without access to satellite signals

SLAM Navigation



A method of measuring the environment and determining a location in that environment at the same time

Outdoor

Indoor

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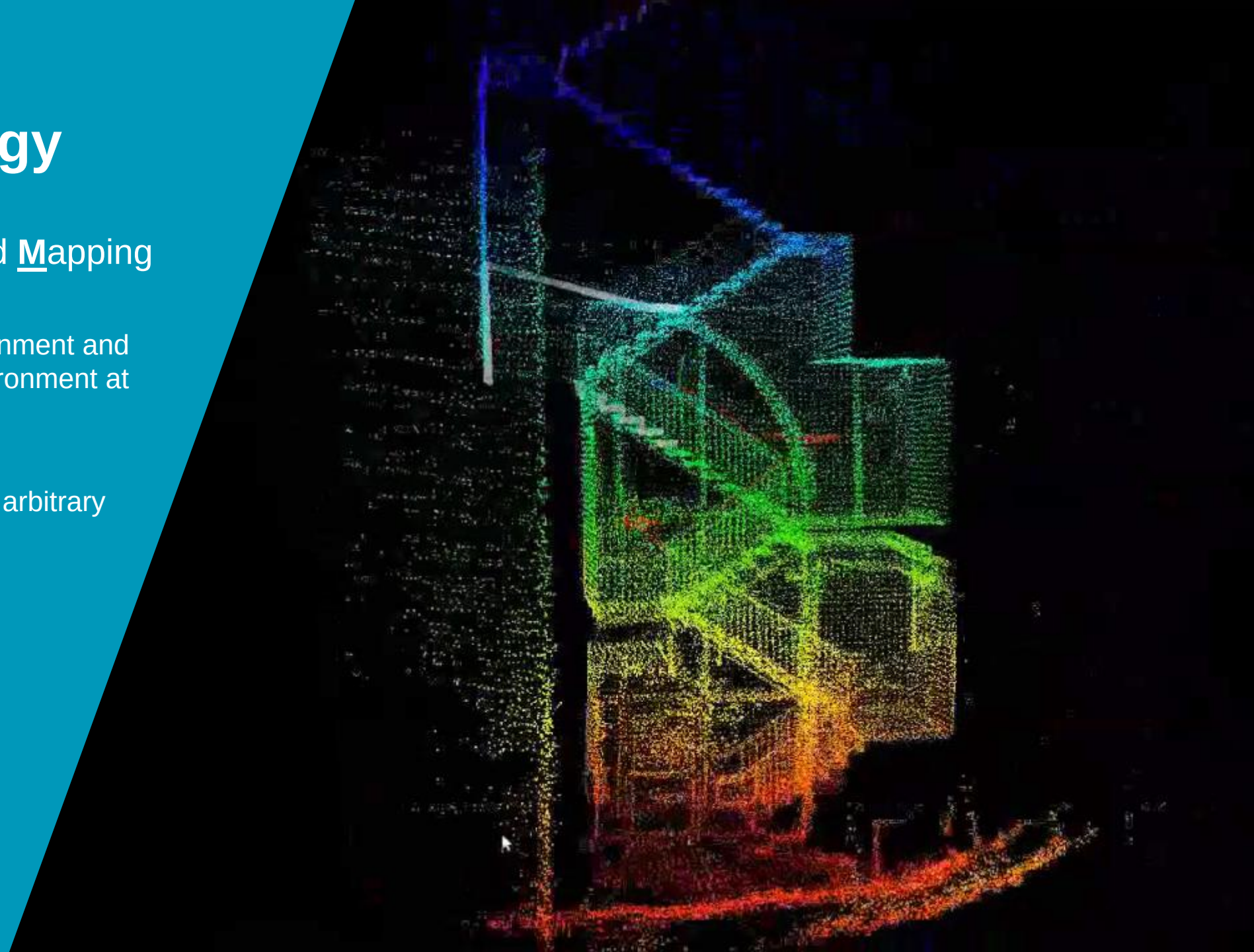
SLAM Technology

Simultaneous **L**ocation **A**nd **M**apping

A method of measuring the environment and determining a location in that environment at the same time

- SLAM allows us to measure an arbitrary environment
- No spatial context



Pegasus:Backpack

- Wearable Ultra Light System
- Indoor & Outdoor Survey
- Asset Management
- BIM Documentation
- Desaster Recovery

