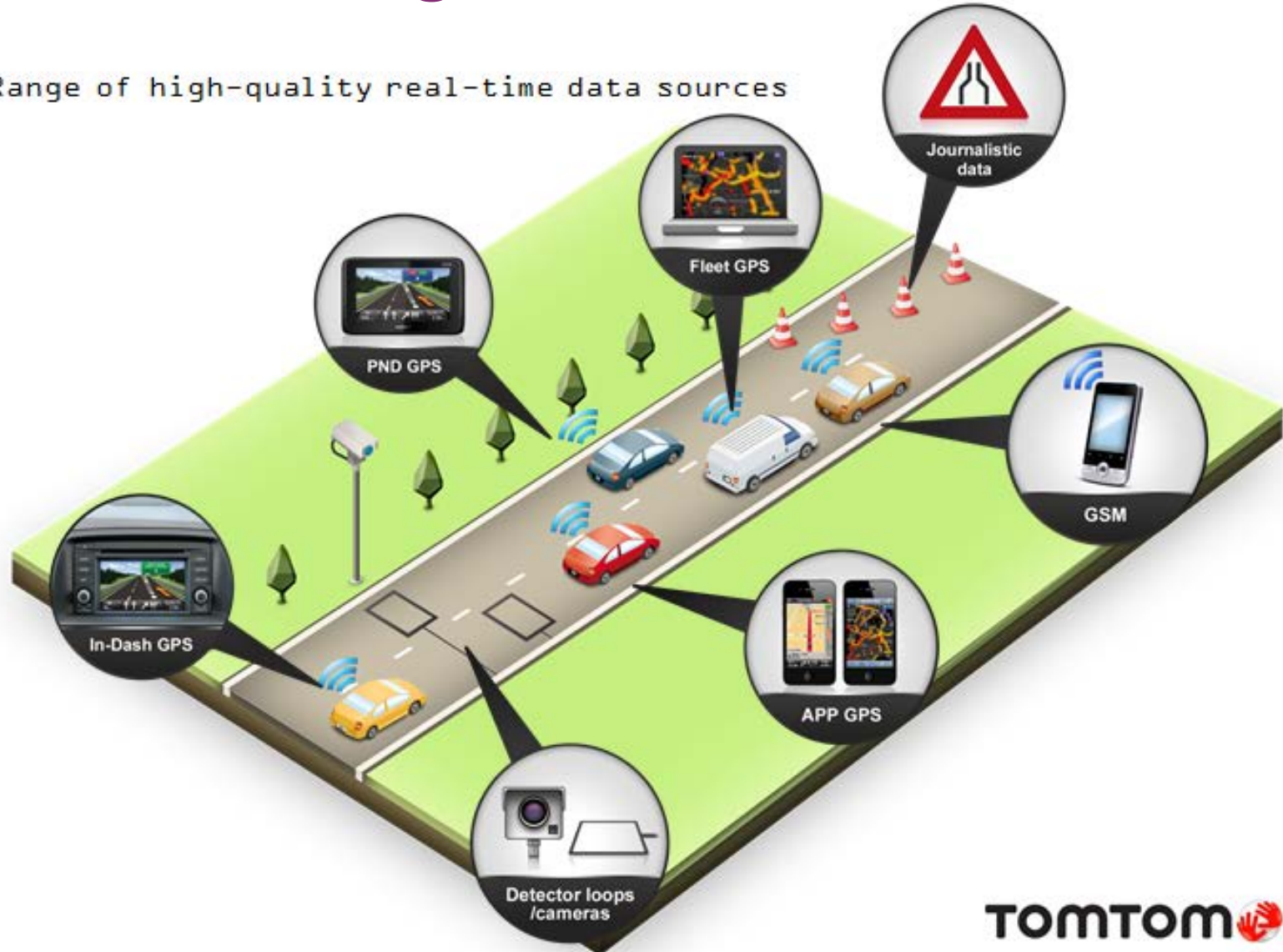


Using Big [Traffic] Data to help Drivers, Road Authorities and Businesses

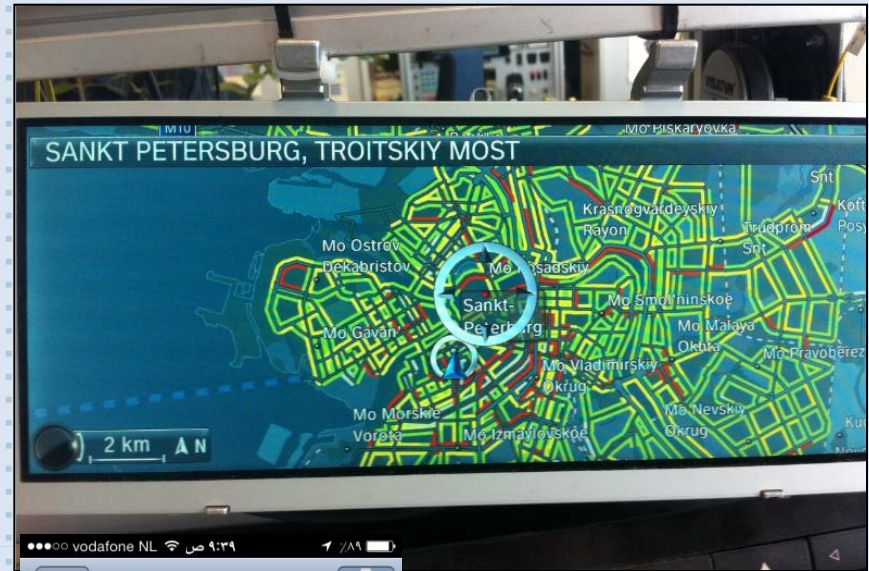
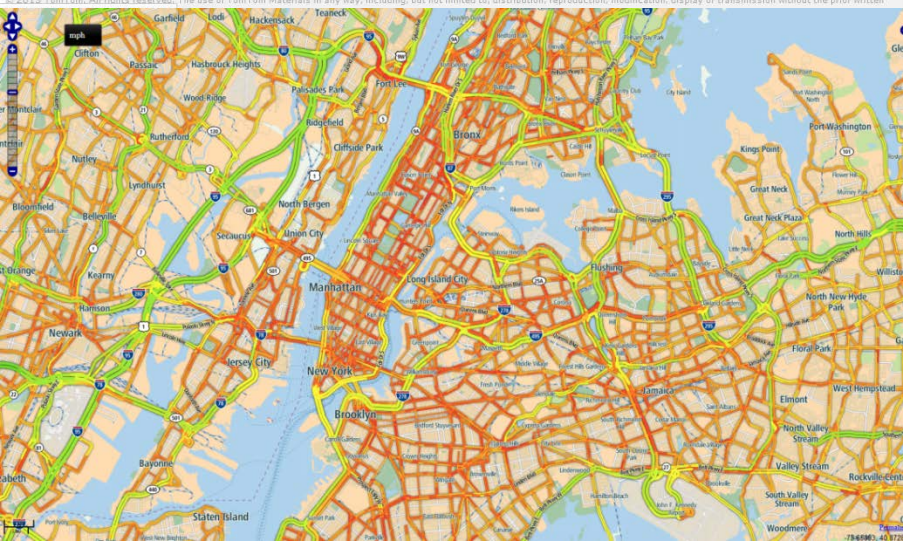
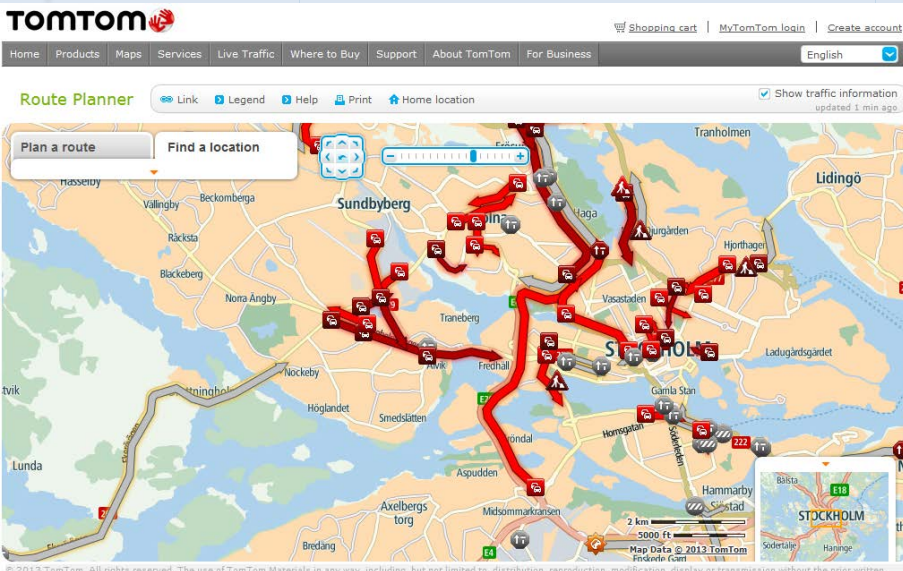


