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PTV Software for Rail Modelling

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PTV Benelux and Nordics

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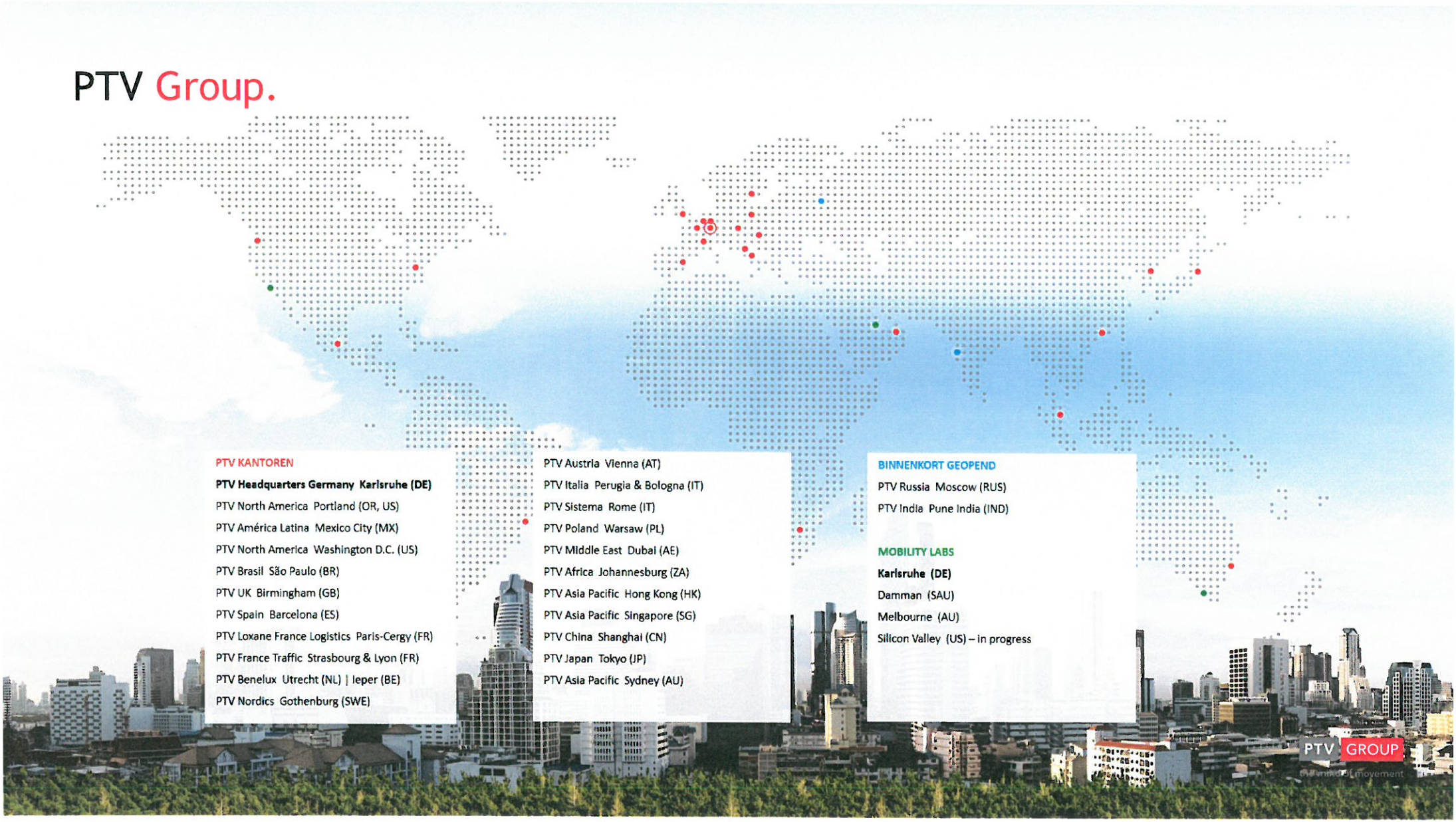
We plan and optimise everything which moves people and goods worldwide.

PTV Clients.

PTV Group.



PTV KANTOREN

PTV Headquarters Germany Karlsruhe (DE)
PTV North America Portland (OR, US)
PTV América Latina Mexico City (MX)
PTV North America Washington D.C. (US)
PTV Brasil São Paulo (BR)
PTV UK Birmingham (GB)
PTV Spain Barcelona (ES)
PTV Loxane France Logistics Paris-Cergy (FR)
PTV France Traffic Strasbourg & Lyon (FR)
PTV Benelux Utrecht (NL) | Ieper (BE)
PTV Nordics Gothenburg (SWE)

PTV Austria Vienna (AT)
PTV Italia Perugia & Bologna (IT)
PTV Sistema Rome (IT)
PTV Poland Warsaw (PL)
PTV Middle East Dubai (AE)
PTV Africa Johannesburg (ZA)
PTV Asia Pacific Hong Kong (HK)
PTV Asia Pacific Singapore (SG)
PTV China Shanghai (CN)
PTV Japan Tokyo (JP)
PTV Asia Pacific Sydney (AU)

BINNENKORT GEOPEND

PTV Russia Moscow (RUS)
PTV India Pune India (IND)

