Consideration of Future Mobility in Travel Modeling

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Can you name the most common top two reasons for model error in travel forecasting?
1. Land use / Demographic

2. Changes in Behavior
Historical Misrepresented Behaviors

- 40% increased HBW trip lengths
- 43% increase in trips per person
- 39% increase in women in the workforce
- 22% decrease in persons per household
- 9% increase in workers per household
- 10% decrease in auto occupancy

Post-construction evaluation of traffic forecast accuracy
Transport Policy, Parthasarathi & Levinson
Current Misrepresented Behaviors

Ride Hailing is found to increase trip making and decrease transit use

Disruptive Transportation: The Adoption, Utilization, and Impacts of Ride-Hailing in the US
UC Davis Institute of Transportation Studies Research Report, Clewlow & Mishra, October 2017
Factors pushing congestion UP

• Convenience of ride hailing
• Reduced in-vehicle “disutility” of AV
• Zero-passerenger AV travel
• Non-driver auto trips without escort
Factors pushing congestion DOWN

• Increased capacity due to CVs
• Smart cities & better information
• 3-D printing reducing freight travel
• Stay at home
  – Activities replaced by technology
  – Augmented reality (AR) & Virtual reality (VR)
Future Mobility Behavior

Transport as a Service (Taas): on-demand autonomous electric vehicles owned by fleets.
So, what things might we consider doing differently?
Large surveys every 10 years will no longer suffice. We will need more frequent updates but may be able to collect less so costs remain the same but are more reliable.
Evolution of Models

• Models will need to be more frequently updated
• Reduced emphasis on calibration and increase focus on structure and sensitivity
• Distribution of choice parameters to reflect uncertainty
• More attention to exogenous reflection of trends in the model
• Different tools for short- and long-term modeling
Role of Big Data

- Big Data
- complex
- anonymous
- terabytes
- passively-collected

Companies:
- ATRI
- Cuebiq
- Here
- INRIX
- TomTom
- StreetLightData
- Airchage
So, how has this come together in a model format and process to represent behavior?
Changes to structure

- Choice of AV added in auto ownership model
- Choice of ride hailing in mode choice (AVs available)
- Adjusted disutility in-vehicle value of time (VOT)
- Changes to trip escorting model to account for AVs
- Changes to parking constraint
Quantitative Risk Analysis

- Select a set of key input assumptions to vary, and levels to test
- Use an experimental design to define a set of model runs to test effects of assumptions
- Use regression analysis to model the key outputs as a function of the input assumption levels
- Define the joint probability distribution of the input assumption levels
- Apply the regression model to many sets of input assumptions, drawing each set randomly from the joint probability distribution, to create a probability distribution of the key model outputs

Further Disruptions Worth Considering

What are we ignoring

• Major economic shift
  – Auto industry
  – Insurance Industry
  – Oil demand and subsequent ripple effect
  – Productivity gains due to decreased driver time

• Automation, machine learning, artificial intelligence

• The Internet of Things – Alexa is just the beginning