Overview

• Project Schedule
• Motivation
• Advanced Freight Forecasting Model
• Statewide Framework
• Regional Framework
Project Schedule

- Currently:
  - Working with FDOT to complete data development
  - Developing statewide model components
- Early 2013:
  - begin CUBE Voyager/FSUTMS integration
  - Calibration and validation
- July 2013: deliver the model and final report

<table>
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<tr>
<th>Task</th>
<th>2012</th>
<th>2013</th>
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<tr>
<td>1: Kickoff Meeting</td>
<td>May</td>
<td>Jan</td>
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<tr>
<td>2: Data Development</td>
<td>June</td>
<td>Feb</td>
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<td>3: Statewide Model Development</td>
<td>Aug</td>
<td>Mar</td>
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<td>4: Integration with FSUTMS</td>
<td>Sept</td>
<td>Apr</td>
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<td>5: Calibration and Validation</td>
<td>Oct</td>
<td>May</td>
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<td>6: Final Report</td>
<td>Nov</td>
<td>June</td>
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Project Motivation

Enhance Florida’s statewide freight forecasting capabilities

Provide a framework to support enhancements to regional freight forecasting

- Represent characteristics of firms and shipments
  - Synthesize firms and goods movements at the zone level
- Represent supply chains and distribution channels
  - Link commodity movements between buyers and suppliers
- Estimate shifts in long-haul and short-haul demand resulting from statewide investments
  - Connect movements from supplier to buyer in a single framework
- Capture trip-chaining that occurs
  - Represent distribution channels in the supply chain
  - Represent touring during pick up and delivery of goods
**Advanced Freight Forecasting Model**

Combine Supply Chain and Tour-based Methods

- **Supply Chain Models**
- **Tour-based Models**
- **Hybrid Models**

- Mode and path selection
- Models shipments using the supply chain framework
- Regional pick up and delivery of shipments is handled by touring trucks

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**Geographical Context**

**Statewide Multi-Modal Freight Model**

- Covers all of Florida and includes supply chains across the USA and internationally
- Synthesizes firms, represents connections between suppliers and buyers, and distributes commodity flows to, from, and across the USA
- For commodity flows (shipments) to, from, and within Florida, models distribution channel, including mode, and transfer locations
- Designed for connection to regional truck-touring models to represent regional delivery movements in detail
Statewide Model Framework

- **Firm Synthesis**: Synthesizes a list of businesses in Florida, the rest of the US, plus an international sample.
- **Supplier Selection**: Connects suppliers to buyers based on the commodities produced by the supplier and consumed by the buyer.
- **Goods Demand**: Distributes commodity flows amongst the paired suppliers and buyers.
- **Distribution Channel**: For each buyer/supplier pair, selects whether shipments are direct or involve intermediate handling (intermodal, distribution center).
- **Shipment Size**: For each buyer/supplier pair, converts an annual commodity flow to shipments by size and frequency.
- **Mode and Transfers**: Identifies the mode for each leg of the trip from supplier to buyer and the transfer locations.

Data Development

- **Economic data**
  - Employment data: firm sizes and locations
  - Input/output data: production and consumption
- **Commodity flow data**
  - FAF³ or Transearch
- **Networks**
  - New Florida Highway network from NAVTEQ plus National Highway Planning Network
  - Networks for other modes: rail, air, and water, and intermodal and distribution facilities
- **Validation data**
  - Commodity Flow Survey tabulations
  - Truck OD data (ATRI)
  - Truck counts
Integration, Calibration, and Validation

- Model Integration
  - Integrated within the CUBE Voyager/FSUTMS framework to provide access to network skim data and assignment
  - Demand model is programmed in the open source programming platform R
  - Executed using the CUBE application manager
- Model Calibration and Validation
  - Calibration of individual model components
  - Validation of the model system for intercity goods movements against truck ODs and truck counts

Statewide Policy Sensitivity

- Changes in land use and economy: spatial distribution of employment and mix of industries
- Changes in transportation supply
  - Major highway network changes
  - Changes to rail capacity
  - Intermodal facility capacity changes, including deep water ports and airports
- Changes in distribution center network
  - New facilities (with regional significance)
- Changes in commodity flow origins and destinations outside Florida
Regional Model Framework

- Shipment Flows (from Statewide Model)
- Vehicle and Tour Pattern Choice
- Number of Tours and Stops in each Tour
- Stop Sequence and Stop Duration
- Tour Start Time and output of Trip List

Regional Model: Truck Tours

- Implemented in Chicago region for CMAP as part of FHWA project
- Model links shipment deliveries and pick-ups together into truck tours
- Tours built for different truck types and for different patterns: single stop, single loops, several returns to warehouse
- Output is a trip schedule similar to that from an activity-based model of personal travel
Regional Policy Sensitivity

- Regional model input is the output from the statewide model, so statewide model’s sensitivity feeds through to regional model
- Local (more detailed) distribution of employment and land use affects local truck travel patterns
- Local changes in transportation supply, non-truck traffic growth causing congestion, and resulting truck travel times
- Local policies such as truck routes, truck prohibitions, delivery windows, and size limits can be modeled

Connections to the Statewide Model

- Statewide model is designed to be integrated with regional models
- Statewide model develops shipment paths including transfer locations and modes, and intercity truck movements
- Statewide model outputs include a list of regional shipment pick-ups and deliveries that must be met in a given day: that can then be microsimulated in the regional model
- Possible modes of operation
  - Integrate complete statewide model with regional model and run models sequentially
  - Provide an extract from the statewide model of regional shipment demand and run the regional model separately
Regional Model Implementation

- Data needs: establishment surveys and truck surveys to support regional model development and calibration
  - Proposed travel behavior inventory (discussion tomorrow morning) includes these surveys
- Consider piloting a regional truck model in partnership with an MPO/District, integrated within their regional model
- Consider further regional implementations if the pilot is demonstrated to be successful

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