Creating Traffic Information

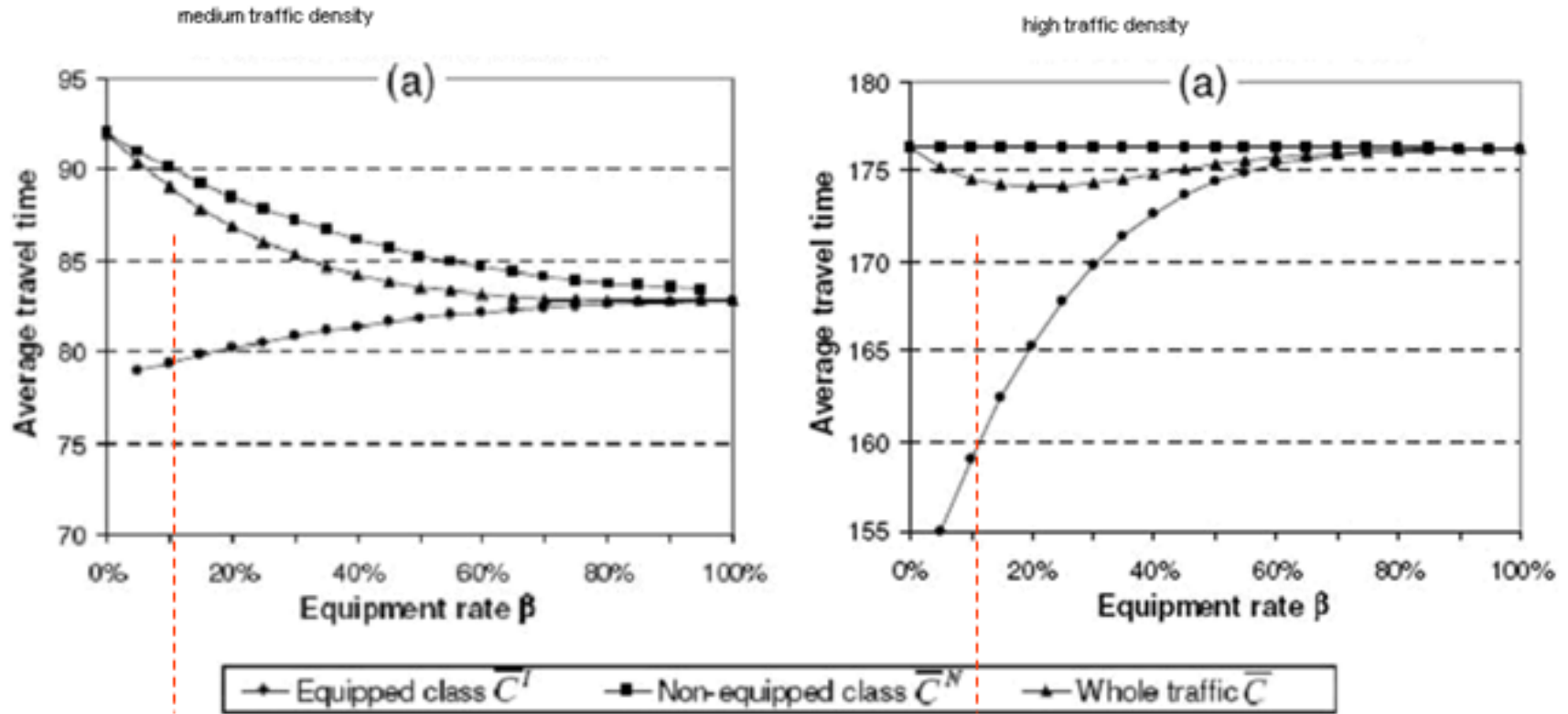
Range of high-quality real-time data sources



TomTom Traffic



Car-centric Route Guidance – Benefits for ALL



10%

10%

Source: F. Leurent, T. Nguyen, TRB 2010.

TomTom's missions

Service Provider



Help drivers get to their destinations as quickly, safely and easily as possible.

Road Operator?



Reduce traffic congestion for all road users, by enabling efficient use of existing infrastructure.

Provide high-quality travel information so individuals can make better travel decisions.

