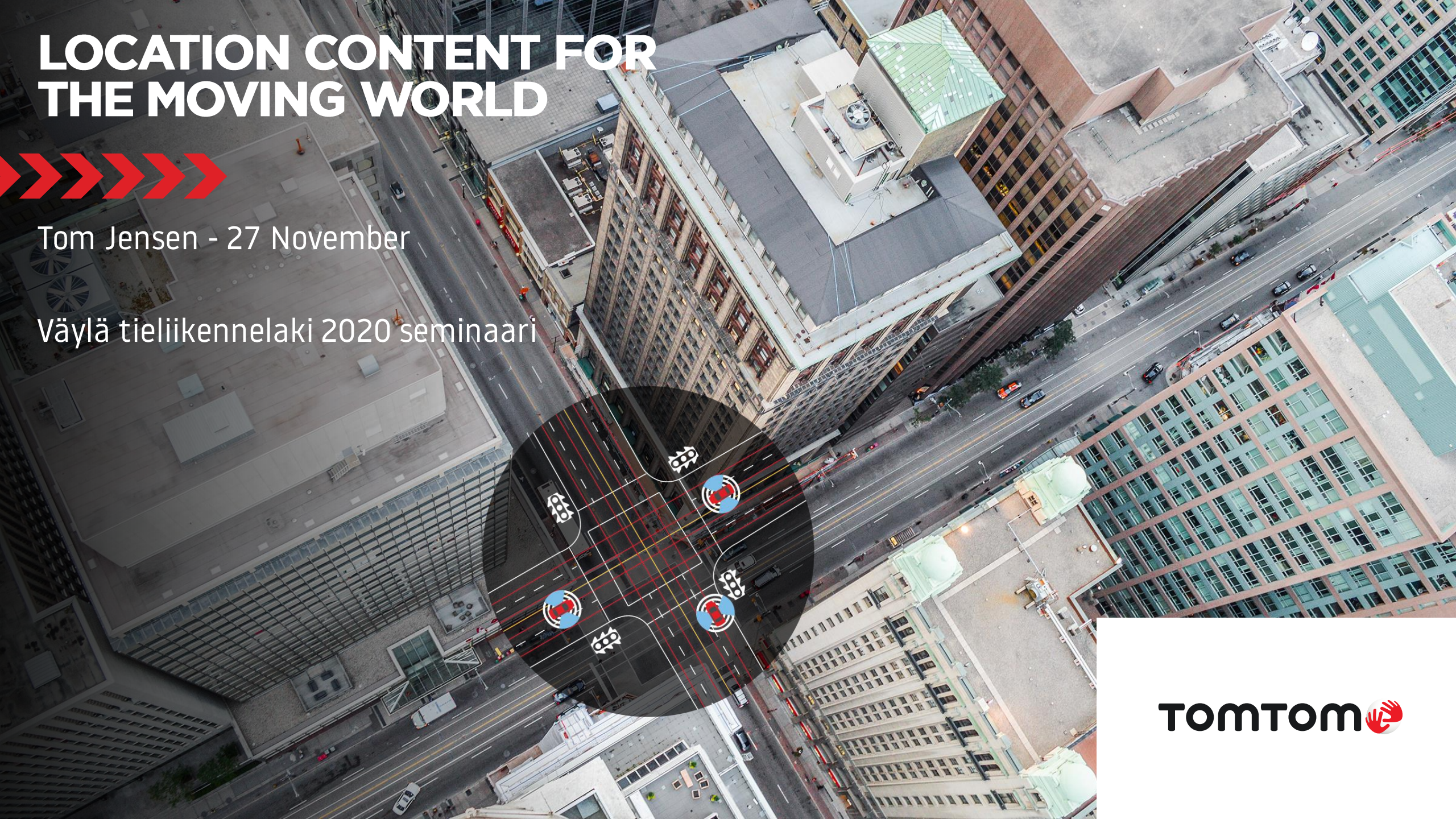
LOCATION CONTENT FOR THE MOVING WORLD

Tom Jensen - 27 November

Väylä tieliikennelaki 2020 seminaari



Our Mission

We are on a mission to create a map where real-world change is detected, updated in our database and shared with users in the shortest time possible.

Why?

We live in a digital world

Everything is connected and through this connectivity, our location content is helping to improve lives – reduction in emissions, reduction in stress, making our streets safer and cleaner.

Location data empowers cities globally to make smarter decisions

We inspire cities to harmonize with local communities to improve infrastructure, enhance services, and create the cities of the future.

A revolution in how people move is just around the corner

Autonomous driving promises to disrupt transportation as we know it today. Our location content will enable this disruption.

How?

Our data is

AUTOMATED

LIVING

INNOVATIVE

VERSATILE

EASY TO USE

Our data is

AUTOMATED

LIVING

INNOVATIVE

VERSATILE

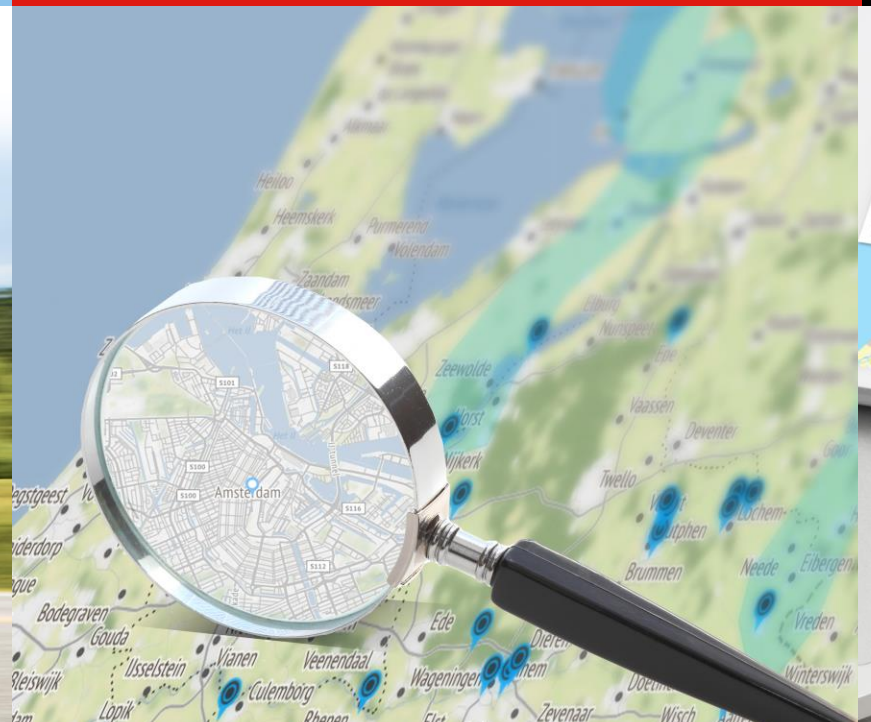
EASY TO USE

Automated

We leverage automation in all our technologies and processes, aiming to make better products and improve time to market

