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2021.01-05 [162571]

2021-02-16

## + New Features and Changes

### COM-API

- + Accelerating the aggregation of line routes; The aggregation of line routes via COM has been accelerated. **(21849)**
- + Access to legend graphic parameters: A new LegendParameters method has been added to the INet, IGraphicalTimetable, and ISchematicLineDiagram COM objects to access the graphic parameters of the network editor, the graphical timetable, and the schematic line diagram. **(19400)**
- + Allocating vehicle units to vehicle combinations: The new 'AddVehicleUnit' and 'RemoveVehicleUnit' methods at IVehicleCombination can be used to allocate vehicle units to a vehicle combination or to remove the allocation again. **(13645)**
- + Usual container functions at ITerritoryPuTDetails: At the network object container ITerritoryPuTDetails the methods GetMultipleAttributes, Count, CountActive, RemoveAll, AddUDA, and DeleteUDA that are common for such containers were added. However, the ItemByKey method, which is also common at such container objects but differs individually, does not exist, because the quantity of relevant key attributes for this object depends on the resolution set during the calculation. **(13515)**

### Graphics

- + Screenshot for print area: The export of raster graphics from the network editor ('Screenshot' function) can now alternatively be executed for the set print area instead of for the currently visible image section. This allows creating reproducible graphic outputs, e.g. for differently set graphic parameters. **(21683)**

### Ride Sharing

- + Import from PTV MaaS Modeller: The import of tour plans calculated with the web application requires the use of this service pack starting with the first PTV MaaS Modeller deployment in 2021. **(22131)**

## ✓ Fixed Bugs

### Activity Profile

- ✓ Crash when changing the temporal distribution: A crash no longer occurs when changing the temporal distribution of an activity profile as long as the calculation of the data to be displayed is still running in the background. **(22261)**

### Add-Ins

- ✓ 2D isochrone -> POI adopts only one value: If several travel times were specified in the dialog of the add-in '2D isochrone -> POI' (in the procedure sequence or via the script menu), only the first of these values was transferred and accordingly only one POI was created. This error has been fixed. **(21976)**

### COM-API

- ✓ Aggregate vehicle journeys did not consider the set of objects: If the 'Aggregate' method was called at an IVehicleJourneys object, all (possibly active) vehicle journeys of the network were always aggregated and not only those contained in the IVehicleJourneys container. This error has been fixed. **(22220)**
- ✓ Interface update after setting the analysis time interval set: When setting the analysis time interval set via COM, the user interface was not updated, i.e. the time intervals of the new analysis time interval set were not available for selection in the drop-down list of the current time interval. This error has been fixed. **(22227)**
- ✓ Multiline header in print frame: It is now also possible to show a multiline text as a header in a print frame using COM (as before via the dialog). **(22067)**

## Data Model

- ✔ Licensing of the mode attribute 'Interchangeable': The attribute 'Interchangeable' of the mode is used within the tour-based demand model, but was previously not activated for the add-on Tour-based demand model. This error has been fixed. **(22230)**

## Dialogs

- ✔ Combination of DRT and Fail to board: In the dialog of the timetable-based PuT assignment, it was previously possible to combine Fail to board with the use of DRT systems, but the procedure could not be executed in this combination. The dialog now prevents this combination, and if procedure parameters are displayed in which this combination is already set, a warning is issued in the dialog and the setting is changed. **(22100)**
- ✔ Incorrect position when inserting procedure parameters: If a specific position is selected when reading procedure parameters additively and then 'Start of the process sequence' is selected again, the procedure steps have nevertheless been inserted at the position selected first. This error has been fixed. **(22219)**
- ✔ Unhandled exception after attribute selection: : If a dialog was exited after clicking an attribute selection contained in it to open the expanding attribute selection, an error dialog appeared (but no crash occurred). This error has been fixed. **(22160)**

## Formulas

- ✔ Formula attributes with subattribute and placeholders: If a formula attribute with subattribute AHPI (this is the only allowed subattribute dimension) is defined by a formula in which another attribute with subattribute API or AI is used through placeholders, the definition for the subattribute values AH or for AH and AP is 'missing'. This caused various problems and messages. This bug has been fixed in that such a formula is now defined by definition for AH (and AP) as well, where the value for these subattribute values is always the empty value. **(21995)**
- ✔ Infinite loop when updating formula matrices with warnings: If warnings occurred when updating multiple formula matrices, for example, because a demand segment of the specified code no longer existed, an infinite loop could occur, causing the user interface to stop responding. This bug has been fixed. **(22270)**

## Graphical Procedures

- ✔ Crash when frequently calculating PrT flow bundles: No more crash when calculating PrT flow bundles numerous times (> 300) within the same session. **(22166)**

## Graphics

- ✔ Cross-section values for transfer relations: When displaying transfer relations in the network editor, the value of one of the two directions was displayed instead of the sum when using the 'Use cross-section values' option. This error has been fixed. **(22234)**

## I/O Interfaces

- ✔ Invalid line routes when using the import 'PuT supply from Visum': Using the import 'PuT supply from Visum' invalid line routes can arise when inserting stop points on links is allowed during the import in the target network and then in the context of editing a line route such a stop point is inserted on the link which is already crossed by a routed part of the same line route. This error has been fixed. **(21926)**
- ✔ Suppress error messages during Emme import: During the Emme import, messages about lines that could not be read could not be suppressed, but had to be confirmed individually. This error has been fixed. **(22199)**

## Installation

- ✔ Note to CodeMeter manual: For licensing errors PTV Visum refers to the CodeMeter manual. So far, however, the reference has been made to an CodeMeter overview document instead of the manual itself. This error has been fixed. **(22249)**

## Matrix Estimation

- ✔ Dialogs with relative paths: In the parameter dialog of the procedure 'Demand matrix correction' a direct entry of the file name for the result or flow matrix has not been accepted when exiting the matrix selection dialog. Consequently, it was impossible to specify a relative path for the file. This error has been fixed. **(22143)**

## Network Editor

- ✔ Lost access nodes when simplifying node-link network for public transport: When executing the multi-edit special function 'Simplify node-link network for public transport' access nodes of stop areas got lost. This error has been fixed. **(22154)**

## Other Procedures

- ✔ Incomprehensible error message when optimizing the signal offset without relevant conditions: If there are no relevant relations between the different signal groups of signal controls to be optimized, for example, because the volume is too small or the distance is so large that it can be assumed that the platoon is dissolved, then there are no relevant conditions for the optimization of the signal offset time. The execution of the procedure 'Signal offset optimization' provided an insufficient error message in this case. It has been improved so that the case can now be identified. **(21968)**

## PrT Assignment

- ✔ UDA to control lane choice in SBA: A network UDA (ID 'SBAUseLaneChoiceLookaheadForPockets') of type Bool can be used to control lane choice on approaches with pockets and separated right turns. If this attribute is 'true', vehicles entering the link will choose lanes that allow them to turn at the To-node of the link according to their route. If this attribute is 'false', the behavior corresponds to the current default, i.e. the lane choice only takes into account the turning possibilities at the following node. In particular, this also includes internally generated nodes, e.g. at the beginning of a pocket. If there are several pockets and/or separate right turns, unrealistic lane changes may occur. The behavior for 'true' changes the results of the SBA assignment and corresponds to the behavior that applies in PTV Visum 2022. **(21780)**

## Procedure Sequence

- ✔ Crash when executing the procedure sequence while editing an input field: No more crash when executing the procedure sequence and an input field (e.g. file name) has not been properly quitted after editing. **(22024)**

## PuT Assignment

- ✔ Crash when calculating a skim matrix for stop areas with a formula matrix as demand: No more crash when executing the procedure 'Calculate stop area skim matrix' if the demand of the selected demand segment is defined by a formula matrix. **(22134)**

## Ride-Sharing

- ✔ Import from MaaS Modeller with different target attributes failed: The import from MaaS Modeller failed if attributes with different names were selected for the induced volumes of links, turns and main turns from PrT paths of ride sharing vehicles. This error has been fixed. **(22204)**

## Visum Files

- ✔ Crash when reading old model transfer files with deleted nodes that are used in paths: No more crash when reading model transfer files saved with PTV Visum 2020 or earlier versions which contain deleted nodes that are part of PrT paths. **(22194)**
- ✔ Warning when reading attribute files that cannot be read: Certain attribute files cannot be read. When saving such files a corresponding hint is given. However, when reading such files the error message was not clear. This error has been fixed. The message now states that tables of the type found in the file cannot be read. **(21950)**

## ❗ Breaking Changes

### COM-API

- ❗ Accelerating the aggregation of line routes; The aggregation of line routes via COM has been accelerated. As a result the naming of the resulting network objects changes. The interactive aggregation of line routes is not affected. **(21849)** [+](#)

2021.01-04 [161275]

2021-01-13

## + New Features and Changes

### COM-API

- + Indirect attributes allowed in export via TableAttrSelection: Indirect attributes can now be exported in the Save...UsingTableAttrSelection export methods (including the discontinued Save...UsingLayout methods), which allow controlling the exported tables and attributes via the ITableAttrSelection object. **(21953)**

- ⊕ Renaming of Save...UsingLayout: The Save...UsingLayout methods (e.g. SaveNetUsingLayout) at IIO and IVisum determine the set of tables and attributes to be saved from an ITableAttrSelection object. However, their naming has led to the misunderstanding that a layout file is necessary. Therefore they were renamed according to the scheme Save...UsingTableAttrSelection. The previous methods are deprecated and will be removed from the COM interface in one of the following main versions. **(21963 !)**

## Demand Procedures

- ⊕ Misleading message regarding convergence in tour-based model: If the so-called rubberbanding was used in the procedure 'Tour-based model - Combined trip distribution / mode choice', an additional balancing procedure is executed, which is independent of the set maximum number of iterations. Outputs for convergence and the number of iterations of this internal support procedure are no longer output as a note to avoid confusion with the notes on the convergence behavior of the main procedure. **(22044)**

## Lists

- ⊕ Aggregation and export of the PrT path on link level list accelerated: Both the calculation of the aggregation classes when grouping the list PrT path on link level and its export have been accelerated significantly. **(22026)**

## PuT Assignment

- ⊕ No rounding by default: The defaults of the general procedure settings with reference to the PuT assignment have been changed. In particular, rounding is no longer carried out by default, since any rounding leads to methodological difficulties and should only be used if it is inevitable for reasons of memory requirements. The defaults only have a direct effect when a new network is created. **(22064)**