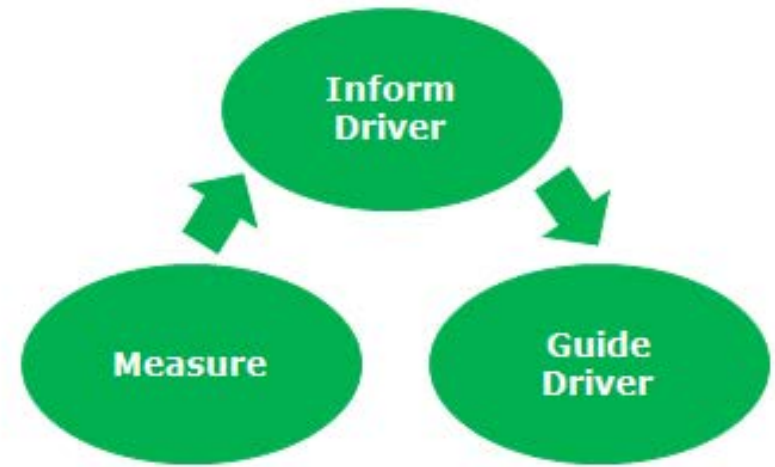
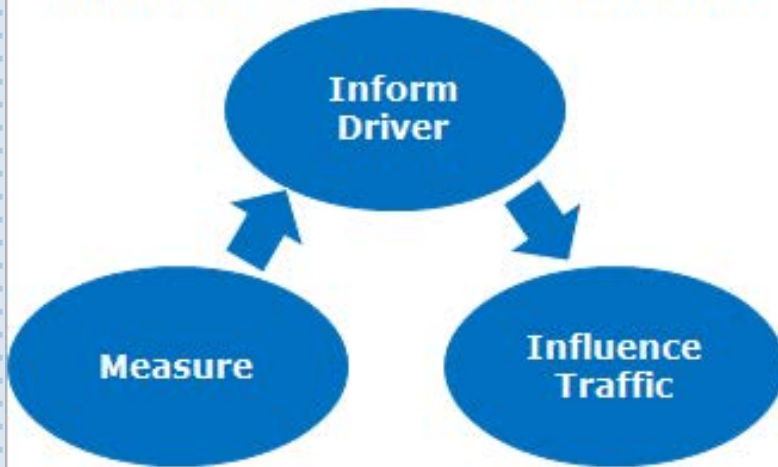
Encourage travellers to think consciously about their options, in terms of (for example) departure time, route choice, travel mode.

Actively work on the creation of new coalitions of the 'players' in the world of mobility.

Provide tools for transport authorities to manage traffic and plan

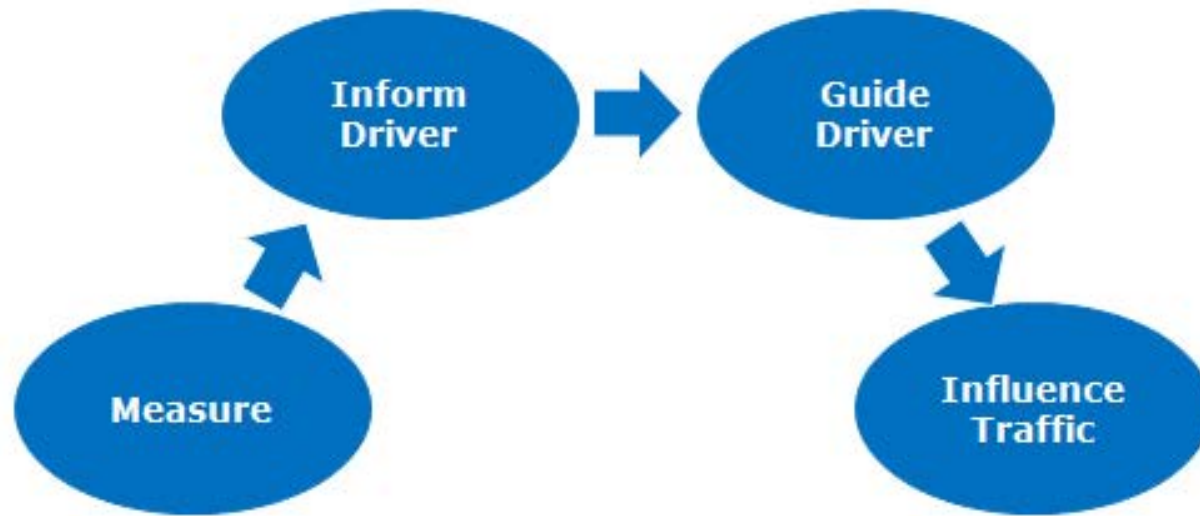
Traffic Management: Traditional Situation

Road authorities **VS** service providers

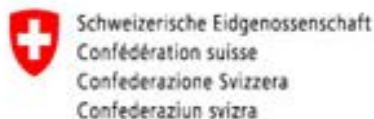


Traffic Management 2.0

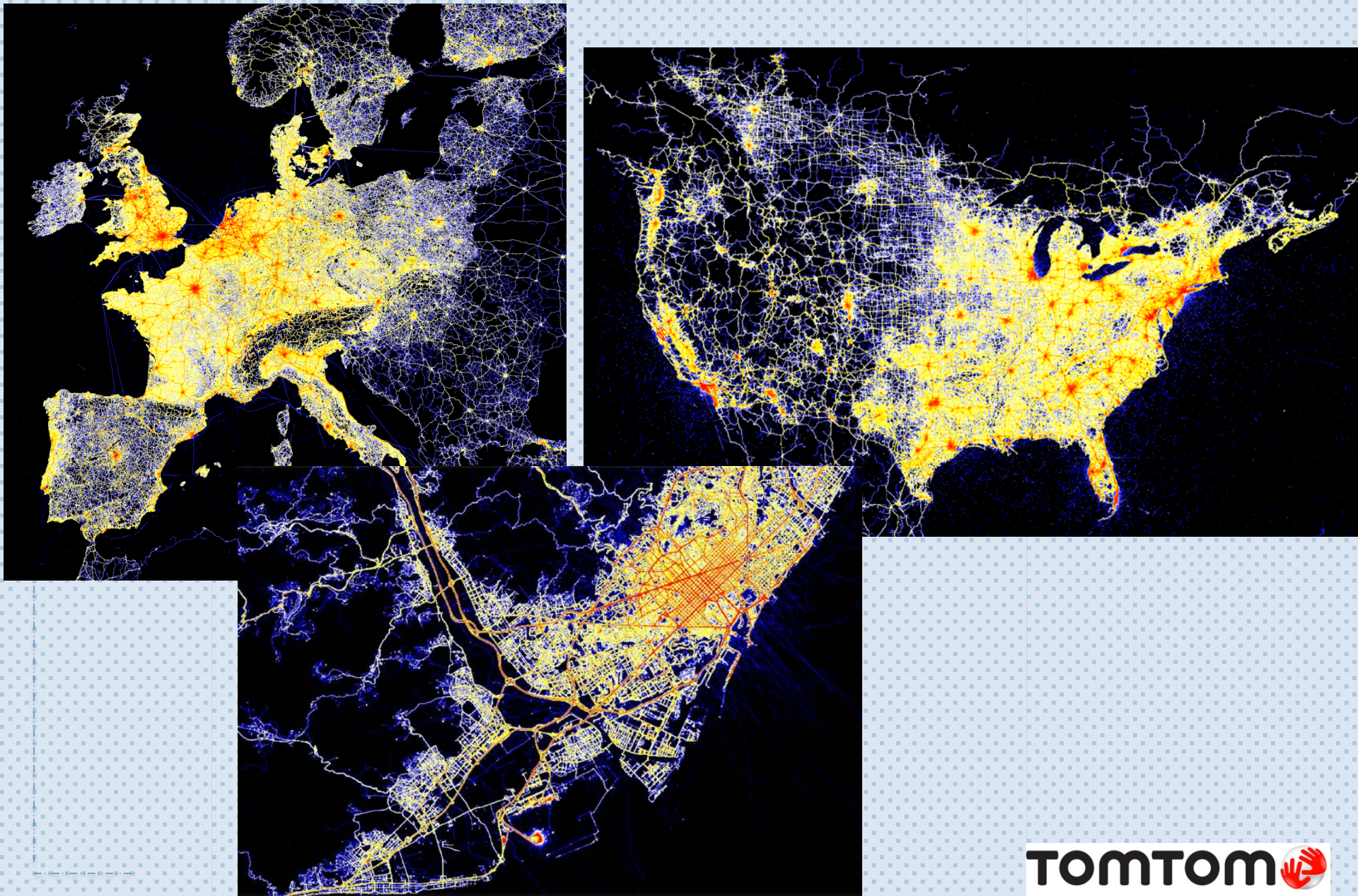
Road authorities & service providers



Working with transportation authorities



Our (Historical) Big Data looks like this...

