A NEW APPROACH TO INCREASE ROAD SAFETY – THE BENEFITS OF ADDING HISTORICAL ACCIDENT AND SPEED DATA TO TRANSPORTATION PLANNING AND SIMULATION TOOLS

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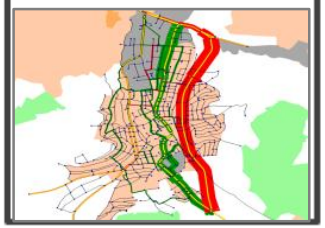
INTRODUCTION

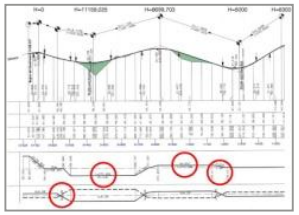
- This is not a research paper/presentation
- Identify new possibilities and opportunities of
  - New technology
  - New data
  - New workflow for road safety management including them
- We did implement and test this in a study region
- Good feedback from road safety practitioners in the study region
- Promising results and future potential

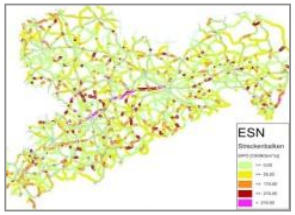
ROAD INFRASTRUCTURE SAFETY MANAGEMENT IN THE EU

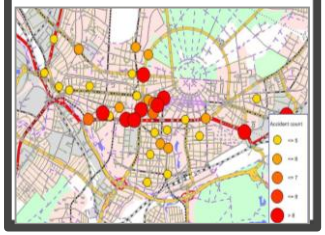
EU Directive 2008/EC/96

Road Safety Impact Assessment (RIA)	Road Safety Audit (RSA)	Network Safety Management (NSM)	Black Spot Management (BSM)	Road Safety Inspection (RSI)
New Schemes			Existing Roads	

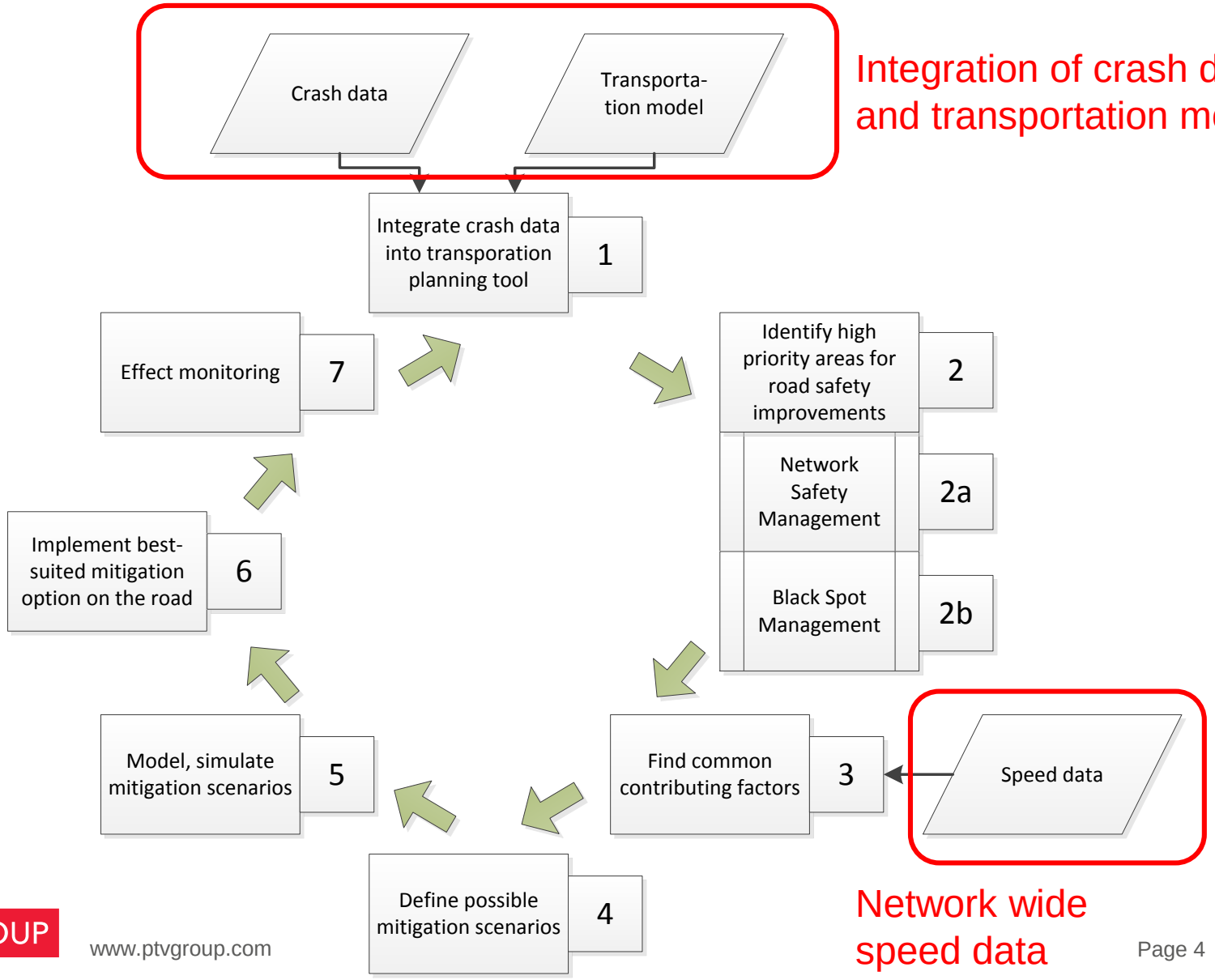








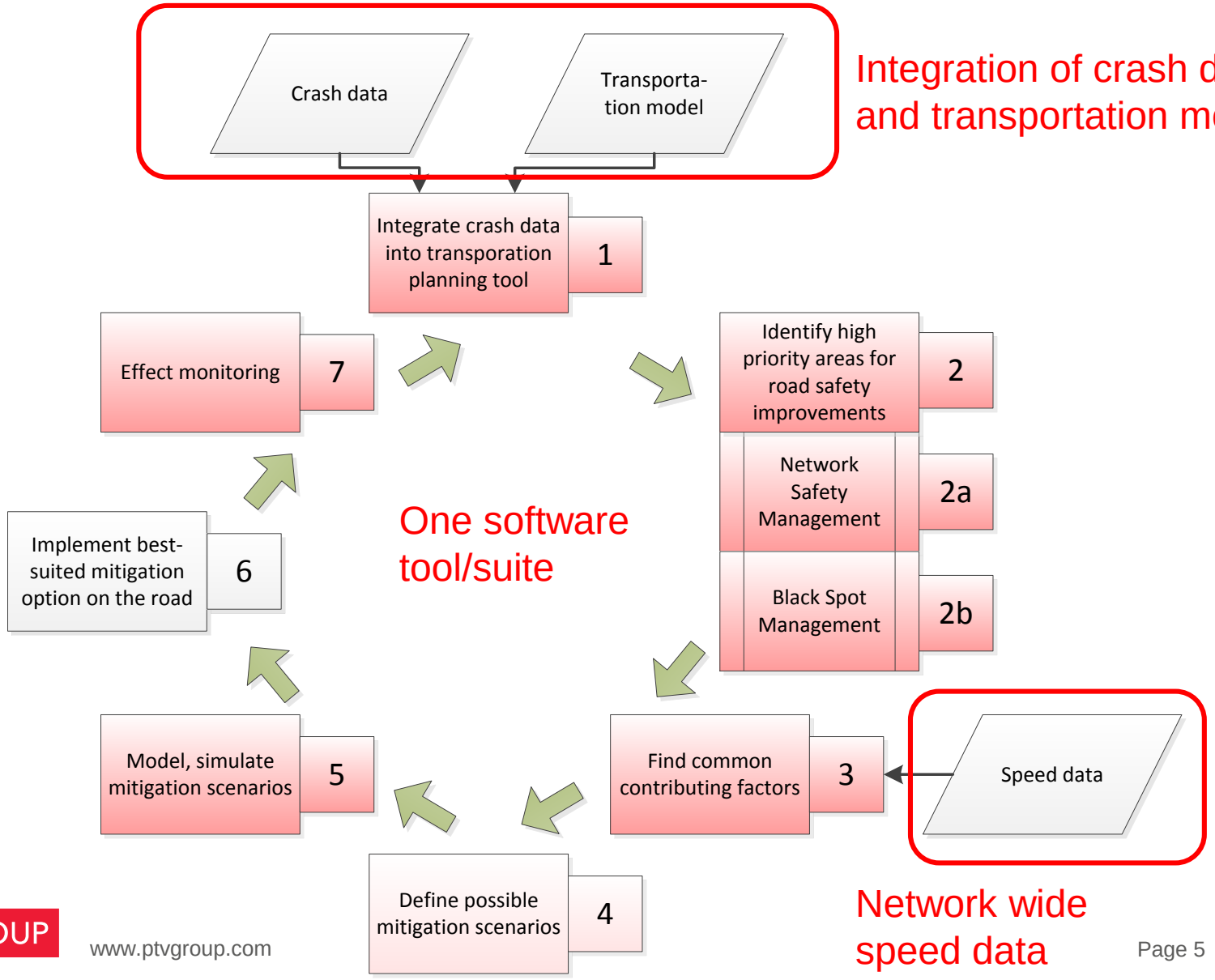
NEWLY INTRODUCED ROAD SAFETY MANAGEMENT PROCESS



Integration of crash data and transportation model

Network wide speed data

NEWLY INTRODUCED ROAD SAFETY MANAGEMENT PROCESS



1 INTEGRATE CRASH DATA WITH TRANSPORTATION MODEL

Advantages of integrating crash data with a transportation model in a transportation planning tool:

- Referencing to the road network
  - Availability of traffic volumes…
    - allows accident rate, accident density indicators
  - …and other road parameters (number of lanes, intersection types, etc)
- Access to safety indicators (e.g. black spots) while doing other transportation planning tasks
  - Road work management
  - Strategic planning

2 IDENTIFY HIGH PRIORITY AREAS

Once crash data has been imported, high priority areas can be identified:

- Network Safety Management (NSM)
  - Macroscopic view
  - High risk sections in the whole network
- Black Spot Management (BSM)
  - Small scale high risk areas (spots/intersections or lines/road sections)

2A NETWORK SAFETY MANAGEMENT (NSM)

NSM examines the whole network:

- Some research estimates that improvements on about 10 % of the network will be enough to avoid about 50 % of the accident cost.
- Goal: priority list of road sections where an improvement of the infrastructure is expected to be the most effective.
- Procedure is based on traffic volumes, accidents and segment lengths of existing road infrastructure.

2B BLACK SPOT MANAGEMENT (BSM)

- The identification of sites with high numbers of severe accident also called black spots on the existing roads.
- BSM is about identifying, ranking, analyzing and treating locations with numerous accidents.