## Visum Files

- ⊕ Warning in case of loss of valid days when importing version files: When importing a version file, valid days contained in it were lost if the add-on module 'CAL' for the calendar did not exist. A warning now indicates this fact when opening the file, which actively changes the data. **(21792)**

## ✓ Fixed Bugs

### Data Model

- ✓ Incorrect adjustment of the origin lane when changing the number of lanes of a link: If a link had several outer pockets at a node, the origin lane for the pockets was not correctly adjusted when increasing the number of lanes of this link, so that a pocket came to be located between the through lanes, which is a forbidden constellation. This error has been fixed. **(22046)**
- ✓ Planned connecting journeys crash: No more crash when displaying planned connecting journeys (e.g. in the list) if the network was previously changed in such a way that the line route items still existed at the respective alighting and boarding point of the planned connecting journey, but there was no longer a stop at a stop point at this location. **(22077)**

### Dialogs

- ✓ Crash when creating a zone time series: A crash no longer occurs when creating a time series for a new zone type relation while editing a demand time series. **(22148)**
- ✓ Incorrect handling of invalid matrix references: In some dialogs where matrix references are used (e.g. in the 'Edit time series' dialog in case of a matrix time series), the matrix references returned an incorrect set of matrices if the descriptive formula of the matrix reference was invalidated by editing. This error has been fixed. **(21448)**

### I/O Interfaces

- ✓ Crash in railML import: The railML import no longer crashes if, in the target network, no stop point could be allocated to all OCPs of the route course in the railML dataset for a vehicle journey to be created. **(21997)**
- ✓ Incorrect routing during OSM import: During the OpenStreetMap import with the configuration 'Import Public Transport Network', incorrect routings could occur because previously inserted line routes preferably followed the route course of previously inserted line routes, even if no further information was provided on their routing. This bug has been fixed. **(22063)**
- ✓ Split links during shapefile import: If during shapefile import of polylines as links a link was split because of loops or parallel links, its attributes were transferred to both new links so far instead of splitting the length-dependent attributes proportionally to the lengths. This bug has been fixed. **(20301)**

## Lists

- ✔ Calculation of aggregation classes: When grouping was set in lists, in various cases the recalculation of aggregation classes was carried out unnecessarily, for example when adding or removing columns that were not subject to grouping. This error has been fixed. **(17424)**
- ✔ Crash due to marked transfers: A crash no longer occurs when closing the list 'Passenger transfers stops / time profiles' if a transfer object is marked in it and the synchronization of the list is activated. **(22076)**
- ✔ Double deletion causes crash: Marking any network object in a list and pressing the 'Delete' key twice caused a crash when the command history was turned off. This bug has been fixed. **(22010)**
- ✔ Missing derived markings for connecting journeys: For connecting journeys and planned connecting journeys, the derivations of used transfer walk times between transport systems, lines/directions, time profiles, and walk times between stop areas were missing. These have been added. **(22080)**

## Lists, Visum Files

- ✔ List layouts in upper case: If the extension \*.llax of a list layout file was capitalized, the layout file was not listed in the selection list for list layouts found in the project directory. This error has been fixed. **(22070)**

## Matrix Editor

- ✔ Calculation of dynamic aggregation too slow: The calculation of dynamic aggregation in the matrix editor was unnecessarily slow and has been accelerated significantly. **(21783)**

## Network Editor

- ✔ Crash when moving a stop point: A crash no longer occurs when moving a stop point from one link to another. **(22090)**

## PrT Assignment

- ✔ Assignment with 0 iterations no longer possible: The (classical) equilibrium assignment could no longer be used to adjust the route volumes to a changed demand by using the existing solution as initial solution and the value 0 as number of iterations, because it was no longer possible to enter the latter in the dialog. This bug has been fixed. **(22137)**
- ✔ Assignment with ICA: A crash could occur, if there existed node legs that were ignored in the ICA calculations. This specifically happens, if there are PuT node legs. The crash occurred on signalized nodes with the analysis method HCM, 6th Edition. This error was fixed. **(22155)**
- ✔ Correction of origin lanes of pockets: No further through lines or pockets of other origin lanes may be located between a pocket and its origin lane. However, such constellations could arise by subsequently changing the number of through lanes (see ID 22046). Since such constellations lead to problems especially in the simulation-based assignment (SBA), they are now corrected by changing the origin lane when the version file is imported. **(21991)**
- ✔ Results related to queues in ICA calculation of signalized nodes: For signalized nodes, results of the ICA calculation that refer to queues were not output correctly. This error has been fixed. **(21981)**

## PuT Assignment

- ✔ Transport system-dependent skims with wrong code: For the transport-system-dependent skims 'In-vehicle distance-TSys(VSys)', 'In-vehicle distance-TSys [%](VSys)' and 'In-vehicle time-TSys(VSys)' calculated in the PuT skim matrix calculation, the transport system code converted to capital letters was used for the code of the (found or generated) skim matrix. As a result, in models generated with Visum 18, the existing matrices were no longer updated, but new ones with capitalized code were generated. This caused the demand model to use skim matrices that still existed but were no longer up-to-date. This error has been corrected by, on the one hand, using the code again as it was written and, on the other hand, checking for the existence of skim matrices with capitalized code. **(21972)** 🚫

## Visum Files

- ✔ Reading of global layout aborts: Reading a global layout file aborted if a stop of a stop sequence included in it did not exist in the network. This error has been fixed by now reading the other parts of the global layout file (including the stop sequence, but without the affected entries in it). **(22078)**

## 🚫 Breaking Changes

### COM-API

- ❗ Renaming of Save...UsingLayout: The Save...UsingLayout methods (e.g. SaveNetUsingLayout) at IIO and IVisum determine the set of tables and attributes to be saved from an ITableAttrSelection object. However, their naming has led to the misunderstanding that a layout file is necessary. Therefore they were renamed according to the scheme Save...UsingTableAttrSelection. The previous methods are deprecated and will be removed from the COM interface in one of the following main versions. Program code that still uses the previous method names will then no longer be executable. **(21963)** [+](#)

## PuT Assignment

- ❗ Transport system-dependent skims with wrong code: For the transport-system-dependent skims 'In-vehicle distance-TSys(VSys)', 'In-vehicle distance-TSys [%](VSys)' and 'In-vehicle time-TSys(VSys)' calculated in the PuT skim matrix calculation, the transport system code converted to capital letters was used for the code of the (found or generated) skim matrix. As a result, in models generated with Visum 18, the existing matrices were no longer updated, but new ones with capitalized code were generated. This caused the demand model to use skim matrices that still existed but were no longer up-to-date. This error has been corrected by, on the one hand, using the code again as it was written and, on the other hand, checking for the existence of skim matrices with capitalized code. Models created with previous service packs of PTV Visum 20 or PTV Visum 21 do not work as before if skim matrices are newly created but matrices with a capitalized transport system code are expected in matrix references. **(21972)** [✓](#)

2021.01-03 [160422]

2020-12-01

## [+](#) New Features and Changes

### COM-API

- [+](#) Access to the lists for table definitions and table entries: COM access has been added to the lists for table definitions and table entries. **(21940)**

### I/O Interfaces

- [+](#) Truncated column names during database export: During database export, long column names, as they occur mainly for indirect attributes, are now truncated depending on the possibilities of the target system. For SQLite export, this means that column names are no longer truncated. If truncation is required, the truncation is now done from the middle, so that the attribute remains more easily recognizable. **(21670)**

### Lists

- [+](#) Note on changes of the active state in List Territory PuT detail: In the 'Territory PuT detail' list, the note in the header about differences in the active state between the time of calculation of the displayed objects and the current state was not always updated correctly, e.g. when modifying the filter. This error has been fixed. **(19372)**
- [+](#) Reference object 'Location' in list of persons: A new button in the list of persons allows you to choose whether the reference object 'Location' should filter those persons who use this location as a household or for one of their long-term choices. **(20528)**

### Main Window

- [+](#) Dynamic (window-specific) highlighting of menus: The menu displayed behind the 'Help' menu, whose title and content refers to the window that currently has the focus, is now highlighted. **(16910)**

### PuT Line Blocking

- [+](#) Warning for empty trips of 0s duration: If empty trips of 0s duration were possible in the network between relevant stop points, i.e. the start and end stops of vehicle journey sections and, if applicable, depots, line blocking led to unexpected or unusable results. In most cases this is a data error, because the attribute t-PuTSys is not maintained at links. During line blocking a warning is now issued, which indicates the affected stop point relations. **(21994)**

## [✓](#) Fixed Bugs

### 3D Graphics

- [✓](#) Crash in 3D network editor with background maps: The program no longer crashes when executing certain procedures with the 3-D network view open at the same time if background maps are used in that view. **(22047)**

### COM-API



- ✔ Problems creating Python cache files in Python 3: In Python 3, sometimes a Python cache file could not be loaded. This error has been fixed. However, since the bug is contained in Python (more precisely in the pywin32 package), it cannot be fixed by installing a Visum update. In this case, please download the VisumPython installation package again and re-install it. **(21898)**

## Data Model

- ✔ Automatic link orientations incorrect: When resetting the calculation method for orientations at the node to automatic, the original orientations were not always restored. This error has been fixed. **(21838)**

## Demand Procedures

- ✔ Non-deterministic results in tour-based model: The procedure 'Tour-based model - Combined trip distribution / mode choice' could produce unstable mode choice matrices under certain circumstances, i.e. the results differed slightly for runs with identical input data. This error has been fixed. **(21474)**

## Dialogs

- ✔ Creating an alias in attribute selection inserts attribute: If an alias was created in the attribute selection of an attribute list and the dialog for creating the alias was closed with the Enter key, then not only the alias was created, but the attribute was also included in the attribute selection. This error has been fixed. **(21954)**
- ✔ Infinite loop in the line route editor: In the line route editor, entries made in one of the cells displayed offset (e.g. Run time) could result in an infinite loop. This error has been fixed. **(21974)**

## Filters

- ✔ No filtering on identifier attributes: For technical reasons, the identifier attributes operator identifier at the vehicle journey and valid day identifier and vehicle combination identifier at the vehicle journey section cannot be used properly in filter conditions - a condition with these attributes is never true. However, they could still be selected in the filter dialog. This error has been fixed, i.e. these attributes are no longer available in the dialog for defining a filter condition. **(16704)**

## Formulas

- ✔ Formula attributes with invalid subattribute values are deleted: If a formula attribute with a time interval set as subattribute in the formula definition used another attribute, which also had analysis time intervals as subattribute but did not provide values for AP and/or AH, then such a user-defined attribute was deleted in some contexts, e.g. when importing a network or model transfer file. This error has been fixed. **(19503)**