2836

Bayerische Moteren Werke AG (BMW)
plant, San Luis Potosi, Mexico

Laramie-Poudre Tunnel entrance

Vars
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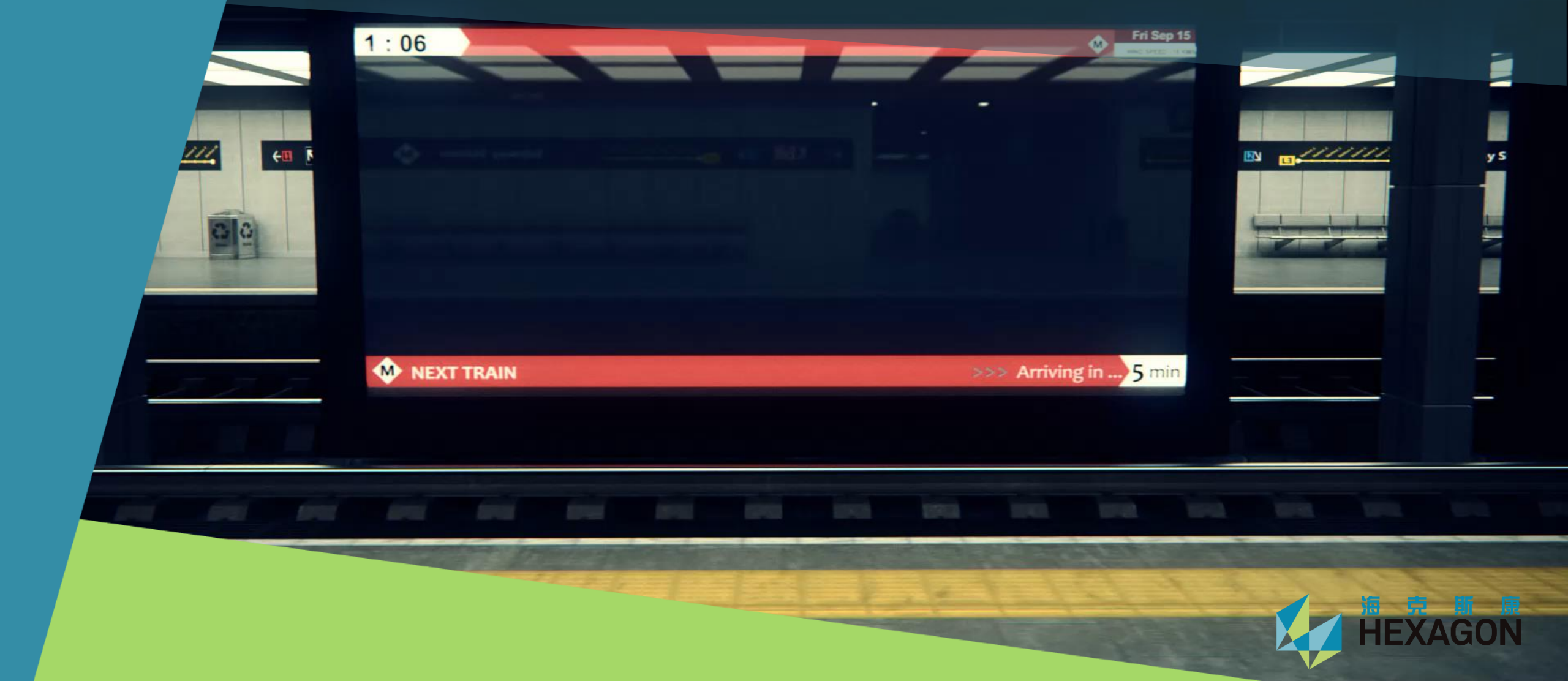
4.725 million passenger journeys were recorded in one day in London



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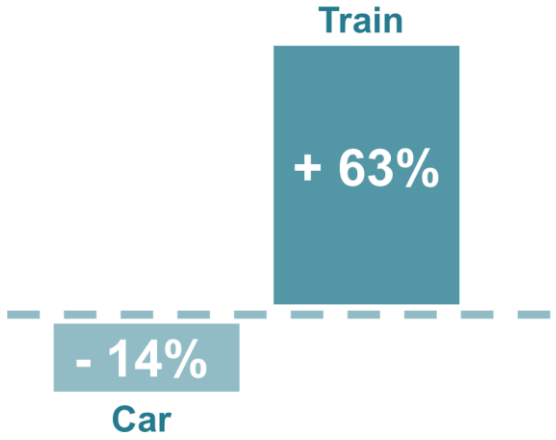
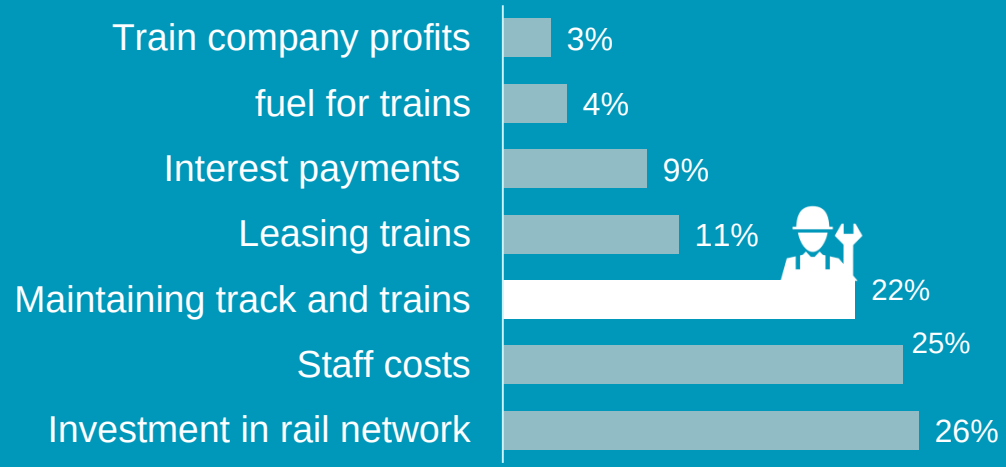
Transportation Competition

Driving gets cheaper (1980 / 2014)



