

# Estimation of System Performance and Technology Impacts to Support Future Year Planning

*Presented by*

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# Background



- Agencies are interested in estimating system performance
- MAP-21/FAST ACT emphasis on establishing performance targets related to goal areas
- For existing conditions, this estimation can be done based on data collected from multiple sources
- For future conditions, models will be needed

# 2010 Survey and Workshop



- On March 31 2010, FDOT sponsored a one-day workshop with staff directors of Florida MPOs on the role of modeling in a performance measurement framework
  - Defining performance measures that MPOs need the most;
  - Evaluating how travel demand models can be used to develop these performance measures; and
  - Determining next steps on how to incorporate workshop outcomes into the FSUTMS framework

# Workshop Summary



- Provided recommendations to enhance travel demand models and for developing analytical tools to evaluate these performance measures
- Performance-based planning allows prioritizing investments to achieve objectives and improve performance

# 2010 Workshop Mobility Measures



Measure	Travel Demand Model Role	Predictability	Priority
Percent peak hour delay	Can provide directly	Can forecast - peak hour model required	High
Travel time between major points	Can provide directly	May require peak hour model May require transit model	High
Transit mode split	Can provide directly	Can forecast - requires mode choice model	High
Non-Single Occupancy Vehicle (SOV) mode share	Can provide directly	High	High
Available mode alternatives	Can provide accessibility to available modes on major routes	Can forecast accessibility to modes - may require additional network detail for local routes	High
Reliability	Can provide basic volume and speed inputs	Ability to predict accidents and incidents extremely limited beyond relating incident delay to speeds and volumes	

# 2010 Workshop Environment Measures



Measure	Travel Demand Model Role	Predictability	Priority
Noise Pollution	Contributes volumes/auto and truck split and speeds	Yes – volumes/ auto and truck split and speeds by facility	High
Billboards	None	No	Low
Mobile source greenhouse gas (GHG) emissions	Volumes, speeds/VMT, need more accurate vehicle distributions	Volumes, speeds/VMT, need more accurate vehicle distributions	High
Water runoff	Provide volumes, would need environmental GIS layers and possibly more detailed vehicle information.	Yes – volumes	Low
Impact on wildlife habitat	Limited – roadway footprint major impact. Need info on habitat	No	Low
Impervious service	Limited to representation of major roadway system. Local system not included.	GIS system better suited to task. Local roads not included.	Low
Use of biofuels/Fuel consumption	Limited to estimate of total VMT	Limited to estimate of total VMT	Low

# 2010 Workshop Safety and Livability



Measure	Travel Demand Model Role	Predictability	Priority
<i>Safety</i>			
<b>Accident rate</b>	<b>VMT by facility type</b>	<b>VMT by facility type (does not predict rate)</b>	<b>High</b>
<i>Livability</i>			
<b>Access to alternative modes</b>	<b>Can provide travel times to major transit lines</b>	<b>Can provide travel times to major transit lines</b>	<b>High</b>
<b>Public health</b>	<b>None</b>	<b>No</b>	<b>Medium</b>
<b>Per-capita roadway lane miles vs. bike lanes, trails</b>	<b>Can provide roadway lane miles</b>	<b>Can provide roadway lane miles</b>	<b>Medium</b>

# 2010 Workshop Freight



Measure	Travel Demand Model Role	Predictability	Priority
number of at-grade crossings	None	Possible	Medium to Low
Rail delay	None – specialized operations models needed	No	Low
Freight moved by truck Vs. rail	Need planning level freight mode choice model and freight data	Need planning level freight mode choice model and economic forecasts	Medium
Extent/Mileage of intermodal infrastructure	Can map, but GIS more appropriate	No – a planning input, GIS more appropriate tool.	Medium
Stakeholder satisfaction	None	No	High
Use of freight technologies	None	No	Low

# 2010 Workshop State of Good Repair



Measure	Travel Demand Model Role	Predictability	Priority
<i>State of Good Repair</i>			
<b>Age of Transit Vehicles</b>	<b>None</b>	<b>No</b>	<b>Low</b>
<b>Number of vehicles greater than a defined criteria miles of service</b>	<b>Limited to mileage on model roadway system. No information on turnover.</b>	<b>No</b>	<b>Low</b>
<b>Overweight permits</b>	<b>None</b>	<b>No</b>	<b>Low</b>
<b>Number of violations of weight restrictions</b>	<b>None</b>	<b>No</b>	<b>Low</b>

