DaySim Enhancements

- Vehicle type (AV versus non-AV) model run as part of the auto ownership model
  - “All or nothing” decision – if household owns AVs, all vehicles owned by household are autonomous (e.g. no mixing)

- Paid rideshare (TNC) mode added to mode choice
  - One TNC mode. Not yet separate modes for single-ride (UberX) versus shared-ride (UberPool) TNC.
  - Also added as an access mode to transit (similar to “kiss and ride”)

- Separate skims/trip tables and assignment for TNCs or AVs is optional
  - Would require significant Cube script changes

- No vehicle repositioning (“deadheading”) model for TNCs or private AVs
  - Can add multiplicative factors on AV trips to reflect increased VMT for repositioning
Use of these new DaySim capabilities

• Jacksonville
  – Exploratory modeling and analysis for FHWA, with Caliper and TransModeler DTA
  – NFTPO is starting to tests scenarios for their next RTP

• San Francisco
  – SFCTA is using for their SFConnect scenarios

• Seattle/Tacoma
  – PSRC is starting to tests scenarios for their next RTP

• Sacramento
  – TNC mode estimated in mode choice models on new household travel survey data.
  – SACOG is testing scenarios for the new RTP, which we will hear about after this presentation…
AV Ownership

• Influenced by income (+), age of household head (-), commute time (+). (The age effects can be “turned off” for future scenarios.

• AV ownership can be specified to increase the chance that the household owns fewer vehicles than drivers

• Auto ownership level can also be influenced by land use density to reflect increased use of shared vehicles in denser areas.

• The share of households owning autonomous vehicles is set by the user as a scenario variable. (It is NOT a forecast.)
Percent of private vehicles that are AVs by age category of head of household

- AV low / SH low
- AV medium / SH low
- AV high / SH low

Percent of private vehicles that are AVs by household income category

- AV low / SH low
- AV medium / SH low
- AV high / SH low

- head under 35
- head 35-64
- head 65 plus

- under $50k
- $50-100k
- over $100k
Percent of private vehicles that are AVs by total household commuting travel time per day

- AV low / SH low
- AV medium / SH low
- AV high / SH low

Percent of private vehicles that are AVs by land use density within buffer around residence

- AV low / SH low
- AV medium / SH low
- AV high / SH low

Legend:
- no commuters
- under 60 min
- over 60 min
- under 300
- 300-1000
- 1000-2500
- over 2500
AVs and TNCs in mode choice

- Can use modified parameters for in-vehicle time, to reflect less stressful/more productive use of time.
  - Can lead to longer trips, more VMT
- TNC costs based on fixed per ride cost and an additional cost per mile
  - Higher per-mile costs lead to shorter trips for TNC.
- TNC availability/wait time effects proxied by land use density
  - TNC use is higher in more urban areas. Can compete with transit use.
- Specify in scenarios whether TNCs are AVs or conventional vehicles (all or nothing)

- The mode share for TNCs is set by the user as a scenario input. (It is NOT a forecast.)
- The use also sets the occupancy distribution for TNCs, to reflect the extent of pooled use. (Can have a large effect on VMT.)
Percent of private vehicles that are AVs by SH scenario

Avg. vehicles/household by scenario
Person-trip mode share by SH scenario

- Base
- AV low / SH low
- AV low / SH medium
- AV low / SH high

Legend:
- walk
- bike
- sov
- hov 2
- hov 3+
- transit
- school bus
- paid rideshare
AM VMT, by Vehicle Type and Scenario

- Non-AV
- Private AV
- Shared AV
DTA Vehicle-Hours of Delay, by Scenario
TNC occupancies and AV\TNC trips

• Can be specified as average persons per vehicle or using a distribution of 1, 2, and 3+ persons
• Cube code must be modified to add TNCs to appropriate trip tables prior to assignment
• Cube scripts can account for vehicle repositioning using TNC trip table factors.
• The same could be done for zero-occupant vehicle (ZOV) trips using private AV trip tables.
Conclusions

• DaySim provides functionality to reflect our assumptions about future AV and TNC use
• Assumptions about future AV and TNC use, changes in auto ownership, changes in use of other modes, and changes in trip patterns are kept as internally consistent as possible...
• However, DaySim cannot forecast what that future use will be.
Average distance per person-trip (miles) by scenario