3 FIND COMMON CONTRIBUTING FACTORS

To determine the reasons for a high crash frequency, common contributing factors or combinations thereof need to be identified:

- Unusual high occurances of individual factors or sets of factors
- Hard to pre-define general thresholds for automatic detection
- Local knowledge and experience of road safety expert needed
- First step: software assists discovery

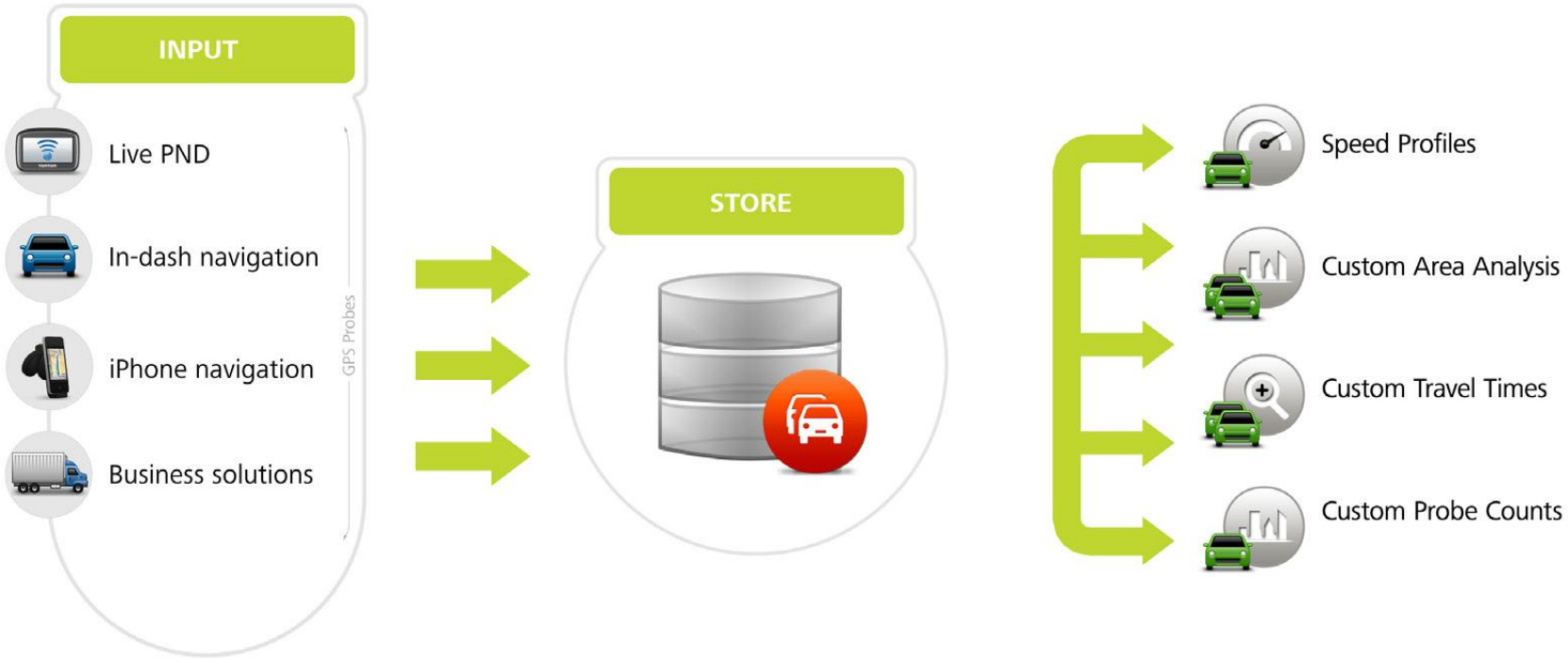
SPEED DATA AS AUXILIARY INFORMATION

Speed is considered the most frequent contributing factor of fatal crashes. Mostly information on actual speeds driven at a black spot or high risk road can only be guessed. With speed data available at those locations the road safety expert is able to tell:

- If speeding is an issue at all
- At what times of the day and days of the week does speeding occur
- If big differences in the speed driven could be an issue
- How and where the speed driven is changing along the route (limited by network detail level)

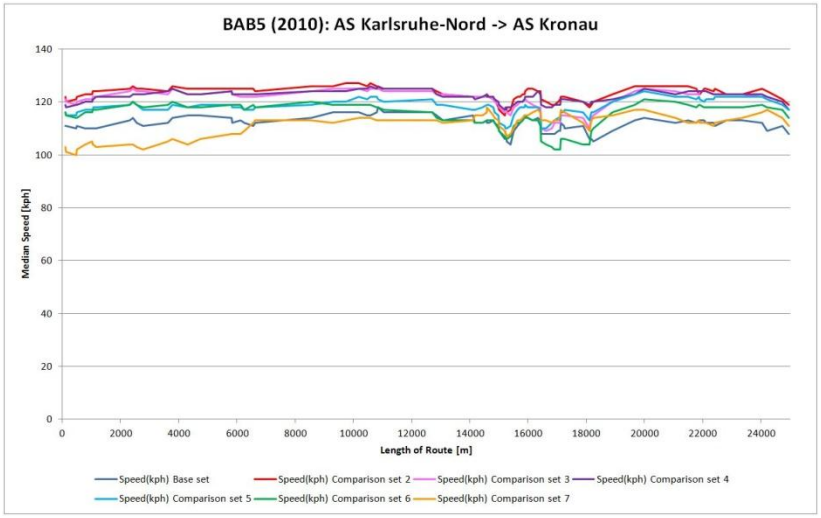
SPEED DATA SOURCES OF TOMTOM‘S SPEED DATA

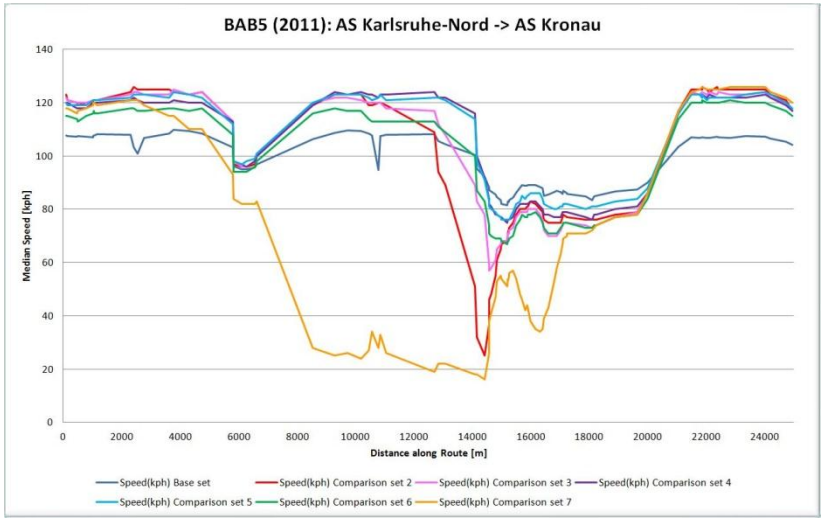
- over 9 trillion anonymous GPS-Measurements collected so far
- „Big Data“



