

## TDOT's New Staffs, Future Plans, and opportunities for Collaboration with MPOs

David Lee, Assistant Director | February 7, 2017

#### Organizational Chart – Long Range Planning



#### **Comprehensive Planning**

Data Management

#### Organizational Chart – Data Management



#### **Data Management**



#### Bio – Jaehoon Kim

- Planning Specialist Adv
- Ph.D in Civil & Environmental Engineering at University of Alabama in Huntsville
- Dissertation: *Estimating Impact of Reshoring Phenomenon on U.S Freight Transport and Network*
- Expertise
  - Travel Demand Modeling
  - Freight Modeling
  - Transportation Safety



#### Bio – Jeffrey Ultee

- Planning Specialist
- Dual Master's at Georgia Institute of Technology
  - Urban Planning
  - Civil Engineering
- Thesis: *The Potential of Express Bus to Serve Peak Travel Demand to Outlying Employment Centers: A Case Study of the Atlanta Region*
- Full-time Modeling Internships
  - Atlanta Regional Commission (ARC)
  - Delaware Valley Regional Planning Commission (DVRPC) (Philadelphia)
- Been at TDOT since July 2016



#### Bio – Tahmina Khan

- Planning Specialist
- Ph.D. in Civil & Environmental Engineering at University of Alabama in Huntsville
- Dissertation: Promoting Transportation Sustainability by
  Suggesting/Limiting Future Land Use Change



#### Bio – Majid Khalilikhah

- Planning Specialist
- Ph.D in Transportation Engineering at Utah State University
- Dissertation: *Traffic Sign Management: Data Integration* and Analysis Methods for Mobile LiDAR and Digital Photolog Big Data
- Expertise
  - Planning and Policy
  - Data Science
  - Big Data
  - Transportation Economics





## Statewide Model

#### SWM- Phase 3

- RSG supported in development
- First draft completed September 2016
- Ongoing updates to ensure reliability
- Phase 3 includes:
  - Freight modeling by commodity type
  - Accounting for alternative modes both freight and passenger
- Data driven
  - ATRI and Transearch
  - AirSage cell phone OD
- Performance
  - $R^2 = 0.9443$
  - RMSE = 36.5%



#### SWM - Structure





#### SWM - Short Distance Model

- For trips less than 50 miles
- Destination choice replaces trip distribution
- Mode choice comes before destination choice
- Mode choice is simplified
  - Estimates those who take alternative modes and filters them out





#### SWM - Long Distance and Freight Models

#### LONG DISTANCE PASSENGER DEMAND 2. Synthetic 1. Network Population Skimming Expansion 3. rJourney National Long Distance Model 4. Matrix Aggregation / Disaggregation

> 50 miles







### SWM - Zones (1/2)



3687 zones



#### SWM - Zones (2/2)





## SWM - Network (1/2)





### SWM - Network (2/2)





#### Use of the Model

- Help plan projects across the state.
  - Assess SE and traffic changes
- Most appropriate in rural areas
  - In urbanized areas, the MPO model should be used instead
- Use inside state of Tennessee
  - Out of state not post-processed





# MPO Model Review

#### Federal Transportation Planning Legislation

- Each metropolitan planning organization (MPO) is required to develop a transportation plan as part of its planning process
- 23 U.S.C. 134 and 49 U.S.C. 5303
- This transportation plan must cover at least a 20-year planning horizon, and "shall include both long-range and short-range strategies/actions



#### MPO Model Development

- 1. RFP/RFQ/Panel Review (TDM Model Design, Horizon Year, Interim year)
- 2. Data Collection/Model Inputs (Network, TAZ review) TDOT Involvement
- **3.** Model Developments (Component Validation, Overall Validation, Land Use Model Inputs) TDOT Involvement
- 4. Base Year Model / E+C Scenarios
- 5. Base Year, E+C Scenario Model Documents (Document review) TDOT Review
- 6. LRTP Scenario Development TDOT Review



#### Guidelines and Check List

 Minimum Travel Demand Model Calibration and Validation Guidelines for the State of Tennessee -Updated 2016

http://tnmug.utk.edu/documents/MinimumTravelDemandModel2016.pdf

- Check List
  - The check list should be filled out before the model is submitted to TDOT.
- Guidelines
  - All the statistics, figures, and benchmarks in the guidelines should be utilized in the model document.
  - For a good modeling practice, the "Preferred" standards should be utilized in the RFQ/RFP. No model should exceed the "Acceptable" standard without any justifications.
  - Screenlines, cutline should always be utilized to evaluate the model performance at the subarea and the corridor level.
  - Reasonable travel speed tests should be performed as well.



