

Autonome Voertuigen hebben de toekomst



Agenda

- **TomTom overview**
- Navigation Technologies for man and machine

TOMTOM'S WORLDWIDE OFFICES



4,600 employees in **58** offices
across **35** countries worldwide

ORGANIZED TO INNOVATE & DELIVER TO BUSINESS SEGMENTS




> B2C devices
> Smartphone Apps




> Consumers

> B2B components



> Car OEMs
> Tier 1 suppliers

> B2B components



> Smartphone vendors
> App & website developers
> GIS owners

> B2B fleet telematics



> Commercial fleet owners

TOMTOM AUTOMOTIVE FOCUS

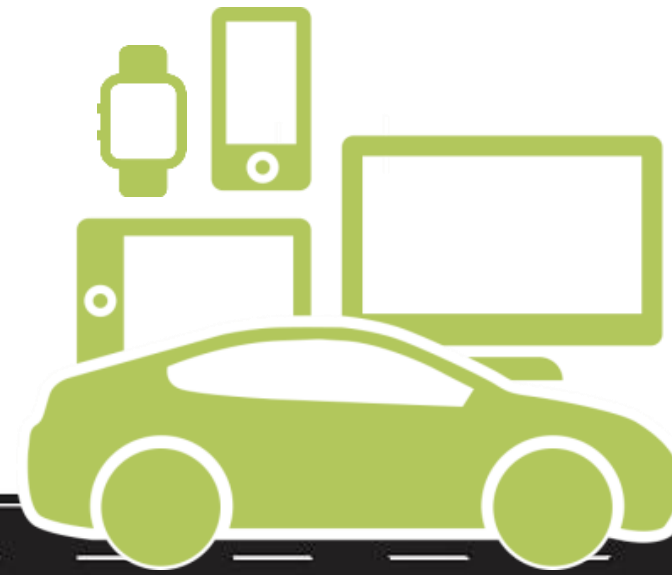
2008 - 2012

Current Strategic Areas

Embedded Navigation

Connected Car

Autonomous Driving





Agenda

- TomTom overview
- **Navigation Technologies for man and machine**

TRENDS

Digital Natives

**Expect
personalized
highly accurate
information**

Electrification

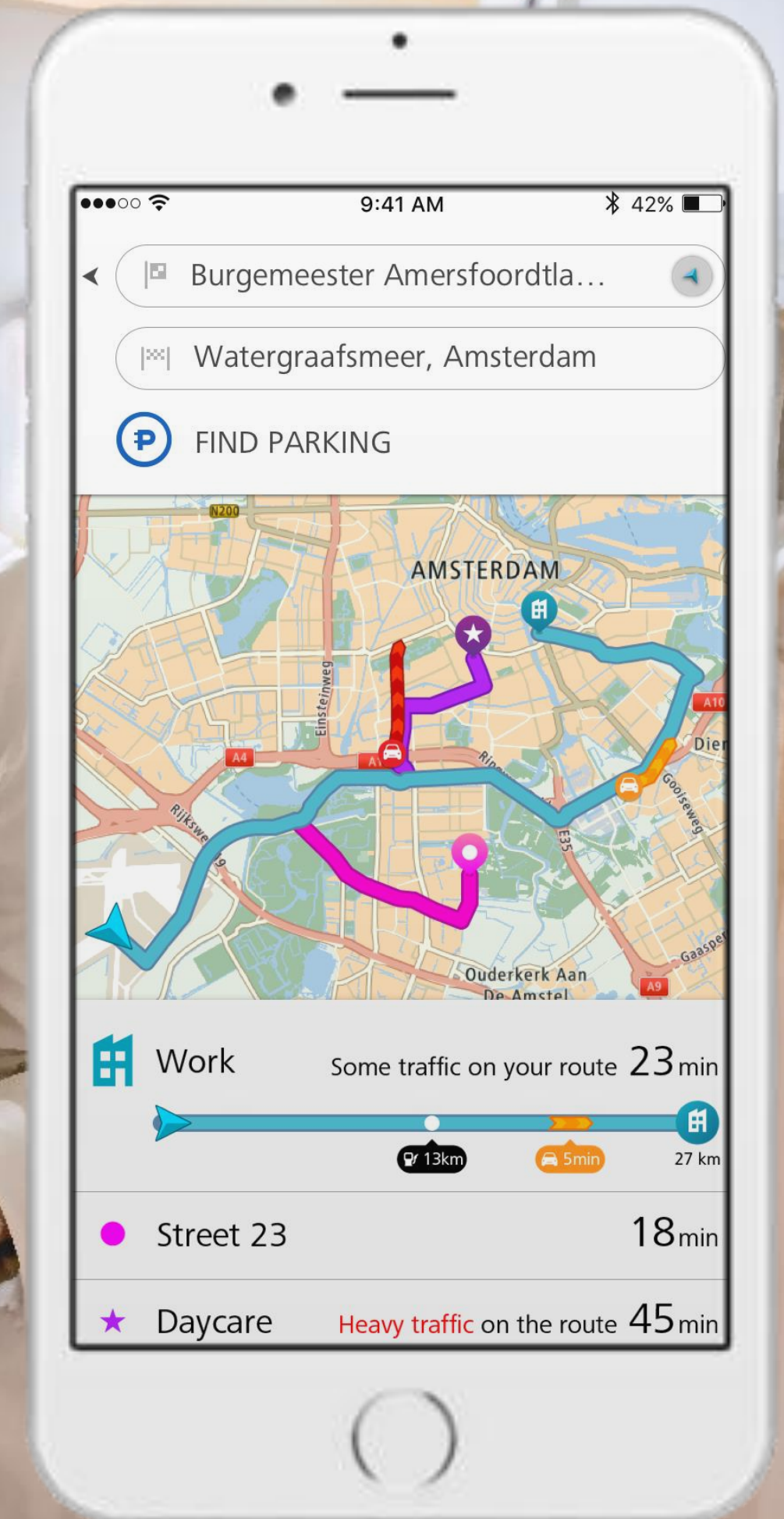
**Electric car
owners require
new information
for mobility
decisions**