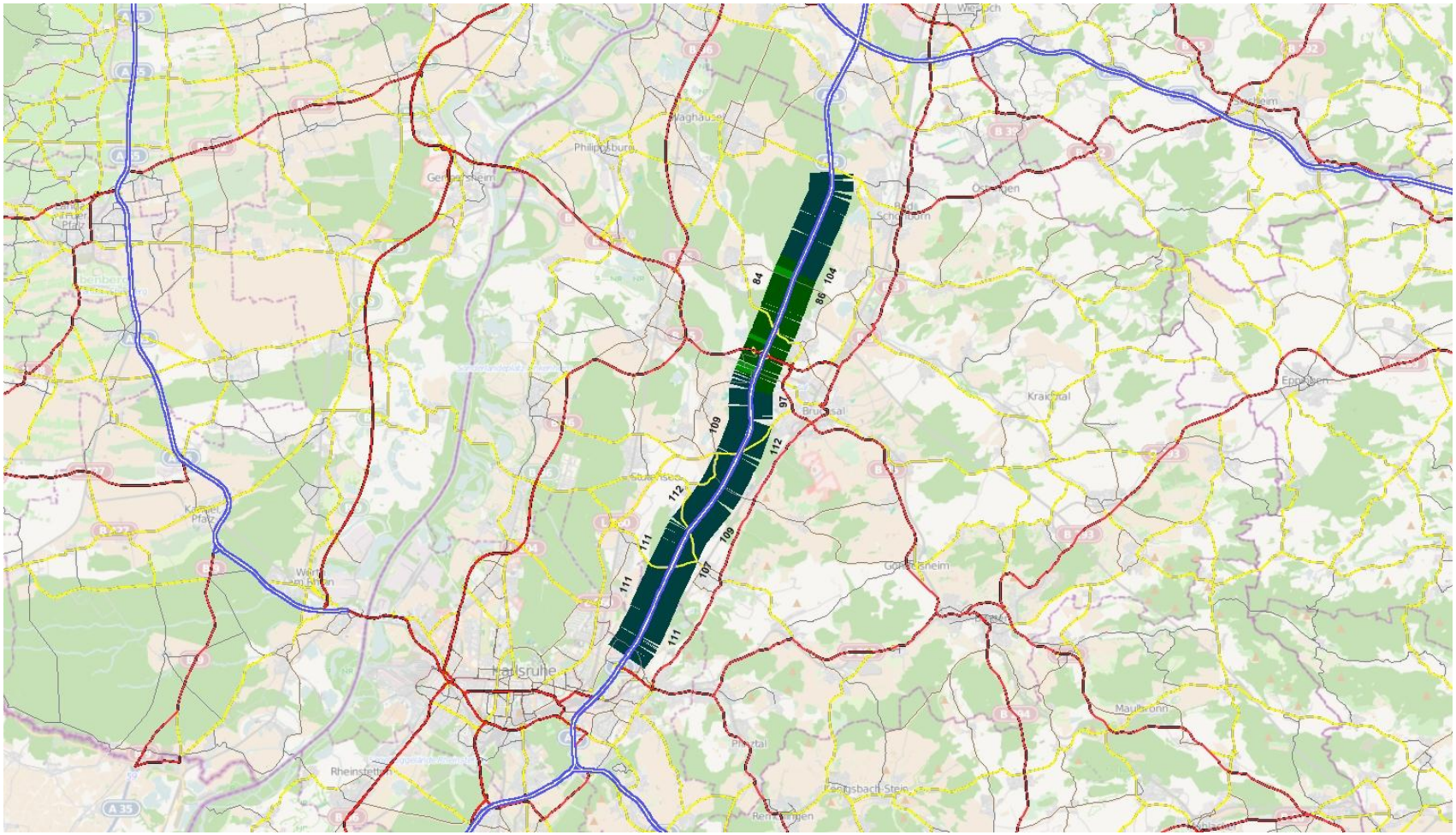
THE ROUTE – A5 DURING ROADWORKS IN 2011

CUSTOM TRAVEL TIMES (CTT)
COMPARISONS OF REGULAR VERSUS ROADWORK SITUATION

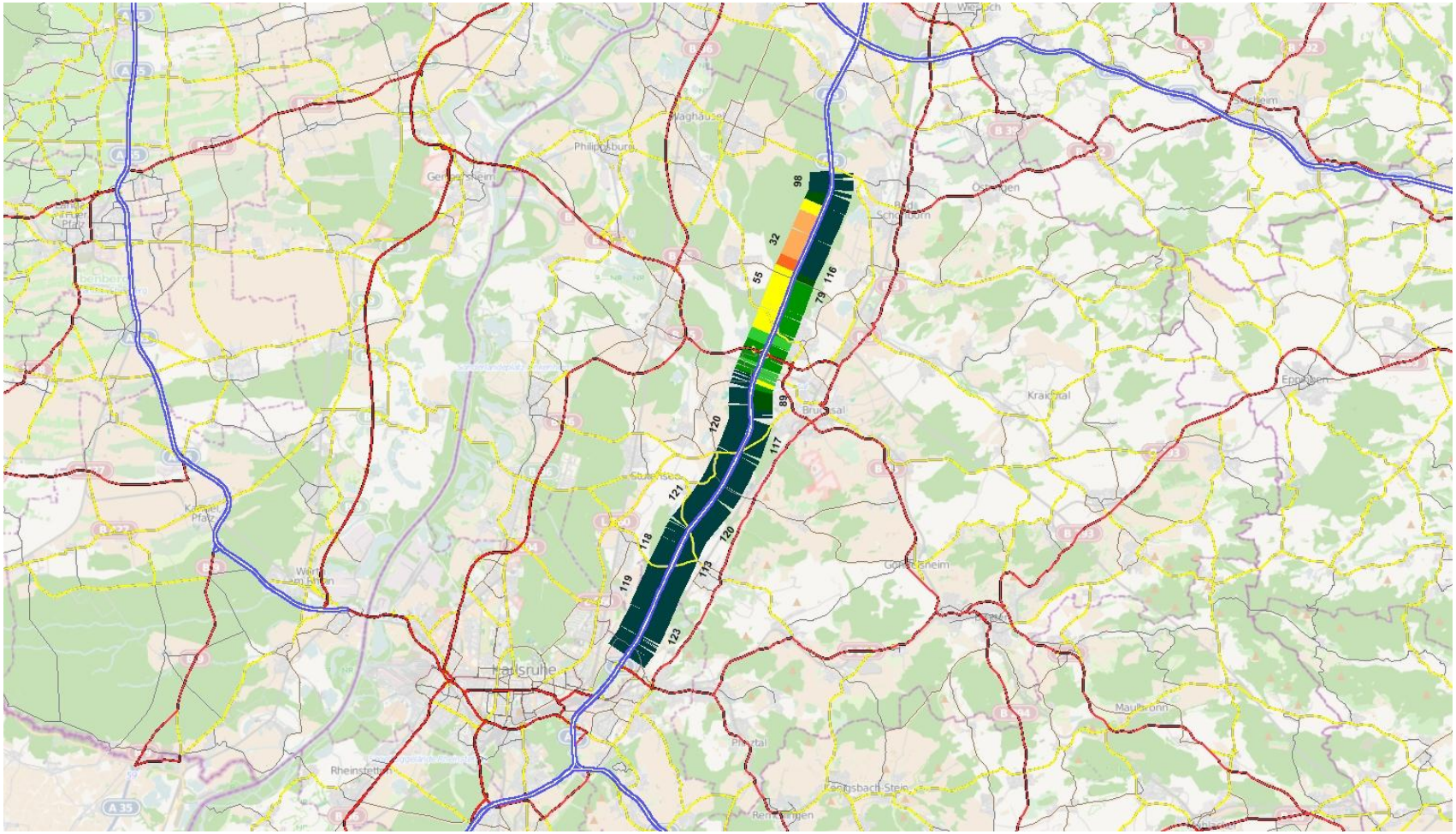




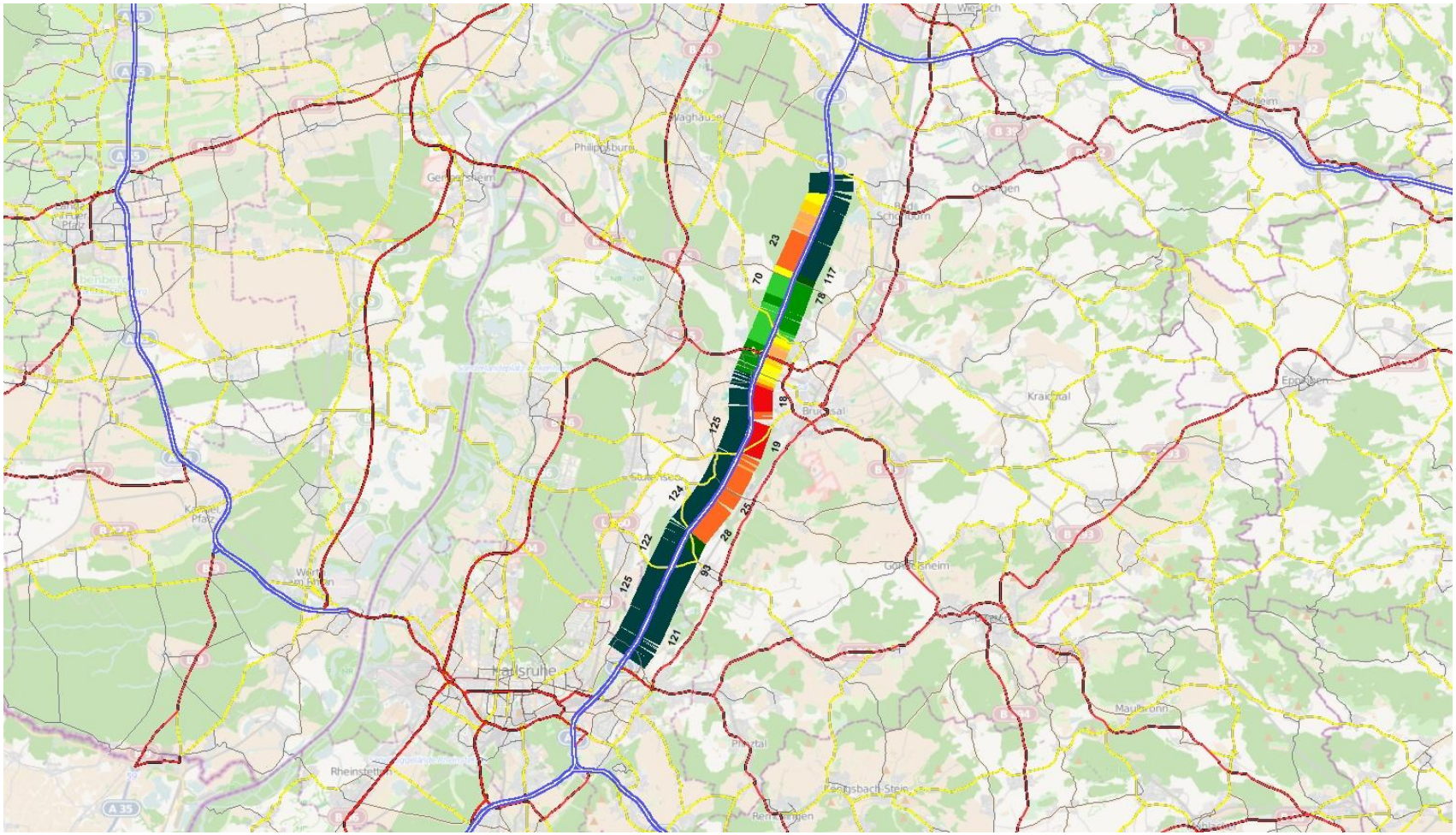
FREE FLOW



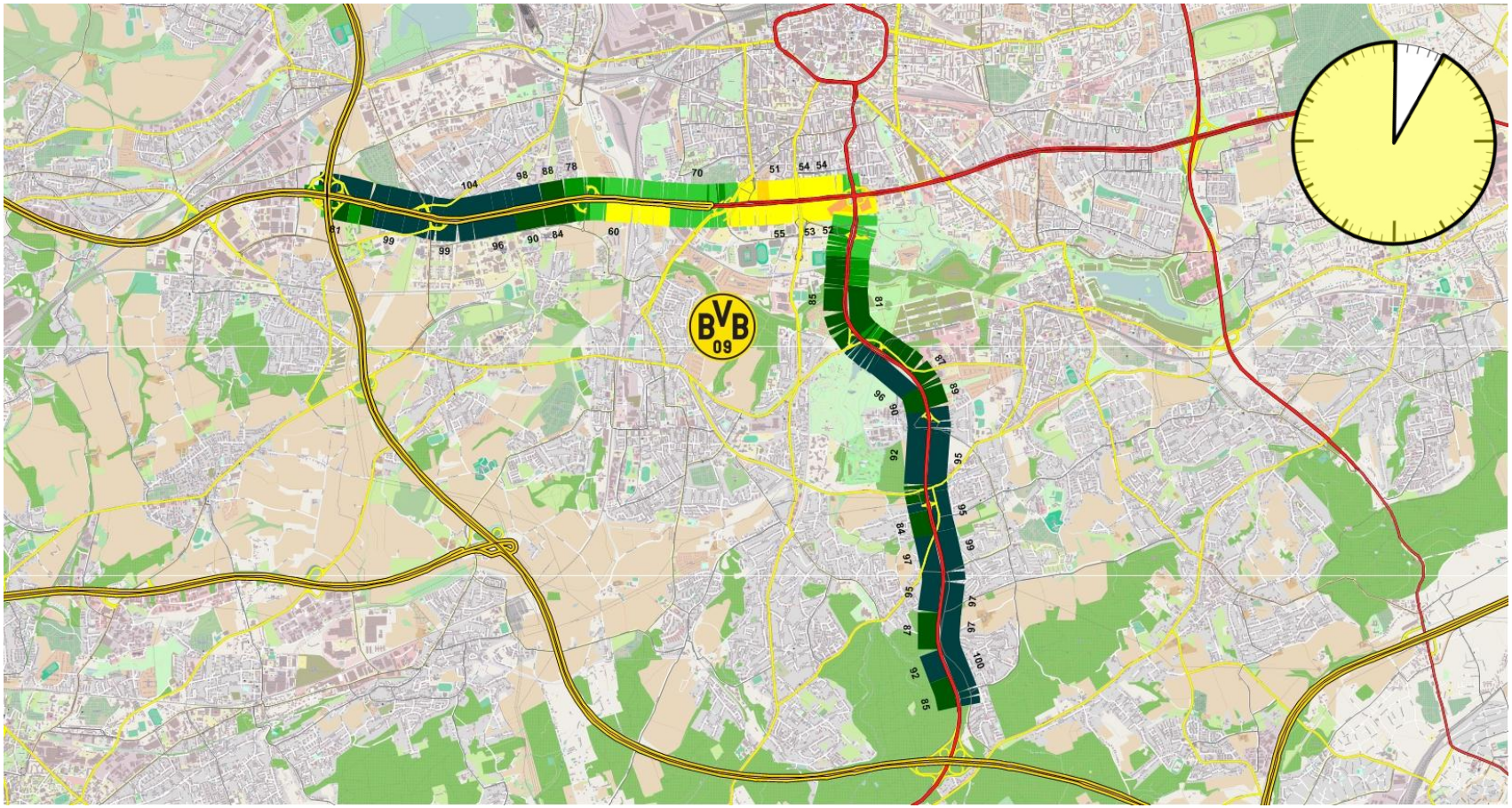
