Florida Statewide Model (FLSWM) in PTV Visum

presented by
Name
Steve Perone

Date
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• Who is PTV Group and who is using Visum?

• Florida State-wide Model (FLSWM) in Visum
PTV Group

- Founded in 1979
- 12 Subsidiaries
- 650 Employees
- $90M Turnover

PTV Headquarters, Karlsruhe, Germany
PTV Vision Suite

- PTV OPTIMA: Real-time Simulation
- PTV VISUM: Strategic Planning
- PTV VISSIM: Microsimulation
- PTV BALANCE: Adaptive Signal Control
- PTV VISTRO: Traffic Analysis
- PTV VISWALK: Pedestrian Modeling
PTV User Community - Partnership

- Econolite Group, Inc.
- INRIX
- Here Maps for Life
- McCain
- PTV Group
- Rhythm Engineering
- IBM
- Microsoft
- TOMTOM

[FLORIDA MODEL TASK FORCE]
<table>
<thead>
<tr>
<th>Year</th>
<th>Version</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015. 7</td>
<td>V15</td>
<td>More to come this summer....</td>
</tr>
<tr>
<td>2014. 7</td>
<td>V14</td>
<td>Distributed computation of procedures, Scenario Management (Multi-User Access), Matrix Editor Improvement, Rubberbanding for tour-based model, PuT skim matrices for time intervals, Distance Measurement in Network editor, OSM Import for geographic area, Spatial PuT Analysis, Evaluation of Transfers, etc.</td>
</tr>
<tr>
<td>2013. 6</td>
<td>V13</td>
<td>Distributed Computing for Scenarios, ICA Assignment Improvement, PrT Calibration Reports, Faster Computation for PuT, Reporting tool for Count data, Live stream Bing Map, Flexible matrix definition with formula, Multi-threading of trip distribution of the 4-step model, Visum Safety, etc.</td>
</tr>
<tr>
<td>2012. 9</td>
<td>V12.5</td>
<td>User Interface update, Time table based capacity restrained PuT assignment, Headway based PuT Assignment using the fare model, Improvement of bush-based assignment, Bing Aerial Photo as a Background image, Schematic Line Diagram (PuT), Nested Demand Model, Multi-threading for Tour Based model, Open Street Map import, etc.</td>
</tr>
<tr>
<td>2011. 10</td>
<td>V12</td>
<td>Scenario Management Phase 2, Formula attributes, Check Network, Open street map as a background Image, Matrix editor improvement, Ring barrier controller (RBC), Signal time space diagram, Multi-thread execution expansion, Duality Gap, Headway based PuT Assignment, TFlowFuzzy Improvement, more COM access, etc.</td>
</tr>
<tr>
<td>2010. 8</td>
<td>V11.5</td>
<td>Multi-threading expansion, ICA Assignment with blocking back, TRIBUT (Highway assignment with Toll), TFlowFuzzy Matrix Extension, Scenario Management Phase 1, Reimplementation of Matrix editor, Google Transit Import, HCM 2010, Open street map import, etc.</td>
</tr>
<tr>
<td>2009. 5</td>
<td>V11</td>
<td>New Origin based assignment (LUCE), Built-in Tour based model (VISEM), ICA node impedance Calculation, signal optimization, Main Zone, Aliases for Attributes, New Junction editor, Smart map, Node flow diagram,</td>
</tr>
<tr>
<td>2007. 9</td>
<td>V10</td>
<td>Dynamic User Equilibrium Implementation (9.5) &amp; Improvement, Equilibrium / Stochastic Assignment Improvement, Custom Volume Delay Function (VDF), Full implementation of HCM 2000, Main nodes &amp; Turns, COM improvements, Integration with Vissim (ANM), 64-bit version support, Multi-threading parallelization of all computationally intense algorithms, etc.</td>
</tr>
</tbody>
</table>
More than 60 software developers
develop ~ 300 new features per year
24-hour technical support concept
• Network Import

• Network Compression

• Assignment Performance Test
Network Import

Shape File

Cube Importer

Visum Network File

Trip Table

CSV

Cube Importer

- **Nodes/Zones**: Select shapefile for nodes and zones. Enter path to shapefile. Select cube attribute for node number. Use cube attribute flag to identify zones. Maximum number for zones.

- **Links/Connectors**: Select shapefile for links and connectors. Enter path to shapefile. Select cube attribute for from node number. Select cube attribute for to node number.