MOBILITY LABS

Karlsruhe (DE)
Damman (SAU)
Melbourne (AU)
Silicon Valley (US) – in progress

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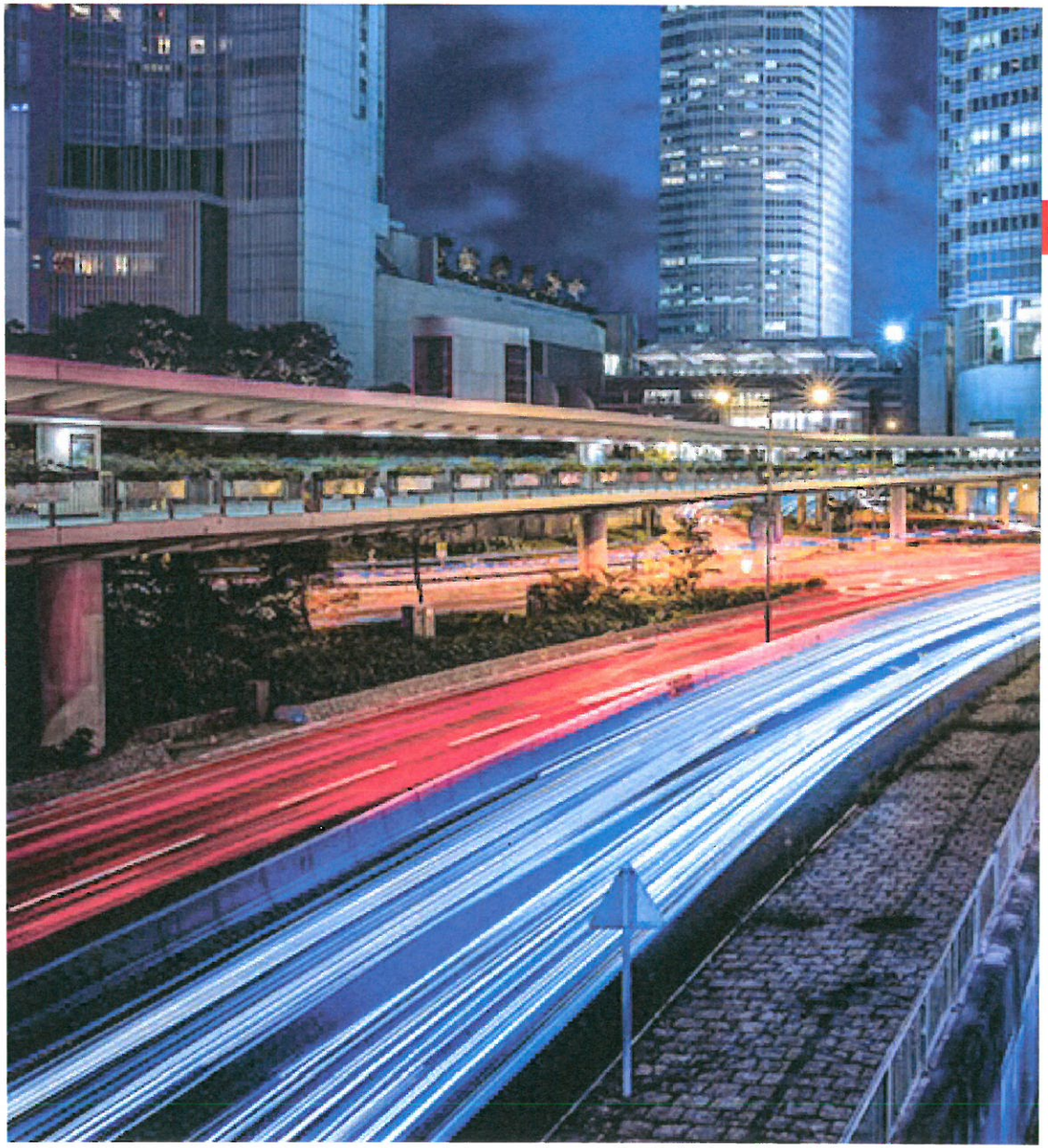

Our software connects.

Plan and Optimize the Traffic

- PTV Data & Algorithms

Strategic
- PTV Visum
- PTV MaaS Modeller

Tactical
- PTV Vissim / PTV Viswalk
- PTV MaaS Simulator

Operational
- PTV Optima & PTV Balance/Epics
- PTV Maas Operator & Controller

Holistic view
- PTV Urban Strategy (TNO)

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Public Transport

- Plan and optimize a timetable and vehicle schedules considering passenger demand, taken New Mobility concepts into account.
- Plan and design platforms, concourse, retail, evacuation and operational performance assessment of stations and surface access areas.

Demonstrated success:

- World leading software, developed with DB and TfL
- UK Department for Transport, Transport for London, Swiss Rail, Austrian Rail, NS/Prorail, De Lijn and more

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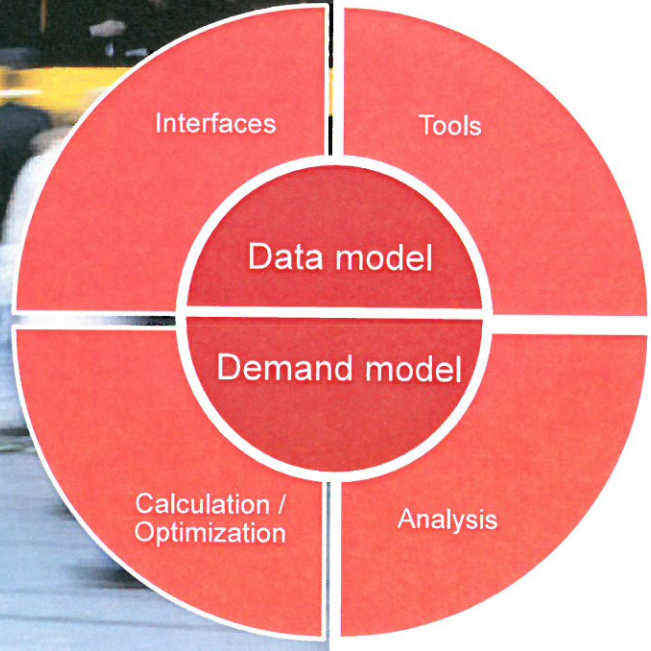

Public Transport in PTV Visum

- Analysis of count / ticketing data
- Multimodal demand models
- Timetable assessment
- Optimalisation of connections
- Fleet planning
- Fare design
- Cost and revenue split
- Tendering of line bundles

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Public Transport in PTV Vissim/Viswalk

- Rail, metro, tram, bus, car, taxi, truck, wheelchairs, cycling
- Station capacity analysis
- Platform density
- Boarding and alighting
- Stairs, escalators, ticket gates, ticket hall, concourse area
- Surface access assessment
- Operational (arrivals and departures) evacuation, retail

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Macro

Where are people travelling to, from, why and how?

How can we improve the current / future system?

- Roads
- Public transport
- Park and ride
- Cycling
- Freight
- Land use
- Demographics
- User charging
- ++++++

Where and when are there problems?

What does the future(s) look like?

Diagnose current mobility

Scenario testing

Value for money assessments

PTV Visum: Modelling to support strategic planning and investment

Meso

System optimisation

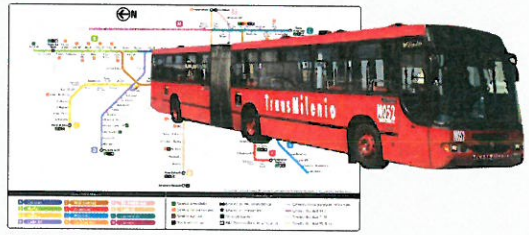
PTV VISUM

PTV VISSIM

PTV VISWALK

PTV VISTRO

Road space management
Signal optimisation



- Detailed design
- Timetable management
- Vehicle scheduling
- Cost and revenue calculations
- Line tendering

