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6th European Conference on ICT in Transport Logistics

LOGISTICS OPTIMIZATION BY THE USE OF TRUCK FCD – ENHANCED ROUTING FOR HEAVY GOODS VEHICLES

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AGENDA

1. Introduction PTV Group
2. Background - Floating Car Data (FCD), challenges
3. Requirements from eFreight Project and Business case
4. Data basis and analyses
5. Network calibration and RE-Layer development
6. Next Level: Truck traffic patterns

Michael Schygulla


WE PLAN
AND OPTIMISE
EVERYTHING
THAT MOVES PEOPLE
AND GOODS
WORLDWIDE.
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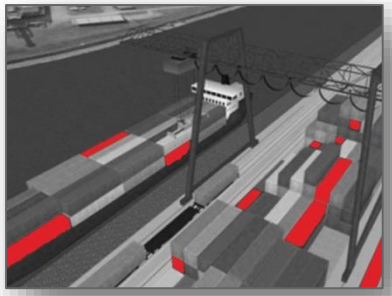
ONE WORLD – TWO MARKETS

TRAFFIC MARKETPLACE

PLANNING AND OPTIMISING THE FLOW OF PEOPLE

LOGISTICS MARKETPLACE



PLANNING AND OPTIMISING THE FLOW OF GOODS

LOGISTICS VALUE NETWORK – OUR PRODUCTS

PTV SMARTOUR

Tour Planning & Optimisation
Increased efficiency of delivery processes

PTV MAP&GUIDE

Transport Route Planning
The transport route planner

PTV MAP&MARKET

Geomanagement & Field Force
Sales efficiency – optimal sites, regions and field force structures

PTV NAVIGATOR

Navigation Solutions
Route guidance for commercial fleets

PTV XSERVER

Developer & Partner Solutions
Software components for 3rd party solutions

LOGISTICS VALUE NETWORK – THE VALUE CHAIN

STRATEGY

PTV MAP&MARKET

TACTICS

PTV SMARTOUR

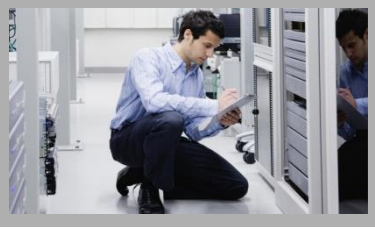
OPERATIONS

PTV MAP&GUIDE

EXECUTION

PTV NAVIGATOR

PTV X SERVER



GEOCODE

NAVIGATE

MAP

ROUTE

OPTIMISE

GUIDE

BACKGROUND: FLOATING CAR DATA

FCD for passenger cars are available. Key technologies are:

- GPS / compass / accelerometer / gyroscopes
  now common parts of mobile/ smartphones
- Mobile communication coverage
- Mobile communication bandwidth

FCD coming from Trucks – logistic fleets haven´t been processed before

- Fleet size and character (vehicle types)
- Transport flows on corridors
- Timeframe of available data

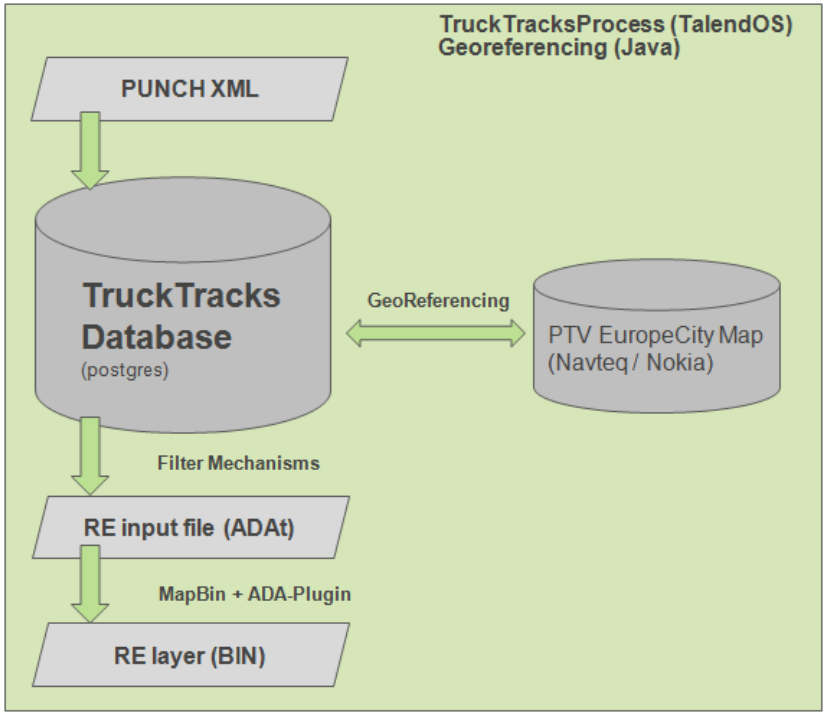
REQUIREMENTS TO PROCESS FCD

- Only few attributes required:
  - One vehicle position at least every minute
  - One position bundle at least every 5 minutes

- Data format independent, most common: XML-Files from Onboard Computers
- Traces should contain position, speed, id and timestamp
- Further data could be used for validation (e.g. heading)
- Setting up stabile technical database for retrieval of data and mapmatching process

