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