## Formulas, COM-API

- ✔ Formula matrices slow down execution of scripts: When there are many formula matrices in the network, their existence unnecessarily slows down the execution of scripts that often modify the network. This error has been fixed. **(20033)**


## Graphics

- ✔ License notice not always visible: The license notice for background maps was not always visible. This error has been fixed. **(22041)**

## Lists

- ✔ Crash when duplicating formula attributes: PTV Visum longer crashes when duplicating a user-defined formula attribute via the 'Duplicate attribute' shortcut menu action in any list. **(21939)**

## PrT Assignment

- ✔ Crash when using an existing assignment as initial solution: The program no longer crashes when using an existing assignment as initial solution if the value for a relation in the demand matrix has changed from 0 to a positive value. **(22058)**
- ✔ Evaluation of the VD function BPR3 for network objects without travel time  $t_0$ : The calculation of the VD function BPR3 at network objects (i.e. links, nodes, main nodes, turns, or main turns), on which the travel time in the unloaded network  $t_0$  had the value 0s, was faulty within some PrT assignment procedures. However, after the assignment, the travel time in the loaded network  $t_{Cur}$  was output correctly based on the wrong volume. This error has been fixed. **(21956)** 

## PuT Assignment

- ✔ No combination of 'Fail to board' and 'Risk of delay': The combined consideration of prevented boarding due to capacity overload on the one hand and the calculation of the risk of delays due to delayed vehicle journeys, on the other hand, is neither useful as regards content nor technically possible. They can no longer be executed together. **(21921)**
- ✔ Rounding with a reduced set of zones: Due to the used bucket round procedure, the demand per OD pair depended on the set of all OD pairs to be assigned if rounding was activated, i.e. if the set of OD pairs was changed (filter of OD pairs or set of zones to be assigned), the demand of the same OD pair could be rounded in different directions, with all consequences for the number of paths and the resulting skim matrices. This applied to the timetable-based as well as to the headway-based assignment. This error has been fixed by always rounding the entire demand matrix. **(22051 🚫)**

## PuT Line Blocking

- ✔ Incorrect evaluation of the state of charge in case of run times 0s: If empty trips were possible in the network due to link run times of 0s or system routes of duration 0s, which do not require any time, the evaluation of the state of charge in the context of line blocking with mandatory user-defined actions ('e-buses') could supply wrong values. As a result, optimal solutions were not found or solutions with limit faults were output despite optimal evaluation. This error has been fixed. **(21986)**
- ✔ Result for recurring actions and standard duration: The result of line blocking with mandatory recurring actions depended on the standard duration of user-defined block item types even if its value was not considered in the charging function. This error has been fixed. **(21964 🚫)**
- ✔ Unfavorable choice of initial solutions for e-vehicles: The initial solutions were chosen unfavorably for line blocking with obligatory user-defined actions (e-buses). This error has been corrected. **(22056 🚫)**

## Ride Sharing

- ✔ Crash in tour planning procedure with reoptimization: Fixed crash in tour planning with reoptimization in certain cases. **(21969 🚫)**
- ✔ Distribution of pre-booking time: The generation of pre-booking times based on the given distribution is now independent of the random seed of the trip request generation. **(22000 🚫)**
- ✔ Tour planning with re-optimization stops: In certain constellations, the 'Tour planning' procedure stopped if re-optimization was activated, i.e. the procedure did not finish, but could still be canceled. This error has been fixed. **(21983)**

## Scenario Management

- ✔ Crash in scenarios with modifications that are mutually exclusive: If there were two mutually exclusive modifications in a scenario management project, a crash used to occur when defining a scenario as soon as both mutually exclusive modifications were selected. This error has been fixed. **(21998)**

## Signal time-space diagram

- ✔ Permanent green not visible with time offset: For a permanent green signal group, no bars were displayed in the signal time-space diagram if the offset was not equal to 0s. This error has been fixed. For permanent green signal groups, a small separator is now also displayed to visually indicate the offset and to help to understand the time course of the vehicle platoon. **(21966)**

## Timetable Editor

- ✔ Timetable does not update when filter for volume attributes is changed: If the filter for volume attributes (formerly the OD pair filter with the option 'Filter network volumes') was changed or activated, the graphical timetable was not redrawn with the reduced volumes as bars. This error has been fixed. **(20990)**

## Visum Files

- ✔ Additive reading of user-defined attributes and time interval sets: If time interval sets and user-defined attributes were read additively from a network file in the same process and an offset was used for the time interval sets to avoid conflicts, this offset was not considered when using this time interval set as subattribute for an imported user-defined attribute. This error has been fixed. **(21992)**
- ✔ Crash when canceling 'Read network file': A crash no longer occurs when canceling the non-additive reading of any network file. **(21912)**
- ✔ Crash when saving to insufficient storage space: Visum no longer crashes when saving a version file to a medium with insufficient space. **(22001)**



- ✔ Display area of the network editor moved: If the display area of the network editor was moved without having the focus (e.g. by synchronizing with moving the view), and then a version file was saved, an incorrect view of the network editor was created when restoring the display area. This bug was fixed. **(21987)**

## ❗ Breaking Changes

### PrT Assignment

- ❗ Evaluation of the VD function BPR3 for network objects without travel time  $t_0$ : The calculation of the VD function BPR3 at network objects (i.e. links, nodes, main nodes, turns, or main turns), on which the travel time in the unloaded network  $t_0$  had the value 0s, was faulty within some PrT assignment procedures. However, after the assignment, the travel time in the loaded network  $t_{Cur}$  was output correctly based on the wrong volume. This error has been fixed. This changes the assignment results of all affected assignment procedures when using the VD function BPR3. **(21956 ✔)**

### PuT Assignment

- ❗ Rounding with a reduced set of zones: Due to the used bucket round procedure, the demand per OD pair depended on the set of all OD pairs to be assigned if rounding was activated, i.e. if the set of OD pairs was changed (filter of OD pairs or set of zones to be assigned), the demand of the same OD pair could be rounded in different directions, with all consequences for the number of paths and the resulting skim matrices. This applied to the timetable-based as well as to the headway-based assignment. This error has been fixed by always rounding the entire demand matrix. For the calculation of a reduced set of zones with rounding, skim results and assignment results may change. **(22051 ✔)**

### PuT Line Blocking

- ❗ Result for recurring actions and standard duration: The result of line blocking with mandatory recurring actions depended on the standard duration of user-defined block item types even if its value was not considered in the charging function. This error has been fixed. This causes the results to change in almost all cases, but not when using the default values for charging function and standard duration. **(21964 ✔)**
- ❗ Unfavorable choice of initial solutions for e-vehicles: The initial solutions were chosen unfavorably for line blocking with obligatory user-defined actions (e-buses). This error has been corrected. As a result, the results of line blocking with obligatory user-defined actions change. **(22056 ✔)**

### Ride Sharing

- ❗ Crash in tour planning procedure with reoptimization: Fixed crash in tour planning with reoptimization in certain cases. The internal rounding in the tour planning algorithm has been changed, which causes slight deviations in the results. **(21969 ✔)**
- ❗ Distribution of pre-booking time: The generation of pre-booking times based on the given distribution is now independent of the random seed of the trip request generation. This means that the results of the procedure 'Generate trip request' also change in the other trip request data. **(22000 ✔)**

2021.01-02 [159789]

2020-11-11

## ➕ New Features and Changes

### Data Model

- ➕ Weight instead of share in the HBEFA data model: In the data model, the terminology has been improved in the context of emission calculation according to HBEFA. In particular, attributes that actually indicate weights, because they do not have to add up to 1 in the sum of all objects, have been named accordingly. Correspondingly, the terms 'share' and 'weight' are used more precisely in the user interface. **(21824)**

### Dialogs

- ➕ Copy & Modify in attribute selection dialog: The 'large' attribute selection dialog of the lists now allows to duplicate an attribute marked in the list using a function from the shortcut menu. Furthermore, the attribute ID can be edited. When combining both features, it is for example very easy to duplicate an indirect attribute with an aggregation function and then just change the aggregation function to select a variant of this attribute. If the value type of the attribute is not changed in the process, the formatting settings are retained when the attribute ID is changed. **(20632)**

- + Improved display of the path to the attribute: In the 'small' attribute selection dialog the path to the attribute is displayed above the tree. This display has been visually and functionally improved. In particular, long paths are now truncated at the front, so that the last levels always remain visible. They can also be clicked to go back to the respective level. **(21845)**
- + More information on bars in the graphic parameters dialog: In the graphic parameters dialog, in the preview area, there are now more messages in case no bars are drawn, e.g. because the scaling attribute has not been calculated for any bars. **(11348)**

## Junction Editor

- + Vissim previewer updated: The Vissim version used for the node preview has been updated to PTV Vissim 2021 SP 2. **(21948)**

## Main Window

- + Search dialog for user-defined tables: If the search dialog is opened from the list of a user-defined table, the search is now limited to this table. In return, all attributes defined for this table can be searched. **(21750)**

## Network Editor

- + Aggregating line routes faster: The aggregation of line routes has been accelerated significantly. As a result, the naming of objects may change, especially in the case generated names. **(21874)**

## Other Procedures

- + Selectable aggregation functions when aggregating line routes: If time profiles with different in-vehicle and dwell times are merged when aggregating line routes (option 'Time profiles with identical in-vehicle times and dwell times' is disabled), an aggregation function for calculating the resulting in-vehicle and dwell times can now be explicitly selected. The previous method of successive averaging, which was dependent on the procedure sequence, is no longer available. It has been replaced by a sequence-independent averaging weighted by the number of vehicle journeys over the time profile item. **(20254 !)**

## Fixed Bugs

### Data Model

- ✔ 'Copy to table' could fail for non-calculated attributes: If cells were selected in a list which, at the time, represented non-calculated output attributes, the action 'Copy selected cells to user-defined table' could fail depending on the individual properties of the selected attributes. This error has been fixed. **(21936)**
- ✔ Better defaults for user-defined attributes: User-defined attributes of the type 'Text' used to be assigned the value 0 as both the lower and the upper limit of the numeric value range. If the attribute was later redeclared as a numerical attribute, this led to unnecessary problems. This error has been fixed. **(20806)**
- ✔ Crash after renaming POI categories or table definitions: Crashes no longer occur after renumbering POI categories or renaming table definitions. **(21899)**
- ✔ Empty values when converting strings to numbers: When changing the data type of a user-defined attribute from a string (text or file name) to a numerical value, empty strings were interpreted as empty values and an incomprehensible warning was issued if the user-defined attribute did not allow empty values. The default numerical attribute value is now set in this case. **(21875)**
- ✔ Numbers of table entries are assigned twice: The number of a table entry could be changed to the number of another existing table entry of the same table, whereby this other table entry was lost. This error has been fixed. **(21984)**

