Activity Models and Transims at Metro

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Introduction

- This is a short description of Metro's progress on two modeling fronts
- Activity-Tour Based Models - Logit
  - Estimated on links, not zones
  - Proposed to apply link-based (sampling)
- Transims Portland Study (At last!)
  - Track 1: Apply current demand modelsTravel
    - Investigate router-microsim convergence
    - Investigate sparse networks
  - Track 2: Calibrate a new set of demand models

Activity-Tour Based Models

- Developed by Mark Bradley, John Bowman and Metro staff.
- Status: Fully estimated, Application Software - First Draft
- Not yet calibrated to external data.
- Impedance generation
  - Auto zone to zone, Walk sampling direct
  - Transit: Hybrid - IVTT Z-Z; walks -links to nearest line, waits from Z-Z skims

Activities

- Work
- School
- Serve Passenger
- Shop
- Other Maintenance
- Meal
- Visit
- Other Discretionary

Activity-Tour Application Order

- Locate Pop/Emp on links
- Primary Tour Type (Work,School,At home,Other)
- Work/School Location (If)
- Auto Ownership
- Work/School Pattern Choice
- Work/School at home Pattern Choice
- Non-Work/School Pattern Choice
- Exact Number Secondary Tours
- Detailed Purpose Secondary Tours

Activity-Tour Application Order

- Presence of Stops in Secondary Tours
- Exact Number of Intermediate Stops
- Detailed Purpose of Intermediate stop(s)
- Tour Time of Day
- Primary Activity Location (Non-work/school)
- Tour Mode Choice
- Intermediate Stop(s) Location
- Trip Mode Choice
- Trip Time of Day

Link to Transims?

- Timing given destination and mode can be inconsistent
- Mode can be inconsistent
- Transims Router - Microsim will find these
- Caused, in part by probability/Monte Carlo
- Caused be real feedback of journey times to pattern
- Router will move transit to walk based on time

Explanatory Variables - Location

- Logsum Mode Choice
- Distance
- River Crossings
- Employment
  - Service, Retail, Agriculture, Construction , Manufacturing, Transportation, Wholesale,Finance, Government, plus Acres of Park
- Other
  - Income, Employment Status, Free Parking

Explanatory Variables - Auto Ownership

- Ordered-Logit/Stop-repeat
- No. Persons > 16
- Walk and tranist accessibility - Home
- Walk and tranist accessibility - Work/School Loc.
- Work & School on tour patterns present
- Parking Cost (Max) at work or School
- No. Employed
- Family: Related?, Chidren <5 years

Modes

- Drive Alone
- Shared Ride
- School Bus
- Shared Ride
- Walk to Transit
- Auto to Transit
- Bike
- Walk

Explanatory: Work/School - Mode

- LOS
  - Cost/Income -
  - Walk Time/Ride Time -
  - Transit
    - Walk, 1st Wait,Wait -
- Walk: Mixed Use
  - Home & Activity Loc +
- Bike: Age>45 -
- Drive
  - Cars/Adult +
  - Age 16-24 -
  - Int. Serve P -
- Shared Ride
  - Cars/Adult +
  - No Cars -
  - Female/Male
    - Children<5, 2-11, 12-17 +
  - Couple - Both Work +
  - Intermediate Stop
    - Any, Serve P, Meal +
  - Travel in either Peak +
  - Distance < 4 mi +

Explanatory: Work/School- Mode

- School Bus
  - Age 5-15 +
  - Leave in AM Peak +
  - Return in PM Peak +
  - Destination CBD -
  - Destination E Portland -
- Walk to Transit
  - Cars/Adult -
  - Destination CBD +
  - Income< 45k +
  - Leave Early or Return PM+
- Auto Access Transit
  - Cars per Adult +
  - Destination CBD +
  - Leave in Early or AM Pk +
  - Return in PM Pk +
  - Round Trip < 10 mi -
- Logsum Param
  - Car Modes (Dr Al, Shared, auto access transit0
  - Walk Modes (Walk, Walk to Transit)

Explanatory: Non-Work/Sch Mode

- LOS
  - Cost -
  - Walk/Ride Time -
  - Transit Times: Walk, 1st Wait, Wait (Other) -
- Wal k (Base)
  - Age >45 -
  - Home mixed use 1/2 mi +
  - Female w/children <12 +
  - Secondary tour +
  - Social Visit +
- Bike
  - Age > 45 -
  - Cars/Adult -
  - CBD Destination +
- Drive - Al.
  - Cars/adult +
  - Leave Early +

Explanatory: Non-Work/Sch Mode

- Shared Ride
  - Cars/Adult -
  - No car in HH -
  - Female w/kids <5, 5-11, 12-17 +
  - Male w/kids <5, 5-11 +
  - Under 5 +
  - Single Person -
  - Intermediate stops on tour, any, Serve P, Meal +
  - Leave Midday +
  - Return Pm or late +
  - Tour purpose meal +
- Walk to Transit
  - Cars/Adult -
  - Destination Downtown +
  - Age 16-24 +
  - Secondary Tour -
  - Leave in AM Pk +
- Logsum parameters
  - Car Modes: Drive Al., Shared, Car to transit
  - Walk modes: Walk, Walk to transit

Transims - Two Track

- Track 1: Router-Microsim using existing trips/tour models
- Investigate convergence properties
- Work with sparse networks - Practicality!
  - Can we get most of the benefits with less cost?
- Track 2: Build Activity Generator/Regenerator
  - Within-Transims demand models
  - Focus on time of day linkage
  - Carry out both Plan and Corridor Study

Transims Demo:Timing

- Track 1 - 6 months
- Track 2 - two years - partially overlapped

Transims Track One

- Develop convergence methods
- Test and determine strategy
- Sparse Networks
  - Need many loading points not on Majors
  - Need MPO network with many local stubs
    - Activity nodes grouped on stubs.
- Prune Down from “All-streets”?
- Build Up automatically from MPO net?

Transims Track Two

- Improve sample matching
  - Urban index added to HH characteristics?
- Build simpler models using market segmentation
  - Informed by existing sample enumeration models
  - Income-Attractions link for work location
  - Household structure (lifecycle) and income for mode
- Investigate feedback mechanisms for calibration
- Develop feedback structures for forecast application
  - e.g. must move times to get microsimulation to work!

Summary

- Activity Models Two Ways -
  - Nested logit & Household matching with synthetic
- Destination & Mode from B& B logit will inform those parts of the Transims activity generator
  - Market Segmentation & explanatory variables
- Transims Track 1 will explore:
  - Use of current demand models with network microsim
  - Development and use of sparse networks
- Track 2: The development of activity models