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PTV VISUM

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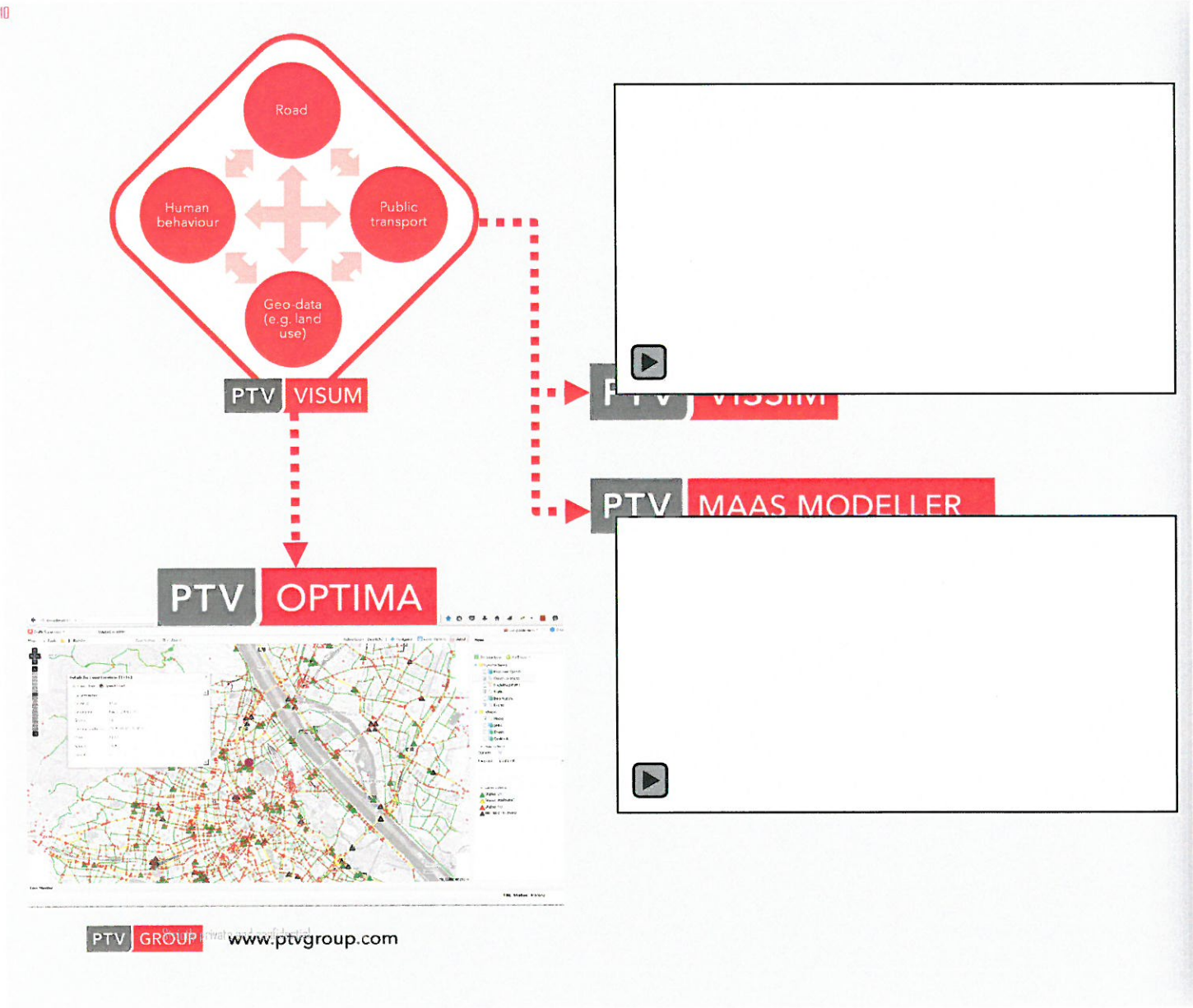

PTV Visum Characteristics: Integration

- Links to the PTV Suite
  - Export to PTV Vissim
  - Dynamic models the basis for PTV Optima
  - Export/import for PTV Vistro
  - Safety add-on module
  - Cloud-based integration with MaaS Modeller
  - Web/cloud-based visualisation (coming 2019)

PuT import and export

- Shapefiles
- Open Street Maps (OSM)
- GPX

- MS Access of SQL Database
- MaaS Modeller

- HAFAS
- Google Transit Feed (GTFS)
- RailML
- VDV 452
- Microbus
- E-ticketing

- Network merger

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Calculation of PuT Demand

Calculation the (future) demand based on socio-economic information and multimodal transportation system

Calculation of modal split taken into account:

- Inter-modality: "Park & Ride" and "bike on train"
- Vehicle sharing: "PuT-bike sharing program"
- Ride sharing: "Mobility as a Service"

Assignment:

- Transport system, headway or time-table based
- Capacity-constraint methods (with over crowding)

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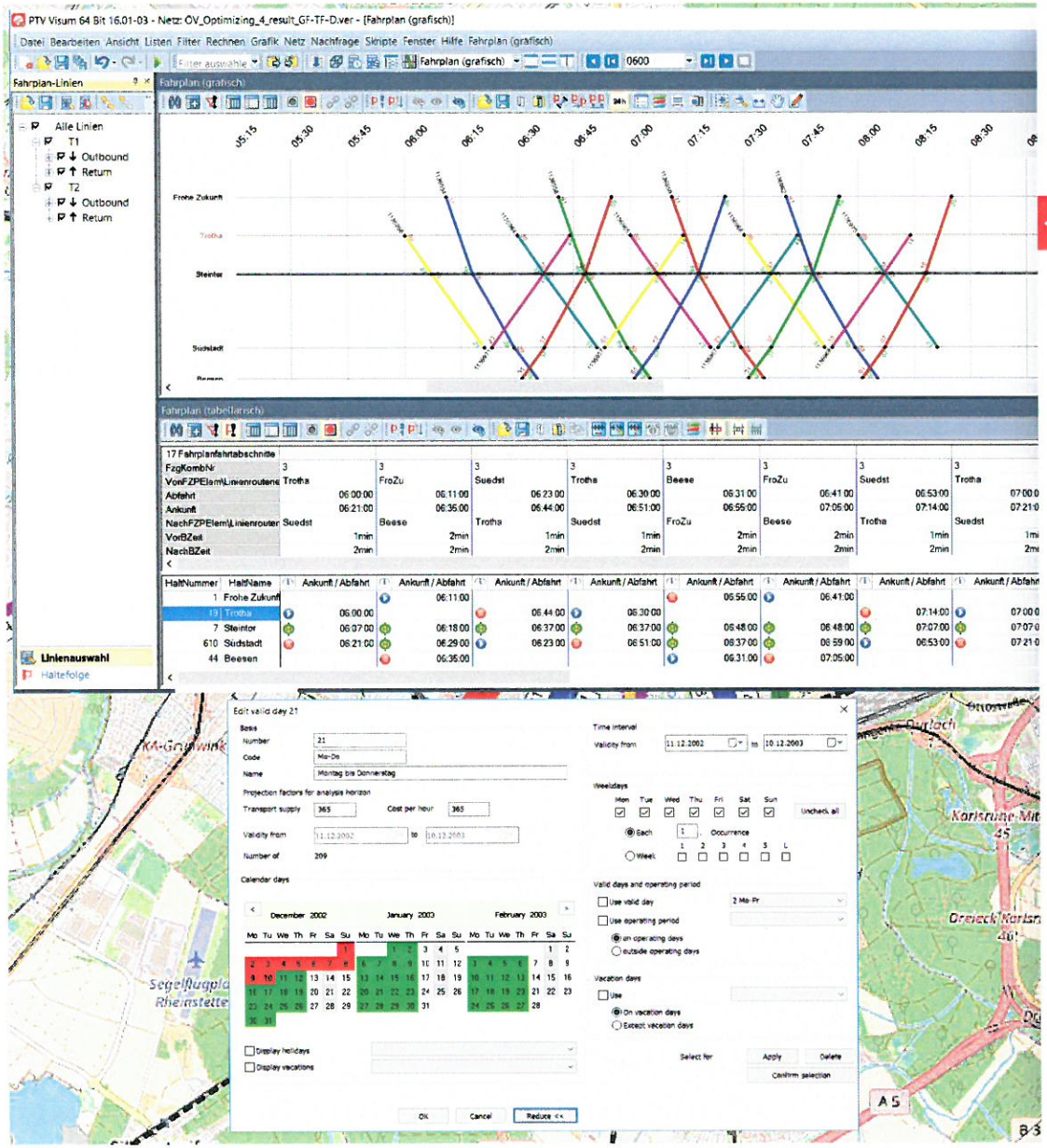

