



INTELLIGENT TRANSPORT SYSTEM
ASSOCIATION OF MALAYSIA

Decision Support in Real-Time Traffic Management

Presented by Cherry Ovasith
Business Development Manager,
PTV Asia-Pacific

22 February 2017



Decision Support in Real-Time Traffic Management

AGENDA

1. Traffic Management Elements
2. Why a modelling approach
3. Introducing OPTIMA - a Model-based Solution
4. OPTIMA Implementation and capabilities
5. Use case
6. Summary



ITS SEMINAR AND EXHIBITION 2017

**DRIVING ITS
TO A NEW NORMAL**

**ITS
MALAYSIA**
INTELLIGENT TRANSPORT SYSTEM
ASSOCIATION OF MALAYSIA

PTV GROUP

the mind of movement

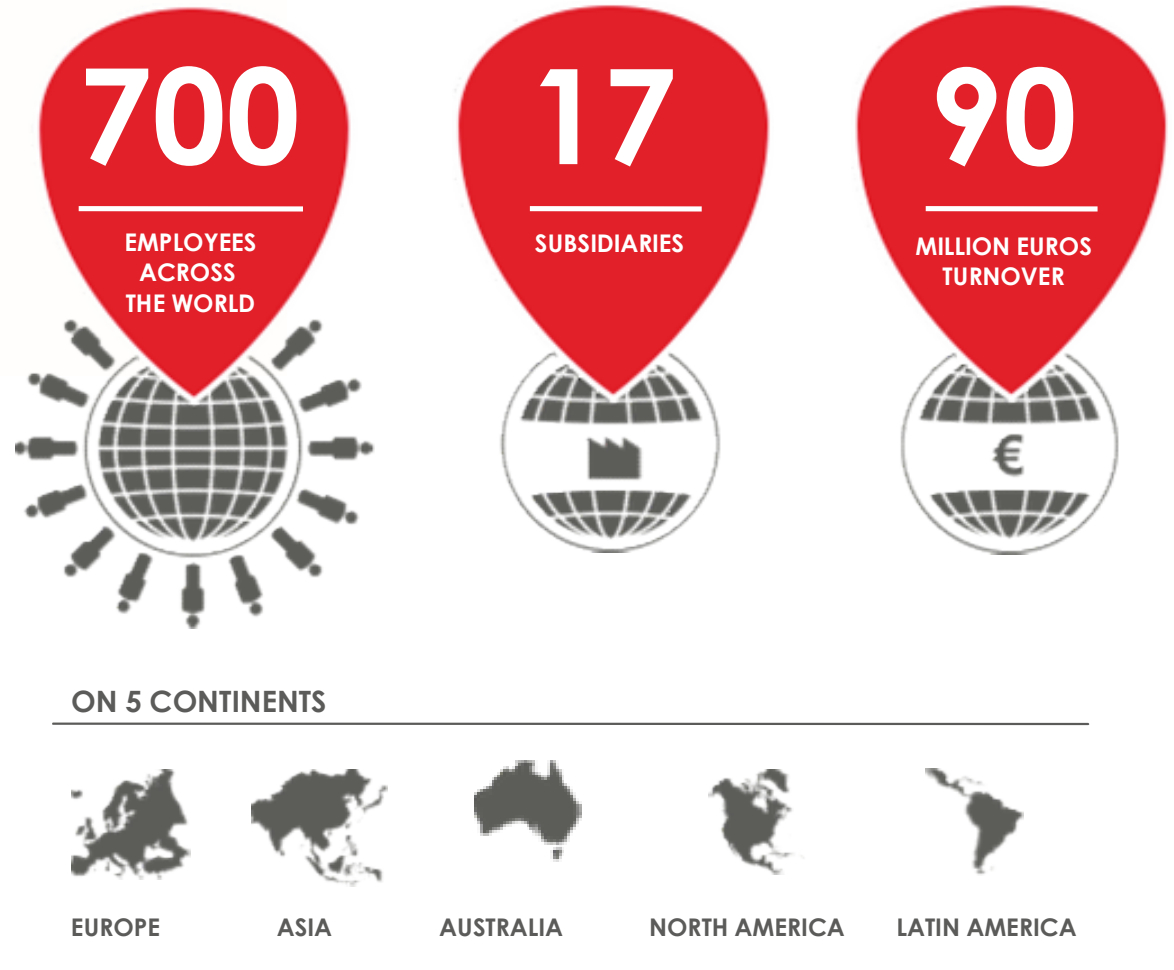
Who are PTV?



And we achieve this with:

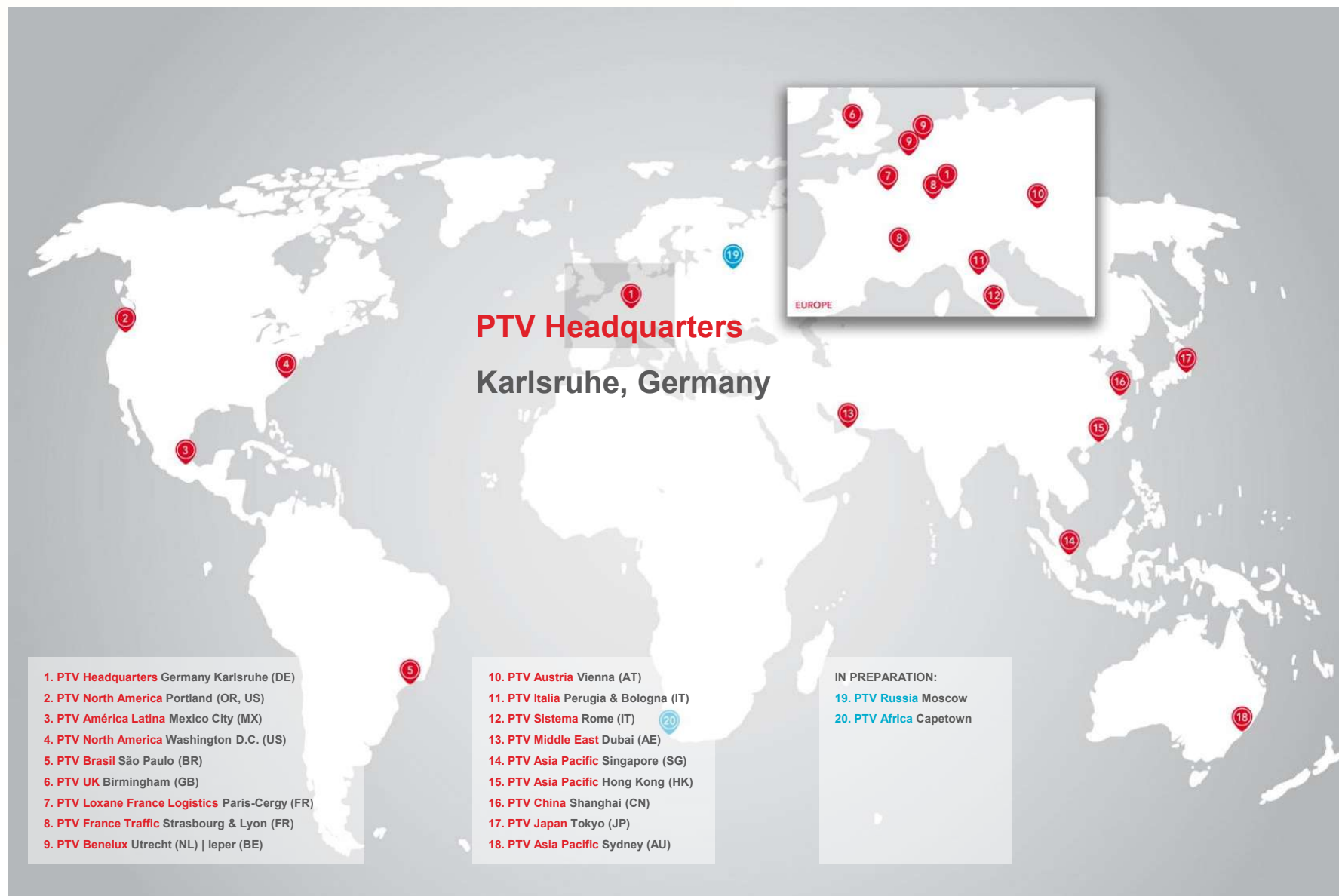


PTV Headquarters, Karlsruhe
Founded in 1979





Our locations





Our Users





Decision Support in Real-Time Traffic Management

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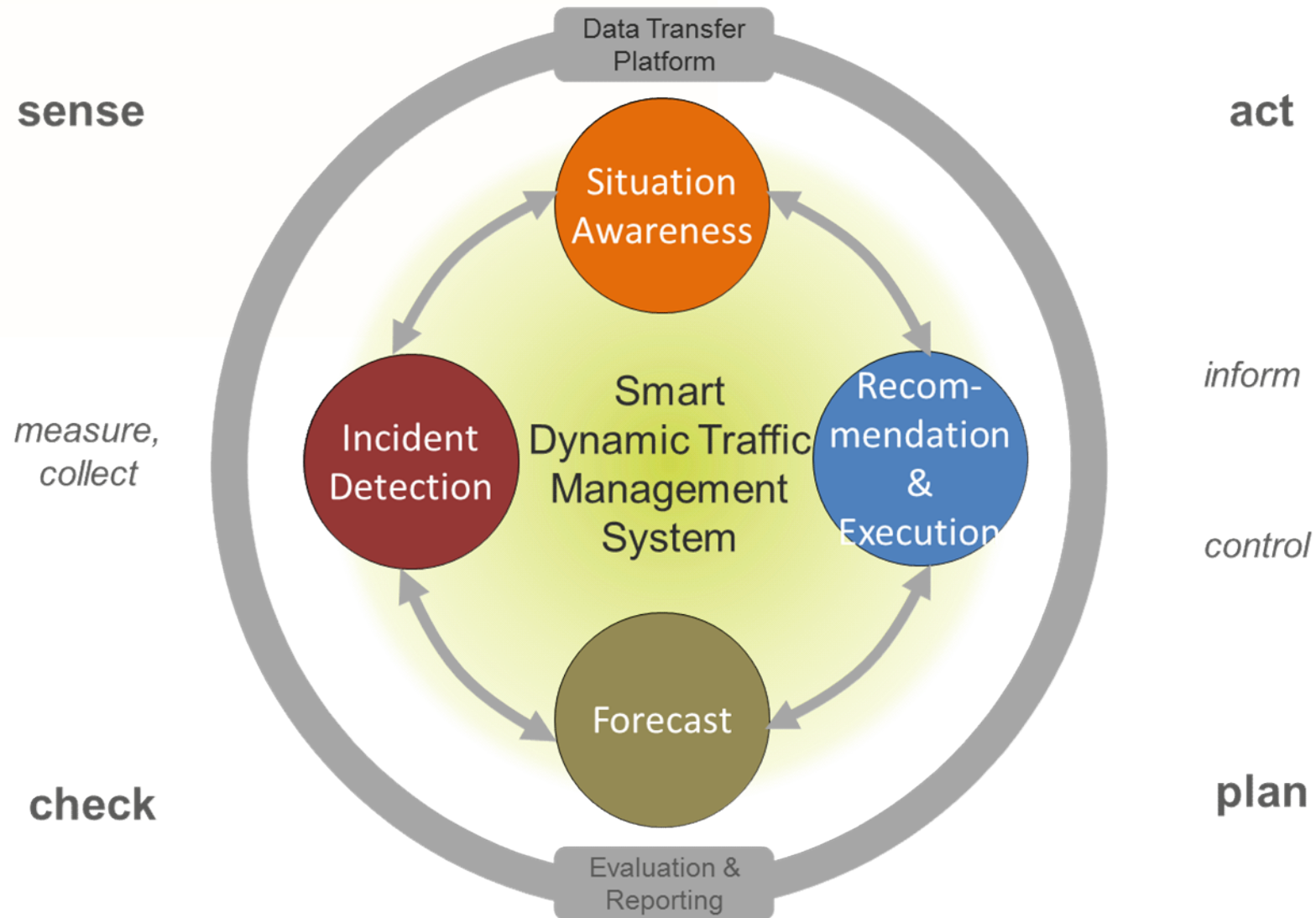
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1. TRAFFIC MANAGEMENT ELEMENTS





