

PTV VISUM

the mind of movement

PTV VISUM 2020

NEW FEATURES AT A GLANCE

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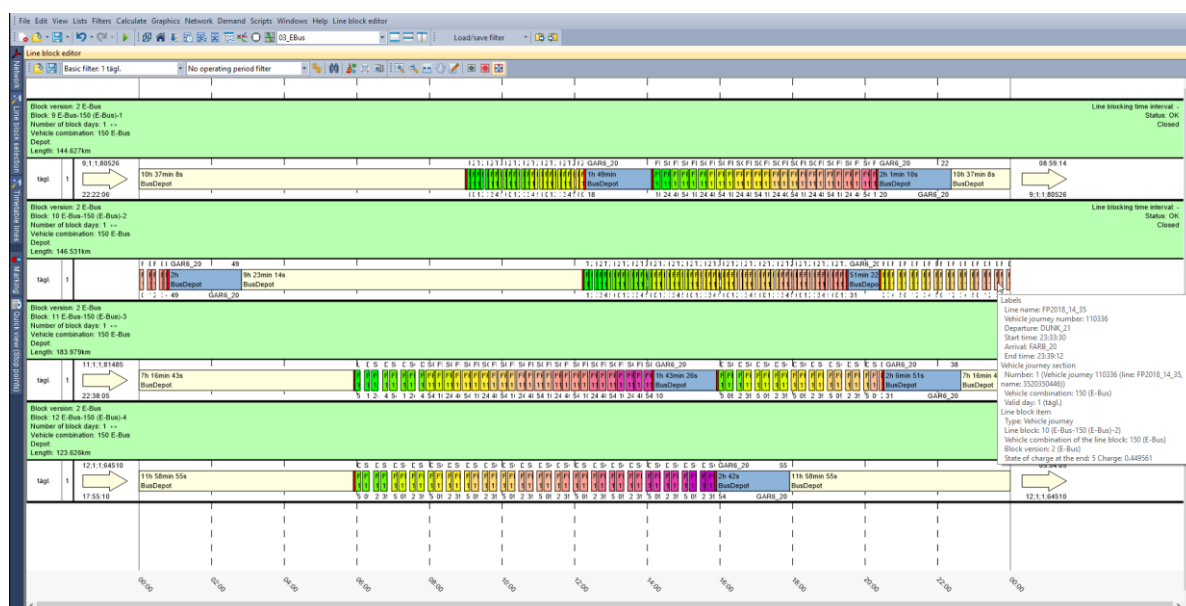
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1 New applications

1.1 Line blocking considering battery-electric buses

With the intention of making urban transport more compatible for people, it should become emission-free. More and more PT operators are therefore converting their vehicle fleets to electric propulsion. In addition to changes in infrastructure, new planning tasks must be solved. Compared to conventional combustion engines, battery electric drives currently have a significantly reduced range and are comparatively time-consuming with respect to recharging. The operator faces shorter line blocks with recurring charging activities. This results in an increased vehicle or charging infrastructure requirement.

Visum 2020 offers the definition of such recurring activities as part of the line blocking procedure in order to determine the number of vehicles and the operating costs after conversion to e-vehicles. Both the temporal function of the charging process and the energy consumption definition is editable and stored within the data model. The capacity of the vehicle combinations, as well as the configurations of the charging infrastructure, is part of the network model. A genetic algorithm that iteratively solves graph flow problems and evaluates them by means of a parameterizable cost function generates an optimal vehicle scheduling. The state of charge of the individual vehicles is calculated for each line block element and can thus be visualized in the line block editor.



Visualization of the state of charge on line block elements

The integration into the network model does not only enable the determination of the required number of vehicles. Questions can also be examined as to whether larger batteries, more charging infrastructure or higher charging currents are worthwhile in order to reduce the number of vehicles. Scenarios in mixed operation of vehicles with combustion engines and e-vehicles can evaluate lines for their "electrification-potential". Charging under catenaries during travel (in motion charging) can also be mapped and thus evaluated.

1.2 Support for activity-based models (ABM)

Activity-based models (ABM) exist for some time. Especially in the US, ABM of various types have been developed and further extended over the last 10 to 15 years. In Europe and in particular in German-speaking countries, agent-based models have been developed predominantly in the academic world and are used more widely to investigate questions in the fields of new mobility and of air quality.

In classical macroscopic demand models, the population is aggregated into behaviorally homogeneous person groups. For each group activity pairs or activity chains are modelled. The calculation of demand is based on negative utilities of traveling. These models are also referred to as trip-based demand models, because they result in several of trip matrices differentiated by person group, trip purpose and mode.

In contrast, in 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 sequentially discrete choices. The decisions depend on characteristics of the individuals. As a result, daily plans as 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.

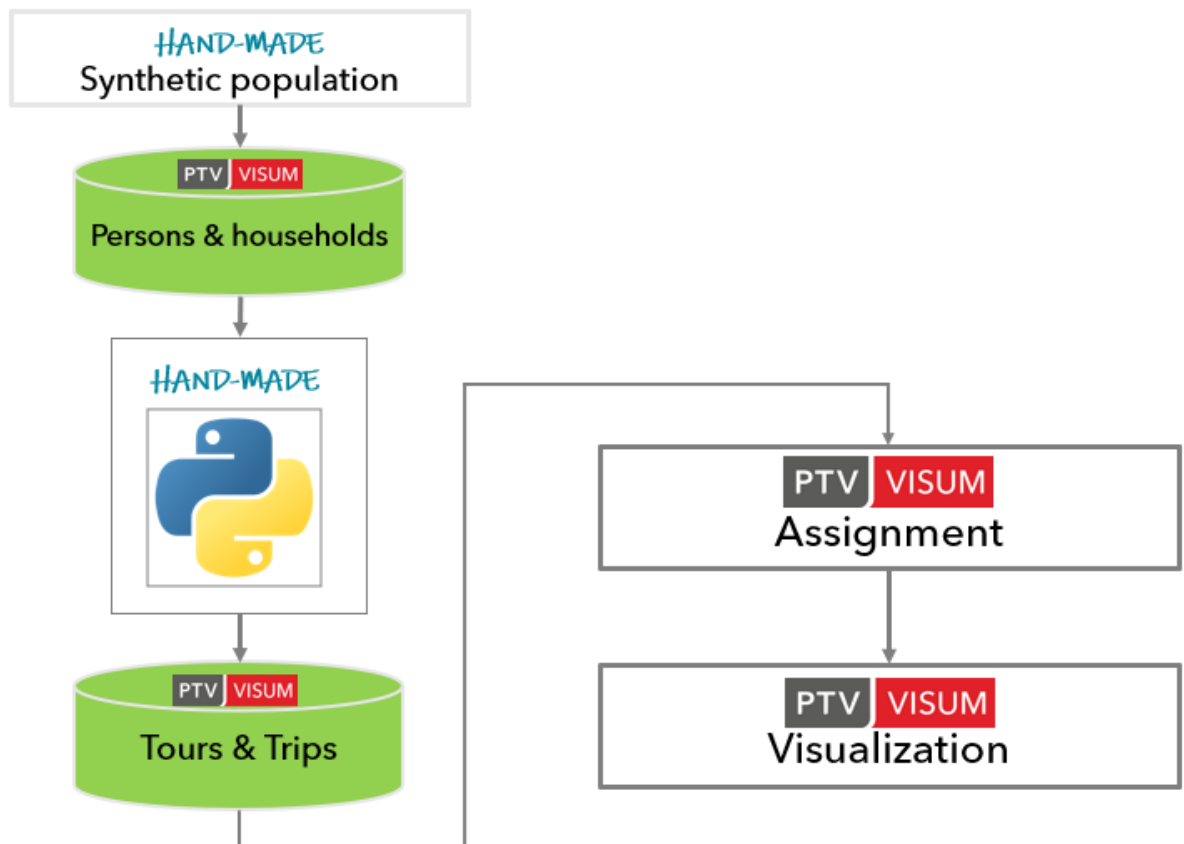
Despite a similar general understanding of these models and their existence over the years, no common structure has emerged that is used as a generally accepted standard. ABM can differ in many ways. This concerns the definitions of the utility functions, considered choices and their order, the decision models themselves as well as various model parameters.