Source: Independent

Rail ticket price brakedown



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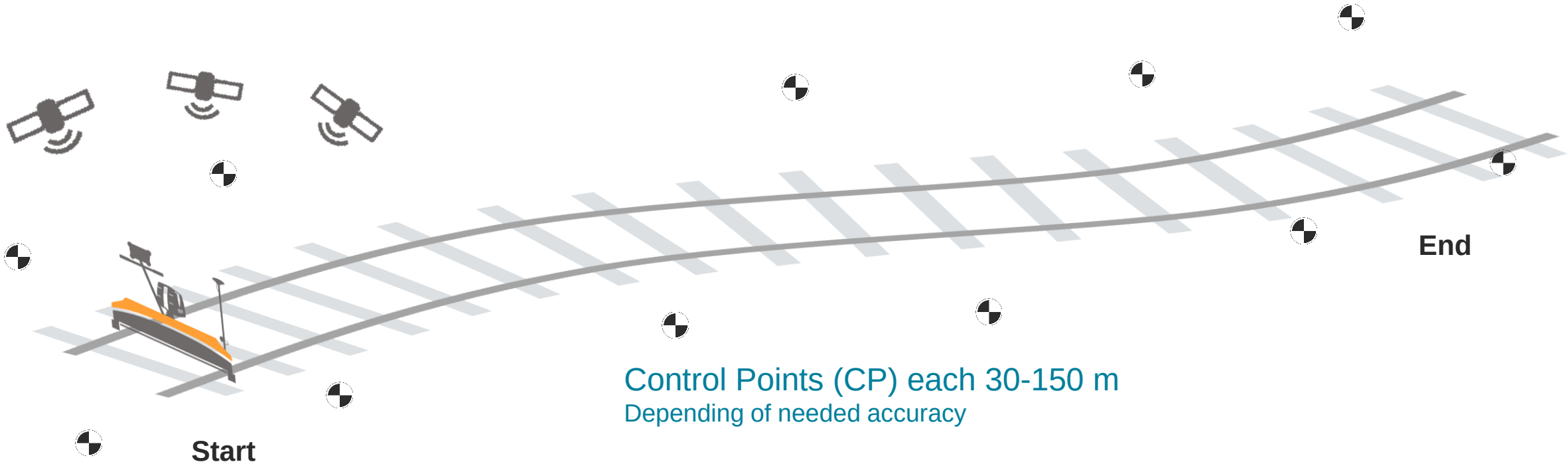
Source: Rail Delivery Group

SiTrack:One

- Fast As-built Rail 3D Capture
- Determination Track-Geometry
- Tunnel Deformation Analysis
- Designed to as-built structure
- Rail Wear Calculation

Workflow - 3D Capture - Using GNSS and/or Control Points



Control Points (CP) each 30-150 m

Depending of needed accuracy

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Workflow Comparison – 4Km Tunnel Survey

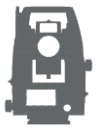
Rail Survey

Sections Survey

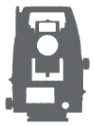
CAD Delivery

Terrestrial scanning plus mechanical track measurement

Rail Survey



Sections Survey



CAD Delivery

Integrated scanner on stop – go mechanical track measurement

Rail Survey

Sections Survey

CAD Delivery

4 Days

9 Days

14 Days

17 Days

19 Days

Cross sections

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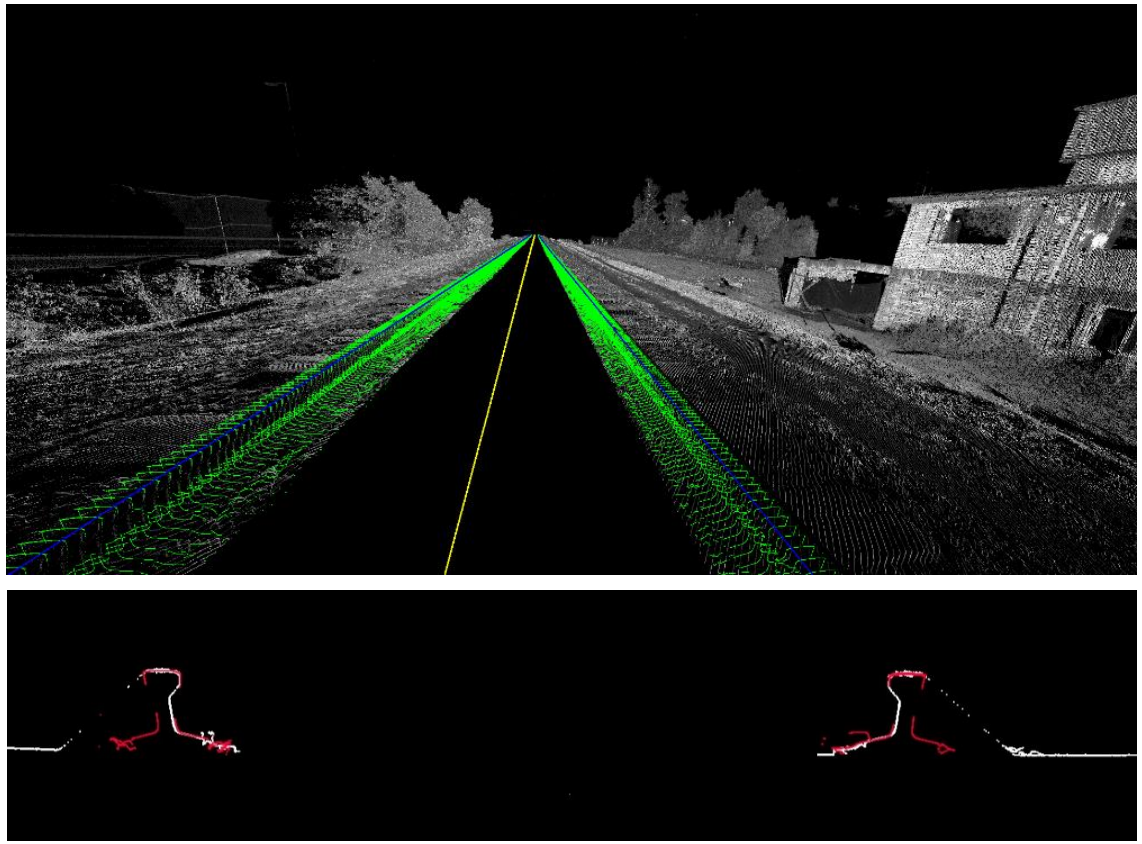
Railway Tasks – New Feature - Rail-Wear-Calculation



