Dynamic traffic management
An industry perspective

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Chantilly, France
Be-Mobile & FLOW in a nutshell

Sister companies

Headquarters: Ghent, Belgium

Founded in 2006 & 2008

~ 25 employees

10+ countries
Return travelers, companies & road operators control over their mobility

Measure traffic & mobility situation

Package the information in traffic & mobility services

Same content on dashboard, LED-board, radio/tv, app, ...
Our traffic software platform

Mobility database

Detect

Merge & decide

Distribute

Analyse
Our traffic software platform

Detect: “Own” data and 3rd party data
- Road sensor data
- Probe vehicle data
- Crowd & public sourcing

Other mobility data
- Traffic centers, public transport, fuel, parking, meteo, car sharing, bike sharing, ...

Mobility database
- Detect
- Merge & decide
- Distribute
- Analyse
Detect - road sensor data

Optical fiber

Tubes

(1) Collect pulses
16/09/2013 11:41:52_793,21ms Tube1
16/09/2013 11:42:04_597,90ms Tube2
16/09/2013 11:42:04_641,85ms Tube1
16/09/2013 11:42:04_782,96ms Tube2
...

(2) Identify axles
Timestamp and speed of axle 1
Timestamp and speed of axle 2
...

(3) Identify vehicles
Domain knowledge!!

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<th>Domain knowledge!!</th>
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<td>car</td>
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<td>van</td>
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<td>truck</td>
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M & D
Mobility database
Distrib.

Detect

Analyse
Detect - road sensor data

Optical fiber Tubes

- Accurate detection & classification
- All weather conditions
Optical fiber Tubes

Detect - road sensor data

Detect

Accurate detection & classification

All weather conditions

Combination with ANPR for trajectory/intersection analysis
Detect - road sensor data

Optical fiber Tubes

- Accurate detection & classification
- All weather conditions
- Combination with ANPR for trajectory/intersection analysis
- Installation & maintenance
Detect - road sensor data

Optical fiber tubes

- Accurate detection & classification
- All weather conditions
- Combination with ANPR for trajectory/intersection analysis

Installation & maintenance
- Limited part of the road network

Ghent - Brussels

Distance

Time

6h

9h
Detect – probe vehicle data

Retrieve real-time GPS positions of X% of the traffic (taxis, trucks, vans...)
Detect – probe vehicle data

Retrieve real-time GPS positions of X% of the traffic (taxis, trucks, vans...)

Map-matching

External digital map
- Links: orange lines
- Supernodes: red dots

Internal road network
- Segments: blue lines
- Nodes: green dots
Detect – probe vehicle data

Calculate trajectories between those points

Traveltime information per trajectory
Detect – probe vehicle data

Merge travel times of all trajectories
Detect – probe vehicle data

Store speed info per segment & per minute for given route
Detect – probe vehicle data

+ Entire road network
+ No new equipment
+ Accurate travel times

Road sensors & FCD are complementary

No distinction between lanes
Detect – events

Journalistic data: cause of traffic jams & other related info

Human traffic operators

A driver sees a live accident ...
... and informs the traffic centre.
A traffic operator receives the alert ...
... and enters the data into the traffic EDITOR.
Merge & decide

Merge different data sources
Handle inconsistencies between data sources
Generate standardized data output formats
Online traffic room for traffic mgmt
Our traffic control room

Web-application

Traffic management solutions for all governments, also the small ones!

Focus on usability

Future challenge: Coordination of traffic management measures among different traffic centers
Online traffic room - scenarios

Core of most traffic management solutions
= Scenario engine

Activation rules
Calendar
Traffic conditions
Manual interventions
...

Output measures
Content on a LED-display
Scenario in a traffic light
...
Our traffic software platform

Distribute

**Navigation / In-car**
- Broadcast
- RDS-TMC
- DAB-TPEG

**Roadside infra**
- LED-displays
- Traffic lights

**Media**
- TV & Radio
- Mobile phones
- Internet

**Mobility database**

- Detect
- Analyse
- Merge & decide
Our traffic software platform

**Analyse**

Historical data (FCD, road sensor data, events)

Online traffic room for data analysis

- Analyse
- Mobility database
- Detect
- Distribute
- Merge & decide
Analyse – Big data & traffic

3m road segments in BeNeLux
Every minute a new value on each segment = $4 \times 10^9$ records a day

All historical data
Database cluster

Partitioning
Replication

Cassandra
Analyse – Big data & traffic

3m road segments in BeNeLux
Every minute a new value on each segment $= 4 \times 10^9$ records a day

All historical data
Database cluster

Scalability
**Analyse – Big data & traffic**

3m road segments in BeNeLux

Every minute a new value on each segment = \(4 \times 10^9\) records a day

All historical data
Database cluster

Last 24 hours
In memory database
Most governments still store their traffic data locally

Traffic data collection as a service
- Upload & validate your own data
- Analyse your data
- Correlate with FCD

Data centralisation

Different data sources