SOURCING

QUALITY

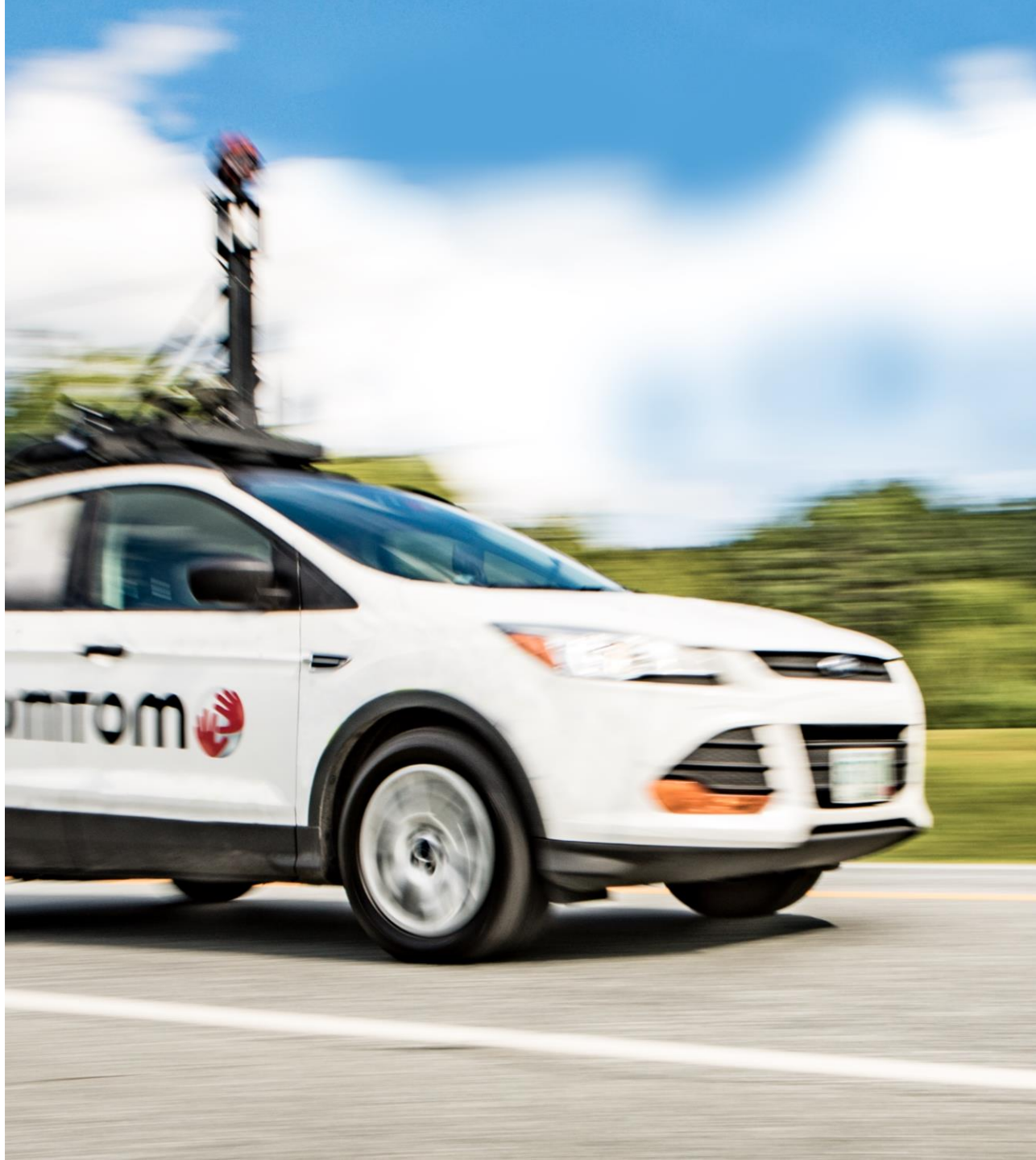


PRODUCTION

AUTOMATED

Sourcing

Leveraging machine learning and AI, we collect information from multiple sources to ensure the most accurate and relevant changes are updated in our database.



AUTOMATED

Quality

Quality is paramount in all we do at TomTom. And, automation has enabled us to deliver high quality without sacrificing time.

AUTOMATED

Production

Automation has enabled TomTom to not only deliver new products to the market, but also improve the legacy products that our customers have relied on for years.

