TOMS
Traffic Online Monitoring System
for ITS Austria West

ITS West Upper Austria

Goal: Real-time traffic situation for Upper Austria (deliver to the „Verkehrsauskunft Österreich" – VAO)

Solution: Development of

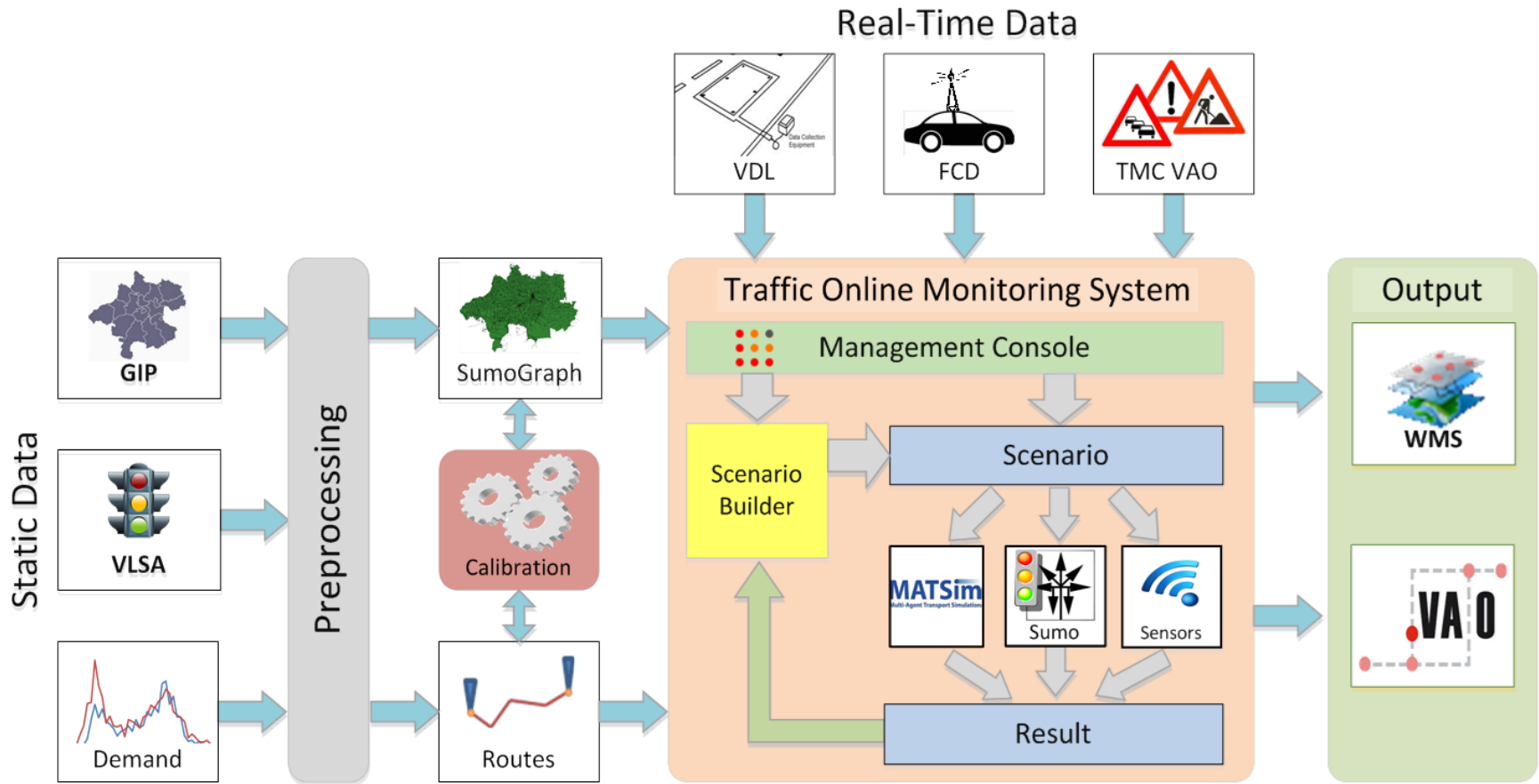Traffic Online Management System (TOMS)

Partner: Goverment of Salzburg, Salzburg Reseach GmbH,

Goverment of Upper Austria, Logistikum Steyr

Duration: 2011 - 2014

System Overview

Preprocessing Static Data

- ## The Road network

  - GIP (Graphenintegrationsplattform)
    http://www.gip.gv.at/

  - Filtered geographically und functionally (level of sigificance) depending on urban or rural

