Are you a …

1. Planner
2. Engineer
3. Modeler
4. Decision Maker
5. None of the above
6. All of the above

[Bar chart showing percentages for each role: Planner 40%, Engineer 26%, Modeler 19%, Decision Maker 2%, None of the above 0%, All of the above 12%]
How do you forecast travel demand?
How do you forecast travel demand?

1. Magic 8-Ball
2. Crystal Ball
3. Ouija Board
4. Ask your mother
5. Travel demand model

![Bar chart showing the percentages of different methods used to forecast travel demand.]

- Magic 8-Ball: 10%
- Crystal Ball: 14%
- Ouija Board: 2%
- Ask your mother: 12%
- Travel demand model: 62%
What is a model?
What is a model?

1. A set of plans
2. Miniature representation of something
3. One who poses for an artist
4. One who displays clothes or other merchandise
5. A computer program / simulation of mathematical equations
6. All the above
What is a Travel Demand Model?

DEMAND
- Population
- Employment
- Land Use

SUPPLY
- Highway Network
- Transit Network
- Operation

Computerized Mathematical Relationships

Level of Service Descriptors
- Number of Trips
- Travel Paths – O/D Pattern
- Traffic Volumes
- Travel Times/Travel Speed
- Ridership
Why use travel demand models?

1. Develop transportation plans and programs
2. Analyze impacts of alternative transportation investments
3. Land Use scenario testing
4. FHWA/FTA – Require data, analytical methods, and modeling techniques are reliable, defensible, reasonably current, and meet data quality requirements.
   http://www.fhwa.dot.gov/planning/certcheck.cfm
5. All of the above
Types of Models

- Geography
  - Statewide Models
  - Regional/Large MPO Models
  - County/Small MPO Models
  - Corridor/Subarea Models
Types of Models

- **Mode**
  - Highway
    - Managed Lanes
  - Transit
  - Freight
  - Bike/Pedestrian
How are Travel Demand Models Used?

- Types of Applications
  - LRTP
  - PD&E
  - Corridor Studies
  - Transit Alternatives Analysis
  - IJR/IMR
  - Design Traffic
  - Traffic and Revenue
  - Air Quality
  - Toll Feasibility / Managed Lanes
  - Comprehensive Planning
  - Congestion Management Plans
Florida Standard Urban Transportation Model Structure (FSUTMS)

- Standardized computer software programs, urban area data formats, and operating procedures.
- FDOT provides software updates, procedural manuals, and technical support to FDOT districts and MPOs.

- http://www.fsutmsonline.net
The 4-Step Travel Model Process

- Trip Generation – How many trips?
- Trip Distribution – Where to?
- Mode Choice – Which mode?
- Assignment – Which route?
Model Development (Specification, Calibration, and Validation)

- Behavioral Content
- Level of Sophistication
- Accuracy vs. Precision
- Cause vs. Effect
Use and Misuse of the Model

- Understanding of the assumptions
- Understanding of the relationships between model components
- Quality Assurance/Quality Control
Challenges/Expectations

- **Challenges**
  - Data Needs
  - Consistency
  - Timing/Schedule
  - Hardware/Software
  - Technical Skills
  - Funding

- **Expectations**
  - Reasonable, Reliable, Accurate
  - “Good numbers for my project”
Reporting Model Results

- Technical Experts/Modelers
- LRTP Steering Committee
- Advisory Committees
  - Bicycle/Pedestrian
  - Citizens
  - Freight
  - Technical Planning
- MPO Governing Board
What Modelers Want to See

- **Input**
  - SE Data
  - Network
  - Parameters/Coefficients

- **Validation Results**
  - Productions/Attractions
  - Trip Length (miles)
  - Trip Length (minutes)
  - Mode Choice
  - Volume/Count
  - Speed
  - Transit Ridership
What Modelers Want to See

- **Trip Generation Characteristics**
  - Total Population and Trip Productions and Attractions (and by County)

- **Highway System Characteristics**
  - Highway Lane Miles by Facility Type
  - Highway Centerline Miles by Facility Type
  - Vehicle Miles Traveled - VMT (1000s) by Facility Type
  - Vehicle Hours Traveled (VHT) by Facility Type
  - Vehicle Trip Ends and County Line Crossings for Number of Lanes and Facility Types

- **Transit System / Mode Share Characteristics**
  - Number of Buses Required, Bus and Rail Route Miles, and Transit Vehicle Hours by Work, Non-Work, and Max / Total
  - Ridership, Passenger Hours, and Transit Linked Trips by Mode
  - Percent Mode Share by County and Transit Mode Share within USA / Urban Areas
  - Population within Various Transit Buffers
What Modelers Want to See

- **Highway Capacity and Usage**
  - Overall Volume to Capacity Ratio by County and Percent of VMT by Volume to Capacity Ratio by grouping
  - Volume to Capacity Ratio of Major Regional Corridors

- **Regional Connectivity and Mobility**
  - Vehicle Hours of Delay by County and by Major Regional Corridors
  - Average Trip Length by Purpose - Minutes, by Facility Type
  - Average Trip Length by Purpose - Miles, by Facility Type

- **Community Impacts / Environmental Justice**
  - Highway and Bus Route Miles Within and Outside EJ Areas
  - Average Trip Length by Purpose within EJ Areas - Minutes, by Facility Type
  - EJ Accessibility
What Modelers Want to See

- **Safety Economic Impact**
  - Crashes, Injuries, and Fatalities per Day, and Hurricane Evacuation Route Lane Miles