- **Turns (Optional)**: Select text file for turn penalties and blocked turns. Enter path to text file. Select units for turn penalties and blocked turns. Enter path to text file for turn penalties and blocked turns. Enter path to text file for turn penalties and blocked turns.

Help  OK  Cancel
Network Import
Network Import

Capacity Equation

The capacity equation is defined by the following term:

\[ ([\text{IMPT_LANE}_10] \times [\text{IMPT_CAPACITY}] / [\text{IMPT_CONFAC}]) \times [\text{IMPT_UROADFACTOR}] \]
Network Import

Generalized Cost (Impedance) Calculation

- Multiple Classes
- Volume dependent via DLL compiled from C++
- Fixed costs (Toll) via Formula attributes
General form: $t = t(BPR) + t(acceleration)$
Accelerated delay function vs. Link length

General form:
\[ t = t(BPR) + t(\text{acceleration}) \]

Non monotonic functions = Potential problems with convergence
Network Import

Original Network

Multi-Delete

Compressed Network

Delete multiple nodes

- 17912 Nodes are connected
  - [ ] Delete also connected nodes

- 16312 Isolated nodes
  - [ ] Delete
  - [ ] Delete with 1 leg (nts are deleted)

- 5104 Nodes with 2 legs
  - [ ] Delete

- 18354 Nodes with multiple legs
  - [ ] Delete

- [ ] Delete also stop (nts are deleted)

- [ ] Clear undo stack to save storage space

OK  Cancel
Network Import

<table>
<thead>
<tr>
<th>Original Network</th>
<th>Compressed Network</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nodes</strong></td>
<td><strong>Links</strong></td>
</tr>
<tr>
<td>103,962</td>
<td>198,010</td>
</tr>
<tr>
<td>47,391</td>
<td>117,492</td>
</tr>
<tr>
<td><strong>Zones</strong></td>
<td><strong>Zones</strong></td>
</tr>
<tr>
<td>9,535</td>
<td>9,535</td>
</tr>
</tbody>
</table>
Assignment Performance

Lohse Assignment (Link Based)

LUCE Assignment (Origin Based)

Original Network

Compressed Network

4 Cores

8 Cores

16 Cores

24 Cores
**Assignment Performance**

**Numerical Integrity of Results**

- **Builds & Workstations**
  - Lohse: Identical
  - LUCE: Identical

- **Number of Cores**
  - Identical
  - Minor Deviation

- **Results**
  - 4 Cores vs. 8 Cores: $R^2=1.00$
  - 8 Cores vs. 16 Cores: $R^2=1.00$
  - 16 Cores vs. 24 Cores: $R^2=1.00$
### Assignment Performance

#### Lohse Assignment
(Link Based, 200 Iterations, Max. Gap : 0.00097891)

<table>
<thead>
<tr>
<th>Core Count</th>
<th>Original Network</th>
<th>Compressed Network</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Cores</td>
<td>3:07:05</td>
<td>2:34:18</td>
</tr>
<tr>
<td>8 Cores</td>
<td>2:05:01</td>
<td>1:45:44</td>
</tr>
<tr>
<td>16 Cores</td>
<td>1:28:20</td>
<td>1:13:05</td>
</tr>
<tr>
<td>24 Cores</td>
<td>1:22:58</td>
<td>1:05:57</td>
</tr>
<tr>
<td></td>
<td>Original Network</td>
<td>Compressed Network</td>
</tr>
<tr>
<td>----------------</td>
<td>------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td><strong>4 Cores</strong></td>
<td>0:45:31</td>
<td>0:28:42</td>
</tr>
<tr>
<td><strong>8 Cores</strong></td>
<td>0:33:04</td>
<td>0:21:12</td>
</tr>
</tbody>
</table>
Post-Assignment Analysis

Select Link Analysis

Accessibility Isochrones
Post-Assignment Analysis

Trip Origins by Truck Types

Desire Line from MCO
Moving Forward

STRATEGIC PLANNING

PTV VISUM

Long-term (20 yrs)

OPERATIONAL PLANNING

PTV VISSIM

PTV VISWALK

PTV VISTRO

Mid-term (5 yrs)

REAL-TIME TRAFFIC MANAGEMENT

PTV OPTIMA

Short-term (15 min)
Thank You!

Steve Perone
steve.perone@ptvgroup.com

Jongsun Won, P.E.
jongsun.won@ptvgroup.com

Michael Oliver
michael.oliver@ptvgroup.com