WORKING DAY – MORNING PEAK



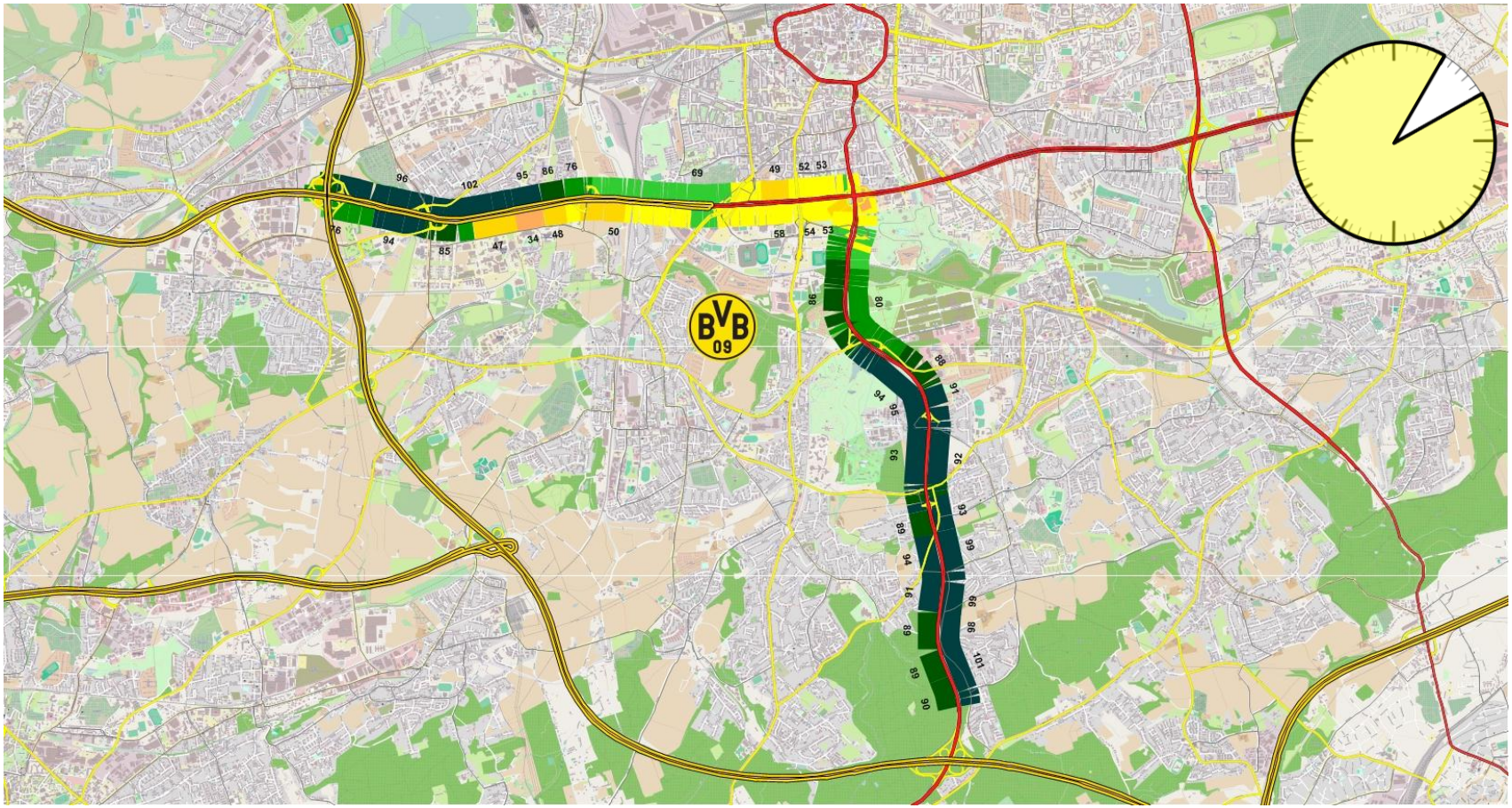
FRIDAYS – EVENING PEAK



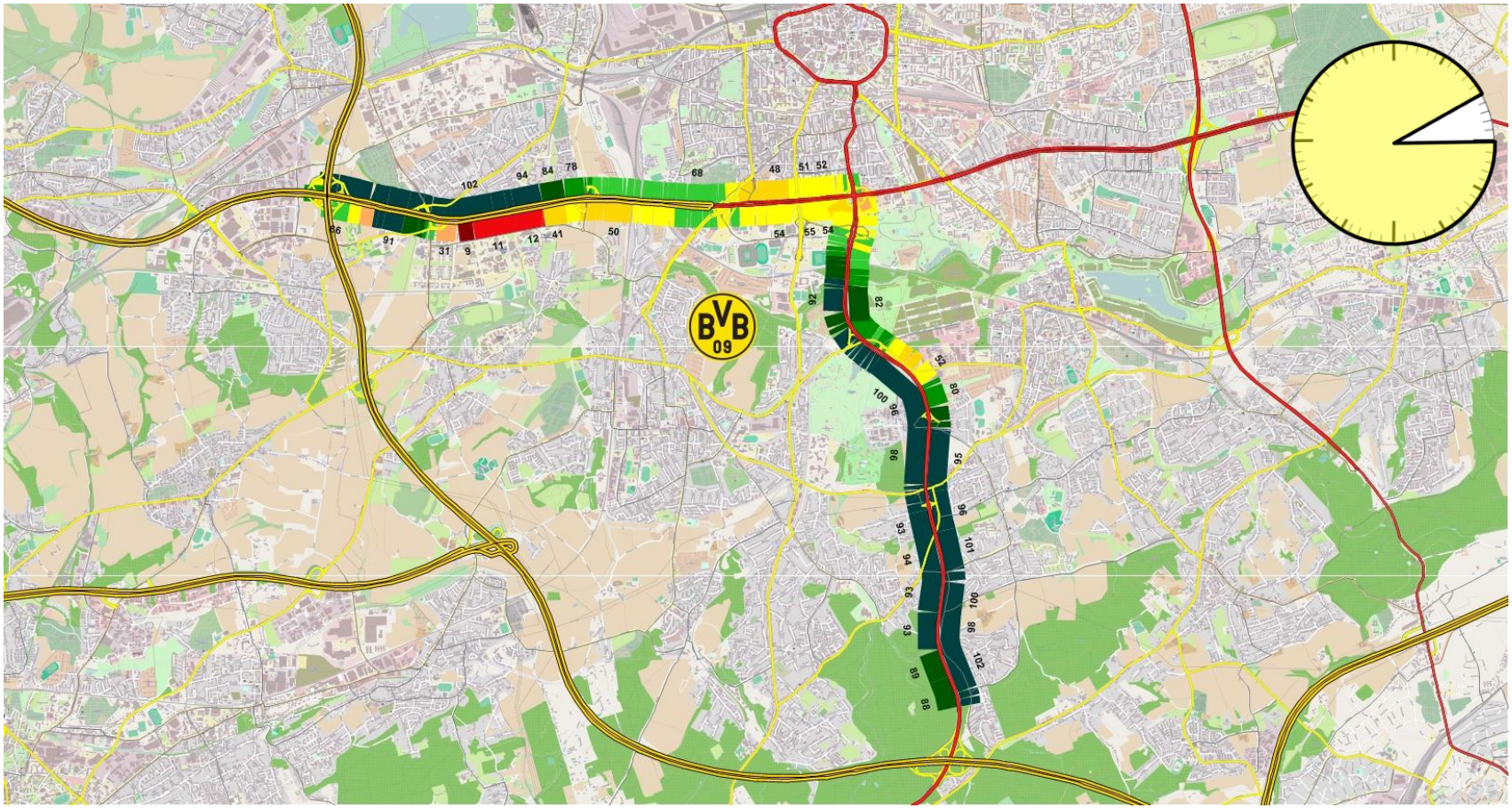
IMPACT ANALYSIS – MAJOR EVENTS
BORUSSIA DORTMUND HOME (SATURDAYS, 12 – 7 PM)



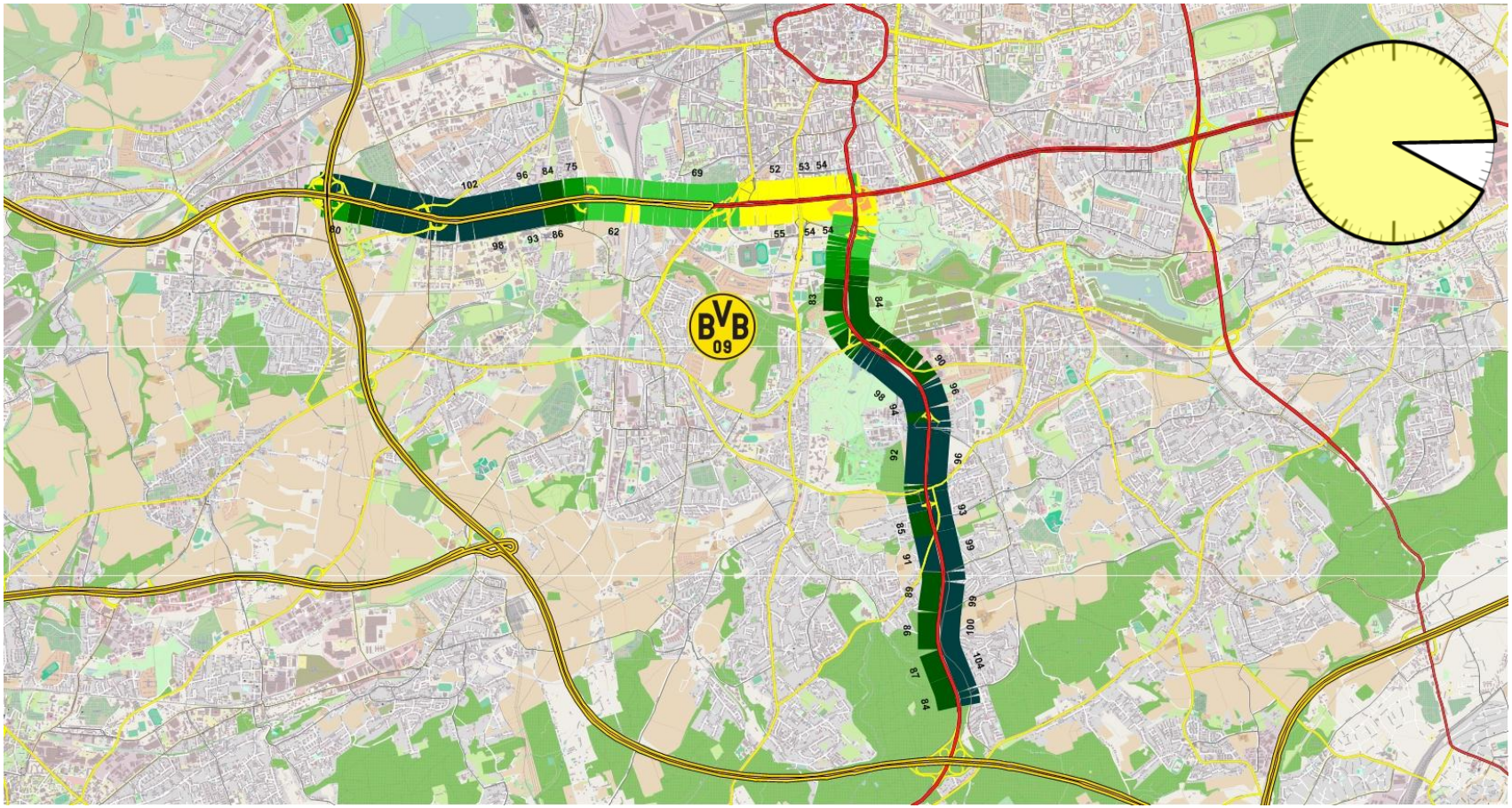
13:00 – 14:00 - BEFORE THE START OF THE MATCH