However, the approach is still popular. ABM model the behavior of individuals in a very intuitive way and have the potential to better account for current changes summarized under the topic of New Mobility. This is reflected in tenders for projects that either directly require microscopic demand modelling or enable the investigations of scenarios that take new forms of mobility into account.

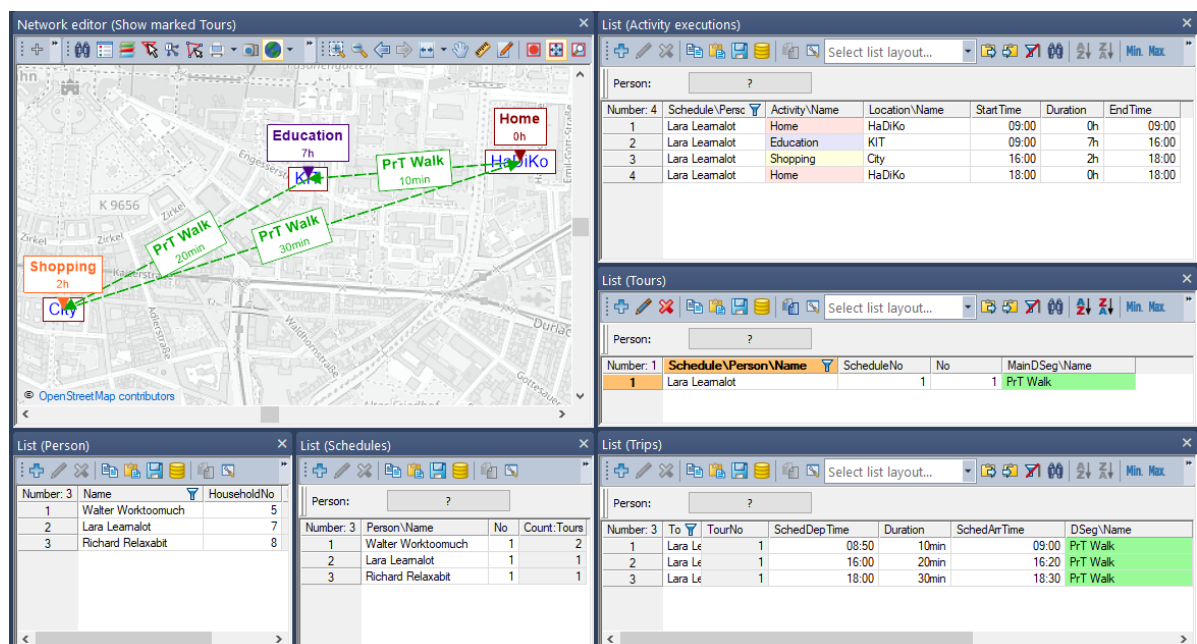
The last two arguments have prompted us to implement a concept for microscopic demand modelling in Visum that supports a wide variety of approaches. This is the main advantage. Of course, when setting up such models, you naturally also benefit from existing advantages of Visum. These include the ability to handle large amounts of data, the direct connection with the assignment and a variety of display options.

In the first stage, the concept includes the extension of the data model, COM functionality, interfaces for input and output as well as typical forms of graphical display that are necessary for the analyses of results in an ABM.

The following figure shows the basic features of the concept.



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 as part of the model building process. The results are stored as schedules, activity executions, tours and trips. Display in the network editors is synchronized as shown in the figure below for a single tour.



With the available functionality, the ABM can be developed in Visum. Further extensions will follow, especially for graphical display. A tutorial will contain detailed instructions of how the

ABM concept in Visum can be used. It also contains an example of a script-based implementation of an ABM.

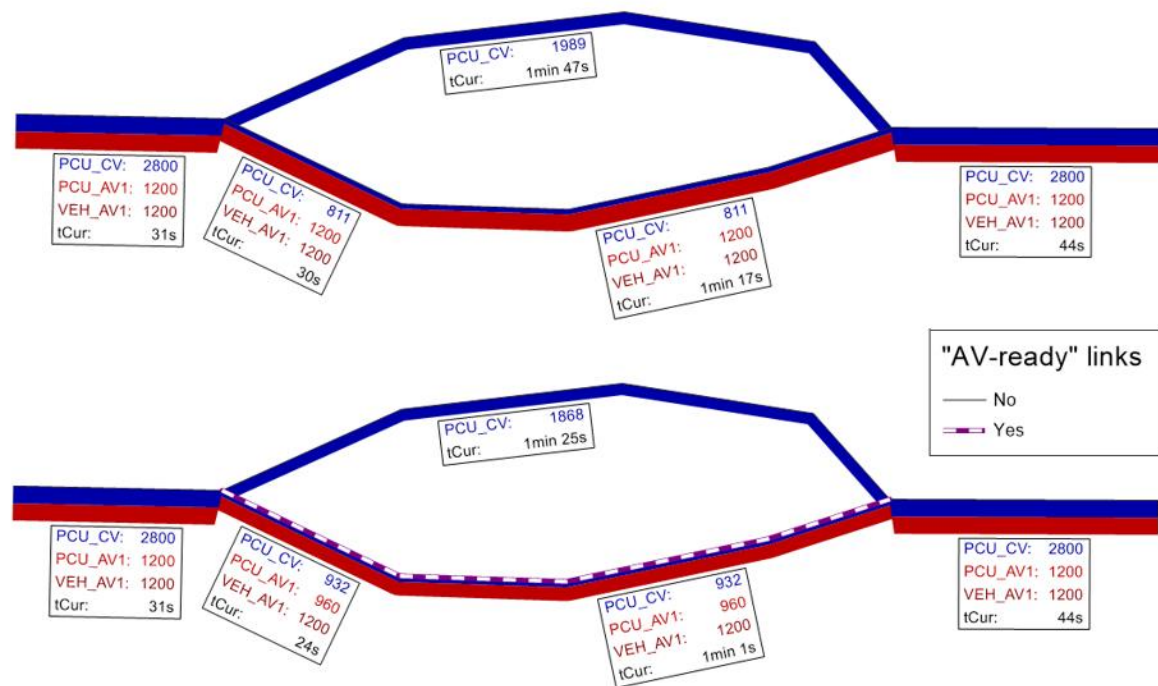
1.3 Modeling of autonomous vehicles (AV)

The requirement of modeling autonomous vehicles (AV) is also increasing in macroscopic models. The evaluation of scenarios investigates the influence of AV on capacity, travel time, and route choice. The underlying assumptions for modelling AV concern for example driving behavior or penetration rates.

Generally, driving behavior of AV differs from conventional vehicles. On road sections where Car2Car or Car2Infrastructure communication is possible, AVs can drive at predefined headways or form platoons. This, in turn, has an impact on the volume-capacity ratio and consequently travel times.

In static assignments travel times are determined by volume-delay functions (VDF) that define how travel time increases depending on the volume-capacity ratio. The higher the volume-capacity ratio, the longer the travel time. The consideration of AV has the effect that the input values for calculating travel times change. In contrast to conventional vehicles for AV different PCU factors apply. On 'AV-ready' infrastructure when AV can drive closer the PCU factor falls below a typical default. On sections, where this is not possible, AV drive like conventional vehicles. This characteristic of varying PCU factors must be considered in the VDF. To enable such flexibility the restrictions for the creation of user-defined VDF have been lifted. More specifically, user-defined attributes (UDA) can be used in such functions and also attributes of other network objects can be included using relations. This allows the investigation of scenarios with different AV vehicle classes and assumptions.