Automation

**Safety is
important to
drivers that are
increasingly
becoming
passengers**

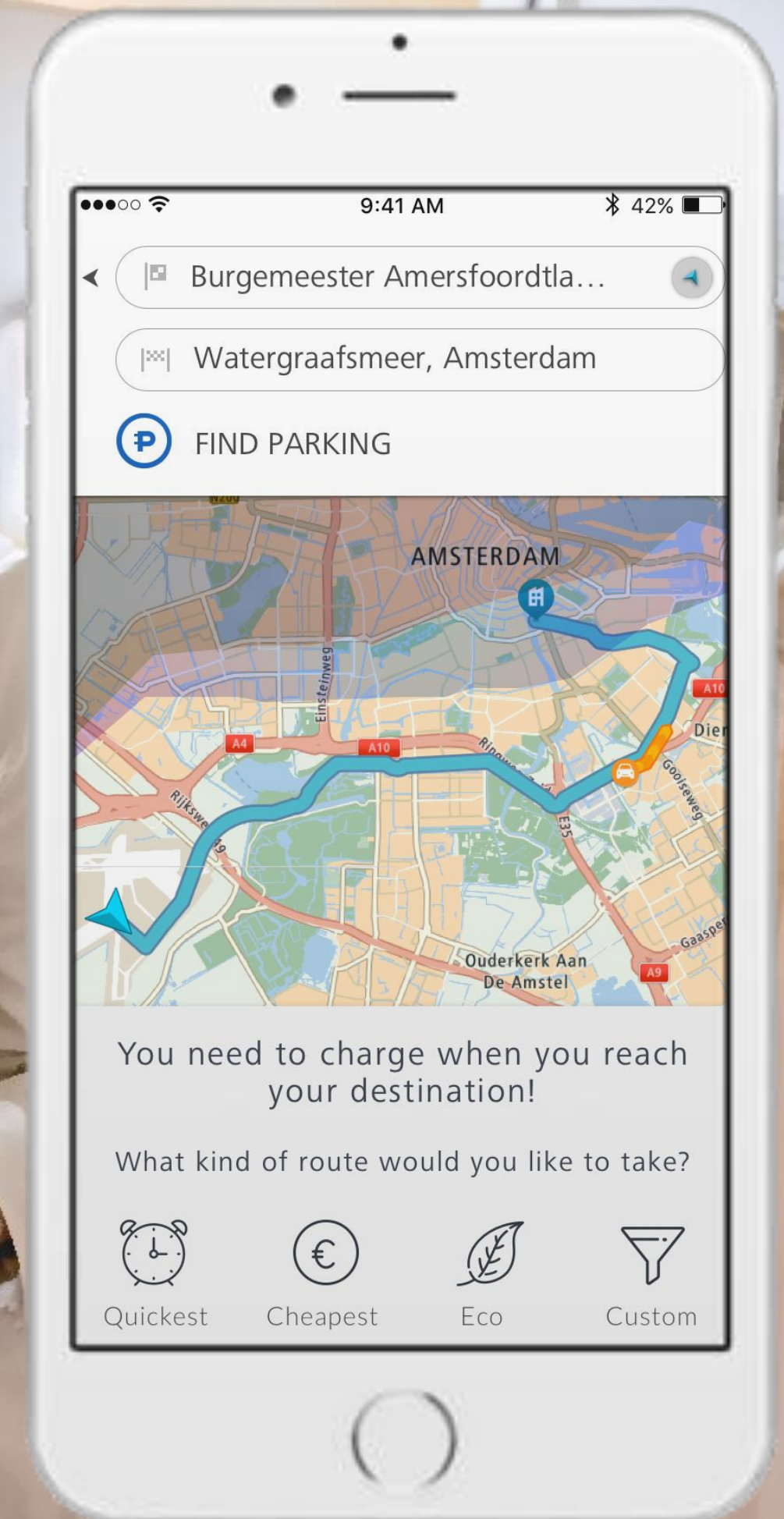
PLANNING

- Personalized trip suggestions



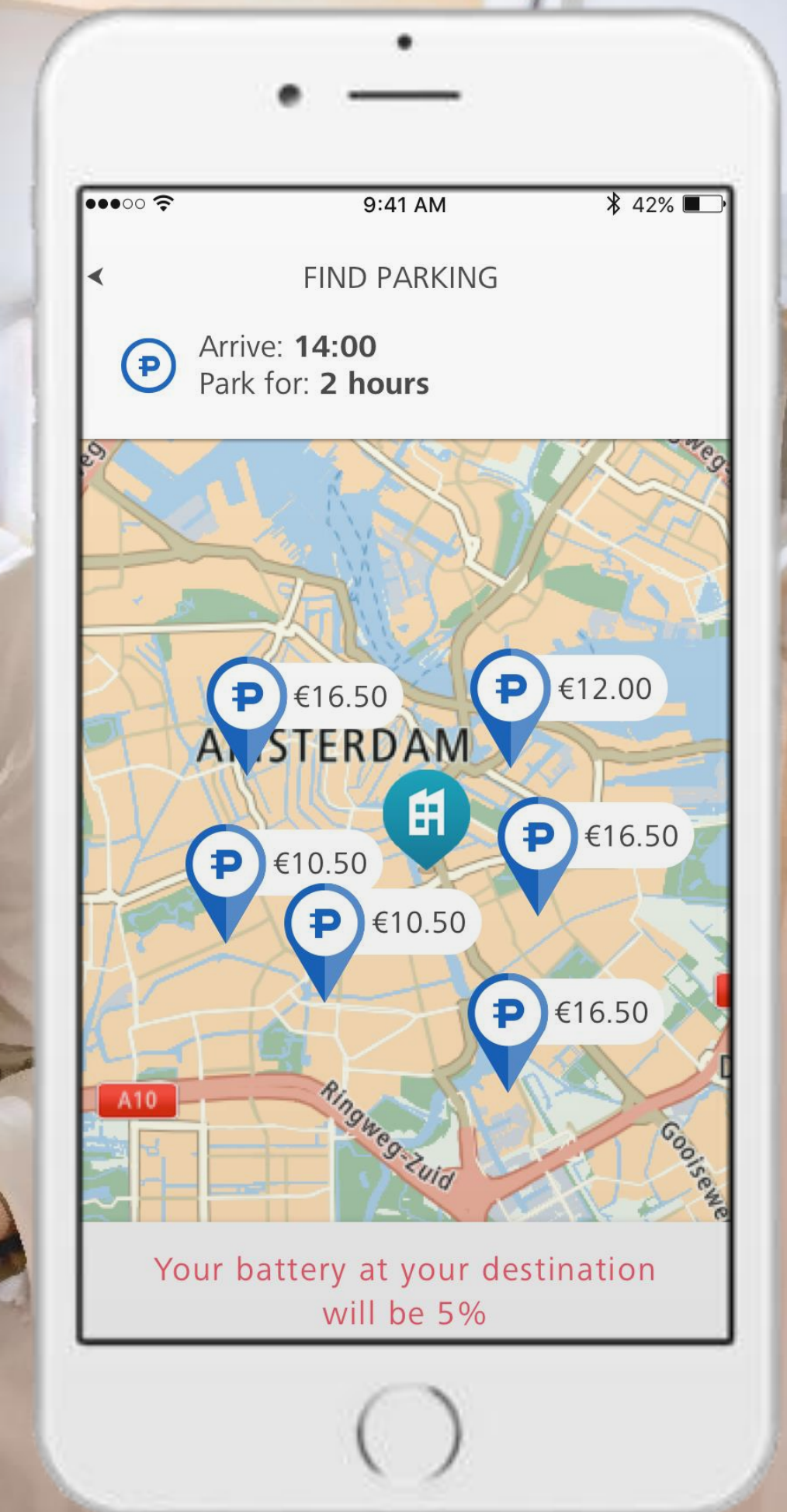
PLANNING

- Personalized trip suggestions
- Battery range



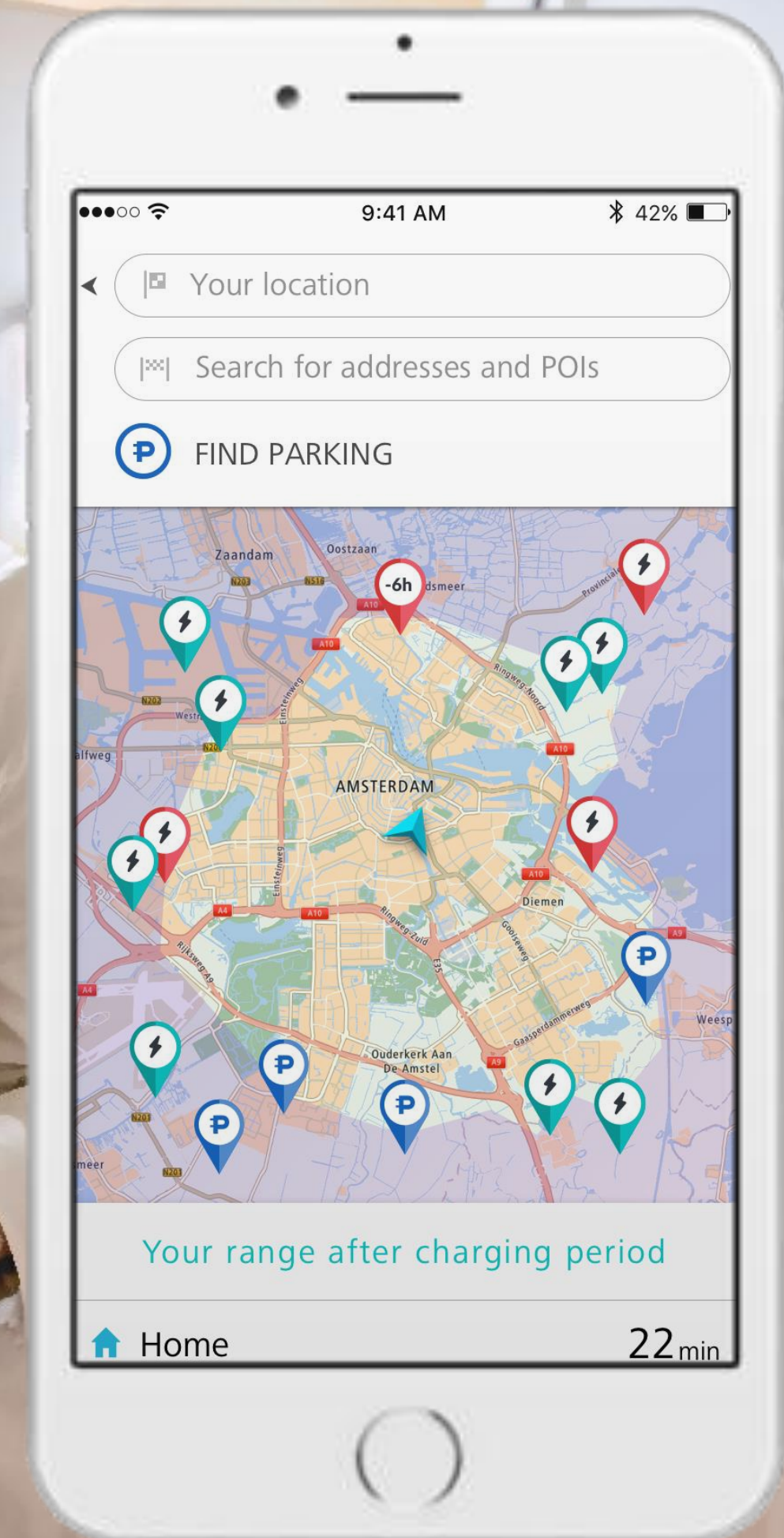
PLANNING

- Personalized trip suggestions
- Battery range
- Parking/charging bookings



PLANNING

- Personalized trip suggestions
- Battery range
- Parking/charging bookings
- Range after charging



PLANNING



Fastest



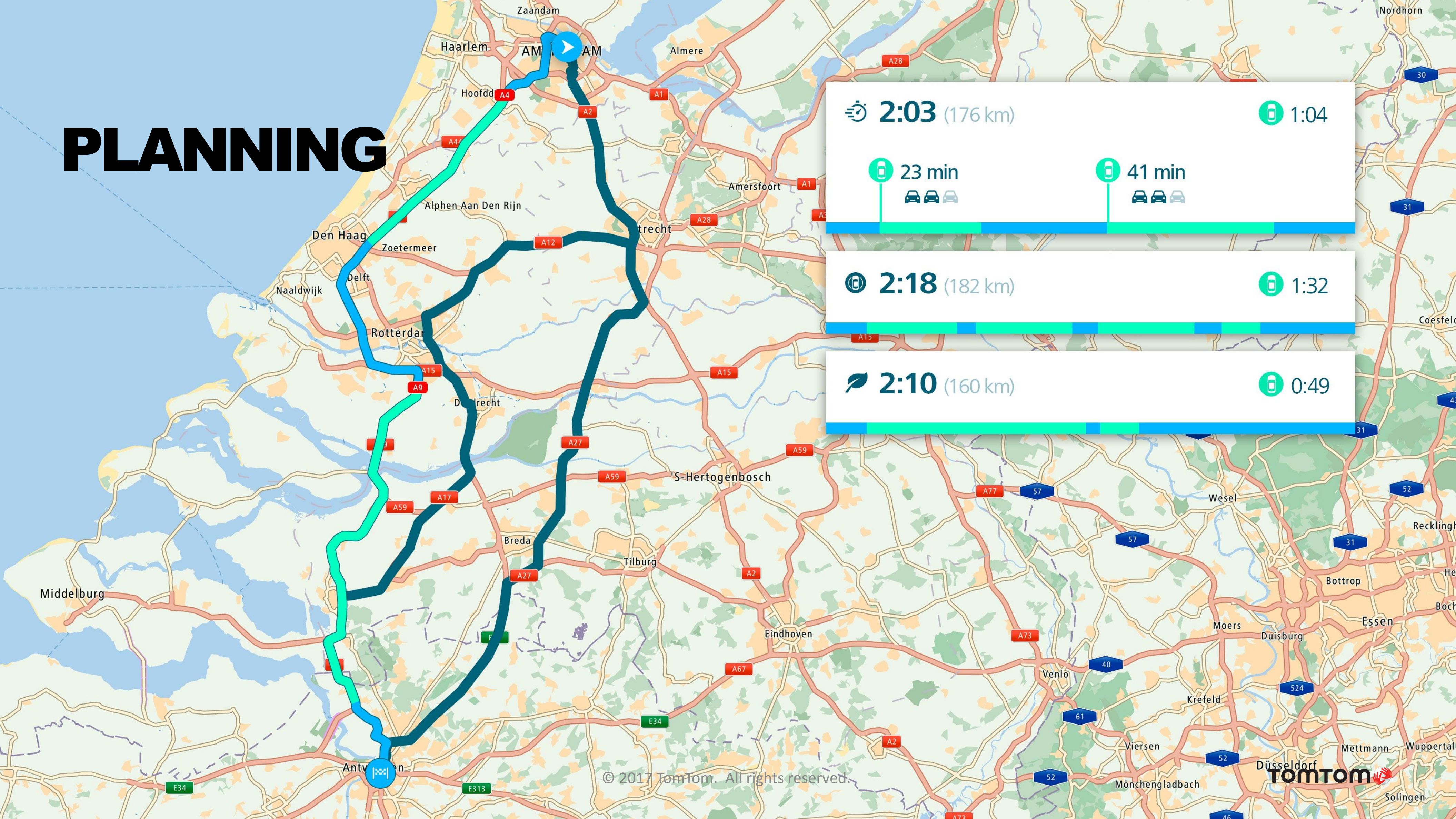
Eco-friendliest

Shortest

Avoid motorways

Winding roads

PLANNING



2:03 (176 km)

1:04

23 min

41 min

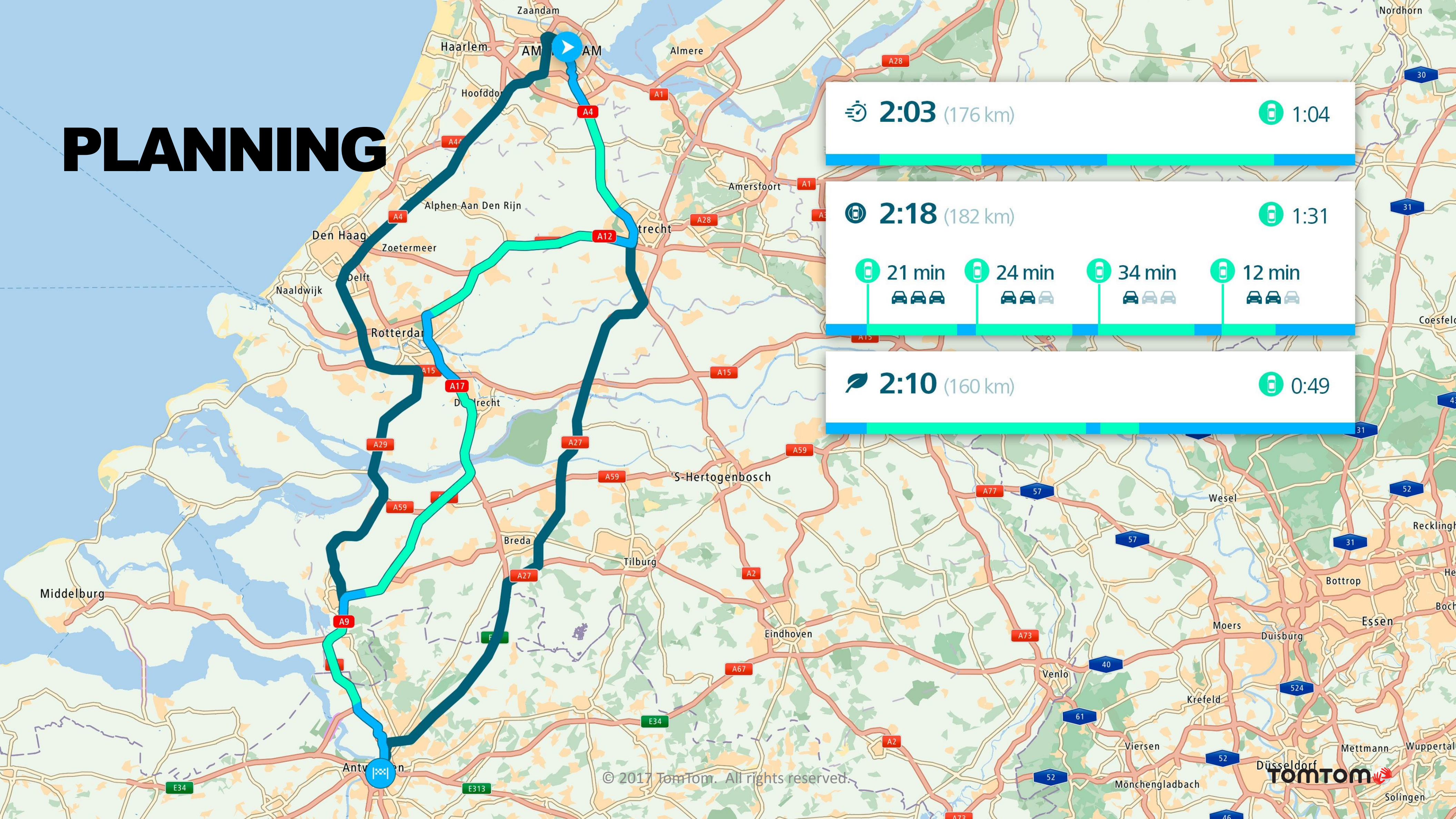
2:18 (182 km)

1:32

2:10 (160 km)

0:49

PLANNING



PLANNING

- **Macro** level information.
- Strategic level of the driving task.
- Allows the user to plan the route & plan secondary tasks.