#### **TDOT Review**

- When the model is submitted for TDOT Review, please include the following files:
- Model check list from the "Minimum Travel Demand Model Calibration and Validation Guidelines for the State of Tennessee - Updated 2016"
- Model Package
  - Compiled Model UI, Resource files
  - All model Inputs for all the scenarios
  - All model outputs
  - Loaded network files
  - Model Document/User's guide
- For the model document
- Please do not use the terms "refer to the previous model document" nor "the assumptions did not change", please list the model assumptions used.



#### Nashville



Metropolitan Planning Organization

Name	Haryono Prawiranata (Hary)	Status	
Email	Haryono.Prawiranata@nashville.gov	- Last Model Certified	2016
Phone	615-862-7215	- Next Update	2020
		- Model Type	4 Steps/ABM

- Types of data that TDOT will purchase?
- Nashville's model uses all roads based on ETRIMS.
- For future model we are going to use ABM. Current adopted model is TBM.



#### Memphis



#### Memphis MPO METROPOLITAN PLANNING ORGANIZATION

Name	Kwasi Agyakwa	Status	
Email	Kwasi.Agyakwa@memphistn.gov	- Last Model Certified	2016
Phone	901-576-7189	- Next Update	
		- Model Type	4 Steps

- 1. Tech/Data Support:
- For the most part, the data we need can be found on TRIMS.
- 2. MPO Travel Demand Model Review Process:

We worked together to

- Develop the TAZ boundary and future population projection control totals so that the Statewide Model and the MPO model relate.
- Review the model calibration results and made the necessary refinements to the model.

The review process enabled us to shed light on issues within the current model so that we can consider future improvements. Several improvements include:

- Network: We discussed updating our network to using TDOT's statewide network or TRIMS as a starting point.
- Base Year: Our base year is 2010 and we've looked at updating it to 2014/15. Our household travel survey was completed in 2014.
- Reporting Tools: Enhance the reporting tools.



#### Jackson



Name	James Matthews	Status	Just Started	
Email	jmatthews@cityofjackson.net	- Last Model Certified	2012	
Phone	731-927-8781	- Next Update	2017	
		- Model Type	4 Steps	

Provided with most of the data files necessary to conduct the model



#### Johnson City

Johnson City MTPO Metropolitan Transportation Planning Organization

Name	Glenn K. Berry	Status	
Email	glennberry@jcmpo.org	- Last Model Certified	2011
Phone	423-434-6272	- Next Update	2017
		- Model Type	4 Steps

• We did not interact that much before. We are getting ready to update our TDM with our consultant.







Name	Bill Albright	Status	Base Year Under Review	
Email	BillAlbright@KingsportTN.gov	- Last Model Certified	2011	
Phone	423-224-2677	- Next Update	2017	
		- Model Type	4 Steps	

- We got mostly the final outputs
- Traffic counts were collected from TDOT and VDOT



#### Lakeway Area



Name	Rich D.	Status	Base Year Completed	
Email	richd@mymorristown.com	- Last Model Certified	2012	
Phone		- Next Update	2017	
		- Model Type	4 Steps	

- We generally work with Knoxville TPO as far as modeling.
- We had used TRIMS in the past, need to get back to using the e-trims now.