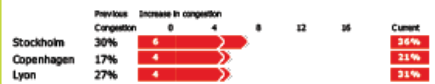


Big Data: TomTom Traffic Index

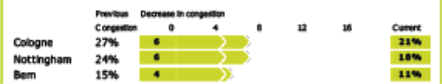
Europe



Top 3 - Increasing congestion



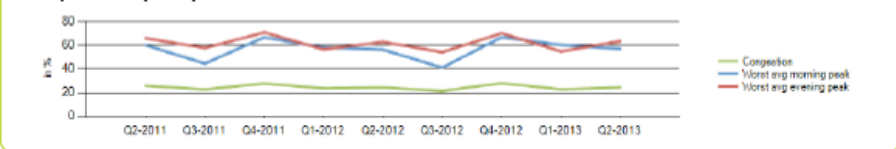
Top 3 - Decreasing congestion



Top 10 cities

Rank	CI change	City	Country	Congestion	Morning peak	Evening peak	Highways	Non-Highways
1	▼	Moscow	Russia	65%	114%	133%	63%	66%
2	---	Istanbul	Turkey	57%	81%	127%	59%	55%
3	▼	Warsaw	Poland	44%	89%	95%	40%	49%
4	---	Palermo	Italy	40%	65%	67%	32%	47%
5	▼	Marseille	France	40%	74%	81%	25%	50%
6	▲	Rome	Italy	36%	84%	67%	28%	40%
7	▲	Paris	France	36%	77%	72%	35%	36%
8	▲	Stockholm	Sweden	36%	75%	85%	34%	38%
9	▲	Brussels	Belgium	34%	71%	92%	30%	37%
10	▲	Lyon	France	31%	66%	66%	27%	38%

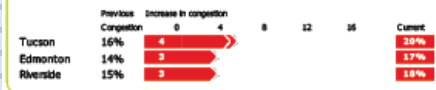
Comparison per quarter



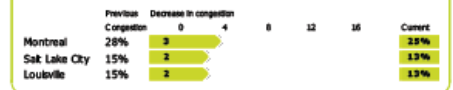
Americas



Top 3 - Increasing congestion



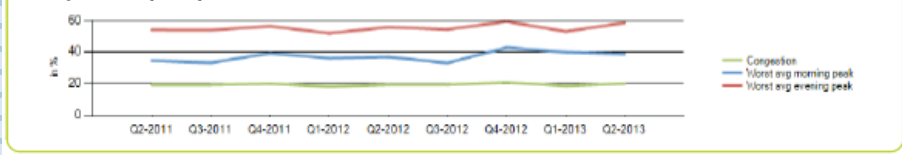
Top 3 - Decreasing congestion



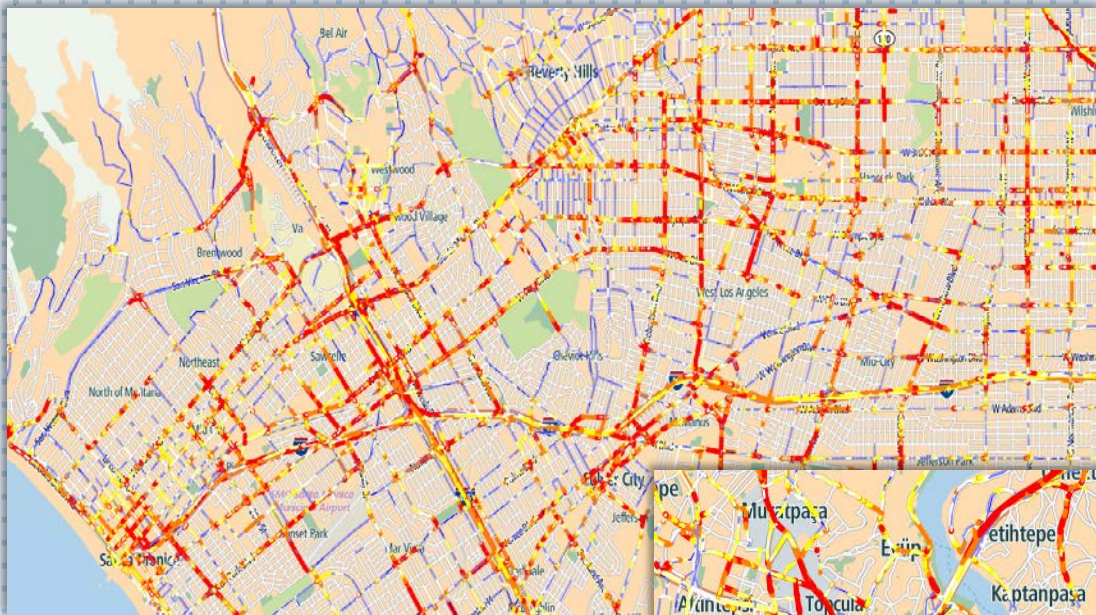
Top 10 cities

Rank	CI change	City	Country	Congestion	Morning peak	Evening peak	Highways	Non-Highways
1	▲	Rio de Janeiro	Brazil	50%	96%	125%	44%	53%
2	▼	São Paulo	Brazil	39%	66%	100%	30%	47%
3	▲	Vancouver	Canada	36%	61%	76%	23%	40%
4	▲	Los Angeles	United States	35%	55%	78%	33%	38%
5	▲	San Francisco	United States	32%	53%	71%	28%	37%
6	▼	Honolulu	United States	28%	36%	59%	19%	36%
7	▲	Seattle	United States	28%	50%	76%	22%	35%
8	▲	San Jose	United States	27%	53%	73%	19%	38%
9	---	Toronto	Canada	27%	54%	72%	21%	34%
10	▲	Washington	United States	27%	49%	66%	20%	34%