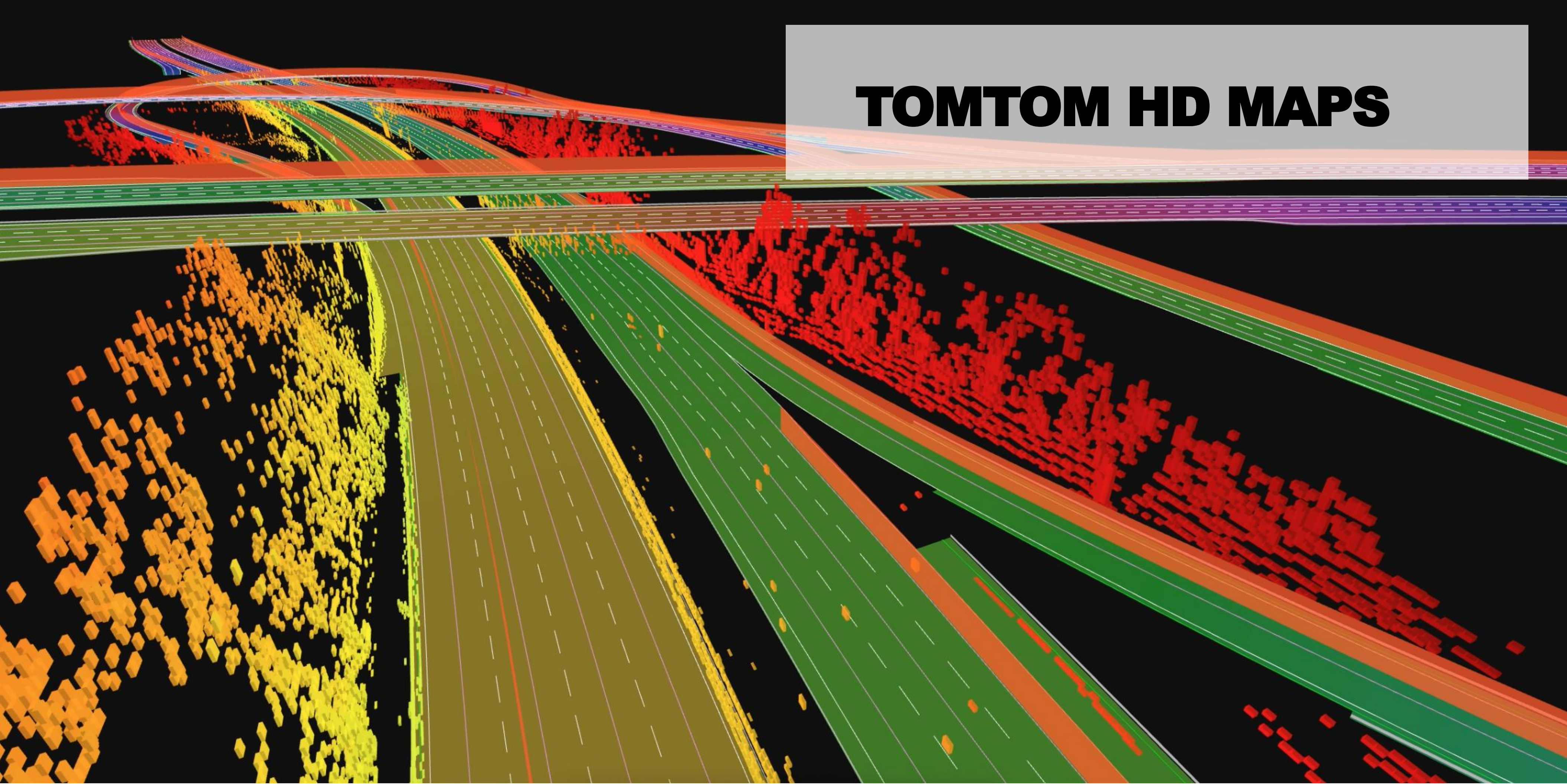
MONITORING

- **Micro** level information.
- Control & tactical level of the driving task.
- What to do on the next intersection, maximum speed, etc.

