

Traffic Map 2.0

Citizens as Sensors

Enrico Steiger

Vienna, July 16th

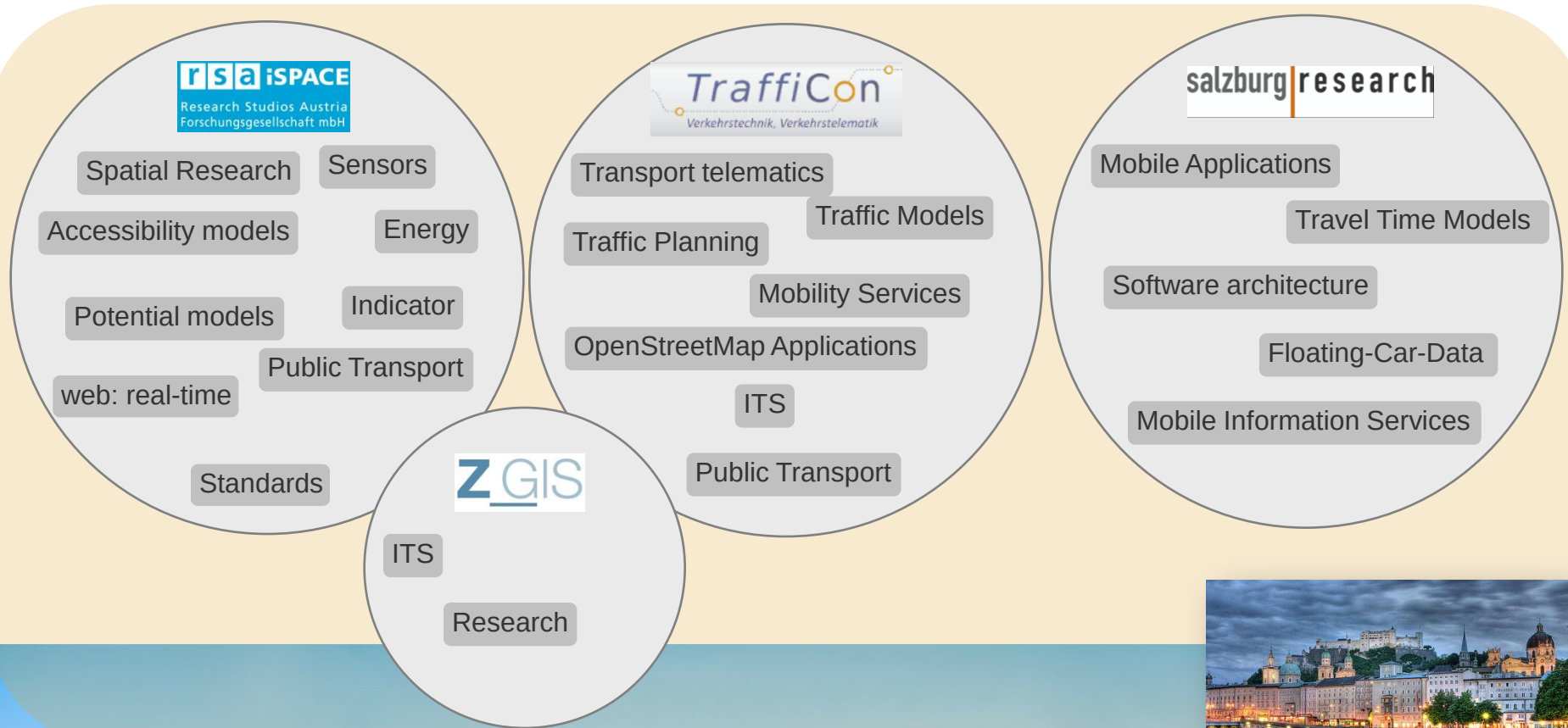
Geoweb 2.0

Mobility

OSM Data CC-BY-SA and Contributors modified by Trafficon



Research Cooperation in Salzburg



➔ **Applied Research and development in the area of transport telematics and geoinformatics**



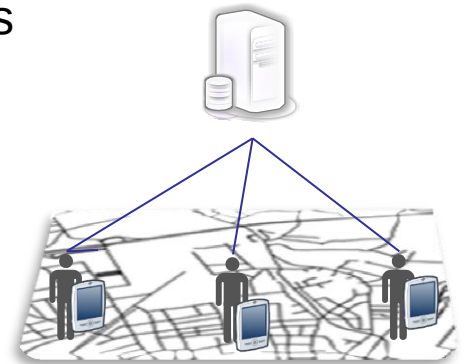
Mobility – quo vadis?

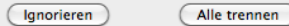
- Number of journeys are steadily increasing
 - One consequence are highly frequented roads.
 - According to calculations by the Federal Office of Statistics every German spends about 70 hours annually in traffic jams.
 - Economy loses
 - Forecast Salzburg 2015: Travel times increases by 15 Minutes / Trip
- Goal is a detection of bottlenecks inside transport networks as well as a temporally, spatially and modal shift of trips.