Our data is

AUTOMATED

LIVING

INNOVATIVE

VERSATILE

EASY TO USE

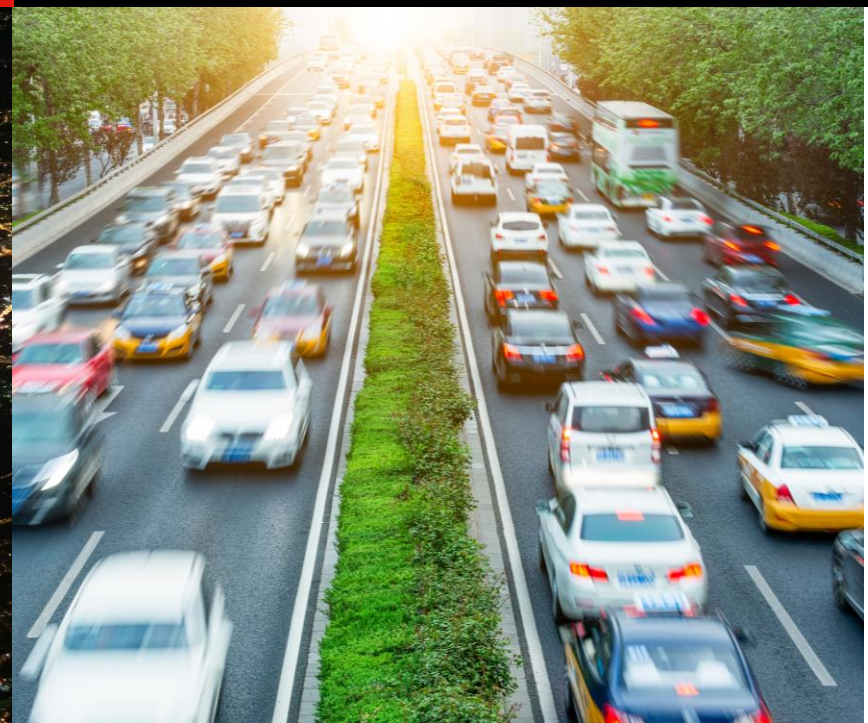
Living

Our location content is continuously evolving to reflect the world around us

VOLUME OF CHANGE

BIG DATA

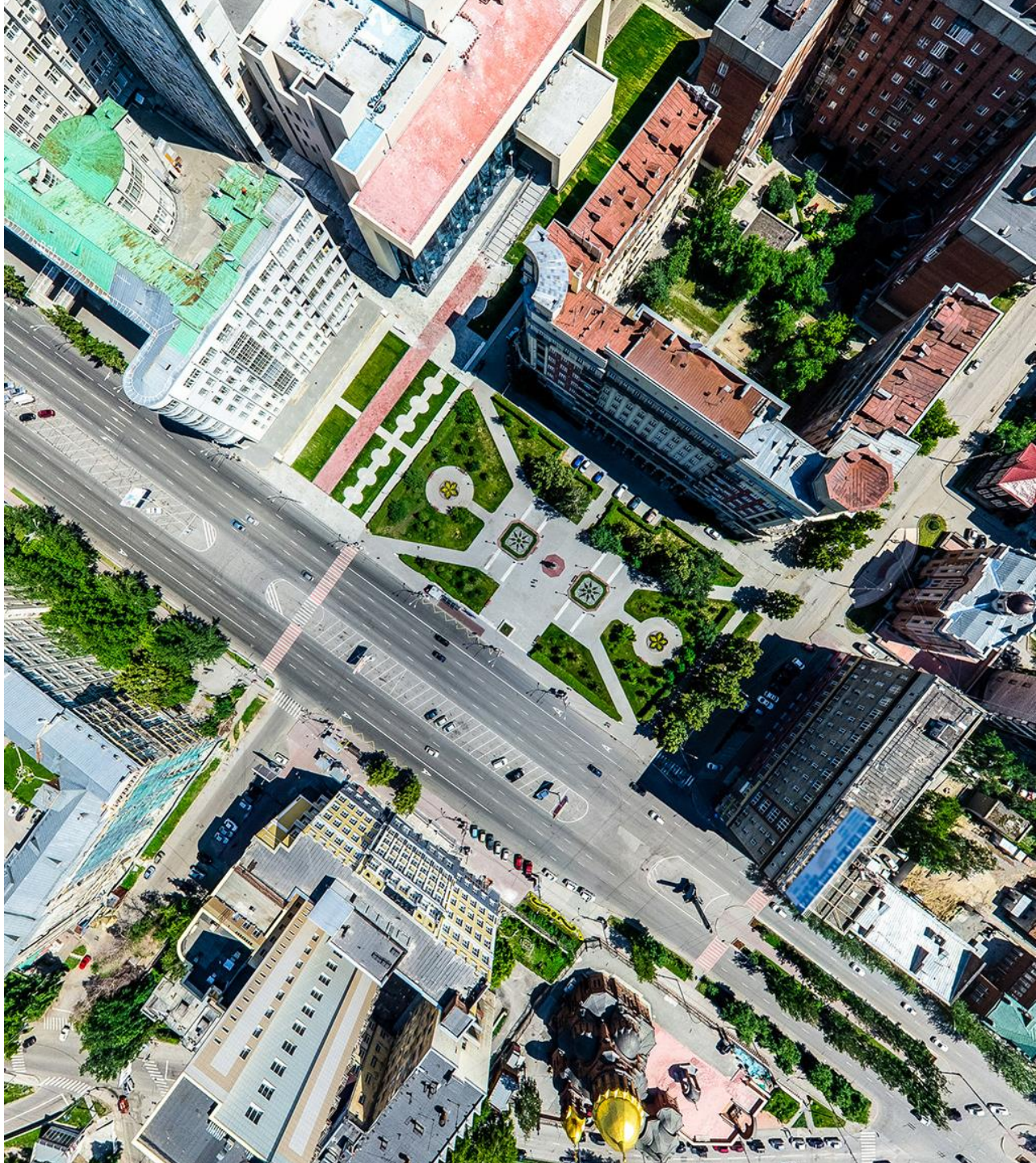
SPEED OF CHANGE

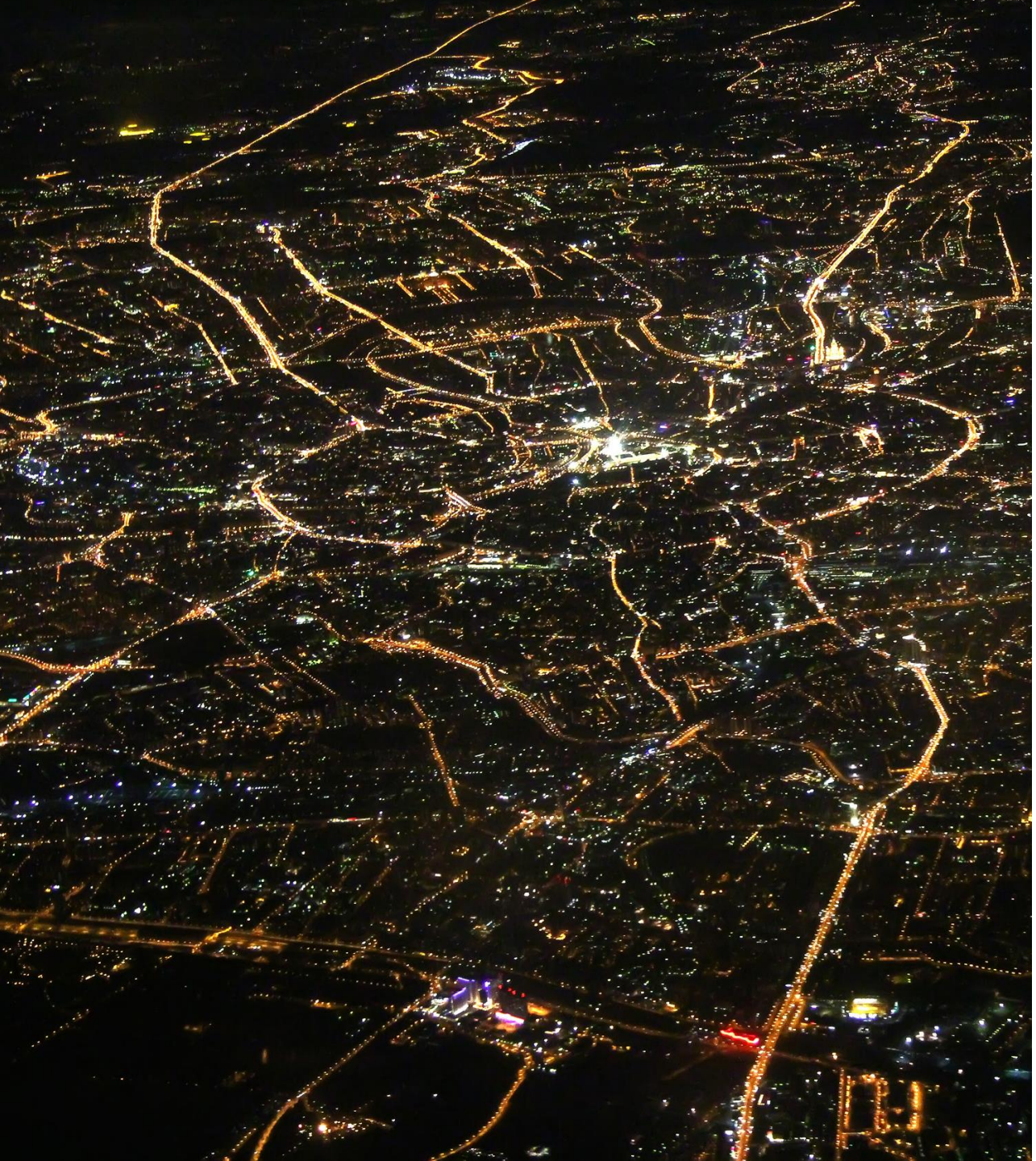


LIVING

Volume of change

Our database is organic - constantly evolving to include new roads, changing POI's, or an updated address. Our ability to process more than 2 million map changes per hour means that TomTom delivers the most up-to-date location data.





LIVING

Big data

With access to 19 trillion data points, TomTom processes more than 21 billion anonymized data points every day.

LIVING

Speed of change

Our production platform and accompanying processes enable us to detect real-world change, make the update to our database, and publish a map product faster than any other mapmaker.