The effect on capacity, travel time and route choice is demonstrated in a simple example. Only one relation from zone 1 (left) to zone 2 (right) exists. In the following screenshot the upper picture shows the result of a static assignment without AV-ready infrastructure, i.e. AV behave like conventional cars represented by the transport system CAR. The demand of transport system CAR can choose between two routes. AV in contrast are only permitted on the lower route. The second picture below shows the result with two AV-ready links where for AV a PCU factor of 0.8 applies. This factor is lower than the standard value of 1.0 that is valid in other parts of the network. The comparison shows that travel time decreases on both routes and that some of the demand of CAR is shifted to the route with AV-ready links.



In the simulation-based dynamic assignment (SBA), travel times are determined by the simulation. Free-flow speed, effective vehicle length and the reaction time determine the car following behavior in the simulation. However, the reaction time is largely responsible for the time headway to the vehicle in front. For local adjustments, factors can be used for the reaction time. This concept has been expanded. In order to model the driving behavior of AV on 'AV-Ready' road sections, the factor for the reaction time can additionally be defined depending on the transport system of the leading vehicle. The reason for this is that AV behave differently among each other than an AV following a conventional vehicle. In this way, the influence of autonomous vehicles on capacity, travel time and eventually route choice can be examined in SBA.

1.4 Local calculation and modelling of relocation in tour planning for Ride Pooling Systems

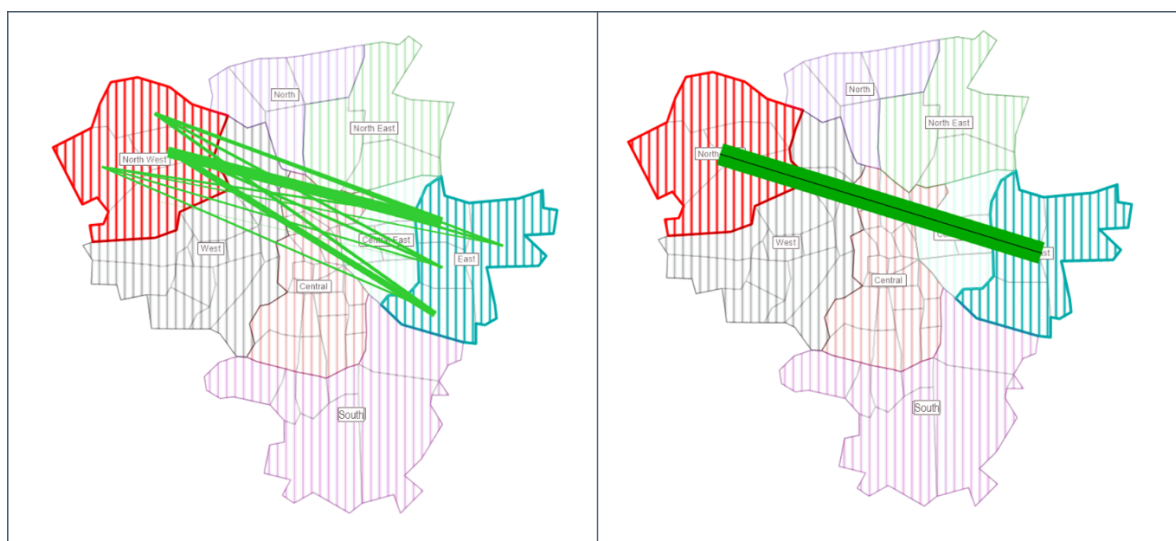
The procedure for tour planning of Ride Pooling trip requests can now be executed on the local computer as an alternative to the cloud-based computation. This can improve calculation times for individual scenarios. The local computation is not bound to a PTV MaaS Modeller user account, but is provided as a regular perpetual license covered by a new add-on module.

The tour planning procedure now also supports a basic vehicle relocation mechanism. Network nodes can be flagged as holding areas through attributes. Vehicles will return to the closest holding area after a selected idle time. From there they will be dispatched to new tours at a later time. Thereby, vehicles can be repositioned near to the relevant origins of demand. The holding areas can also serve as initial spawning sites for new vehicles, which may improve the realism of the assessment.

1.5 Experimental feature: Ride-Sharing Systems in combination with Public Transport - First & Last Mile Concepts

Studies show that Ride Sharing concepts are a sustainable offer for urban transport only in combination with conventional mass public transport. In order to evaluate the feeder function of ride-sharing systems (first & last mile concepts), the timetable-based assignment brings together the modes of conventional public transport and ride-sharing systems. Within an assignment, the transfer process is depicted, and the temporal and spatial consistency is considered. The results are intermodal connections including the passenger volume.

While the timetable-based assignment for conventional public transport follows macroscopic principles, Ride-Sharing systems can only be modeled sufficiently by microscopic simulations. In order to archive stable results for such systems, a large number of realizations, i.e. in this case trip requests and their characteristic values must be summarized. In addition, key values of Ride-Sharing systems are volume/capacity dependent. In the context of an assignment it is not justifiable to carry out multiple microscopic tour planings in each iteration for reasons of run times. Therefore, the average of the realizations is not obtained from several simulations, but from spatial and temporal aggregation. For this purpose, nodes are combined in larger areas. The aggregates of the characteristic values between and within these areas are used for the route search and choice within the assignment.



Aggregation of characteristics for microscopic trip requests

This method preserves the microscopic character of the Ride-Sharing and provides stable parameters for integration into the macroscopic assignment.

The determined characteristics serve for the evaluation of potential public transport path legs, which are carried out on the network of a chosen private transport system. If such a path leg is chosen, the next iteration will generate a trip request on this relation for microscopic trip planning. This will be the base for new characteristics. The single tour planning is thus fed by trip requests that start or end at transfer stops, but unimodal trips are still as well possible.

The results of the single tour planning can be saved file-based. Due to their aggregation, no single tour plan is consistent with the resulting assignment connections. An analysis of the tour plan, for example the one from last iteration, can, however, provide useful

information for an operational perspective on the Ride-Sharing system.

This new extension of the timetable-based Public Transport assignment is currently still experimental. While the full functionality is available and ready-to-use, the procedure does not always produce convergent solutions. In contrast to deterministic purely macroscopic methods, the simulation-based aspects of this procedure restrain smooth convergence. Instead, solutions can differ drastically between successive iterations. Therefore, results of the procedure should be assessed critically and possibly be underpinned by multiple calculations with varying parameters. We are looking forward to receive your feedback on the application of this new functionality.

2 Procedures

2.1 Remarkable speedup of highway assignments through new shortest path search

Considerable efforts were again undertaken to speed up highway assignments. This time the biggest change relates to the shortest path search. Here a new technique called Customizable Contraction Hierarchy has been applied. The changes affect nearly all private transport assignments – static and dynamic. The savings in run time depend on a number of factors. The following table shows factors of speed up for models of different size.

Model	Speed-up factor
Validate (Germany)	13.2
Stuttgart	7.2
London	2.8
Dubai	2.4
Philadelphia	2
Karlsruhe	1.9

2.2 Extended stability criteria for PrT assignments

In nearly all private transport assignments, the gap is the most important measure for convergence. However, it does not allow further analysis in which parts of the network and to what extent volumes and impedances, respectively, fluctuate in successive iterations.

For this reason, extended stability criteria have been introduced. Their use as termination criteria for convergence is optional. The definition of parameters is based on existing guidelines, e.g. WebTAG guideline for Highway assignment modelling in the UK. Thresholds for the relative deviations between volumes and impedances, respectively, of successive iterations can be defined together with the share of links and turns that must fall below these limits. The output of relative deviations for individual network objects allows to graphically display closeness of results between successive iterations. The evaluation of extended stability criteria can be restricted to active network objects, i.e. ruling out parts of the network with low importance.

