

# Innovations in Transport Modeling

Portland, Oregon

So much to do - ***so little done?***

So much to do - ***so little time?***

Keynote: Keith Lawton

Monday June 23rd. 2008

# Progress So Far

- Activity/ Tour-Based in place (or should be)
- Land Use model integration -- ***well on it's way*** - but still more needed
- Large array of utility-based tools
  - Logit: mnl, nested, cross-nested, ordered, mixed ....
  - More familiar to academics than practitioners
- Little in choice theory other than utility maximization (in practice) – some academic, but not in general practice, this is probably OK (Eric Miller)
- Large-scale network – microsimulation & DTA
  - Some – need more & integration with demand

# Issues

- Innovations slow to acceptance in practice
- Appropriate modeling structure/paradigm
- Pricing: fuel and road
  - Effect on car acquisition/disposition
  - Effect on travel behavior
  - Coefficients, elasticities, value of time
- GHG
  - Low carbon vehicles -- electric, recharge etc -- how affect models?
- Methods: Mostly exist?
  - What about less than perfect knowledge and lack of symmetry in decision-making - inertia
- Data Needs
  - Price response, value of time, re-focus surveys

# Innovations - Slow Acceptance

## Metro: An Example

- Prototype activity model 1997-98
  - Used in pricing but needed work - joint mode & destination hard to calibrate
- New Starts & Summit: ***Intervened - became priority***
  - Good idea, but needs a standardized model
  - Metro model did not maximize user benefits or please FTA
  - Focus model development staff on trip-based revision
  - No resources for activity model
- Too busy with “other stuff” to do what’s needed
- Worked with TRANSIMS to move knowledge forward
  - Research project - more for microsimulation integration

# Innovations - Slow Acceptance Due To Technical Complexity

- Practitioners often not familiar with utility maximization tools such as cross-nested logit, mixed logit & so on
- Intellectually challenging & hard work **-Time!**
- Training? Takes Time and Resources!
- Academics? As part of practice approach
- Joint practitioner-academic (also tutorial)
- Examples at PSU, UT Austin, Arizona State, Northwestern

# Appropriate Modeling Structure

- Relationships among choices
  - Housing location, car ownership, and mode preference linked (Greig Harvey, long ago)
  - Our “standard” models (trip & activity) assume that the order of decisions are destination choice followed by mode choice with car ownership independent
  - Probable that a mode preference exists
    - Those who prefer car - look for destinations by car (ubiquitous)
    - Those who prefer transit - look for destinations accessible by transit (and locate HH with transit access, and may condition car ownership)  
- will use car if transit destinations unacceptable
  - Probably no-one looks at destinations based on joint mode accessibility (logsums anyone?)

# Appropriate Modeling Structure

- Mode choice and the value of time versus cost
  - Assume that cost can be expressed by oopcost per mile & that the resulting coefficient means something based on average value of oopcost and a cross-sectional survey (see FTA standard) - A small problem of perfect correlation!
- Response to price
  - Probably not uniform or uniformly distributed
  - A distribution of value of time
  - Of importance for both mode selection and route selection under a variable pricing or toll scenario

# Pricing: Fuel

- Car acquisition & disposition (car ownership and fuel efficiency emergent)
  - Inertia, not symmetrical
  - Needs data - panel, retrospective, stated preference
  - Can we make assumptions from meta analysis of 1973-1980 as interim?
- Effects on travel behavior
  - Tour or activity pattern formation (generation)
  - Destination choice
  - Mode choice

# Variable Pricing: Roads

- Given poor performance of toll models
  - Needs work
- Value of time - again!
  - Distribution of response or VOT -- context and preference
  - Probably not normal -- long tailed (log-normal?)
  - Estimate via mixed logit (simulation)?
  - Need to simulate with draws to get response in application
    - (After getting the distributions)
  - Microsimulation of travelers (see activity models)
  - Detailed time of day distribution
  - Real travel time on networks (microsimulation or Dynamic Traffic Assignment) to interact with demand/choice side.

# Green House Gases: Meeting Goals - Long Term Models

- Vehicle technology - limits?
- Pricing: Travel behavior modification
  - Pricing:discussed on slides 7 & 9
  - Urban design (Land Use)
  - Pedestrian & Bicycle infrastructure effects
- Household composition & aging - accounting
- Alternative (low carbon, no carbon) fueled vehicles
  - Behavioral effects of recharging regimes or range limitations

# Road Pricing & Congestion Travel Response: Ongoing Research

- NCHRP: 8-58
- SHRP 2: CO 4
- Should answer many of the questions on the previous slide

# Surveys & Data

- Anyone who started fielding a survey over the last six months should look for emergency funding to continue and move to longitudinal panel (USDOT??)
- For pricing SP surveys can be a quick response - have problems with perception of time savings vs. real.  
***Need longitudinal panel!***
- ***Re-design surveys*** to focus on income, real perceived costs of reported travel for the respondent & vehicles used - ***Price Response***
  - Focus on price response for all choice elements: Housing location, activity location, activity frequency, mode choice, vehicle choice.

# What to Do?

## START! Get Moving

- Two pronged approach:
  - **Long Term Preparation:**
    - Look at real (new) model needs - start data collection design ...  
Collect Data. **Don't start a planned HH survey without reviewing!**  
Develop and implement integrated LU element if you don't have one
  - **Short Term (Now!)**
    - Try to move models to rational form (**Activity/Tour** + Integrated LU if available) - **necessary but not sufficient.**
    - Use values of time culled from other sources, or assumed from reviewing aggregate historical responses to price changes (e.g. fuel efficiency changes '73 to '79). Look at values derived by Brownstone & others (I-15) and Small & others (SR 93) before accepting mode choice derived values