



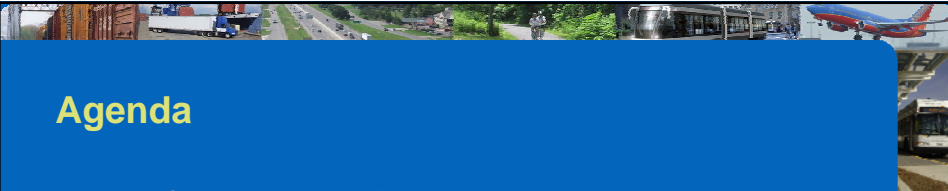
# Advanced Travel Models

*Florida Model Task Force*

*December 1, 2010*


*Frederick W. Ducca*  
*National Center for Smart Growth*

FLORIDA  
MODEL  
TASK  
FORCE



## Agenda

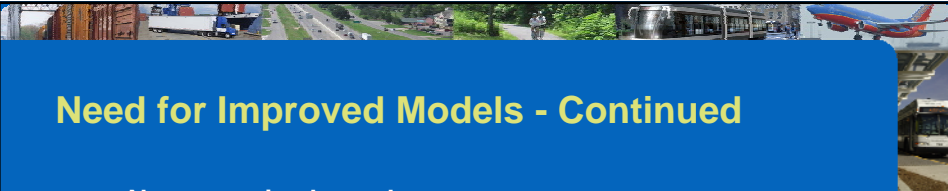
- Need for Advanced Models
- Characteristics of Advanced Models
- Comparison with existing Models
- Paths to Advanced Models
- Issues
- Experience





## Need for Improved Models


- Current Models can not address
  - Road pricing
  - Time specific policies
    - Parking
    - Tolling
    - HOV
  - Speeds, volumes
  - Traffic operations improvements

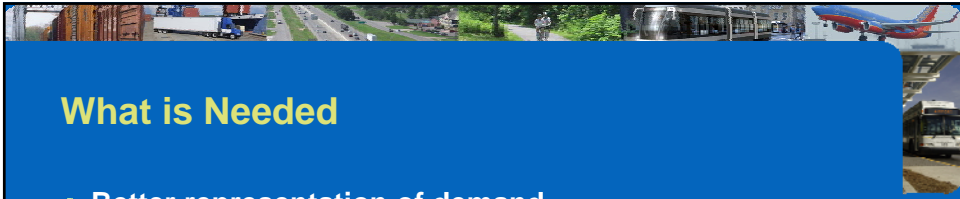


## Need for Improved Models - Continued

- Non-motorized travel
- Peak spreading
- Goods movement



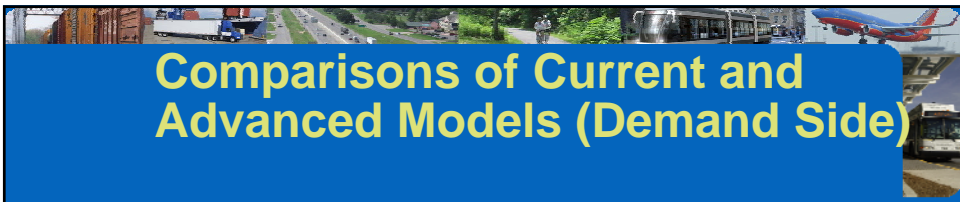
(Source NCHRP – 288)







## What is Needed

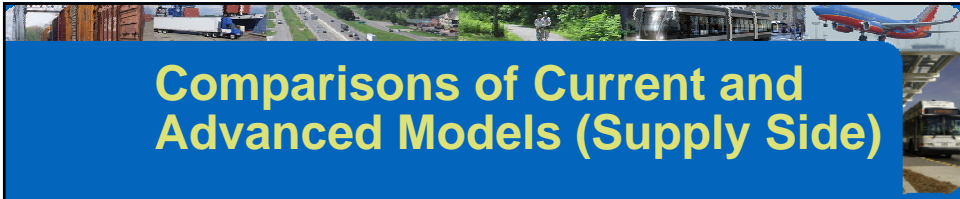
- **Better representation of demand**
  - Tours vs. trips
  - Disaggregate, household or individual vs. zones
- **Better Network Representation**
  - Continuous time representation vs. peak and off peak
    - Ability to integrate operational changes

