## PTV VISUM – DEVELOPMENT 2012 - 2016

<table>
<thead>
<tr>
<th>Year</th>
<th>Graphical user interface/ GIS</th>
<th>Private transport</th>
<th>Public transport</th>
<th>Demand modeling</th>
<th>Miscellaneous</th>
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<tr>
<td>2012</td>
<td>- Window redesign</td>
<td>- Multi-threading of LUCE</td>
<td>- Capacity restriction in the timetable-based assignment</td>
<td>- Add-In Nested Demand Model</td>
<td>- OSM Import - Live Background maps</td>
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<td></td>
<td>- Transfers display</td>
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<td>- Fares for the headway-based assignment</td>
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<td>- Schematic line diagram</td>
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<td>2013</td>
<td>- Formula editor</td>
<td>- Improved Assignment with ICA</td>
<td>- Reporting Add-In Import transit supply</td>
<td>- Formula matrices</td>
<td>- One step Vissim export - Visum Safety</td>
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<td>2014</td>
<td>- Distributed computing</td>
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<td>- Skim matrix calculation for stop areas</td>
<td>- Tour-based “Rubberbanding” Matrix references</td>
<td>- Import PuT supply from Visum</td>
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<td></td>
<td>- Multi-user mode</td>
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<td>- Arrival time-based demand</td>
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<td>- GPX Import GTF Export</td>
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<td>- Redesign of the timetable editor</td>
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<td>2015</td>
<td>- Improved display of isochrones</td>
<td>- Stochastic assignment for bicycles with path level costs</td>
<td>- Couplings Passenger trip chains</td>
<td>- Tour-based freight model Park &amp; Ride</td>
<td>- GPX Import GTF Export</td>
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<td>- New functions in the formula editor</td>
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<td>2016</td>
<td>- Visum 3D</td>
<td>- Simulation-based dynamic assignment (SBA)</td>
<td>- PuT assignment with “Optimal strategies” Check-in/ Check out data support</td>
<td>- Built-in Nested demand model</td>
<td>- Accessibility</td>
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### Speed

- Visum Safety

### User friendliness

- One step Vissim export
- Import PuT supply from Visum
- GPX Import
- GTF Export
Central access point to recently used files, help channels and product-specific news

- HTML page is hosted in PTV
- Product send request containing: **Product, language and region.**
- Page with according content is provided to product.
- User is notified, when new service packs are available
MULTIMODALE APPLICATIONS

Motivation
- regional and national demand models
- modeling of long-distance passenger demand
- modeling of long-distance freight transport
- modelling of bicycle carriage
- display of P+R entire paths from origins to destinations
- display of tours and paths from ABM models

Examples for existing modelling options with several modes
- P+R in demand models
- PrT as PuT auxiliary in public transport assignments
NETWORK GRAPH AND PATH SEQUENCES

Origin/Destination zone

zones with mode change

{car, rail, coach} : allowed modes for OD pair

: possible path sequence for main mode {air}
MULTIMODAL ASSIGNMENT – BASIC CONCEPT

1. Calculation of skim matrices (mode-specific)
2. Multimodal assignment
3. Calculation of multimodal skim matrices
4. Calculation of new OD matrices (mode-specific)
5. Assignment of demand segments (mode-specific)
EXAMPLE: BIKE ON TRAM AND LRT

- demand for Bike on tram/LRT
- subordinate Dsegs: main mode “PT (bike)” + “bike”
- skims path sequences: distance + time
  - distance = trip distance + ride distance
  - time = sum of t0 & ride time
- path sequence set: BT
- display of marked path sequence in the network
VEHICLE SHARING

Modeling and evaluation of Vehicle Sharing Systems

- increasing popularity of sharing systems
- modeling of sharing systems addressing city planners and operators
  - modeling the choice between PT and/or different sharing systems
  - support or competition for PT?
  - size/positioning of such systems
New network object ‘Station’
- occupancy
- capacity
- VDF for rent and return

‘Sharing’ leg time based on TSys tCur

New: Sharing TSys type
- station-bound
- free floating

New: Zone Dwell Time
RESULTS – EVERYTHING YOU KNOW FROM PUBLIC TRANSPORT
NEW PRT-ASSIGNMENT BI-CONJUGATE FRANK WOLFE (BFW)

- extension of the Frank Wolfe (FW) method
- better convergence
- multi-threaded

- as subordinate assignment in Assignment with ICA available
BFW IN COMPARISON TO OTHER ASSIGNMENTS

Example network Chicago
- 1,800 zones
- 41,000 links
- 13,000 nodes

Hardware
- 4 cores
- @3.60GHz

Graphs:
- Gap vs Iterations
- Gap vs Run time
Modeling of planned and unplanned events

- “Event”: road closure, temporary speed reduction
- unplanned: unchanged behaviour, i.e. drivers stick to their routes like in the base case, no change of route choice
- planned: adaptation of route choice until a new equilibrium state is reached
EXAMPLE: TEMPORARY SPEED REDUCTION

V0 6:30 - 6:40 to 10mph
EXAMPLE: TEMPORARY SPEED REDUCTION

V0 6:30 - 6:40 to 10mph

Parameters: Simulation-based dynamic assignment (SBA)