Aims - Traffic Map 2.0

- Road users move as a active source of information inside traffic networks
- Objective of forming a „Community“ to detect traffic conditions
 - user generated traffic map
- Applications:
 - Traffic situation map on the internet
 - Traffic messages (congestions, delays etc.)
 - Level of Service (LOS) criteria:
 - Travel time
 - Tailback lengths
 - Average waiting time
 - Travel speed





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Powered by TomTom HD Traffic

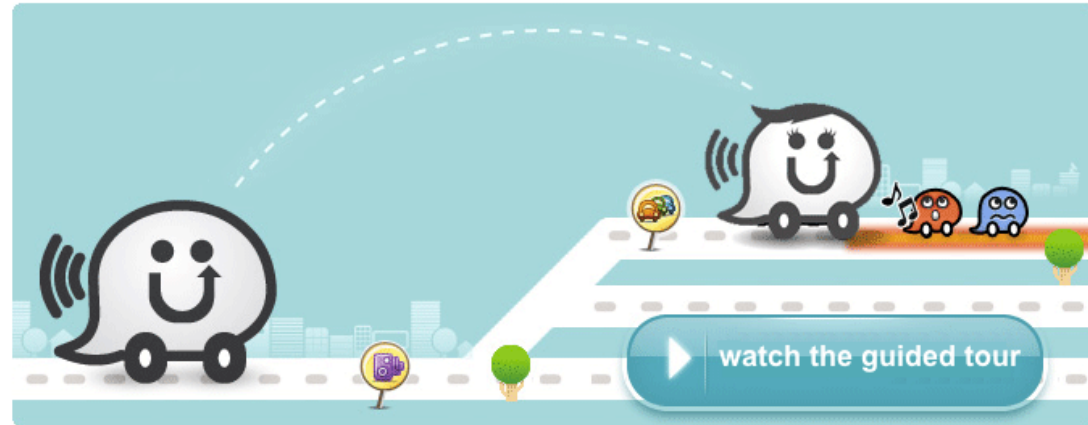
Traffic updated 1 minute ago

List of all reported incidents in this view

Previous



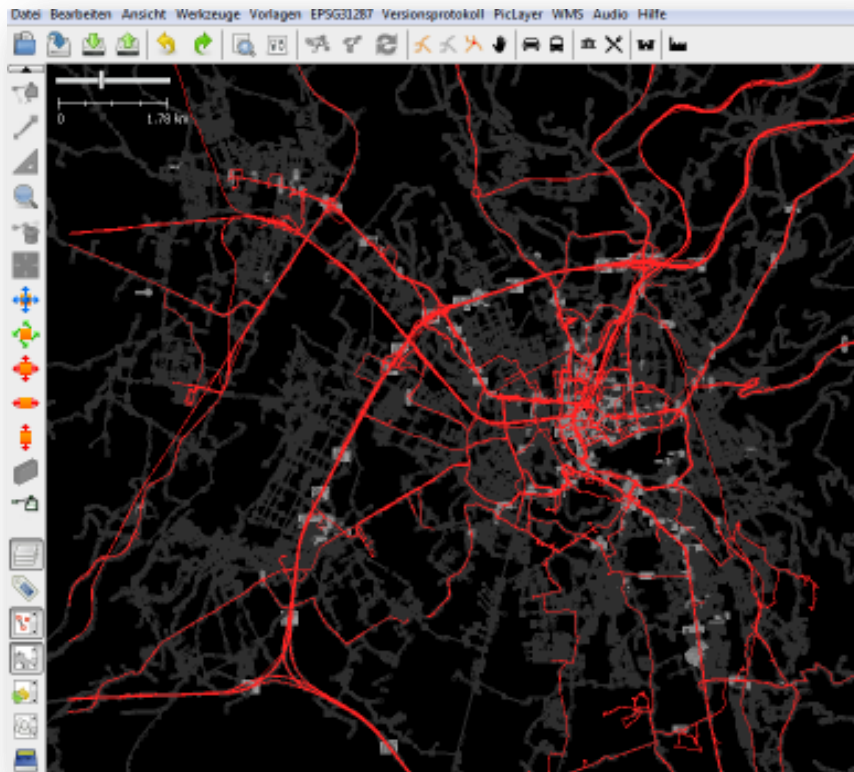
Example: Community approach WAZE



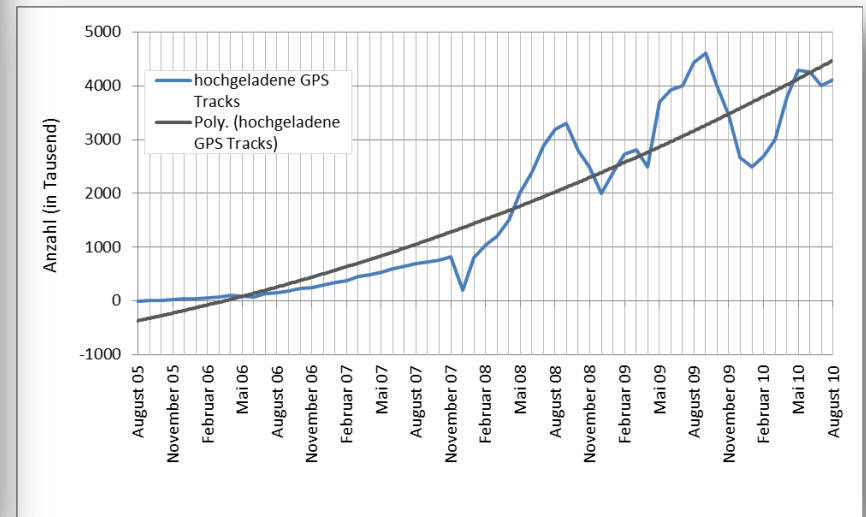


What contribution can the OpenStreetMap project provide concerning traffic detections?