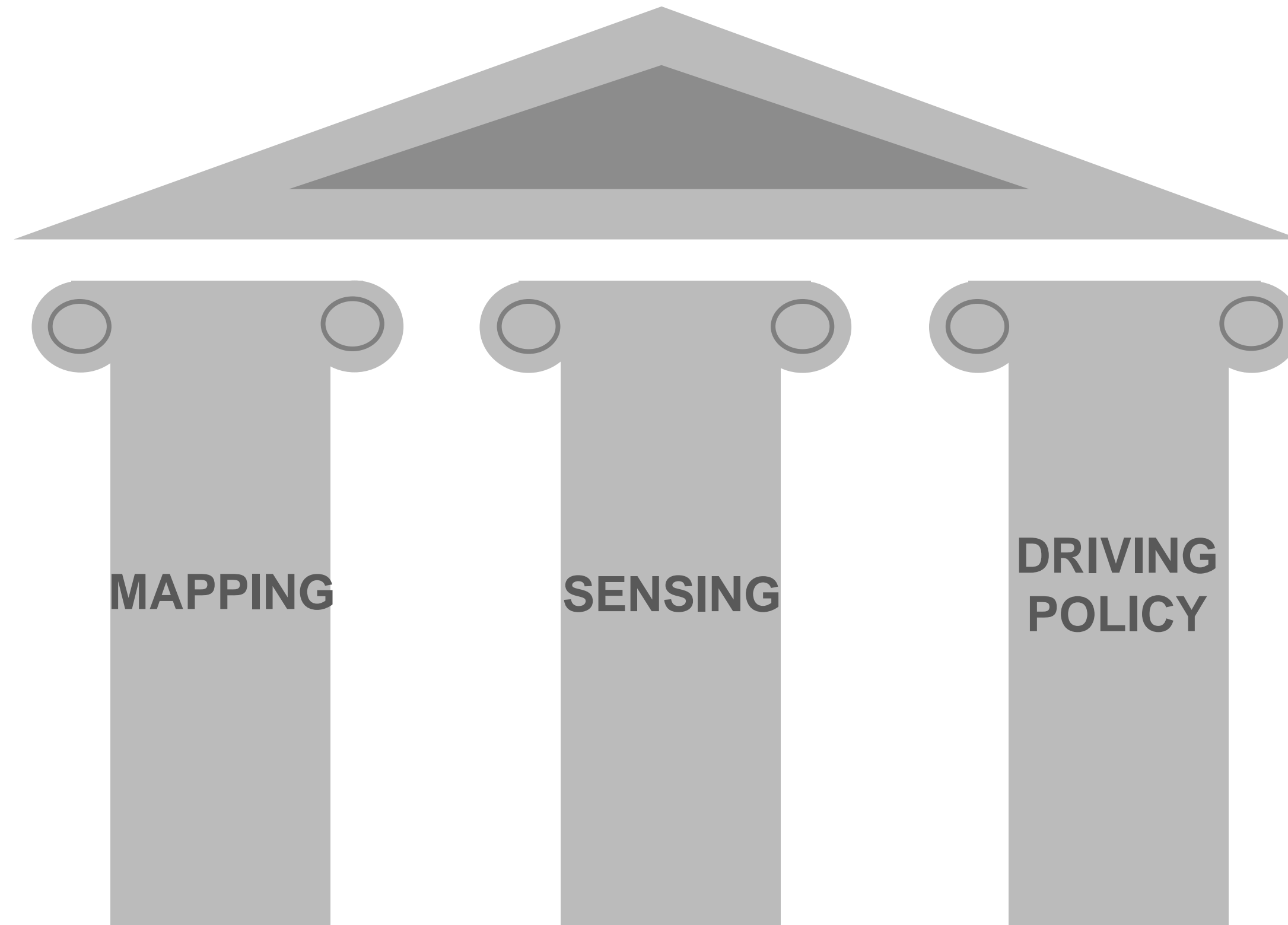
IN THE CAR



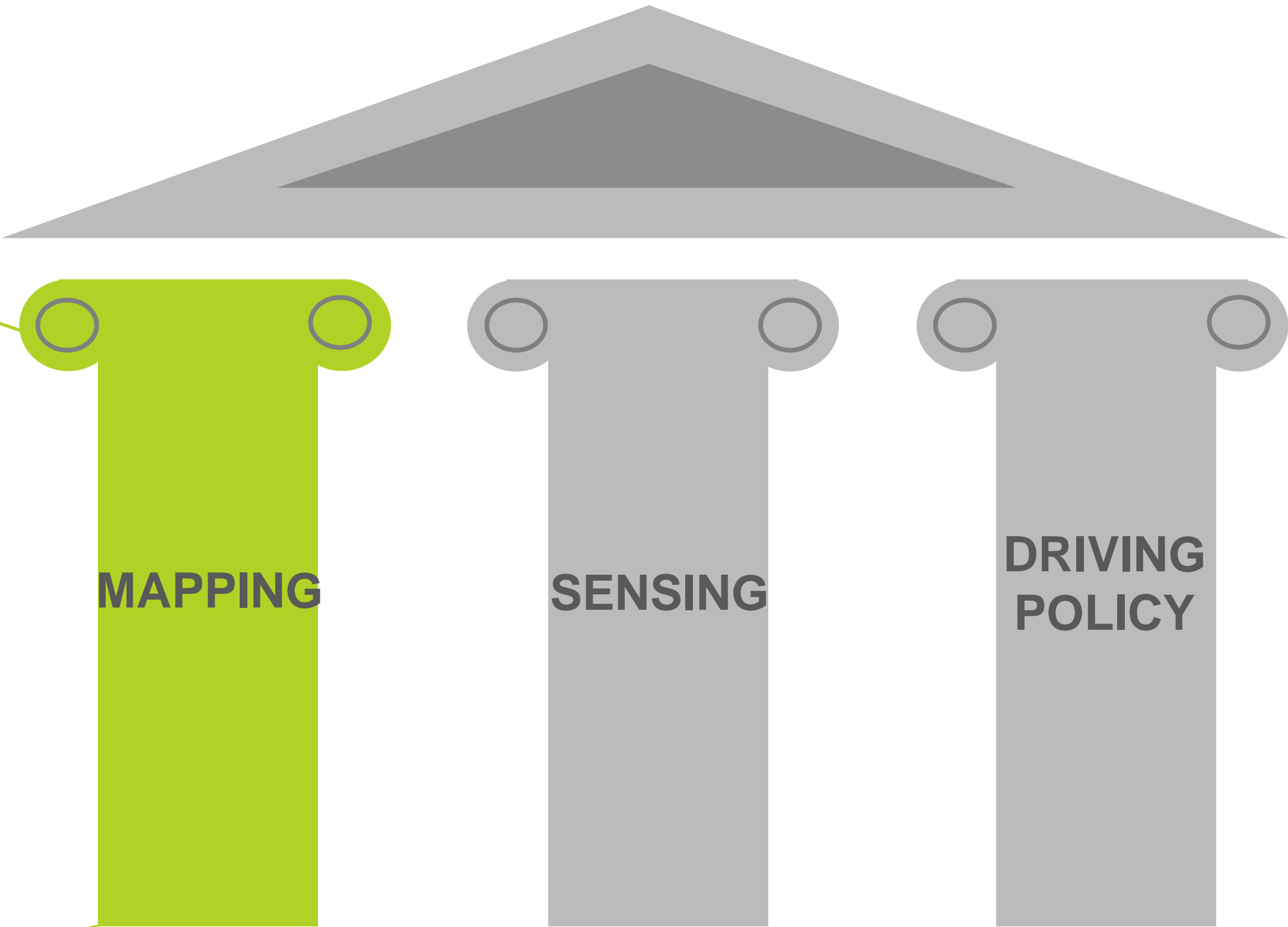
TOMTOM HD MAPS



THE PILLARS OF AUTONOMOUS DRIVING

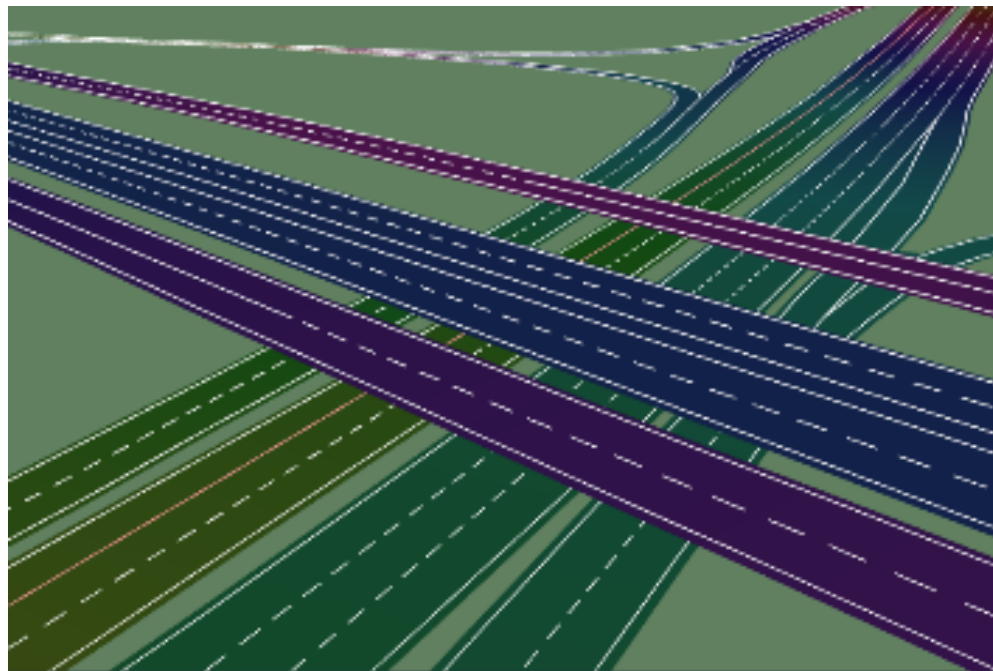


TOMTOM FOCUSES ON THE MAPPING PILLAR



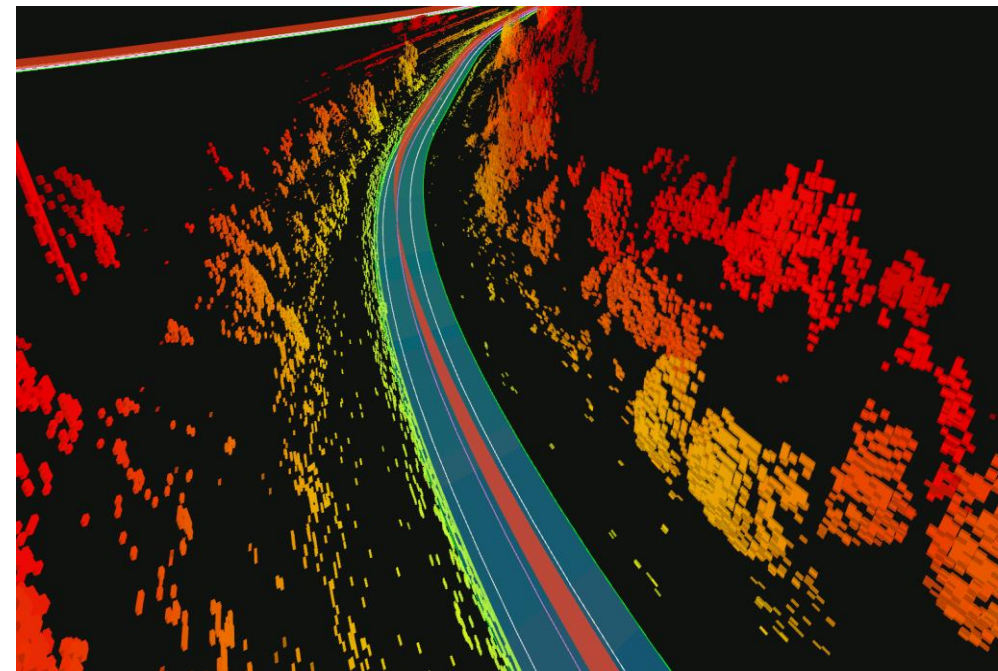
TOMTOM AUTONOMOUS DRIVING COMPONENTS

Map



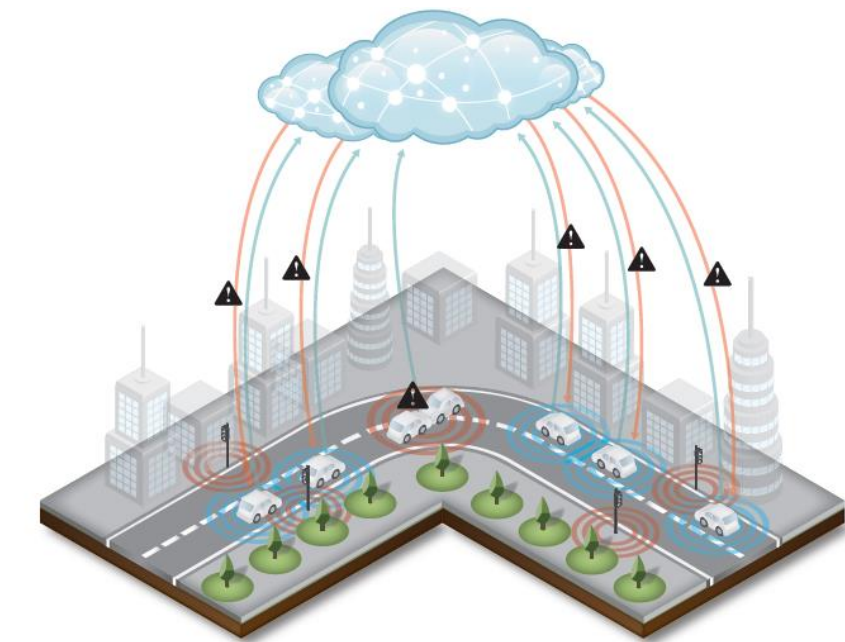
- 3D border-to-border lane model
- Objects (signs, lights, poles)
- Speed limit information

Localization



- LiDAR and Radar localization continuous correlation layers

Live Services



- Temporary road hazard information (slow traffic, lane closure, debris)

TOMTOM HD MAP DELIVERS HIGH ACCURACY & FULL ATTRIBUTION



**HIGHLY
MAINTAINED**

**HIGHLY
ACCURATE**

**HIGHLY
ATTRIBUTED**

TOMTOM MAP MAKING – RANGE OF DATA SOURCES

Mobile Mapping



Field Survey



Active Community Input



Probe Data



Authoritative Sources



Sensor Data

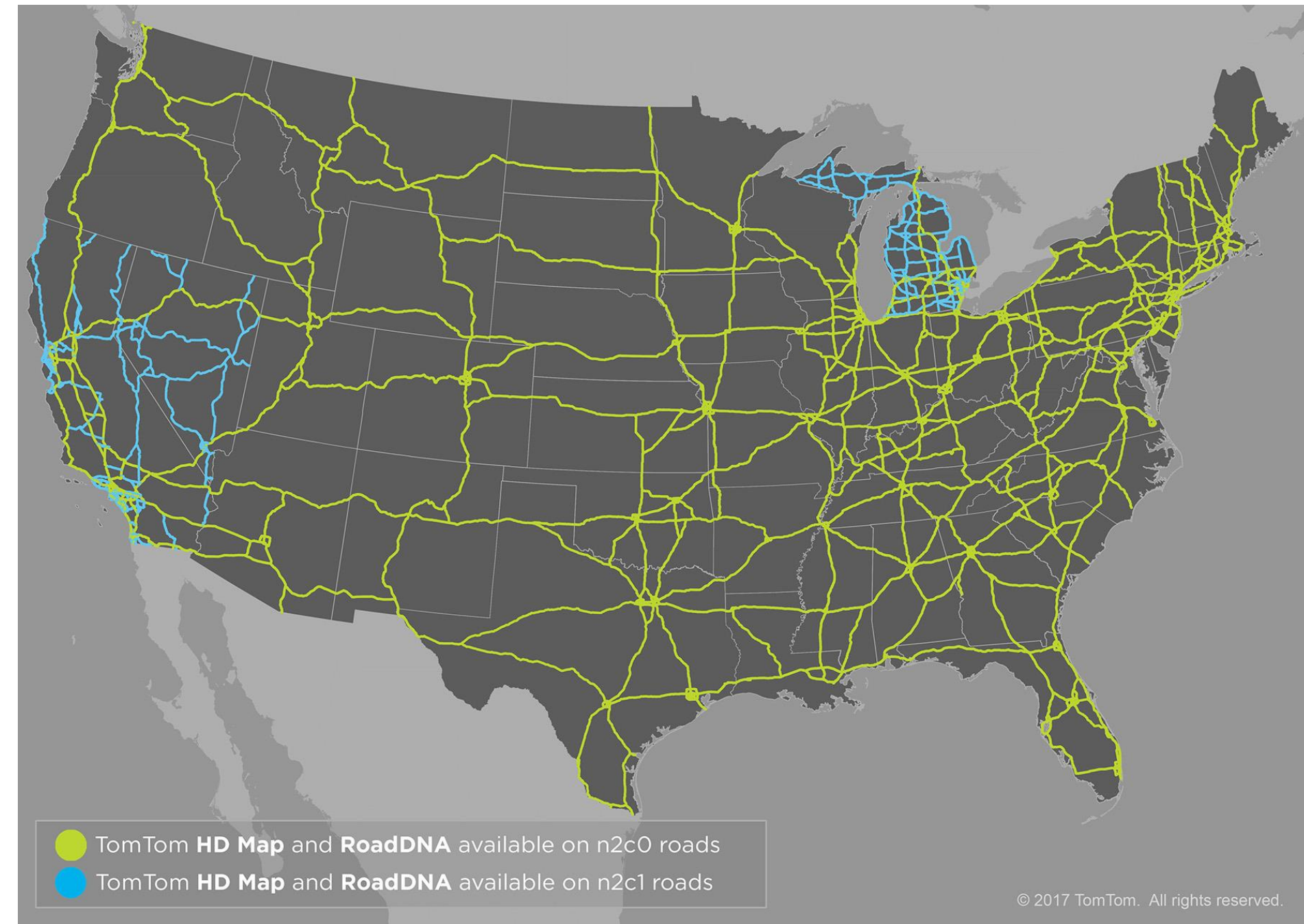
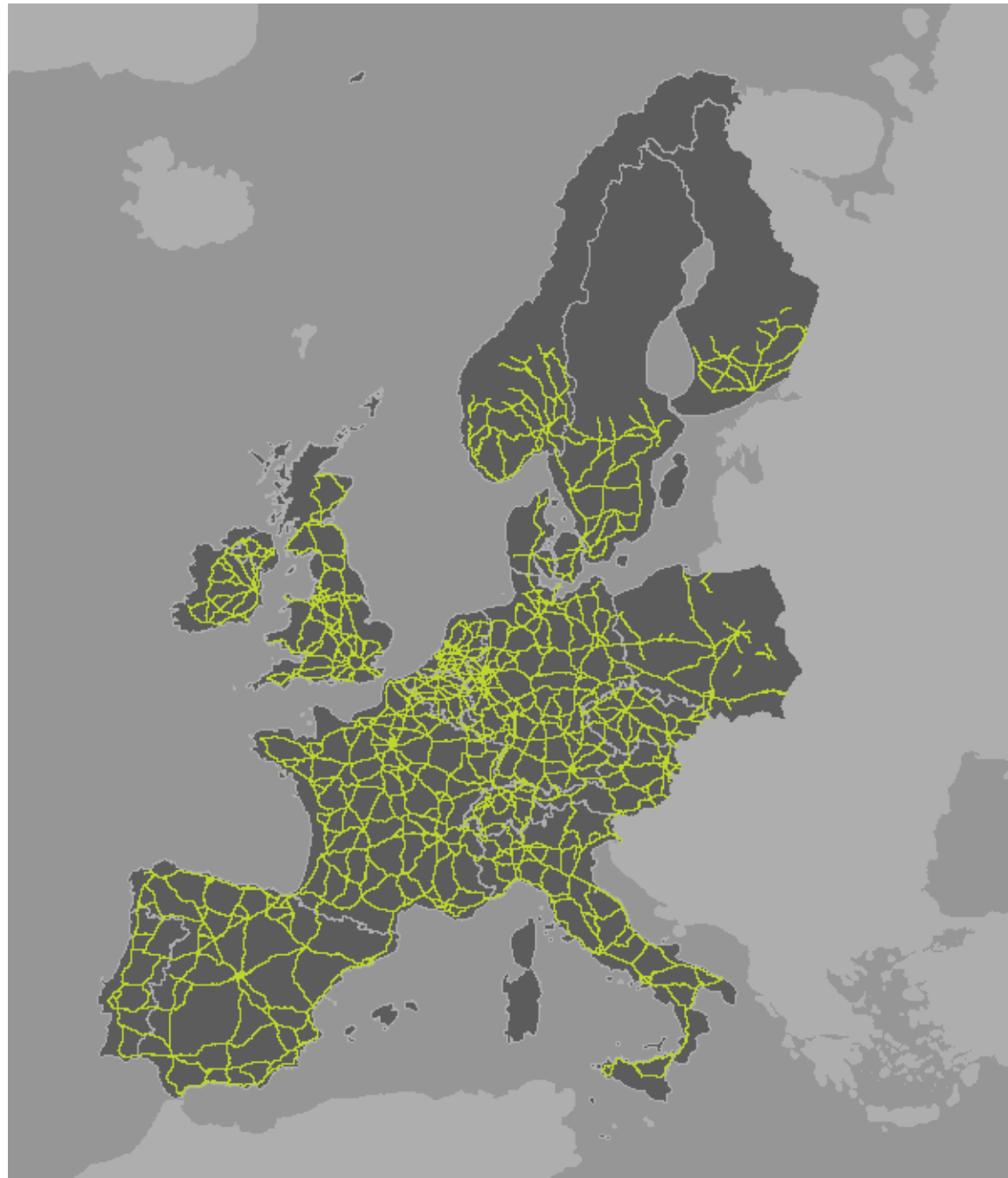
Intelligent
Transactional
Map Making

