

Item 5

TPO Travel Demand Model Update Scoping Overview

PRESENTER: MIKE CONGER, TPO STAFF AND VINCE BERNARDIN, CALIPER CORPORATION

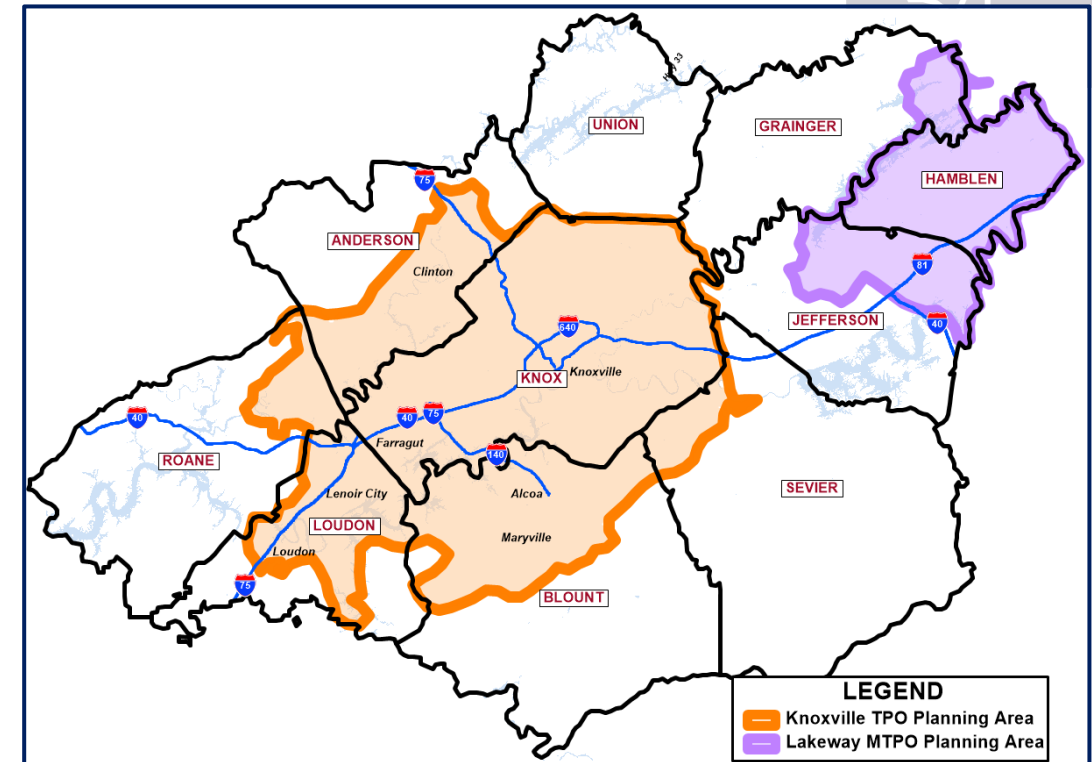
NO ACTION REQUIRED

Agenda

1. INTRODUCTION
2. REVIEW OF STAKEHOLDER SURVEY
3. OVERVIEW OF WORKSHOP

KRTM Overview & Purpose of Workshop

- Knoxville TPO Maintains a 10-County Regional Travel Demand Forecasting Model that includes all areas subject to Air Quality Conformity
 - Includes both the Knoxville TPO and Lakeway MTPO Planning Areas
- Current model validated to 2022 Base Year but based on platform originally developed in 2009/2010 – reaching end of life
 - Expectation for Mid and Large MPOs to Conduct Major Household Survey and Model Update every 10 years or so to capture changing travel behavior
- 2022 Model Update Contract with Caliper included Visioning/Scoping Exercise to lay groundwork for next major update



