

What is new in PTV Vissim/Viswalk 2022

The background of the lower half of the page is black. It features several overlapping, semi-transparent geometric shapes in shades of red and dark red. These shapes form a dynamic, abstract composition that suggests movement and depth, with some shapes appearing as if they are layered on top of others, creating a sense of three-dimensional space.

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Preamble

This document provides an overview of PTV Vissim/Viswalk's important changes from version 2021 to version 2022 regarding handling and program behavior. Functionality which has already been added in service packs of version 2021 is mostly not covered in this document. Please see the version 2021 service pack release notes for more of these features. The release notes for versions 2022 SP xy include additional new features which are also not included in this highlights document.

Detailed descriptions of how to use the new functionality can be found in the Vissim 2022 online help and in the document "Vissim 2022 - Manual.pdf".

1 Vehicle Simulation

1.1 Bosch Emissions

With this new add-on module, Vissim can use the cloud service ESTM by Bosch for emission calculation. The individual vehicle trajectories are sent to the Bosch server at the end of a simulation run, and the resulting emissions of CO₂, CO, NO_x, HC and particles are determined with a resolution of 1 simulation second. These values are passed back to Vissim and aggregated within the network performance evaluation (vehicles) and the link segment evaluation, so they can be visualized as link bars, link colors and in charts.

For the assignment of vehicle types to emission classes, there is the new network object type "Emission class distribution". Such a distribution holds 182 predefined emission classes, each one with a value indicating the size of the share of that emission class among all vehicles of that vehicle type. In the file HBEFA_EmissionClassDistributions.inpx in the subfolder "Vehicle Fleet & Settings Defaults" of the "Examples Training" folder, there are 168 distributions defined, 28 each for 6 European countries as listed in the German manual for emission factors (HBEFA) for 2022. These emission class distributions can be easily added to a network file through File - Read Additionally - Network, selecting the above example file and then deselecting all network object types before selecting only "Emission Class Distributions".

The Bosch emission calculation can be activated on the tab page "Emissions" of the Evaluation Configuration dialog. Network performance evaluation and/or link segment evaluation need to be active, too. For each individual link, the attribute "Emission calculation active" can be switched off, but that should only be used for contiguous sections far away from the locations where emission results are required. This is because all vehicles are considered to enter the first link with "Emission calculation active" with a cold motor, causing significantly increased emissions. In-between links (including connectors) without "Emission calculation active" also cause the motor to be considered cold again. Because of this, it is recommended to have long enough entry links modeled to allow the vehicles one to two minutes of driving before they reach the actual project area. These warmup links should have "Emission calculation active" but neither "Link evaluation active" nor "Network performance evaluation active". Inside the actual project area, one or both of the two latter attributes need to be set as well in order to actually collect the values in the respective evaluation.

1.2 Reversing at PT Stops

With the new line stop attribute "Change of driving direction", it can be indicated that a PT vehicle is supposed to depart in the direction it has come from after the dwell time in the respective PT stop. In order for this to work, there needs to be a link in the opposite direction overlapping with the link of the PT stop. After the dwell time, the vehicle is automatically removed from its link and placed on that opposite direction link, with no visible change of the location in world coordinates. Then, the vehicle starts to move on that link, with its rear end leading the way and the front end following. The attribute "Driving direction" of the vehicle is still "Forward" because it follows the driving direction of its (new) link, but the new vehicle attribute "Turned" is true, indicating that the 2D/3D

model and blinkers are shown in reverse direction. All network objects work normally during such a "Turned" trip, the only difference from normal driving is the location of the doors and the visualization.

This works for line stops in PT lines as well as partial PT routes. In order to allow a PT line to continue (with a contiguous time table) beyond that PT stop, there needs to be a (usually invisible) connector downstream of the PT stop connecting the link of the PT stop to the overlapping link in the opposite direction. If there is no need for a contiguous time table, the PT line can also simply end downstream of that PT stop, and a new partial PT routing decision can be located on the link in opposite direction, so that it is passed by the PT vehicle just after having left the PT stop, providing a new link sequence to follow.