### Dialogs

- ✔ Queries when importing network files: If errors occur when importing network files, you can choose between different options on how to deal with them. The text in this dialog was not visible on monitors with certain resolutions. This error has been fixed. **(21903)**

### Formulas

- ✔ Performance problems in case of many formulas: In networks with a lot of formula attributes and formula matrices, various performance problems occurred, for example when reading the version file, changing attribute values, or applying model transfer files or modifications in scenario management projects. This error has been corrected. **(21475)**

### Graphics

- ✔ Highlighting remained visible: If the mouse pointer left the drawing area of the legend in a graphic window with a legend (network editor, graphic timetable, schematic line diagram, or transfers display of regular services), the highlighting drawn in the area of the mouse pointer continued to be there. This error has been fixed. **(21930)**

## Junction Editor

- ✔ Crash when changing signal control data: The program no longer crashes when making certain changes to the signal program of external signal controls (Vissig), for example changing the signal state sequence of a signal group. **(21970)**

## Main Window

- ✔ Crash when loading a global layout file in the procedure sequence: A crash no longer occurs when reading a global layout file in a script that is executed in the procedure sequence. **(21941)**
- ✔ Search dialog does not respond to create and delete: The search dialog did not react on creating or deleting network objects, e.g. POI categories so that the drop-down list for the option 'Only search within' was not filled correctly afterwards. Furthermore, when opening the search dialog from a POI list, the search only within the POI category selected in this list was not applied as default. Both errors have been fixed. **(15188)**

## Network Editor

- ✔ Crash in case of view outside the validity range of the projection: Crashes no longer occur when drawing the background map for a network section that is outside the validity range of the set projection. **(21829)**
- ✔ Crash when aggregating vehicle journeys: Crashes no longer occur when aggregating vehicle journeys if different groups of vehicle journey sections are merged to new vehicle journey sections with different valid days. **(21942)**
- ✔ Crash when editing line routes or system routes: A crash no longer occurs when exiting PTV Visum while editing the course of a line route, system route, or PrT path has not yet been completed or has been canceled. **(21946)**
- ✔ Crash when quickly moving link polygon points: The program no longer crashes when quickly moving a polygon point of a link. **(21907)**

## Other Procedures

- ✔ Better information for 'Go to the procedure': The parameter dialog of the 'Go to' procedure now explicitly points out if a procedure is selected as destination, which is not before the 'Go to' procedure itself. **(21816)**
- ✔ Note on the reinstallation of the HBEFA data package: If one of the required files was not found during the emission calculation according to HBEFA, until now, the message did not indicate that the problem can be fixed by reinstalling the HBEFA data package. This information has been added. **(21820)**

## PuT Line Blocking

- ✔ Crash when canceling line blocking from line selection: If line blocking was performed from the shortcut menu in the tool window for the line block selection, error messages or cancellation of the process by the user caused the program to crash. This error has been fixed. **(21830)**

## Ride Sharing

- ✔ High memory consumption of tour planning: The memory consumption of the 'Tour planning' procedure was too high and has been reduced. **(21904)**

## Visum Files

- ✔ False warning about formula attributes: When importing a version file, false warnings about invalid formula attributes could occur in certain constellations. This error has been fixed. **(21399)**
- ✔ Re-projection of links with WKTPoly: The additive network file import did not re-project links whose polygons were described by the WKTPoly attribute in a different projection than the one set in the target network. This problem has been fixed. **(21911)**
- ✔ Reading some older version files failed: The import of version files saved with PTV Visum 20 or earlier versions failed if a model transfer file view was open in the version file and the windows were to be restored when reading the version file. This error has been fixed. **(21913)**
- ✔ Saving version files slow with many cores: Saving a version file was too slow when using many cores and has been accelerated. **(21754)**

## ❗ Breaking Changes

## Other Procedures

- ❗ Selectable aggregation functions when aggregating line routes: If time profiles with different in-vehicle and dwell times are merged when aggregating line routes (option 'Time profiles with identical in-vehicle times and dwell times' is disabled), an aggregation function for calculating the resulting in-vehicle and dwell times can now be explicitly selected. The previous successive averaging, which was dependent on the procedure sequence, is no longer available. It has been replaced by a sequence-independent averaging weighted by the number of vehicle journeys over the time profile item. Naturally, this changes the calculated in-vehicle and dwell times. **(20254 +)**

2021.01-01 [158934]

2020-10-15

## + New Features and Changes

### Dialogs

- + Transfer changed attributes of connectors to the opposite direction: Similar to the link dialog, the values of attributes changed in the dialog can now be transferred to the opposite direction of the selected connector. **(21340)**

### I/O Installation

- + Add-on module 'ABM' in thesis licenses: The add-on module 'ABM' for modeling activity-based demand models is now provided with the thesis licenses. **(21819)**

### I/O Interfaces

- + Multi-allocated operating points and link information in railML import: The interaction between specified link information and making decisions regarding operating points (ocps) which are allocated to multiple stop points in the target network has been improved. The link information (if specified) is now dominant in the sense that only the non-reachable stop points accessible via suitable links are included in the decision. **(21593)**

### Other Procedures

- + Boolean-valued attributes during intersection: The 'Intersect' procedure and the interactive intersection of attribute values during multi-edit operations in the network editor have been modified to allow for the use of Boolean and enumeration attributes as target attributes. **(20462)**

### Ride Sharing

- + Acceleration through limited vehicle search: When using the dispatcher in tour planning, a new option has been added to give preference to vehicles that are located near the pickup node. This significantly improves the run time (at the expense of the quality of the solution). **(21620)**

## ✓ Fixed Bugs

### COM-API

- ✓ Crash on `IntersectAttributePara.ItemByKey`: When calling the COM function 'ItemByKey' at the 'IntersectAttributePara' parameter object of the 'Intersect' procedure, a crash or undefined behavior could occur when accessing the received 'IntersectAttributeItemPara' object. This error has been fixed. **(21864)**

### Data Model, Matrix Estimation

- ✓ Relation from links to screenlines accelerated: The evaluation of the relation from links to screenlines was accelerated considerably. Especially the calculation of the flow matrix in the 'Demand matrix correction' procedure is much faster if count values for screenlines are specified. **(21822)**

### Dialogs

- ✓ Crash in case of user-defined PrT skim: A crash no longer occurs when editing the parameters for a user-defined PrT skim if a user-defined attribute was used in the definition of this skim, which was deleted afterwards. **(21817)**
- ✓ Dialog with links at high resolution: In the dialog that offers possible alternatives as clickable links, not all alternatives were visible (and thus selectable) at higher screen resolutions. This error has been fixed. **(21815)**
- ✓ Notification of non-readable network object types when saving attribute files: The 'Save attributes to file' dialog did not provide a warning for network objects whose attribute files cannot be re-imported in general. This error has been fixed. **(21733)**

### Filters

- ✔ Double evaluation of the volume attributes filter: In certain cases, the volume attributes filter (formerly: 'Filter network volumes' option of the OD pair filter) was evaluated twice, especially when other filters were also defined in the network. This bug has been fixed. **(21689)**


## Graphics

- ✔ Clicks in profile analysis: In the profile analysis, it was not possible to change just the class shown in the detail view by clicking on another class in the upper display area, while retaining the time. This error has been fixed. **(21202)**
- ✔ Cross-section values and link selection cannot be combined: If the option 'Use cross-section values' was set for 'Link bars' in the 'General settings', it was no longer possible to control the link bars to be displayed via the link selection, and instead bars were always drawn on all links. This error has been fixed. **(21564)**
- ✔ Links with inner pockets in SBA visualization: The SBA visualization sometimes produced a wrong display at links with inner pockets. This error has been fixed. **(21811)**
- ✔ Point symbols in legend: In the legend of the network editor, point symbols were displayed even if the drawing of the point symbol itself was switched off for the network object type (and therefore in the network e.g. only diagrams were shown at this network object ). This bug has been fixed. **(21739)**

## I/O Installation

- ✔ Chinese as first language: On some operating systems, Chinese was selected as the primary interface language during installation, even though the language of the operating system was not Chinese. This error has been fixed. **(21632)**

## I/O Interfaces

- ✔ Crash when displaying GIS objects: The program no longer crashes when showing objects from a personal geo database as GIS objects. **(21806)**
- ✔ Repeated warning in case of multiple train type codes in HAFAS import: If the 'ZUGART' (train type) file in a HAFAS dataset contains the same train type code multiple times, the warning, which is displayed in the import dialog when selecting this file, was issued several times. This error has been fixed. **(15753)**
- ✔ Translation of the ObjID of user-defined attributes in database export: When exporting a network to a database (regardless of its type), the ObjID in the 'User-defined attributes' table is translated into the selected export language. **(21779)** 

## Lists

- ✔ 'Enter' in the last row led to the first row of the list: If a change to the contents of a cell in the last row of a list was completed with the Enter key, the focus jumped to the first row of this list. This error has been fixed. **(19335)**
- ✔ Crash when marking connecting journeys: The program no longer crashes when marking one or more connecting journeys for which there is no corresponding planned connecting journey if a list of the planned connecting journeys is open at the same time. **(21906)**
- ✔ Crash when right-clicking column headers in PrT path lists: The program no longer crashes when right-clicking column headers in a 'PrT paths' or 'PrT paths on link level' list (to open the column header shortcut menu). **(21902)**
- ✔ Grouping by deleted user-defined attribute: If a list was grouped by a user-defined attribute that was then deleted, the list remained grouped. This error has been fixed. **(21736)**

## Lists, Visum Files

- ✔ Export with key columns changes formatting: If an attribute file was saved from a list and a key set was selected (i.e. not the 'Export list columns only' option), and if the list already contained an attribute occurring in the key set, the column for this attribute was removed and newly created with the key columns at the front. In this case, both the position of the column in the list and the formatting was changed because the new column was created with the default format. This error has been fixed. **(18931)**

## Main Window

- ✔ Shortcut menus were missing: In the whole program shortcut menus were missing or empty if the license 'DC' (for distributed computing) was not available or not active. This error has been fixed. **(21897)**

## Matrix Editor

- ✔ Columns wider after editing the view options: After each edit of the Matrix Editor's view options, the Matrix Editor's columns became slightly wider. This bug has been fixed. **(15008)**