Our data is

AUTOMATED

LIVING

INNOVATIVE

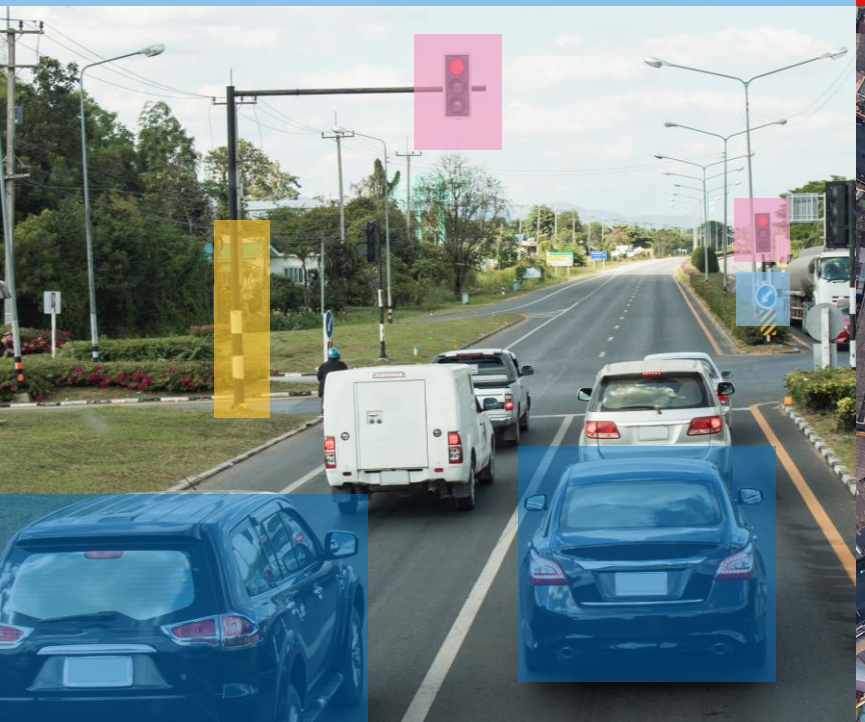
VERSATILE

EASY TO USE

Innovative

We are continually introducing new technology to advance our product development

MACHINE LEARNING



CONTINUOUS INTEGRATION

HD MAP WITH ROADDNA

INNOVATIVE

Machine learning

Localization is a key requirement of self-driving cars. Autonomous vehicles use road features such as sign posts, traffic lights, and road markings to accurately identify the position of the car on the road. Applying Machine Learning TomTom has developed tools to automatically extract features from images captured by the car.

INNOVATIVE

Continuous integration

Our map is always changing to keep pace with the real world. In order to ensure it is always up-to-date we continuously add and update change. These changes are delivered to our customers weekly. Using our API's ensures that the latest data is always accessible.

INNOVATIVE

HD Map with RoadDNA

Autonomous vehicles require maps that are significantly different than the maps that are used in today's navigation systems. Our HD Map with RoadDNA product will power self-driving vehicles of the future.

Our data is

AUTOMATED

LIVING

INNOVATIVE

VERSATILE

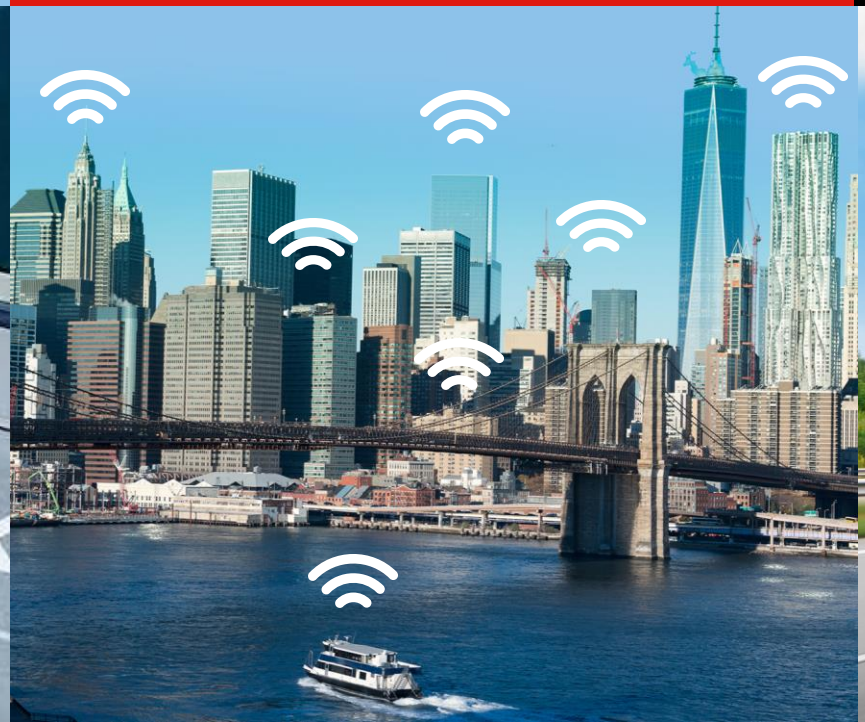
EASY TO USE

Versatile

Our location technology content has relevance in many use cases

AUTONOMOUS DRIVING

SMART CITY & MOBILITY



CONNECTED NAVIGATION

VERSATILE

Autonomous driving

As the driving task gradually shifts from the driver to in-vehicle automated systems, the role and scope of digital maps shifts accordingly.

The user of the map is no longer the driver, but rather a machine. As a result, a new generation of maps built purposely for machines is needed.

VERSATILE

Smart city & mobility

As cities become more connected, they are finding new ways to make their cities work for the communities they serve.

Through TomTom connected services, cities can now use the power of data to improve the experience for all members of a community, from government officials to residents and visitors.

VERSATILE

Connected navigation

Cars have been connected for several years, with the ability to send and receive information. Now that cars are becoming more autonomous, the speed of connectivity and the volume of data being sent over the air is increasing. With incremental updates, TomTom can send only relevant updates to the car, saving larger country or regional updates for when the car is connected to a more robust internet connection.