The following figure shows the relative changes in volumes between two successive iterations for the network of Karlsruhe.



2.3 Base load in SBA

Like in static assignments, a base load can be considered in SBA. In contrast to static applications, the base load in SBA has a temporal dimension. The main purpose is to evaluate the effects of road-based public transport on general traffic. Busses usually result in a reduction of capacity. On the other hand, measures like the introduction of dedicated bus lanes can be investigated.

For the base load, one can either specify an attribute that is interpreted as the number of vehicles per hour or one can use an attribute with a sub-attribute of a time interval set or directly define the number of service trips per time interval from the PT operating indicators. Since the vehicles of the base load are considered in the simulation, a private transportation system must be referenced for which meaningful simulation parameters for the effective vehicle length and the reaction time are set. The base load is defined as part of the SBA procedure parameters.


Parameters: Simulation-based dynamic assignment (SBA) X

Basis | Assignment time interval | Volume balancing | **Base volume**

☒ Use base volume on links

*

Transport system: Bus Bus ▼

 Base volumes are hourly values. For time-dependent base volumes, choose an attribute with subattribute <Time intervals>. The base volume then refers to the respective time interval.

On links with a base volume, additional vehicles of the specified transport system are included in the simulation during the demand period.

2.4 Dynamic matrix correction for public transport

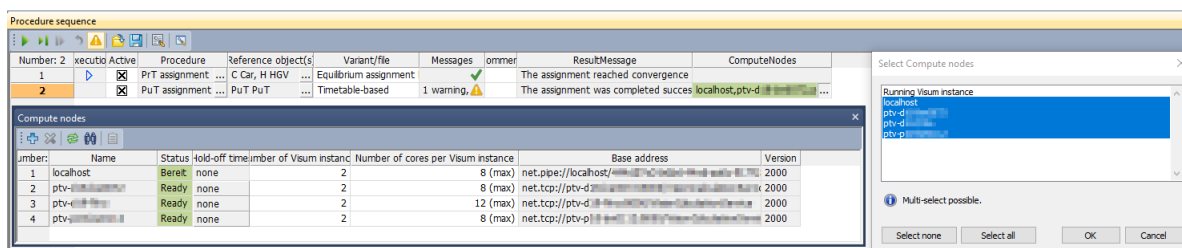
The procedure for dynamic matrix estimation has been extended to public transport. Demand matrices can be adjusted based on observed data, potentially also considering changes on the supply side. More specifically, you can correct matrices of demand segments that have been assigned using the timetable-based assignment. There are two preconditions for dynamic matrix correction in public transport. Passenger volumes must be stored for demand time intervals. Secondly, the demand time series must be based on a matrix time series.

In the procedure itself, the known options for the input data are available, i.e. link counts, boardings, alightings at stop areas, passenger kilometres etc. Observed input data can be stored as user-defined attributes (BDA) with reference to a user-defined time interval set in the model. During dynamic matrix estimation, this temporal information is taken into account when adjusting matrices from the corresponding demand interval.

2.5 Distributed computing of the timetable-based assignment

The timetable-based assignment is a dynamic assignment. It takes the coordination of the timetable into account and thus ensures precise results of the indicator calculation. The procedure determines connections for each OD relation and carries out a route choice of the demand. It's often used without considering capacity restraints.

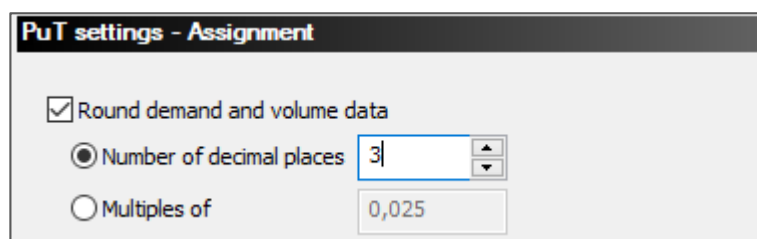
Due to these properties, the individual OD relations are not interdependent, and it is possible to perform their calculations separately. With Visum 2020 it is possible to use the already existing functionality of the distributed calculation within the timetable-based assignment. For this purpose, external computation nodes can be selected on which the relations are divided based on their origin zones. The computers receive the corresponding number of origin zones proportional to the processors available.



This considerably reduces the overall runtime of a larger timetable-based assignment. The runtime scales well with the number of selected cores.

2.6 Rounding in PT assignment

The method for rounding of passenger volumes in public transport assignments has been revised. A so-called “bucket”-rounding is used, which in particular ensures that the total demand does not change. The parameter for the number of decimal places has been increased and a new parameter has been introduced that allows rounding to multiple of a number.



With these changes, rounding can easily be used to reduce the number of routes. Post-processing of assignment results like flow bundle or skim matrix calculations produces consistent results based on rounded volumes.

2.7 Extensions for public transport operating indicators

In order to estimate the impacts on PT, operating indicators are determined that describe the operational and financial expenditure for offering public transport supply on the one hand and the expected revenue from fare collection on the other.

In Visum 2020, the scope of this impact model has been extended once again. Among other things, the PT operator is now available as a dimension in the detailed public transport territory evaluation. New key figures such as the ‘seat hour’ on the route can be evaluated. Hints for unusually long passenger trip chains are given in order to prevent misinterpretations and the evaluation of the results via the detailed PT territory list has been improved by the more flexible setting of the filter conditions.

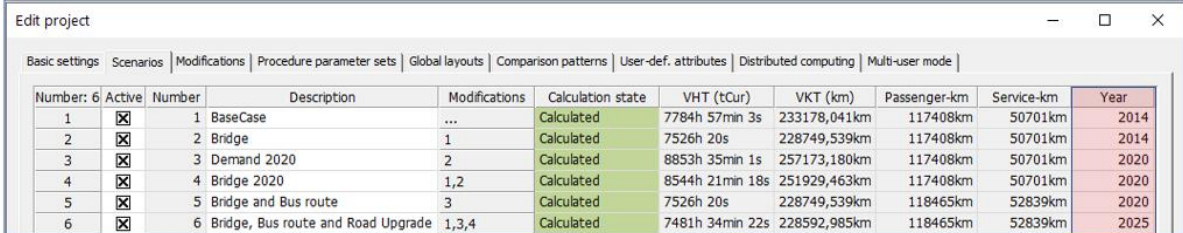
2.8 Integration of the recent HBEFA 4.1 for calculating emissions and fuel consumption from traffic

The latest version HBEFA 4.1 of the Handbook for emission factors was released by infras in September 2019. This major update incorporates many new measurements generated by the “Dieselgate” investigations and alternative propulsion technologies. Besides the update of many values and factors, the new version also comprises some structural adaptations. The set of traffic situations and levels of service has been extended, and the definition of some vehicle classes was refined. Due to these changes, the procedure parameters and other input values (e.g. the fleet compositions) need to be adjusted prior to recalculate emissions for an existing model using the HBEFA 4.1 emission factors. The set of available results has been extended by optional CO₂ emissions along the production chain, so called Well-to-tank (WTT) emissions.

PTV Visum 2020 will support the calculation of emissions using HBEFA 4.1 starting with an early ServicePack. Until the new methodology is available, the calculation of emissions will be generally disabled. The legacy HBEFA 3.3 is NOT supported.

3 Scenario management

For the scenario management, user-defined attributes (UDA) have been introduced for scenarios, modifications, and procedure parameter sets. The additional attributes allow to add additional information and are of huge benefit in large projects with numerous scenarios and modification. The user gains more overview and documentation. UDA enable sorting, grouping and editing like in lists. For easy access the corresponding functionality is available in the context menu. All UDA are listed in a specific new Tab, but can be created directly from the tabs of the corresponding objects too.