- ✔ Displaying invalid values: In the matrix editor, invalid values in matrices (so-called 'NaN' = 'not a number') were displayed as empty cells. This error has been fixed, i.e. it is now shown directly (as before in the tooltip) that the value is invalid. **(20953)**
- ✔ Opening of the matrix histogram too slow: Opening a matrix histogram was very slow in large networks and was accelerated. **(21773)**

## Network Comparisons

- ✔ Executing procedures in a version comparison with a relative path: If a version comparison with a network loaded in the background was defined using a relative path to the version file, the procedure sequence could not be executed in the main network and in the version comparison. This error has been fixed. **(21852)**
- ✔ Layout for attribute-based version comparisons: If a layout file was used for selecting the attributes to be transferred when creating a version comparison with attributes transferred from the comparison network, the attributes contained therein were selected, but in addition to the attributes previously set (or at least set by default). This error has been fixed. **(21813)**

## Network Editor

- ✔ Special functions for marked objects applied to all objects: Multi-edit special functions called on objects marked in the network editor did not affect the marked objects but all (possibly active) network objects of the selected type. This error has been fixed. **(21873)**

## Other Procedures

- ✔ Aggregating line routes with a common share: If a minimum common share of the route course of two line routes was required when aggregating line routes and the line routes did not start at the same stop point, they were sometimes not aggregated depending on the processing order, even if they had a sufficiently long common section. This error has been fixed. **(21847)**
- ✔ Behavior of 'Edit attribute' in case of empty values: If the right side of an allocation in the 'Edit attribute' procedure returned an empty value and empty values were not allowed on the left side for a numerical target attribute, the affected network object was skipped and the value was not changed, although everywhere else the calculation was continued with 0 for numerical attributes and in formulas in case of an empty value. The Multi-edit functionality in the network editor was also affected if a formula was used as a source, but the value 0 was set if an attribute was used as a source. This error has been fixed, i.e., the 0 value is set if an empty value is not allowed in a numerical attribute. **(21589)**

## PrT Assignment

- ✔ If the 'Use tolerances' option was not selected in the 'Assignment analysis' procedure, the 'Assignment deviation' attribute at links was always 0. This error has been fixed. **(21729)**
- ✔ SBA assignment freezes: The simulation-based dynamic assignment (SBA) got into an endless loop when the signal program was switched at 0 o'clock in a daily signal program list of a signal control in the network. This error has been fixed. **(21809)**

## Procedure Sequence

- ✔ Repeated messages in the message window: Messages from procedures executed in the procedure sequence were sometimes displayed several times with identical text in the message window. This error has been fixed. **(21787)**

## Scenario Management

- ✔ Opening a project terminates if there are errors in scenario indicators: If a problem occurred while opening a scenario management project created in an earlier program version when adjusting the scenario indicators to renamed attributes (e.g. because an attribute used in that project has become obsolete), the project could no longer be opened. This error has been fixed. **(21796)**

## Visum Files

- ✔ Crash when saving after loading a global layout: After loading a global layout file, saving a version file caused a crash in certain constellations. This error has been fixed. **(21850)**
- ✔ Invalid system routes from network files: By additive reading of a network file, system routes could be created in a network, which did not start or end at a stop point. This error has been fixed. **(21695)**

## ❗ Breaking Changes

## I/O Interfaces



- ❗ Translation of the ObjID of user-defined attributes in database export: When exporting a network to a database (regardless of its type), the ObjID in the 'User-defined attributes' table is translated into the selected export language. This changes the export result, with corresponding changes to the importing systems. **(21779)** ✓

## Other Procedures

- ❗ Behavior of 'Edit attribute' in case of empty values: If the right side of an allocation in the 'Edit attribute' procedure returned an empty value and empty values were not allowed on the left side for a numerical target attribute, the affected network object was skipped and the value was not changed, although everywhere else the calculation was continued with 0 for numerical attributes and in formulas in case of an empty value. The Multi-edit functionality in the network editor was also affected if a formula was used as a source, but the value 0 was set if an attribute was used as a source. This error has been fixed, i.e., the 0 value is set if an empty value is not allowed in a numerical attribute. Procedure sequences with the 'Edit attribute' procedure, in which this constellation occurs, therefore now deliver deviating results. **(21589)** ✓

2021.01-00 [158003]

2020-09-18

## + New Features and Changes

### COM-API

- + COM objects of the procedure sequence more similar to lists: The behavior of the COM object IOperationExecutor for the procedure sequence has been made more similar to lists. In particular, the construction of this COM object no longer opens the window of the procedure sequence. Only if the new method Show() is called the window opens. This enables the execution of the procedure sequence to be automated without necessarily making the corresponding window visible in the program. **(21283)**

### Data Model

- + User-defined tables: User-defined tables were introduced as new network objects. The tables are used to store user-defined data and formulas. **(3530)**
- + Working with fleet compositions: The creation and editing of fleet compositions has been improved. Lists for fleet compositions, HBEFA fleet compositions, and HBEFA subsegments are now available. **(21281)**

### Demand Procedures

- + Deleting a lot of objects from ABM demand models: The deletion of a lot of objects from the context of the ABM demand model (e.g. persons and activity locations) was accelerated. **(20635)**
- + Messages for demand procedures: The output of messages when executing demand procedures has been improved. **(21663)**

### Dialogs

- + Attribut selection: The sections 'Last selected' and 'Description' in the attribute selection dialog can now be collapsed. This setting is permanently saved per user. **(21461)**
- + Attribute selection dialog: The attribute ID, which is often required for access via COM, can now be copied from the attribute selection dialog and pasted in a script, for example, via the shortcut menu. **(18625)**
- + Attribute selection dialog: The path to the selected attribute is now displayed. It provides a better orientation, especially for indirect attributes. Clicking the individual nodes navigates to the corresponding node in the attribute selection. **(19288)**
- + Selection of HBEFA fleet compositions: There exists a new dialog for the selection of HBEFA fleet compositions. It includes the option to filter the columns. **(21628)**

### I/O Interfaces

- + Additional output during railML import: When importing railML data, OCPs that lead to shortened vehicle journeys are now also listed. **(19917)**

### Installation

- ⊕ Update of CodeMeter Runtime: The software manufacturer WiBu Systems has informed us about an error in the component 'CodeMeter runtime', which we use for the license protection of our software. The bug affects the TCP/IP communication of the license server. It constitutes a security issue, but only has an impact in case of a targeted attack on the network. With this service pack, an update of the affected component is installed, fixing the problem. For more information, see <https://www.wibu.com/en/support/security-advisories.html> **(21831)**

## Junction Editor

- ⊕ Vissim previewer updated: The Vissim version used for the node preview has been updated to PTV Vissim 2021. **(21578)**

## Lists

- ⊕ Editing or deleting user-defined attributes in lists: In lists, user-defined attributes (UDA) can be directly edited and/or deleted using the 'Edit attribute definition' and/or 'Delete attribute' shortcut menu entries. **(21676)**

## Matrix Estimation

- ⊕ Messages for matrix estimation: The output of messages when executing the matrix correction procedure has been improved. **(21662)**

## Network Comparisons

- ⊕ Executing procedures in the comparison network: When comparing versions of networks loaded in the background, active procedures can be executed in the loaded network as well as in the version comparisons. In such cases, the procedures and filters of the loaded network are transferred to the version comparisons. The results of the version comparisons can be used temporarily in the loaded network. **(20356)**

## Network Editor

- ⊕ Edit line course: While digitizing line routes it is possible to change the visibility of the background map, the legend, and the net object layers. It is also possible to change the legend and the displayed background map. **(20792)**

## Other Procedures

- ⊕ Check network consistency: The network check function 'Check network consistency' has been extended. The network consistency between pairs of active nodes can now also be checked. **(21480)**

## PrT Assignment

- ⊕ Directory for user-defined volume-delay functions (VDF): The project directory for user-defined VDFs can be changed to any folder. As a consequence, DLLs are also loaded from the new directory. **(21456)**
- ⊕ Messages for PrT assignment procedures: The output of messages when executing PrT assignments has been improved. **(21660)**

## Procedure Sequence

- ⊕ Interrupt procedure: During the execution of a procedure a button offers to interrupt the procedure after the current procedure has ended. The results of the previous calculations are fully available. **(20146)**

## PuT Assignment

- ⊕ Vol/cap ratio-dependent impedance sharing: The impedance for renting at a station or zone can now be influenced by a station or zone attribute. This allows better modeling of a free-flow system. **(17420)**
- ⊕ Warnings: A large number of open links for PuT Walk causes long run times when searching for paths. Often the opening of these links is not intended. When executing the procedure, a warning message indicates if a large number of walk links exist. **(18545)**

## PuT Line Blocking

- ⊕ Consideration of unfavorable combinations: If the capacity or volume is taken into account in line blocking with vehicle interchange, such selections of vehicles that do not have sufficient capacity are now selected less frequently. In parallel vehicle journey sections, the combinations are also taken into account. As a result, favorable solutions are found more quickly. **(21659)**
- ⊕ Fixing blocking days and create forced chaining not only for neighbors: In the line block editor entire blocking days (more precisely combinations of blocking days and a number of calendar days) can be fixed and forced chaining can be created between arbitrary (matching) block items, even if these elements are not neighbors. **(20679)**
- ⊕ Marking of block items: Block items can be marked in the line block editor by drawing a rectangle. **(20661)**

- + Marking of forced chaining: Alternative to line block elements forced chainings can be marked in the line block editor (20662)
- + The output of messages when executing the line blocking procedure has been improved. (21665)

## PuT Operating Indicators

- + Operator Indicators per DSeg: The calculation of indicators has been extended for the network object Operator. 'Passenger trips unlinked per Dseg', 'Passenger-km per DSeg', 'Passenger-mileage per DSeg', and 'Passenger-hours per DSeg' are available. These indicators are as well added for flow bundle analysis. (20865)

## Safety

- + Configuration file: The selection of a configuration file of the accident data format as well as the change between different configuration files have been improved. (21294)
- + Configuration file: When upgrading to the last major version of PTV Visum, only the last used xml configuration file is migrated. For future updates, the entire contents of the configuration folder will be migrated again. (21552)

## Timetable Editor

- + Uniform distance between stop events: When displaying uniform stop distances in the graphic timetable, hidden stops are no longer considered. (21537)

## Fixed Bugs

### Activity Profile

- ✔ Labeling of the time axis: The label of the time axis was not displayed modulo 24h when using a calendar. When using a weekly calendar, the days of the week are now displayed, and when using a yearly calendar, the date is now displayed at the change of day. (21699)