Our data is

AUTOMATED

LIVING

INNOVATIVE

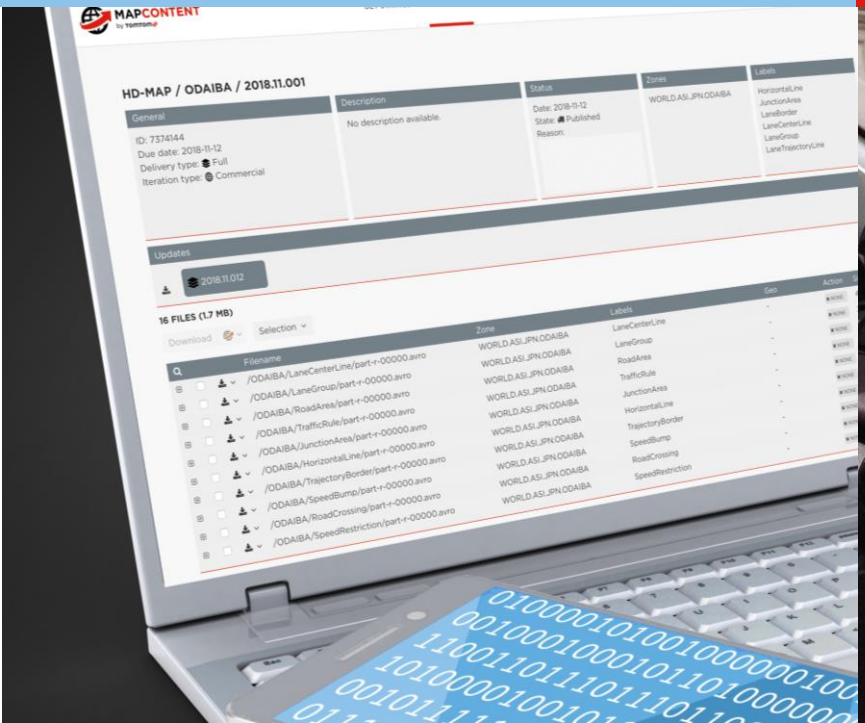
VERSATILE

EASY TO USE

Easy to use

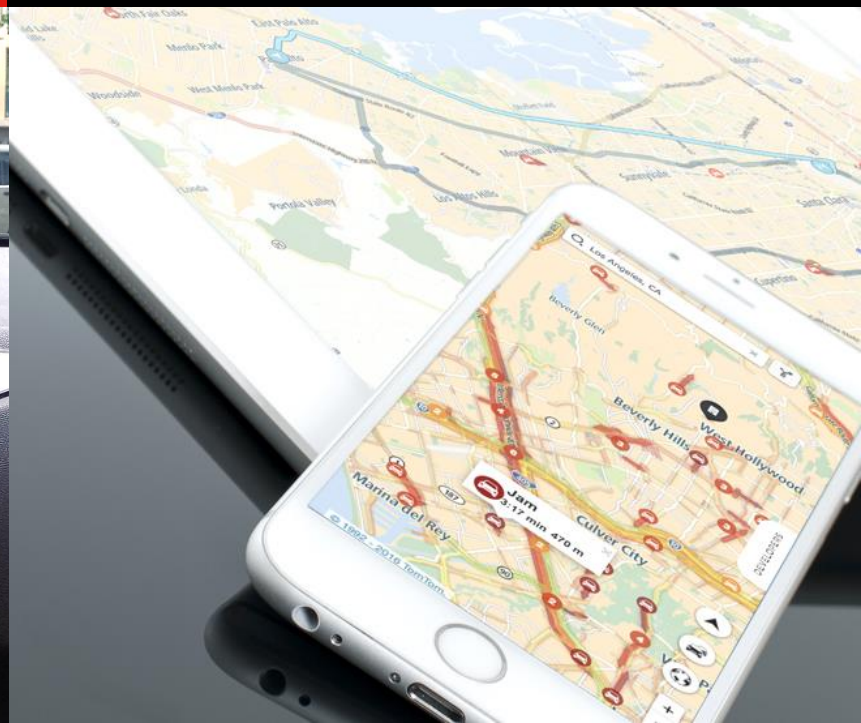
Our products and services are delivered in a variety of formats to meet customer needs

MAP FORMATS



LIVE SERVICES

APIS



EASY TO USE

Map formats

Complied maps and un-compiled maps, NDS or APIs. Map formats differ depending on the use case. At TomTom we have a map product format to meet all customer needs. What remains constant is the quality of our data and the speed at which real world change is recognized in our map.

EASY TO USE

Live services

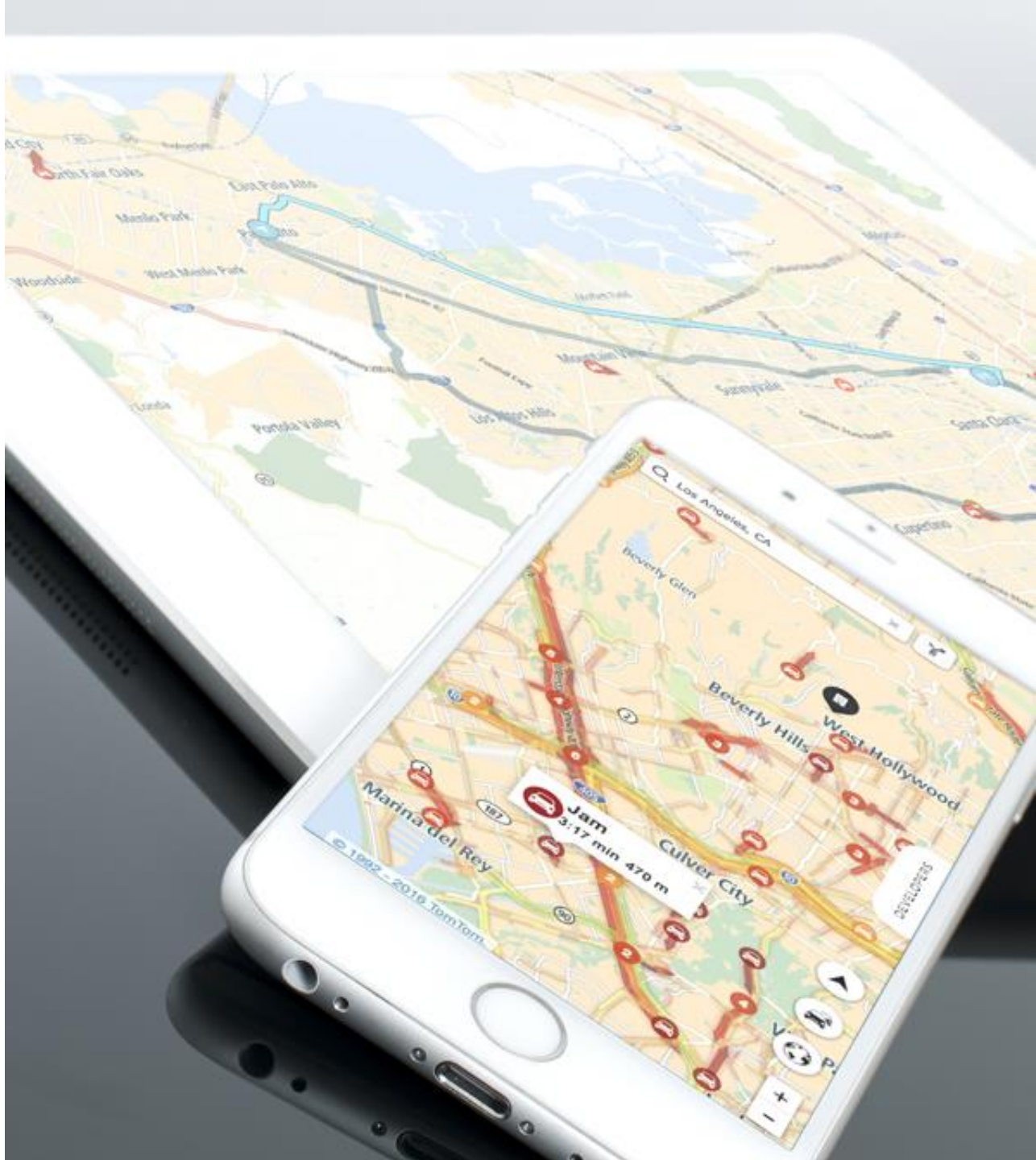
TomTom Connected Services deliver traffic and travel information to drivers. The products range from static to dynamic services, supporting use cases from traffic to parking and electric vehicle services.

These products utilize TomTom's state of the art machine learning and AI to allow drivers to receive the most up-to-date information and for cities to have the most comprehensive tools for planning, analysis and simulation.

EASY TO USE

APIs

Our maps, traffic, geofencing, routing, and search APIs enable developers to build location-based applications.



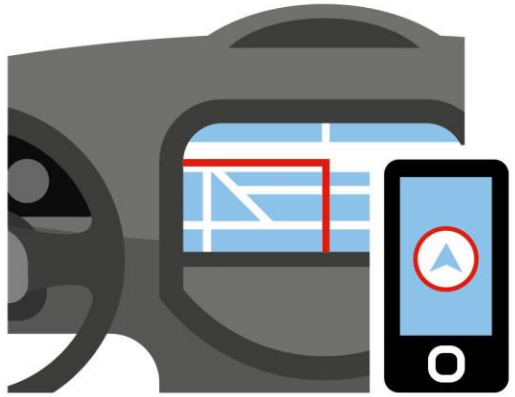
WHAT?

Maps

- We are the pioneers and a global leader in location content for the world's largest technology companies, car manufacturers, fleet management organizations, cities, and the driver.
- We have revolutionized the way that maps are updated by inventing a proprietary mapmaking platform, able to deliver a continuously up-to-date map.
- TomTom maps cover the world.