TRADITIONAL METHODS

CROWDSOURCING

HD MAP COVERAGE

TOMTOM IS LEADING IN HD MAP COVERAGE



>360,000 Km across US and Western Europe freeways

TOMTOM ROADDNA – CONTINUOUS CORRELATION LAYERS

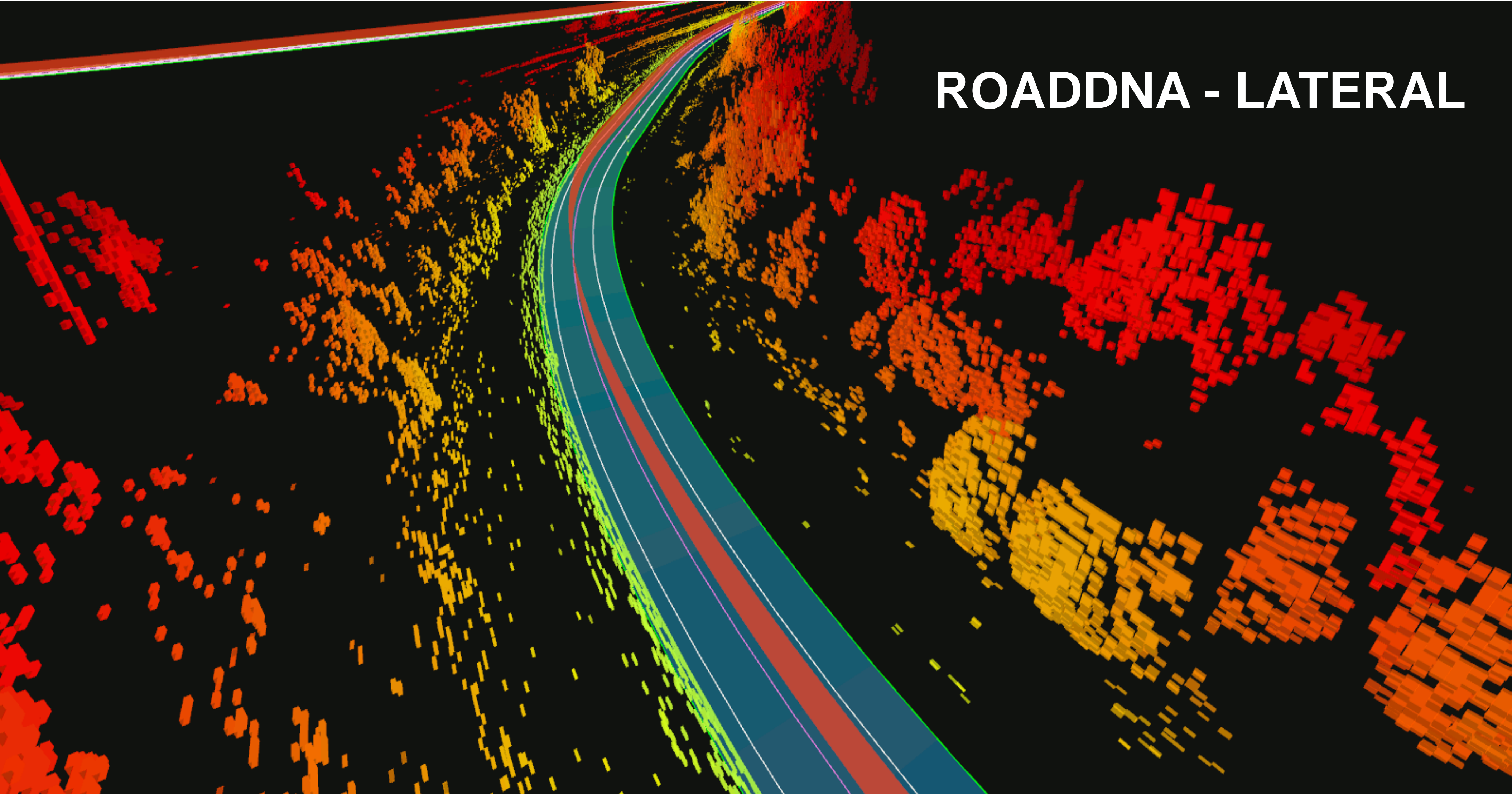


ROBUST

SCALABLE

ACCURATE

ROADDNA - LATERAL



REVEALING THE ROAD AHEAD – INCREASED SAFETY FOR ALL

TomTom helps connected cars see beyond their sensors and increase safety on the roads for all drivers



LIVE SERVICES, ENHANCED BY SENSOR DATA (xFCD)

- **Sharing** vehicle sensor data can play a significant role in increasing the safety and comfort for **all drivers** on the road.
- **Live Warnings** based on data from other drivers **nearby**.
- **xFCD** to **complement** existing services
 - Increases quality
 - Enhanced coverage
 - Added granularity



Extended floating car data (xFCD)