- High resolution rails point cloud
- Rail profile scanners – high-end technology (1000Hz)
- Automated rail information export

Configurations:

- 2 Scanner Heads
- 4 Scanner Heads

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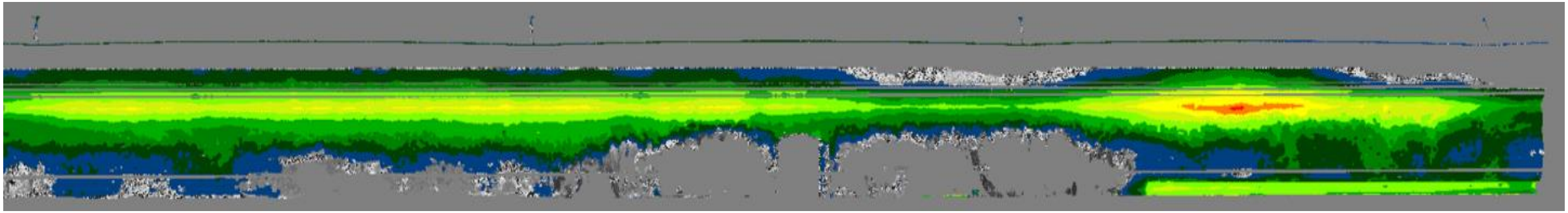
SiRail Suite



- Batch tunnel deformation analysis
- Automated calculation of differences “designed to as-built structure”
- Batch extraction and adjustment of the as-built rails

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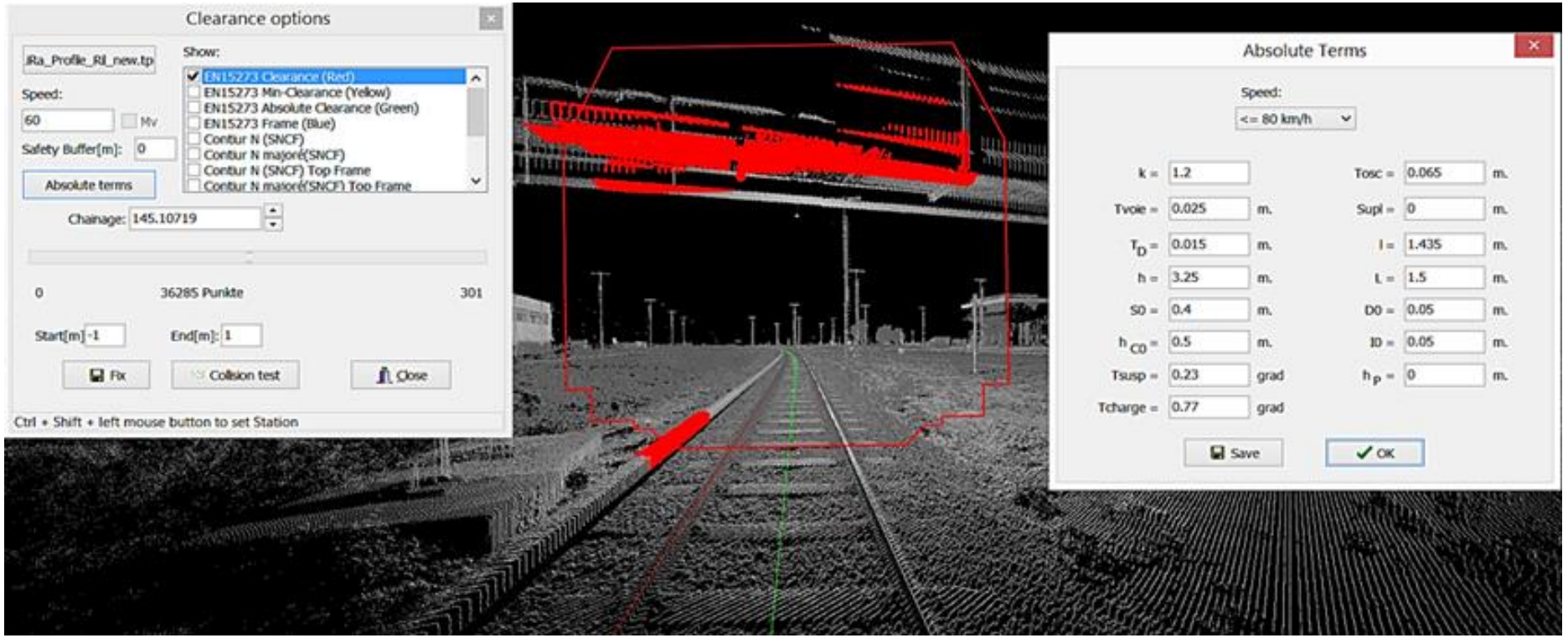
SiRail Suite