Number	Active	Number	Description	Modifications	Calculation state	VHT (tCur)	VKT (km)	Passenger-km	Service-km	Year
1	<input checked="" type="checkbox"/>	1	BaseCase	...	Calculated	7784h 57min 3s	233178,041km	117408km	50701km	2014
2	<input checked="" type="checkbox"/>	2	Bridge	1	Calculated	7526h 20s	228749,539km	117408km	50701km	2014
3	<input checked="" type="checkbox"/>	3	Demand 2020	2	Calculated	8853h 35min 1s	257173,180km	117408km	50701km	2020
4	<input checked="" type="checkbox"/>	4	Bridge 2020	1,2	Calculated	8544h 21min 18s	251929,463km	117408km	50701km	2020
5	<input checked="" type="checkbox"/>	5	Bridge and Bus route	3	Calculated	7526h 20s	228749,539km	118465km	52839km	2020
6	<input checked="" type="checkbox"/>	6	Bridge, Bus route and Road Upgrade	1,3,4	Calculated	7481h 34min 22s	228592,985km	118465km	52839km	2025

In addition, the database format of the scenario management project has been migrated to SQLite, because the previous format is no longer supported by Microsoft and has limitations for further development.

4 Graphics and handling

4.1 User-defined sets of time intervals

In Visum 2020 several time interval sets can be defined. Time intervals of one of these sets represent the analysis time intervals which are still used for outputs in dynamic applications.

The definition of analysis time intervals was subject to restrictions. More precisely, analysis time intervals could not overlap, and any aggregation must be based on existing analysis time intervals. For input data, e.g. counts, greater flexibility is required. In addition, any change to analysis time intervals inevitably results in deleting attribute values with this time dimension. For input data this is an undesired effect.

For this reason, some changes and extensions have been implemented. Time interval sets and time intervals are network objects and are no longer available in the general procedure settings. Access to time interval sets is available via the menu Network: the corresponding time intervals can be created and edited directly in the list.

Number: 3	No	Code	IsAnalysisTimeIntervalSet	Count: TimeIntervals	Min: TimeIntervals\StartTime	Max: TimeIntervals\EndTime	Distinct: TimeIntervals\Duration
1	1	AnalysisTI	<input checked="" type="checkbox"/>	18	06:00:00	09:00:00	10min
2	2	Counts 15	<input type="checkbox"/>	6	07:00:00	08:30:00	15min
3	3	Counts 30	<input type="checkbox"/>	3	07:00:00	08:30:00	30min

The analysis period and the time interval set that represents the analysis time intervals are defined in the network settings under Calendar and analysis period. Like before result attributes of procedures exist for analysis time intervals and can be animated in the network editor based on these intervals.

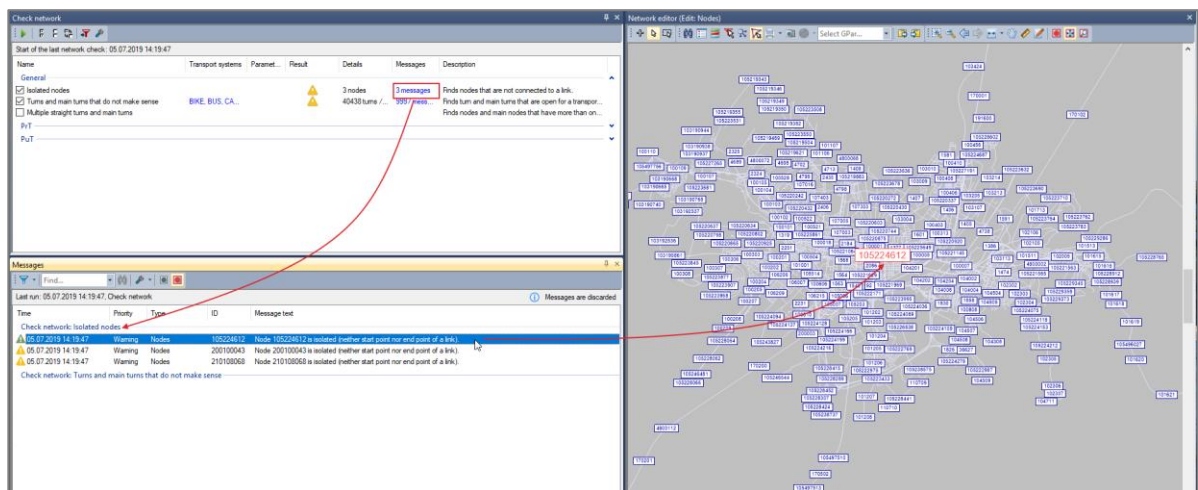
Aggregation over time intervals can be performed using several time interval sets. For example, you define one time interval set with intervals of 15min that represent analysis time intervals. Another set is used for observed count data that are available for 1h intervals. If you were to compare the observed 1h count data with the calculation results over 15min aggregation of results can be achieved using the functionality in the attribute selection dialog.

The screenshot displays the 'Links: select attributes' dialog box in the Visum 2020 software. The dialog shows a tree view of attributes for 'Volume PrT [veh]'. The tree includes 'Analysis horizon', 'Analysis period', 'Current time interval', and a list of time intervals (0600, 0615, 0630, 0645). Below these, there is a section for 'Zeitintervall aus Menge 3 6-9 60min' with sub-attributes for 'Min (...)', 'Max (...)', 'Sum (...)', and 'Avg (...)'. The 'Sum (...)' attribute is expanded, showing a list of time intervals (SUM:3\0600, SUM:3\0700, SUM:3\0800) with checkboxes. The 'SUM:3\0600' attribute is selected.

To the right of the dialog, a data table is visible. The table has columns for 'PrT(0615)', 'VolVehPrT(0630)', 'VolVehPrT(0645)', 'VolVehPrT(SUM:3\0600)', and 'VolVehPrT(AVG:3\0600)'. The data rows show values for various time intervals, with the 'VolVehPrT(SUM:3\0600)' column highlighted in red.

4.2 Interactive network check

For many transport modelling projects, it is necessary to check the global network quality. The redesign of the network check workflow improved the usability of the network check functionality by making it accessible through a tool window instead of a dialog. From the tool window it is possible to directly observe the effects of actions, like repairing and setting objects to active, right away in the network editor. The content of the tool window can be adjusted according to the users need, i.e. hiding irrelevant topics. The start of the last check and a description are displayed. A mouse click on messages opens the message window. Using the synchronization between the message window and network editor the critical network objects can be accessed quickly.



4.3 Editing of line routes

The ability to edit line routes has been enhanced in Visum 2020. Due to the multi-layer data model, line routes may be created that have elements which are not used by any vehicle journey. A smart shortening of all (active) line routes to the elements that are served by vehicle journeys is available. This serves for clarity and minimizes the susceptibility to errors.