GPS-Tracks OpenStreetMap



JOSM with: OSM Data CC-BY-SA and Contributors



- 1.9 billion GPS coordinates worldwide (August 2010)
- Spatial positioning roads, waterways etc. → use of GPS-Logger
- Traffic flow information can be derived from GPS-Tracks

Method development (2002 – 2010)



Stefan Krampe

**„Traffic Detection with
Floating-Traveller-Data (FTD)
for mobile navigation services“**
(Dissertation 2006)

for:

- Deutsche Telekom AG
- Land Hessen (HMWVL)



Enrico Steiger

**“Methods of traffic data detection and forecasting
from volunteered geographic information for
intelligent transportation systems (ITS)”**

(Diploma Thesis 2010)

Prealanalysis of GPS-Tracks

○ Evaluation of characteristic GNSS values

$x(t_i), y(t_i)$ Position

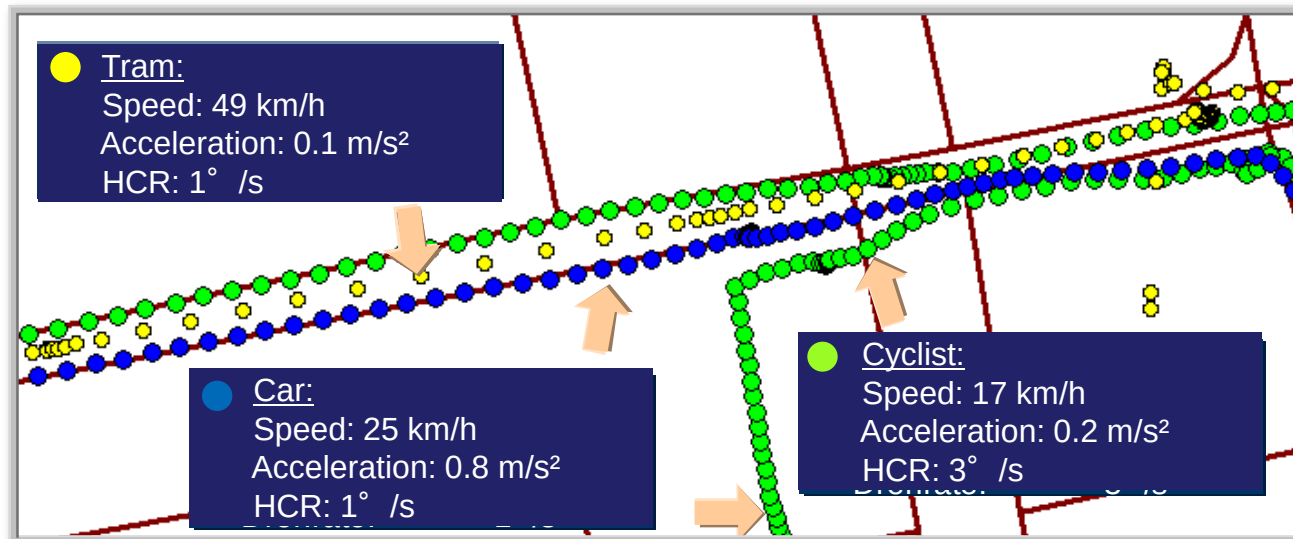
$\rho(t_i)$ Movement direction

$\Delta x(t_i)$ Path change in a time interval

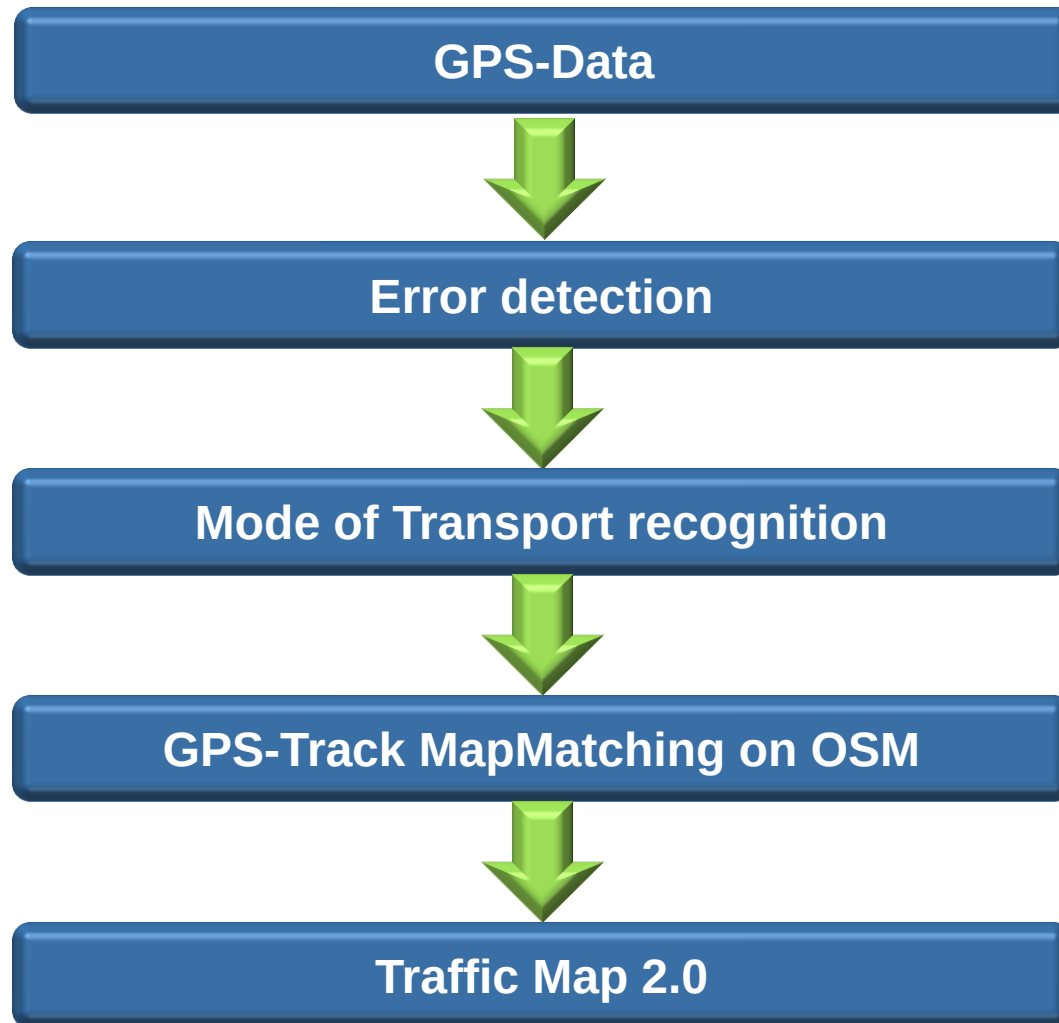
$v(t_i)$ Speed in a time interval

$b(t_i)$ Acceleration in a time interval

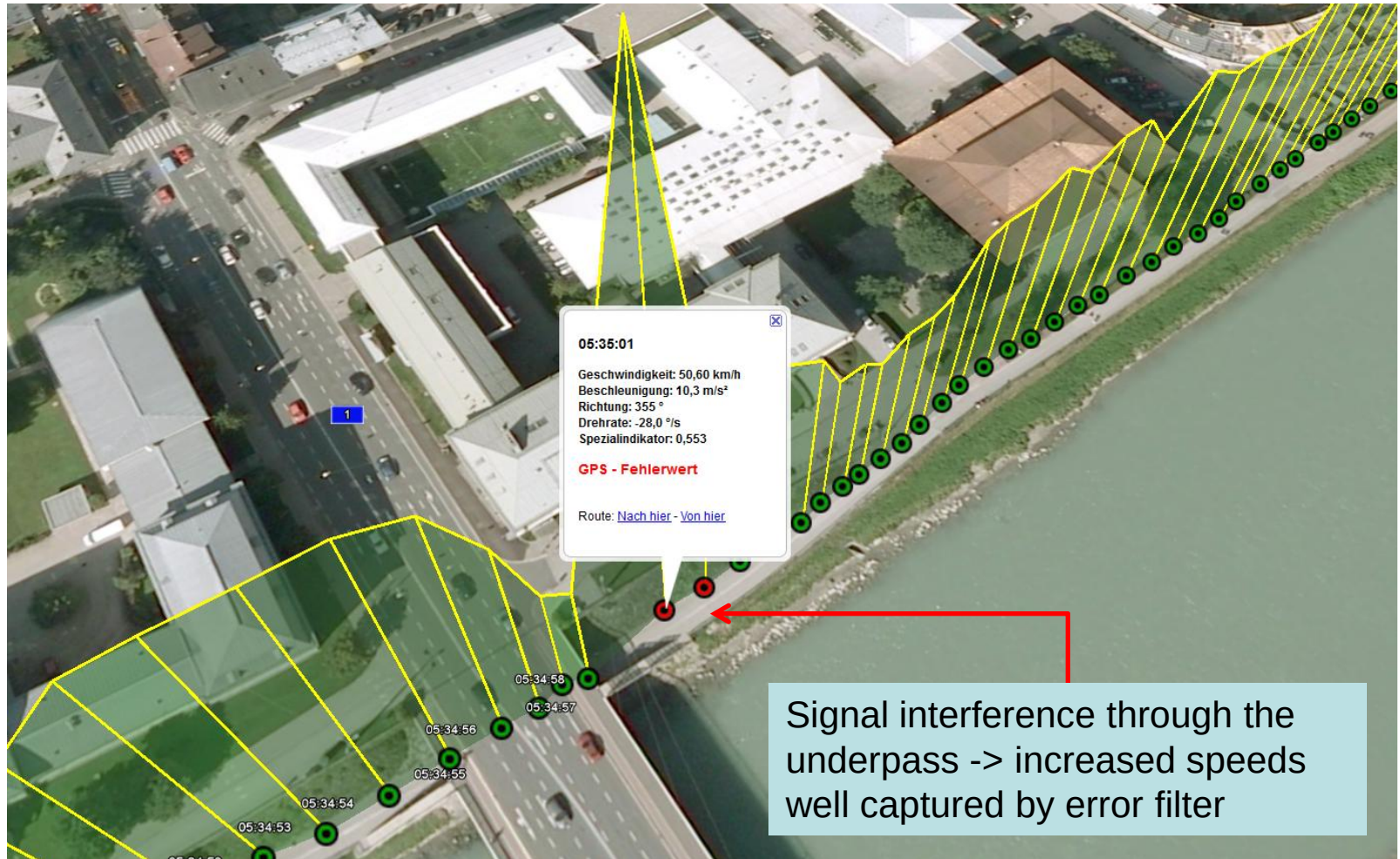
$\omega(t_i)$ Heading change rate (HCR) in a time interval



