Design of a Dynamic Activity Travel Modeling System for Metro

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Overview

- Background
- Motivation
- Other tour/activity models
- Design concept
- Development plan
Background

- **Metro**
  - Advanced trip-based modeling
  - Bowman-Bradley Day Pattern Model
  - TRANSIMS

- **John Gliebe**
  - Work with Metro on TRANSIMS
  - Dissertation on joint activity modeling
  - Experience with other activity model projects
Motivation

- Trip-based models no longer cut it for some of the more complex questions.
  - Time of day sensitivity
  - Dynamic congestion effects
  - Variable pricing and tolls
  - Reliability of both highways and transit

- Existing activity/tour-based models be missing the enhanced temporal element
  - Potential to misrepresent space-time constraints
  - Dynamic path information does not inform travel choices
Other Activity & Tour-Based Models

- Day Pattern Approaches
  - SFCTA, SACSIM, DRCOG
- Household Role Hierarchical
  - MORPC, NYBPM
- Continuous Time Emphasis
  - FAMOS, CEMDAP
- TRANSIMS
Design Principles

Scale
- Urban/metropolitan scale
- Three levels of temporal resolution (initially)
  - Long-term, Daily, Dynamic (minute by minute)

Theoretical
- Random utility models used consistently throughout
- Use of time-dependent travel times and costs
- Utility is time-dependent
- Household members are interdependent

Implementation
- Modular implementation
- Design, build and test approach to development
- Self-calibrating
- Microsimulation of outcomes
Application Programming

- Design: Controller–Model–Event Manager
  - C++ for core numerical processing
  - Python for user interface and scripting
  - VISUM for network assignment

Performance Goals

- Run entire model system with feedback in no more time than current trip-based model
- Multiple DASH runs/averaging
  - May require parallel processing
Development Plan

Core Track
- DASH
  - Tour primary stop purpose
  - Tour mode purpose
  - Next purpose
  - Next location
  - Next mode
- Initial conditions model
  - Role and day pattern
  - Starting time

Supporting Track
- Population synthesis
- Long-term choices
  - Workplace location
  - School/college location
  - Auto ownership
- Assignment Integration
  - Static (near-term)
  - Dynamic (long-term)
- Feedback
Timeline

- 2008 – Estimation, calibration and testing using 1994 survey and static skims from trip-based models
  - 1995 EMME/2 network
  - 1995 VISUM network
  - 2005 VISUM network validation
- 2009 – Testing and calibration using dynamic skims (source TBD)
- 2010-2011 Update with new survey results