Comparison per quarter

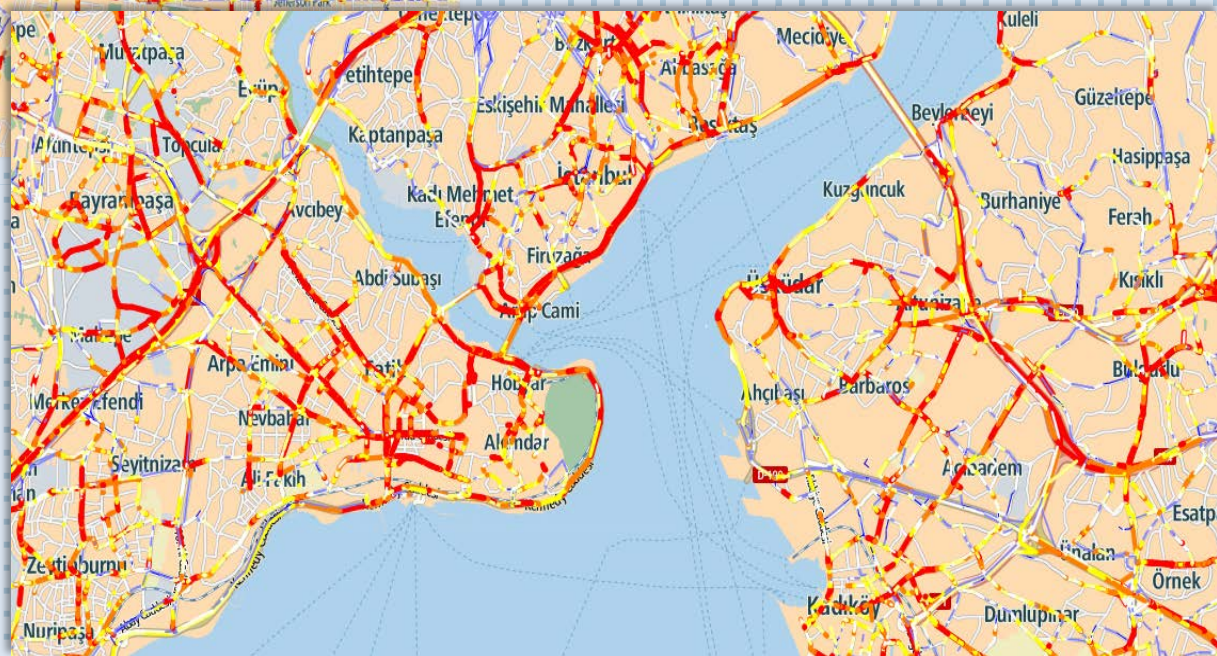


Traffic Index



Index values calculated for each individual road segment.

Los Angeles



Istanbul

Traffic Index

Why and for whom?

- Encourage travelers to make smarter decisions using modern technology and information sources
- Help the public understand they should not expect cities to 'build their way' out of congestion
- Help authorities identify and diagnose trouble spots in the network and make more informed investment decisions

TomTom & Privacy

- Privacy is a true concern to us all. Nevertheless, when handled correctly it can also become an important differentiator in the marketplace. Collecting and using data from individuals must adhere to strict rules. At TomTom, we take privacy of our end-users very seriously. Our systems, software and the way in which we employ them, are built using 'privacy by design'. For example, all of our location data is anonymized as soon as possible. Customers have to explicitly opt-in but can also opt-out at any given moment.
- TomTom avoids tracking of drivers by segregating location data into independent and short time sequences. TomTom also cannot and will not try and re-identify individuals from the location data collected. Additionally TomTom only delivers aggregated data and by doing so thwarts any residual potential for re-identification of individuals. Our approach has been independently verified by external audits, including a leading European Data Protection Authority.

TomTom Historical Traffic

Requirements:

The operating company managing the 407 toll road in Ontario requires reliable data for measuring travel times on the 407 facility. This is required for understanding overall performance as well as the travel time savings that the 407 offers drivers compared to alternative routes.

Solution:

TomTom's historical traffic database, Traffic Stats, provides objective and easy-to-use travel time measurements and reporting which can easily be processed and, if necessary, combined with other data sources.





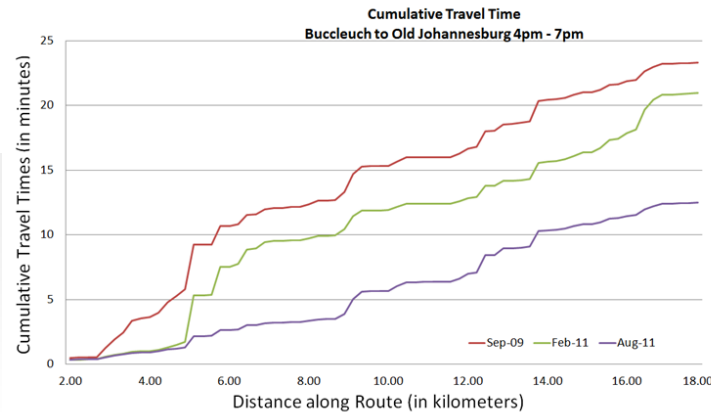
TomTom Traffic - Traffic Stats

Requirements:

Provide accurate, objective measure of the true benefits of a redesign of a motorway interchange (before & after study). This redesign is part of the Gauteng Freeway Improvement Project.

Solution:

TomTom GPS-based probe data was used to measure actual changes in speeds and travel times.



- Cumulative Travel Time has reduced from **23** min to **12** min
- Buccleuch to New Road used to take **15** min, which can now be done in about **5** min
- New Road in Midrand remains a bottleneck and increase the travel time with about **3-4** minutes

TomTom Traffic - Custom Origin Destination

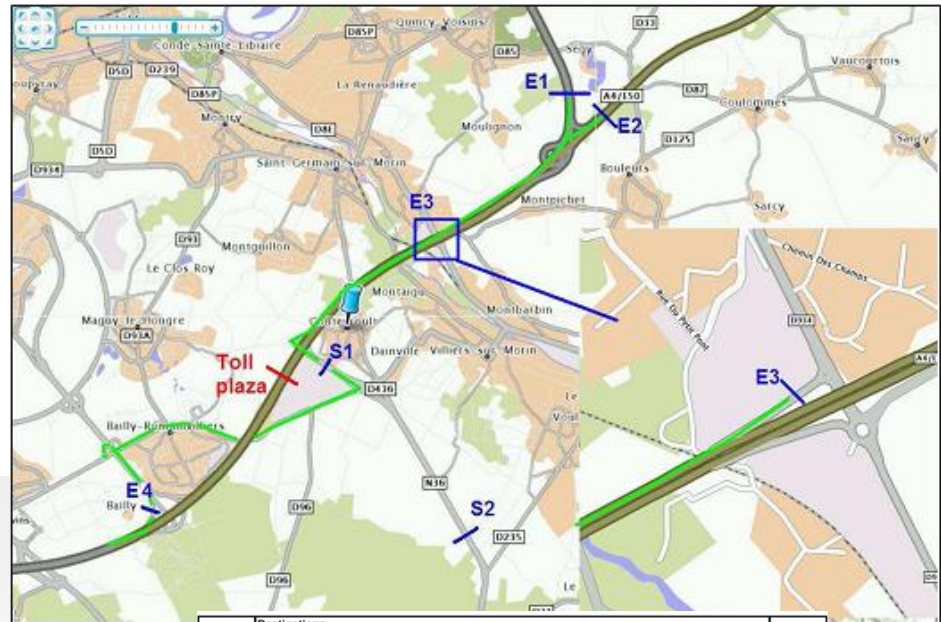
Requirements:

Customer wanted to understand whether a high percentage of drivers bypass a toll plaza on the AutoRoute – and are those that bypass the toll only local drivers or also long distance travellers.

Existing loop counters did not provide information on route choice or origin.

