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Analytical Efficiencies Through the Integration of Modeling and Simulation Tools

Steve Perone
PTV Group

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ANALYTICAL EFFICIENCIES THROUGH THE INTEGRATION OF MODELING AND SIMULATION TOOLS

PTV Vision Traffic Suite Software

Portland State University
Spring Transportation Seminar
May 9, 2014

Steve Perone, President
Who is PTV Group?

Modeling Resolutions

Tools & Methods to Support Integrated Modeling

The Next Frontier – Real Time Prediction
AGENDA

- Who is PTV Group?
- Multi-Resolution Modeling – The PTV Way
- Methodologies and Tools for Multi-Resolution Modeling
- The Next Frontier – Real Time Technology
PTV GROUP’S INTERNATIONAL FOOTPRINT:

- 600 Employees across the world
- 12 Subsidiaries
- 70 Million Euros turnover

On 5 continents:

- Europe
- Asia
- Australia
- North/Latin America

www.ptvgroup.com
PTV VISION – BEGIN WITH THE END IN MIND
AGENDA

- Who is PTV Group?
- Modeling Resolutions
- Tools & Methods to Support Integrated Modeling
- The Next Frontier – Real Time Technology
MULTI-RESOLUTION MODELING COMPONENTS

- Macroscopic Modeling
- Regional Focus
- Mesoscopic Modeling
- Corridor Focus
- Microscopic Modeling
- Facility Focus
WHAT IS MULTI-RESOLUTION MODELING?

- Regional
- Corridor
- Facility

- Hour
- Minutes
- Seconds
WHAT IS MULTI-RESOLUTION MODELING?
WHAT ARE THE KEYS TO SUCCESS?

1. Robust & Well-defined Data Model
2. Support Correct Level of Detail
3. Vertical Consistency of Outputs
4. Ability of Cross-Validity
AGENDA

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MULTI-RESOLUTION MODELING COMPONENTS – PTV

PTV VISUM

PTV VISSIM

PTV VISTRO

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"LET PTV VISUM HELP - HOW CAN I....?"

1. Work with Travel Demand Model Data?

2. Work with Big Data?

3. Work with Detailed Network Geometry & Control Data?

4. Model Time Dynamics?

5. Fuse Data Sources?

6. Can this help a Traffic Management Center?
Can I Work with Travel Demand Model Data?
INTEGRATE WITH OPEN STREET MAP (OSM)
WORK DIRECTLY WITH BING AERIAL MAPS
LEVEL OF SERVICE (LOS) RESULTS

Traffic Control
- a. intersection flow rate [veh/h]
- b. capacity [veh/h]
- c. growth / cycle / cycle
- d. X volume/capacity
- e. d0, incremental delay [s]
- f. initial queue delay [s]
- g. platoon ratio
- h. proportion arriving on green
- i. progression factor

Lane Group Results
- j. volume/capacity
- k. delay for lane group [s/veh]
- l. lane group LOS
- m. critical lane group
- n. 50th percentile queue length [veh]
- o. 50th percentile queue length [ft]
- p. 95th percentile queue length [veh]
- q. 95th percentile queue length [ft]

Movement, Approach, & Interaction Results
- r. movement LOS
- s. d0, approach delay [s/veh]
- t. approach LOS
- u. d0, interaction delay [s/veh]
- v. interaction LOS
- w. interaction VIC

Sequence
- x. 1 18s
- y. 59 2 46s
- z. 60 2 15s
- {a}. 60 4 69s
- {b}. 304 17s
- {c}. 60 8 69s
- {d}. 131 17s
- e. 13 15s
- f. 13 15s
- g. 13 15s
EXAMINE DESIGN SOLUTIONS WITH SIMULATION

PTV VISSIM

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Can I Work with 'Big Data'?
NAVIGATION NETWORKS WITH TMC CODES
NAVIGATION NETWORKS WITH TMC CODES
NAVIGATION NETWORKS WITH TMC CODES
NAVIGATION NETWORK – SPEED PROFILES

Column chart for Links, 45299619(200659380->200652551)

Column chart for Links, 45322063(200653621->200070102)
Can I Add Detailed Network Geometry / Control Data?
Can I Model Time Dynamics?
DYNAMIC USER EQUILIBRIUM (DUE) ASSIGNMENT
How Do I Fuse Data?
A SINGLE INTEGRATED MULTI-MODAL NETWORK
ORIGIN-DESTINATION MATRIX ESTIMATION (ODME)
ORIGIN-DESTINATION MATRIX ESTIMATION (ODME)
AGENDA

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9. Can this help a Traffic Management Center?
PTV VISION – DYNAMIC TRAFFIC MANAGEMENT ELEMENTS

Data Transfer Platform

Situation Awareness

Smart Dynamic Traffic Management System

Incident Detection

Forecast

Recommendation & Execution

Evaluation & Reporting

sense

measure, collect

check

act

inform

control

plan

PTV GROUP

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PTV OPTIMA – HOW DOES IT WORK

OFF LINE | ON LINE

PTV VISUM

- CENSUS DATA (inhabitants, workers)
- NETWORK DATA (street map)
- TMB TRANSPORTATION MODEL BUILDER
- TRANSPORT MODEL (graph, OD matrices)
- PROBE TRAJECTORIES (cars, taxi, trucks ...)
- AVL/AVM DATA (busses & TPL vehicles)
- RTD DYNAMIC USER EQUILIBRIUM
- BASE PATH CHOICES (turn splitting rates)
- STRATEGIES (signal plans ...)
- STRATEGY EFFECTS (max speeds, capacities)
- BASE TRAFFIC ESTIMATION

PTV OPTIMA

- VEHICLE TRACKER
- LINK SPEEDS
- TRAFFIC STATE HARMONIZER
- TRAFFIC MEASURES (speeds, flows)
- TRE TRAFFIC REAL-TIME EQUILIBRIUM
- REAL-TIME KPI
- REAL-TIME TRAFFIC FORECAST (speeds, flows, queues, ...)
- DETECTION AND CONTROL
- DETECTION (Incident detection, alerts)
- CONTROL (signal plans, messages, ...)
- SMART DISPLAY
- DETECTION AND CONTROL
- SMART DISPLAY
- RECOMMENDATIONS (VMS messages)
- TRAFFIC CONTROL & INFORMATION SYSTEMS
- TRAVEL TIME MEASURES (ANPR, Bluetooth ...)
- DETECTOR DATA (loops, cameras, ...)
- EVENTS (incidents, roadworks, ...)
- EVENT EFFECTS (max speeds, capacities)
- CONTROL STATUS (greens, cycles, messages, ...)
- DETECTOR DATA (loops, cameras, ...)
- EVENTS (incidents, roadworks, ...)
- EVENT EFFECTS (max speeds, capacities)
- REAL-TIME TRAFFIC FORECAST (speeds, flows, queues, ...)
- DETECTION AND CONTROL
- SMART DISPLAY
- RECOMMENDATIONS (VMS messages)
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PTV OPTIMA – YOUR TRAFFIC DATA AMPLIFIER!

A traffic data AMPLIFIER

A traffic data HUB

www.ptvgroup.com
PUTTING IT ALL TOGETHER

REALIZE THE BENEFITS
Decision Support at Each Level

Decision Support Across Levels
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