For easy creation of the overlapping link sequence, there is the new context menu item "Create Reverse Direction For All Links" after a click on a selected sequence of links and connectors.

1.3 Meso Simulation

1.3.1 Merging Penalty [2021 SP 06]

The new node attribute "Meso penalty (merging vehicles)" contains a value in seconds which is added to the minimum meso time gap between two vehicles on the same outgoing lane which are coming from different incoming lanes or links. This allows to calibrate the capacity drop at merging areas.

1.3.2 Lane Selection [2021 SP 07]

If the lane change distance of a downstream connector reaches back upstream into a meso edge, vehicles selecting a lane on that meso edge (in the previous meso node) consider already their lane preference on all meso edges downstream up to that connector.

Connectors in micro sections have no effect on meso lane selection, and the meso vehicles don't look through micro sections.

If the lane changes happen too early, the lane change distance of the connector(s) can always be set to the emergency stop distance plus 5 meters in order to get almost always the same meso behavior as in versions before 2021 SP 07.

1.4 Driver Errors [2021 SP 07]

Extended options for the creation of "accidents" or "critical situations":

The driving behavior attribute "Speed misestimate distribution" has been renamed to "Speed misestimate distribution (default)". Additionally, one attribute "Speed misestimate distribution (x)" is available for each vehicle class number x.

If the driving behavior used by a vehicle references a specific speed misestimate distribution for a vehicle class containing the vehicle type of an observed vehicle, that distribution is used. If not, the default speed misestimate distribution (if existing) is used.

A vehicle using a speed misestimate distribution misestimates the current speed of all

other vehicles for the purpose of gap calculation, at priority rules, conflict areas, during lane changes (new!) and for overtaking in the opposing lane. The speed of each considered vehicle is multiplied with the same factor drawn from that distribution. The fractile for the random value is constant for each individual vehicle during a simulation run.

At conflict areas, vehicles using a factor other than 1.0 will also ignore the current and future acceleration and deceleration of surrounding vehicles, taking into account only their current speed, multiplied by the factor.

The new attribute "Conflict areas count as interaction objects" can be activated in a driving behavior in order to allow distraction for vehicles using that driving behavior to include ignoring of conflict areas. If the attribute value is "true", conflict areas are counted for the maximum number of interaction objects set in the driving behavior. A COM script can change the vehicle type of a vehicle during a simulation run in order to make it use a different driving behavior, with a lower number of interaction objects including conflict areas, so that vehicle might ignore other vehicles or pedestrians if these conflicts are downstream of conflict areas, e.g. for interaction with the opposing through traffic. (If the attribute is set to "false", each vehicle always sees at least all conflict areas up to the first downstream vehicle or within the maximum lookahead distance if this doesn't contain a vehicle.)

Vehicles have the new attribute "Remaining distraction duration". While a driver is distracted (caused by a driving behavior with active distraction parameters), this attribute shows for how many simulation seconds this state will continue.

1.5 Attribute Decisions and Attribute Modifications

These network objects have additional options now.

Attribute decisions have the new attribute "Filter" for a boolean condition to limit the vehicles (or pedestrians) to be affected. Attribute decisions can optionally assign a value calculated through a formula ("Attribute computation") instead of a constant value only (attribute "Value" is obsolete). The previous attribute "Attribute" has been renamed to "Target attribute" (can also reference an attribute of type string now), "Decision type" to "Value assignment type" and "TimeFrom" to "FromTime" and "TimeTo" to "ToTime" (both floating point values now), to be in line with attribute modifications.

Attribute modifications have the new attribute "Value assignment type" to choose between calculation of the new attribute value through a formula or drawing the value from a free distribution (new attribute "Distribution"). The latter is only possible during a simulation run.

Both attribute modifications and attribute decisions now allow the setting of values of attributes which contain the key of a referenced object (drop down selection list in the list window).

1.6 Parking in Reverse

[This feature is still under construction and will be available in an early service pack.]