## Comparisons of Current and Advanced Models (Demand Side)


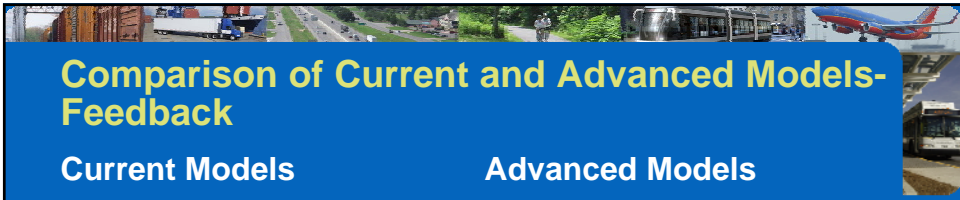
	Current Model	Advanced Model
Analytical Unit	Trips between TAZ pairs	Individuals' activity-travel patterns
Demand Categorization	Trip purpose	Activity type
Spatial Distribution	Gravity model	Activity location choice
Travel Mode	Trip mode split	Tour mode choice
Time-of-Day	Trip time-of-day split	Activity timing and duration




## Comparisons of Current and Advanced Models (Supply Side)

	Current Model	Advanced Model
Analytical Unit	Aggregated vehicle trips between TAZ pairs	Each vehicle with its driver/passengers
Time Period	Multiple hours	Second-by-second
Travel Time Estimation	Volume-delay function/ v/c ratio	movement of individual vehicles
Assignment Method	Time-independent static assignment	Time-dependent dynamic assignment

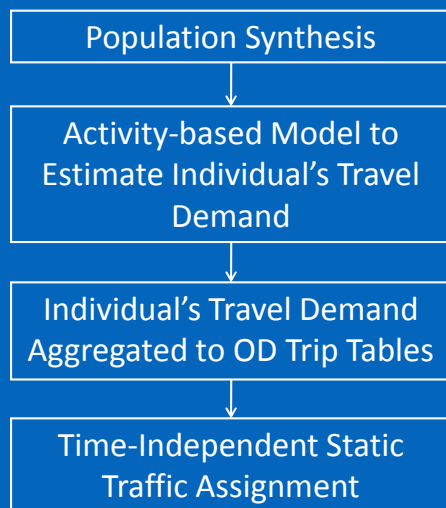



## Comparison of Current and Advanced Models-Feedback

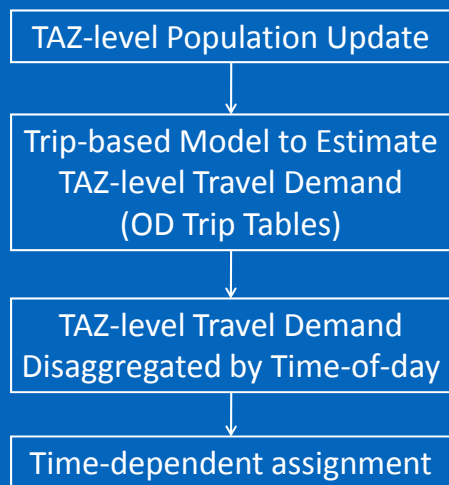
Current Models	Advanced Models
<ul style="list-style-type: none"> <li>• Travel times between zones</li> <li>• Response - Change                             <ul style="list-style-type: none"> <li>• destination</li> <li>• mode</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Travel times</li> <li>• Tours which can not be easily accomplished</li> <li>• Response - Change                             <ul style="list-style-type: none"> <li>• tour destination(s)</li> <li>• tour mode</li> <li>• departure time</li> <li>• activity schedule</li> <li>• Stay home</li> </ul> </li> </ul>