- Use current assignment result as initial solution
- Iteration offset for volume balancing: 10
- Maximum number of iterations: 50
- Maximum gap: 0.01

Planned Event
BASE CASE VS PLANNED EVENT: VOLUMES

Time Interval: 06:20-06:30
BASE CASE VS PLANNED EVENT: VOLUMES

Time Interval: 06:30-06:40
BASE CASE VS PLANNED EVENT: VOLUMES

Time Interval: 06:40-06:50
BASE CASE VS PLANNED EVENT: VOLUMES

Time Interval: 06:50-07:00
BASE CASE VS PLANNED EVENT: VOLUMES

Time Interval: 07:00-07:10
EXAMPLE: TEMPORARY SPEED REDUCTION

V0 6:30 - 6:40 to 10mph

Unplanned Event

Parameters: Simulation-based dynamic assignment (SBA)

- Use current assignment result as initial solution
- Iteration offset for volume balancing: 10
- Maximum number of iterations: 1
- Maximum gap: 0.01
BASE CASE VS UNPLANNED EVENT: VOLUMES

Time Interval: 06:20-06:30
BASE CASE VS UNPLANNED EVENT: VOLUMES

Time Interval: 06:30-06:40
BASE CASE VS UNPLANNED EVENT: VOLUMES

Time Interval: 06:40-06:50
BASE CASE VS UNPLANNED EVENT: VOLUMES

Time Interval: 06:50-07:00
BASE CASE VS UNPLANNED EVENT: VOLUMES

Time Interval: 07:00-07:10
More realistic behavior on freeways

- speed limit for HGV lower than for car
- right (left) driving rule
- link type dependent option: Use outermost lane only by TSys
DEMAND MATRIX CORRECTION – METHOD OF LEAST SQUARES

- provides ALWAYS a solution!
- applicable to demand matrices of PrT and PuT
- Matrix correction for several demand segments in one procedure
- different counts and distributions can be combined
- tolerances are replaced by weights
- calculation of flow matrix considerably faster
- run time savings also for TFlowFuzzy
- 'Least squares' with even shorter run times as TFlowFuzzy
DEMAND MATRIX CORRECTION – PARAMETERS

Procedure parameters:

- Ratio of weights for OD deviation relative to count weight: 0.5

Weights:

- Based on counted link volumes
- Only active links
- Volume: Add Value 1, Weight: Add Value 2

Tolerances:

- Based on counted turn and main turn volumes
- Only active turns and main turns
- Volume: Add Value 1, +/-: Add Value 2
Objective:
Person groups with the same trip purpose compete for the same attraction potential.

Example:
- 2 person groups employees with and without car (450 pers. / 150 pers.)
- 2 locations with work places (200 / 400)

Distribution of work places among persons of different groups is a result of the calculation!!
ANALYSING CONNECTIONS

Overview of connections

- new list: Connecting journeys
- connections listed for stop or vehicle journey
- status: „Missed“ / „Reached“
- adjustable time window for max. wait time between connecting journeys
- synchronization
- easy to use in version comparison to highlight changes of missed and reached connections for different scenarios
GLOBAL LAYOUT

- manage settings of all open windows in one single layout file including
  - window positions
  - filter settings
  - graphic parameters
  - view-specific layout settings
- drop-down menu in toolbar for easy access to files
- files for view-specific settings remain
DIRECT EDITING OF LINK BARS AND LEGEND
3D - INFO SIGNS

- info signs for labeling arbitrary network objects
- combination of free text and attribute values
- graphic design
  - size
  - alignment
  - rotation
  - show/hide via storyboard actions
  - …
By popular request of our users !!!

Node 984 = origin

Node 984 = destination
ADD-IN: OD IMPORT

- converting OD data to matrices
- segmentation
  - time slice
  - content
- flexible attribute allocation
- result: multiple matrices (per time interval x segment)
  - (main-) zone
  - stop areas
- special features
  - mapping coordinates → zones
  - calculation of skim matrices (weighted average, sum)
  - calculation of travel time using departure and arrival times
for which network objects?
several models: differentiation by attribute value
model variables: arbitrary attributes of selected network object types
optional time-dependent model:
calendar year as additional model variable
optionally data for several years can be read from other files

New Add-In ‘Generic Accident Model’
EXAMPLE: GENERATED ACCIDENT MODEL

Actual accidents at nodes in a calendar year

Generated Accident Model:
- unknown: $\exp\left(64 + 0.000049 \, V + 0.35 \, n - 0.03 \, t\right)$
- signalized: $\exp\left(228 + 0.000193 \, V + 0.25 \, n - 0.11 \, t\right)$
- roundabout: $\exp\left(159 + 0.000035 \, V + 0.54 \, n - 0.08 \, t\right)$

$V$: traffic volume, $n$: number of legs, $t$: time
TECHNICAL CHANGES

Changes

- no support of Windows Vista OS
- removal of the 32Bit-Version

COM / Scripting

- update of Python libraries
- removal of obsolete COM methods
  (WriteToLogFile,… → Visum.Log, AddODMatrix, AddSkimMatrix,...)