3D Maps: Beyond Automotive

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TomTom Maps
The Traditional Map

The Big Three

- Map Display
- Geocoding
- Routing/Navigation
The Automation Levels of Driving

- **Level 0**: Driver controls all aspects of driving
- **Level 1**: Automated subsystems
- **Level 2**: Combined automated subsystems
- **Level 3**: Hands off the steering wheel conditionally
- **Level 4**: Automated but driver can intervene
- **Level 5**: No steering wheel

**ADAS**

**Autonomous Driving**
TomTom Advanced Map Content

- **Advanced Driving Attributes (ADA)**
  - 2.5-Dimensional terrain content

- **HD Map**
  - 3-D border-to-border road network data

- **RoadDNA**
  - TomTom localization technology
Advanced Driving Attributes

**Gradient**
Highly accurate change of height content for safety and efficiency applications.

**Absolute Height**
Complete global coverage for energy usage estimation and visualization.

**Curvature**
Universal coverage safety and performance applications.
Next Generation Automotive Maps

**HD Map** provides highly detailed and **precise 3D lane model** including **geometry** for
- lane markings,
- lane center lines
- road borders

Enriched with **lane level attributes**:
- speed limits,
- marker types,
- lane types, ....

**Road DNA** provides very **accurate positioning data** relative to the 3d lane map (lane features) allowing for vehicle positioning with relative accuracy better than 50cm longitudinal and 20cm lateral
How It’s Made

Intelligent deployment of Mobile Mapping vans equipped with mapping sensors and the application of (semi-) automated data processing tools
Road Borders & Lane Information

Lane border types are captured as they are in reality.

Data is sufficient to properly represent road surface and features.
HD Map – Border to Border Representation

Highly Detailed
3D Lane Geometry
- markings
- centerlines
- road boundaries

Highly Accurate
Sub meter absolute
Decimeter level relative

Richly Attributed
Lane level attributes
- speed restrictions
- divider markings
Position Landmarks
Side Depth Data From the Laser Cloud

RoadDNA image
Road DNA – Scalable Positioning Content

Robust
Tollerancy towards changes in reality or map version

Scalable
Low storage
Low processing

Highly accurate
<0.5 m longitudinal & <0.15m lateral accuracy
GIS Applications

- Urban Planning
- Intersection Modelling
- Signal Timing
- Safety
  - Dangerous Locations
  - Emergency Pull Off
- Highway Design/Planning
- Smart Cities
- V2I Installations
- Noise Abatement
Detailed Intersection Data

- **Crossing connectivities** – all manoeuvres in line with traffic rules
- **Lane groups**
- **Connectivities to standard map** – can be IDs or stubble geometry
- **Stop line**
- **Pedestrian crosswalk** – area feature within crossing area
- **Bicycle crossing** – area feature within crossing area
- **Traffic lights** – point in 3D associated to lane centerline
- **Traffic signs** – safety related
- **Tram tracks**
Thank You!

Any questions?

Feel free to visit us at booth 216