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AGENDA

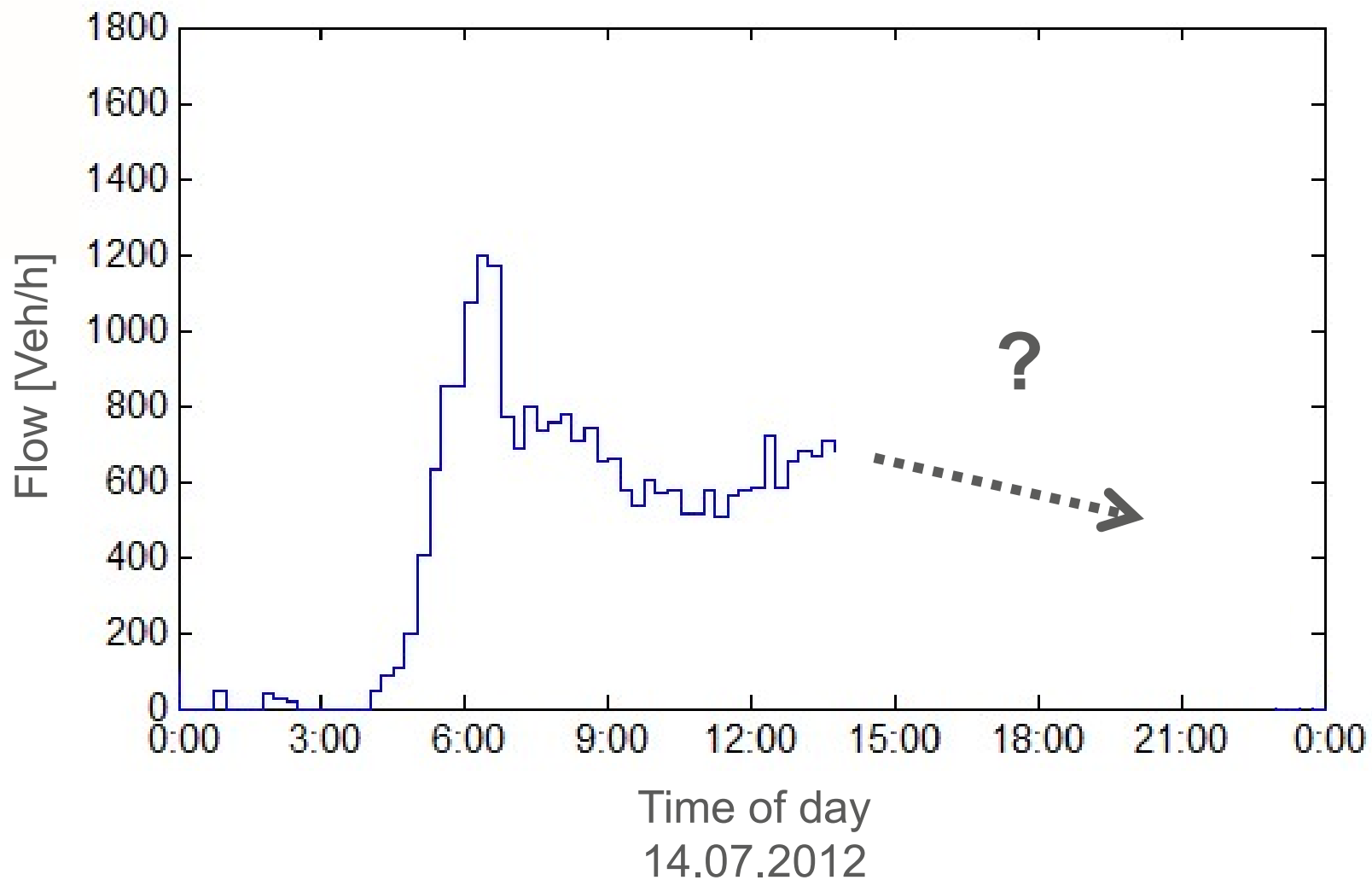
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2. WHY A MODELLING APPROACH

The Statistical approach

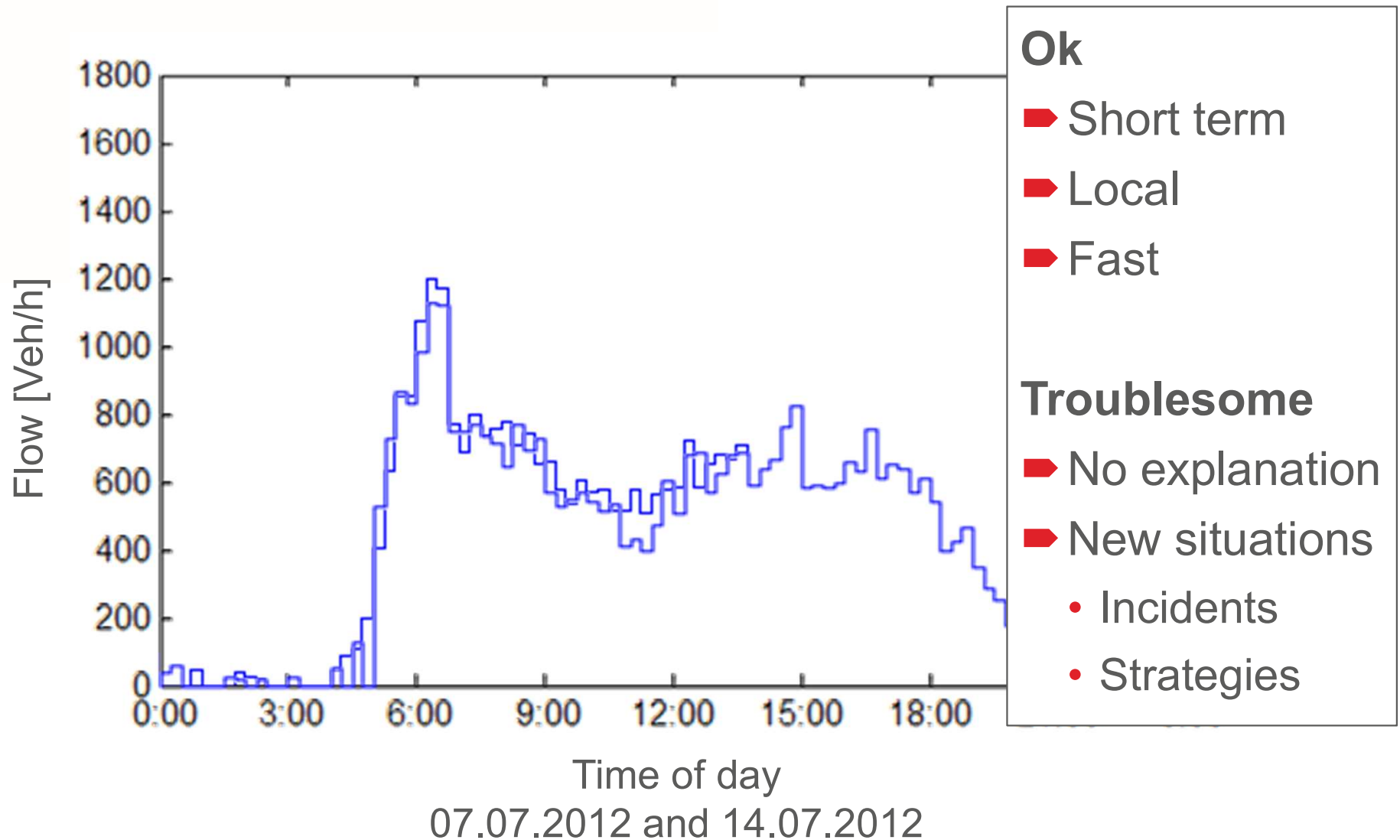




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2. WHY A MODELLING APPROACH

The Statistical approach



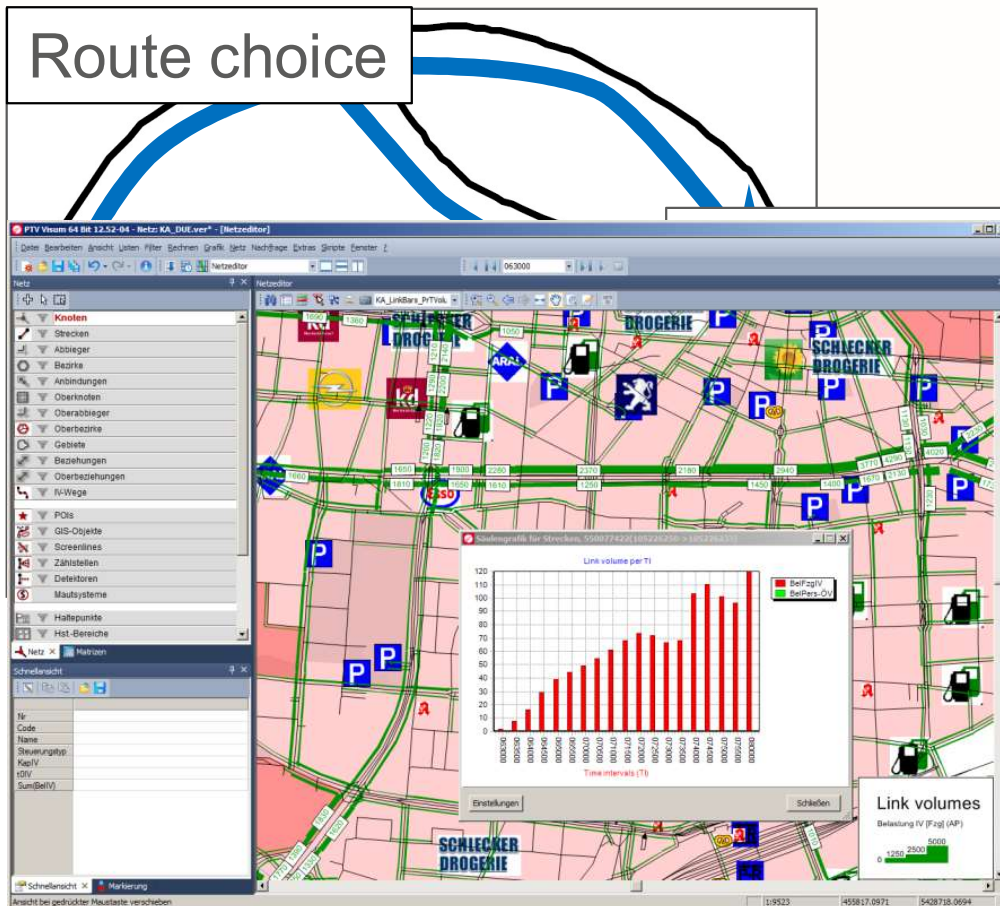


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2. WHY A MODELLING APPROACH

The Model-Based approach - based on physical interpretation

Route choice



Ok

- Short term
- Comprehensive estimation
- Consistent forecast
 - Incidents
 - Actions