Solution:

TomTom Origin-Destination data was used to provide the answers quickly using the stored retrospective data in the historical traffic database



Origins	Destinations										Total
	A	B	C	D	E	F	G	I	J		
A	123	893	125	2,151	3,512	451	4,623	1,235	1,566	14,679	
B	153	464	7,876	123	414	56	1	53	435	9,575	
C	64	13	535	65	6,423	13	645	324	1	8,083	
D	12	4,532	5,747	324	534	98	64	2,432	12,463	26,206	
E	15	576	2,314	4,523	21,421	657	679	85	79	30,349	
F	14,645	342	6,346	1,243	456	9,870	345	635	234	34,116	
G	238	6,578	234	356	2	324	54	23	63	7,870	
I	26,642	235	4,523	423	213	523	76	423	64	33,122	
J	7,654	345	765	34	534	2,134	764	7,981	342	20,553	
Total	49,544	13,978	28,465	9,242	33,509	14,126	7,251	13,191	15,247	184,553	



Australia
Government
Traffic Analysis

TomTom Traffic - Custom Travel Times

Requirements:

Customer wanted to test alternatives for their field surveys as a reliable travel time analysis tool.

Solution:

Chose TomTom Custom Travel Times as a source of GPS travel times due to readily available data to compare with other methodologies. Results confirmed TomTom has higher sample sizes and higher accuracy for all roads in Western Australia and is a cost-effective and time efficient option for their needs.

Enter the GPS satellite navigation technology

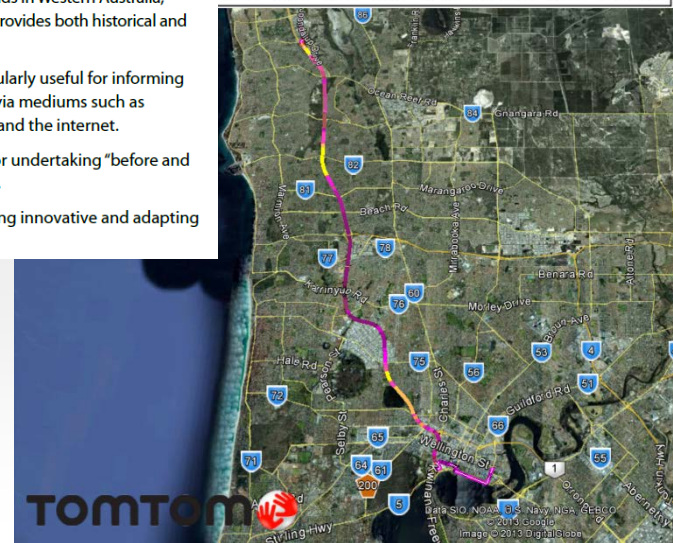
Billions of travel time data are being collected everyday throughout the world by in-car navigation devices and apps on smartphone handsets. ANI, with the help from TomTom navigation company, has been investigating the feasibility of using the satellite navigation travel time data with the ultimate view of replacing "floating car" surveys.

The results to date have been very encouraging and positive. The satellite navigation technology provides a larger sample size than the "floating car" methodology with a higher theoretical accuracy. It covers all roads in Western Australia, 24 hours a day 7 days a week, and provides both historical and real time information.

The real time information is particularly useful for informing road conditions to the road users via mediums such as electronic variable message signs and the internet.

The historical data can be useful for undertaking "before and after" studies of transport projects.

This is another example of ANI being innovative and adapting to the changing environment.



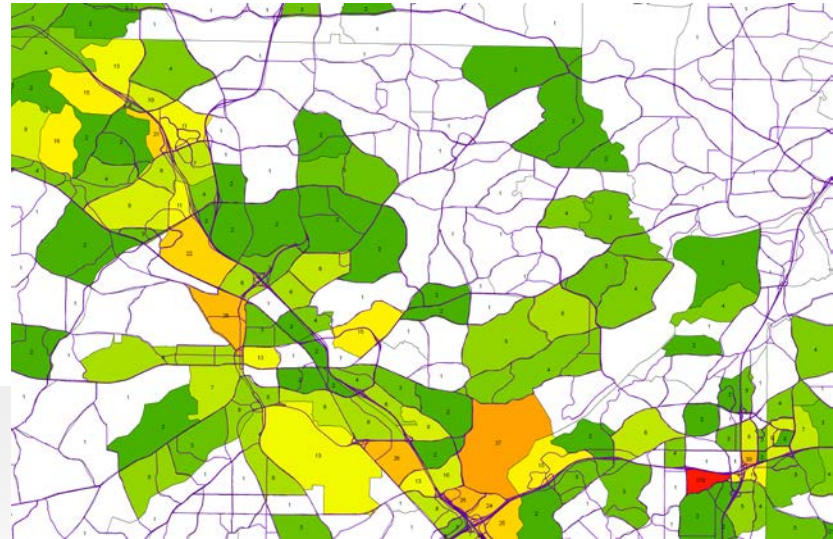
TomTom Traffic - Custom Origin Destination

Requirements:

Understand the travel market for the highway system in the Atlanta area based on actual measured trip movements, as a basis for studying toll revenue potential.

Solution:

An extended model was built based on Origin Destination matrices for a large number of on and off ramps in the Georgia area for different time spans to provide the data the customer needed.



VMZ Berlin

Berlin Traffic Control Centre



Germany
Government
Traffic Management

SIEMENS



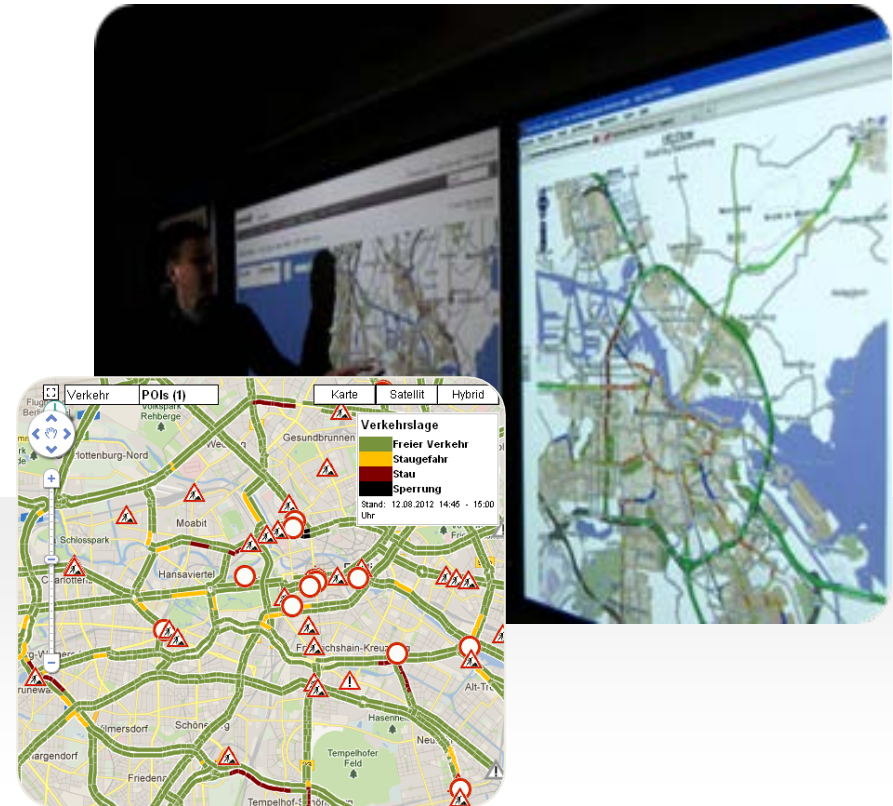
TomTom Traffic - Flow

Requirements:

Regional government in Berlin contracted VMZ (wholly owned subsidiary of Siemens) to run the traffic control centre to monitor traffic conditions and manage the traffic flow throughout the region – on major roads and secondary roads.