CHALLENGES OF FCD PROCESSING

- Methodologically: Distinguish individual or temporary behavior (such as parking vehicles or braking maneuvers) from traffic-related behavior (such as congestions).
- Technologically: Implement a system, capable to compute several hundred routings per second.
- Implement a Georeferencing system to validate the GPS traces on the driven segments



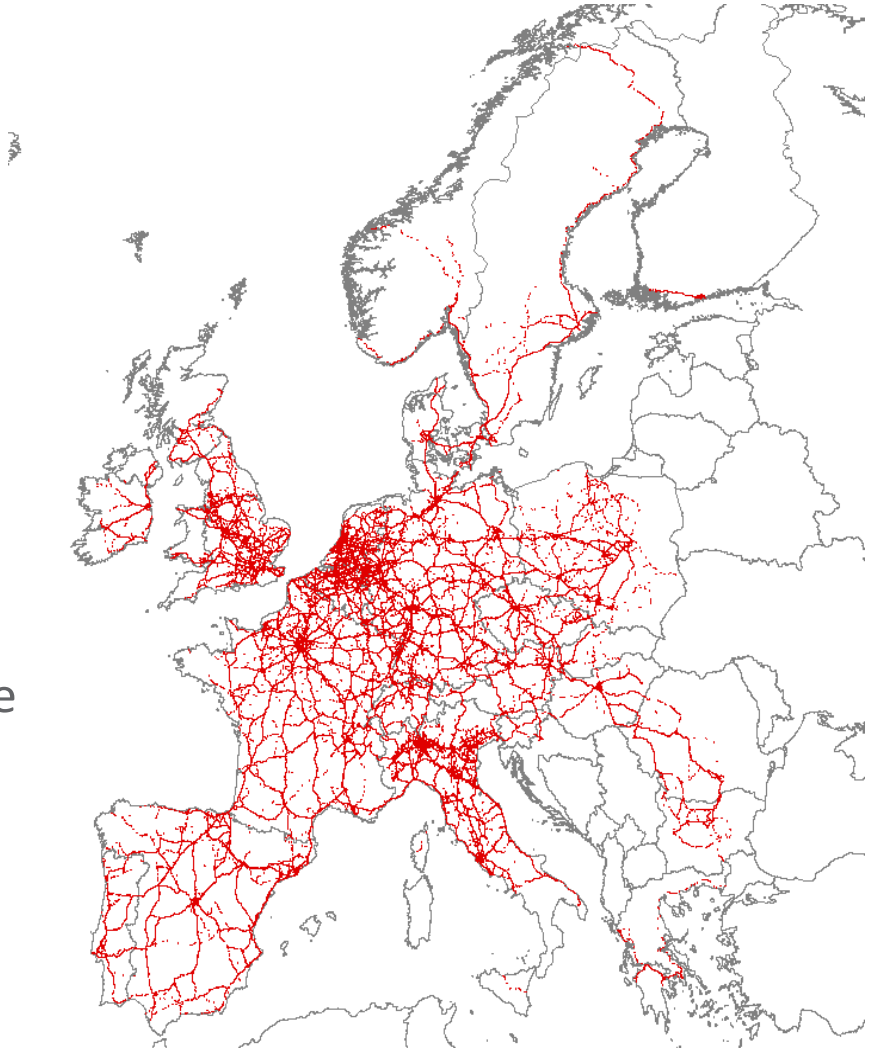
REQUIREMENTS FROM PROJECT AND BUSINESS CASE

Main focus of developments

- Developments focused on road transport optimisation
- Enhancement of planning and routing
- Utilization of fleet data all over Europe
- Consideration of fleet specific operation profiles
- Better and more accurate planning/ routing results
- Test environment for demonstration

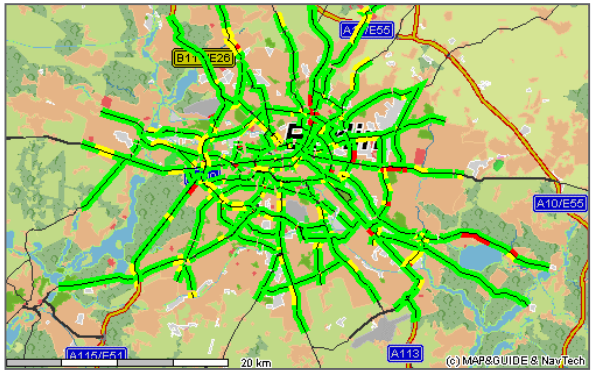
BASIS FOR ENHANCED ETA CALCULATIONS

- Database: 15 months of trace data from trucks, unique heavy goods vehicle fleet of ~ 1000 trucks
- Traces: 14.994.637 valid points with Speed > 0
- All traces with speed 1 - 95 km/h are being used
- Mapmatching with 1.237.994 Network-Segments