“Troublesome”

- Slower



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2. WHY A MODELLING APPROACH

Statistical vs. **Model based** approach

Objective \ Method	Observed Data	Statistical Approach	Model based Approach
Traffic estimation “What is going on?”	Maybe, with extensive measures	Yes	Yes
Traffic forecast “What is going to happen?”	No	Only “usual” conditions	Yes
Scenario evaluation & decision support “What would happen if?” “How should we act?”	No	No	Yes



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AGENDA

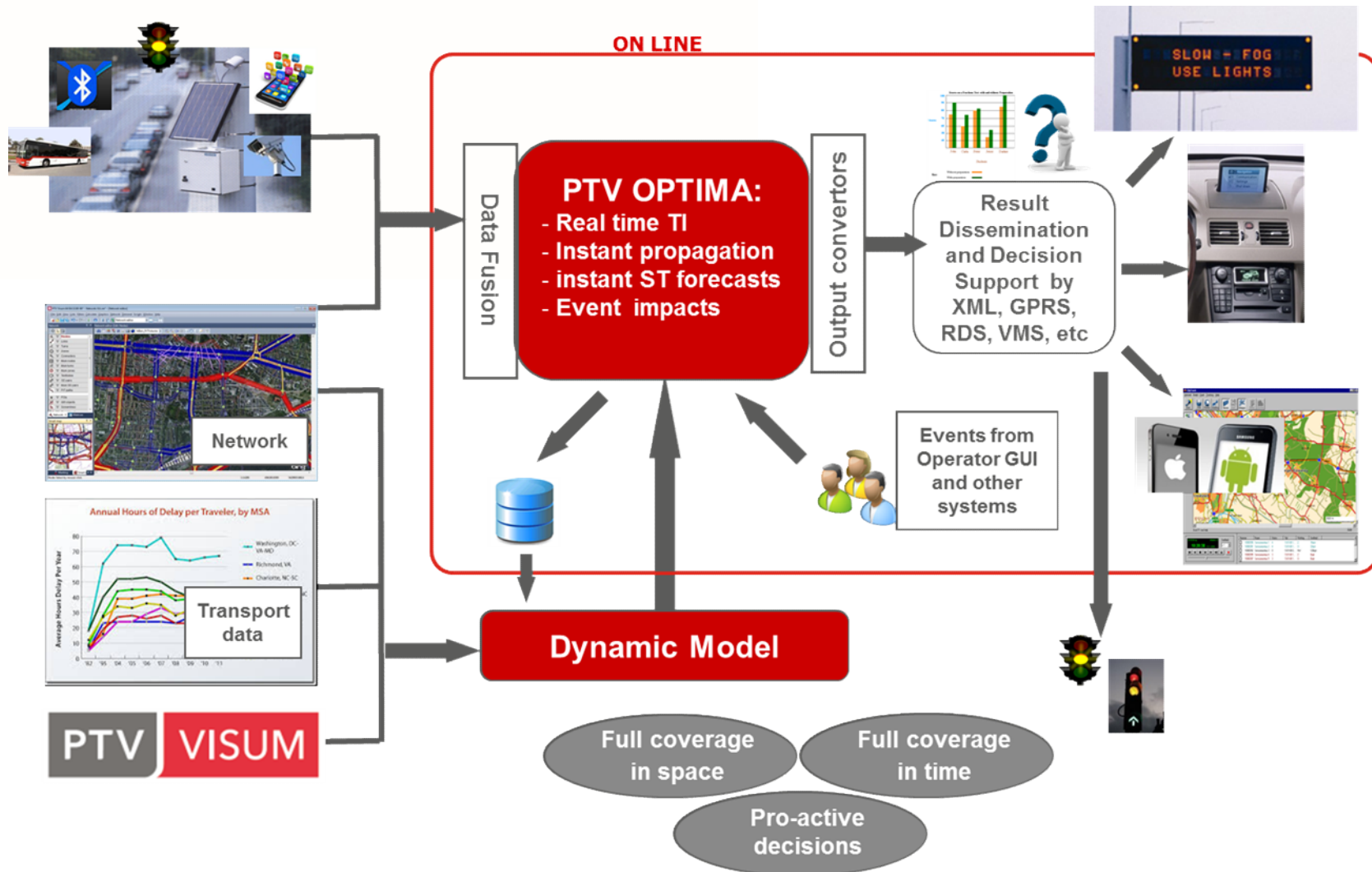
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3. INTRODUCING **OPTIMA** - A MODEL-BASED APPROACH

