The role of maps as a major enabler towards automated driving

TomTom
5 myths about maps and map making…

1. Maps are not needed for Autonomous Driving
2. Maps can easily be made by using sensors only
3. Car OEMs will not give map makers access to car sensor data
4. Map freshness cannot be delivered with the required high quality in a scalable and efficient way
5. Market leaders in ADAS are automatically the future market leaders of maps for Autonomous Driving
Historic evolution of using maps in the car

- Radio
- Paper Map
- Radio- nav
- Digital Map
- Infotainment
- Map with “API”
- Connected/smart car
- Live Map Layers
- Automated Vehicle
- HD Map

© 2016 TomTom. All rights reserved.
Impact of “future trends” on map

The Internet of Things and Automated Driving create

**More Demand** for maps

**Shift of map domain**

© 2016 TomTom. All rights reserved.
The role of a map in automated driving

Navigation
- Getting from A to B

Planning
- Planning the next maneuver within and beyond sensor horizon

Localization
- Complement sensors in positioning

Comfort
- Making automated driving feel comfortable
What is a map?

Several map layers

- Live map layers
- Real-time map updates
- Localization content
- HD Map
- ADAS content
- Navigation map
Advanced Map for Automated Driving

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
RoadDNA
RoadDNA provides robust & scalable positioning content

**Robust**  
Tolerant regarding changes in reality or map version

**Scalable**  
Low storage  
Low processing  
Automated production

**Highly accurate**  
<0.5 m longitudinal & <0.15m lateral accuracy
Driver behavioral data – Local Speeds (IQ Routes 2.0)

Big data
Pattern data mining of vehicle probes allows creation of predictive map layers

Scalable
Vehicle probe data is similar around the world

Comfort
These layers allow the automated car to drive in an intelligent human way
This is not fiction...

Germany
~28,000 km

US: CA, MI + NV
~41,000 km

Roadmap
EUR and NAM

© 2016 TomTom. All rights reserved.
Essential components of a mapmaking platform

- Highly Accurate
- Detailed
- Feature rich
- Up-to-date
- Prepared to support new layers
- Scalable

High Quality
Efficient
Real-time
Future proof
INTELLIGENT MAPMAKING

Perfected approach that combines professional mapmaking methods with community input.
Intelligent map making in action
Mapping expertise on top of sensor data and machine learning
Real-time maps and Traffic and Travel services

Professional sources

Map & Service Production Platform

Incremental Map updates

GPS traces

Onboard map

Live map

Traffic & Travel services

© 2016 TomTom. All rights reserved.
One day of community input
Automated Driving requires an environmental model

Professional sources

Incremental Map updates

Map & Service Production Platform

Environmental model

Onboard map

Sensors

Live map

Live Map data
- Slippery roads
- Road blocks
- Jams Ahead
- and more....

© 2016 TomTom. All rights reserved.
5 myths about maps and map making...  

1. Maps are needed for Autonomous Driving  

2. Maps cannot easily be made by using sensors only  

3. Car OEMs will share sensor data if it makes sense and does not impact users  

4. Map freshness can be delivered with the required high quality in a scalable and efficient way  

5. Market leaders in ADAS are not automatically the future market leaders of maps for Autonomous Driving
THANK YOU

ANY QUESTIONS?