# MAP 21 (FAST Act) Goal Areas



Safety

Infrastructure Condition

Congestion Reduction

System Reliability

Freight Movement and Economic Vitality

Environmental Sustainability

Reduced Project Delivery Delays

# Proposed Mobility-Related Measures



## NHS



- % of the Interstate System providing for Reliable Travel Times
- % of the non-Interstate NHS providing for Reliable Travel Times
- % of the Interstate System where Peak Hour Travel Times meet expectations
- % of the non-Interstate NHS where Peak Hour Travel Times meet expectations

## Freight



- % of the Interstate System Mileage providing for Reliable Truck Travel Times
- % of the Interstate System Mileage Uncongested

## CMAQ



- Annual Hours of Excessive Delay Per Capita
- Total Emission Reductions

# Existing Situation



- Significant research on estimating mobility, reliability, safety, and environmental performance measures
- Data becomes available from different sources
- However, these models and data have not been sufficiently integrated with demand models
- Recently, there have been some efforts
  - incorporate the estimation of LOS in NERPM
  - Reliability and safety estimation that works with TRPRM
- There is a need for integrated tools and methods to estimate performance measures and the impacts of advanced technologies and performance

# FITSEVAL



- In 2008, the FITSEVAL tool was developed to estimate the impacts of advanced strategies on system performance.
- The tool has been applied in at least two FDOT districts (Districts 1 and 5).
- FITSEVAL can provide a platform for the needed development.
- Required enhancement
  - Examine and extend the performance measures estimated by the tool
  - Incorporate methods from recent research and findings to estimate measures (HCM, HSM/PlanSafe, SHRP2, MOVES, etc.)
  - Make more use of the data collected from different sources, possibly by integrating with data analytic tools
  - The technologies and strategies assessed by FITSEVAL may need to be expanded to additional strategies to reflect the current needs.

# Goal and Objectives



- Support forecasting system performance and the impacts of conventional improvements and advanced strategies on performance by taking advantage of state-of-art models, methods, and parameters and the availability of data from multiple sources.
- The specific objectives are:
  - Identify a set of measures that can be used for assessing performance
  - Identify methods to predict measures for impact assessment
  - Identify business processes that can benefit from the utilization of the project development
  - Enhance and extend existing models in FITSEVAL to allow the assessment of system performance and the impacts of additional technologies

# Task 1: Identification of Business Processes



- Identify the agency business processes that are expected to benefit from the developed environment
- Identify the current practices associated with using tools to support these business processes and the issues associated with this use
- Review of the use of FITSEVAL in District 1 and 5, developments in Florida, and other similar tools in the nation for prioritization of improvements

## Task 2: Identification of Measures



- FITSEVAL currently estimates mobility, safety, and emission measures but not reliability measures.
- This task will review national and state documents that identify performance measures
- These documents will include those related to long range plan, corridor plan, congestion management plan, MAP 21 performance measures, and TSMO program measures; in addition to the output from the 2010 FDOT workshop
- The measures will be assessed and a subset will be selected for possible estimation utilizing the enhanced FITSEVAL tool

## Task 3: Estimation of Measures



- For each identified measure, methods will be identified for use in the developed environment.
- The suggested methods will take advantage of the modeling capabilities of FITSEVAL and the support of data.
- Examples are:
  - Reliability measures based on findings from SHRP 2 reliability and capacity programs
  - Safety estimation based on HSM and PlanSafe methodology
  - The EPA MOVES models with different levels of analysis

# Task 4: Impacts on Performance



- The FITSEVAL tool, identified methods to estimate the impacts of 13 ITS applications
- This task will update the methods for the most widely used TSMO applications and will identify methods to assess the impacts of emerging technologies such as those of connected, automated, and electric vehicles at the sketch planning level
- These methods combined with the performance measure estimation methods will be implemented in an updated version of the FITSEVAL tool

# Discussion