PuT Timetable planning and optimisation

- Representation and processing trips for a timetable in time/distance or distance/time diagram
- Representation of lines, targeted selection of stops to be represented, control of the stop sequence
- Differentiated representation of trips according to various properties, such as valid day, line, vehicle type, operator, etc.
- Intelligent integration of tabular and graphical view for the selection, insertion and processing as well as removal of trips
- Representation of detailed additional information on line trips in the graphic timetable, e.g. the number of passengers per route section per trip from the assignment or representation of capacity
- The individual trip allocation can also be displayed in blocks in the time/distance diagram

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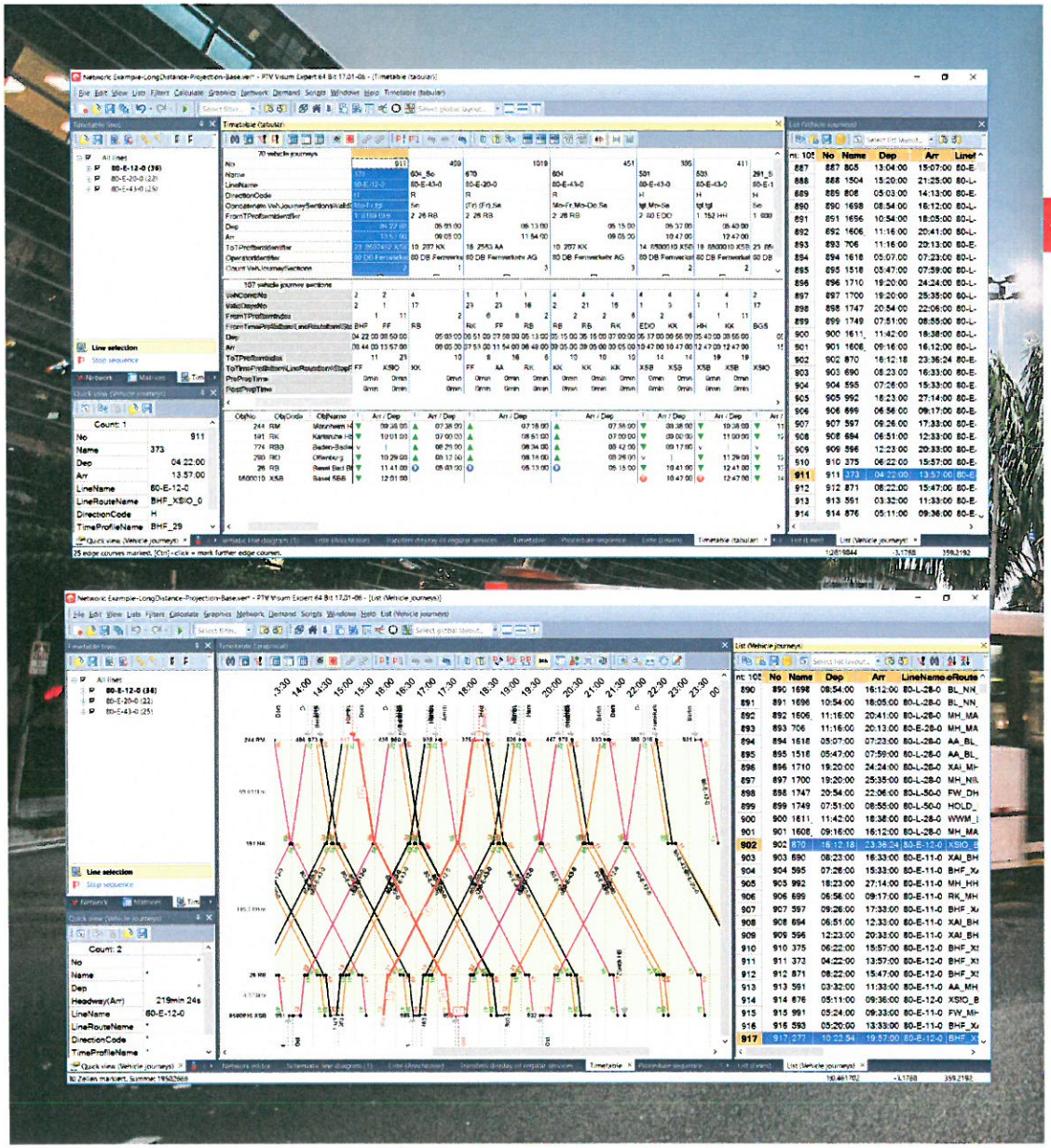

Timetable-based assignment

Features

- Dynamic assignment considering true timetable
- Flexible utility function
- Transfer times & walking legs
- Consider fares
- Consider capacities
- Integrate vehicle sharing
- Analysis of delays
- Tabular timetable editor
- Graphical timetable editor

