UC Davis STEPS PROGRAM:
EMERGING REVOLUTIONS BREAKOUT DISCUSSION

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Shared Vehicle Services: Modeling the Travel Effects

- New and changing systems
- Limited traveler response data
- Policies and plans shaped now
- Methods available to investigate system-level effects:
  - Activity Based Travel Demand Models:
    - travel activity data
    - detailed transportation networks
    - replicate current and predict future traffic behavior
  - Dynamic Traffic Assignment Models:
    - vehicle activity with traveler characteristics
    - new services with distinct operating characteristics

Some Factors Impacting Vehicle Travel & GHGs

Reduce

- If cost less, then shed car
- Given relative modal use costs,
  - Fewer and shorter SOV trips
  - Expand first and last mile transit access and ridership on high quality lines
  - More shared, transit, walk, and bike trips
- Less congestion
  - reduced stop and go travel
  - shorter direct routes

Increase

- If limited access to car, then
  - More vehicle trips
  - Fewer non SOV trips
  - Longer vehicle trips
- Substitute for poor transit
- Relocation travel
- More congestion
  - more stop and go travel
  - longer routes to avoid slow travel times

Current Modeling Research

- Limited temporal and spatial representation of supply and demand
  - No induced travel, hold demand fixed
    - exception two studies that estimate fleet size
  - Randomly generated demand data (survey or model)
    - exception two studies use local travel activity data
  - Representation of travel conditions vary
    - Average speeds without networks
    - Networks with and without DTA
  - Small geographic area (e.g., central business district) rather than regional wide effects

	Phase 1: Dynamic Ridesharing (complete)	Phase 2: Shared Use (SR) Taxi (on-going)	Phase 3: Shared Use AV Taxi (proposed)
Models	• SF Bay Area ABM	• SF ABM + • MATsim DTA	• SF Bay Area ABM + • MATsim DTA
Simulation	Feasible DR given: • Participation • Trip Length • Time Flexibility • Proximity	• ABM: SR feasible? • DTA: SR use cost • Iterate individual travel utility (ABM and DTA converge)	• More complete integration of ABM & DTA • Compare personal, taxi, and shared taxi
Induced Travel	• LR elasticity VMT with respect to mean MPH	• Focus on mode and route choice, but some destination, trip making, and auto ownership	• Relocation travel • Mode, route, destination, trip making, and auto ownership choice
Outcome	• Moderate DR -9% VMT • High DR -23% VMT	• Travel effects at different use cost levels	• Travel effects • Empty relocation and drop-off queuing (magnitude)