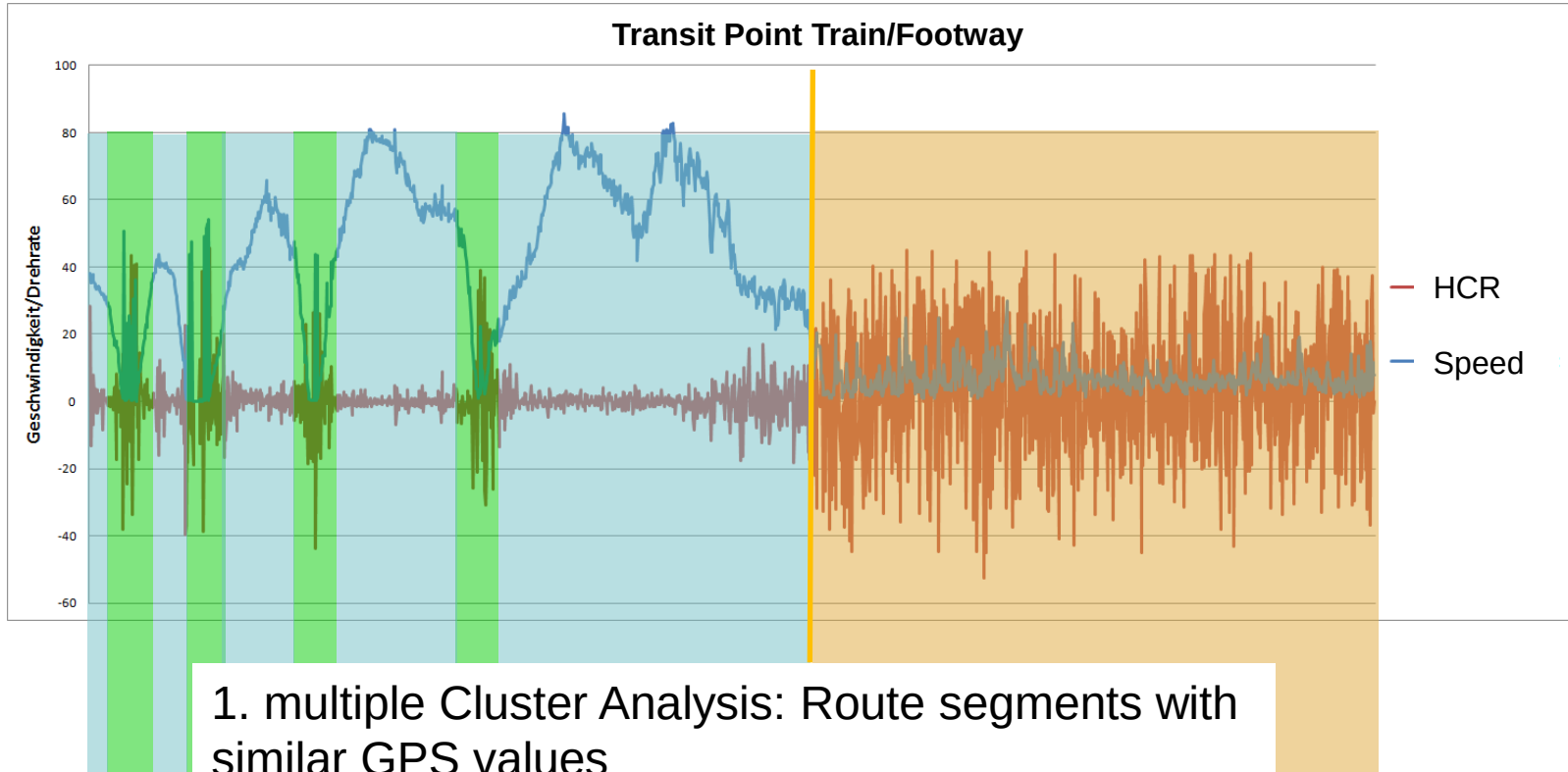
Traffic Map 2.0 - Process



Detecting GPS-Errors



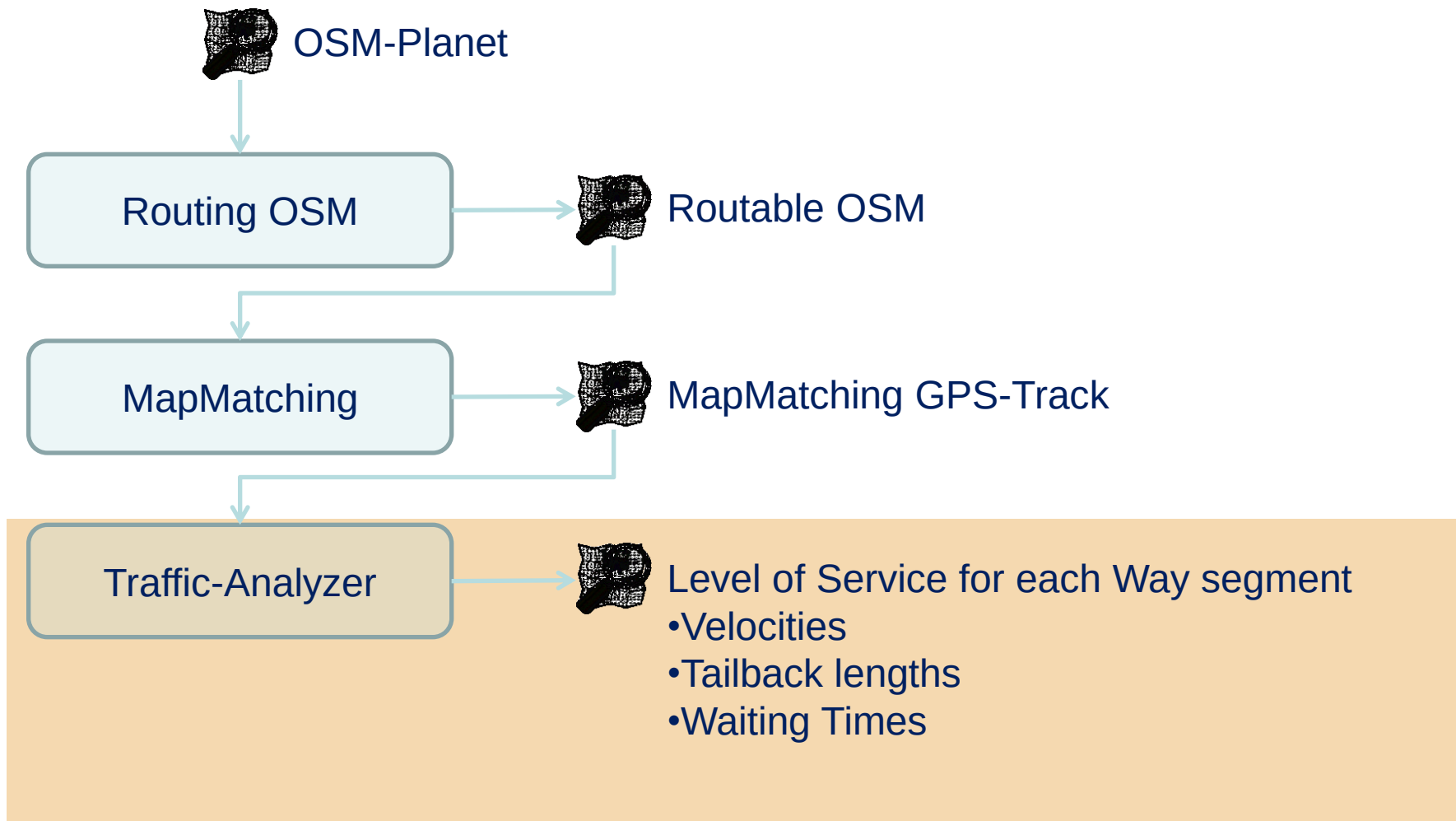
Mode of Transport recognition