- 2D Clearance-analysis (static, dynamic): Exact determination of clearance infringements
- Based on European rules and individual Formulas (for example for SNCF - National French Railway Company)
- Calculation of potential clashes also between neighborhood tracks

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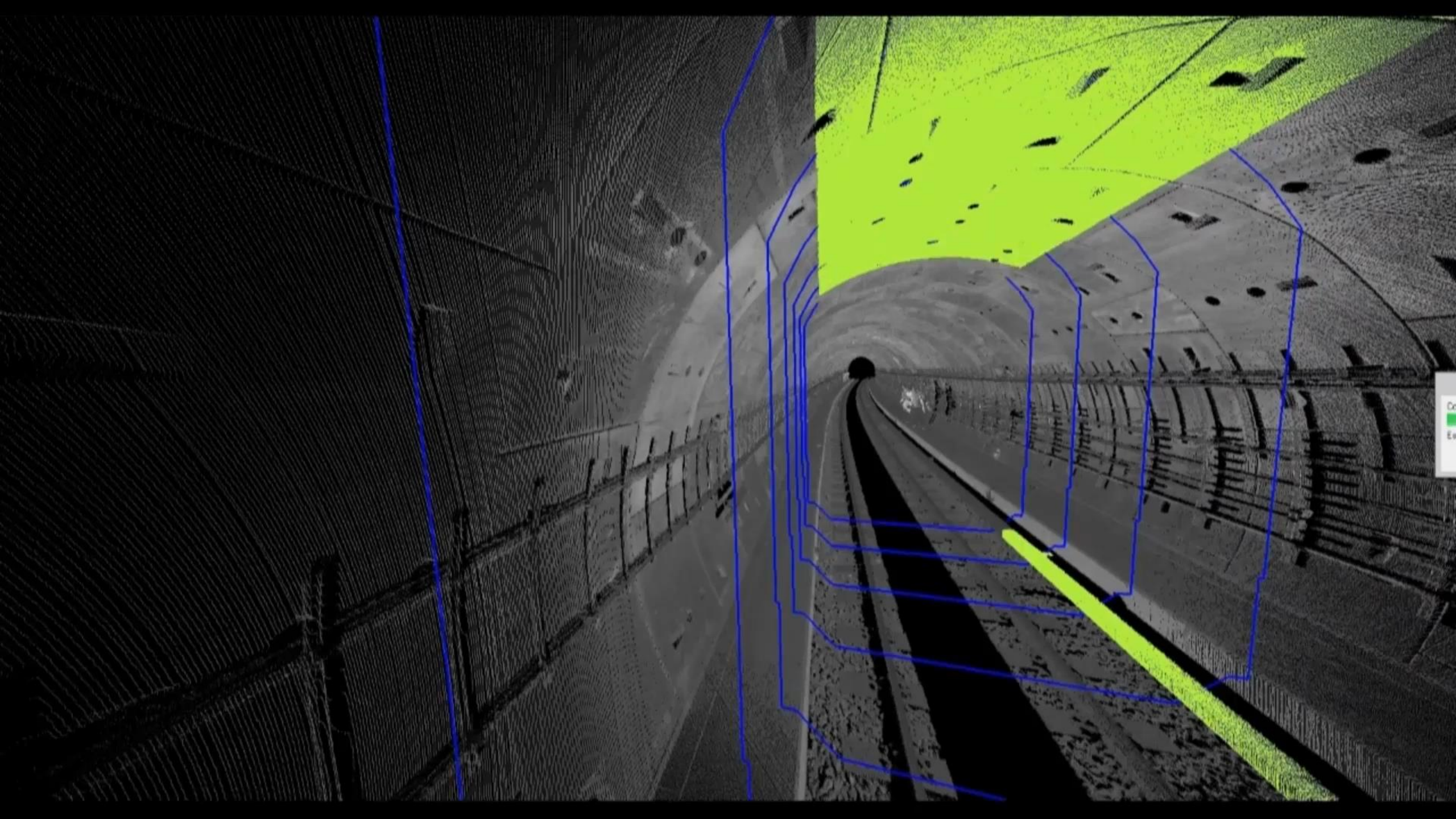