  - Netconvert for generating a Sumo or MATSim network file
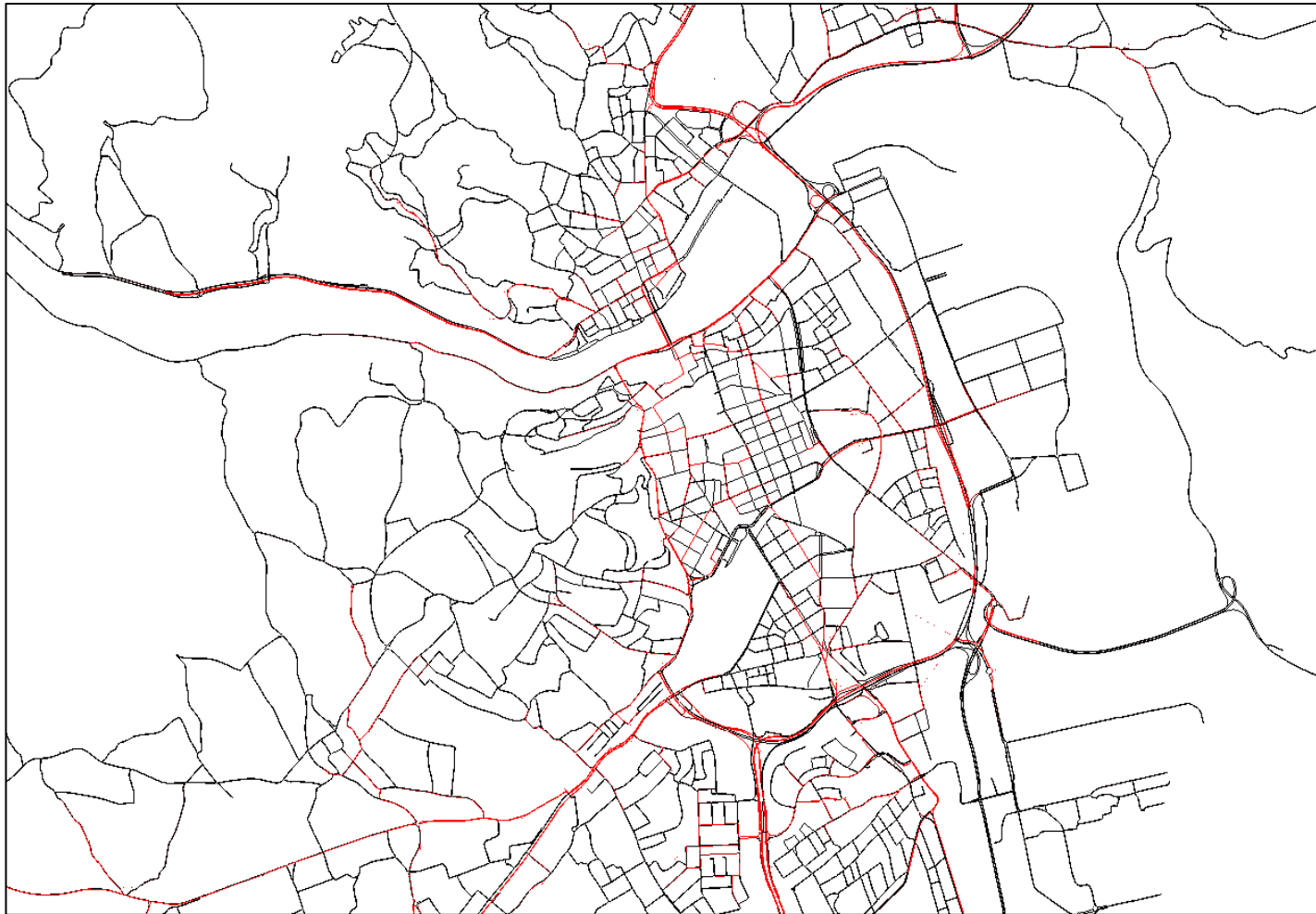
- ## The Routes File

  - Demand model from 2014 with hour-based distribution of trips, used to:

  1. Produce Trips

  2. Compute best routes

  3. Balance drives by
     - Alternative route
     - Shifting vehicles
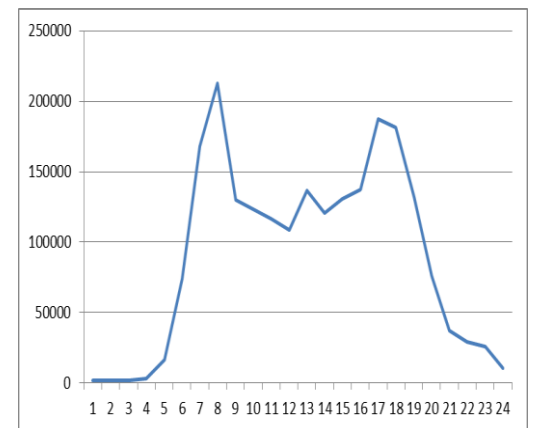
Calibrating the Demand Model

– around 10:00AM: huge traffic jams in the simulation

Calibrating the Demand Model

- Calibration Run:
  - Start time for Sumo is 00:00
  - End time begins with 6:00AM
    - Advances in one hour increments
    - Ends with 8:00PM
- Dump to Calibrator every 2 min
  - Delayed or early vehicles are detected
- After Sumo ends
  - Delayed vehicles are randomly:
    - Rerouted
    - Shifted
  - Early vehicles are postponed

Calibrating the Demand Model

- Modified Dijkstra for alternative routes

- "Significantly different route":
  - 50% of length
  - 10 min driving time

- Route must be different from all those already computed

- Not too long – max 5% longer

- The „difference" must be a contiguous set of road segments
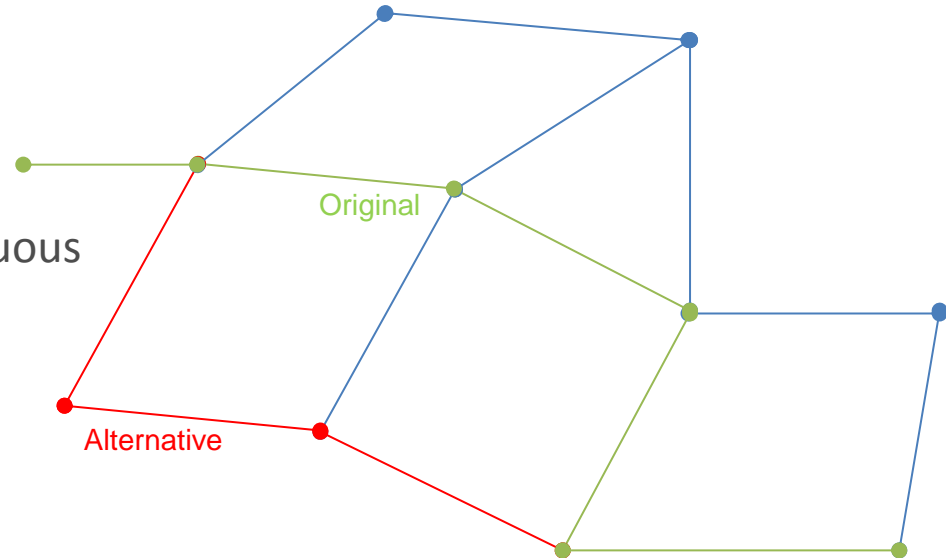
Calibration of Upper Austria

- Microscopic Simulation 1h 24min
  - (end times for Sumo between 6:00 and 16:00, runs 9 weeks)

```
03/17/2014 09:24:36: -------------------------------------------
03/17/2014 09:24:36:           Calibration attempt 3
03/17/2014 09:24:36:              end time 8
03/17/2014 09:24:36: -------------------------------------------
03/17/2014 09:24:36: Started sumo.exe with arguments D:\Projekte\ITS_West\ITS-West\(
17.03.2014 09:24:53: Client 10.32.1.151:57377, joined
03/17/2014 10:41:19: Client 10.32.1.151:57377, disconnected
03/17/2014 10:41:36: There were 36016 seriously delayed vehicles
03/17/2014 10:48:54:          28784 were shifted, 13839 were rerouted
03/17/2014 10:48:54:       there were 4426 vehicles that arrived too early.
```