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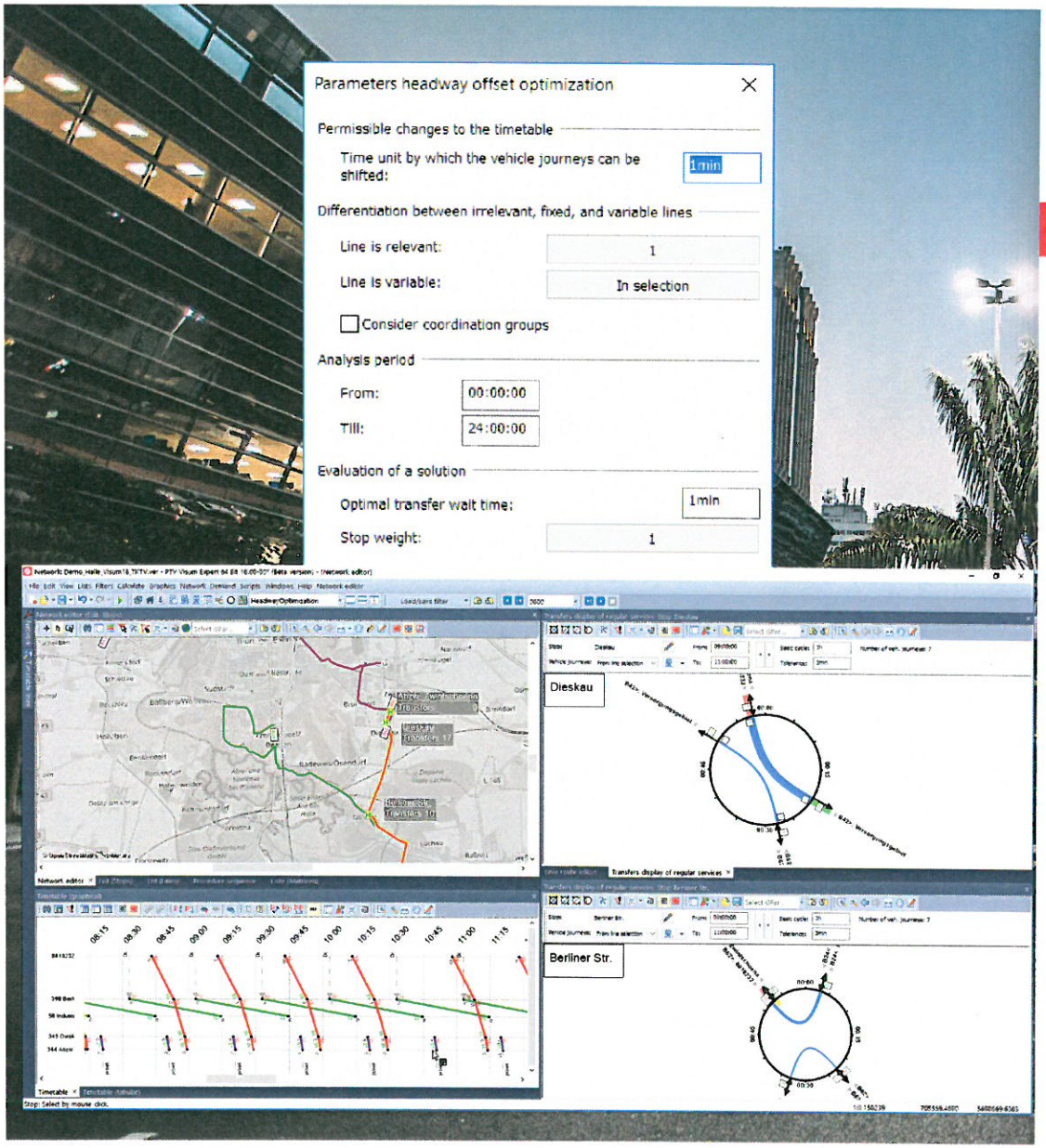

Headway offset optimisation

Optimizing timetable to minimize transfer wait times

- Optimize headway offset between vehicle journeys of selected lines → shift vehicle journeys in time
- Minimize "waiting times x number of transferring passengers"
- Include stop weights

- Minimize objective function using a genetic algorithm, local optimization methods and random solutions

- Adapt time table or generate model transfer file

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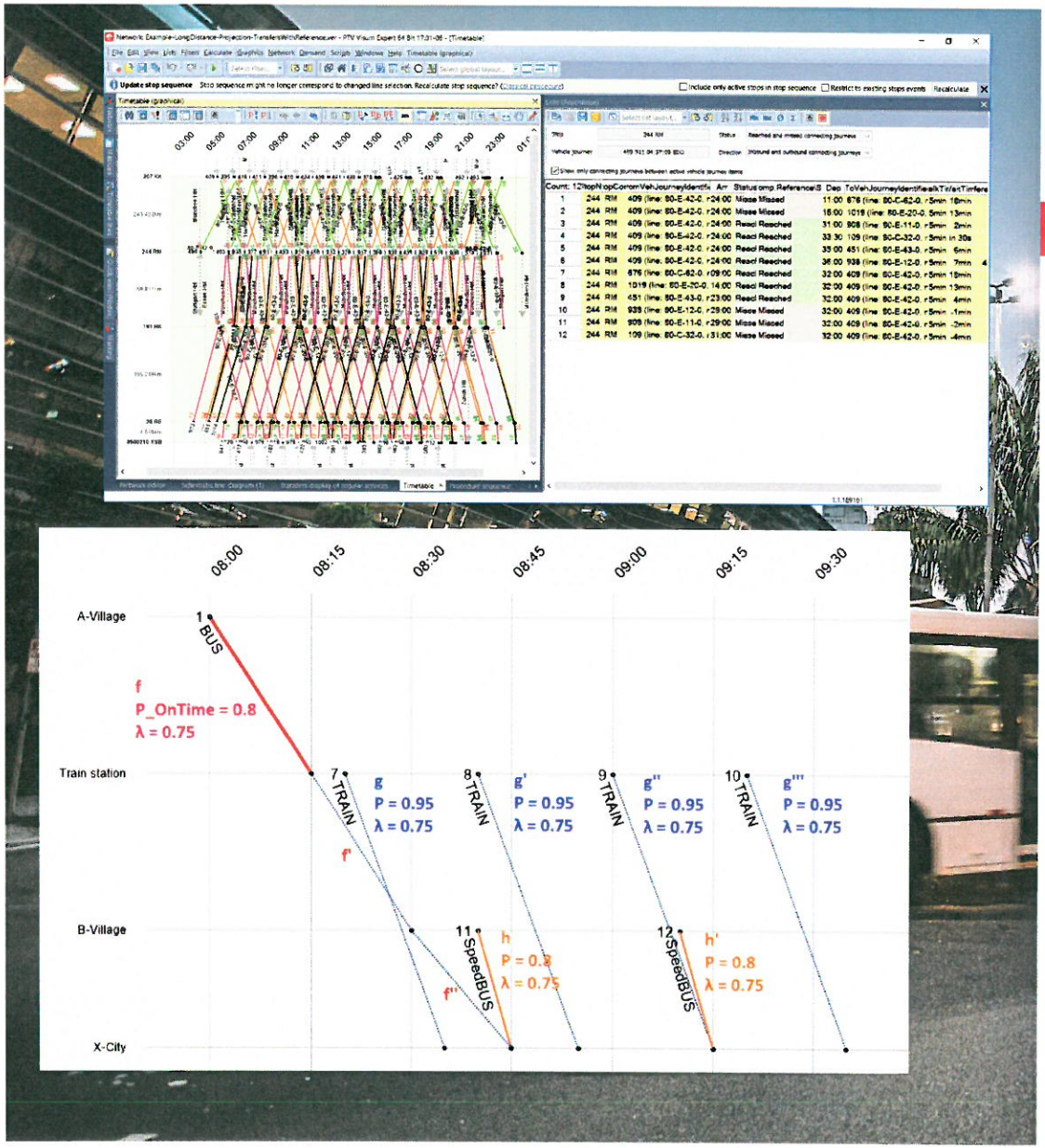