Traffic Congestion costs $63.70 per every hour a Trucker drives

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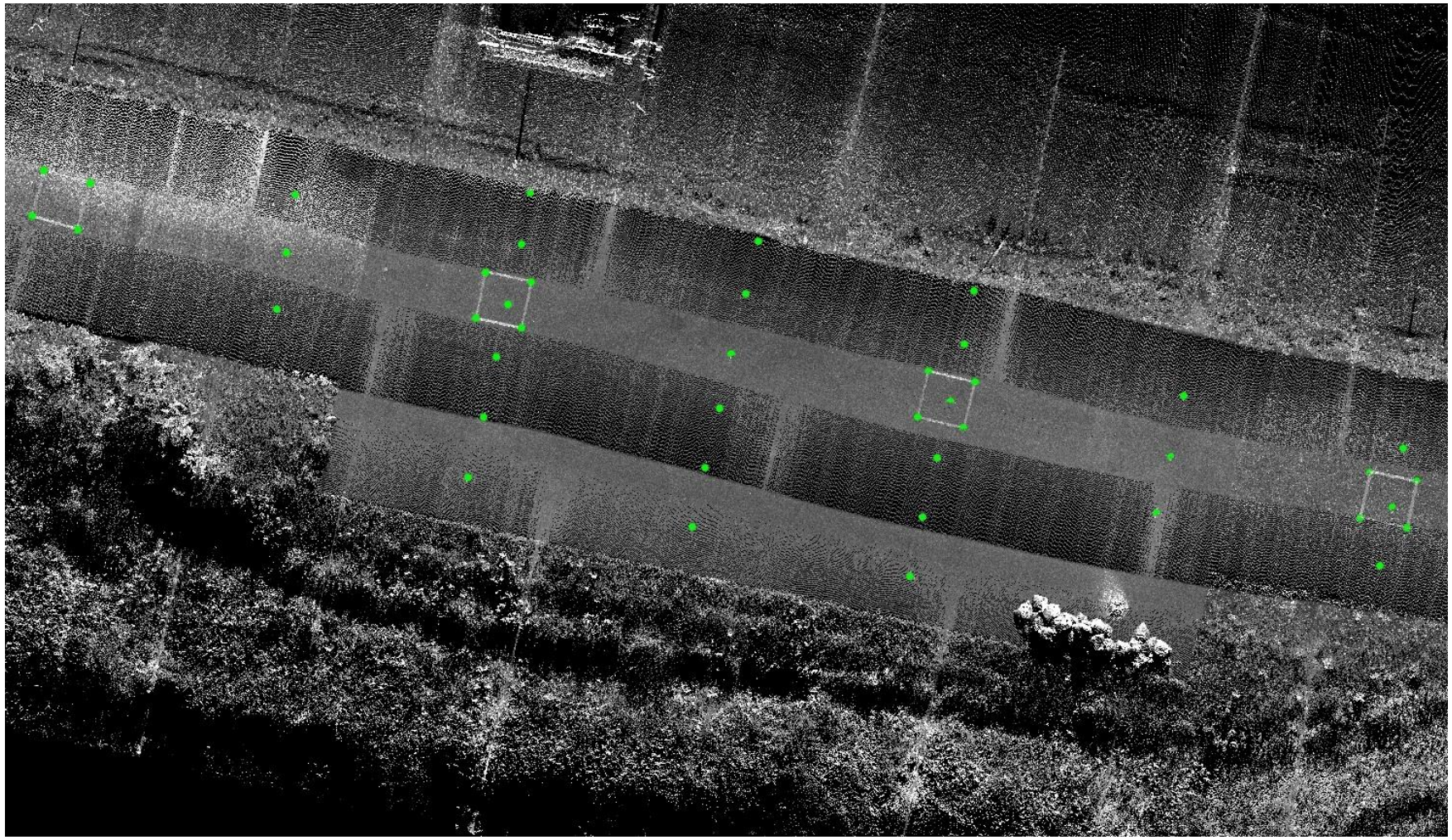
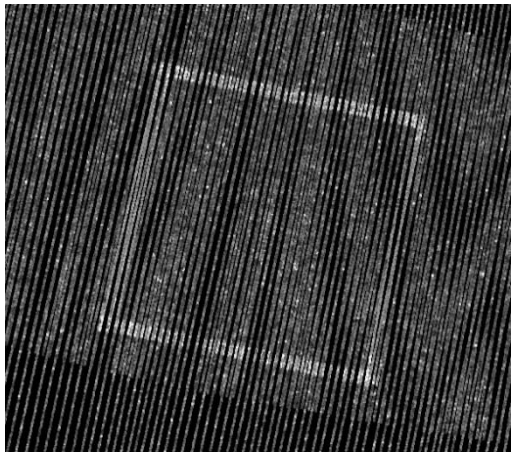
ProScan

- Kinematic Scanning
- TPS and GNSS Positioning
- Asphalt Thickness Layer
- Tunnel Deformation
- Ground Elevation Map

