PTV GROUP

the mind of movement

PTV Visum

Bundle Description

Shorttitle	PTV Visum Bundle Description
Version of template:	xx.yy.zz

Contents

1 PTV Visum Expert

PTV Visum Expert includes all Visum base functionalities and comes with the following former additional modules:

- Junction Editor
- RBC
- Calendar
- Distributed Computing
- Matrix Estimation
- Interfaces

2 Road

Urban Traffic is often determined by the performance of intersections and its control system. This model provides the tools for a more detailed modelling in the perspective of private Transport. Its task is to measure the performance, optimize the signal controls and simulates the impacts in a much higher resolution.

Vissig will manage and process several signal programs for fixed-time signal control. Vissig's enables you to quickly and easily access each element. It can be used to design controls that can be saved to an external file (*.sig format). They can be imported from PTV Visum into PTV Vissim or vice versa at any time.

The graphical editor integrated into Vissig enables easy editing or modifying the controls. Changed signal time plans or interstages are only a few mouse clicks away. Other compelling Vissig features provided in PTV Visum and PTV Vissim are:

- Management of several intergreen matrices and signal programs
- Editing of interstages and signal time plans
- Green time optimisation
- Operation of different daily signal programs

Beside Vissig, a detailed evaluation of junction performance is enabled. The Intersection Capacity Analysis (**ICA**) which includes procedures of the US Highway Capacity Manual (HCM) calculates junction performance indicators. ICA includes a complex junction model that reflects best practices in traffic engineering analysis. ICA takes interdependencies between turning volumes at a junction into account, and therefore provides more realistic results of junction capacity and delay analysis. The module supports ICA calculations with respect to HCM 2000, 2010 and the 6th edition. The results of the calculation are provided in an automatically created report which lists the detailed calculation results for each node. An additional overview of the most important parameters of all nodes in the network facilitates analysis.

The simulation-based assignment (**SBA**) is a dynamic assignment method in which temporal changes of supply and demand are taken into account. The method is particularly suitable for operational applications where oversaturation and queueing to adjacent roads are present over large parts of the network at different times and in different places. An essential feature of this assignment method is the use of a simulation for the network loading process, i.e. impedances in the network are updated considering individual vehicles moving through the network. Delays at junctions are calculated based on the junction control and the detailed node geometry.

Modelling **road toll** projects are supported by a special PrT assignment method. "Conventional" approaches use a constant value of time to calculate road toll. Basically, costs (toll fees) are then converted into time and standard mono-criteria assignment methods can be directly applied. Unlike the conventional approach, TRIBUT applies a random time value. Therefore, TRIBUT calculates the route search and choice based on two separate sets of criteria: time and costs (bi-criteria). During the last few years, this method has been applied to evaluate privately funded toll motorways in France. In contrast to the conventional approach, it is characterised by a more realistic price elasticity concerning the use of toll roads.

Prediction of road **emissions and fuel consumption** is becoming increasingly important for the evaluation of environmental policies and infrastructural developments and also for the topic of shared mobility. The latest HBEFA (Handbook emission factors for road transport) is available. the ever more stringent legislation for traffic in cities using this functionality for your planning. Besides others, emission calculations take into account the fleet compositions, link types and calculated volume.

The bundle is completed by the Safety module. It adds a **road safety** dimension to your traffic model. Using the module, you will be able to import and analyse accident data. One of its functions is filtering data and providing a clear overview of this on the transport network. Thanks to the Heatmap, accident black spots are available at a glance and are displayed in line with the criteria you have chosen to set. Black spots can be generated and stored manually or automatically for subsequent analysis. With the reporting function, you receive detailed information about each and every accident. Group evaluation enables you to identify similarities between accidents and draw conclusions for traffic planning purposes.

A detailed introduction to Vissig, ICA, SBA, Road Toll, Emissions and Safety can be found in the manual, in provided examples and in our webinars:

https://your.visum.ptvgroup.com/webinar-ica-play

http://your.visum.ptvgroup.com/WebinarRecording_SBA_EN_Play

http://your.visum.ptvgroup.com/webinar-emission-calculation-en-play

http://your.visum.ptvgroup.com/webinar-improving-road-safety-with-ptvvisumsafety-play

3 Demand

Modelling demand and estimate mode choice are major features for strategic modelling. PTV Visum Expert comes with tools for a conventional four-step demand model. This bundle extends the Visum license for more specific approaches.