Analysis of delays and optimization of connections / transfers

- Input
  - Distribution of delay probabilities of the timetable items P_{OnTime}
  - λ of exponential distribution
- Calculation after PT assignment
  - Search for alternative connections
- Results
  - Risk of delay in minutes (per trip and total)
  - Share of delayed passengers per PuT path

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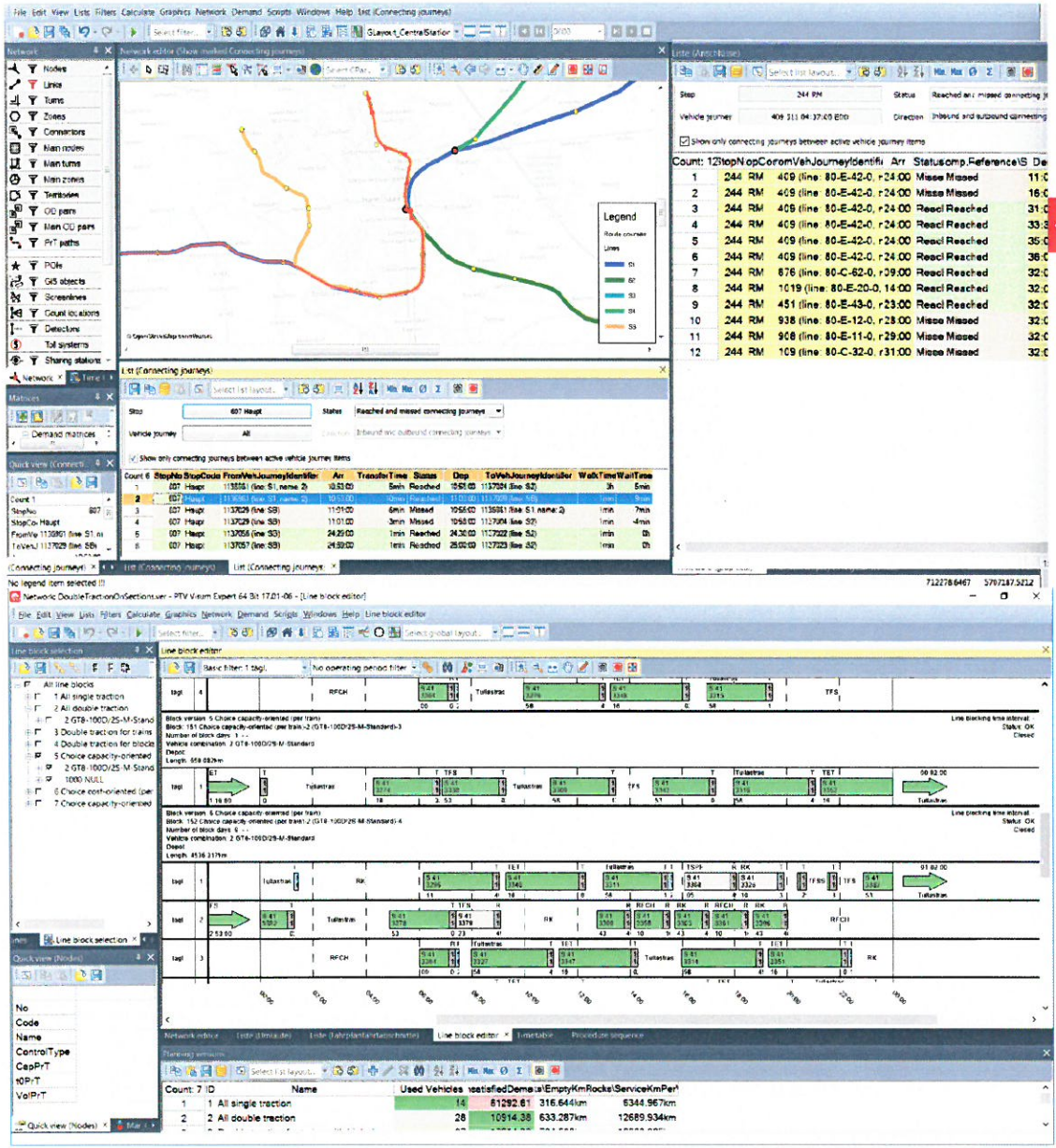
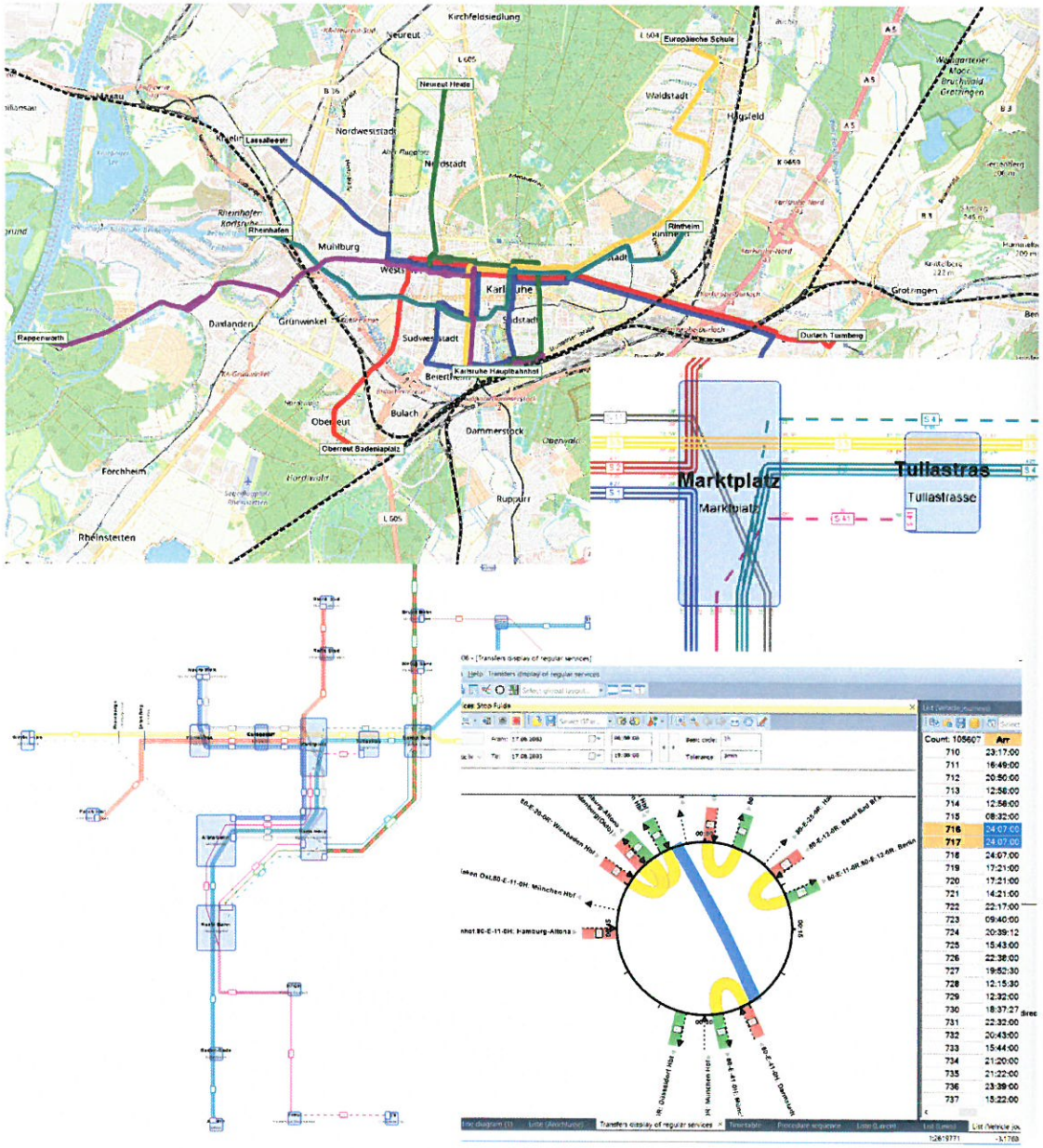