Logical Model

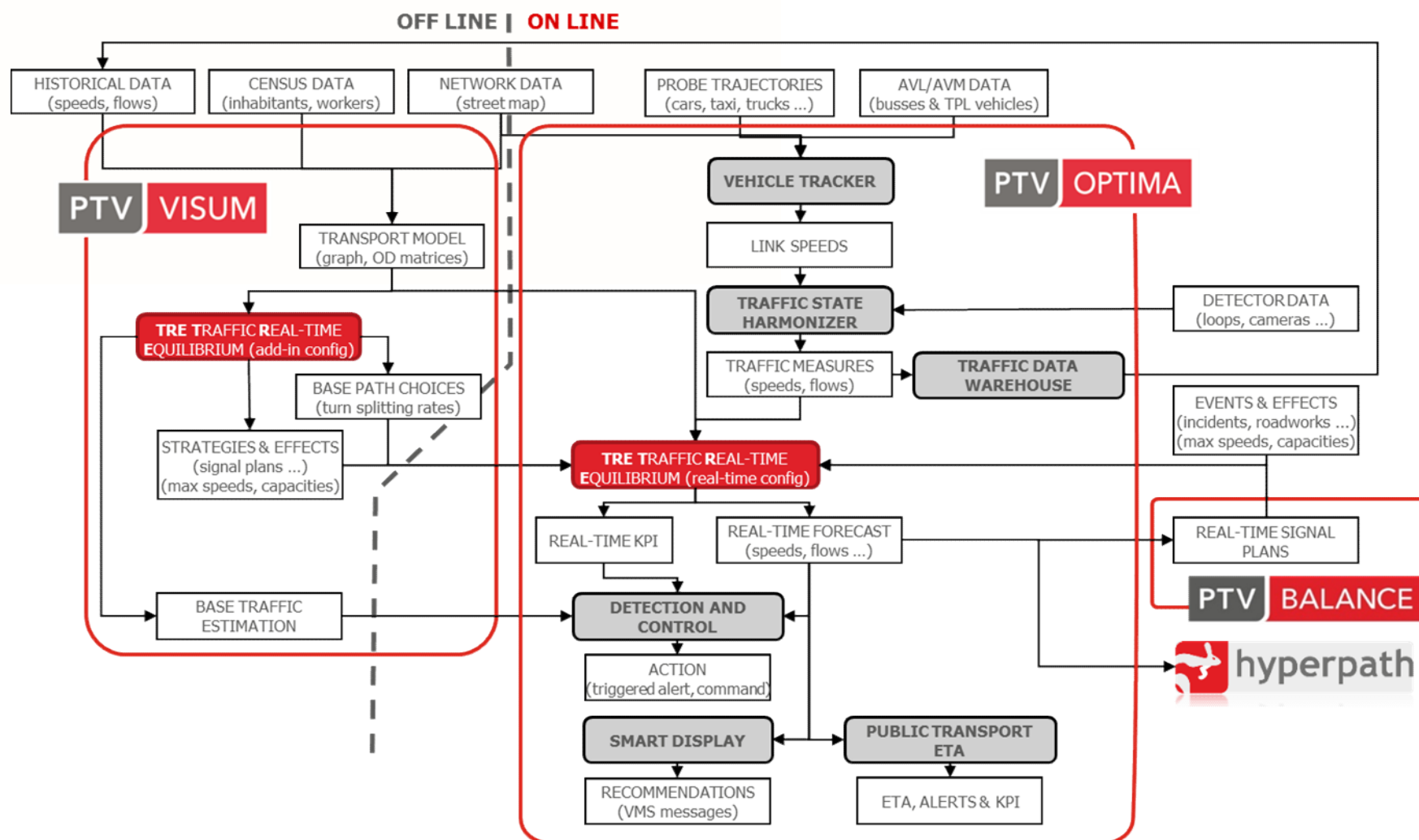




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3. INTRODUCING **OPTIMA** - A MODEL-BASED APPROACH

Functional Model

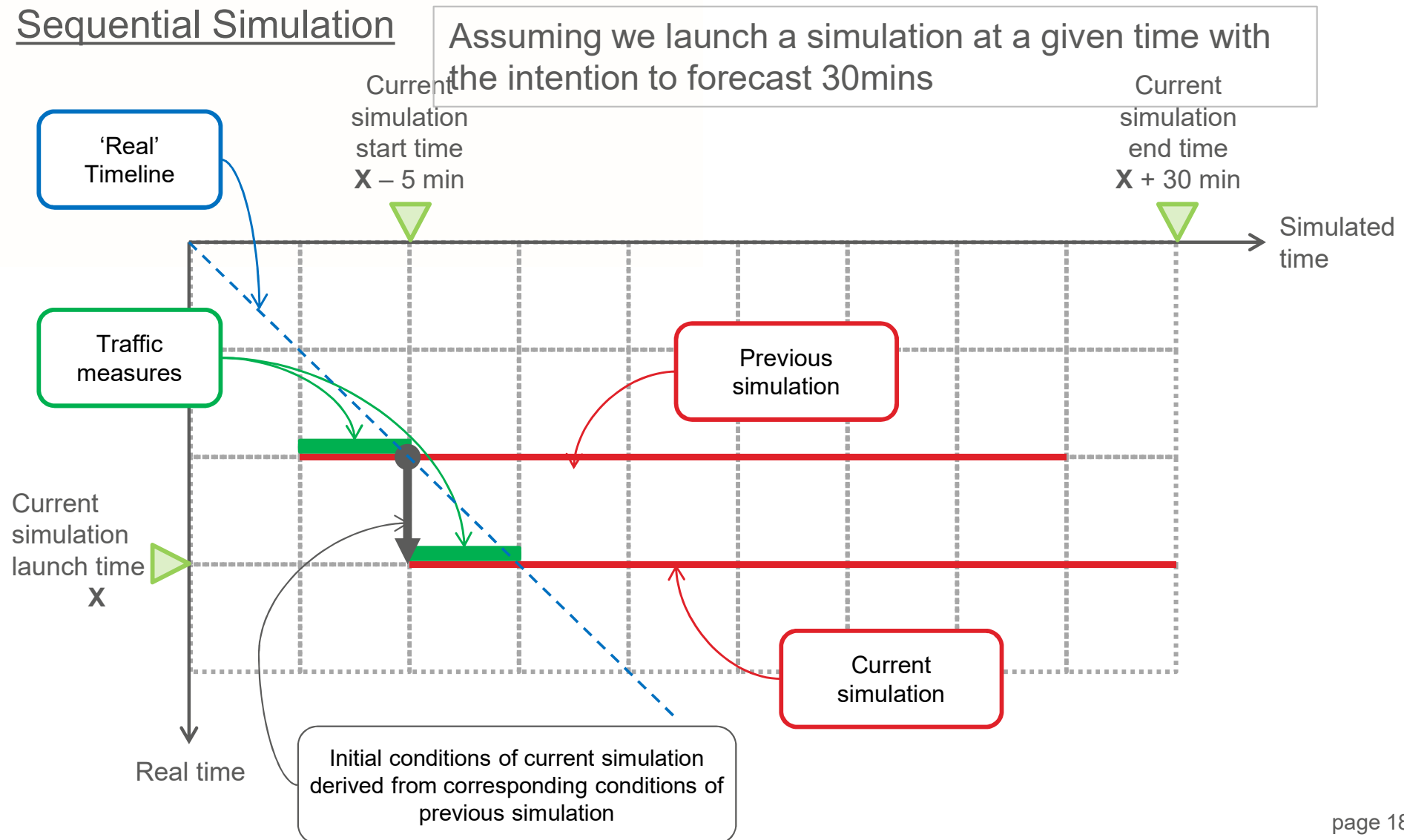




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3. INTRODUCING **OPTIMA** - A MODEL-BASED APPROACH

Sequential Simulation





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4. **OPTIMA** IMPLEMENTATION AND CAPABILITIES

Key Functions

Starting with a network...
...traffic data from loops
...and FCD (GPS)

Traffic data
FUSION

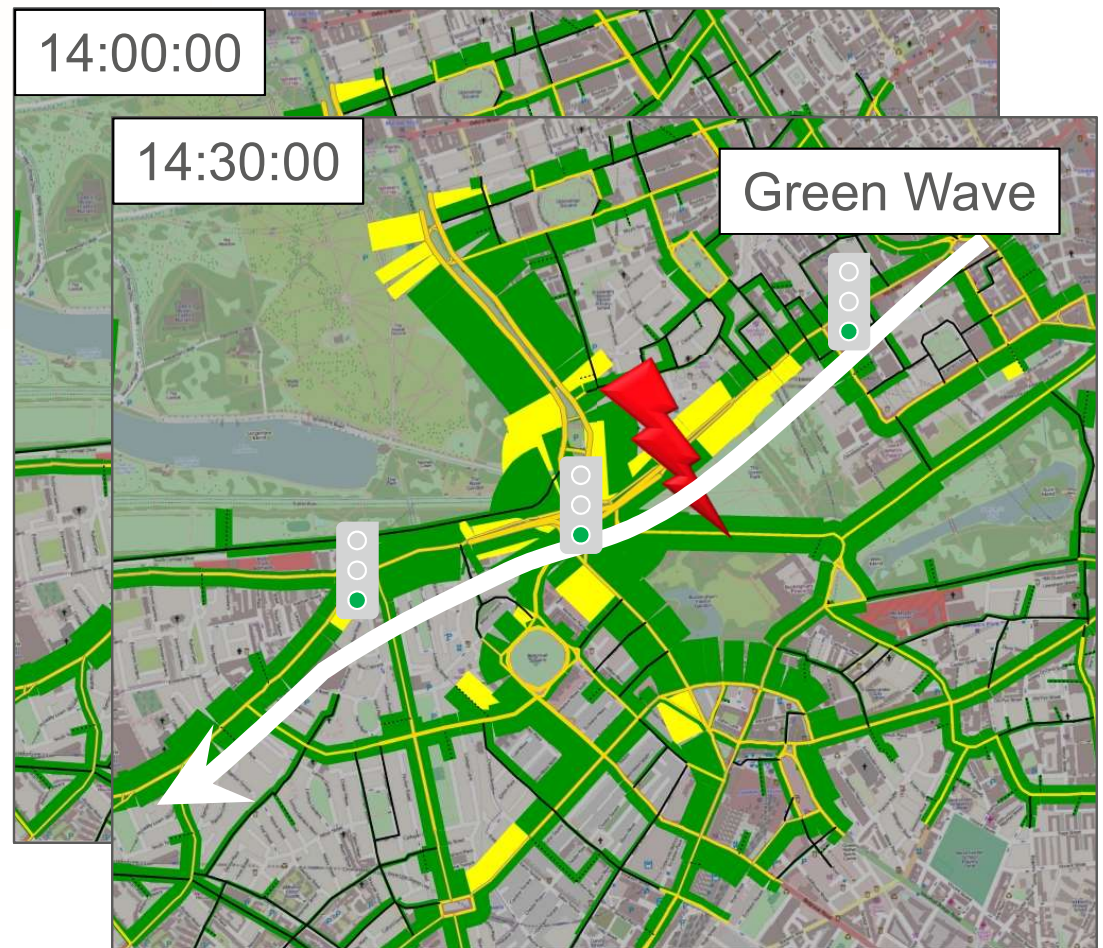
Traffic state
ESTIMATION

Traffic state
FORECAST

usual conditions

incidents, without actions

incidents, with actions
(Scenario evaluation and Decision support)



Background image from OpenStreepMap



OPTIMA: **KEY FUNCTIONS**

Decision Support System





OPTIMA: **KEY FUNCTIONS**

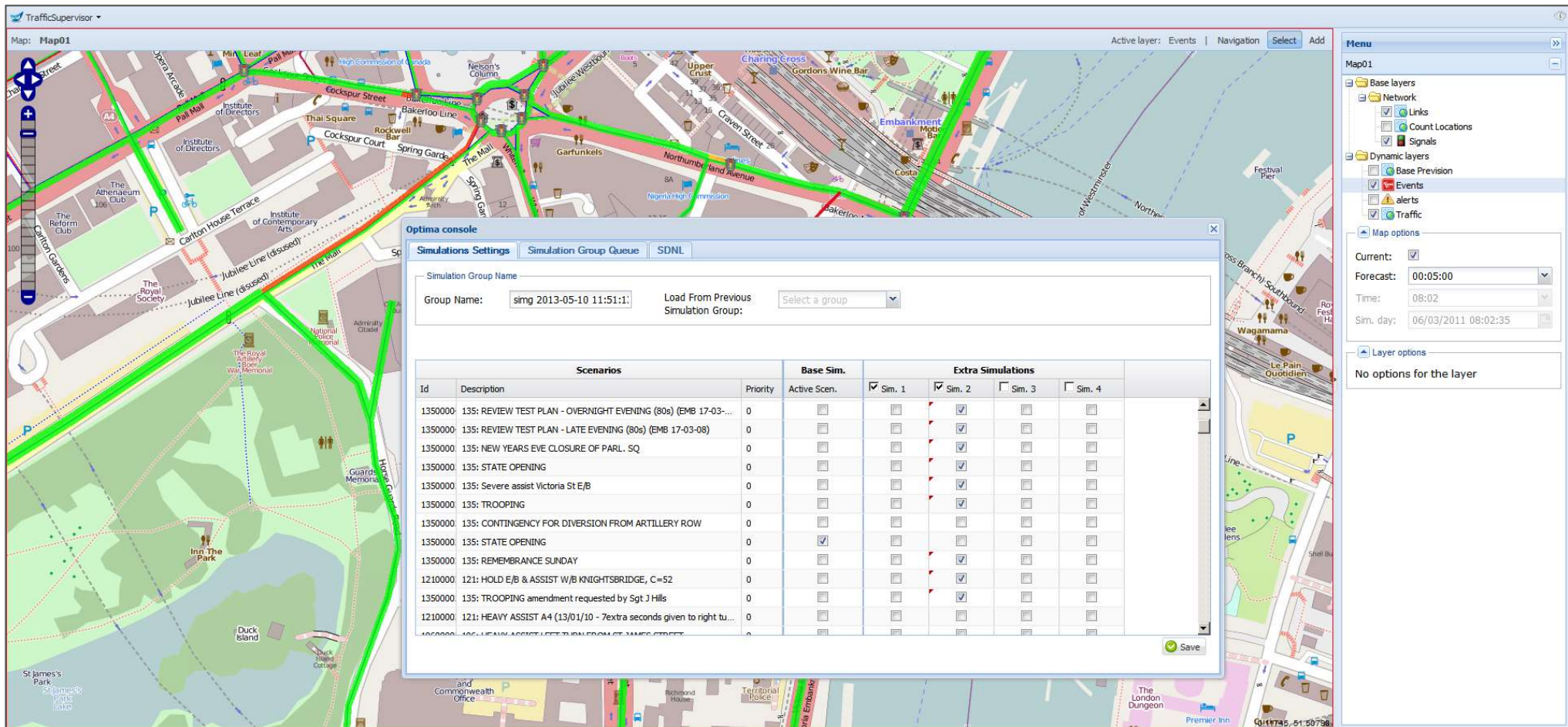
Decision Support System



OPTIMA: KEY FUNCTIONS

Decision Support System

- Build scenarios
- Run multiple simulations in real time (alternative + base "do nothing" situations)