Active community input



Governmental & journalistic data

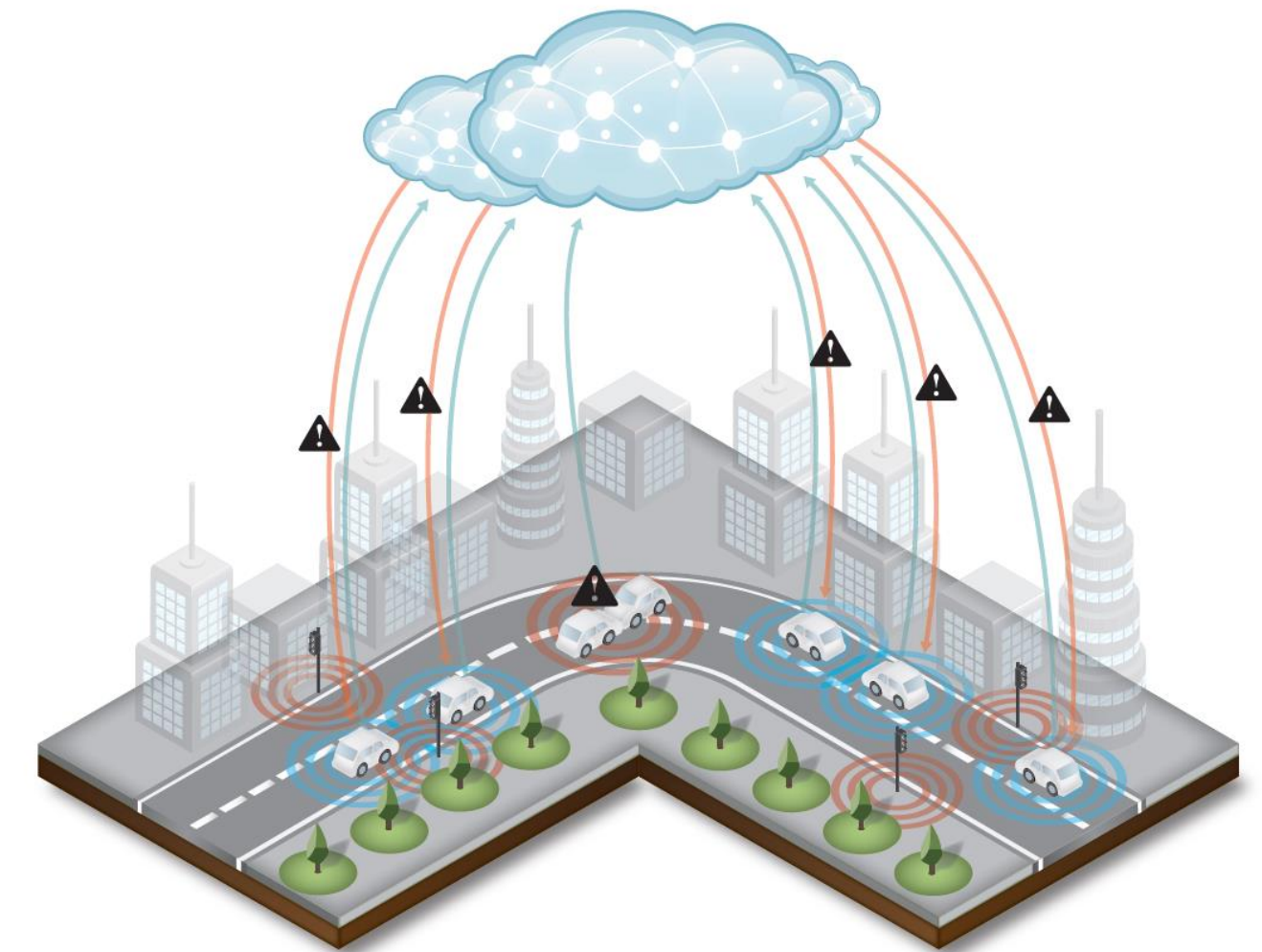


500 million connected devices

Hazards

Road weather

Speed limits



EXAMPLES OF PARTNERS USING TOMTOM HD MAPS



BOSCH



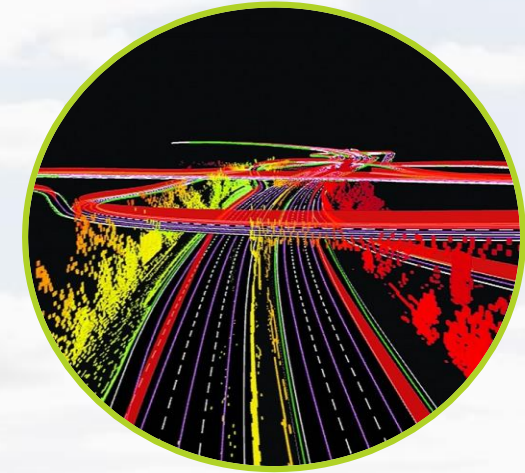
Baidu 百度



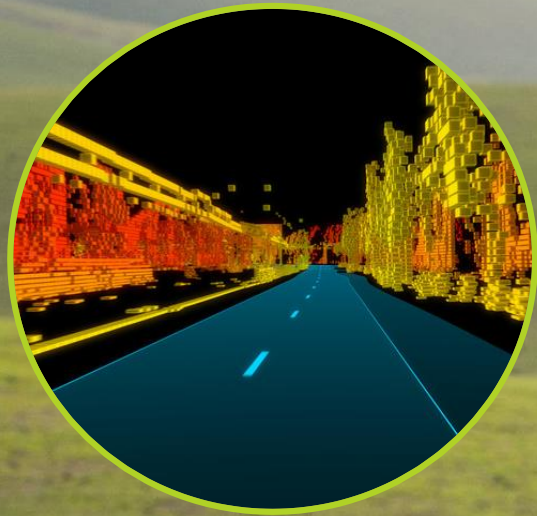
QUALCOMM



TOMTOM AD PRODUCTS ARE ALREADY IN THE FIELD



TOMTOM AD PRODUCTS ARE ALREADY IN THE FIELD



ON THE HIGHWAY

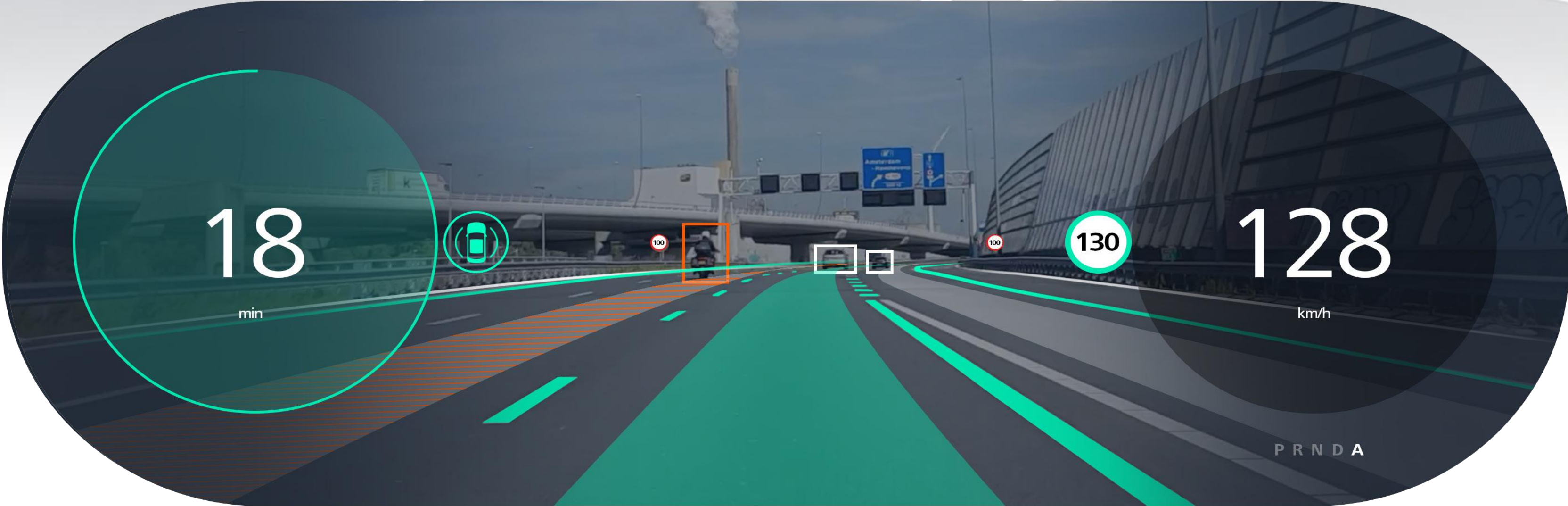
**CONVENTIONAL
TURN-BY-TURN**

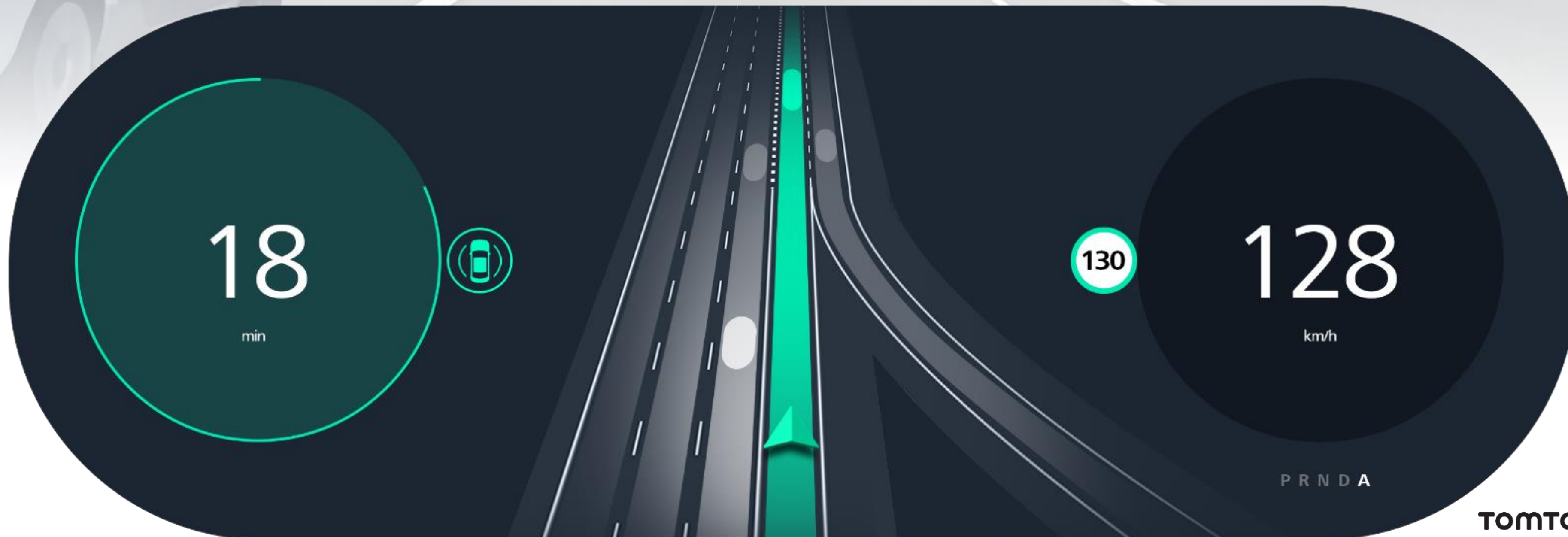
TRANSITION

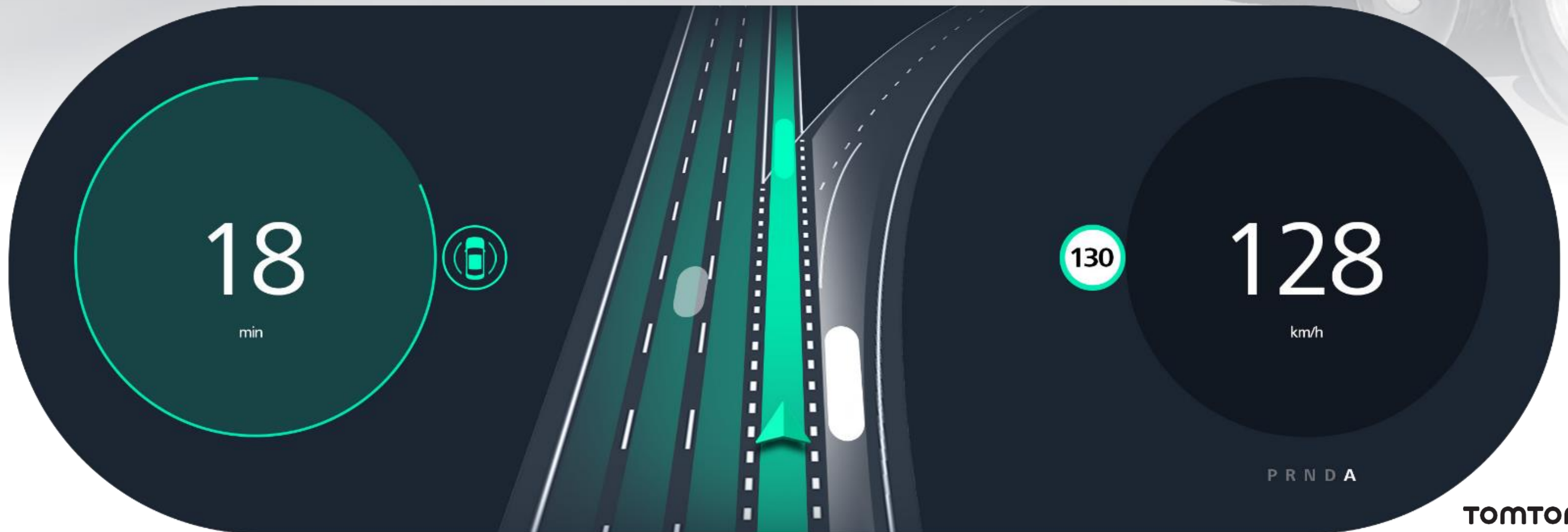
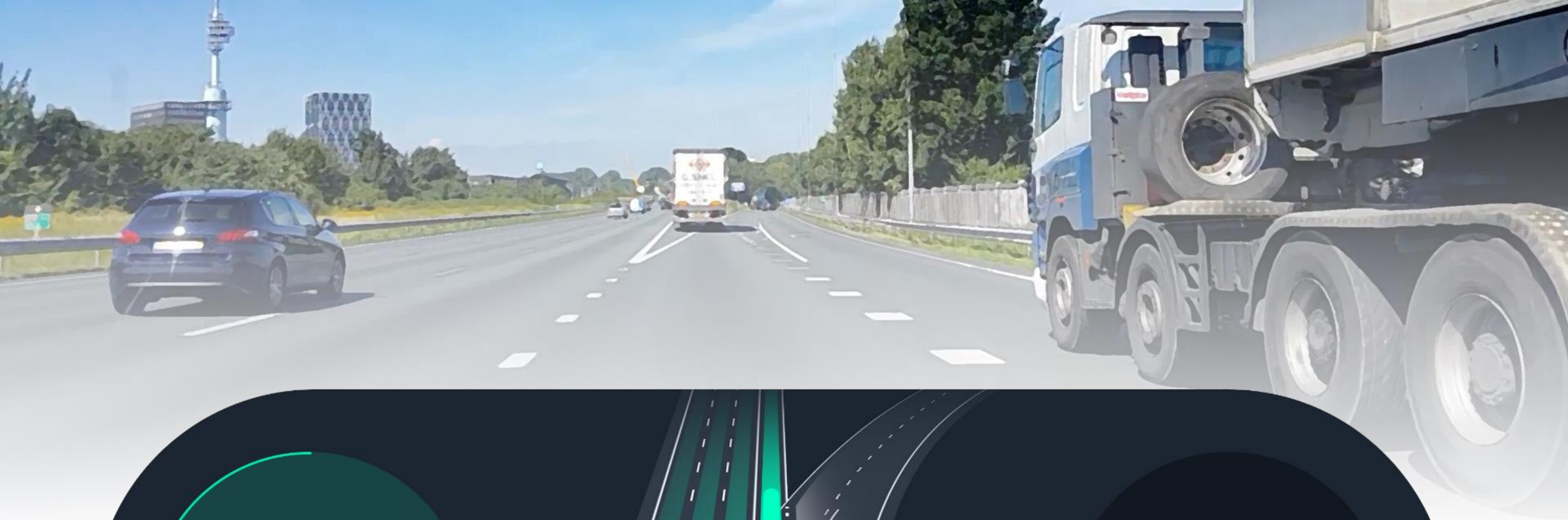
**AUTOMATION
INTERFACE**