#### Knoxville



Name	Mike Conger	Status	Base Year Completed	
Email	Mike.conger@knoxtrans.org	- Last Model Certified	2012	
Phone	865-215-3813	- Next Update	2017	
		- Model Type	Tour	

In review model



	Name	Email	Phone	In Associate with	Status	Last Model Certified	Next Update	Model Type
Chattanooga	Yuen Lee	ylee@chattanooga.gov	423-643-5946		Base Year Completed	2012	2017	ABM
Bristol	David Metzger	<u>dmetzger@bristoltn.org</u>	423-989-5519			2016	2021	4 Steps
Cleveland	Greg Thomas	gthomas@clevelandtn.gov						
Clarksville	Stan Williams	stanwilliams@cityofclarksville.com	931-645-7448	Nashville		2013	2017	4 Steps





# Data Investigation

#### What TDOT Have

- TRIMS
  - Two related systems (TRIMS and ETRIMS)
- Commercial Data
  - HERE
  - NPMRDS
  - Transearch
  - AirSage
  - ATRI
  - Woods and Poole
  - InfoGroup



#### What Data Included - Roadway Information

#### • TRIMS

- Road Segment (functional class, road names, and urban/rural information)
- Roadway Geometry (number of lanes, speed limits, land use, school zones, and access control)
- Roadway Description (cross section of the roadway from the left side to the right side of the roadway)
- Traffic (AADT, collection year, peak hour, and truck percentage)
- Route Features (as intersections, cultural features, bridges, traffic control devices)
- Crash (all types of crashes, Location, Condition)
- Structures (Bridge Inspection Data)
- Maintenance Inventory (condition of linear features such as guardrails, fences, pavement markings, concrete barriers), etc.



#### What Data Included – Travel Speed Data

- HERE (2015~2016)
  - All Street Network Data
  - Average Speed for each 15 minutes of the week
  - Coverage on all roads in the Map, Referenced to TMC codes or Link IDs
  - Traffic speed data summaries (e.g. Day of Week by Year and by Month)
- NPMRDS
  - A subset of HERE data
  - TMC Static data (TMC code, Country, State, County, Distance (length of TMC in miles), Road Number, Road Name, Latitude, Longitude, Road direction)
  - Average Travel Time in Seconds (TMC code, Date, EPOCH (5 minute increment, in the range 0-287) for all vehicles, Passenger vehicles, Freight vehicles)
  - NHS Network GIS File: Link ID, Alignments



#### What Data Included – O/D Data

- Transearch
  - 2012 Commodity OD Data by 43 SCTG classification
- AirSage
  - Long Distance Passenger OD matrix
  - Number of Trips from origin to destination during given Date Range and Time Period
  - TDOT has OD trips from Apr. 1, 2014 to Apr. 30, 2014 through Mon. to Thu. for 24 hours
- ATRI (American Transportation Research Institute)
  - Truck GPS Trace Information
  - TDOT has OD matrices once treated
  - Two weeks of data from each of the four quarters of 2013



#### What Data Included – Socioeconomic Data

- Woods and Poole
  - 2015 Base Socioeconomic Data (Employment, Population, Income, Households, etc.)
  - TN County level detail projections
- InfoGroup 2013
  - Detail Business info and the locations
  - Employment Data (by NACIS Code or SIC Code)



### Applications to SWM

- TN Statewide Travel Demand Model
  - Network Attributes
    - TRIMS roadway segment information
    - TRIMS Traffic Counts
  - Employment Data Development
    - 2010 InfoGroup Economic Data
    - Woods & Poole`s database
  - Long Distance Passenger Demand Model
    - AirSage used for calibration for long distance travel
  - Freight & Truck Demand Model
    - ATRI O/D Data for Pivoting off of Truck OD Data
    - Transearch Data for Freight Demand



## Future Plan



TΝ

#### Future Plan – Forecasting Office

- Enhance tight relationships with MPOs and Universities (through TNMUG, MPO Annual Conference)
- Data Sharing and Brainstorming for Research Idea
  - AirSage: TN MPOs, Universities where have license agreement
  - Transearch: TN MPOs, RPOs, Universities
- Embracing cooperation with other Divisions and Offices within TDOT and Involving TNMUG
- Integration of DV and Forecasting Activities through visualization and spatial analyses with model



#### Future Plan – TN Statewide TDM

- Land Use Model Development (Potential)
- Model Application Development
  - Relative Comparison and Prioritization
  - Corridor Analyses
  - System Analyses
  - Commercial Vehicle Management Plan
  - Scenario Analyses for Sustainability (Emission Reduction)
  - Performance Measures Development (MOEs)
  - Congestion Management
  - Hotspot Analyses