Parking lots can have the new values "Reverse > forward" and "Any > opposite" for the attribute "Parking direction". Both require a connector coming from a "downstream" position on the main road, i.e. where vehicles have already passed the parking lot link, to the parking lot link. That connector must have the new attribute "Reverse parking" set to true. A parking lot route must lead from a parking lot decision across that connector to the parking lot link. This parking lot route has the calculated attribute "Parking direction" set to "Reverse". Parking lot routes have the new attribute "Relative flow" which defines the probability of each of the parking lot routes leading to the same parking lot to be used by a vehicle which has selected that parking lot at the parking lot decision.

In the car park creator, there is the new option to select the percentage of vehicles parking in reverse. If this is 0%, only parking lots for forward parking are created (along with the required links, connectors, routes and decisions). If this is 100%, only parking lots for reverse parking are created (along with the required network objects). For all other values, the parking lots are created for both forward and reverse parking, with the connectors and routes for both options.

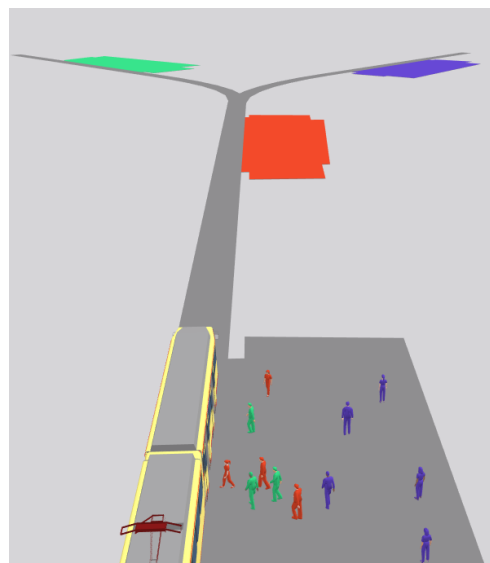
Collision prevention is handled automatically as for parking out in reverse. No conflict areas or priority rules are required, and it is recommended to avoid those in the proximity of parking lots for reverse parking and or parking out in order to prevent deadlocks. On connectors with the attribute "Reverse parking", no network objects are allowed at all.

2 Pedestrian Simulation

2.1 Formula-Based PT Line Selection

Pedestrians whose route ends on a PT waiting area select a set of PT lines which they consider for boarding at the moment when they reach the PT waiting area. They will try to board each service of one of these lines upon arrival. Previously, the boarding volumes which distributed pedestrians on the set of PT lines had to be fixed numbers.

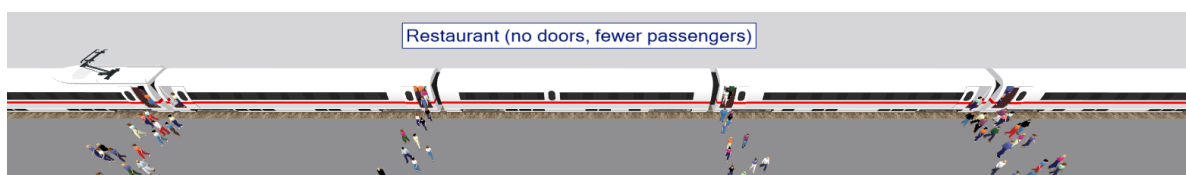
This is extended by the possibility to have a formula instead of a number. Hence, passengers can select their PT line set based on their individual attributes. A common use case would be partially overlapping courses of two different PT lines, where depending on their destination some passengers can select only one of the two lines, while others can reach their destination with both.