Cluster 1 Train

Cluster 2 Footway

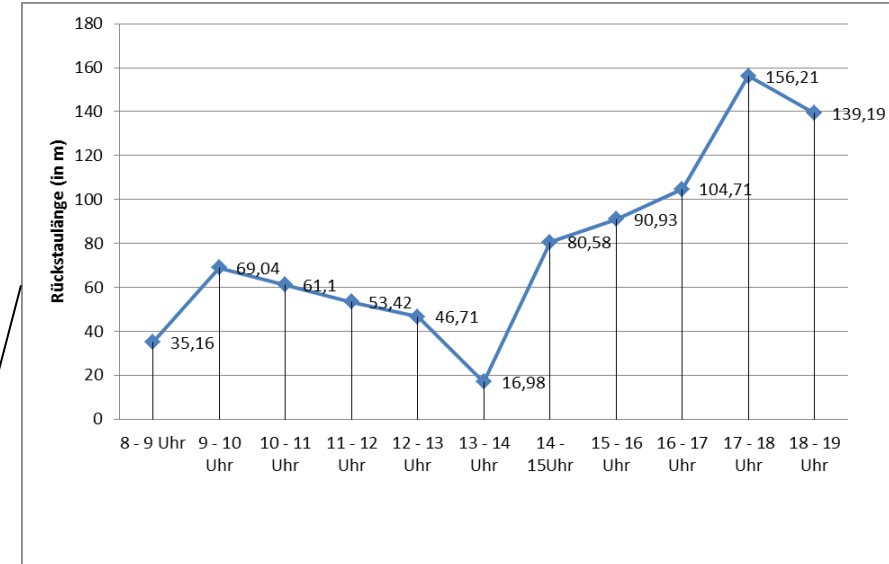
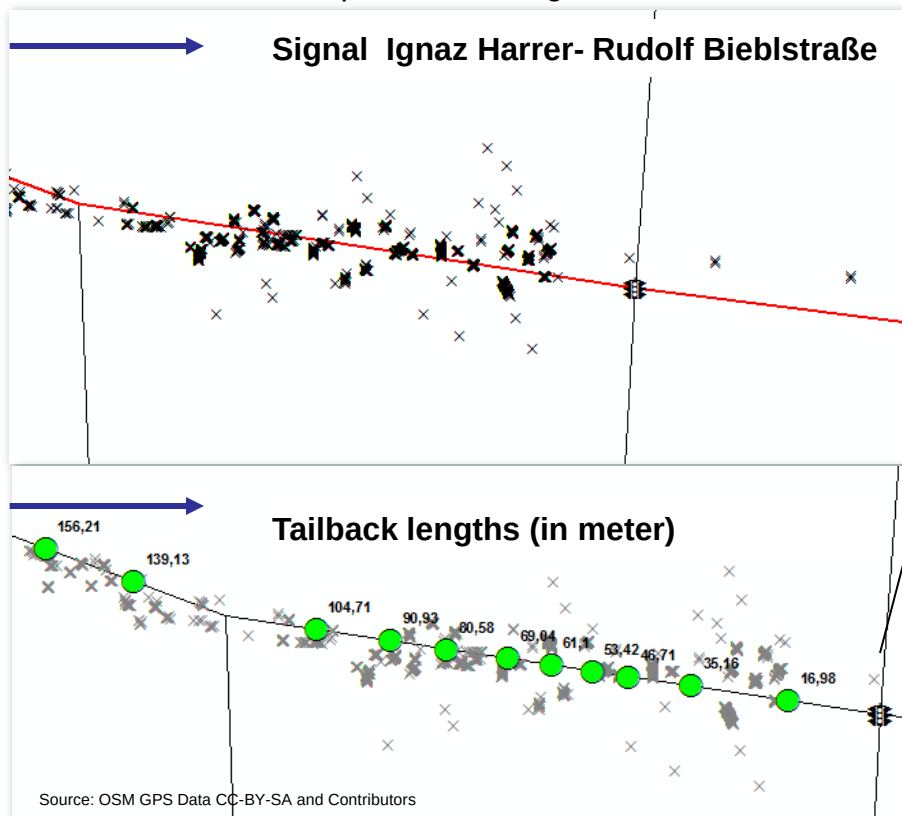
Processing OSM GPS Data