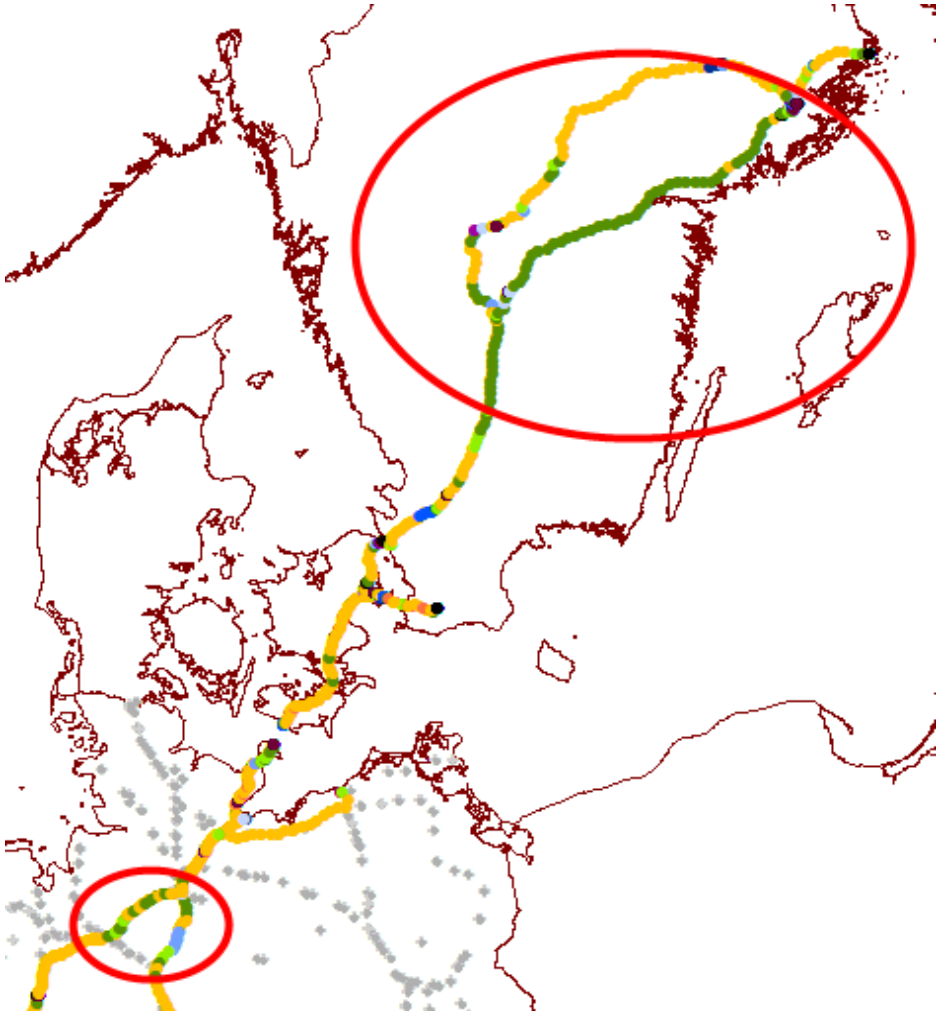
PROCESSING OF DATA AND RESULTS

- comparison of speed values on specific segments with other relevant values :
  - Network related speed values
  - Truck profile related values
  - Navteq speed/daytime per segment



- Development and creation of specific data layer
  - Specific layer additional to standard in Routing engine
  - Network calibration and detailed analyses of different corridors

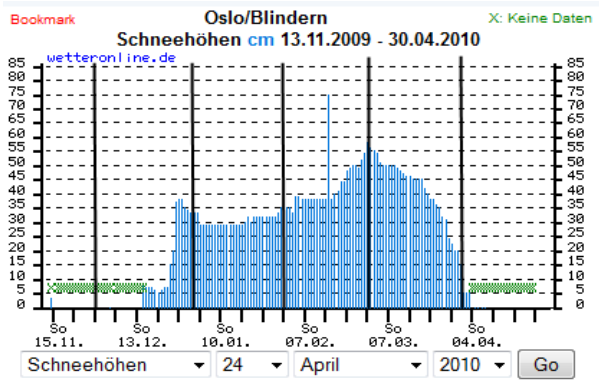
TRACE ANALYSES PER DATA SOURCE



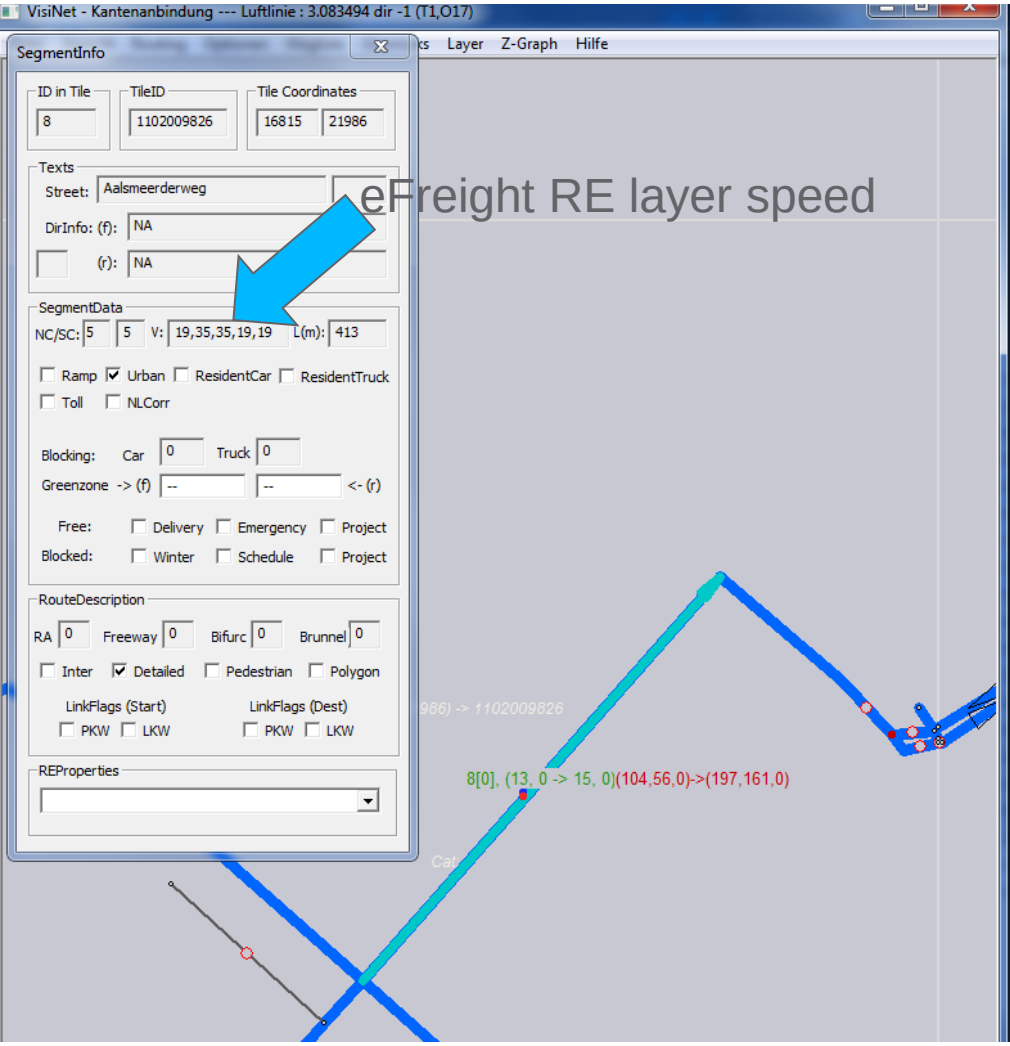
Construction sites(?)
Congestion
Bremen – Hamburg