2.2 Door Selection of Alighting Passengers

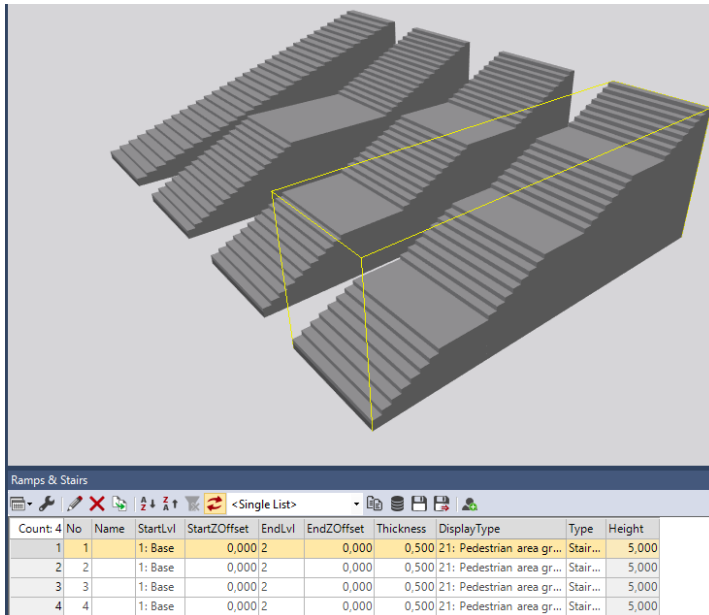
Trains often have segments unavailable for passengers (control room) or which serve specific purposes (bike carriage, restaurant). For cases where these parts have no (or very few) passengers, whereas for the rest of the train simple distributions (equally distributed, linearly increasing from end to end) exist, this new feature allows to define for each 2d/3d segment a part without passengers. The previously existing distribution of alighting passengers is then only applied on the parts of the train which are not excluded from passenger occupation.

This can be important, when the lower occupation is reflected with a reduced number of doors as it is for example the case for restaurant carriages.



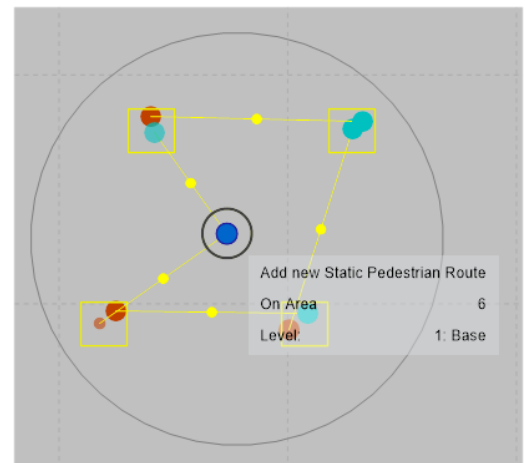
2.3 Straight Stairs With Multiple Landings

For modelling comfort straight stairs can now have up to three landings.



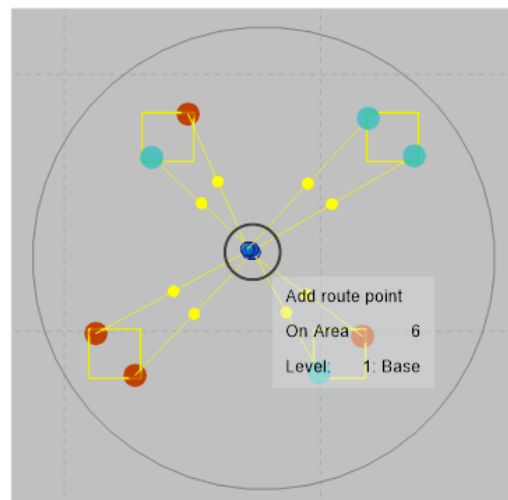
2.4 Editing of Objects in Multi Selections

After having selected multiple objects, beginning to edit previously meant that the multi selection was lost. Now pedestrian routes and the points of areas can be edited in the network editor and the multi selection is preserved, provided that the editing mode of the respective object type is selected.



2.5 Adding a Route Location to Many Routes At Once

For cases where areas are frequented by pedestrians walking along many different routes, it is now possible to add a route location to that area for many different routes at once. The new route location can be either the first new route location for each route after the route decision, the new last route location before the route destination or the new route destination.



2.6 Shapefile Import

It is now possible to import shape files of polygon geometry type as areas or obstacles into Viswalk.

2.7 Pedestrian Attribute Dwell Time [2021 SP 06]

Pedestrians in network have a new attribute Dwell Time which is editable during simulation (manually, with attribute modifications, attribute decisions, and scripts). This is offered for use in situations where the dwell time is not known at the beginning of the dwelling process, but dwelling ends following dynamically evolving conditions.