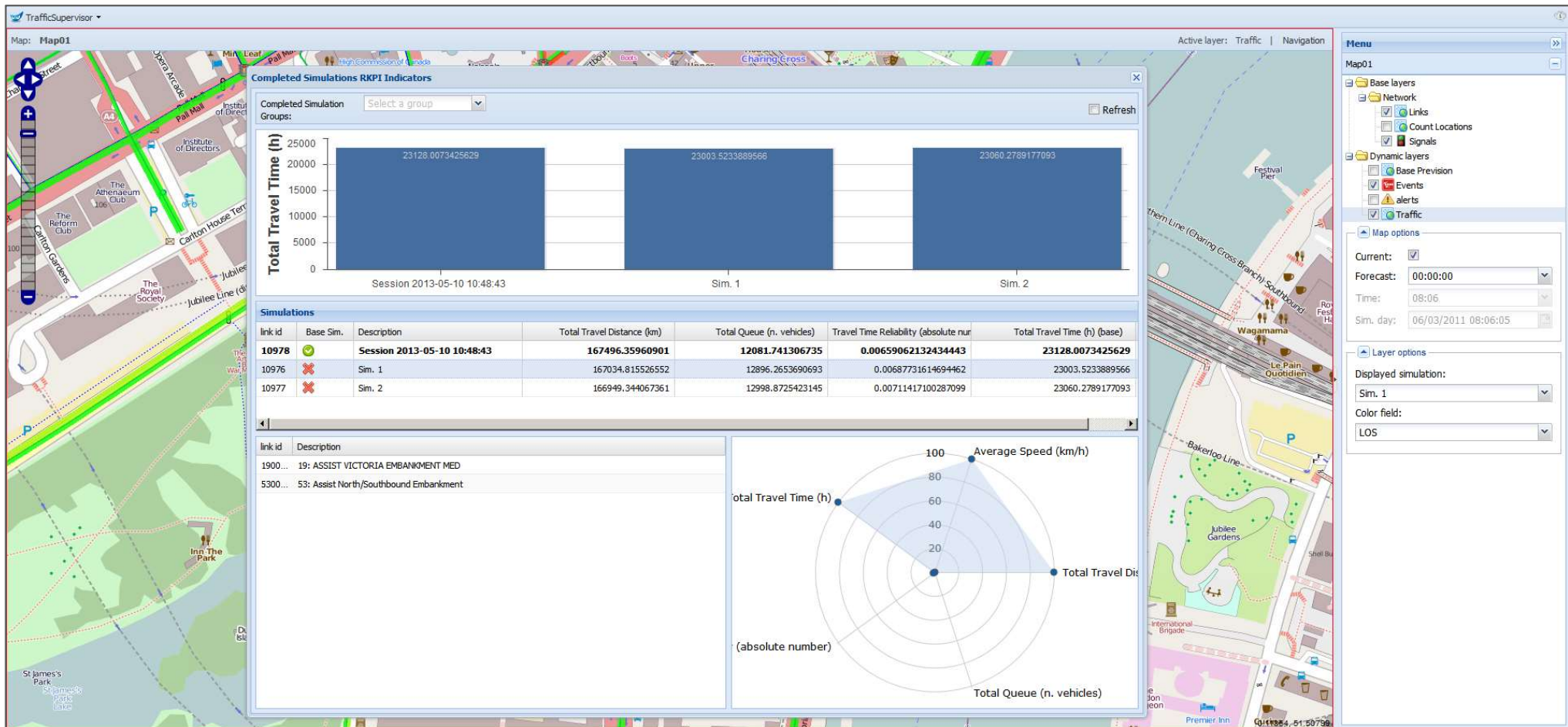
The screenshot displays the Optima console interface. The background is a map of London, showing streets like Cockspur Street, Pall Mall, and the Jubilee Line. Overlaid on the map is the 'Optima console' window, which contains a 'Simulations Settings' tab. This tab shows a list of simulation scenarios with columns for 'Id', 'Description', 'Priority', 'Base Sim.', and 'Extra Simulations' (Sim. 1, Sim. 2, Sim. 3, Sim. 4). The 'Base Sim.' column has a checkbox for 'Active Scen.'. The 'Extra Simulations' columns have checkboxes for each simulation. The 'Id' column contains values like 1350000, 1210000, and 1350000. The 'Description' column contains various event descriptions such as '135: REVIEW TEST PLAN - OVERNIGHT EVENING (80s) (EMB 17-03-...)', '135: REVIEW TEST PLAN - LATE EVENING (80s) (EMB 17-03-08)', '135: NEW YEARS EVE CLOSURE OF PARL. SQ.', '135: STATE OPENING', '135: Severe assist Victoria St E/B', '135: TROOPING', '135: CONTINGENCY FOR DIVERSION FROM ARTILLERY ROW', '135: STATE OPENING', '135: REMEMBRANCE SUNDAY', '121: HOLD E/B & ASSIST W/B KNIGHTSBRIDGE, C=52', '135: TROOPING amendment requested by Sgt J Hills', and '121: HEAVY ASSIST A4 (13/01/10 - 7extra seconds given to right tu...'. The 'Priority' column contains values like 0, 1, and 2. The 'Base Sim.' column contains values like 0, 1, and 2. The 'Extra Simulations' columns contain checkboxes for each simulation. The 'Id' column contains values like 1350000, 1210000, and 1350000. The 'Description' column contains various event descriptions such as '135: REVIEW TEST PLAN - OVERNIGHT EVENING (80s) (EMB 17-03-...)', '135: REVIEW TEST PLAN - LATE EVENING (80s) (EMB 17-03-08)', '135: NEW YEARS EVE CLOSURE OF PARL. SQ.', '135: STATE OPENING', '135: Severe assist Victoria St E/B', '135: TROOPING', '135: CONTINGENCY FOR DIVERSION FROM ARTILLERY ROW', '135: STATE OPENING', '135: REMEMBRANCE SUNDAY', '121: HOLD E/B & ASSIST W/B KNIGHTSBRIDGE, C=52', '135: TROOPING amendment requested by Sgt J Hills', and '121: HEAVY ASSIST A4 (13/01/10 - 7extra seconds given to right tu...'. The 'Priority' column contains values like 0, 1, and 2. The 'Base Sim.' column contains values like 0, 1, and 2. The 'Extra Simulations' columns contain checkboxes for each simulation.

Id	Description	Priority	Base Sim. Active Scen.	Extra Simulations			
				Sim. 1	Sim. 2	Sim. 3	Sim. 4
1350000	135: REVIEW TEST PLAN - OVERNIGHT EVENING (80s) (EMB 17-03-...	0	☐	☐	☒	☐	☐
1350000	135: REVIEW TEST PLAN - LATE EVENING (80s) (EMB 17-03-08)	0	☐	☐	☒	☐	☐
1350000	135: NEW YEARS EVE CLOSURE OF PARL. SQ.	0	☐	☐	☒	☐	☐
1350000	135: STATE OPENING	0	☐	☐	☒	☐	☐
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1350000	135: STATE OPENING	0	☒	☐	☐	☐	☐
1350000	135: REMEMBRANCE SUNDAY	0	☐	☐	☒	☐	☐
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OPTIMA: KEY FUNCTIONS

Decision Support System

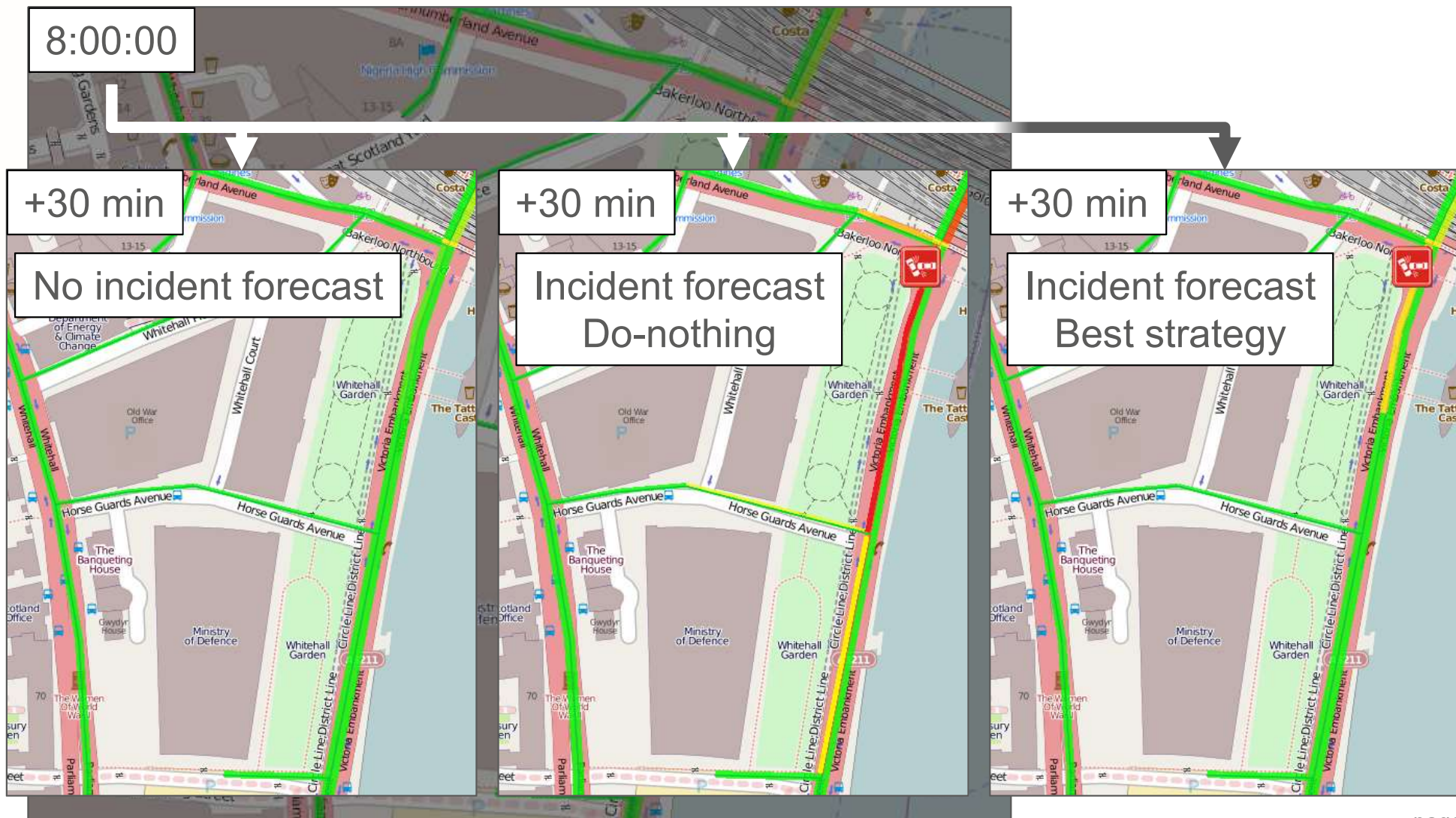
- Evaluate KPI
- Compare and rank alternative solutions against base ("do nothing") situation