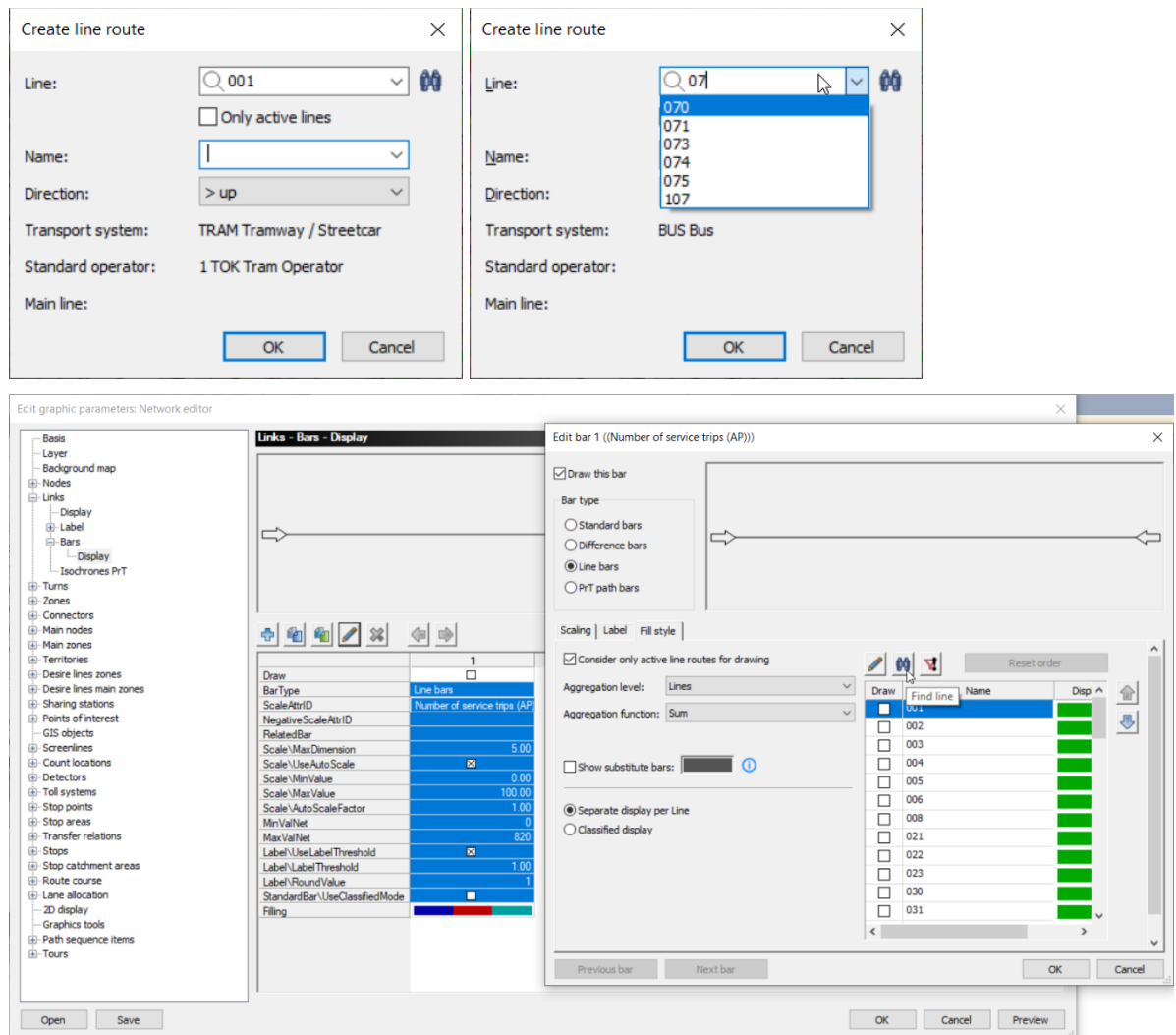
In addition, the use case that elements of an existing line route and their time profiles are reused for another line route has been greatly simplified. Instead of coding them identically, it is possible to copy parts of the line route and link them to existing line routes. The line routes to be linked to only require identical stop points at the end on one or both sides. The allocation of time profiles can be controlled by the user.

The identification of line routes has been simplified by the fact that the direction of travel of the line route is now displayed much more clearly. The correct selection of line routes is improved.

4.4 Easier workflows with search functionality

When modelling public transport supply the number of lines and stops can be quite large. To speed up work flows in models with many lines and stops, search options are included at more places.

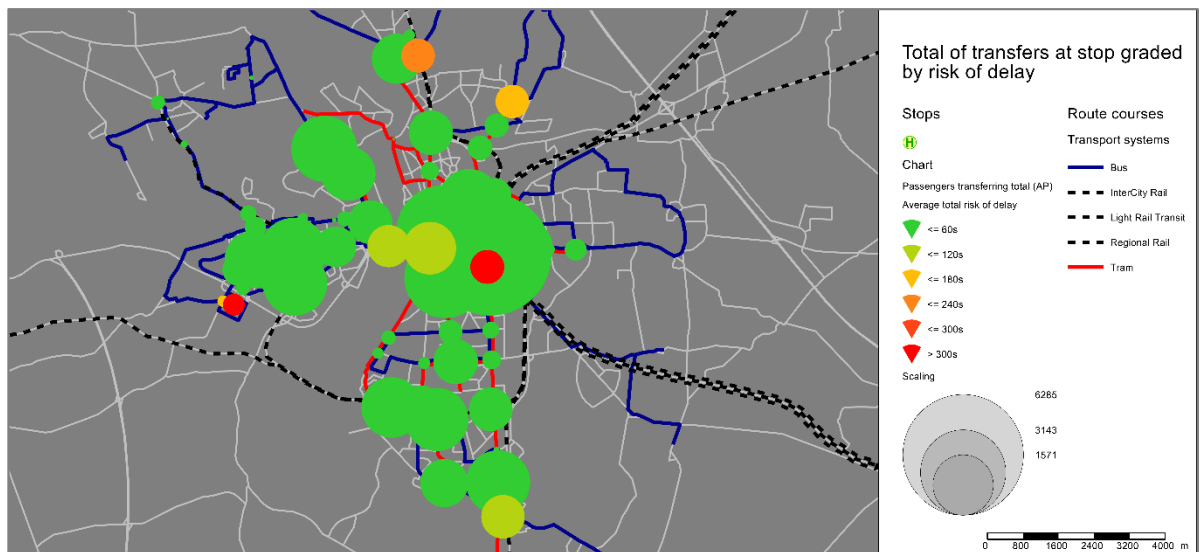
When creating a line route, the corresponding line can be selected by starting to type the part of the line number. This is much faster than scrolling through lists and then selecting the corresponding line. Further the selection for displayed and non-displayed line bars in the graphic parameters has been improved. Furthermore, relevant stops for fare zones can be selected more quickly by searching for them.



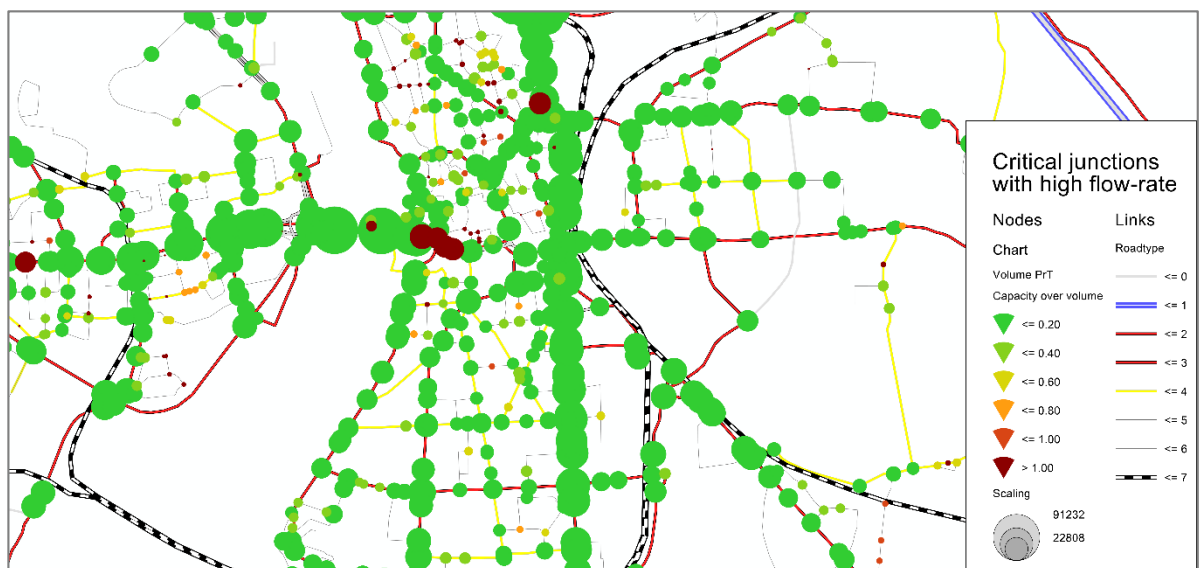
4.5 Diagrams for displaying two dimensions

Analysis often includes more than one criterion. To focus on the important parts in the network right away, diagrams can be scaled by one attribute value and colored by a second attribute value.