- Mesoscopic Simulation 14min

```
05/09/2014 10:06:19:
05/09/2014 10:06:19:          Calibration attempt 0
05/09/2014 10:06:19:             end time 9
05/09/2014 10:06:19: -------------------------------------------
05/09/2014 10:06:19: Started meso.exe with arguments C:\Users\ppau\Documents\develop
5/9/2014 10:06:34 AM: Client 10.32.0.162:61833, joined
05/09/2014 10:21:47: Client 10.32.0.162:61833, disconnected
05/09/2014 10:22:13: There were 21416 seriously delayed vehicles
05/09/2014 10:25:11:          13263 were shifted, 8153 were rerouted
05/09/2014 10:25:11:       there were 2017 vehicles that arrived too early.
05/09/2014 10:25:41:
```
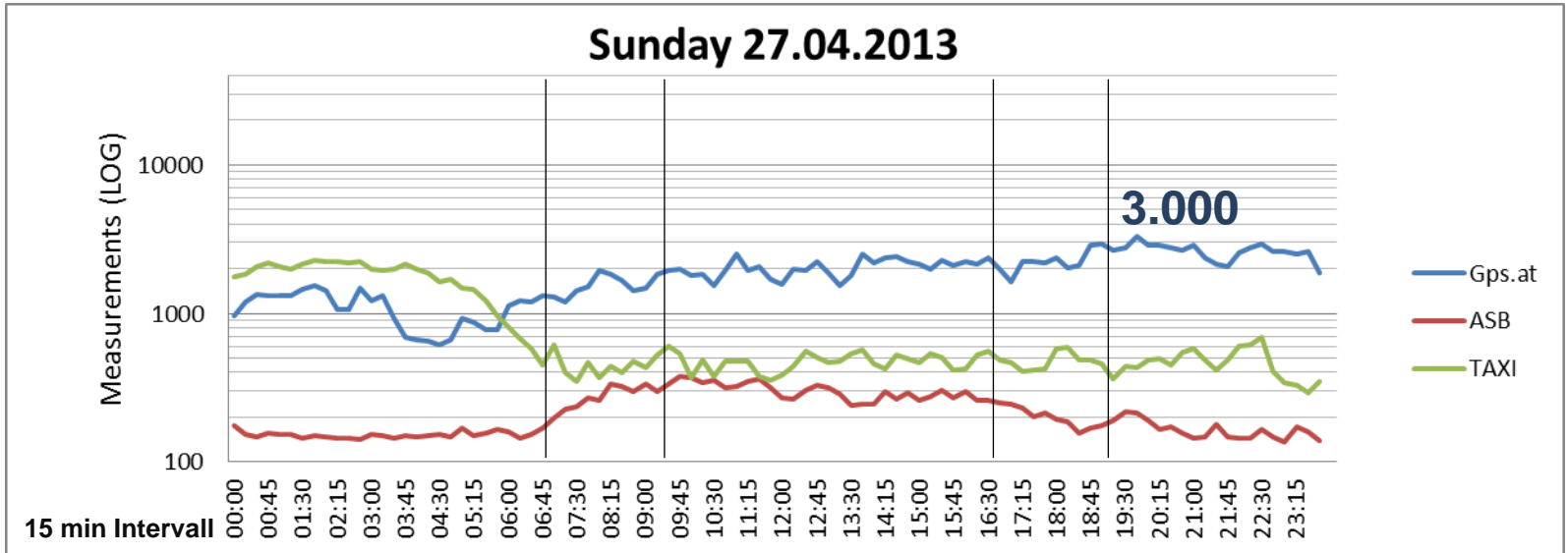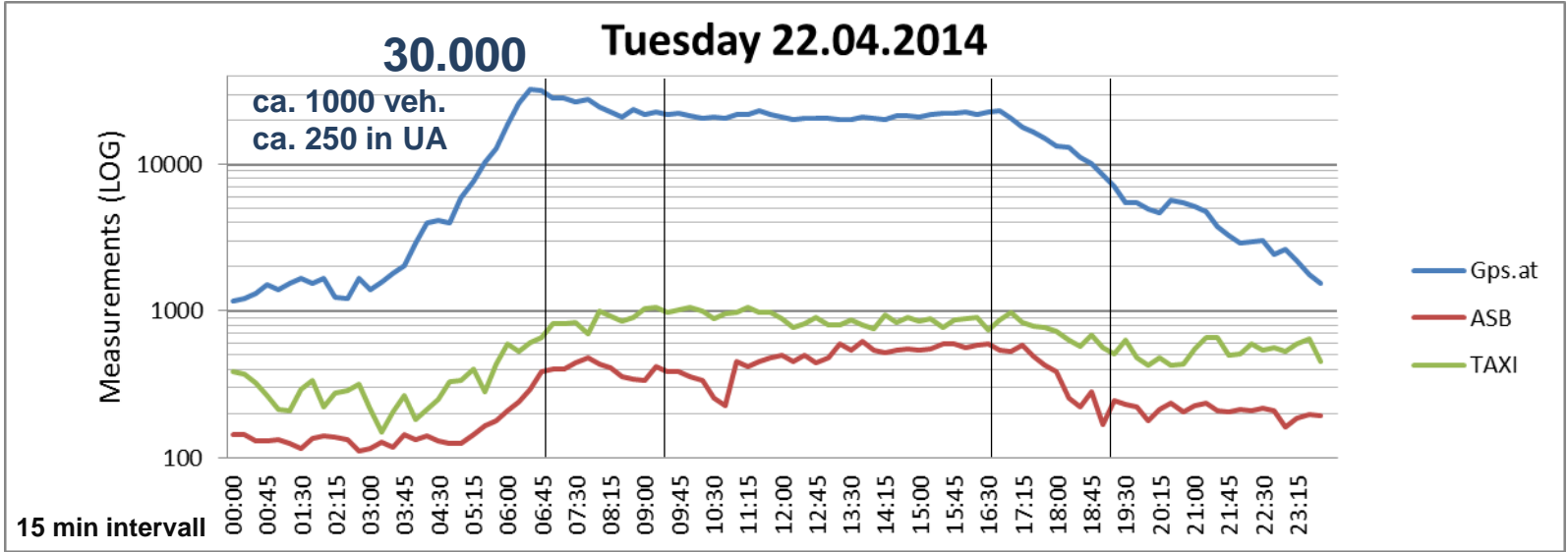
Integration of Real Time Data - VDL