Paved Surface Point Density





More than 60K points in a 1x1m square

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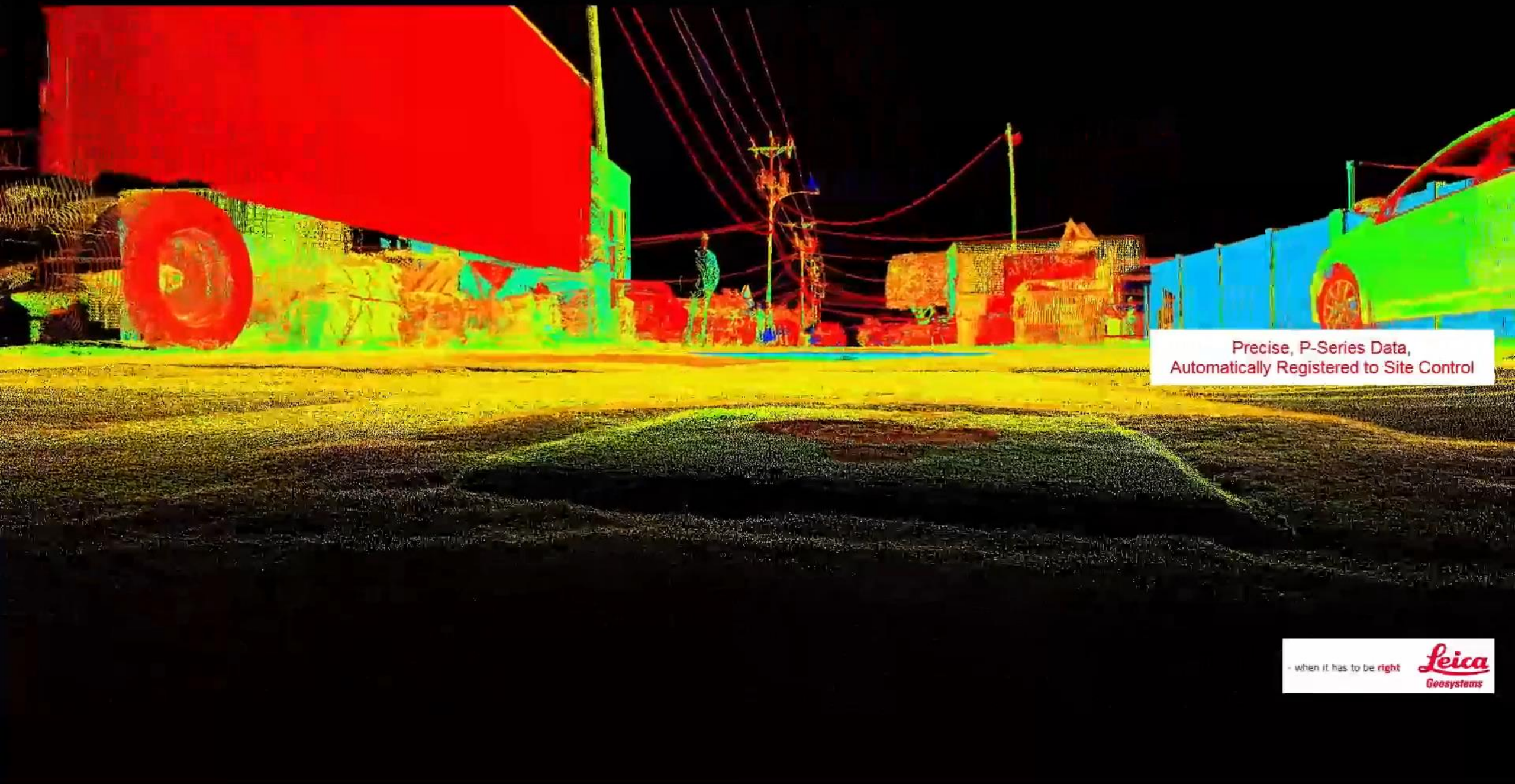
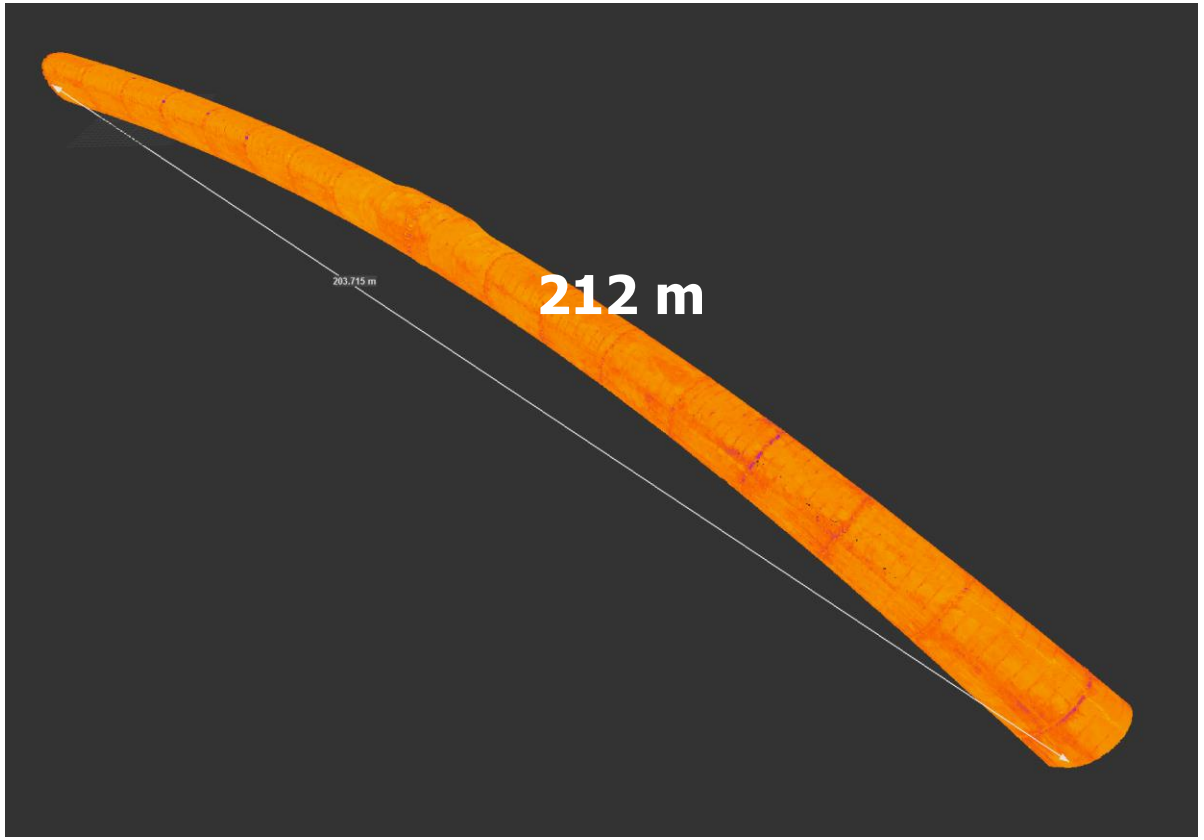