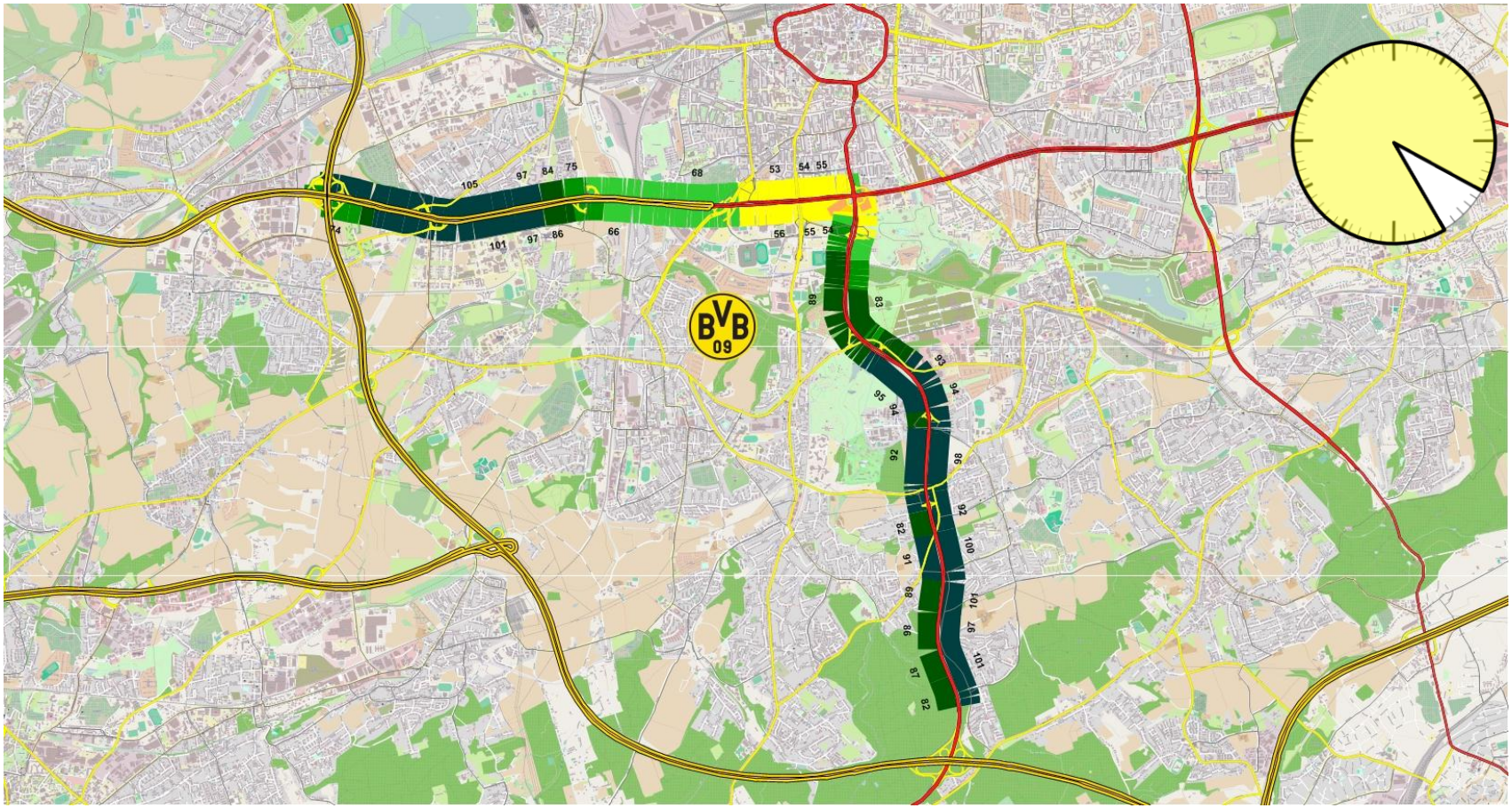
14:00 – 15:00 - BEFORE THE START OF THE MATCH