- Vehicle Detection Loops
  - Geocoded in a preprocessing step
  - Individual or average velocities
  - Nr. of passed vehicles
- Data used also for *online calibration* of the simulation
  - Insert new vehicles with random routes
 - Remove vehicles

VDL B127 Puchenau
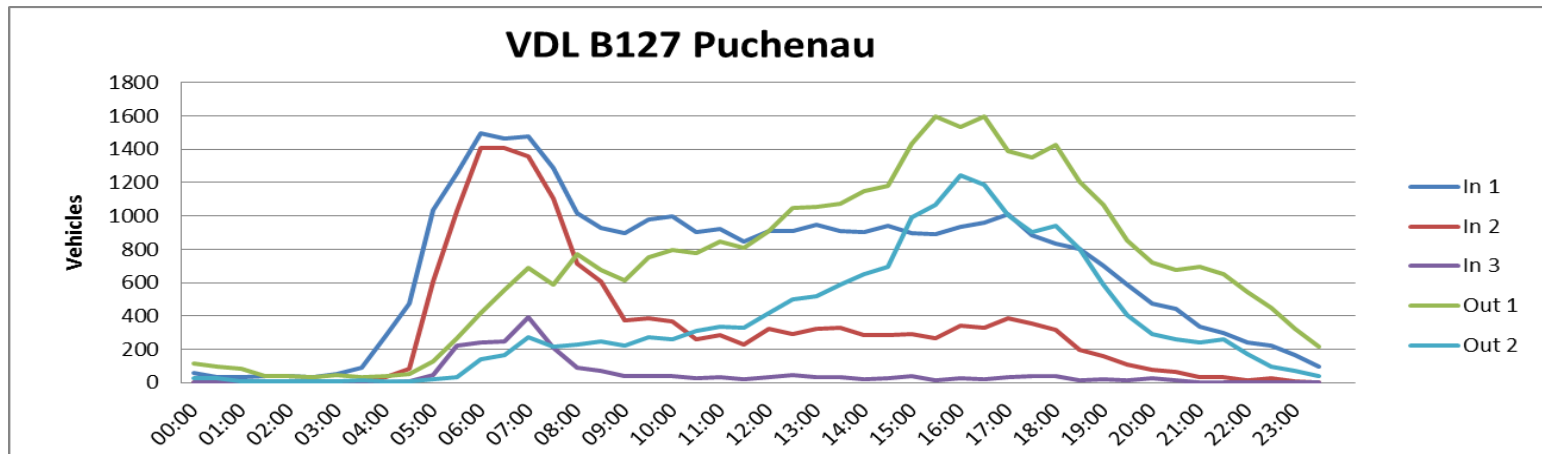
Integration of Real Time Data - FCD

Integration of Real Time Data - FCD

- Dijkstra
  - Calculates the route with minimal sum of edge weights
  - Weight is normally driving time