### Add-Ins

- ✔ COM reference is retained for some Add-Ins: The COM reference was retained after using the Add-Ins 'OMX Import', 'Generic Accident Model' and 'Import DIVAGEo' if the Python environment of Python 2.7 was used. This error has been fixed. (21566)

### Add-Ins, COM-API

- ✔ Fast InProcess matrix data transfer after internal script no longer possible: If a script was executed as part of a procedure step 'Run script', whose code was stored directly in the procedure parameters (i.e. without reference to an external script file), the fast direct data transfer between PTV Visum and Python via the methods `VisumPy.helpers.GetMatrixRaw / SetMatrixRaw` no longer worked. This affected the add-in 'Calculate Matrix' in particular, which could also lead to subsequent errors. This error has been fixed. (21789)

### COM-API

- ✔ Changing the matrix type: Changing the attribute value for the matrix type to the value 4 (skim matrix) failed via COM. This error has been fixed. (21484)
- ✔ Creating procedure variables: Creating a procedure variable via COM failed. This error has been fixed. (21727)
- ✔ Network editor special functions showed notifications: PTV Visum displayed a popup notification when performing network editor special functions (e.g., 'Set lengths for line routes') via COM. This bug has been fixed. (21601)

### Data Model

- ✔ Deleting demand segments referenced from the demand model: Version files could not be saved anymore when deleting a demand segment that was referenced by a demand stratum in a demand model. This could potentially also result in a crash in the following actions. This error has been fixed. (21616)

### Demand Procedures

- ✔ Crash on AMD processors: Matrix multiplications, e.g. within the procedure 'Tour-based model - Combined trip distribution/mode choice', no longer lead to a crash on computers with AMD processors of newer generations. (21245)

### Dialogs

- ✔ No hourglass for long-running actions: For actions with a longer run time, a progress dialog is displayed after a short waiting time. So far, no hourglass was shown, so that the program looked like it crashed before. This error has been fixed. **(21562)**

## I/O Interfaces

- ✔ Imports with data outside the ASCII character set: Various imports, including OpenStreetMap (OSM), Cube, and TransCAD, sometimes failed if the data contained characters outside the ASCII character set. This error has been fixed. **(21721)**
- ✔ Stop points not reached with multi-assigned OCPs in railML: If an operating point ('ocp') in railML was assigned several stop points in the Visum target network, a stop point that could only be reached via closed links could be selected when selecting the stop point via shortest path searches. If a second search over closed links was not allowed as a fallback level, no valid path could be found in these cases. This error has been corrected by taking the search parameters of the shortest path search fully into account. **(21658)**
- ✔ Treatment of time shifts in the HAFAS import: When importing HAFAS data 'zeitvs' files containing time shifts for each station were not imported correctly if several lines with different reference periods (e.g. summer time) were specified for the same station. In addition, no vehicle journeys could be imported if time shifts were specified and the route course is given using times and not just using stop numbers in the \* A VE lines. Both errors have been fixed. **(21393)**

## Junction Editor

- ✔ Displayed intergreen time violation for continuous red or continuous green: If a signal group shows continuous red or continuous green, an intergreen time violation was displayed incorrectly in the junction editor for the signal times. This error has been fixed. **(20927)**

## Lists

- ✔ Crash in case of grouped PrT path list on link level with link filter: Visum no longer crashes when changing the link filter when a grouped PrT path list on link level is displayed with the 'Only active links' option. **(21693)**
- ✔ Group column and column filter: In rare cases, the elements displayed did not match the grouping or column filter criteria entered by the user. This error has been fixed. **(21649)**
- ✔ Marking a lot of ABM objects: The program no longer freezes when marking a lot of activity locations in the list. **(21655)**

## Main Window

- ✔ Translation of attributes and tables to fallback language: The fallback language selected for the user interface was not considered when issuing attribute and table names (IDs, short names, long names) on the user interface until now. This bug has been fixed. Output to files is not affected except for the optional attribute file comments with attribute descriptions. **(21826)**

## Miscellaneous

- ✔ Translation of IDs: The attributes 'ObjID' and 'AttID' in the attributes list were translated, although they are language-independent identifiers. This error has been fixed. **(21722)**
- ✔ Translations for Chinese and Japanese partly swapped: The languages Japanese and Chinese were also swapped for the translations of the identifiers for the values of enumeration types (see ID 21550). This error has been fixed. **(21637)**

## Network Comparisons

- ✔ Crash when creating a model transfer file in models with vehicle journey coupling section items: Visum no longer crashes when creating model transfer files if vehicle journey coupling section items exist in the compared models. **(21686)**

## Network Editor

- ✔ Vehicle journey sections with operating periods incorrect: The multi-edit special function 'Normalize vehicle journey sections' yielded an incorrect result if the corresponding vehicle journey sections had operating periods associated. In such cases the valid day has been calculated correctly taking the operating periods into account, but the restricting reference to the operating period was not removed. This error has been fixed. **(21586)**

## PrT Assignment

- ✔ Daily signal program lists in SBA when using a calendar: If an SBA assignment result did not start on the first day of the calendar, the daily signal program lists were not initialized correctly. This error has been fixed. **(21714)**

- ✔ Dynamic-stochastic assignment: When using time series per pair of zone types and percentage connectors in the dynamic-stochastic assignment, the source and target demand was calculated incorrectly. As a consequence, the travel time (tCur) on the corresponding connectors was also wrong. This error has been fixed. **(21731)**
- ✔ Random seed in the stochastic assignment: In the stochastic assignment a random seed was used for all network objects. Because of this, even small network changes could lead to large deviations. This error has been fixed. **(21746)**
- ✔ Simulation graph at separate right turns: The internally generated nodes of the simulation graph (Meso nodes) were positioned incorrectly at separate right turns if there was a pocket at the outbound links. **(21609)**
- ✔ Simulation-based assignment: Bypasses at roundabouts haven't been used within the simulation. This error has been fixed. **(21613)**

## PuT Assignment

- ✔ Connection import: The Import of fares failed if the connections include vehicle journeys with multiple journey sections. This error has been fixed. **(21688)**
- ✔ Crash during delay analysis with soft capacity restriction: The program no longer crashes when calculating delay risks if the timetable-based assignment was previously calculated with (soft) capacity restriction. **(21617)**
- ✔ Crash when calculating skims per time interval: The program no longer crashes during timetable-based skim calculation per time interval when using the aggregation function 'Average value of connections with low impedance'. **(21648)**
- ✔ Maximum file size for connection file export: The maximum value for the size of exported files during connection file export was limited to 2 GB in the procedure parameters dialog. This error has been fixed. **(21711)**
- ✔ Run time: A error causes high run times for the PuT Assignment. This has been fixed. **(21751)**

## PuT Line Blocking

- ✔ Overflow in case of open line blocks and long calendar periods: A numerical overflow occurred when open line blocks were created in a network with calendar in which the line block period started at a late day in the calendar. Consequently, the results did not make sense. This error has been fixed. **(21610)**

## PuT Operating Indicators

- ✔ Output of the operator for objects without a result: If the public transport operating indicators were calculated for 'Territory x Operator' and then the option 'Hide objects with no result' was deactivated in the list 'Territory PuT detail', the columns 'Operator number' and 'Operator name' were not output for the then visible data sets without a result. This error has been fixed. **(20782)**
- ✔ Territory-based passenger trips: The passenger trips for territory PuT detail objects of all output levels, calculated by the procedure 'PuT Operating Indicators', were faulty if a PuT path had several path legs, of which one path leg did not touch all territories. This error has been fixed. **(21698)**

## PuT Operating Indicators, Visum Files

- ✔ Writing a version file after calculation of the indicators: After executing the procedure 'PuT Operating Indicators' with an active line filter and with an output of the indicators for territory x operator, territory x operator x vehicle combination, territory x main line or territory x main line x vehicle combination no version file could be written anymore if there were network objects without an allocation of an operator or a main line. This error has been fixed. **(21707)**

## Subnetwork Generator

- ✔ Crash when determining PuT demand: The program does not crash anymore when determining the PuT demand for the subnetwork with modeled stops where the active status of the stop area and its access node is different. **(21600)**

## Timetable Editor

- ✔ Drawing of marked line block items: If the line block editor was not visible (e.g. docked with other views), it did not scroll to the first marked line block item when changing the marking. If the line block editor was then made visible, the marked line block items were possibly not in the visible area. This error has been fixed. **(21700)**
- ✔ Moving line block items to a new line block at day change: If the 'Move line block items to new line block' function was used to move a line block item whose preparation or post-processing time starts before or after 24h, these preparation and post-processing line block items ended up in the wrong block day. This error has been fixed. **(21709)**

- ✔ Preparation and post-preparation time after Undo in the line block editor: If a block item of type vehicle journey is moved to a line block of another block version and because of that an existing block item of the same vehicle journey section is deleted, the corresponding layover times for the preparation and post-preparation times were not restored if the action was later undone. This error has been fixed. **(21535)**

## Visum Files

- ✔ Crosswalks sometimes cannot be read from network files: In certain cases, network files with data about crosswalks and associated detectors and signal groups could not be read additively. More precisely, when reading the data the corresponding leg of the crosswalk could not be found. This error has been fixed. **(21664)**
- ✔ Drag & Drop of list layouts (.llax): Lists could not be opened by drag & drop of a list layout with the extension .llax. This bug has been fixed. **(21594)**

## ❗ Breaking Changes

### PrT Assignment

- ❗ Random seed in the stochastic assignment: In the stochastic assignment a random seed was used for all network objects. Because of this, even small network changes could lead to large deviations. This error has been fixed. This changes the results of the assignment. **(21746)**
- ❗ Simulation graph at separate right turns: The internally generated nodes of the simulation graph (Meso nodes) were positioned incorrectly at separate right turns if there was a pocket at the outbound links. This can change SBA assignment results. **(21609)**
- ❗ Simulation-based assignment: Bypasses at roundabouts haven't been used within the simulation. This error has been fixed. This changes the result of simulation based assignment (SBA). **(21613)**

### PuT Line Blocking

- ❗ Overflow in case of open line blocks and long calendar periods: A numerical overflow occurred when open line blocks were created in a network with calendar in which the line block period started at a late day in the calendar. Consequently, the results did not make sense. This error has been fixed. This can change the results of the line block calculation for open line blocks in networks with a calendar. **(21610)**

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## + New Features and Changes