Automatic determination of tailback lengths and average waiting times from GPS Data

- Test area Ignaz-Harrer/ Münchner Bundesstraße
dailytime change of tailback lengths at traffic signals

Identification of time-dependent waiting time - cluster centroids



Average tailback length /hour

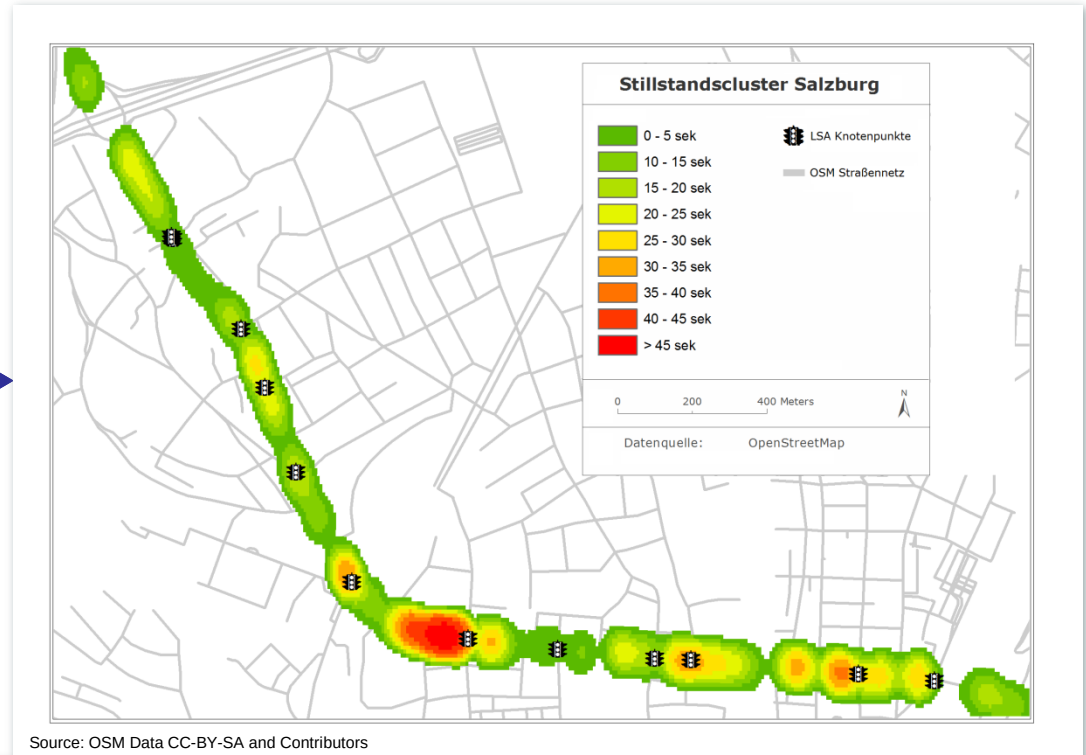
Level of Service

criterion: traffic signal waiting time

Test area Ignaz-Harrer/ Münchner Bundesstraße

Standstill grids (resolution 10x10 meter grids)

Dependency frequency distribution of standstills inside road networks and their temporal duration