OPTIMA: **KEY FUNCTIONS**

Decision Support System





OPTIMA: KEY FUNCTIONS

Queues & Spill back



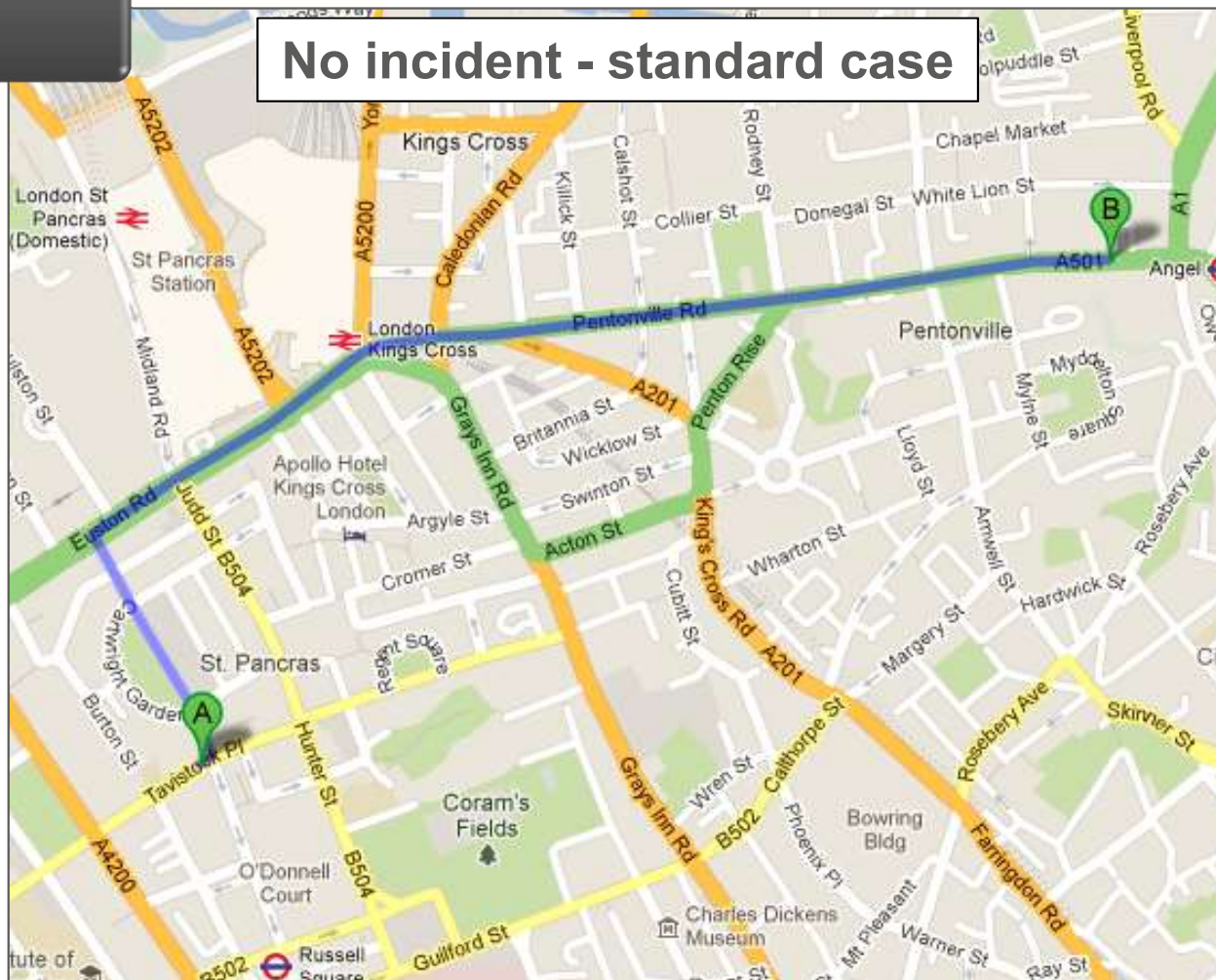
Background image from OpenStreetMap



OPTIMA: **KEY FUNCTIONS**

On-trip Re-routing

Route from A to B
in base assignment.



Google Maps



OPTIMA: KEY FUNCTIONS

On-trip Re-routing

Route from base assignment no longer feasible.

New equilibrium with closed link could produce diversions like route shown.



Google Maps



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5. USE CASE PIEDMONT REGION, ITALY

Project Overview

☐ Project name:
Regional Traffic
Supervision Centre of
Piedmont

☐ Purchaser:
5T srl, Piedmont, Italy

☐ PTV Group's role:
Main contractor

☐ Project volume:
584,000 EUR

☐ Implementation period:
2011 - 2013

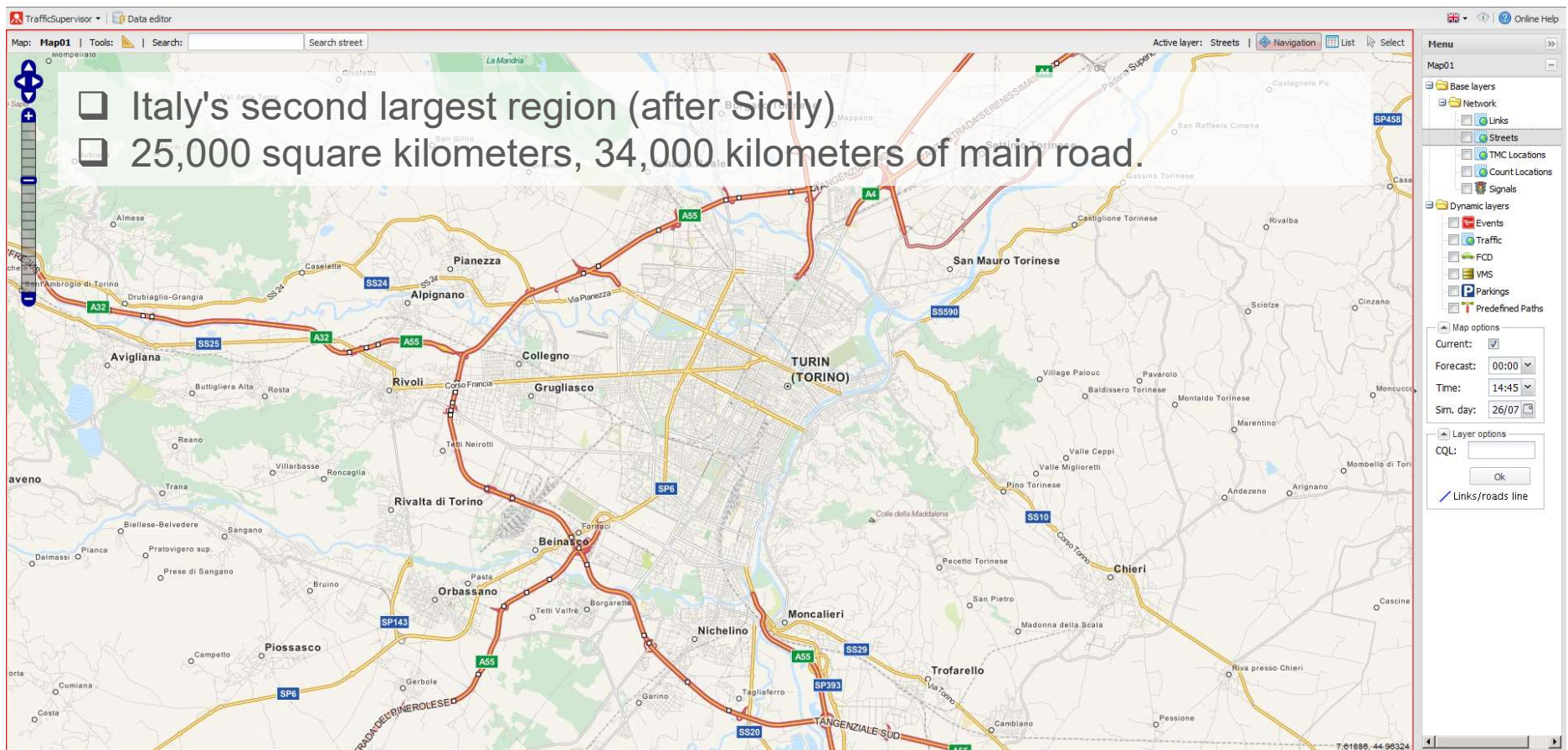


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5. USE CASE

PIEDMONT REGION, ITALY

Close Up

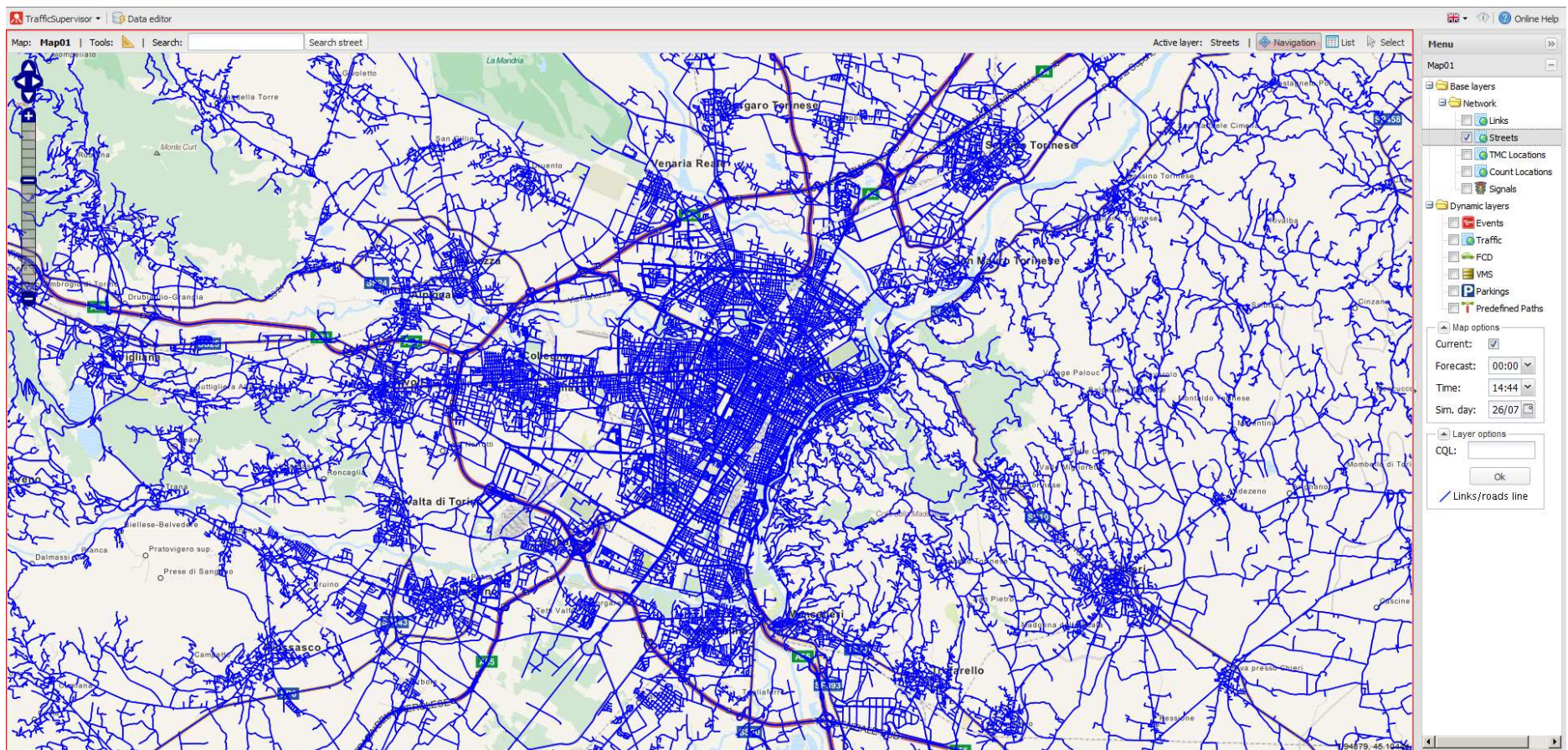




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5. USE CASE PIEDMONT REGION, ITALY