Visem is based on the concatenation of activities that create a "mobility program". The population is divided into "behaviour groups" for typical trip chains (e.g. employees with a car, pupils …). Calculations performed with Visem also consider socio-demographic and transportation policy issues. Visem calculates three logical work units: trip generation, trip distribution, and mode choice. These logical units are interlocked. Trip distribution and mode choice are calculated simultaneously, with a single method. For all three work units, the calculations are based on the behaviour-homogenous groups and activity chains.

In **Activity-based models** (ABM) the focus lies on individual persons and their mobility. ABM are microscopic demand models in which mobility decisions of all persons are individually simulated as sequential discrete choices. The decisions depend on characteristics of the individuals. As a result, daily plans as a sequence of activity executions are calculated. The daily plans contain information about the activities, e.g. start times, durations and locations, and also about the trips including the choice of mode. The synthetic population is externally calculated or can be generated in Visum e.g. based on survey data. The data of the persons and households are stored in the new data structures persons and households. Households, like other activity locations, are geocoded. All objects can be described by additional attributes. The calculation of daily plans and the resulting tours and trips are based on scripts that must be created by the users as part of the model building process. The results are stored as schedules, activity executions, tours and trips.

The **EVA demand calculation** method provides an alternative approach for three stages (trip generation, trip distribution and mode choice) of the conventional 4-stage traffic planning model. Developed by Prof. Lohse (Dresden University of Technology), it comes with a method of balancing the differences between origin and destination traffic. If trip generation and trip distribution are calculated independently, i.e. one after the other and above all separately for each activity pair as in the standard 4-stage model, differences frequently occur between the origin and destination traffic of the zones. The EVA model links generation and distribution by an explicit constraint step to make up for the differences. Furthermore, it supports simultaneous calculation of destination choice and mode choice. In the EVA model, trip distribution and mode choice are performed simultaneously, i.e. by applying a one-stage discrete choice model to three-dimensional utility matrices indexed according to origin zone, destination zone and mode.

The demand bundle includes also the **tour based freight** model, which allows the modelling of tour-patterns of different economic sectors, for example, agriculture, construction, and healthcare, and different vehicle types (delivery concepts) such as lorries, vans and cars. It consists of two procedures: generation and distribution; followed by the calculation of tours and subsequent trip matrices.

A detailed introduction to Visem, ABM, EVA, and Tour-based freight can be found in the manual and in the provided examples.

4 Transit Planner

This bundle extends your PTV Visum license in perspective of public transport planning.

Developing and testing timetable scenarios is one of the major use cases within PTV Visum. A powerful visualization prevents incorrect entries and improves quality assurance. **The graphical timetable** editor complements the tabular one since its display options provide an optimum overview of the current planning status and trip-related information:

- Display and editing of all or selected timetable trips in time-distance or distance-time diagrams
- Display of one or several lines, selection of stops for display, control of the order of stops
- A trip-differentiated display according to certain attributes (e.g. day, line, vehicle type, operator, etc.)
- An intelligent combination of a tabular and graphical display for selection, insertion, editing and deleting of trips
- Visualization of additional service trip details, e.g. number of passengers per route section per trip (based on assignments), automatic passenger count results or the deviations between actual and scheduled departure times

Data from ticket systems or from elaborate surveys are very valuable for planning. They represent a reliable status quo. Passenger surveys usually do not include the passengers' complete trip within the PuT network - especially when they transfer several times or who walk from one stop to another to transfer. The **survey data** functionality is used to check and complement trip-based passenger information. It is primarily based on modeling of the survey-relevant PuT supply and on parameters for reconstructing incomplete or correcting wrong trip data.

From route information and by means of so-called direct assignment, a PTV Visum version file is created. It allows you to perform all common procedures, e.g. route evaluation according to the number of traversed zones, the generation of demand matrices and visualization of passenger volumes per links, stops, and lines.

A detailed introduction to graphical timetable editor and survey data processing can be found in the manual, in provided examples and in our webinars:

https://your.visum.ptvgroup.com/webinar-working-with-timetable-editor-play

https://your.visum.ptvgroup.com/webinar-e-ticketing-play

https://your.visum.ptvgroup.com/WebinarRecording_PUT_EN_Play

5 Transit Operator

This bundle includes the features of the Transit Planner bundle. It extends it by the operator perspective on costs, line blocking and an additional display, the schematic line diagram.

The **line cost functionality** enables analyzing the efficiency and cost recovery level of a PuT system, its service units, and service lines. The results can be separated by operators and service areas. The costs are calculated based on vehicle deployment, the use of stops and routes as well as on general, operator-specific attributes and the respective rates.