PuT Fleet planning and optimisation

- Explicit consideration of depots and their capacities
- Management of interlining trips based on the network
- Consideration of vehicle-specific preparation and closure times and line-related additional elements such as refuelling, cleaning and vehicle preparation
- Sort according to selection and linking of trips
- Vehicle assignment can be further optimised by taking into account vehicle combination capacities.
- Modelling of forced chainings & couplings as predecessor/successor relationships
- Use of secondary properties for the targeted selection of solutions from a range of equally viable solutions
- Allocation of a trip to a number of different vehicle types instead of a particular vehicle type



PuT passenger planning and optimisation

- Visualisation of PuT supply in the form of a schematic network display similar to the flow bundles in the network
- Quick overview of connections as well as a clear display of line routes.
- Call-up in an informative and easy-to-understand overall display of relevant aspects such as service frequency, departure times, type of quote, operator or template results such as capacity and loads, as well as transfer flows at stops
- Configurable layout of the display of selection and location of stops up to the edges
- Support through automated positioning algorithms during generation and subsequent optimisation if required
- Option to export to SVG

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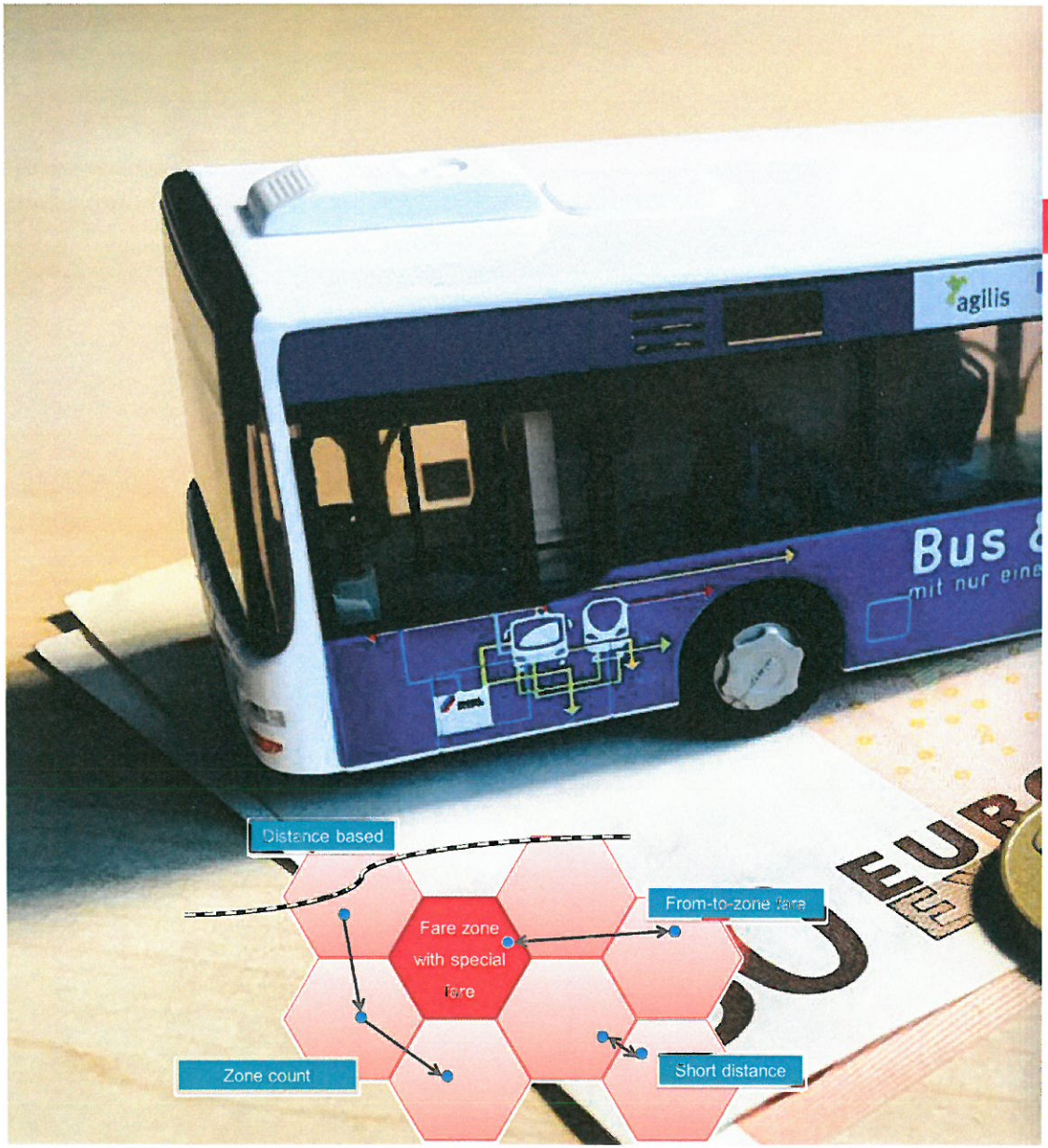