Reference Network



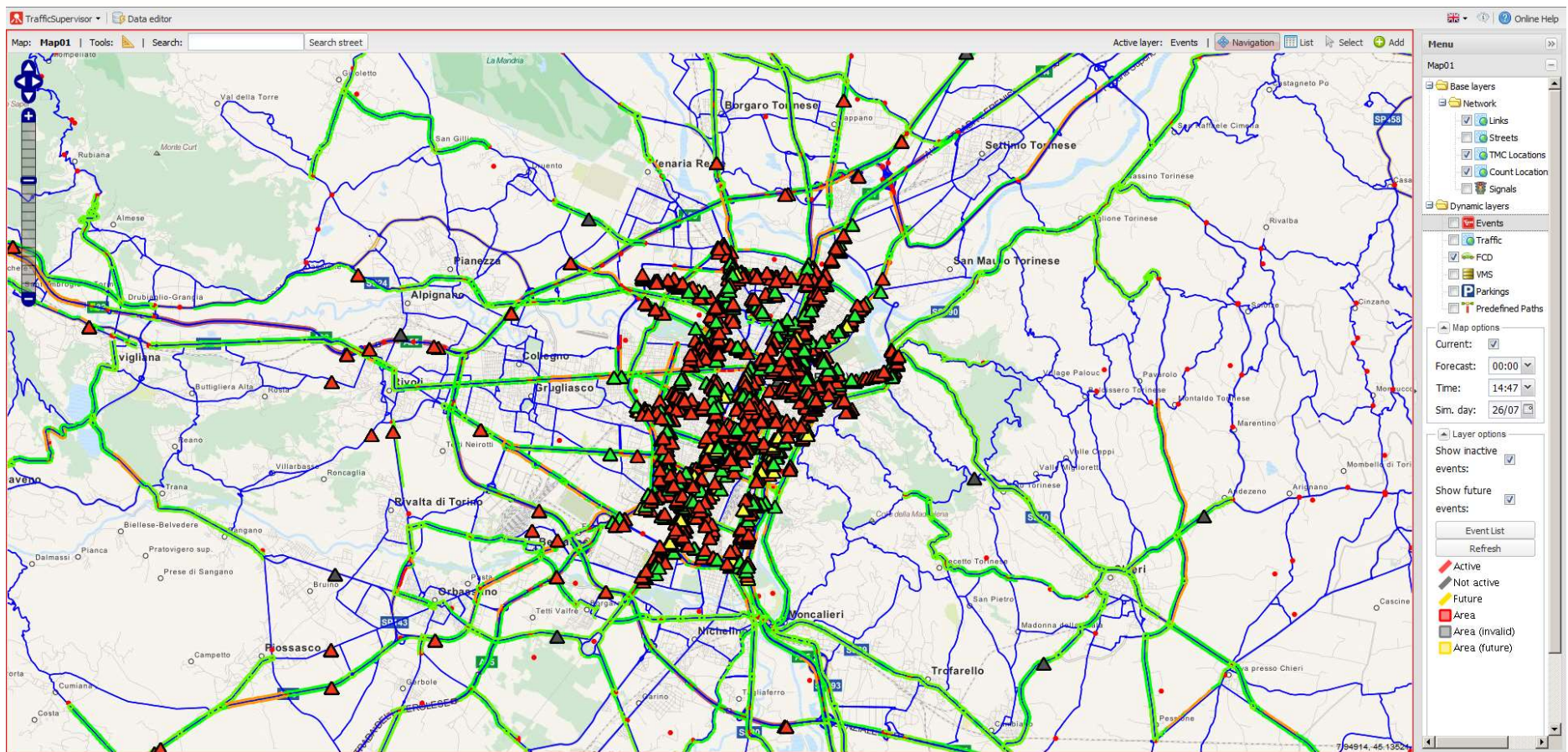


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5. USE CASE

PIEDMONT REGION, ITALY

Simulation Network – FCD & Detectors



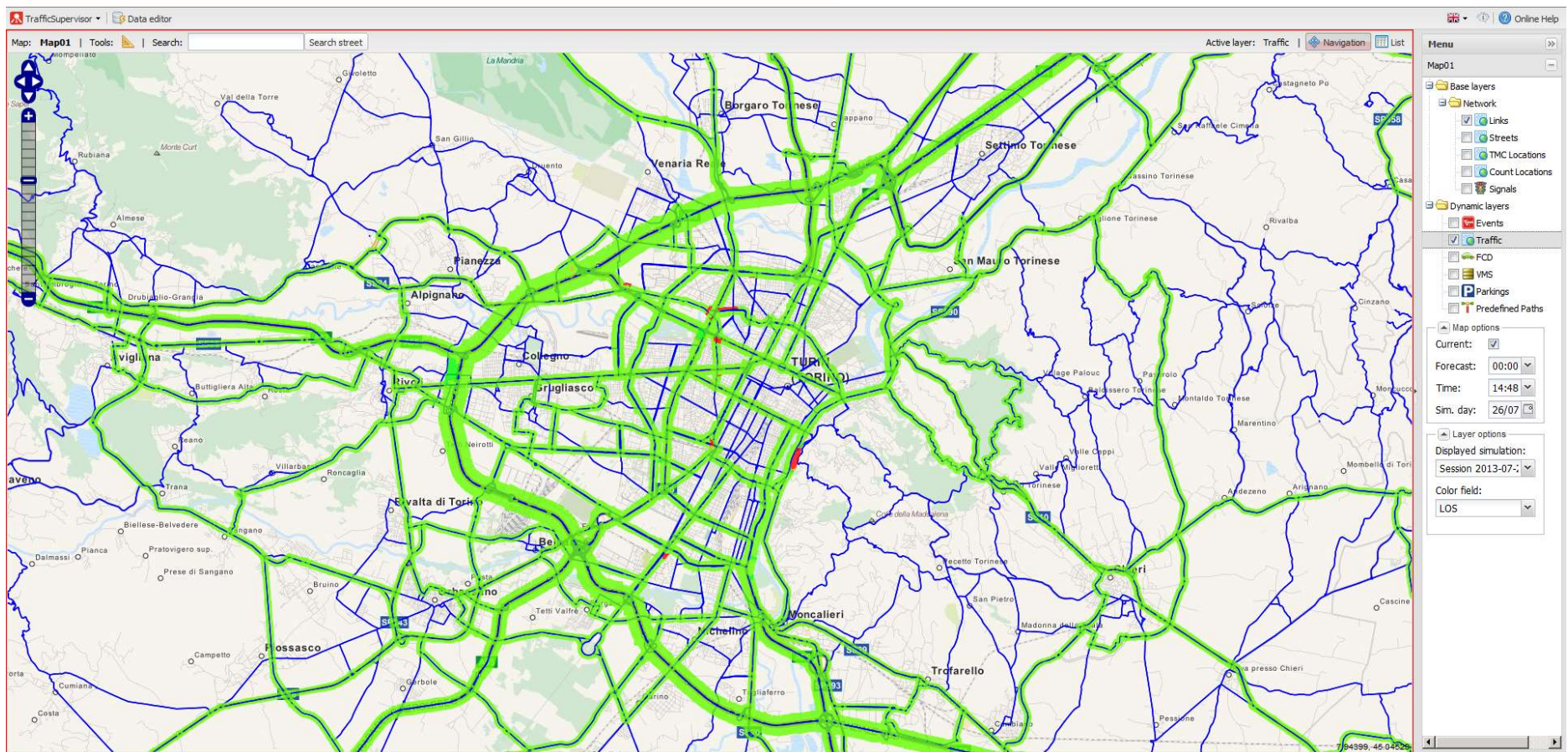


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5. USE CASE

PIEDMONT REGION, ITALY

Simulation Network – PTV Optima Results



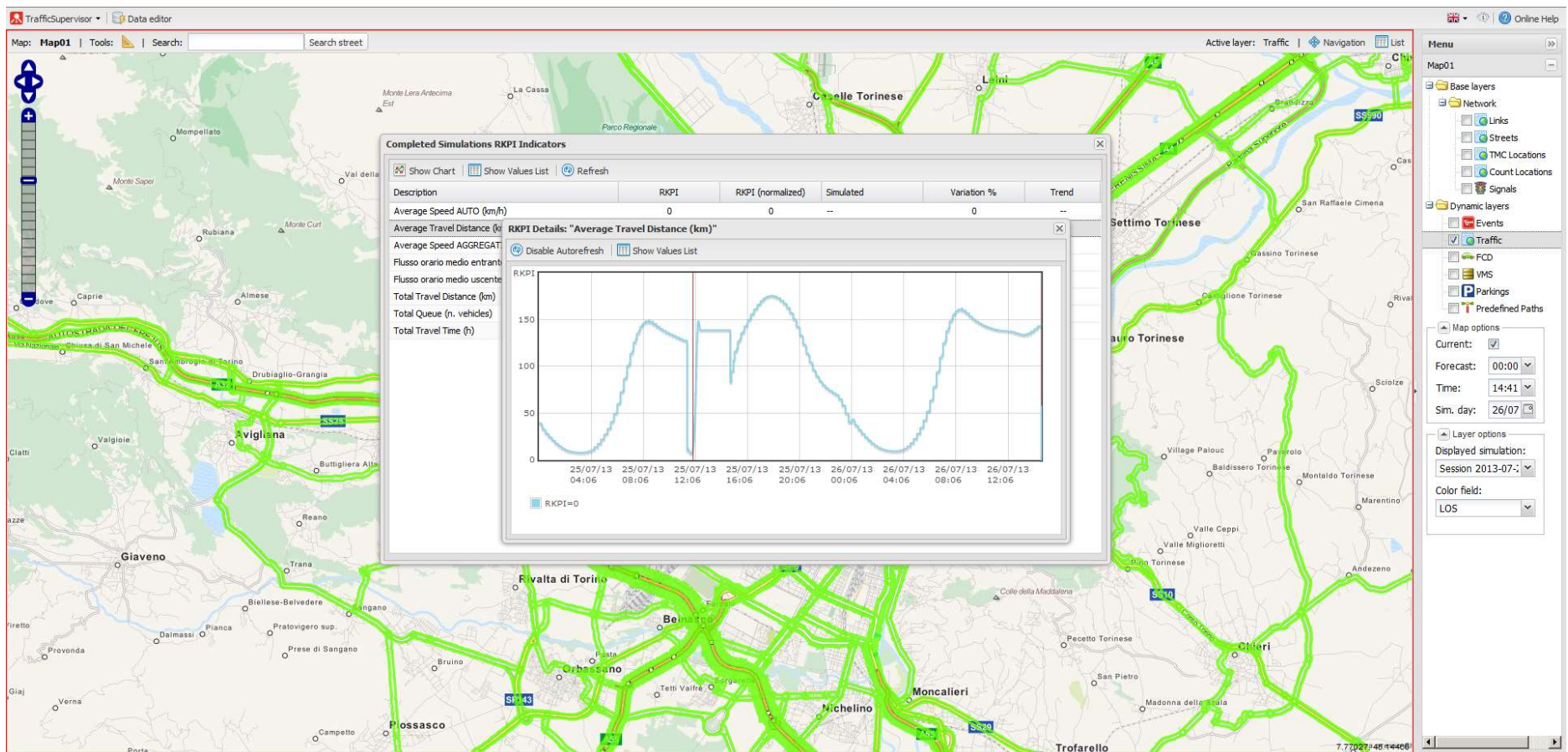


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5. USE CASE

PIEDMONT REGION, ITALY

KPI Chart – Long Term Monitoring

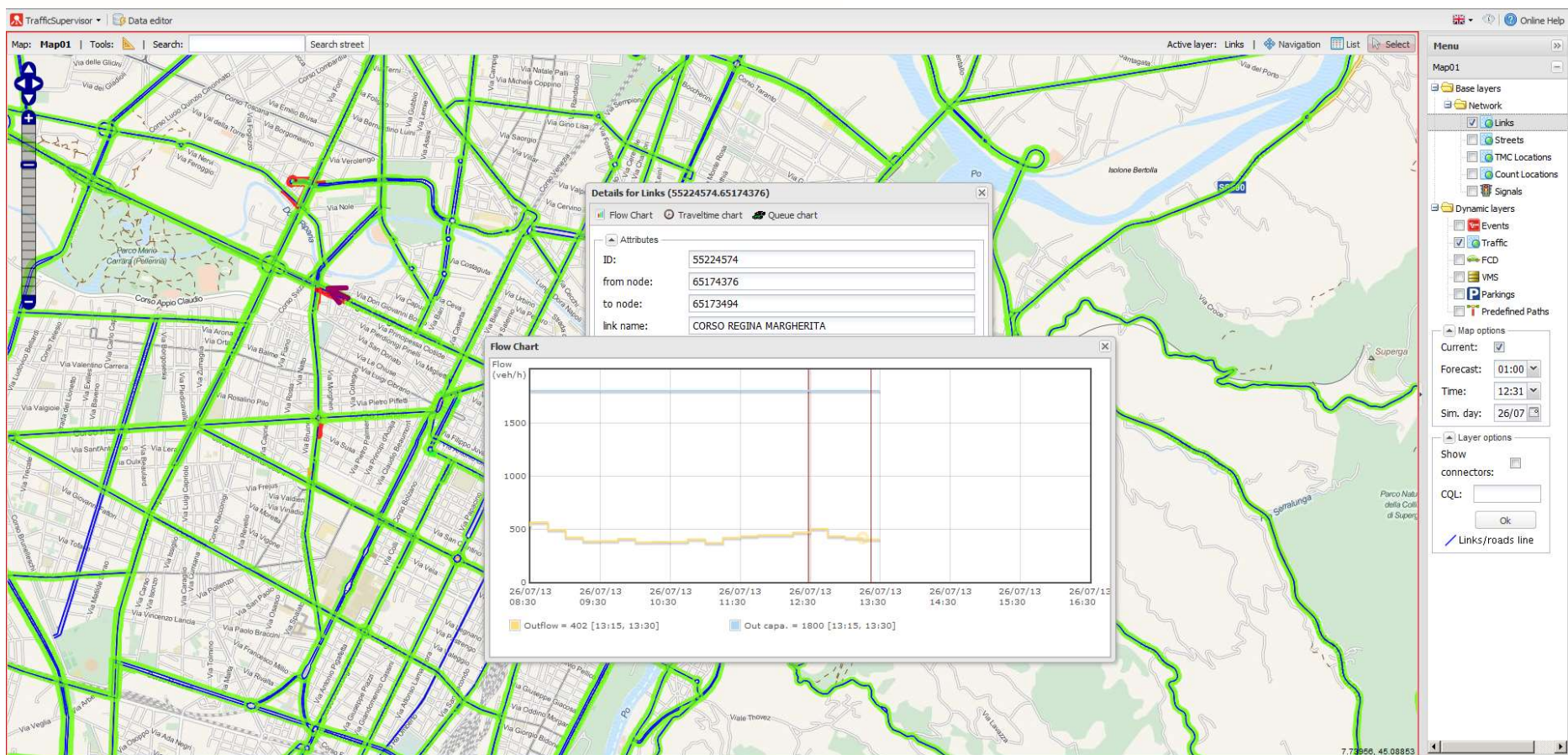




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5. USE CASE PIEDMONT REGION, ITALY

Flow Chart on Link – Result Analysis



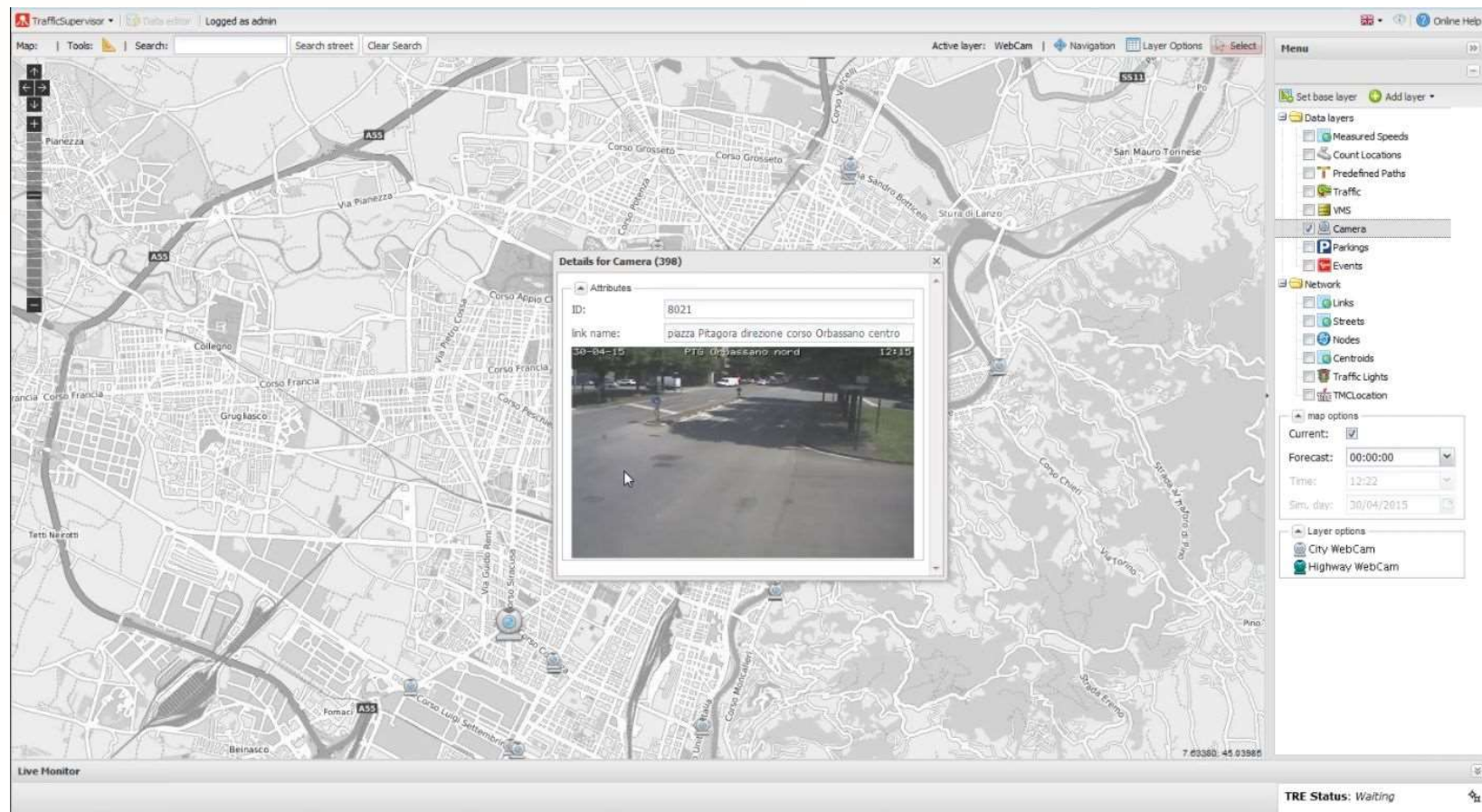


Decision Support in Real-Time Traffic Management

5. USE CASE

PIEDMONT REGION, ITALY

Web Cameras





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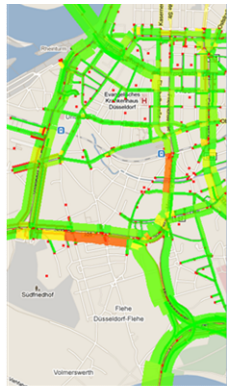
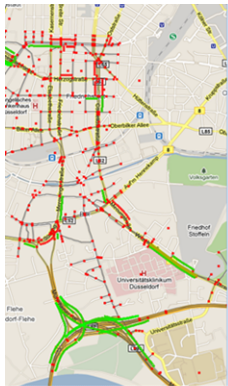


Decision Support in Real-Time Traffic Management

6. SUMMARY

PTV **OPTIMA** CAN BE SEEN AS...

traffic data
AMPLIFIER



traffic data
HUB



**REAL-TIME
DECISION** support system