Hannover - Hamburg
(congestion?)

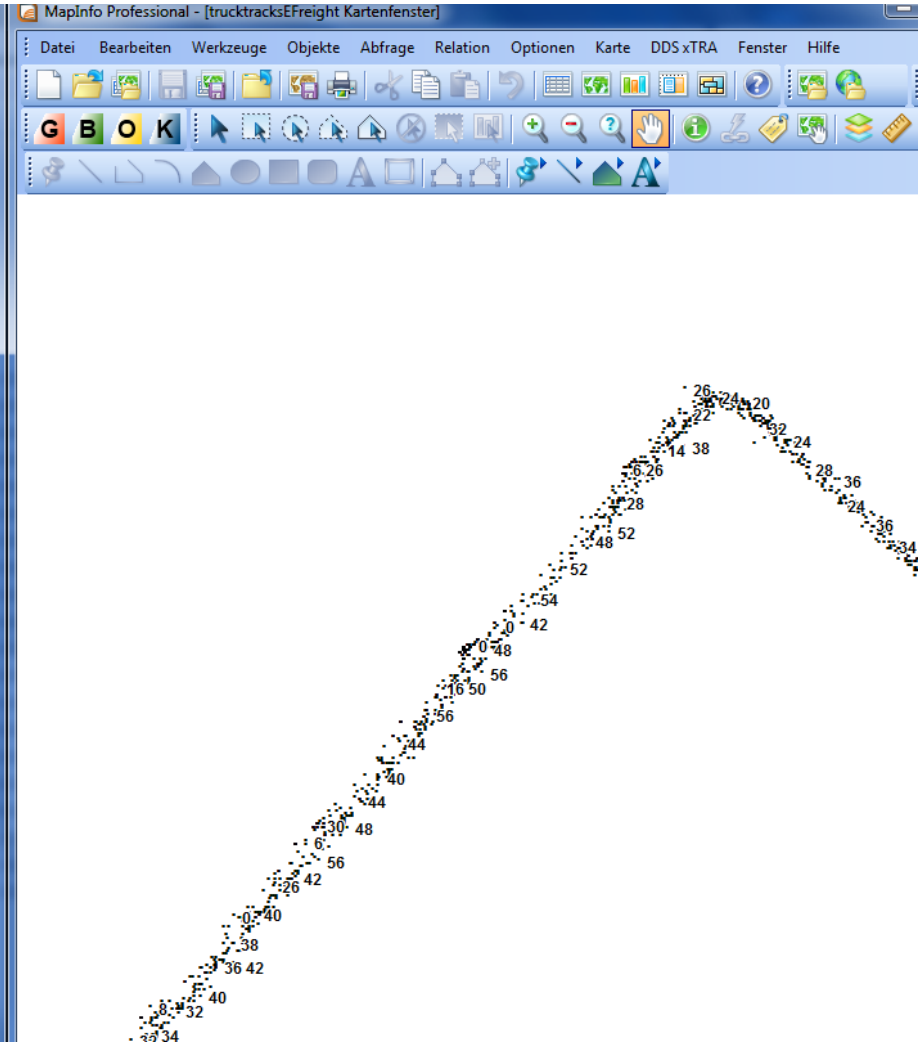
Slower in sweden
Snow heights and season effects