For public transport this can for example be useful to display the number of transfers at a stop and color the pie charts according to the average wait time at the stop.



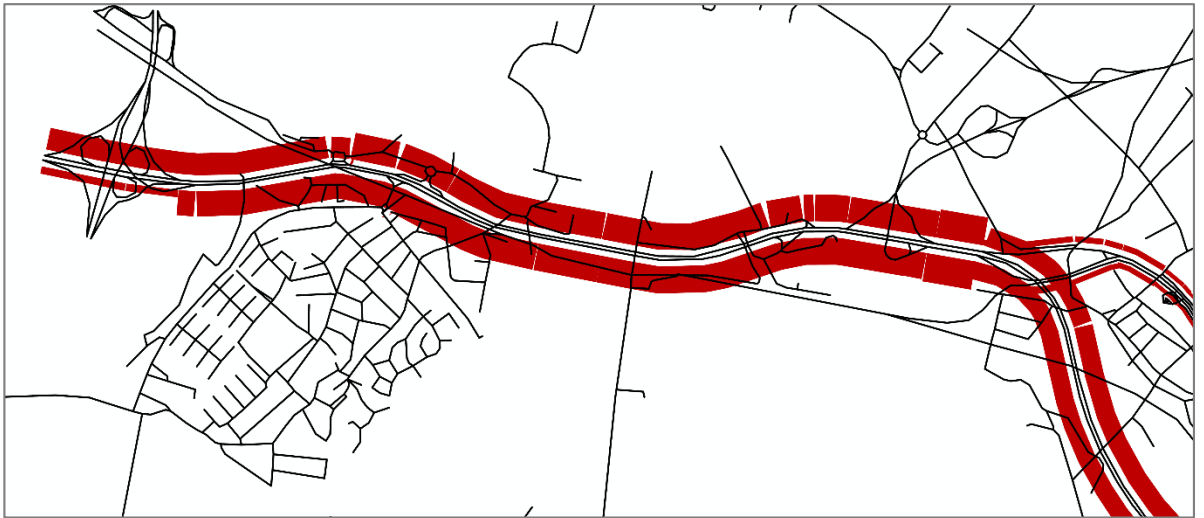
Concerning private transport, pie charts can be displayed at every node. When scaling them by the total volume and coloring them by the volume-capacity ratio, critical junctions can be identified.



4.6 Display of link bars

Link bars are an important visualisation especially for link volumes. At nodes with many legs it was possible that link bars were overlapping, not displayed correctly or had gaps between them. By improving the algorithm for drawing link bars the gaps are gone and the network-wide view on link bars looks a lot smoother.

Before link bars were not automatically connected.



For a smoother picture the link bars are now always connected.



4.7 Special functions on selections

Up to now, special functions in the network editor could only be executed for one object, all active objects, and all objects. For example, when editing surfaces of multiple adjacent zones by hand the recalculation of the centroids had to be executed for each zone separately.

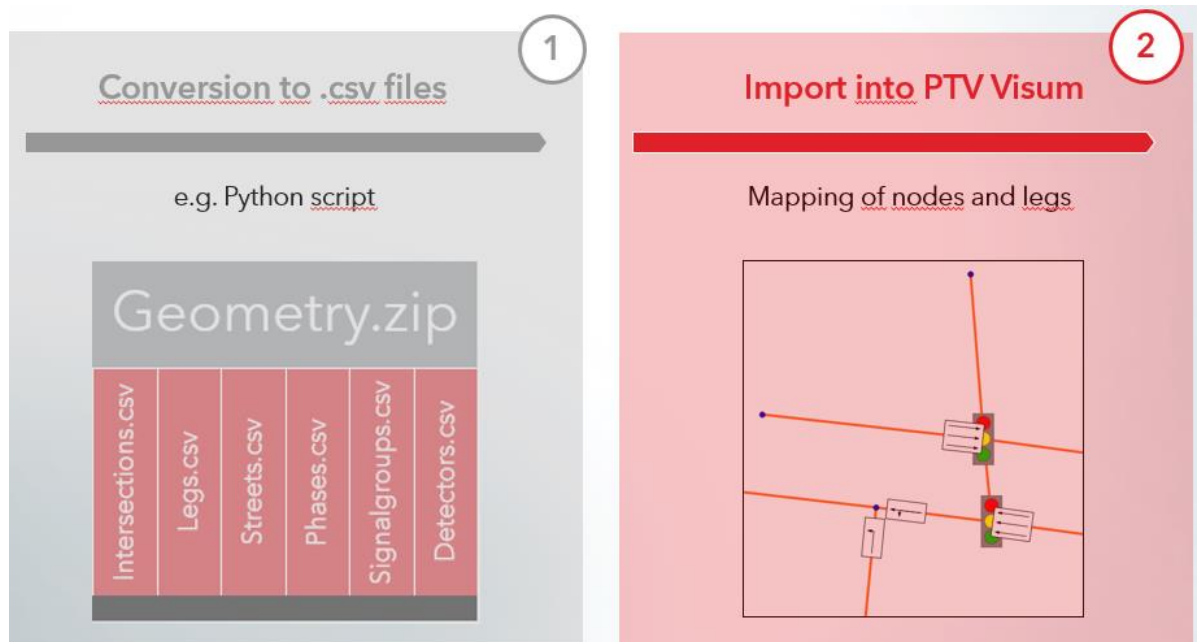
This uncomfortable workflow is improved by offering the execution for all special functions also on manually set selections. Now it is easily possible to select e.g. all edited zones and choose the context menu entry 'Recalculate the centroids'.

5 Add-Ins, interfaces and COM

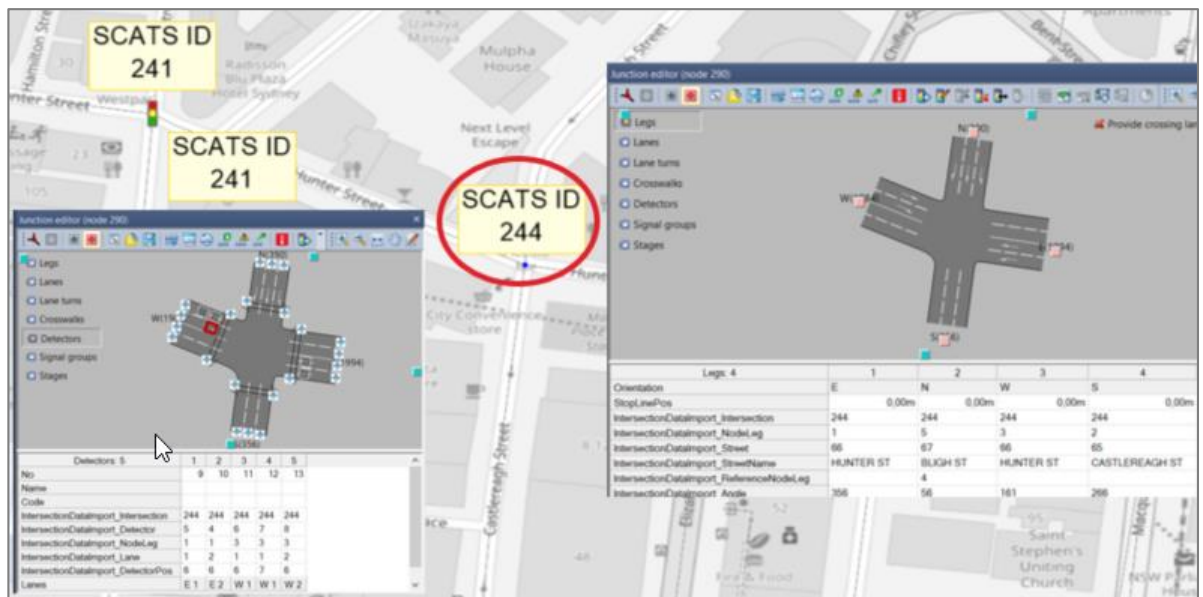
5.1 Intersection data import

More and more applications benefit directly from the fact that junctions are coded in detail. For example, assignments like SBA or assignment with ICA can consider junction impedances based on geometry and control. The interface to PTV Vissim automatically generates simulation-ready networks if junctions in Visum have all the required attributes set. However, the efforts to manually code junctions are a significant part of network building process. To considerably reduce these efforts, the intersection data import has been implemented. In its current form, the import reads mainly geometry data.