Decision Support in Real-Time Traffic Management

6. SUMMARY

REAL INSTALLATIONS

- not pilots or
small areas



- ☐ TURIN (**ITALY**) : 2014
- ☐ ERFURT (**GERMANY**) : 2014
- ☐ VIENNA (**AUSTRIA**) : 2015
- ☐ CATANIA (**ITALY**) : 2015
- ☒ **RUSSIAN** HIGHWAYS : 2015
- ☐ MOSCOW (**RUSSIA**) : 2014 - 2015
- ☐ SACHSEN ANHALT REGION (**GERMANY**) :
2015 - 2016
- ☐ ABU DHABI (**UAE**): 2015
- ☐ PARIS (**FRANCE**): 2015



Decision Support in Real-Time Traffic Management

What make OPTIMA
superior to other systems?

OPTIMA

= Model-based approach +
Real-time traffic data

SIMULATE
current traffic situations
“What is going on?”



FORECAST
traffic situations
“What is going to happen?”



EVALUATE
scenarios
“What would happen if?”
“Which solution should we implement?”



OTHER Systems

= Statistics-based approach +
Real-time traffic data



Only
“usual” conditions



The logo consists of the letters 'PTV' in a bold, black, sans-serif font inside a white rounded rectangle, followed by the word 'GROUP' in a bold, white, sans-serif font inside a red rounded rectangle.

PTV GROUP

the mind of movement

THANK YOU
for your attention



PTV Software - Asia Users Group