NETWORK CALIBRATION - EXAMPLES



eFreight RE layer speed



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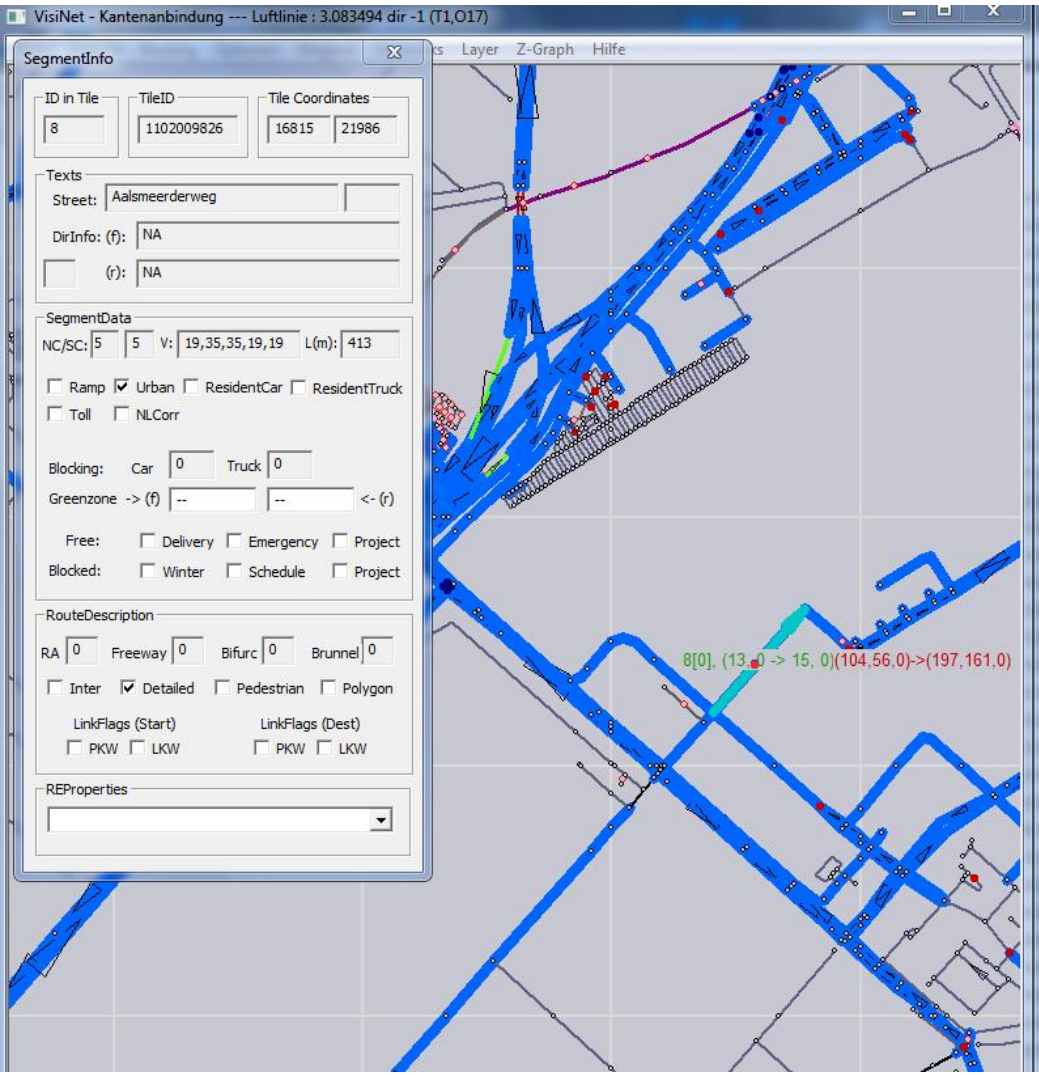
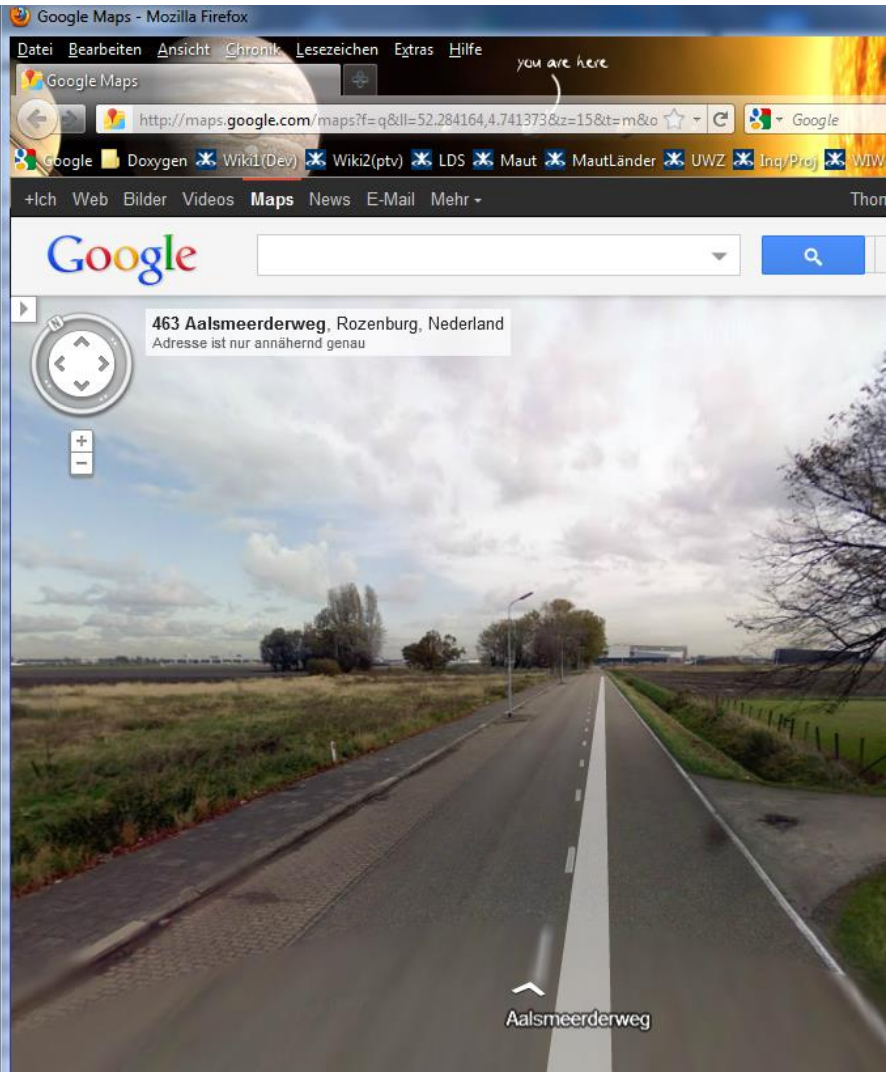