Solution:

Chose TomTom Traffic to provide speed information on all strategic roads in the region every minute. OpenLR location referencing used for information on all FRC 0-4 roads.





Italy
Government
Traffic Information

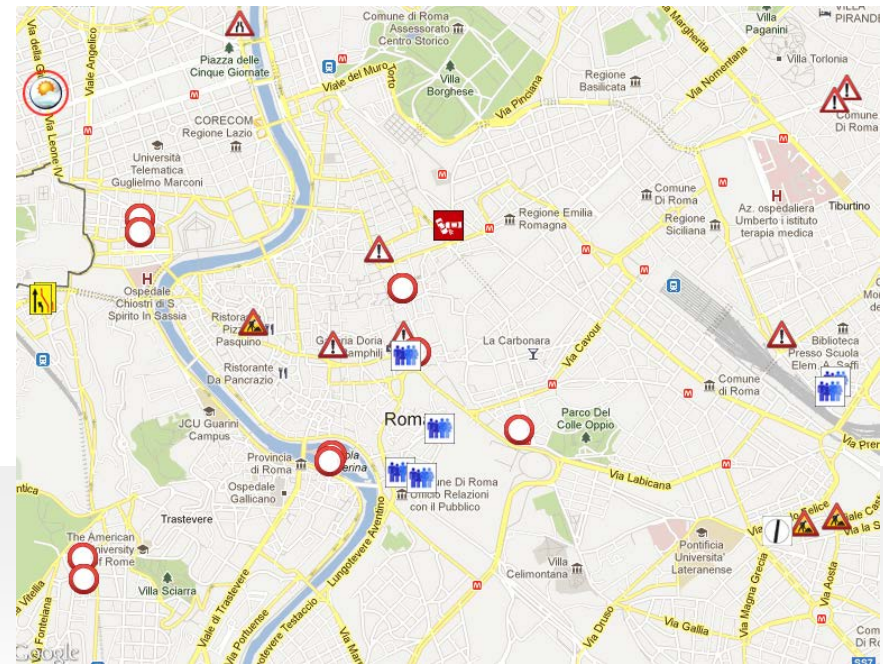
TomTom Traffic – Incidents and Flow

Requirements:

Regional traffic management agency wanted additional real-time traffic information to add to their existing data and improve their traffic forecasting capabilities and hence reduce congestion by taking pre-emptive action.

Solution:

Chose TomTom Traffic data due to its freshness and detail. OpenLR used to give insights into the performance of the secondary roads in addition to the major roads.



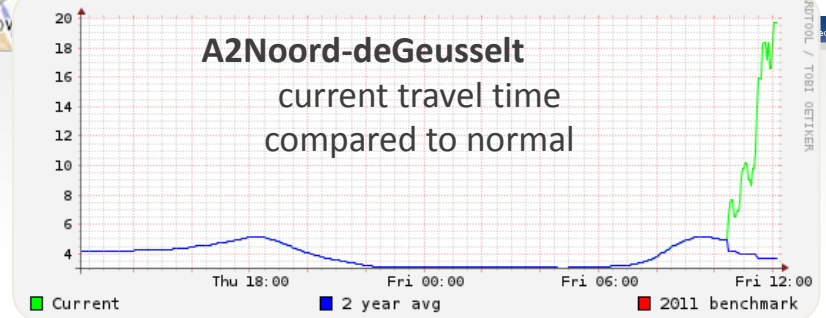
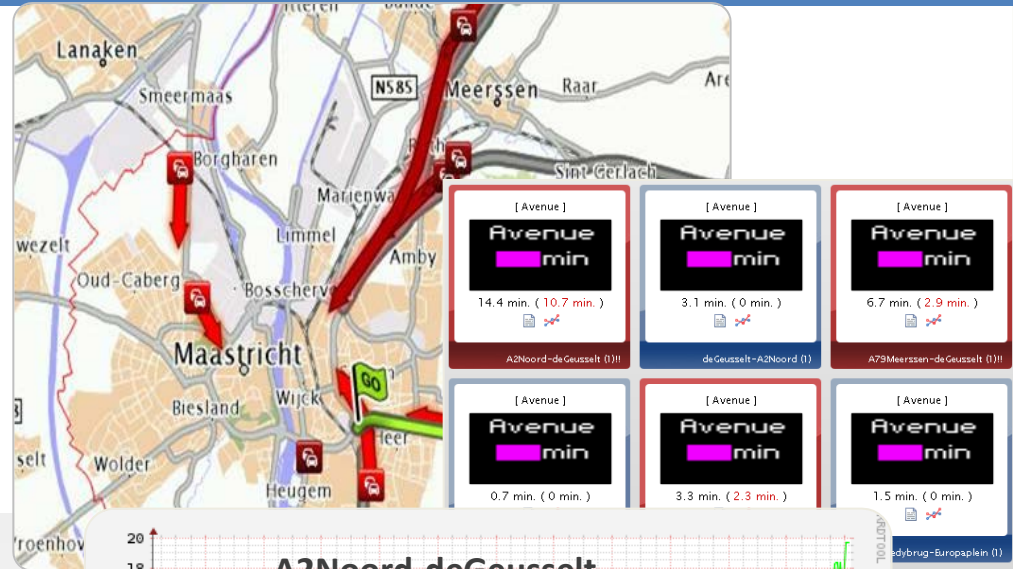
TomTom Traffic - Route Times

Requirement:

Government required contractors to ensure surface traffic was not affected during construction of tunnel to improve the major highway (A2) linking Belgium and Netherlands.

Solution:

Chose TomTom real-time route time information to monitor 24 representative routes every minute around the work zone to show no significant increase in travel times.