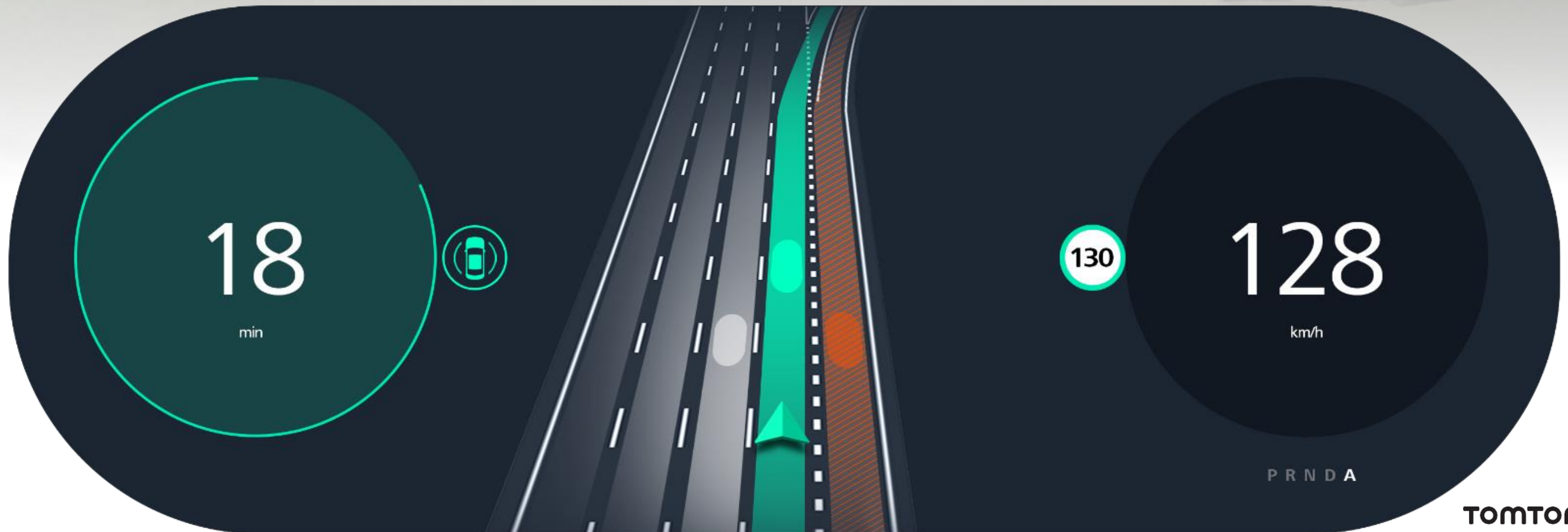


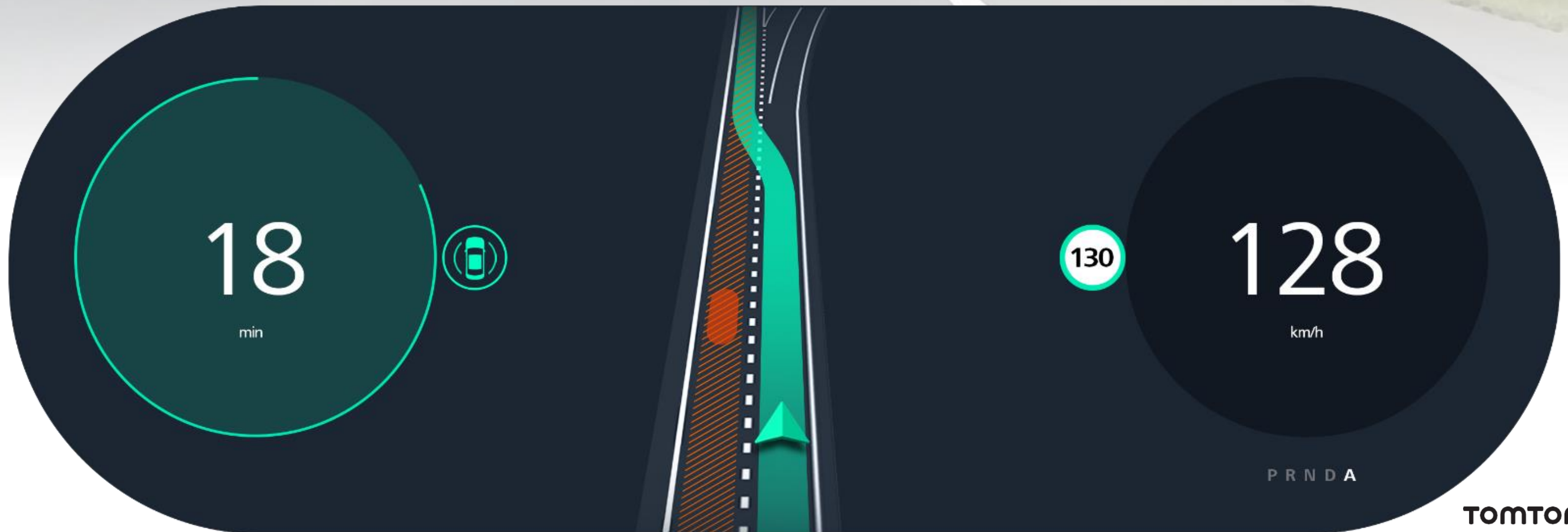
ON THE HIGHWAY

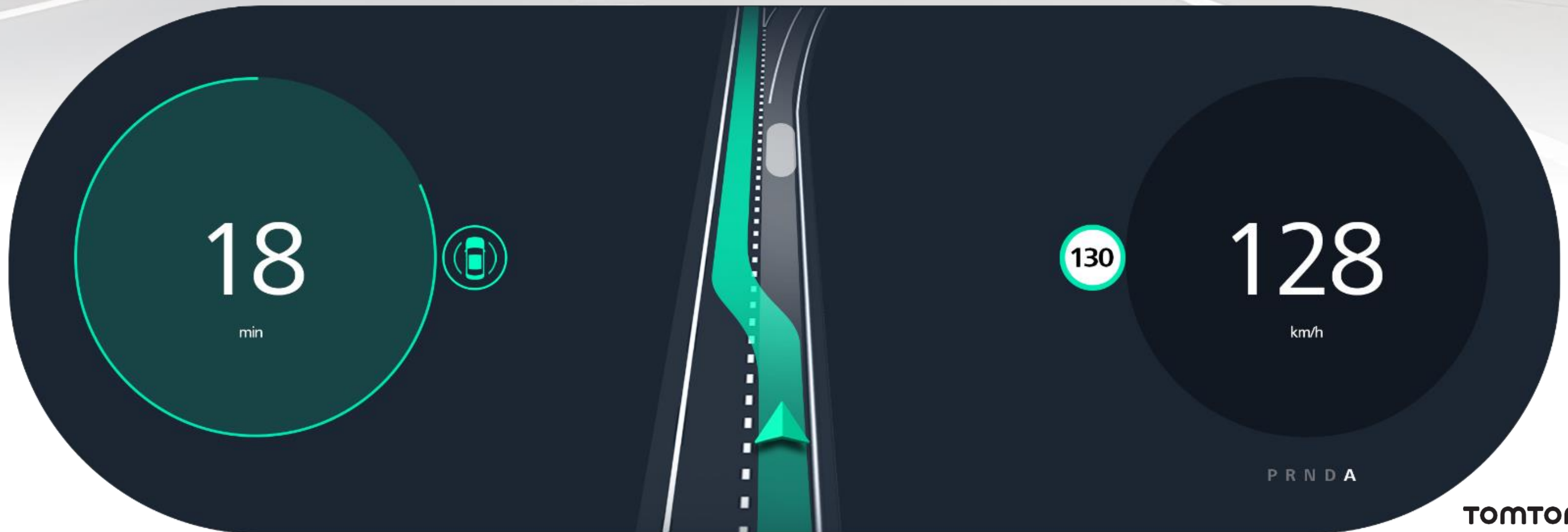


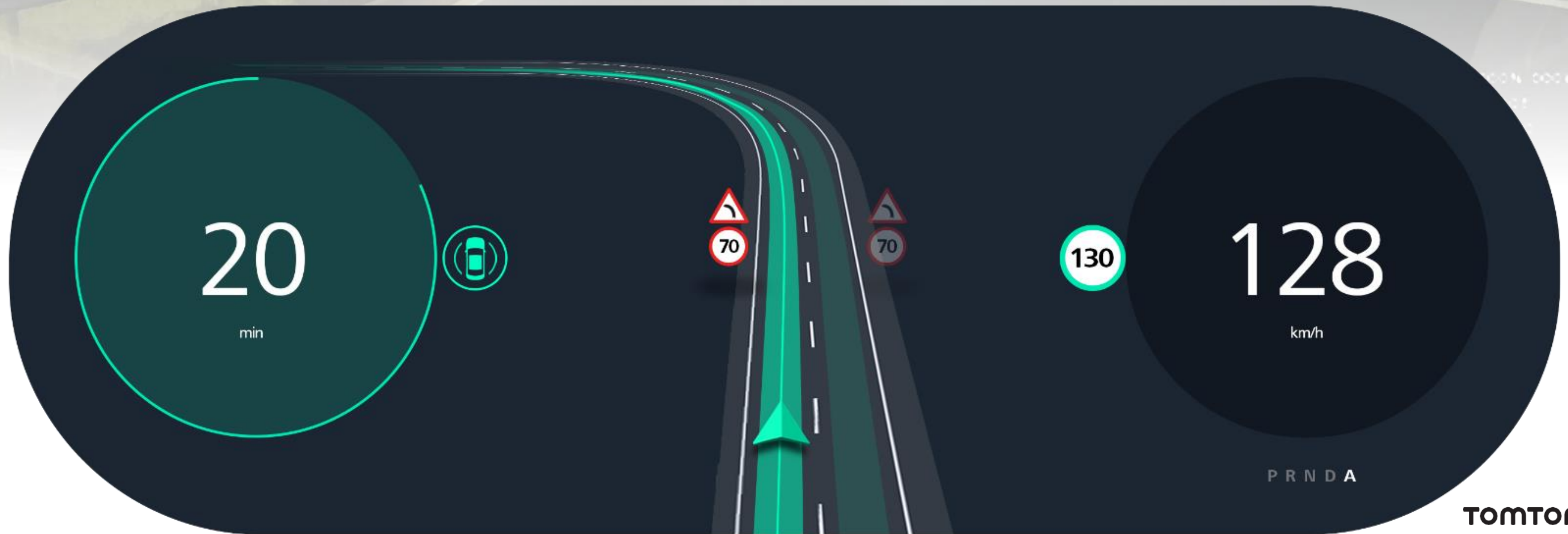






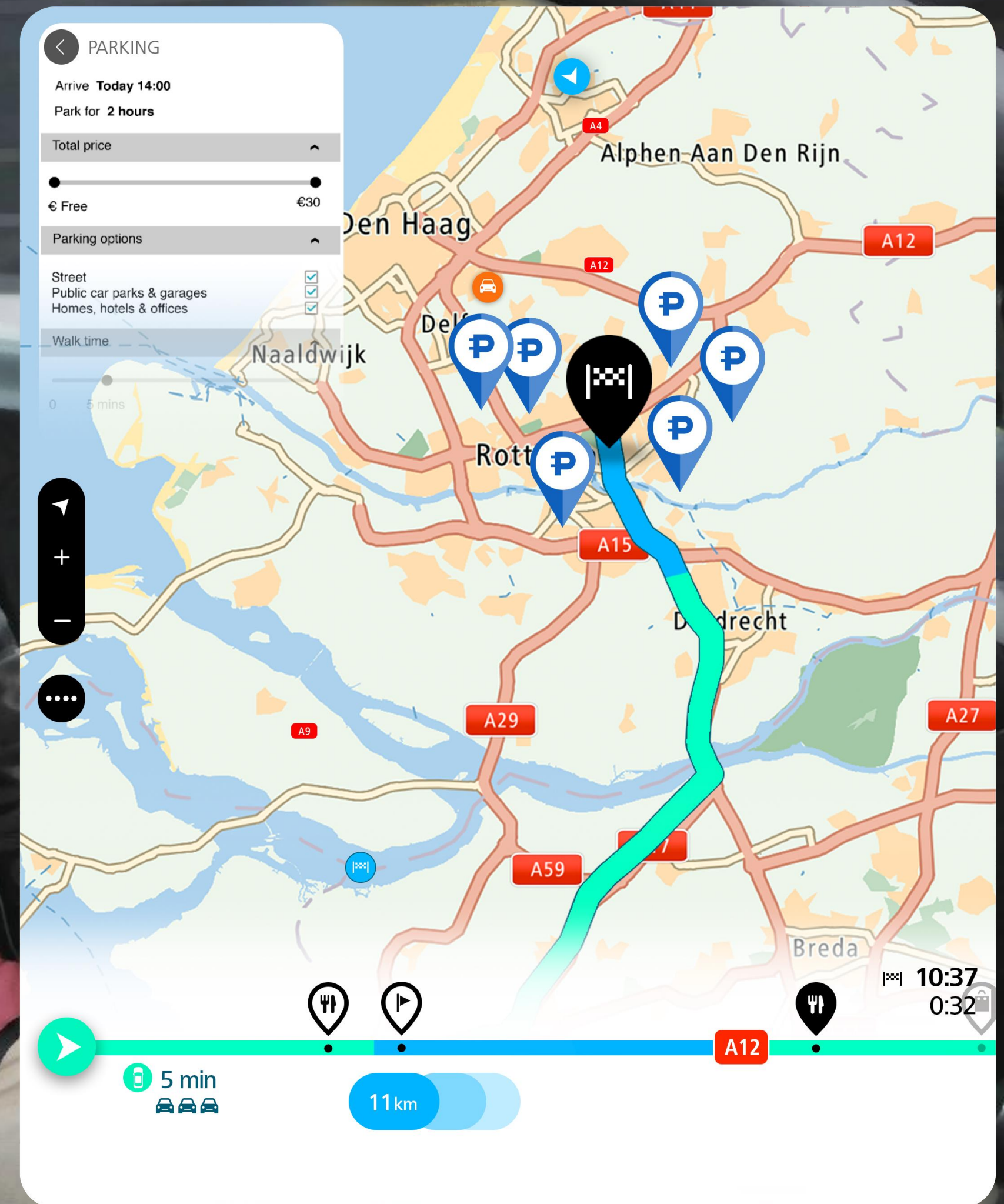






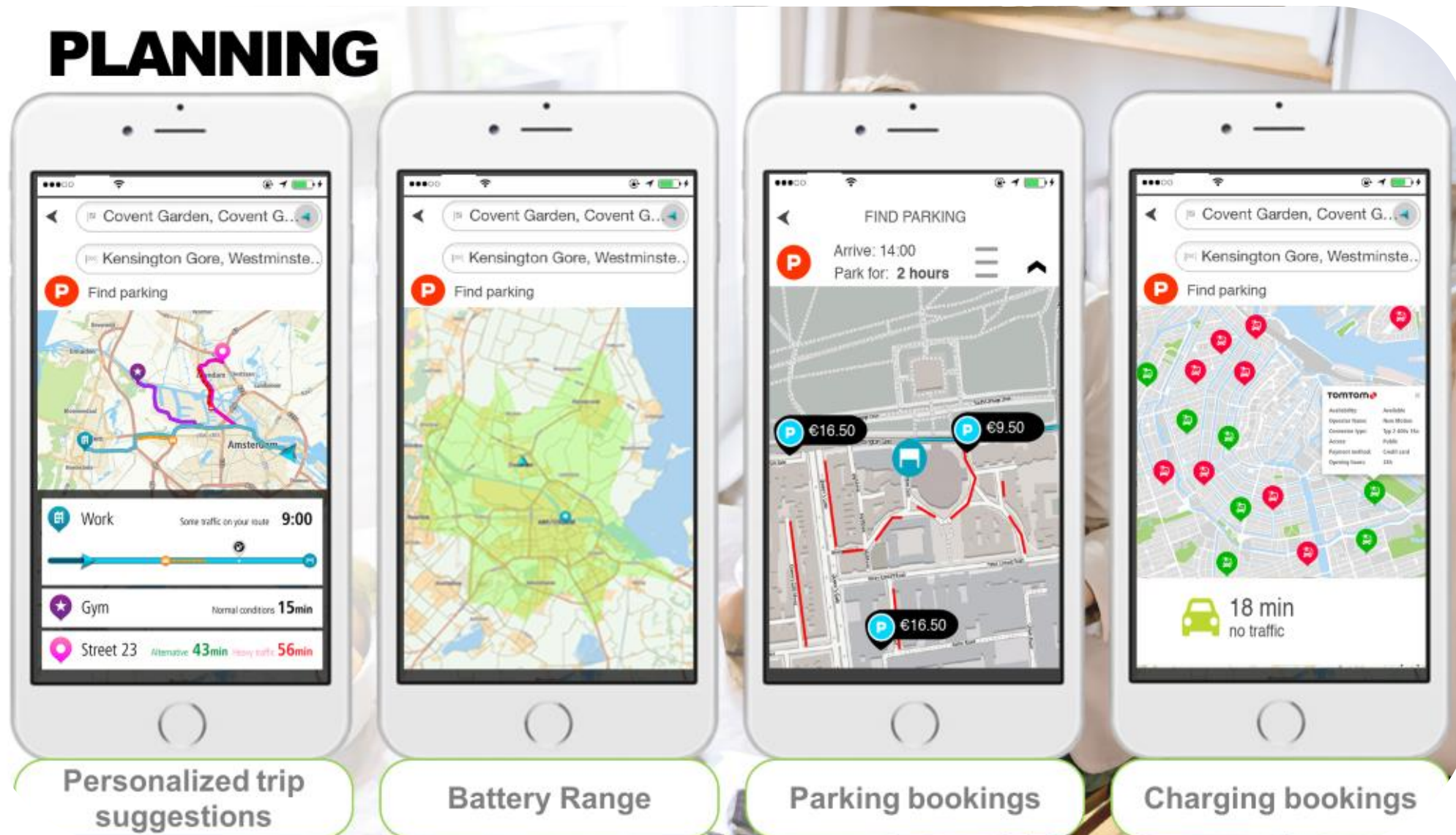
PASSENGER

- Emails
- Calls
- Advanced planning
 - Hotels
 - Restaurants
 - POI's