2.8 Import of IFC4 files

It is now possible to import IFC files which follow IFC4 standard.

2.9 Evaluation of Number of Stops [2021 SP 07]

Areas, ramps and area measurements now count how often pedestrians stop as well as the total time spent stopping. A stop is counted when walking speed falls from above to below 0.2 m/s and stop times are all times spent moving with less than 0.2 m/s.

2.10 Distribution of Waiting Passengers Along a Platform

Passengers who are waiting for a train do not necessarily distribute equally along the platform, be it that the platform is very long and most prefer not to walk too far on the platform or that they wait preferably where the doors will be or because seat reservations are not equally distributed along the train in a particular station. To overcome the existing somewhat cumbersome method to model this (with multiple waiting areas), it is now possible to set a "Distance to PT waiting position distribution" for PT waiting areas. This defines how far pedestrians walk on the platform from where they have reached the area. For cases where different trains require different such distributions, pedestrians also have a new attribute which defines their individual distance distribution. The value of this attribute can be set with attribute decisions and attribute modifications.

The chosen distance distribution defines the probabilities for waiting positions for the first few pedestrians. If by and by the platform gets more crowded also the initially less likely positions will be utilized. In that case the resulting distribution will be different from the given distribution, just like pedestrians only walk with their given desired speed when they can walk unimpeded, but with a reduced speed when it is crowded.

3 Signal Control

3.1 Internal Supply Data for Fixed Time

The signal controller type "Fixed Time" (a.k.a. Vissig) doesn't use a *.sig file anymore. The supply data which used to be stored in that separate file is now all contained directly in the attribute "Internal Supply Data" (in an encoded format which cannot be edited by the user). The configuration file vissig.config provided with the Vissim installation is still used as supply file 1 and can be modified by the user if required in special cases.

When a network with fixed time controllers still referencing a *.sig file is opened, the conversion is done automatically, and as soon as the *.inpx file is saved, the *.sig files are not required anymore and can be deleted (unless they are used by some other file as well).

3.2 New RBC Controller

Due to popular demand PTV has decided to build a replacement for the old rbc_controller.dll which had been developed by a third party. The new rbc_controller_ptv.dll is much faster and will eventually include improvements which were not possible in the legacy solution. It closely matches the simulation behavior of the old controller, and the user interface is almost unchanged.

Initially, not all features of the old controller DLL are supported. In the first beta release, the new RBC controller supports free-running configurations as well as basic coordinated timing features but no preemption. Customers with a Vissim license bought before 2022 can continue to use their unlimited license for the old controller. Only the new rbc_controller_ptv.dll will be included in the Vissim 2022 release installation, but the old rbc_controller.dll can be copied manually from the Exe\ folder of a Vissim 2021 installation into the Exe\ folder of a Vissim 2022 installation.

RBC signal controller objects in existing networks are now shown with the controller type "Ring Barrier Controller (old)". They can be converted to use the new controller DLL by clicking "Convert RBC (old) to RBC" in the context menu of the SC list window. Newly created SC objects can be set to use either type.

3.3 Vehicle to Signal Controller Communication [2021 SP 07]

V2I (Vehicle to Infrastructure) data is sent to downstream signal heads from vehicles of vehicle types which have the new option "SC Communication" active in their attribute "Equipment". The vehicle sends its number, vehicle type number, lane attribute (UDA) "MAPlane", speed, distance to the stop line [m], expected travel time to the stop line [s] and current blinker state to the controller of the next downstream signal head within the maximum lookahead distance, provided the controller DLL has requested V2I data from Vissim. (Eventually, a "priority" value and the MAPlane of the outgoing lane at the next node will be also sent to the controller.)

Currently, this communication is only known to be supported by LISA+/OMTC controllers version 8.