- Modified Dijkstra for Floating Car Data
  - Weight = driving time – reduction
  - Reduction depends on:
    - Nr. measurements/edge
    - Distance to the edge
    - Direction
  - ➤ Calculate most plausible route
  - Calculate velocities for all road segments
    - Using time between measurements
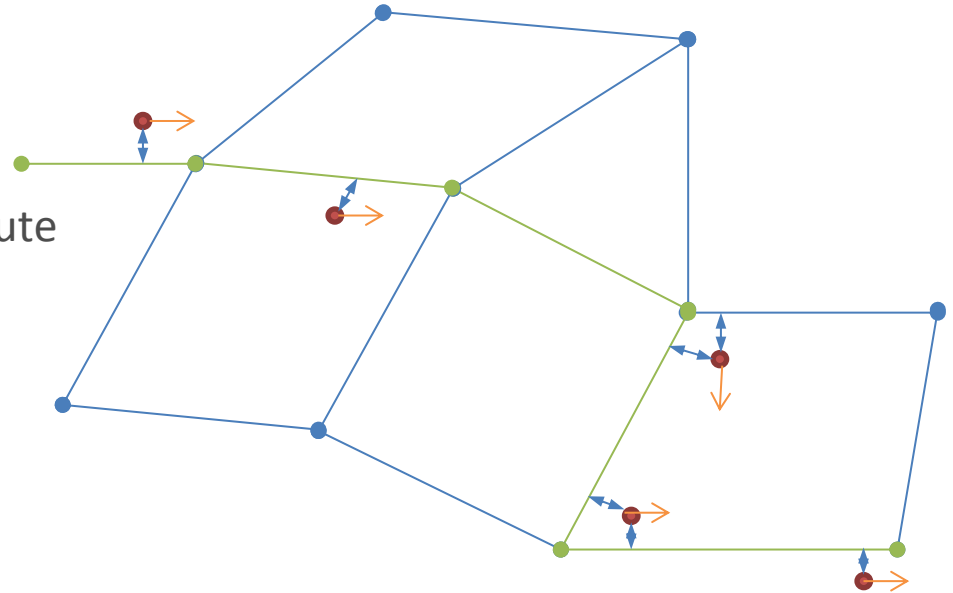
TOMS

Main Task: Simulation and real-time data are used to generate periodically an online snapshot of the traffic situation of Upper Austria

- Real-time data do not cover all roads

- Traffic simulation can be used to fill the gaps

- Sensor data calibrates the simulation (add/remove vehicles)

roads covered by real-time data

positions of traffic counters
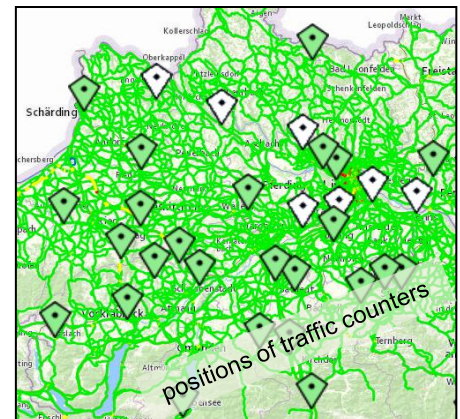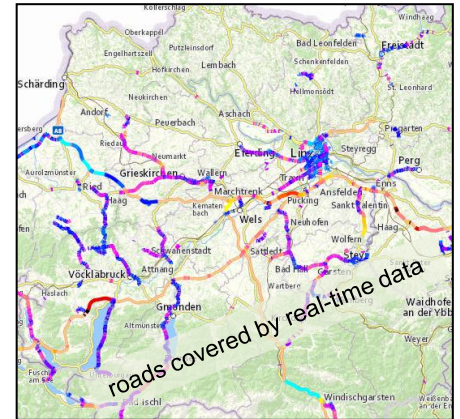
TOMS

Starts simulation loop	Starts real-time data loop
Collect simulation output	Collect and process real-time data
Extract traffic values from all roads in the dump	Override the default or simulated velocities
Calibrate: Insert adjustments computed from real-time data	Generate a LOS (Level of Service) output

TOMS

Future work

- Intensive testing of mesoscopic simulations

- Replay function

- Validating the traffic situation with video cams

Video starten   Standbild
Hoersching, Hoersching B133 km 2,36 000hm
Kamera 1 Kamera 2

Video starten   Standbild
Steyregg, Steyregg B3, km 236,80 259hm
Kamera 1 Kamera 2

Video starten   Standbild
Wilhering, Wilhering B129 km7,8 270hm
Kamera 1 Kamera 2