MAPS FACTS

As of Q2 2019



Navigable maps for

163 COUNTRIES

35 TERRITORIES

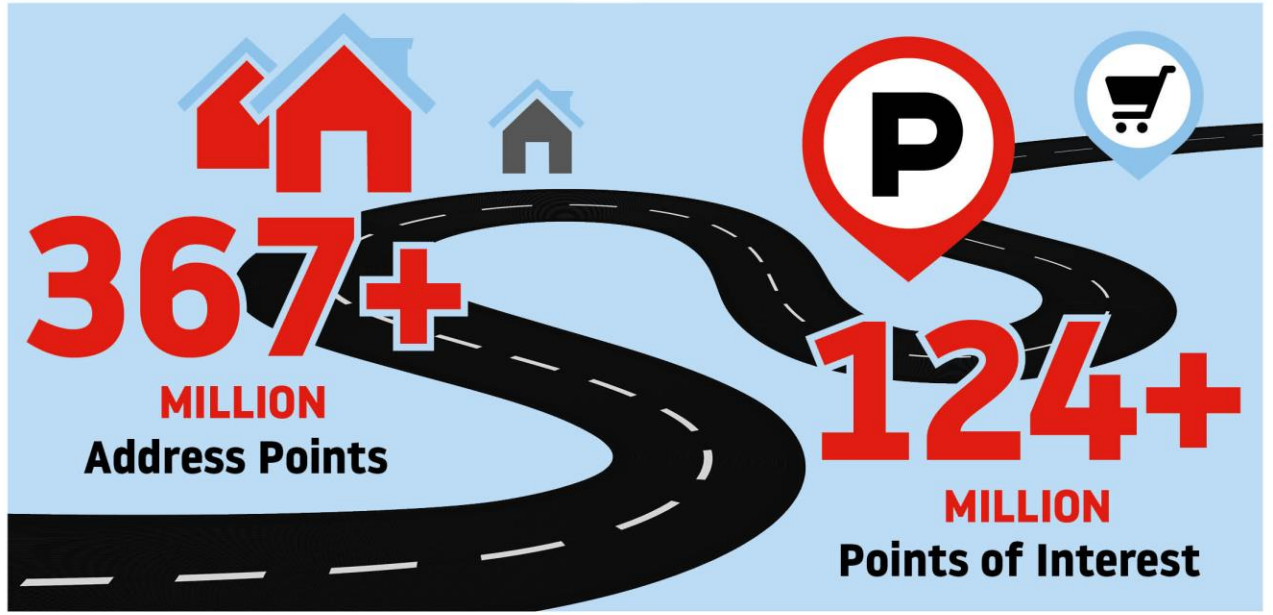
67+ MILLION KM ROADS

152 MILLION

Building footprints

across

83 COUNTRIES



367+ MILLION

Address Points

124+ MILLION

Points of Interest

Map is updated and released to customers

WEEKLY

Voice Maps in

55 LANGUAGES

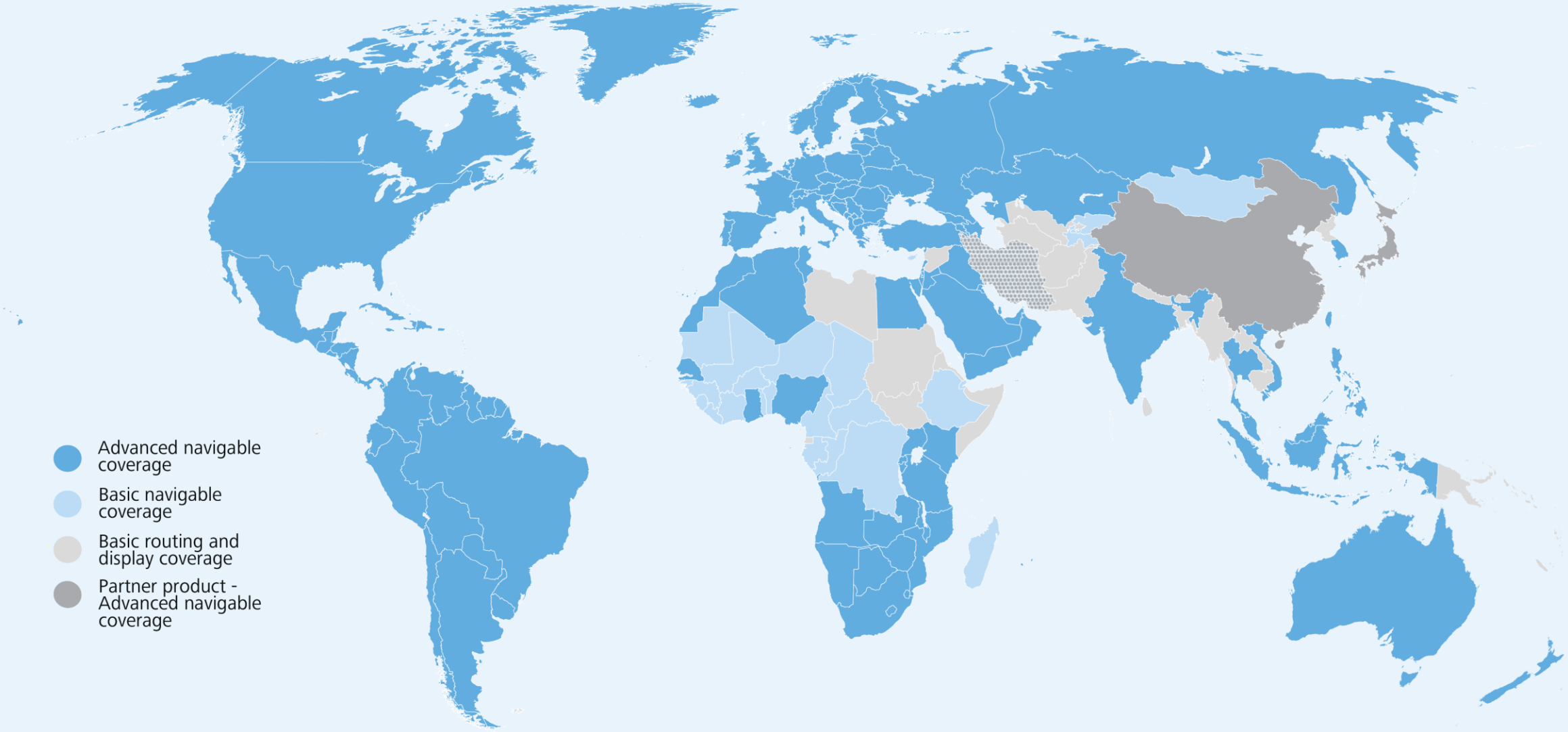
across

190 COUNTRIES & TERRITORIES

TOMTOM

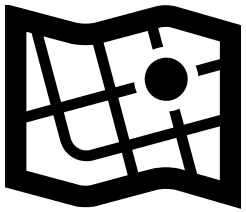
Global map coverage

(as of Q2 2019)



Sophisticated and detailed maps

Enabling a range of location-based functions



CORE

At the heart of all our products, the road geometry including attribution and maneuvers.

ADDRESSING

A global database of highly accurate unique building addresses, address ranges and postal codes.

POINTS OT INTEREST

A global search index of locations ranging from hotels and restaurants to fuel stations and EV charging locations.