PuT Cost calculation

- Comprehensive analysis of the efficiency and the cost recovery rate of a PuT system, its components and the individual lines
- Differentiation of the results according to operator and area
- Calculation of costs from the quantity structure for vehicle assignment, the use of stops and routes as well as general operator-related properties and from the associated cost rates
  - Driver/vehicle units
  - Stops, routes
  - Operators
- Estimation of the revenues using the assignment of the calculated distribution of passenger demand based on revenue rates or a defined price model

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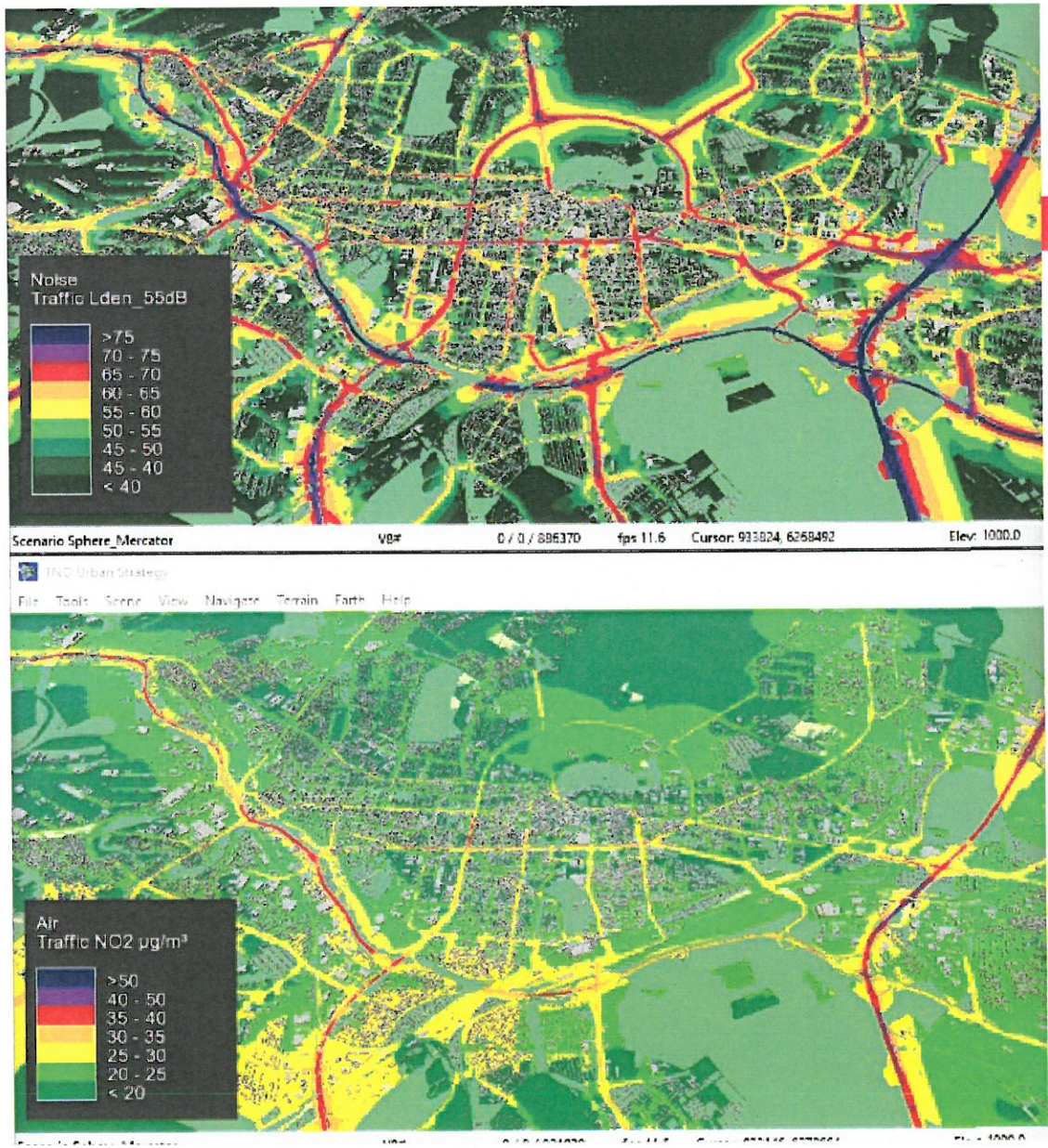
General	Operational KPI	Passenger KPI
Stop time	Service Km	Passenger Km
# Departures	Service time	Passenger Hrs
# Arrivals	Empty Km	Passenger trips
# Vehicle journeys	Empty time	Avg. Volume
Avg. Service distance	Operating Km	Avg seat / capacity ratio
Avg service time	Operating time	Boardings
Revenues	Seats	Alightings
Total Costs	Seat Km	Transfers
Cost per components	Distance	Through
	Duration	
	Avg speed	

PTV Visum, possible KPI's



Holistic View

- Need to balance between accessibility and environmental quality

PTV additional value

- Partnership with TNO
- Integrating Mobility Planning, Spatial Planning and Environment

PTV offers

- Holistic integrated approach from the start
- Interactive approach
- Legal setting for environment analysis
- MaaS # E-mobility # Enviroment

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Support and innovations

- We develop the software, but let the market use it
- Of course we support, we have our PM&S team

PTV additional value

- Worldwide partnership > 300 universities
- Software development > 200 FTE
- PM&S hubs to support clients

PTV offers:

- Training methodology of modelling
- Training on usage of PTV Software Solutions
- Project training on the job

- On the job technical support
- Review and/or second opinion

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