The import of junction data is a two-step process. First, the original data must be converted to .csv files. This step is outside Visum and can be undertaken using a script. The second step is the intersection data import in Visum, where these .csv files are imported as .zip archive.



The .csv file contain a number of necessary attributes, others are optional and can be evaluated during the import. All data are taken over as user-defined attributes (UDA). This is also the case for additional columns which are not needed for matching algorithm. In other words, it is also possible to read count data of detectors to the target network. The matching of intersections can be coordinate-based and/or done by allocation of node UDA. As a result of the import, the junction geometry is changed, i.e. the number of inbound and outbound lanes is adjusted, lane turns are generated, crosswalks and detectors are created, signal groups and their allocation to stages are defined. The following figure shows results of an import of data from SCATS. The screenshots of the junction editor show details of the mapping of legs and detectors.



5.2 Support for Python 3

On January 1st, 2020, the Python Software Foundation will officially discontinue support for Python 2.7. From then, only the current Python 3.7 version will be maintained. So far, Visum only allowed to execute scripts and Add-Ins designed for Python 2.7 and provided the necessary run time and libraries. As the two versions are not fully compatible, existing scripts may not run in a Python 3.7 environment without changes.

In order to comply with the ongoing evolution of the Python platform, Visum now allows to also execute scripts and Add-Ins designed for Python 3.7 and provides the corresponding Python environment. For the time being, the legacy Python 2.7 version will be supported and installed in parallel. Therefore, the Visum setup now installs both versions of the Python runtime as well as the Python libraries and the VisumPy package in recent versions for both variants.

The default Python environment used for starting scripts through the script menu, through COM or through the command line is now Python 3.7. This can be changed through a setting in *User preferences/Working environment/Script files*. The scripting environment for running an Add-In is configured individually through an XML structure in the corresponding *.vai file.

For the procedure "Run script", the environment - including some other scripting languages like VBS - can be selected for each procedure individually. Thereby, even different environments can be used in a single procedure sequence. In order to avoid breaking existing models, this defaults to Python 2.7. Thus, most existing procedures using Python scripts can be run without adapting the script code – although we strongly advice to update the scripts to Python 3.7 for future maintenance.

5.3 Virtual Python environment compatible to venv

The Python environment provided by Visum includes a set of useful Python libraries, which can be used by Scripts and Add-Ins. In order to provide a reliable setting, these libraries are installed in the Visum installation folder and thus outside the system Python installation path. When those libraries shall be referenced in scripts started outside Visum or during script

development in an IDE, it is required to adjust the search path for libraries used by Python. Up to now, this could be achieved by using the `SysPath` module provided by PTV and incorporate this in the source code. In order to simplify this, a virtual Python environment called “*PTV Visum 2020*” compatible with the standard `venv` tool is now created during the installation. In many modern Python IDEs, this can be selected for running the scripts, so changes to the script code are no longer required.

5.4 Changes to the COM interface

The changes related to time intervals (see section 4.1) also imply some changes to the related COM-APIs. The COM object `IAnalysisTimes` has been removed and replaced by the new type `ITimeIntervalSet`, which is accessed through function on `Visum.Net`. The obsolete functions for `IAnalysisTime` (e.g. `Visum.Procedures.Functions.AnalysisTimes.TimeInterval`) are still provided for backward compatibility, but will be removed in future versions. Scripts using these functions should be adapted.

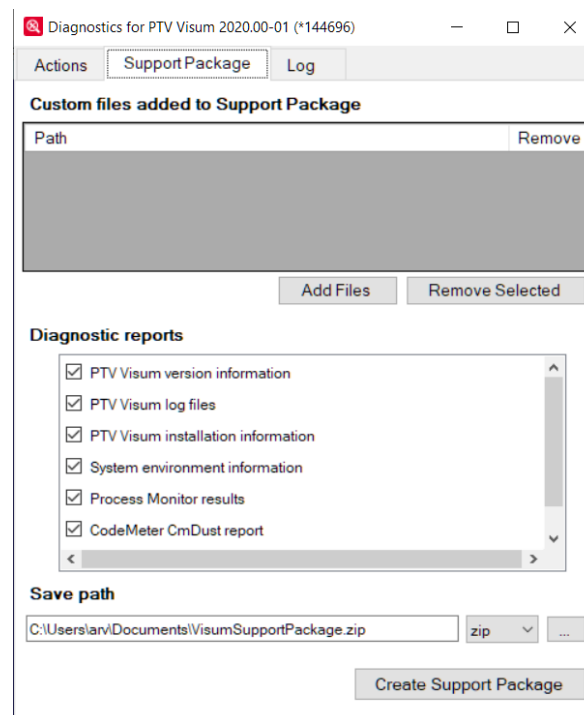
The method `AddUserDefinedAttribute` (provided for many object types) now expects string values for the parameter ‘*subAttr*’ instead of numbers. The parameter can thereby now refer to any custom time interval set.

6 Technical changes

6.1 Diagnostics for Support

When PTVs customer support deals with support cases, some background information (e.g. operating system, ...) and files (e.g. log files) are typically required. In order to facilitate this, we now provide a tool which collects the relevant information and composes it in a support package which can be provided along with the support request.

In order to launch this tool, type “*Diagnostics for PTV Visum 2020*” in the search field of the Windows start menu. It is not required to start Visum for this. The user interface of the tool is displayed.



Change to the page “*Support package*”. You can select the relevant information in the list “*Diagnostics Reports*” – usually, the pre-selection should not be altered. The button “*Add Files*” allows to include further files which might be helpful for analysing the support case (e.g. screen shots, input files, ...). After pressing the button “*Create Support Package*”, the selected information is acquired and stored in the specified file.

On the page “*Actions*” the support tool provides some further useful functionality.

6.2 End of Life for legacy MS Windows operating systems

The products of the PTV Vision Traffic Suite are supported and tested by PTV only on the Windows operating systems with active Extended Support by Microsoft. Details on the support lifecycle are provided by Microsoft in the [Windows Lifecycle Fact Sheet](#).

On January 14th, 2020 the support for the operating systems MS Windows 7, MS Windows Server 2008 and MS Windows Server 2008 R2 by Microsoft officially terminates. MS

Windows 8 is only supported after updating to MS Windows 8.1. Older versions of MS Windows 10 are consecutively dropped from support. Similar rules apply to the related MS Windows Server operating systems. In accordance with these changes, the products of the Vision Traffic Suite will no longer officially support legacy operating systems. PTV will discontinue to test and support the operation of its software on these platforms.

6.3 Selectable user interface languages

The languages offered for the user interface are no longer controlled through the license. All available languages can be selected, independent of the license. The completeness of the translations cannot be guaranteed for all languages; thus, some elements might appear in the fallback language – usually English.

Online help, manuals etc. are still provided in a subset of the supported languages.



the mind of movement

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