4 Visualization

4.1 Scatter Plots

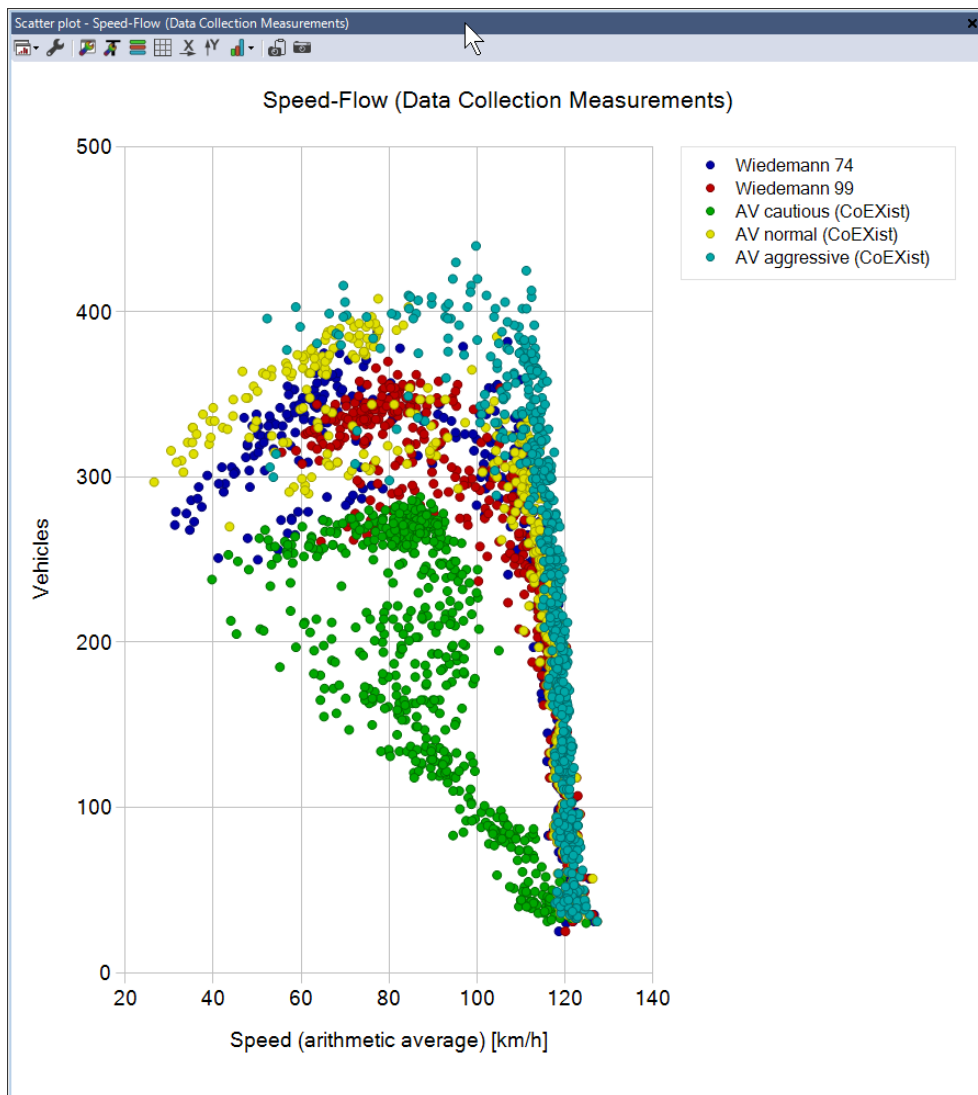


Chart windows of this new type can be opened from the menu View - Create Scatter Plot. The network object type has to be selected, as well as the attribute to be used as x-value and the attribute to be used as y-value for each data point. The data points can be color-coded as separate data series through the selection of either the objects or any available subattribute (simulation runs, time intervals, vehicle/pedestrian classes). Optionally, the data points can also be filtered, i.e. shown only for specific objects, simulation runs, time intervals and vehicle/pedestrian classes (provided the data has been collected specifically for these classes). The standard aggregations (minimum, maximum, average, standard deviation, current, last, total) are also available.

4.2 User-Defined Web Map Services

The currently available list of background map providers can be accessed through the User Preferences, under GUI / Background Map. In this list, additional user-defined Web Map Services (WMS) can be added by entering their access parameters. The list of user-

defined WMS can be exported to an *.xml file. Such an *.xml file, e.g. exported from Vissim and/or by a different user, can also be imported.