Level of Service

- Analyzing speeds

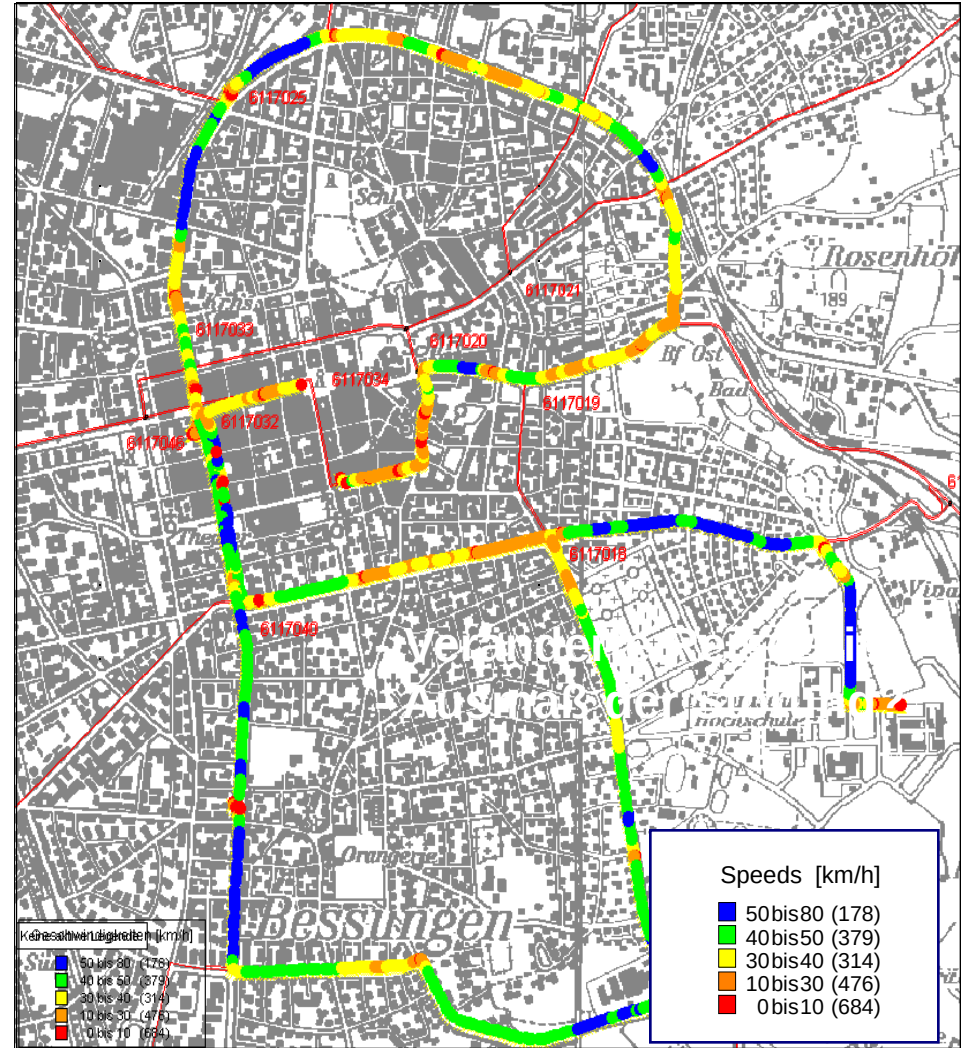
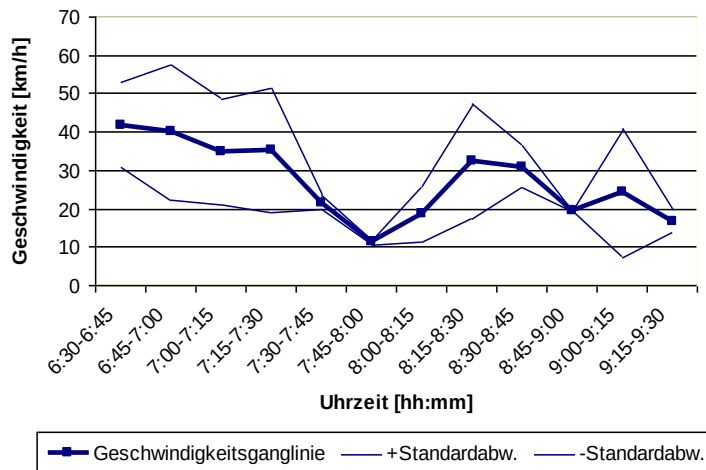
Motorized Traffic



Data:

- Travel time
- Travel speed

Speed Graph and traffic forecast



Reisezeitmessung mit OpenStreetMap

mittlere Reisezeit MIV und ÖPNV
Ignaz- Harrer/ Münchner Bundesstraße

— MIV - - - - - ÖV

LOS	
A	Freier Verkehrsfluss
B	leicht erhöhtes Verkehrsaufkommen
C	Erhöhtes Verkehrsaufkommen
D	großes Verkehrsaufkommen, zähfließend
E	großes Verkehrsaufkommen, stockend
F	sehr großes Verkehrsaufkommen, Stau

0 25 50 Metern

Datenquelle: OpenStreetMap
Erstellung: 19.10.2010



Conclusion

- Strong penetration of mobile location technologies within the next years allows an efficient traffic detection
- developed methods and procedures can be a basis for upcoming online traffic models.
- Historical OSM GPS data provides a very good basis for evaluating the quality of transport networks (LOS)
 - ➔ Improving traffic planning



Questions?

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Thank You