Revenues are estimated from the distribution of passengers using the assignment results and on the basis of a simplified or detailed modelled fare structure. An essential element of the cost calculation is the estimation of the number of vehicles. The bundle contains the **line blocking** (vehicle scheduling) function which enables to calculate blocks on a given timetable. It considers depots and their capacities, rules for linking journeys and determines vehicle relocations. Restrictions for battery electric vehicles and it's charging infrastructures are considered and helps to plan emission-free operations. Using the integrated calendar enables efficient analysis of the cost- efficiency considering different operation days.

You can assign a number of possible vehicle types to a trip. During the optimisation procedure, the vehicle type is chosen that allows for a minimum deployment of vehicles. For vehicle selection, the software can also consider passenger volumes calculated during an assignment or based on survey data as well as the vehicle's capacity to ensure demand-optimised vehicle deployment.

The **Schematic Line Diagram** (also known as Timetable-network-graph) is used for visualizing a Public Transport network and time-table in a schematic display known from network maps provided by many Public Transport organizations. This kind of display supports the planning of Public Transport supply by providing a quick overview of connections and line routes. Extensive graphics parameters, bars and labeling options allow presenting the most important aspects like service frequencies, departure times, service type, operators or model results like capacities, volumes or transfer flows in an informative and intuitive way. The initial positioning of the stops and routing of edges is supported by automated positioning algorithms but can be adapted manually. The smart data model allows transferring a layout to other variants of a network or time-table, thus minimizing the effort for maintaining the diagram. The possibility to export the graphic to SVG allows passing it to other departments post-processing for customer information.

A detailed introduction to line costing, line blocking, and schematic line diagram, can be found in the manual, in provided examples and in our webinars:

https://your.visum.ptvgroup.com/webinar-fare-modelling-play

https://your.visum.ptvgroup.com/webinar-line-bundling-play

https://your.visum.ptvgroup.com/webinar-line-blocking-play

https://youtu.be/QW0I_R5nP8w

6 Shared Mobility

This bundle extends your PTV Visum license on the perspective of planning and analyzing new mobility concepts.

Ride-sharing combines microscopic ride requests with calculated vehicle tours. Therefore, individual travel requests are collected and bundled in such a way that they can be served with minimum effort. Modelling ride-sharing delivers the paths of passengers and tours of vehicles. By that KPIs like Passenger and vehicle mileage are derived to measure the impact on traffic and answers the questions of sustainability of these modes. The environmental effect is derived by and emission model.
Visum functionalities enable to integrate of ride-sharing into a full-scale Transport model. Due to this, it's possible to integrate it in demand modelling to calculate the modal split. This will answer how many people will use this mode of transport. Comparing the operation scenarios mode shifts will be visible; determine which mode benefits or loose. Modelling new mobility services helps to balance the gain of demand and operational costs. Comparing scenarios with different fleet sizes and holding areas will determine operational costs and service quality. Introducing an electric fleet will increase the fleet size and vehicle mileage. Trying out the optimal locations for the charging facilities will minimize the effect.

Vehicle-sharing concepts offer the exclusive usage of available shared vehicles for a given time span. For answering questions about planning, dimensioning and usage of vehicle-sharing systems e.g. bike- or car-sharing this bundle is an extension of the macroscopic time-table assignment.

As such it considers path legs and transfers between sharing systems and classic Public Transport supply.

Three types of sharing systems can be distinguished and be depicted by this model:

- Station-bound systems
  - With a free choice of return system (one- way system)
  - Exclusive return at renting station (round trip)
- Free-floating systems

The routes of the passengers can be analyzed by the multitude of public transport evaluations in PTV Visum and their characteristics can be used in a demand model.

Prediction of road emissions and fuel consumption is becoming increasingly important for the evaluation of environmental policies and infrastructural developments and also for the topic of shared mobility. The latest HBEFA (Handbook emission factors for road transport) is available. the ever more stringent legislation for traffic in cities using this functionality for your planning. Besides others, emission calculations take into account the fleet compositions, link types and calculated volume.

The bundle is completed by the Safety module. It adds a road safety dimension to your traffic model. Using the module, you will be able to import and analyse accident data. One of its functions is filtering data and providing a clear overview of this on the transport network. Thanks to the Heatmap, accident black spots are available at a glance and are

displayed in line with the criteria you have chosen to set. Black spots can be generated and stored manually or automatically for subsequent analysis. With the reporting function, you receive detailed information about each and every accident. Group evaluation enables you to identify similarities between accidents and draw conclusions for traffic planning purposes.

A detailed introduction to ride-sharing, vehicle-sharing, emission calculation as well as safety, can be found in the manual, in provided examples and in our webinars:

https://your.visum.ptvgroup.com/webinar-emission-calculation-en-play

https://your.visum.ptvgroup.com/webinar-improving-road-safety-with-ptvvisumsafety-play