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Design of a Dynamic Activity Travel Modeling System for Metro

John Gliebe
Portland State University

Overview

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

Background

n Metro

- n Advanced trip-based modeling
- n Bowman-Bradley Day Pattern Model
- n TRANSIMS

n John Gliebe

- n Work with Metro on TRANSIMS
- n Dissertation on joint activity modeling
- n Experience with other activity model projects

Motivation

- n Trip-based models no longer cut it for some of the more complex questions.
 - n Time of day sensitivity
 - n Dynamic congestion effects
 - n Variable pricing and tolls
 - n Reliability of both highways and transit
- n Existing activity/tour-based models be missing the enhanced temporal element
 - n Potential to misrepresent space-time constraints
 - n Dynamic path information does not inform travel choices

Other Activity & Tour-Based Models

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

Design Principles

n Scale

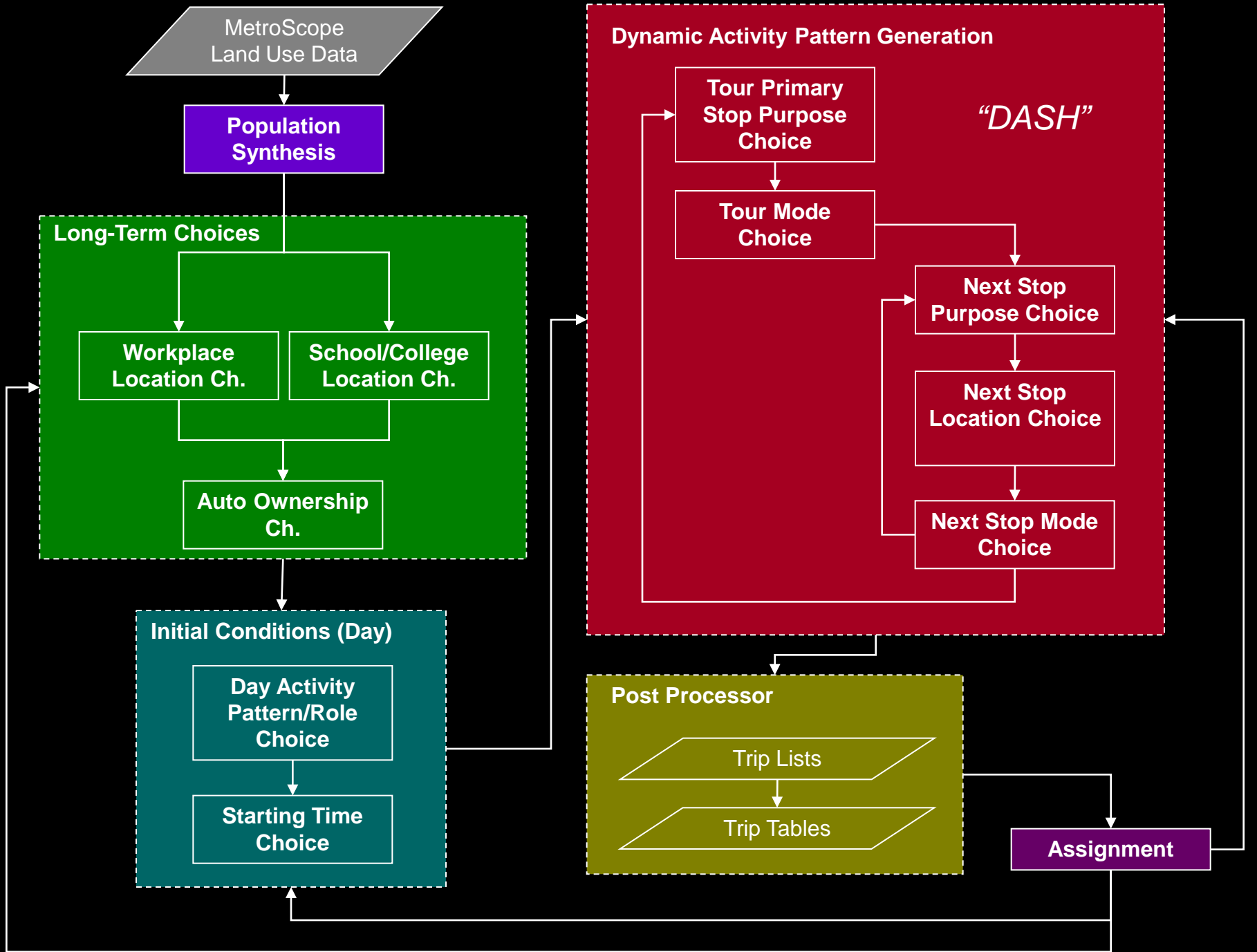
- n Urban/metropolitan scale
- n Three levels of temporal resolution (initially)
 - n Long-term, Daily, Dynamic (minute by minute)

n Theoretical

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

n Implementation

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



Application Programming

- n Design: Controller–Model–Event Manager
 - n C++ for core numerical processing
 - n Python for user interface and scripting
 - n VISUM for network assignment
- n Performance Goals
 - n Run entire model system with feedback in no more time than current trip-based model
 - n Multiple DASH runs/averaging
 - n May require parallel processing

Development Plan

n Core Track

n DASH

- n Tour primary stop purpose
- n Tour mode purpose
- n Next purpose
- n Next location
- n Next mode

n Initial conditions model

- n Role and day pattern
- n Starting time

n Supporting Track

n Population synthesis

n Long-term choices

- n Workplace location
- n School/college location
- n Auto ownership

n Assignment Integration

- n Static (near-term)
- n Dynamic (long-term)

n Feedback

Timeline

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