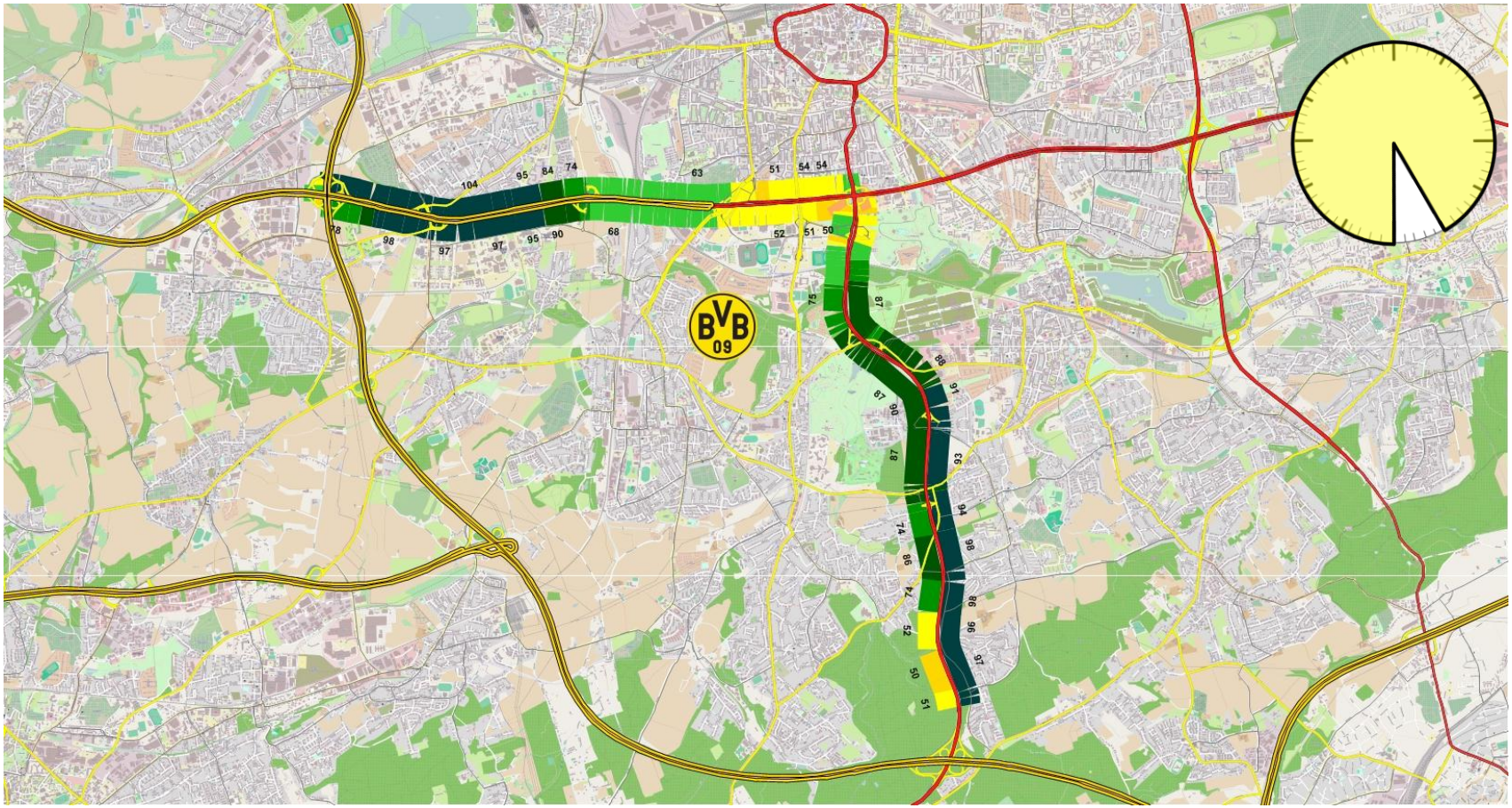
15:00 – 16:00 - DURING THE MATCH



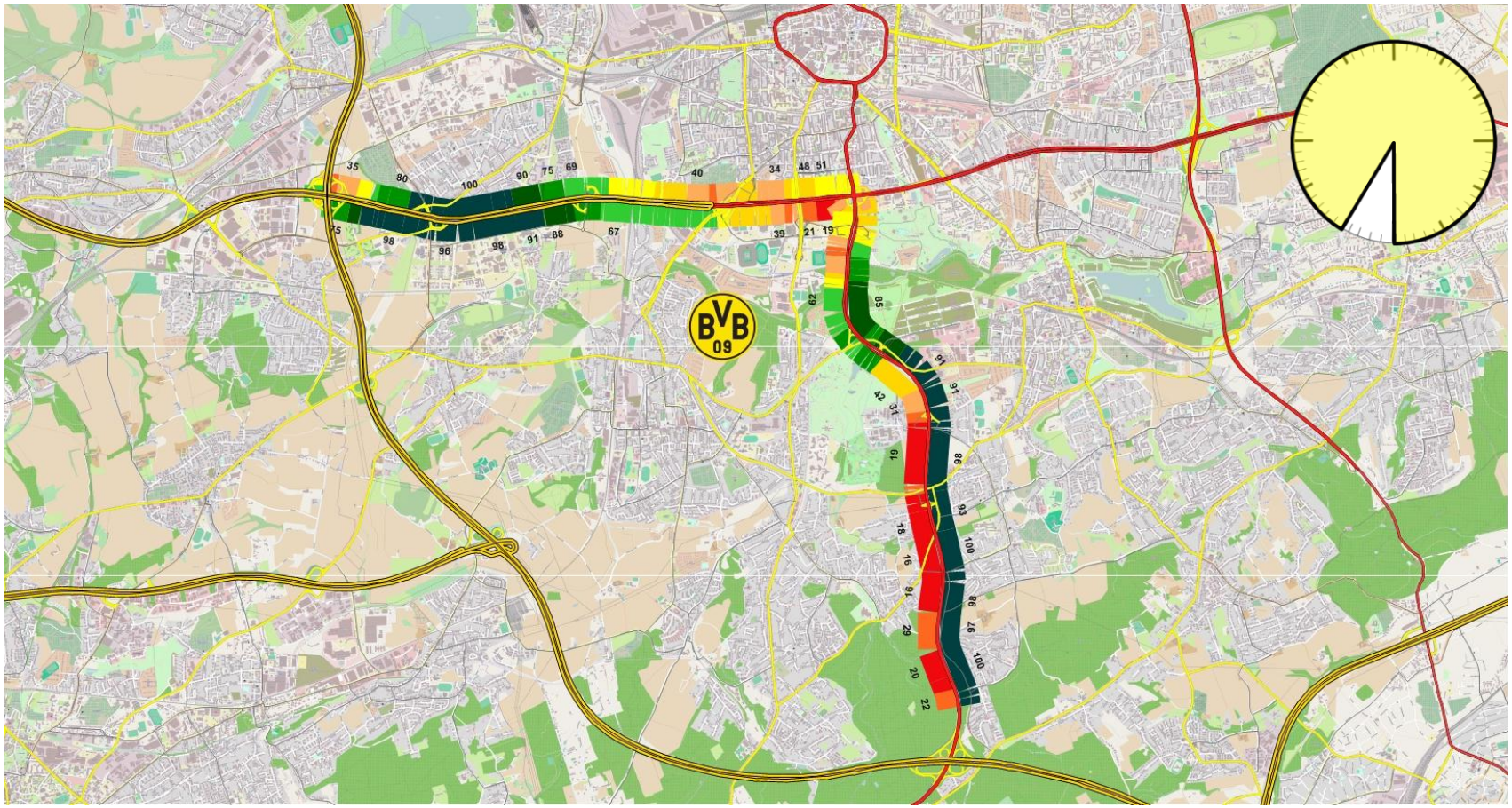
16:00 – 17:00 - DURING THE MATCH

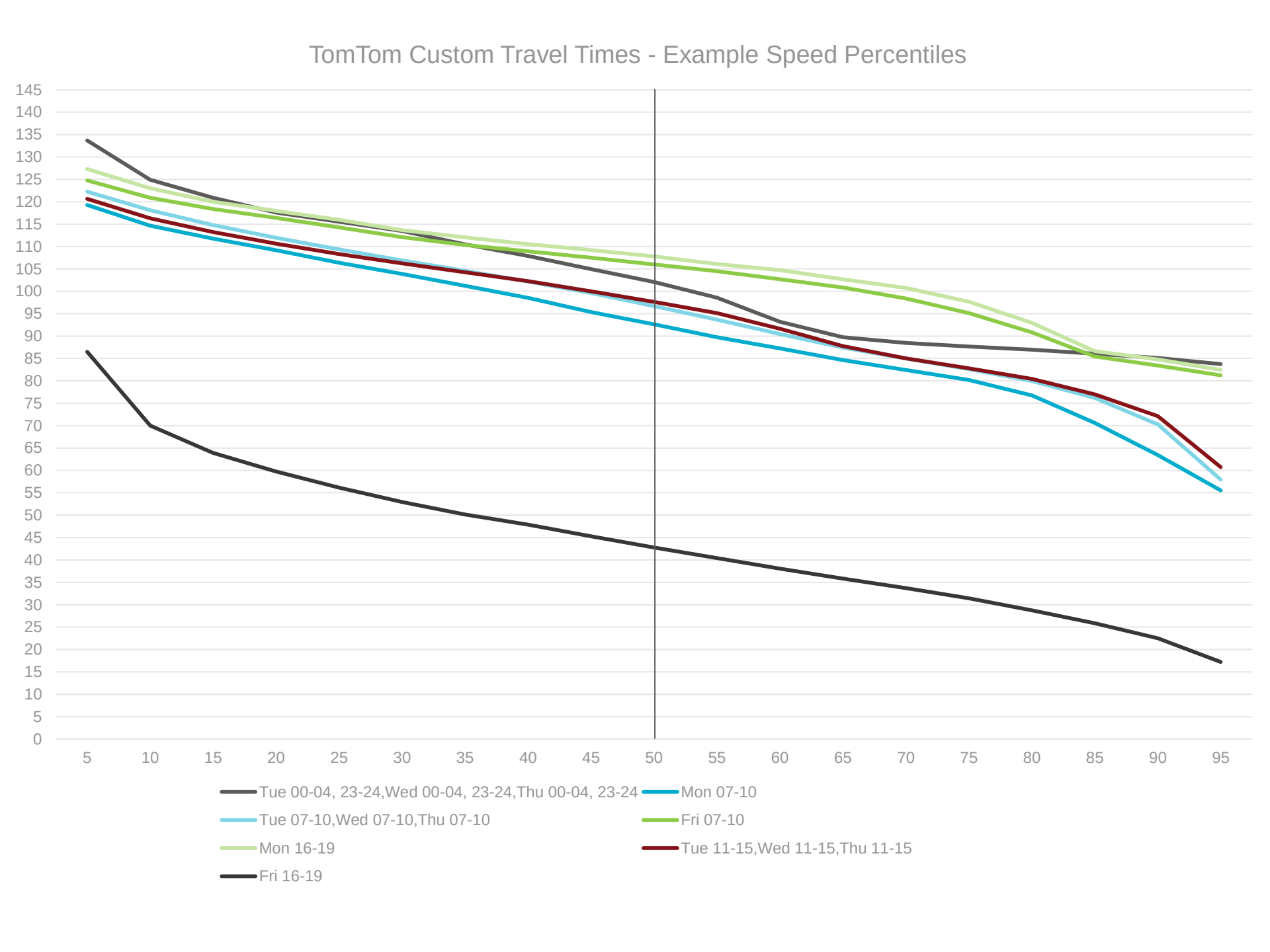


17:00 – 18:00 - DURING THE MATCH AND SHORTLY AFTER



18:00 – 19:00 – AFTER THE MATCH




TomTom Custom Travel Times - Example Speed Percentiles
145
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Tue 00-04, 23-24,Wed 00-04, 23-24,Thu 00-04, 23-24
Mon 07-10
Tue 07-10,Wed 07-10,Thu 07-10
Fri 07-10
Mon 16-19
Tue 11-15,Wed 11-15,Thu 11-15
Fri 16-19

5 MODEL AND/OR SIMULATE MITIGATION SCENARIOS

To estimate performance outcomes of different scenarios, modelling and simulating the options is essential:

- Quantify travel time losses, capacity reductions, amount of diverted traffic
- Visualize scenarios via network graphs or simulation videos for decision makers

6 IMPLEMENT MITIGATION SCENARIO ON THE ROAD

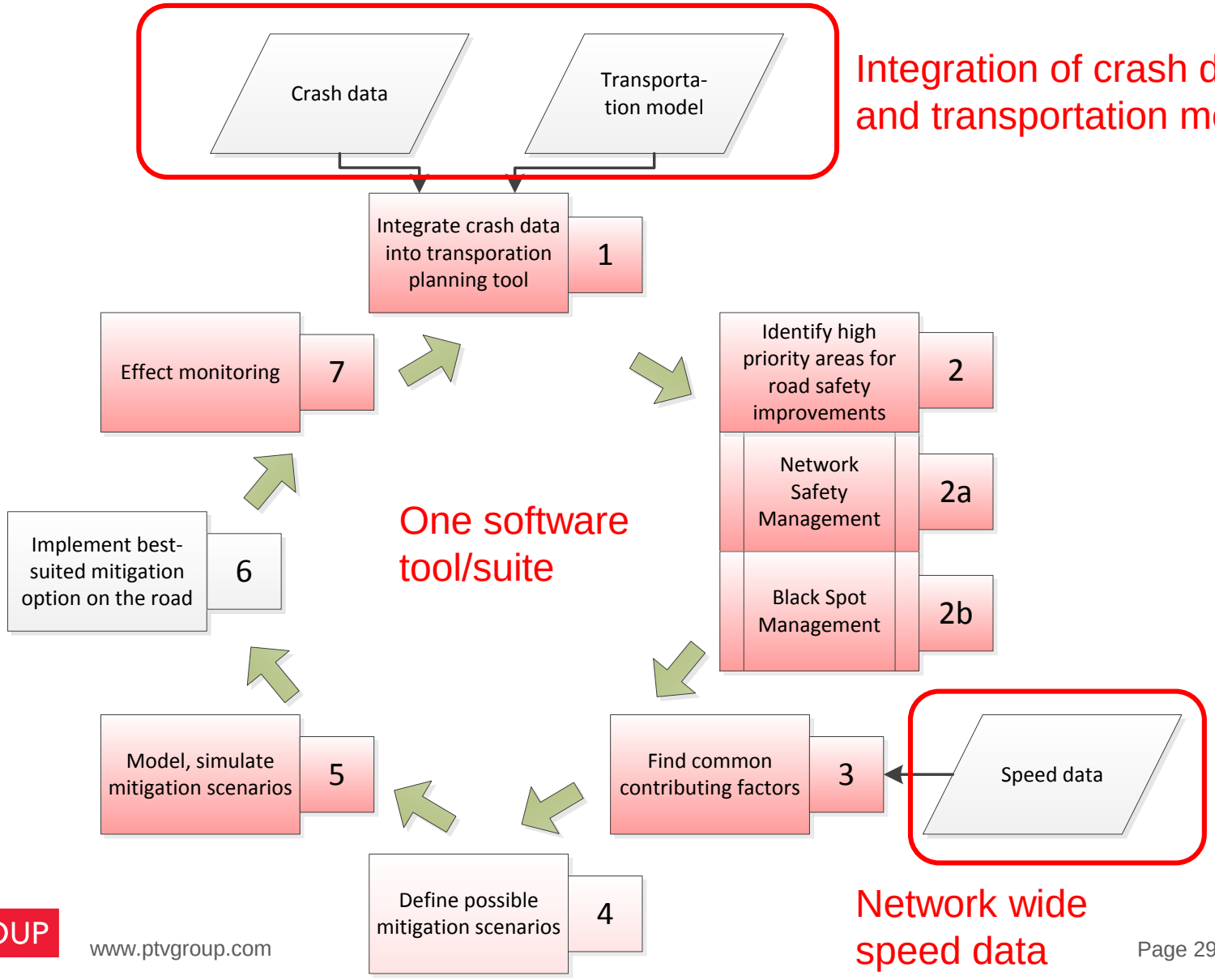
After decision on which mitigation scenario to implement, it needs to be „put on the road“…