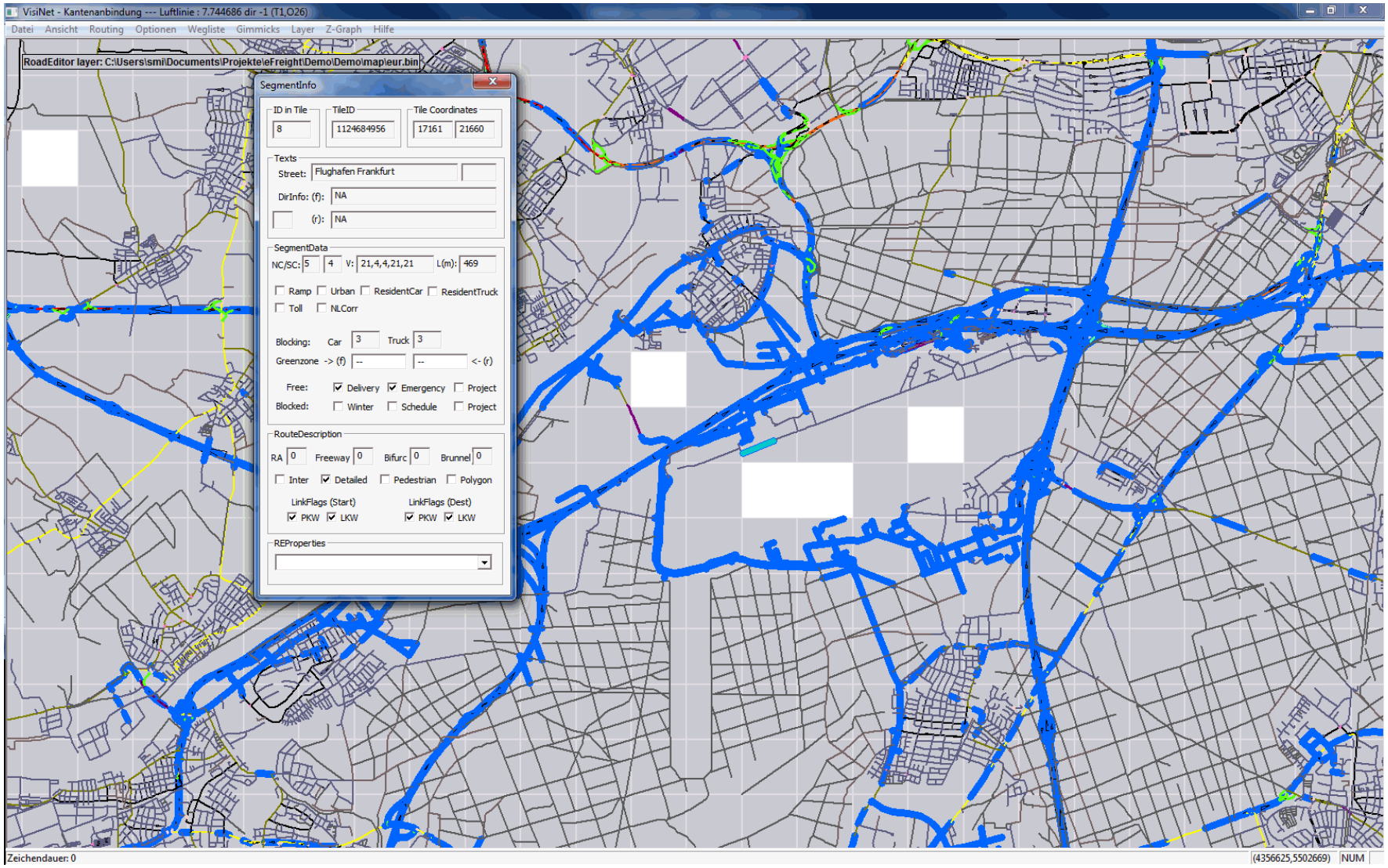
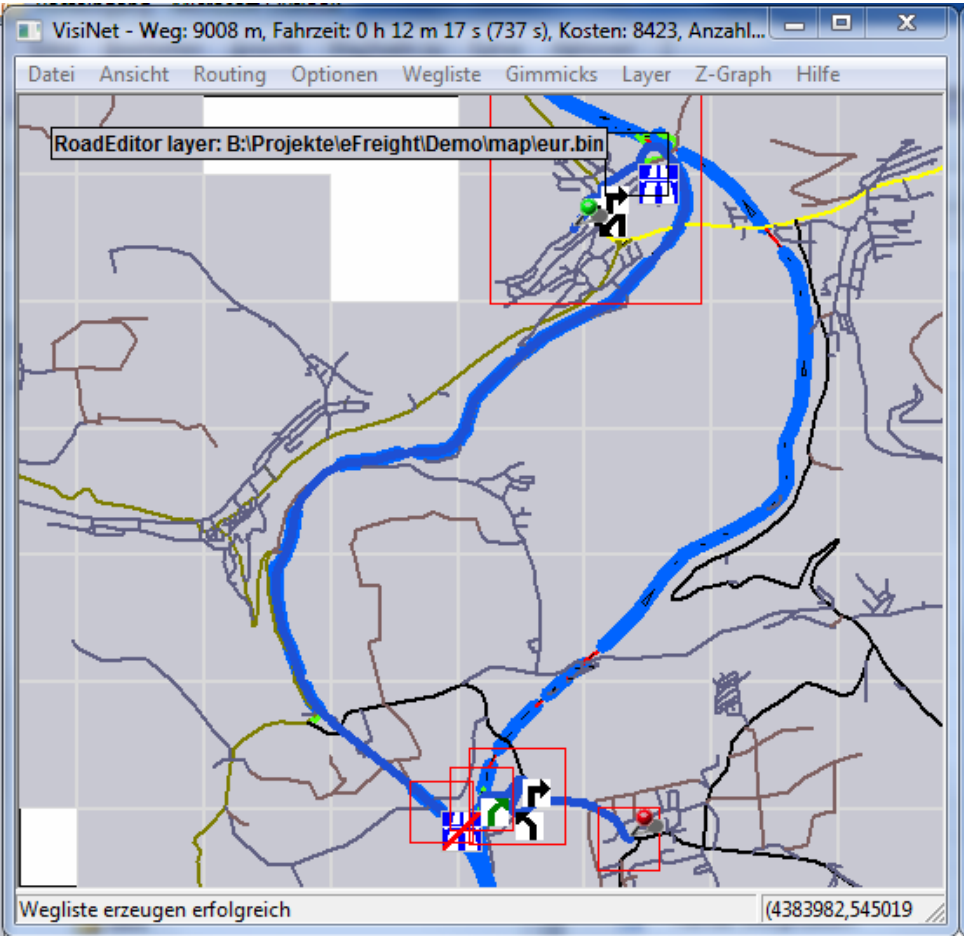