 - Parking/charging bookings



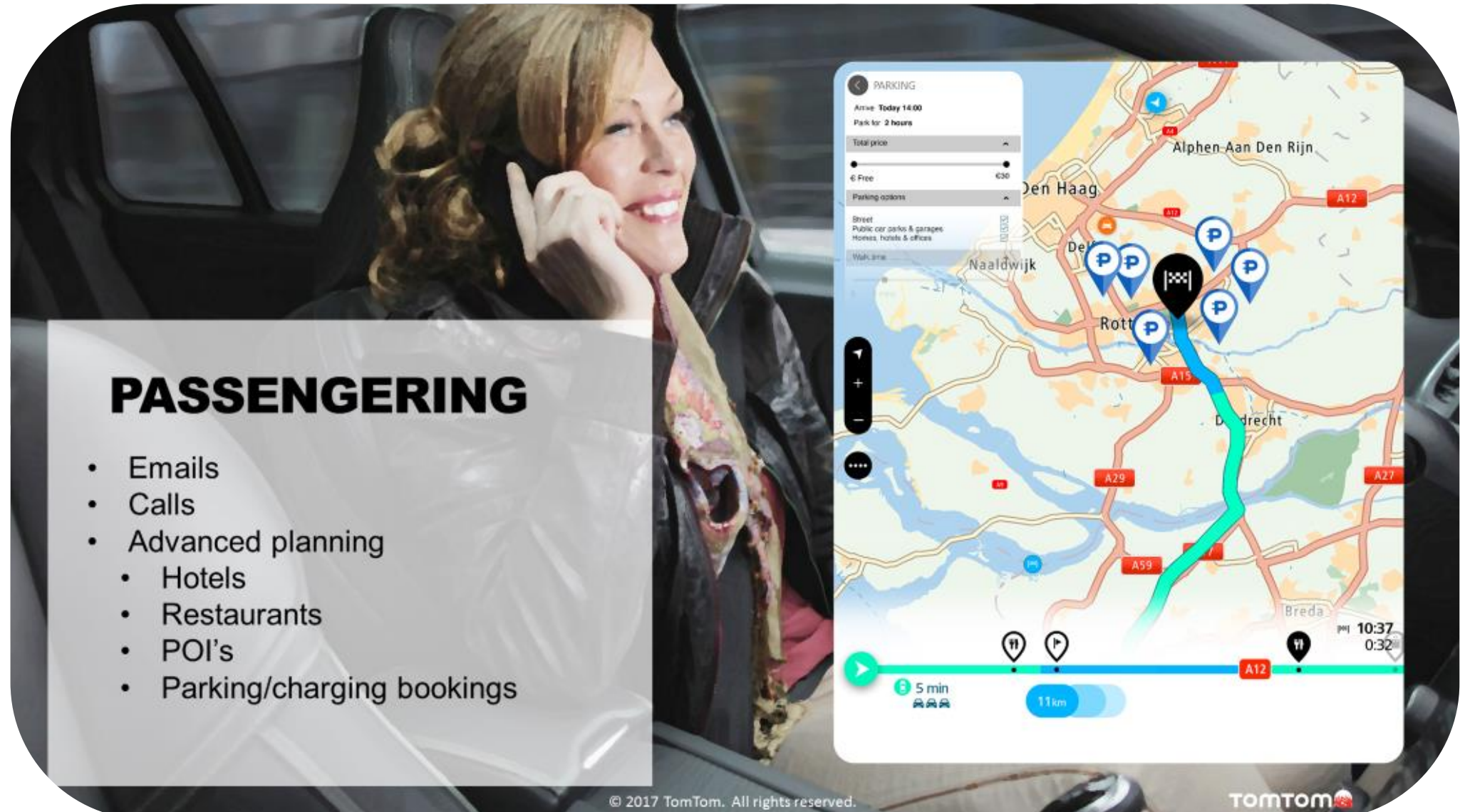
Extra user value

PLANNING



PASSENGERING

- Emails
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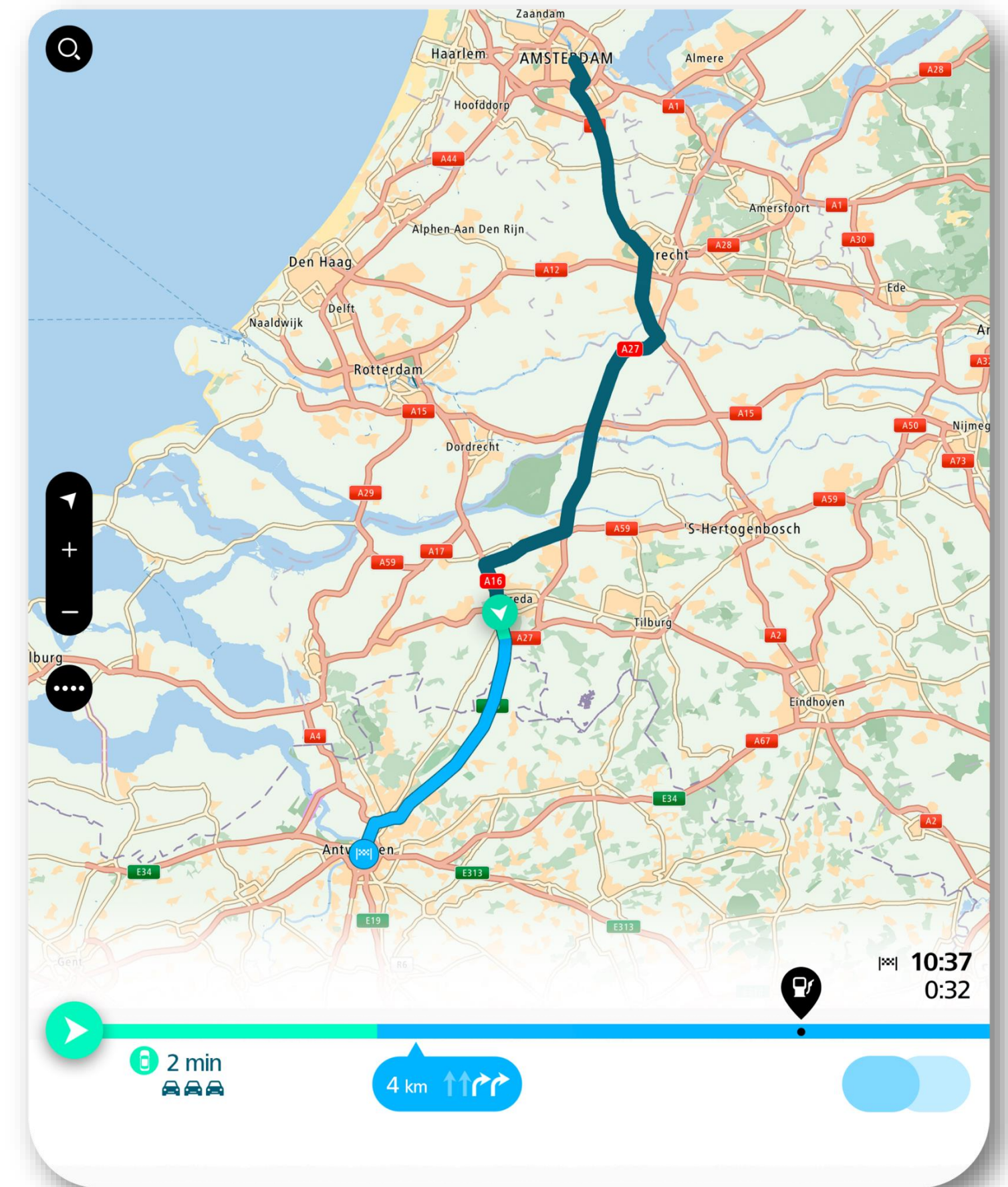


And potential revenue for OEM

HANDOVER



DRIVER NEEDS TIME TO TAKE BACK CONTROL



AUTO RE-ROUTING IF DRIVER NOT READY TO TAKE OVER