SPEECH

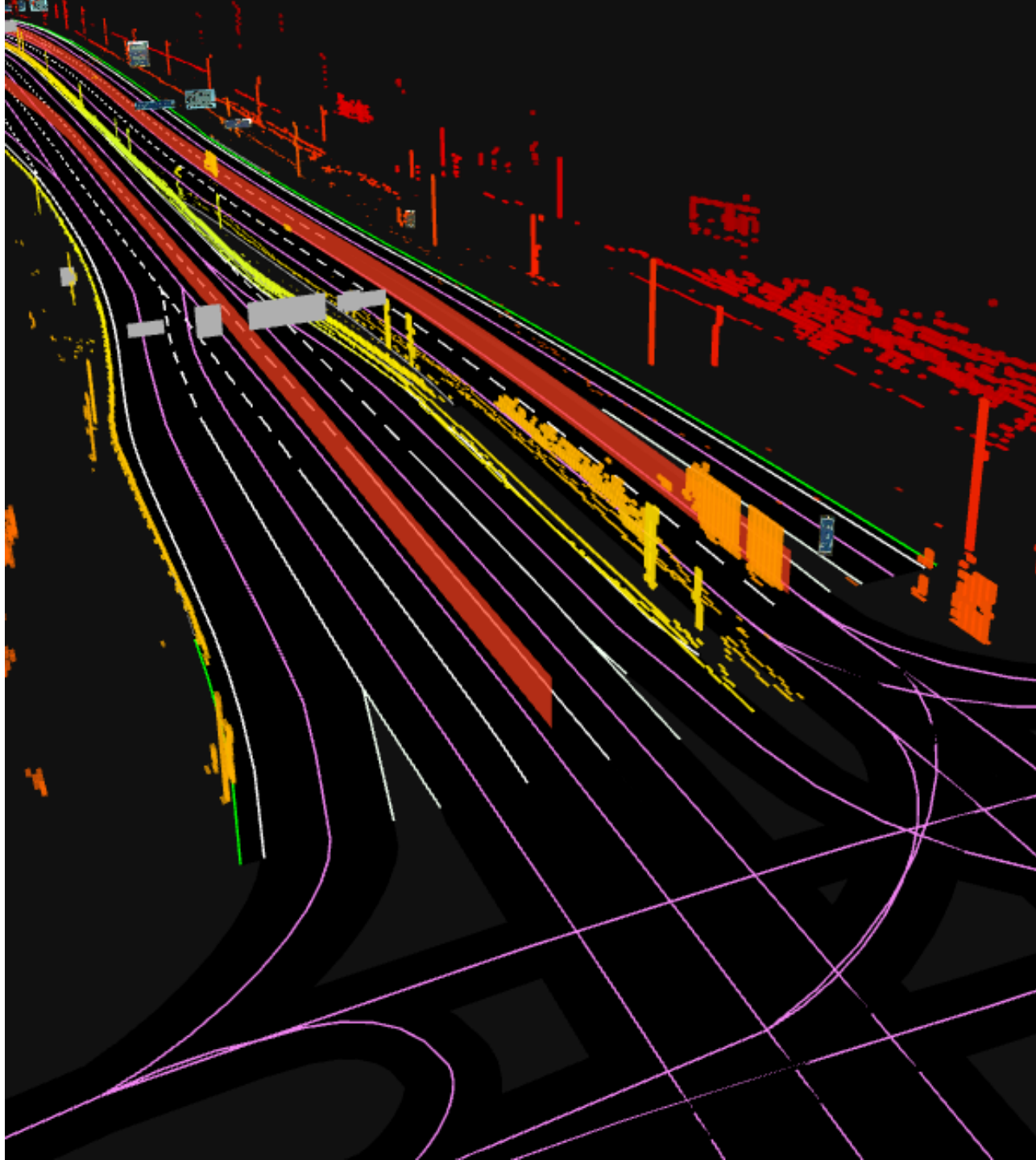
Integrating speech technology into map applications. Provides natural spoken instructions for navigation technologies.

VISUALIZATION

3D Landmarks, Advanced City Models, Land use and land cover. Bringing map features to life.

Autonomous Driving

High definition maps are vital to the success of autonomous driving. With our ADAS Map and HD Map with RoadDNA we can provide navigational and path planning features that will enable autonomous driving.



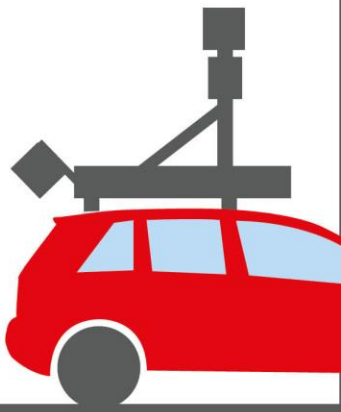
AUTONOMOUS DRIVING FACTS

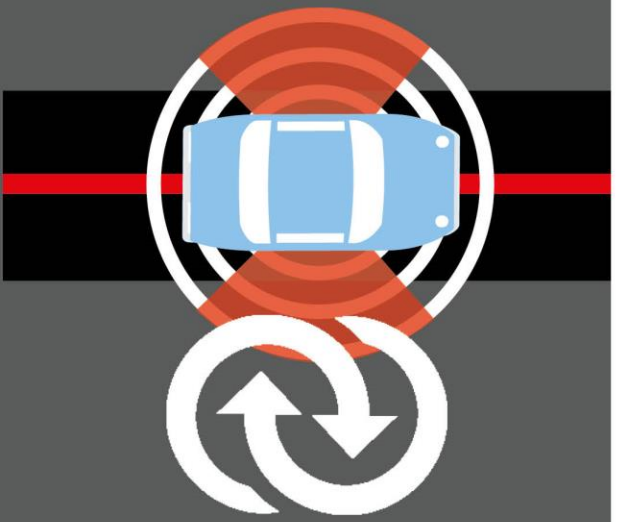
As of Q2 2019

125
IMAGES PER KM

375
MILLION IMAGES PER YEAR

collected by mobile mapping vehicles



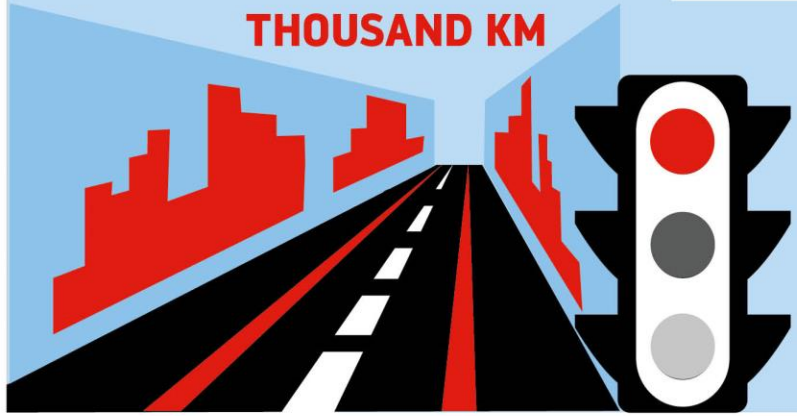


200+
REQUESTS

for TomTom HD Map samples for integration

400+
THOUSAND KM

of HD Map with RoadDNA coverage



12+
MILLION

traffic signs available globally

FIRST

to cover highways in Europe, US, and Asia

Closed deals with multiple

TOP **10**

carmakers

TOMTOM

ADAS Map

Highly accurate map content for driver assistance

GRADIENT

Improves fuel efficiency

CURVATURE ON ROAD

Aids safer driving through predictive speed control

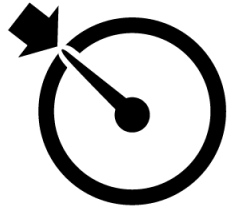
CURVATURE & LANE AT JUNCTION

Improves comfort and predictive gear shifting

Informs driver of lane marking and possible maneuvers

TRAFFIC SIGN

Provides warnings and visualization for drivers



SPEED RESTRICTIONS

Enhances speed control and overspeed warnings

HD Map with RoadDNA

Powering sensor-agnostic localization

SIGNS

A collection of traffic signs along the road, primarily tailored for camera-based localization

ROADSIDE

A highly optimized LiDAR point cloud of roadside patterns, delivered in a storage-friendly and processing-friendly format, primarily

POLES

A collection of vertical poles along the side of the road, suitable for LiDAR, camera, and radar-based localization

MARKINGS

A model of lane markings along the roadway, primarily tailored for camera-based localization

REFLECTIVITY

Localization data that leverages the reflectivity of the road surface, primarily tailored for LiDAR-based localization