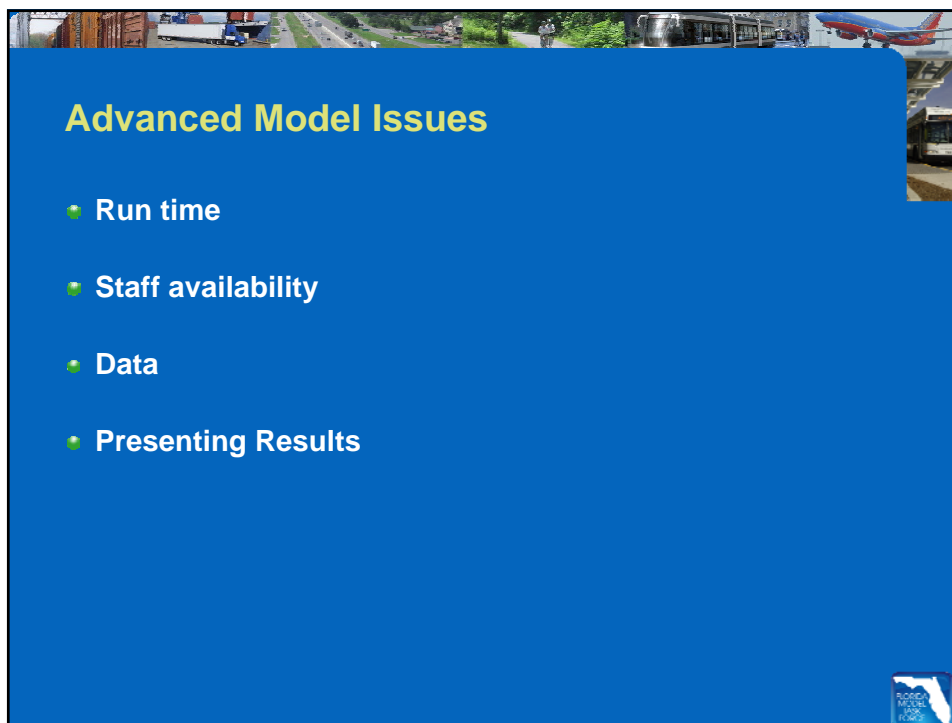
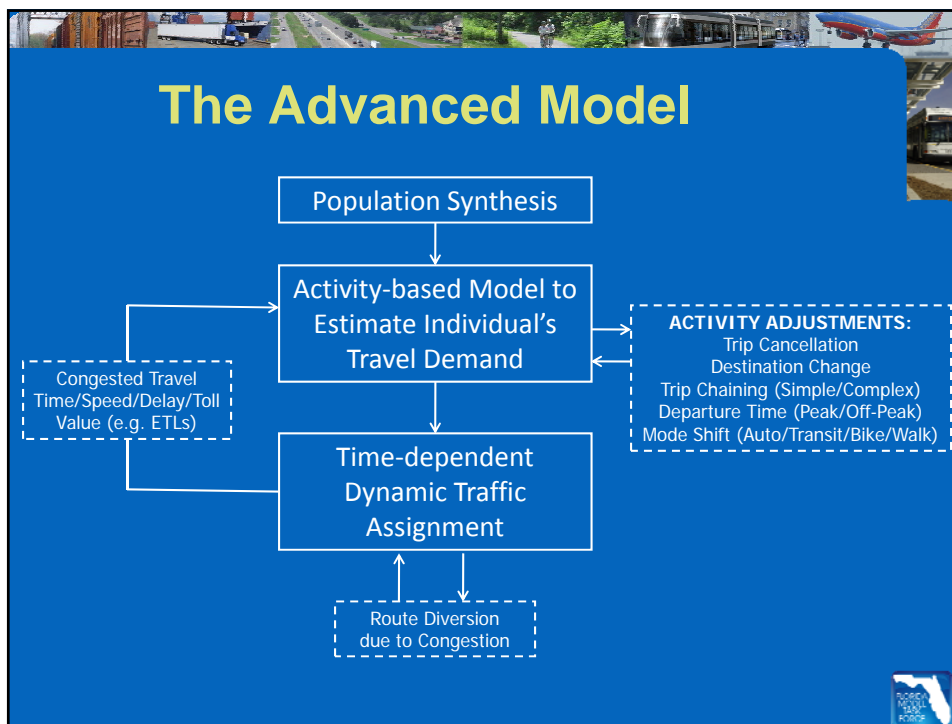