7 EVALUATE AND MONITOR EFFECTS

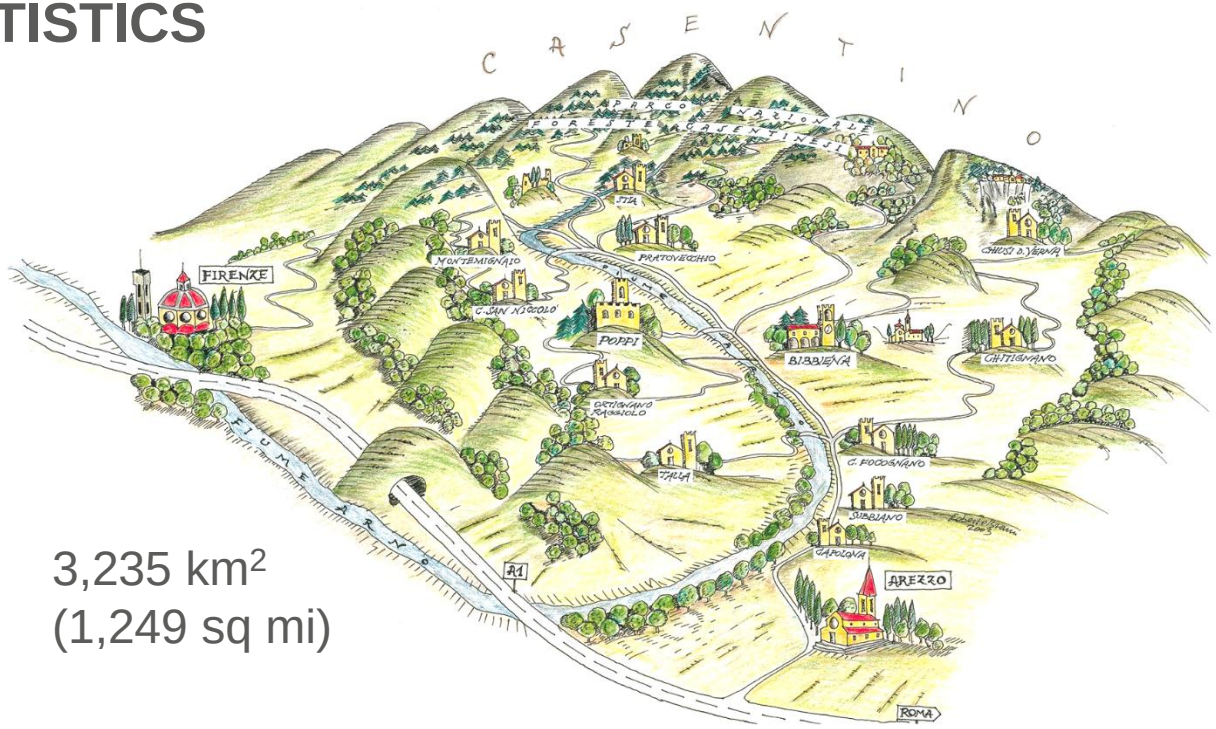
The monitoring of locations where measures have been implemented is of vital importance:

- Mid- to long-term evaluation is the only way to ensure the measures taken are effective
- Notice re-emergance of old black spots
- Time lines to consider return to mean (RTM) effect

NEWLY INTRODUCED ROAD SAFETY MANAGEMENT PROCESS



AREZZO – STATISTICS



Area

Total	3,235 km² (1,249 sq mi)

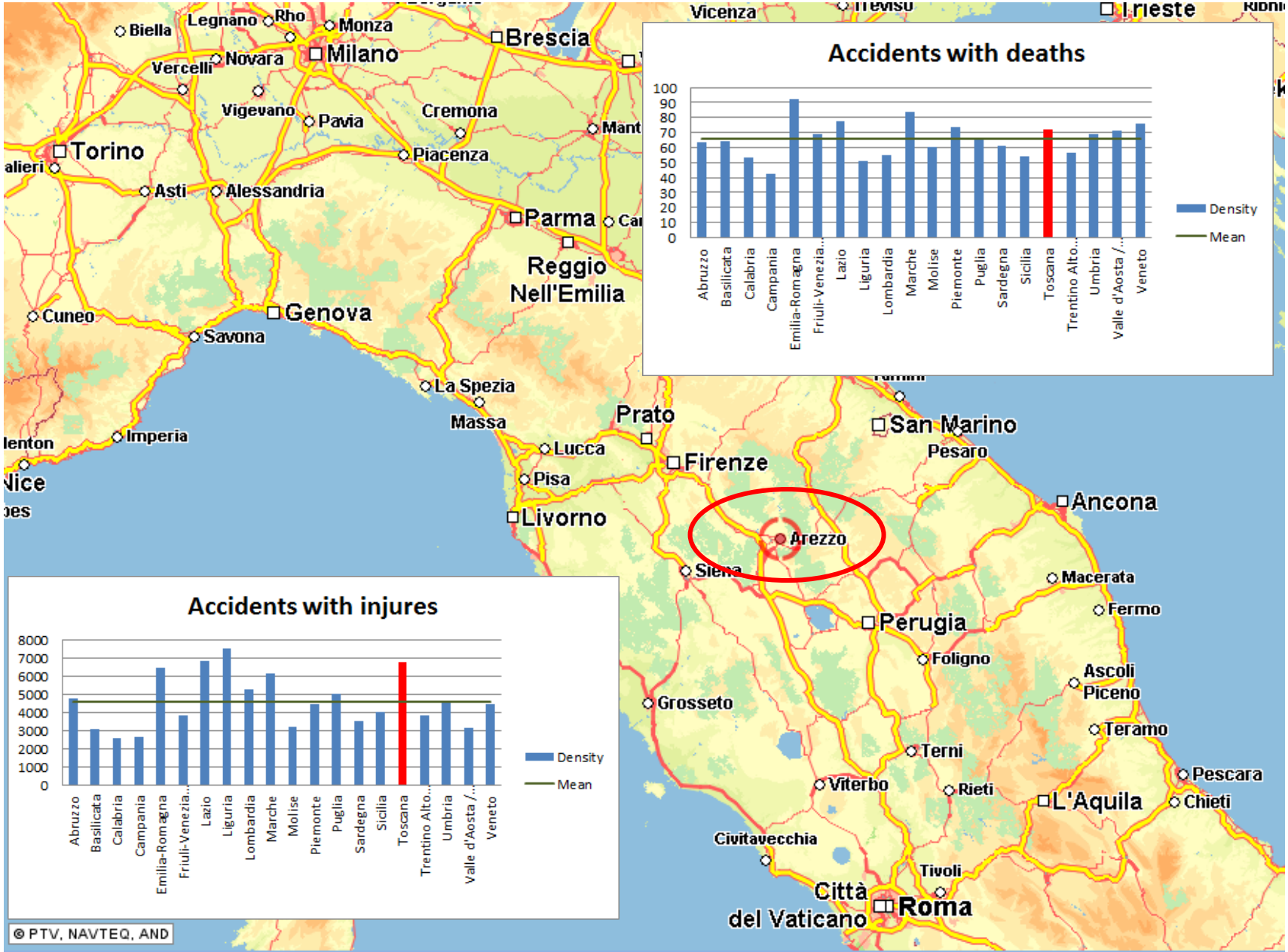
Population

Total	346.324
Density	107/km² ⇦ EU average: 116/km²

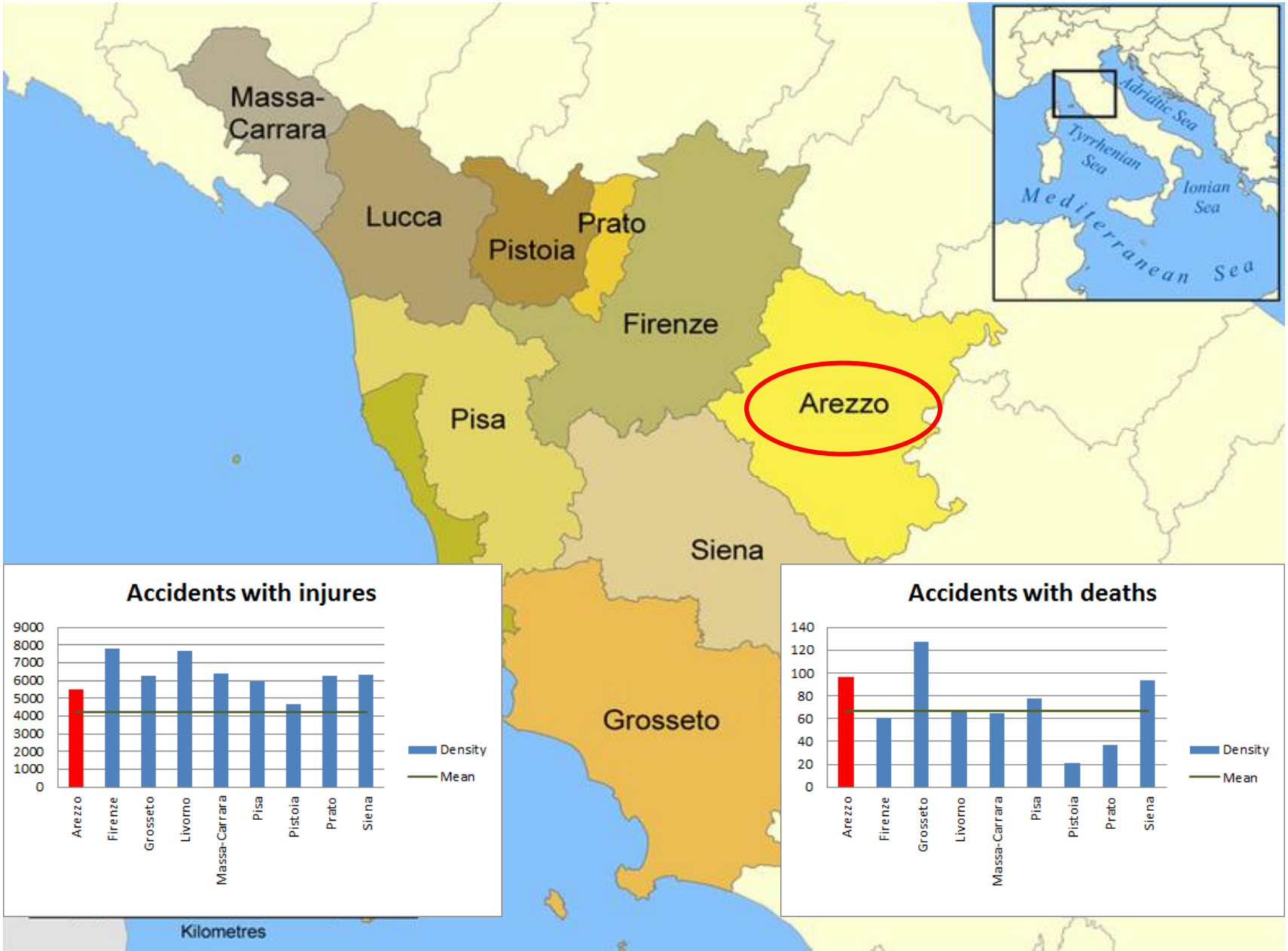
Road network

Total length	~10,000 km

AREZZO – THE STUDY REGION



AREZZO – THE PROVINCE



SITUATION IN AREZZO

Available transportation data:

- Transportation model (PTV Visum)

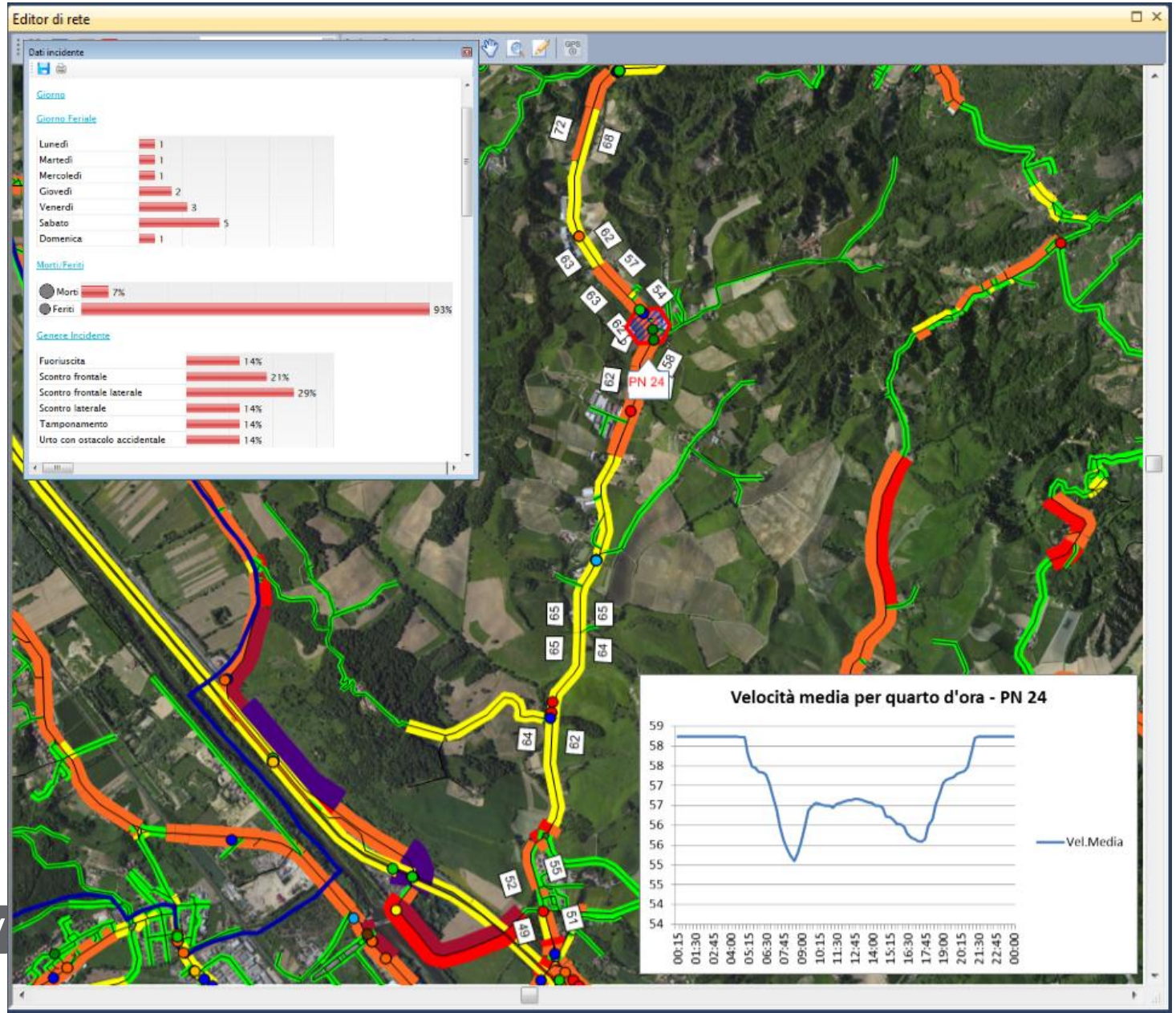
Available crash data:

- SIRSS – Sistema Integrato Regionale per la Sicurezza Stradale (Regional Integrated System for Road Safety

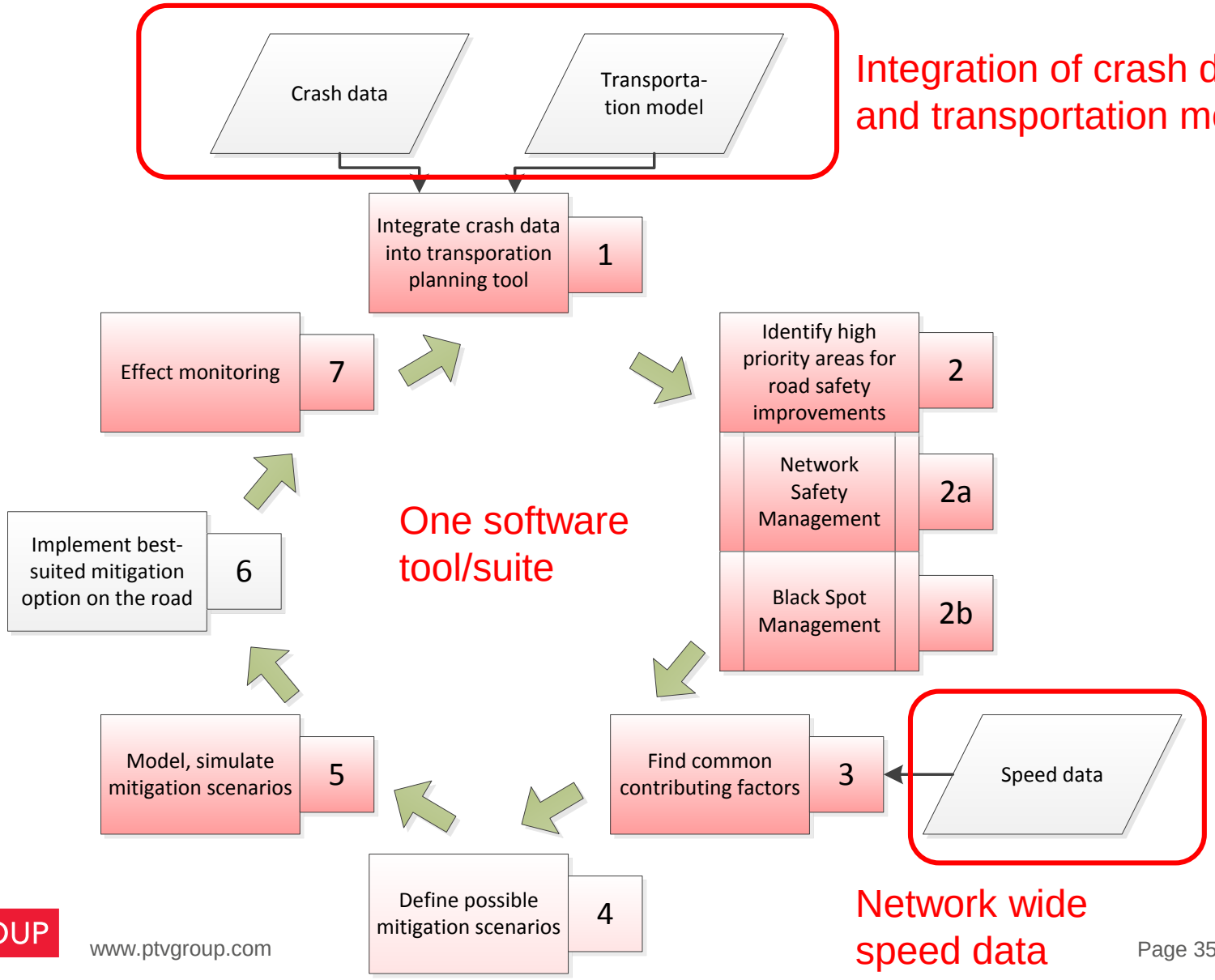
Newly introduced software:

- PTV Visum Safety module
- PTV Vissim (for test case)

USE OF SPEED DATA FOR CRASH ANALYSIS



NEWLY INTRODUCED ROAD SAFETY MANAGEMENT PROCESS



FINDINGS IN AREZZO

Only preliminary findings as of yet:

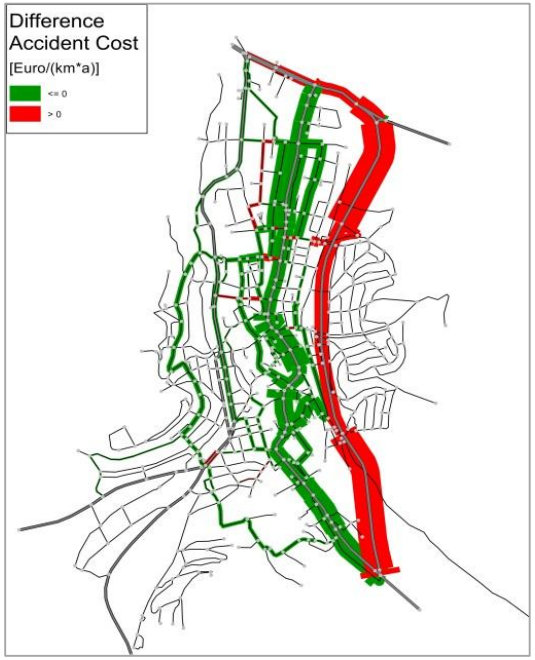
- Low configuration effort of software
- New process workflow is feasible for the respective department(s)
- More efficient than previously used procedures
- Combination of data gives new insights
- Reduction of time from emergence of black spots to mitigation seems possible

NEXT STEPS

The following next steps have been defined:

- Further investigate speed data usage for road safety work
- Evaluate how the additional safety information affects other planning and traffic management tasks
- Evaluate possible Risk Impact Assessment (RIA) use cases with Accident Prediction Models

ROAD SAFETY IMPACT ASSESSMENT (RIA)



Estimation of the effects that changes in the amount and the distribution of traffic volumes have on the road network.

Example of new bypass and the impact on safety:

increase

decrease

} of accident costs

THANK YOU FOR YOUR ATTENTION

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