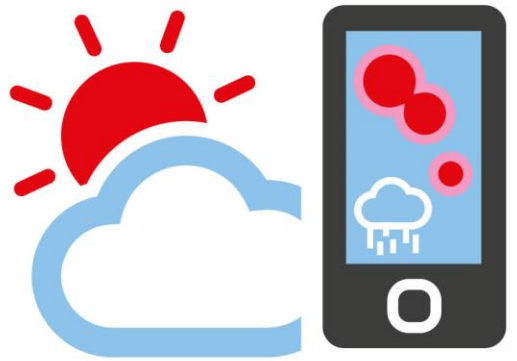
RADAR

A continuous view of roadway objects, as perceived by radar sensors, primarily tailored for radar-based localization

TRAFFIC AND TRAVEL FACTS

As of Q2 2019

Weather in
146
COUNTRIES

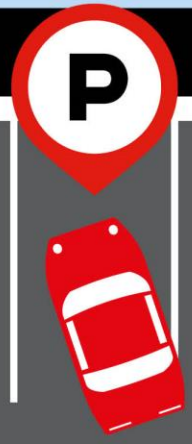


On-Street Parking in
114
CITIES

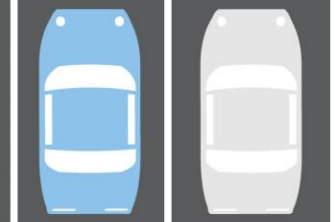
21
COUNTRIES

Live Traffic in
81
COUNTRIES

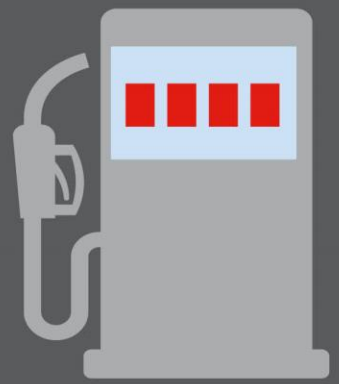
130K
EV Charging Stations in
50
COUNTRIES



Off-Street Parking in
70+
COUNTRIES



Fuel Prices in
40
COUNTRIES



TOMTOM

Traffic and Travel Information Services

Delivering data reliability, road coverage, accuracy, and freshness

TRAFFIC

Current and predictive traffic information

SPEED CAMERAS

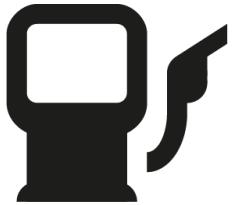
Fixed and mobile cameras and safety zones

WEATHER

Tabular and advanced weather information

PARKING

Off and On-Street parking information



FUEL

Static and dynamic fuel information

EV STATION

Static and dynamic EV station information

Historical Traffic

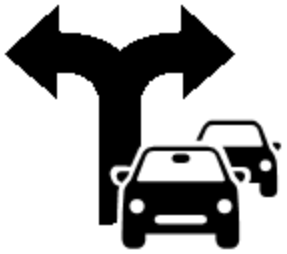
Delivering data reliability, road coverage, accuracy, and freshness

TRAFFIC STATS

Provides insights into the traffic situation on the road network, 24 hours a day, 7 days a week

O/D ANALYSIS

Helps users understand the patterns of everyday movement



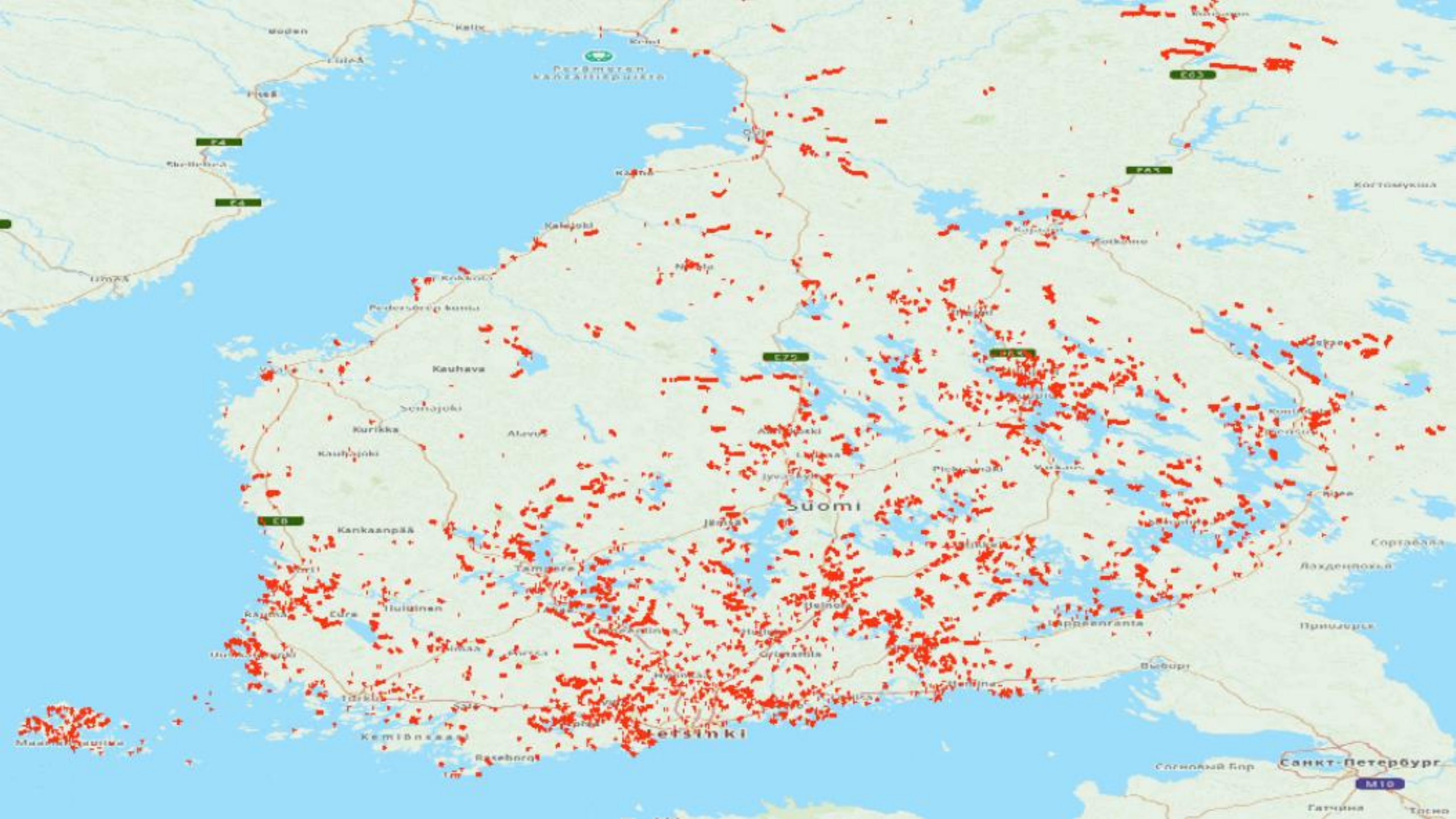
ROUTE MONITORING

Allows users to monitor conditions such as travel times, delay times and flow data, ensuring drivers are better informed and encounter less congestion

TN-ITS GO : further deployment in EU

- 20 Partners in Europe
- Supporting Standardization and Implementation
- Towards TN-ITS Services in 15 Member States
- Feedback Loop from Map Provider
- New features supporting new use cases (multimodal)

TN-ITS GO is co-financed by the European Union's Connecting Europe Facility, grant agreement no. MOVE/B4/SUB/2017-63/CEF/PSA/SI2.770546


Suomi
Helsinki
Kauhava
Санкт-Петербург

Our Vision

Location content that is representative of the real world as it changes, supporting a connected and autonomous future.

THANK YOU