- **Environmental Impact**
  - User Costs and Average Congested Travel Speed to Major Activity Centers (Auto) by Segment
  - Comparison of Lane Miles and Average Travel to Activity Centers (Transit) by Segment
  - Percent of Freeway Lane Miles with a V/C > 1.0 and Transit Share from Activity Centers - Productions
  - Transit Mode Share to Major Activity Centers - Attractions
  - Average Vol/Cap Ratio Weighted by Truck VMT, by Facility Type
  - Table IX – Environmental Impacts

- **Land Use / Urban Form**
  - Lane Miles and Trip Ends Outside the Urban Areas / Urban Service Areas
Oh…and the Kitchen Sink too!
What Committees Want to See

YR 2025 5-minute (congested) isochronal travel time from TAZ 707 (Florida Hospital)

- 0 - 5 minutes
- 5 - 10 minutes
- 10 - 15 minutes
- 15 - 20 minutes
- 20 - 25 minutes
What Committees Want to See

Distribution Output – Desire Lines
What Committees Want to See

Volumes Using Bandwidth
What Decision Makers Want to See

- Population Growth
- Employment Growth

### Population Growth

- **Beach/CBD**
- **Central**
- **North**
- **Northwest**
- **South**
- **West**

### Employment Growth

- **Beach/CBD**
- **Central**
- **North**
- **Northwest**
- **South**
- **West**

- 2005 Population (in 000's)
- 2035 Population Increase (in 000's)

- 2005 Employment (in 000's)
- 2035 Employment Increase (in 000's)
What Decision Makers Want to See

- Cost Feasible Projects
  - Multimodal Improvements
  - Interchange + Intersection Improvements
  - Highway Improvements
  - Transit Improvements
## What Decision Makers Want to See

### Cost Feasible Plan Performance

<table>
<thead>
<tr>
<th>Metrics</th>
<th>Existing plus Committed (Priority I)</th>
<th>Cost Feasible Plan (Priorities I – IV)</th>
<th>Percent Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume to Capacity Ratio</td>
<td>0.84</td>
<td>0.80</td>
<td>(5%)</td>
</tr>
<tr>
<td>Daily Vehicle Miles Traveled (in 000’s)</td>
<td>61,418</td>
<td>62,856</td>
<td>2%</td>
</tr>
<tr>
<td>Daily Vehicle Hours Traveled (in 000’s)</td>
<td>3,116</td>
<td>2,796</td>
<td>(10%)</td>
</tr>
<tr>
<td>Daily Average Speed</td>
<td>20 mph</td>
<td>22 mph</td>
<td>10%</td>
</tr>
</tbody>
</table>
Central Florida Regional Planning Model (CFRPM)

- CFRPM v5.0 = currently adopted LRTP model
  - Base year: 2005
  - Future years: 2015, 2020, 2025, 2030, 2035
- CFRPM v5.5 = time of day model
- CFRPM v5.6 = time of day model with emphasis on transit modeling
Approximately how many roadways are included in the CFRPM?

1. <500
2. 500 to 1,000
3. 1,001 to 1,500
4. 1,501 to 2,000
5. >2,000
Approximately how many square miles are covered by the CFRPM?

1. <2,000 miles
2. 2,001 to 4,000
3. 4,001 to 6,000
4. 6,001 to 8,000
5. >8,000
What is the approximate population included in the CFRPM?

1. <2,000,000 people
2. 2,00,001 to 3,000,000
3. 3,000,001 to 4,000,000
4. 4,000,001 to 5,000,000
5. >5,000,000
What is the approximate total employment value used in the CFRPM?

1. <1,000,000 people
2. 1,00,001 to 2,000,000
3. 2,000,001 to 3,000,000
4. 3,000,001 to 4,000,000
5. >4,000,000
In a model that incorporates over 1,800 roadways, covers 9,500 square miles, has a population of 3.9 million people, and includes 1.8 million employees, what is the probability that the individual roadway you want to study is ‘ready to go’ using the ‘off the shelf’ model?

DISCLAIMER: ADJUST EXPECTATIONS ACCORDINGLY.
CFRPM Version 6

- CFRPM v6.0 is currently under development
  - Base Year 2010, Future Year 2040
  - Anticipated completion in late 2015/early 2016
  - Incorporate time of day, transit, truck models, expanded area

- Challenges associated with using adopted CFRPM v5 while v6 is being developed
  - Impact of recession
  - Change in growth patterns
  - Changes in travel patterns due to roadway construction/realignments between 2005 and 2010
Beyond CFRPM Version 6

- Activity Based Modeling
- Dynamic Traffic Assignment
- Data Driven Models
- Statewide Models
  - Freight
  - Managed Lanes
  - Visitor Model
The following best represents your view of travel demand models:

1. Takes too long and costs too much money.
2. Valuable tool when used appropriately.
3. I’d like to learn more.
4. I don’t trust anything that comes from a model.
5. Just give me the “right” numbers!

Graph showing the distribution of responses:

- Takes too long and costs too much money: 73%
- Valuable tool when used appropriately: 10%
- I’d like to learn more: 3%
- I don’t trust anything that comes from a model: 5%
- Just give me the “right” numbers: 10%
Closing Thoughts

- **Lots of assumptions / simplifications**
  - can’t simulate the individual
  - all roads are not created equal

- **Data is important (GIGO) and costly**
  - census, hh surveys, attraction data, counts?

- **Lots of math calculations**
  - long run time

- **Model answer shouldn’t be the final answer**
  - accuracy traditionally +/- a lane call
Things to Remember

- The model is a tool to predict complex behavior
- The model is not the final or only answer (i.e. model results must be interpreted and compared against other data)
- Adjust expectations of model capabilities and be aware of model limitations
- Always ask: Does this make sense?
Thank You!!!