Precise, P-Series Data,
Automatically Registered to Site Control
- when it has to be right
Leica
Geosystems

Applications: Tunnel



Kinematic Laser Scanning:

- 102 Million Points
- Data Captured in 27 Minutes
- Data Processed in 30 Minutes
- Length of Trajectory 212 m
- Resolution 6 mm

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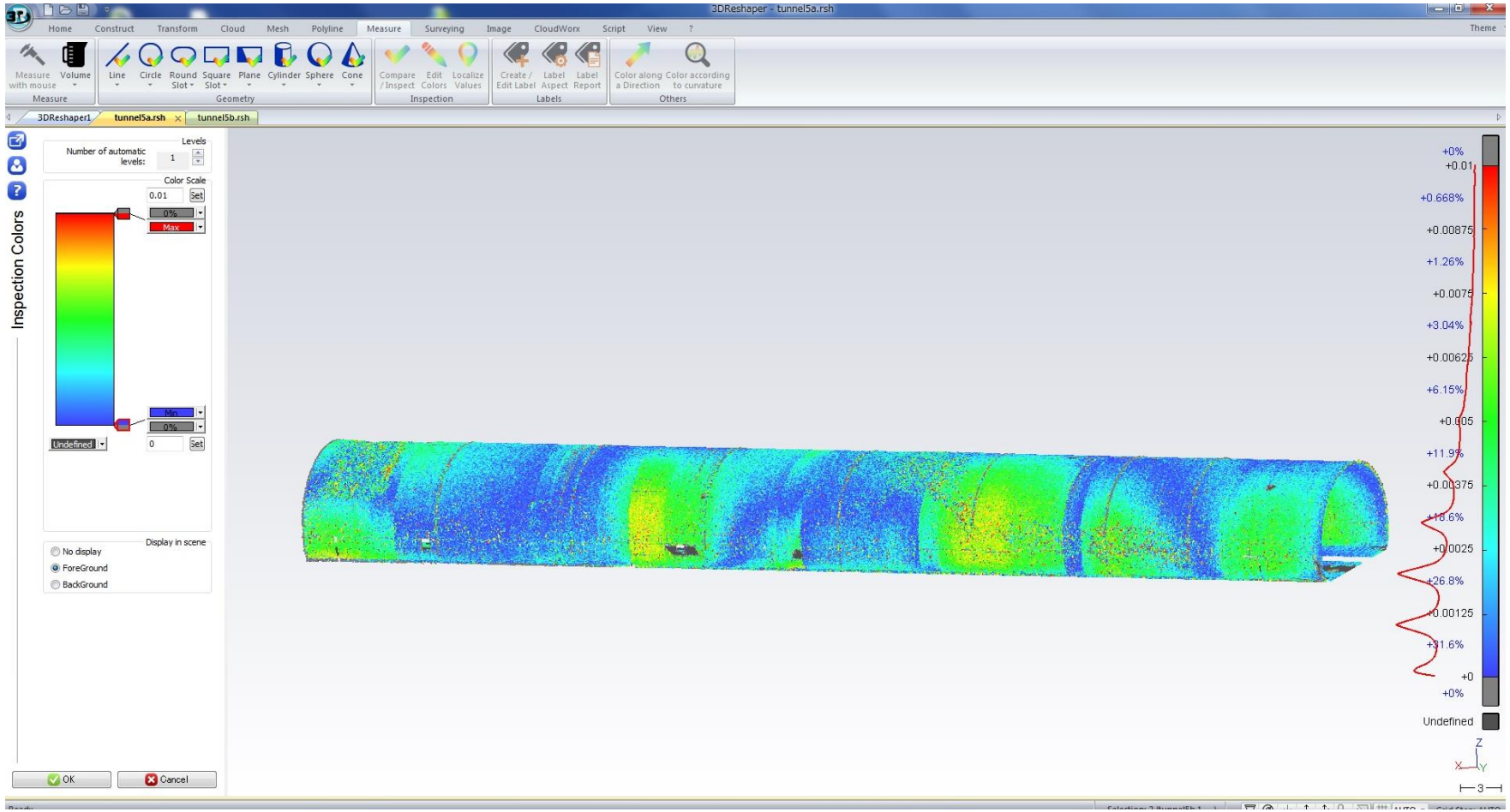
Applications: Tunnel



Tunnel Deformation

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PRODUCTIVITY

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谢 谢