### ANM

- + Speed per transport system: When exporting networks for links the maximum speed per vehicle class is saved to the .anm file. **(19055)**

### Activity Profile

- + Activity Profile: The new profile view shows the temporal distribution of various activities. Activities can be line block items, vehicle journeys, DRT trips or activities from ABM models. Individual activities are plotted on a time axis. Activities that overlap in time are displayed on top of each other so that the y-axis shows the number of simultaneous activities at any given time. **(20546)**

### Add-Ins

- + Demand calibration: The new tool calibrates automatically modal split and average travel distance of 4-step and Visum models. It consists of two Add-Ins: "Demand calibration preparation" which prepares the model for calibration, and "Demand calibration" as the calibration procedure. **(19325)**
- + Safety - Add Ins: The Safety Add-ins have been updated. **(21342)**
- + Support for Python 3.7: All pre-installed PTV Visum Add-Ins support Python 3.7 as well as Python 2.7. The user chose the Python version centrally via user preferences. **(21308)**

### COM-API

- + ID of user-defined attributes: The ID of user-defined attributes can be changed via COM. For this purpose the property IAttribute.ID has been made writable. On the other hand, the type of the return parameter for the existing property for reading the ID has been changed from Variant to BSTR. **(21080 ❗)**



- + Network editor in the foreground: A new COM method is available that can be used to activate the view of the network editor and bring this window to the foreground. **(20088)**
- + SQLite export of lists and matrices via COM: Lists and matrices can be exported to SQLite via COM. Two new methods have been introduced: `IList.SaveToSqliteDatabase` and `IMatrixTable.SaveToSqliteDatabase`. **(21038)**

## Data Model

- + New relations from stop points: There are new relations from stop points to serving, beginning and ending vehicle journey items. **(20354)**
- + Synchronization: The possibilities of synchronization have been extended. Optionally, marked objects related to transfers can now also be synchronized between views. **(20182)**
- + WKT polyline for system routes: The geographic course of system routes is available via the calculated attribute WKT polyline. **(16499)**

## Demand Procedures

- + Path sequences from the tour-based model with temporal distribution: Taking the time series for activity pairs into account departure and arrival times for path sequence items can optionally be generated when executing the procedure 'Tour-based model - Combined trip distribution/mode choice'. **(20566)**

## Dialogs

- + Allocation of modifications to scenarios: The dialog for allocating modifications to scenarios has been revised. In the new grid the attributes of the modifications can be displayed and the number of modifications can be restricted using column filters. **(21120)**
- + Attribute selection: The attribute selection dialog allows access to the last selected attributes, which are also available for filters and graphic parameters. **(19021)**
- + Attribute selection: The filter in the attribute selection considers sub-attributes as well as relations. The character '\' separates the corresponding levels. **(19290)**
- + Collaps all relations in attribute selection dialog: Before it was only possible to collapse single relations. Now it is possible to collapse all open relations in the tree view with one action to return to the initial view. **(20352)**
- + Editing fleet compositions: The dialog for editing shares of subsegments of a fleet composition has been improved. The editability of shares depends on the type of the fleet composition and the use of column filters has been enabled. **(20539)**
- + Editing of time series: The dialog for editing a time series has been changed to a list grid. This enables entering matrix references for matrix time series as text, which in turn offers the possibility to set all matrix references at once by copy & paste. In addition, inconsistent entries are visually highlighted. **(21175)**
- + Option 'Use the pocket length for the determination': The option 'Use the pocket length for the determination' in the general procedure settings for the node impedance calculation for signalized nodes is only visible if the option can be used for the calculation method. **(20874)**
- + Route course display: A filter and a search function are available for selecting the route to be displayed. The space bar can be used to select and there is a button to un/select all route courses. **(19949)**
- + Save network file: The dialog for saving network files has been revised. **(18657)**
- + Search in graphic parameter dialog for line bars: In the graphic parameter dialog for route courses, you can now search in the (possibly very long) list for each aggregation level. Via a new button the search dialog can be opened to search for attribute values of the corresponding network object. **(20363)**
- + User preferences of background maps: User-defined entries for map services can be duplicated. **(21156)**

## Filters

- + Volume attributes: A supply filter, i.e. a filter that acts on line-, line route or, among other things, journey attributes, influences volumes and attributes dependent on them, such as volume capacity ratio. It can be combined with flow bundle evaluations and OD pair filters. The functionality is similar to the option 'Filter network volume' in the OD pair filter. Both filter options are now combined in the filter 'Volume attributes'. You can find them in the menu bar entry 'Filter'.  
The public transport indicators are calculated based on journey sections. As the assignment results are available on a trip basis, a load distribution rule for the timetable trip segments must now be set in the general procedure settings. **(20906)**

## Graphical Procedures

- + Shortest path search in opposite direction: The shortest path search includes a new option that allows to switch the calculation to the opposite direction. Intermediate points are considered. **(6852)**

## Graphics

- + Background maps: The OSM background maps have been removed. Instead PTV maps in four color gradings are offered. At the same time, the default map service has been changed. **(21530)**

## I/O Interfaces

- + Data base export with indirect attributes: When exporting the network to data bases of various formats, indirect attributes can now also be exported, similarly when saving a network file. The values of editable indirect attributes are always ignored when reading such data bases. **(20491)**
- + HAFAS 5.40.49: The HAFAS interface supports the HAFAS Format 5.40.49 **(21377)**
- + HAFAS: Optional height data in HAFAS coordinates will be interpreted as height above sea level and transferred to PTV Visum. **(21362)**
- + HAFAS: The HAFAS format contains optional files, which holds the geographical route network. The import of HAFAS data considers this data as well as the allocation of vehicle journeys to the exact line routes. **(13025)**
- + HAFAS: The code of the transport association in the stop data is written in an user defined attribute of stops. It's no more stored in the code of the stop. **(21361)**
- + HAFAS: The name of the dataset is stored in the attribute of the network version name and in the network notepad. **(21360)**
- + Post-processing of data: The functions 'aggregate vehicle journeys' and 'determine operating periods' are offered in the parameter of the import interfaces, which accepts data based on operating days. The selected functions will be executed automatically after the import is done. **(20779)**
- + PuT supply from Visum import: Is possible to transfer line blocks from a Visum version within the framework of the PuT import. A new line block version is created in the target network. **(20776)**
- + Speed up of SQLite export: The SQLite export has been accelerated. **(21303)**
- + VDV 452: Importing line blocks via the VDV 452 interface means that there is a line block version for each calendar day of an operating day. The resulting line blocks can thus later be linked to longer line blocks. For the export of VDV 452 data including line blocks, only the specification of a reference date is necessary. **(20704)**
- + VDV452: The import as well as the export of forced and passenger trip chains of journeys are supported. For the import from VDV 452 data the columns THROUGH\_START and THROUGH\_END of the table JOURNEY (715) are evaluated. The import is only possible if the data record also contains line blocks. If this is the case, an entry for vehicle journey sections is written for each calendar day of the operating day. The bindings are always both forced and passenger trip chains. The export fills the corresponding columns with the bool '1' as soon as a chain exists. For meaningful further processing, the export of line blocks is necessary here as well. **(20714)**

## Installation

- + Examples and HBEFA: The installation examples and the HBEFA data package are available as separate packages. Both packages can be selected as additional options when installing PTV Visum, so that only a single setup is needed for a complete installation. **(21243)**

## Lists

- + Initial sorting order in list layouts: In list layouts, the initial sorting order can be defined by editing the XML file. **(20360)**
- + List layouts in XML format: The layout files for lists have been changed to XML format and can therefore be edited. **(20325)**
- + Multi-selection of reference objects: For the following lists a multi-selection of reference objects is available: Line route items, time profile items, vehicle journey items, (planned) connecting journeys, arrivals/departures. **(21288)**

## Main Window

- + New icon in filter tool window: The filter for volume attributes can be accessed by a new icon in the filter tool window. **(21261)**

## Matrix Editor

- + Speed up when copying matrix values: Pasting matrix values from the clipboard to PTV Visum has been accelerated. **(20808)**

## Miscellaneous

- + Speed up by improved memory allocation: A general speed up for most procedures has been achieved resulting from the adaption of recent memory management technologies. **(21041)**
- + User preferences for matrices: The user preference for activating a matrix swap file has been removed. **(19531)**

## Network Comparisons

- + Analysis of differences between networks: The 'Simple comparison with a version file' now creates a version comparison with a network loaded in the background. The view of the generated model transfer file allows more information of deleted objects to be displayed as well as the display of attribute values of network objects that have been modified. The differences between networks can be displayed in the same way for already existing version comparisons with the network loaded in the background. **(17313)**

## Network Editor

- + Simplifying node-link structure for PT networks: A new special function for simplifying the node-link structure of public transport networks has been implemented. **(18819)**
- + Vehicle journeys couplings: The special function 'Set couplings to maximum extensions' check whether all (active) coupled vehicle journeys are coupled on the entire parallel line route items. If this is not the case the coupling is extended to these sections. **(19281)**

## Other Procedures

- + Aggregate vehicle journeys: After an import of timetable data, based on operating days, many identical journeys can be found in the model. The special function 'Aggregate vehicle journeys' checks the journeys for identical departure times, time profiles, and extensions. If they are identical it combines them into one journey. Linked line block items are adjusted accordingly. **(18379)**
- + Aggregating PuT supply: After aggregating vehicle journeys, lines, line routes, or time profile items as well as after disaggregating the line block items of the affected journeys remain. **(21265)**
- + Determine operating periods: The function 'Determine operating periods' checks the existing PT valid days and generates periods by considering common operating time spans. Assigning the periods to vehicle journeys reduces the number of required PT valid days. **(20767)**
- + HBEFA output for electric vehicles: There are new attributes for fuel consumption of electric vehicles, to which the results of the HBEFA calculation are saved. **(20801)**
- + Projection of matrices: The already existing functionality for the projection of matrices in the matrix editor has been implemented as a new procedure. **(14709)**

## PrT Assignment

- + Evaluation for all assigned demand segments: The list 'PrT assignment quality data' contains an additional row per iteration in which attributes are calculated for all assigned demand segments. **(20642)**
- + New attributes to investigate convergence behaviour: The previously as user-defined attributes (UDA) generated attributes of links, turns, main turns and connectors for investigating convergence behaviour are now built in. They are calculated for the static PrT assignments (Equilibrium, LUCE, BFW, Lohse and Tribut-Lohse) and assignment with ICA (WebTAG criteria). The attributes previously available as UDA on turns and main turns for assignment with ICA (Classical criteria) are also integrated permanently. **(20899)**
- + Warning for wrong user-defined VD functions: A warning is shown if user-defined volume-delay functions in the corresponding project directory are found which were created under 32bit instead of 64bit. **(21446)**
- + Extended convergence criteria for active network objects: If the extended convergence conditions are used in the PrT assignment, the termination criteria for relative differences can optionally be applied to active links, turns and main turns only. **(20713)**