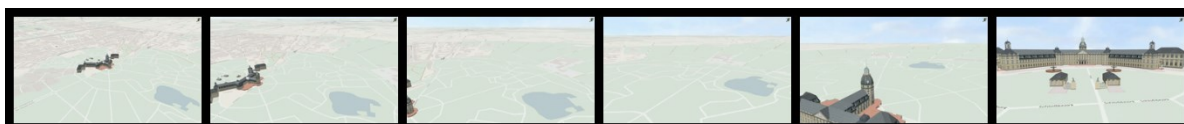
4.3 Video Recording: Codecs

Vissim 2022 doesn't use the Windows-internal service Video for Windows (VfW) anymore but the free library ffmpeg. This avoids crashes due to faulty codecs (especially from Logitech). The following encoding options are now available in the storyboard (regardless of what codecs are installed on the machine): uncompressed, WebM VP8, WebM VP8 (small file), Windows Media Video 8, Theora, FFmpeg video codec #1 (lossless), MPEG-4 part 2.

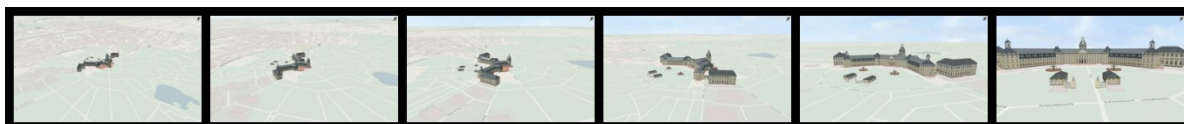
4.4 Video Recording: New Camera Movement

With the previously existing method to compute the movement of the camera and the change of its viewing direction, it was common that the region or object of interest got out of view for some time during the camera movement, possibly confusing spectators.

With the new method to compute the viewing angle during movement, the region or object of interest will usually stay in view.



Old method




New method

The difference between the two methods is that with the old method the camera's viewing angle was interpolated linearly between start and end, just as the position is interpolated linearly. With the new method, first the points on the ground ($z=0$) are computed to which the camera views at start and end. During the movement, a point on the ground is linearly interpolated to which the camera directs, while nothing changes for the computation of the position of the camera.

The old method remains available as an option for backwards compatibility and since in rare cases it still produces better results.

5 Handling

5.1 Geolocation

With the button  in the network editor toolbar, an edit field to enter a geographic location (city, building, river, ...) can be opened. A list shows suggested locations including the entered text, and through a click on a list item, the view in the network editor is moved to the position of that location.

5.2 List Column Filter for Empty Cells

If a list column contains empty cells, it can now also be filtered by "empty" or "not empty".

5.3 License Management [2021 SP 08]

This has been improved in many ways. PTV Vissim will automatically notify you when your license has been extended to a new main version due to your maintenance contract, and you can install that license update with a single click.

License activation, update, and deactivation can now be triggered directly in the License Management dialog. License borrowing is also simpler and more robust now. Please see the new online help for further details: https://cgi.ptvgroup.com/vision-help/LicenseMgt_ENG/Content/0_TitelCopyright/Index.htm.

You can use the new license management in two ways:

1. Within PTV Vissim through Help / License / Manage licenses.
2. With the stand-alone tool PTV License Manager which can be downloaded from our download area. As this can be used independently of a Vissim installation, it is recommended for managing licenses on a license server. It also works for previous Vissim versions.

6 Technical Changes

6.1 CodeMeter Runtime

The CodeMeter runtime version deployed with PTV Vissim has been updated to CodeMeter 7.21a. ATTENTION: The version 7.30 which is available at WiBu has a bug causing it not to work for PTV products!

6.2 Python

PTV Vissim 2022 doesn't support Python 2.7 anymore for event-based scripts but only Python 3.9. It is recommended to use the "PTV Vision - Python" setup from the PTV download page: <https://cgi.ptvgroup.com/visionSetups/en/>

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