

# Real-World "Static" Map Data and its Connection to "Dynamic" Scenario Generation

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#### The company

- Headquarters: Holzkirchen, near Munich, Germany
  Subsidiary: 3D Mapping Solutions Inc., Pittsburgh, PA, USA
- Founded 2007 by Dr.-Ing. Gunnar Gräfe and Dipl.-Ing. Martin Lang, both with more than 20 years experience in kinematic surveying
- 54 highly skilled employees
- Working for almost every global automobile manufacturer/supplier
- Active internationally (Europe, USA, China, Japan, Brasil, Russia, India etc. )

### 3D Mapping provides the bridge between real world and the perfect digital twin

3D Mapping digitizes the reality for projects worldwide using 3D Mapping owned high-end mobile mapping systems or partner systems.

3D Mapping extracts all object and

attribute information from scanner and camera data with outstanding quality.

3D Mapping produces as-

built maps for engineering or automotive HD Maps as perfect Digital Twin.







# Worldwide survey services for Automotive Applications...







- Worldwide kinematic survey services for
  - Precise as-built digital HD Map road data production
  - Driving simulator applications and Race track simulation
  - High-end Surface models of (crg-projects)
    - race tracks
    - Proving grounds, test areas and special tracks with multiple resolutions
    - Public roads



## **Open Drive Data Production example**





Example: inner city HAD Map data including all extracted geometry like curbs, markings, pedestrian walks etc. 3D Mapping Solutions GmbH • Raiffeisenstrasse 16 • 83607 Holzkirchen • <u>www.3d-mapping.de</u> • info@3d-mapping.de

# Digital twin of the "static" reality



- Digital twin of the "static" reality is the Basis for OpenScenario
- The standards OpenDRIVE, OpenCRG and OpenSCENARIO shall be independent from each other.
- OpenDrive
  - As-built road data
  - Geometry
  - Topological connections
- OpenCRG
  - Road surface models as basis for precise vehicle dynamics behavior.
- As the OpenScenario parameter set will be very huge and complex and settings very variable, the OpenDrive (including CRG) dataset shall have as many predefined settings to support OpenScenario as possible.

# Possible standard settings for the OpenDrive DigitalTwin





- OpenDrive lane model
  - Variable road logic and logical connections shall be fully supported in OpenDrive
  - E.g. driving directions changing at certain times of day.
- OpenDrive Objects
  - Most of variable object settings cannot be detected by Mobile Mapping and are unknown for the OpenDrive provider as well as for the OpenDrive user.
  - This means, that OpenDrive shall presume standard settings, defined within OpenScenario, such as
    - Traffic light settings for vehicles as well as for pedestrians / bicycles
    - Temporary changing traffic signs
    - Street lamp settings

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# Possible standard settings for the OpenDrive Digital Twin





- OpenCRG surface model
  - Helpful will be an OpenScenario definition, in which cases a shape description in OpenDrive for the road surface might be sufficient and in which cases a surface model is recommended.
  - This could possibly be done as "benchmarks" depending on road condition
    - A corresponding "rating" of road surfaces has been developed at 3D Mapping together with customers and is currently validated within customer projects. This kind of rating might be a choice to describe the road condition.

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## **3D city models combined with OpenDrive**

3DMAPPING SOLUTIONS

- Integration of 3D HD road space models into 3D city models
- Cooperation between virtualcitysystems and 3D Mapping Solutions
- Interface OpenDrive + cityGML + CAD / CAE











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