## PuT Assignment

- + Acceleration of the calculation: The headway- and timetable-based Assignment has been accelerated. The OD pair filter as well as the flow bundle evaluation also benefit. **(17436)**
- + Assigning demand to parallel vehicle journeys: If there are simultaneous vehicle journeys of a time profile, the filter for active vehicle journey sections is taken into account when selecting the vehicle journey to which volumes are assigned. If none of the simultaneous vehicle journeys has an active vehicle journey section on each vehicle journey element, the vehicle journey is selected arbitrarily. **(21300)**
- + Calculation of volume matrices between stop points: The option to save the volume matrices between stop points in the general procedure settings and the corresponding lists 'Volume matrix between stop points' have been removed. Use the procedure 'PuT relation-based analysis' instead and the result matrices produced by this procedure. **(17157)**
- + Determination of the relevant fare zones for traversed stops: By default only stops at which the time profile allows for boarding or alighting are considered when determining the relevant fare zones for traversed stops. The behaviour is defined by the new option 'Only consider stops with a stop of the time profile' for ticket types, Tab 'Basis'. The previous behaviour has also been altered: Only stops with a matching transport system are considered. **(21008)**
- + Fail to board: The timetable-based assignment has been extended. The effects due to insufficient capacity of the vehicles can be taken into account. **(15789)**

- + Intermodal Assignment (timetable-based assignment in combination with DRT): Since the introduction of the intermodal assignment in Visum 2020, various improvements, extensions, and adjustments has been made. Among others, the dominance rules, and the definition of independence for DRT path legs has been adapted. In addition, the penalty for unserved demand for DRT path legs has been revised. **(21010)**
- + Intermodal Assignment (timetable-based assignment in combination with DRT): The intermodal assignment has been complemented by the option of a warm start. In addition, the final DRT skim values can be stored into main zone matrices. **(20770)**
- + PuT assignment statistics: The list 'PuT assignment statistics' has been extended and also shows values for flow bundle volumes and volumes filtered by the OD pair filter. **(18795)**
- + Service frequency: Previously, the number of arrivals at the destination was counted. Now, a graph (maximum flow method) is built for the calculation, from which the number of connections on each section can be read. The sum of the connections at the weakest point defines the service frequency. The definition thus follows the calculation in the headway based assignment. The characteristic value according to the previous definition is displayed as the new parameter 'Number of arrival times'. **(6825)**

## PuT Line Blocking

- + Connect line blocks: The function 'connect line blocks' enables automatically link the line blocks of multiple selected line block versions. The resulting line blocks are summarized and stored in a separate line block version. **(20768)**
- + Objective function: Line blocking with vehicle interchange or the line blocking including user-defined line block item types (e.g for e-Mobility) requires an objective function to evaluate the solution found. The specific objectives are no longer linked multiplicatively but additively. It is possible not only to determine the best solution but to store all solutions found, which form the optimum in there objective component (Pareto- optima) Besides, the various gradients of the charging functions are taken into account at an early stage to determine the dwell time. **(21264)**
- + Selection of empty trip- Tsys: The list to select the empty trip Tsys can be filtered. The filter is based on all existing combinations in the active supply or the combination for which the non-default empty trip- Tsys is selected. **(21050)**

## PuT Operating Indicators

- + Calculation of PuT operating indicators: The procedure 'PuT operating indicators' has been revised and improved. **(20722)**
- + PT Trips Unlinked and Revenues: The PT Trips unlinked for the territory PuT detail is considering the set rule of distribution for vehicle journey sections, i.e. evenly, weighted by seat or total capacity. The revenue distribution considers the settings of the distribution from the path to path legs. **(20907)**
- + Spatial PuT analysis: A line route item PuT detail object is created for the route element at which a vehicle journey section ends. The Post length of this element is 0. This element is taken into account according to the distribution rules for the line route elements. **(20357)**

## Ride Sharing

- + Dispatcher with re-optimization: For the dispatcher, optionally a re-optimization can be activated. After a certain defined number of trip requests, it optimizes the future, already known trip requests with tour planning procedures. **(21546)**
- + Pre-booking time when generating trip requests: For the pre-booking time of trip requests a distribution can be defined. Prebooking times of more than 30 min are valid. **(21492)**

## Ride Sharing. Progress bar for tour planning

- + For the calculation of the tour planning a progress bar is shown and the calculation can be cancelled. **(21297)**

## Safety

- + Import of accident data: When importing accident data the key identifier can be uniquely configured. **(21500)**
- + Safety - Add Ins: The Safety Add-ins have been updated. **(21342)**

## Scenario Management

- + Allocation of modifications to scenarios: The dialog for allocating modifications to scenarios has been revised. In the new grid the attributes of the modifications can be displayed and the number of modifications can be restricted using column filters. **(21120)**
- + Changes of courses in model transfer files: When changing courses of network objects in the line hierarchy, system routes or PrT paths the model transfer file only contains the changed parts compared to the comparison network, i.e. inserted, deleted and changed elements. This supports more use cases in scenario management, in which independent modifications with changes of the same course are combined in one scenario. **(19391)**

- + Save model transfer files outside the project: When saving modifications outside the scenario management project the code of the modification is suggested as file name. **(21116)**

## Schematic Line Diagram

- + Transfer Nodes: Within the transfer nodes, all edges can be drawn right-angled or right-angled and diagonal using entries in the context menu. This results in a clearer display. **(18916)**

## Timetable Editor

- + Compact line block display: In the line block editor, a graphically more compact version of the line block display can be displayed, in which part of the labels are omitted. The options which labels are to be displayed are set via the graphic parameters of the block display. The vertical extent of the header data has been minimized. Vertical scrolling is now possible using the mouse wheel. **(20875)**
- + Edit vehicle journey: The dialog for editing one or more vehicle journeys contains the possibility to change the attribute 'Vehicle combination set'. **(12765)**
- + Graphical Timetable Editor: The graphical display of the timetable includes an option to distribute the stops evenly one the space axis. **(19275)**
- + Synchronization of line block items: The synchronization of line block items with other network objects has been improved. Markings are transferred to lists of timetable sections, vehicle journeys, and system routes, as well as to the schematic line diagram map and the tabular timetable in the journey section mode. **(21194)**

## Transfers Display of Regular Services

- + Graphic parameters: The graphic parameters of the arrival groups can be transferred to the departure groups via a link. The return direction is available in the same way. **(20147)**
- + Supply Filter: The arrival, as well as the departure groups can be filtered separately. The filtering is based on serving public transport systems, (main-) lines, line routes, time profiles, vehicle journeys, or operators. The display of transfer- or trough passenger flows follows this selection. **(20143)**

## Visum Files

- + Changes of courses in model transfer files: When changing courses of network objects in the line hierarchy, system routes or PrT paths the model transfer file only contains the changed parts compared to the comparison network, i.e. inserted, deleted and changed elements.  
This supports more use cases in scenario management, in which independent modifications with changes of the same course are combined in one scenario. **(19391)**
- + Errors and warning when reading networks: Errors and warnings can optionally ignored for all tables when reading networks. **(20370)**
- + Initial sorting order in list layouts: In list layouts, the initial sorting order can be defined by editing the XML file. **(20360)**
- + List layouts in XML format: The layout files for lists have been changed to XML format and can therefore be edited. **(20325)**

## ! Breaking Changes

### COM-API

- ! ID of user-defined attributes: The ID of user-defined attributes can be changed via COM. For this purpose the property IAttribute.ID has been made writable. On the other hand, the type of the return parameter for the existing property for reading the ID has been changed from Variant to BSTR. Scripts may need to be adjusted. **(21080 +)**

### Data Model

- ! Calculation of angles for main turns: The calculation of angles for main turns has been corrected. This means the type of a main turn can change when set based on standard values. **(20426)**

### PrT Assignment

- ! Consideration of minimum speed of the link type: The value of vMinPrT was used differently in the calculation of the maximum travel time (tCur) in assignment with ICA and the blocking back calculation. This error has been fixed. This can change result when using the blocking back calculation. **(21444)**
- ! Coordinates of zones when using MPA: So far, coordinates have not been set for internally generated zones when using MPA which resulted in an inefficient shortest path search. This bug has been fixed. This can change assignment results when MPA is used. **(21235)**



- ❗ Gap calculation for LUCE: The gap calculation has been corrected. As a consequence, assignment results can change. **(9651)**
- ❗ Lanes of channelized turns and pockets in SBA: Lanes of channelized turns and of pockets of outgoing links were connected to the wrong lane of the destination link. This error has been fixed. This can change assignment results in SBA. **(21445)**
- ❗ Link type vMax in the dynamic stochastic assignment: When calculating the travel time  $t_0$  in an unloaded network in the dynamic stochastic assignment the link type specific maximum speed (vMax-PrTSys) has not been considered. This error has been fixed. This changes the results of the dynamic stochastic assignment. **(21463)**
- ❗ Number of lanes for channelized turns in SBA: For the simulation graph in SBA the number of lanes for channelized turns was determined from the number of lane turns. This error has been fixed. This can change assignment results in SBA. **(21558)**

## PuT Assignment

- ❗ Determination of the relevant fare zones for traversed stops: By default only stops at which the time profile allows for boarding or alighting are considered when determining the relevant fare zones for traversed stops. The behaviour is defined by the new option 'Only consider stops with a stop of the time profile' for ticket types, Tab 'Basis'. The previous behaviour has also been altered: Only stops with a matching transport system are considered. This can change results of the fare calculation. **(21008 +)**

## PuT Line Blocking

- ❗ Objective function: Line blocking with vehicle interchange or the line blocking including user-defined line block item types (e.g for e-Mobility) requires an objective function to evaluate the solution found. The specific objectives are no longer linked multiplicatively but additively. Thus better results are found. It is possible not only to determine the best solution but to store all solutions found, which form the optimum in there objective component (Pareto- optima) Besides, the various gradients of the charging functions are taken into account at an early stage to determine the dwell time. This can lead to fewer iterations needed. **(21264 +)**

## PuT Operating Indicators

- ❗ The procedure 'PuT operating indicators' has been revised and improved. The results of the calculation can change. **(20722 +)**