Basque Country



Spain
Real Time Traffic
Traffic Control Centre Monitoring

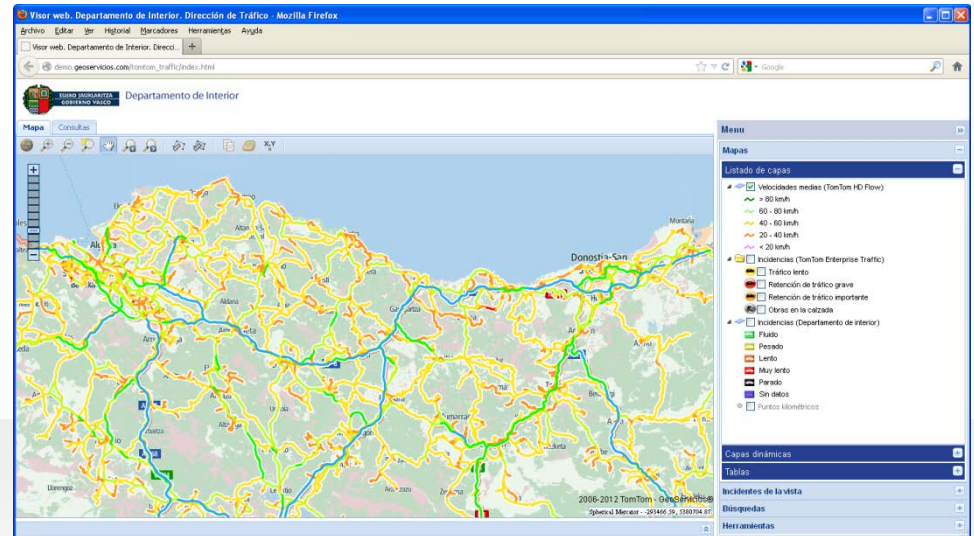
TomTom Traffic - Flow

Requirements:

Highest quality traveller information for the Basque area to enable the Traffic Control Centre to have a full view of the traffic status in the area to keep all routes operating efficiently.

Solution:

Chose TomTom Traffic Flow information to give their Traffic Management Control Centre the best insights into the real-time performance on the road network.



Olympic Delivery Authority

London 2012



UK

Event Management / Government
Traffic Monitoring / Traffic Management

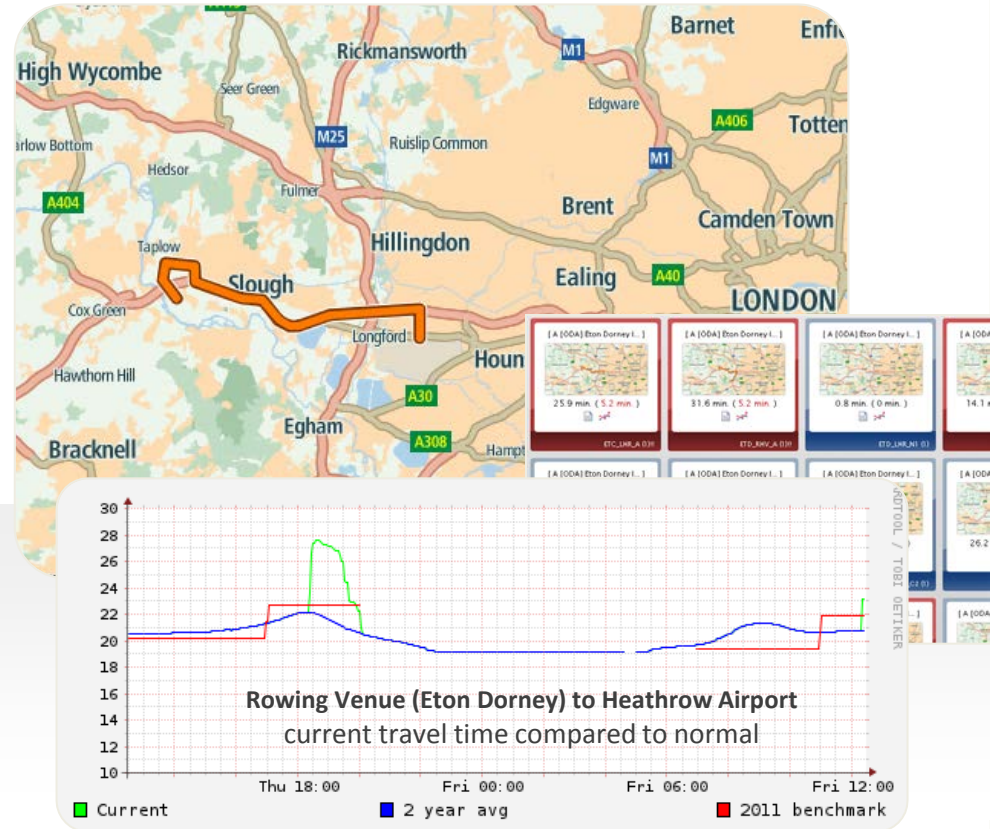
TomTom Traffic - Route Times

Requirements:

Traffic management at major event across multiple venues at the same time. Requirement to monitor travel times on specific routes and use information to alert drivers and offer alternative routes if necessary.

Solution:

Chose TomTom HD Route Times to monitor 120 key routes every minute throughout the period of the London 2012 Olympic Games. TomTom arranged a web portal to highlight current problem routes.



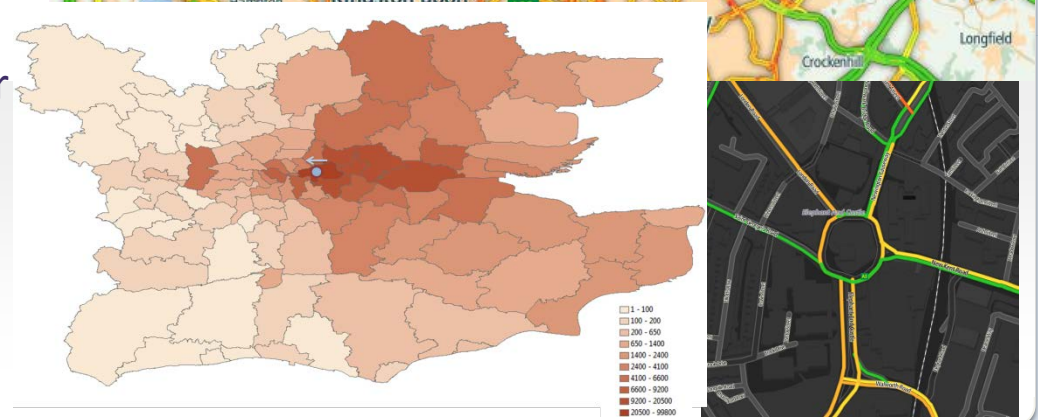
TomTom Traffic – HD Flow and Origin Destination Analysis

Requirements:

Trial new technologies available in the market to keep the city flowing. The focus of the trial was to find innovative ways to collect travel time information and motives

Solution:

Chose TomTom HD Flow for the greater London area and a OD analysis for Tower Hill to understand, integrate, test, demo and present the innovative solution for collecting traffic data.





TomTom Traffic - Traffic Flow & Traffic Stats

Requirements:

Provide drivers with the best information available on traffic and road closures for the course of the Riyadh metro construction project, the largest in the world. Archive the data for use in transport planning analyses and performance reporting.

Solution:

TomTom traffic data fusion, Traffic Stats and mapping solutions, used together with apps and interfaces from partners.





TomTom Location Based Services

Requirements:

All Traffic Solutions builds and operates variable message signs. To be able to quickly collect and share accurate traffic information, they needed precise traffic data for which they did not have to invest heavily to cover multiple regions in the US.

Solution:

TomTom was able to supply All Traffic Solutions with market leading traffic information, which was easy to integrate in the variable message distribution system. The data has coverage on all major and minor roads in the US, and is fully customizable to be used in the existing architecture of All Traffic Solutions.