## Paths to Reach the Advanced Model (from demand side)



## Paths to Reach the Advanced Model (from supply side)










### Issues with Advanced Models- Run Time

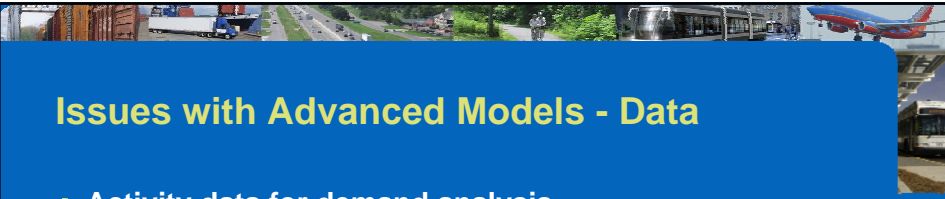
- **Current Models**
  - Demand – Zones or zones squared
  - Network – Links
- **Advanced Models**
  - Demand – households/people
  - Network – vehicles/people/time steps
- **Computer capability**
  - Speed continues to improve
  - Algorithms improve
  - Multiprocessing capability



### Issues With Advanced Models – Staff Availability

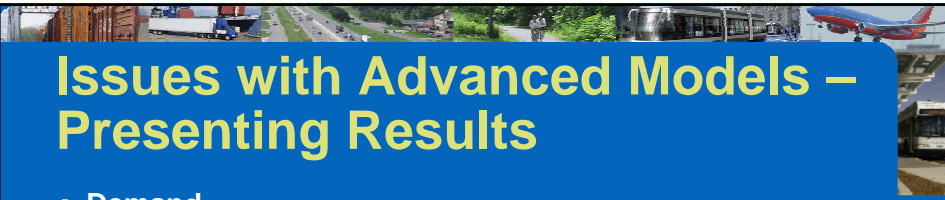

- **Current Status**
  - Most still familiar with four step
- **Future**
  - Improving as MPOs move to advanced models
  - Graduate schools teaching new methods






## Issues with Advanced Models - Data

- Activity data for demand analysis
- More detailed land use data
- Traffic operations
  - When operations issues are modeled



## Issues with Advanced Models – Presenting Results

- Demand
  - Tours more complex than trips
- Network
  - Can not produce v/c ratios  $>1$
  - Visualizations powerful tool
    - But
  - Difficult to compare visualizations







### Experience with advanced models - Demand

- **Implemented**
  - Columbus
  - Sacramento
  - New York
  - San Francisco County
- **Planned**
  - Atlanta
  - Dallas
  - Seattle
  - Denver
  - San Diego
  - Portland
  - Los Angeles



### Experience with Advanced Models - Network

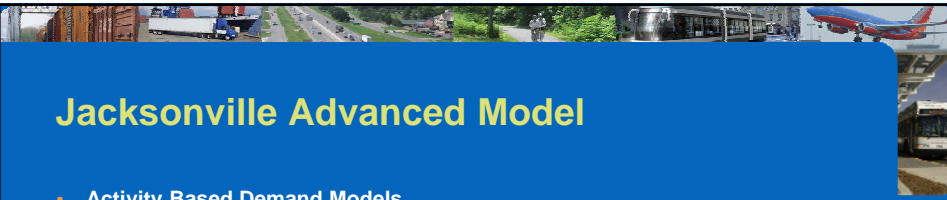
- Chicago – experimental, Argonne Labs
- Burlington, VT
- Buffalo, NY
- Southern California (Moreno valley)
- New Orleans
- Sacramento
- Austin
- El Paso
- Champaign-Urbana, Illinois





## Integrating Demand and Supply

- Burlington, VT
- Jacksonville, FL
- Sacramento, CA
- Columbus, OH



## Jacksonville Advanced Model

- Activity Based Demand Models
  - Operate at parcel level
  - Forecast in 30 minute time slices
  - Allocate down to closest minute
- Time-Dependent Traffic Assignment
  - Operate at sub-TAZ level (activity locations for TRANSIMS)
  - LOS feedback at 5–15 minute level
  - Allocate second-by-second
- Dynamically integrate analysis of activities, networks and environment
  - Behaviorally detailed (VOTs, reliability)
  - Spatially detailed (small scale improvements)
  - Temporally detailed (reflect variations in supply and demand)

