Linking TransCAD to Synchro Micro-simulation

-Using DTA as an Intermediate

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Outline

- Background / Introduction
- Development of DTA model
- Using DTA for Conversion
- Conclusions
Background

What is DTA?

Dynamic Traffic Assignment
Background

Traffic Planning v.s. Traffic Operations

- Models
  - Travel demand models
  - Simulation models

- Software
  - TransCAD, Cube, Visum, Synchro, VISSIM

- Analysis level
  - Macro-, Meso-, Micro-scopic
Background

Traffic Planning v.s. Traffic Operations

- Travel demand models
- TransCAD
- CUBE
- Macroscopic
- Large-scale network

- Traffic simulation models
- Synchro
- VISSIM
- Microscopic
- Area or arterial analysis
Background

Conventional Four-step Transportation Planning Process

Trip generation  Trip distribution  Mode choice  Trip assignment
Background

Static Traffic Assignment  Dynamic Traffic Assignment

Objective
Determining link volumes of a given network from a given travel demand

- Traffic conditions are not time-dependent
- Considers time-varying traffic conditions
Background

Figure 1: Assigning a time-dependent demand using a static assignment with demand slices and a dynamic assignment.
Current static planning models lack the level of details to analyze temporal congestion.

DTA can provide:

- Time-dependent link-based MOEs
- Impact analysis of traffic incidents (work zones, accidents, special events).
Development of DTA model

Major DTA Tools

- **DTALite**
  - Simulation-based
  - NeXTA as GUI
  - Newell’s traffic flow model and more

- **DynusT**
  - Simulation-based
  - NeXTA as GUI
  - Greenshields traffic flow model
Development of DTA model

- NeXTA/DTAlite package
Development of DTA model

- Major procedures to create a DTA model

1. Prepare network profile and travel demand
2. Import network and demand into NeXTA
3. Run Assignment with DTALite to Equilibrium
4. Model calibration
Development of DTA model
Development of DTA model

Reno-Sparks DTA network

2. Import network and demand into NeXTA

3/12/15
Development of DTA model

- Reno-Sparks DTA network
Development of DTA model

- Reno-Sparks DTA network
  4. Model calibration
    - Link volume
    - Travel speed and time
    - Congestion (length and duration of queuing)
    - route choice (freeway bias)
    - trip making by time of day

Demo
Conversion from TransCAD to Synchro
Datasets required for simulation

- Network profile
- Traffic demand
  - Trip routes, turning volumes
- Signal information
Conversion from TransCAD to Synchro

**TransCAD**
- Network
  - node, link
- Traffic demand
  - OD matrix
- Signal information
  - control type

**Synchro**
- Network
  - node, link, lane
- Traffic demand
  - turning volumes
- Signal information
  - details

**DTA**
- Vehicle routes
- QEM/Synchro
Conversion from TransCAD to Synchro

- **Major steps**
  1. Create a DTA network
  2. Define and cut a subarea for analysis
  3. Run DTA for the subarea
  4. [Run QEM to generate signal timing]
  5. Export subarea to Synchro
  6. Modify in Synchro and run SimTraffic

- **Demo**
Conclusions

- Capabilities and Benefits of DTA
- When to Apply DTA
- Limitations of DTA
Capabilities and Benefits of DTA

- Mesoscopic, connecting travel demand forecasting and micro-simulation
  - large-scale network, animations of individual vehicles
  - operational and planning.

- Current and near-term traffic performance analysis
  - TDM: long-term
  - Simulation: current
When to Apply DTA

- Visual animation of vehicles on a large scale network
- Visual display of system performance details
- Work zone analysis
- Near-term planning project analysis
  - lane configuration change, pricing, special event
Limitations of DTA

- Long-term planning
  - Lack of future travel demand data and field data makes DTA not a suitable tool.
  - TDMs such as TransCAD is a better fit for bottlenecks estimation studies.
Limitations of DTA

- **Data Collection Effort**
  - If detailed input data is unavailable, DTA model might not replicate real traffic conditions.

- **Small network or area studies**
  - Degree of simulation resolution in DTA is less detailed than micro-simulation tools.
  - Pedestrian
Future challenges

- Calibration for Reno and LV models
- Case studies to test model application
- DTALite and NeXTA development

Interested?
Thank you!

Questions & Comments?