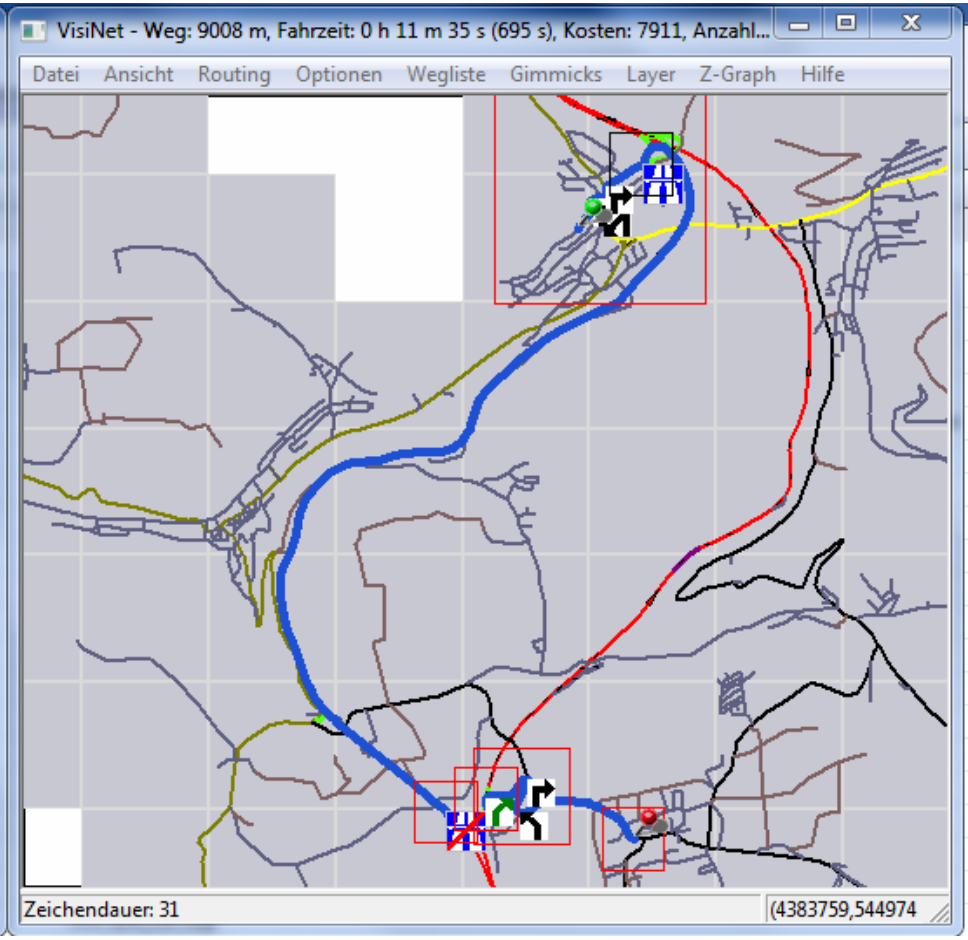


VISUALIZATION – RE LAYER SEGMENT INFO - FRA



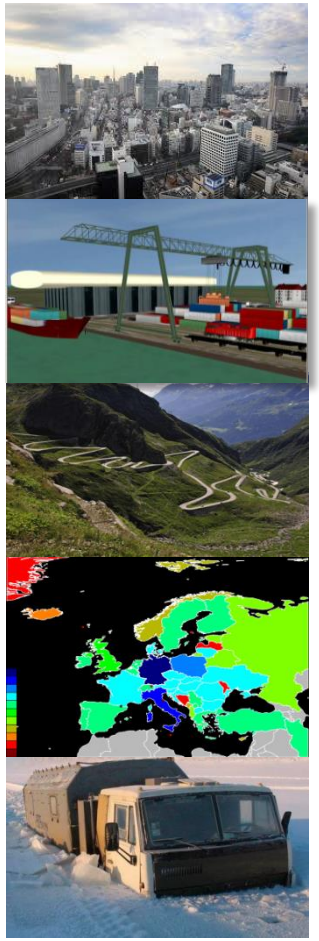
EXAMPLE: RE LAYER ROUTING SLOWER





OBSERVATIONS FROM ANALYSES

Time losses of fleet according to FCD



Europe wide in dense areas and main highways(A6 in Ger).

Close to ferry terminals.

Hills, alpine areas

Country related driving speed – differences in nl, swe, ita

Weather and seasons

CONCLUSIONS

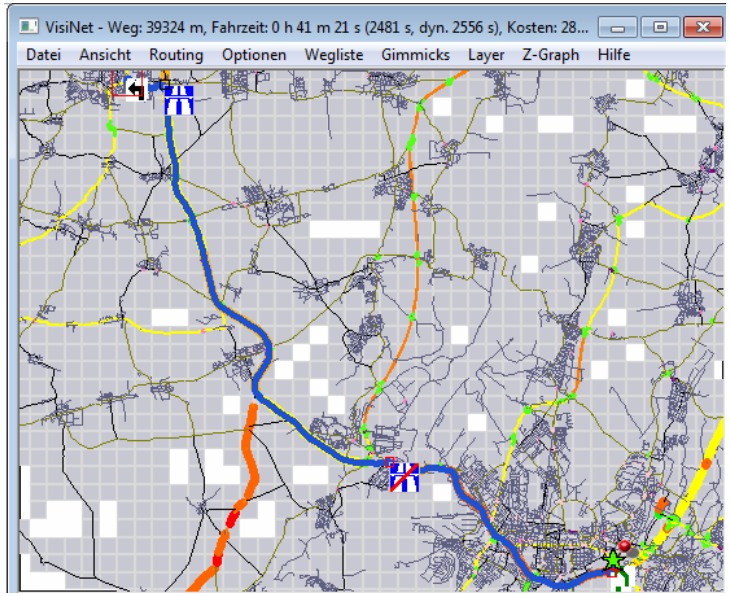
- Setting up test environment for ETA solution and route calculation successful
- Comparison of different routings possible
- Standard planning process „as it is“ not sufficient/ accurate
- Routing results with RE-Layer in some cases faster than standard
  - Due to large amount of trips at night
- Time losses often at ramp (not only on road)
- Better accuracy of route calculation for individual segment
- Further consideration and developments in frame of GET project

NEXT LEVEL: TRUCK SPEED PATTERNS

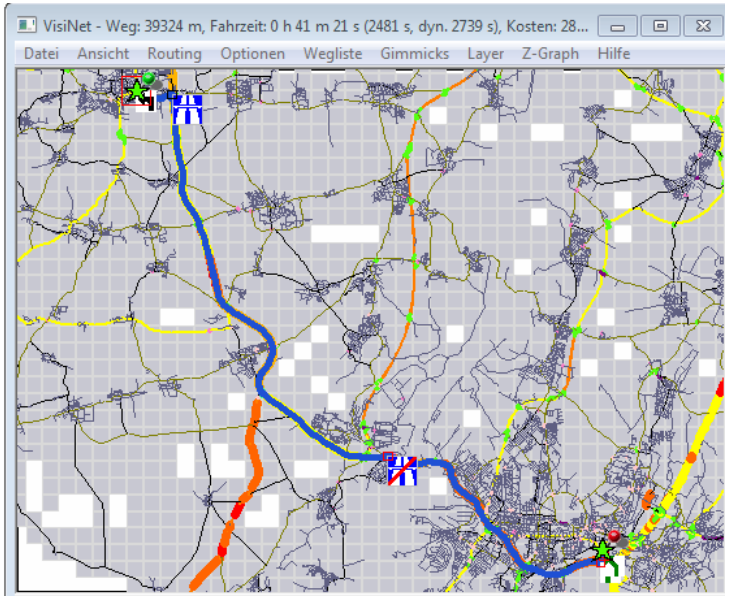
More data needed for stabile processing of speed pattern for trucks per hour

green: eFreight truck
blue: Navteq
red: TomTom

ROUTING EXAMPLE



test route on locations 10b and 11b, starting at 06:00



starting at 07:00

06:00 → 2556 s (42:36 min)
07:00 → 2739 s (45:39 min)
static → 2481 s (41:21 min)

THANK YOU FOR THE ATTENTION!

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