STAKEHOLDER SURVEY

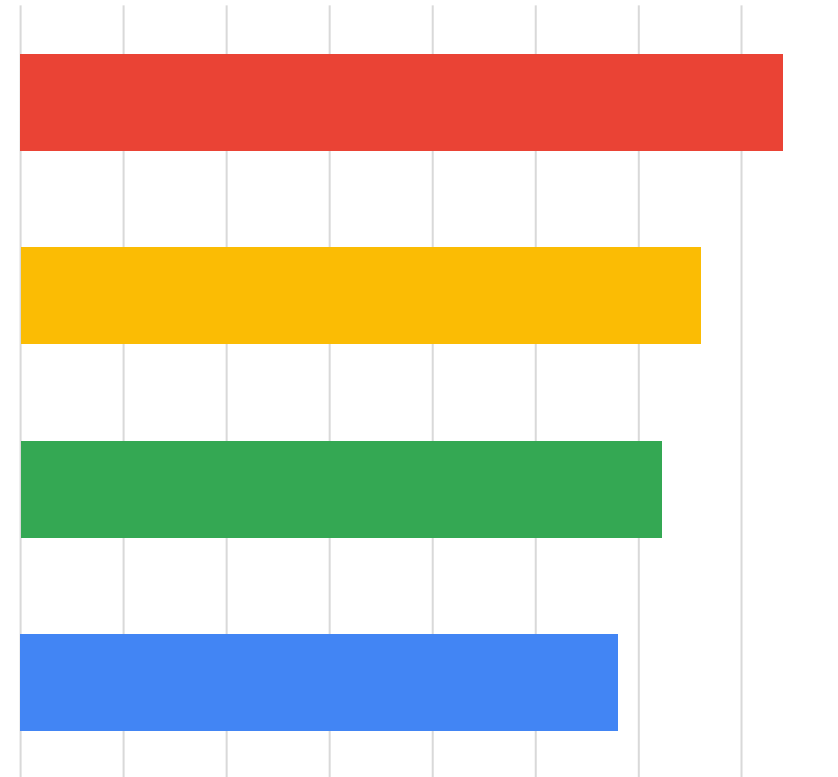


RESPONDENTS

- 12 responses
- Most had not used the model
- But 1/3 claimed a technical background

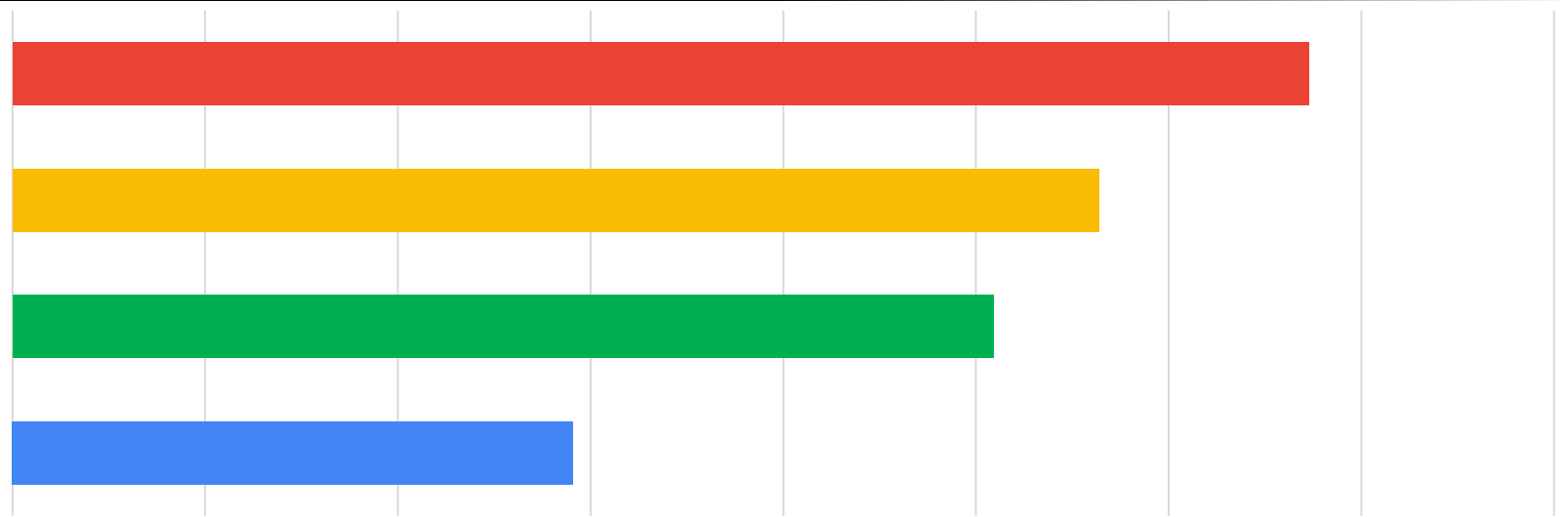
IMPORTANCE IN PRIORITIZING NEEDS

1. **Technical analysis** (quantifying objective, measurable factors, e.g., minutes of delay, vehicle-miles-of-travel)
 - All respondents thought it was very or fairly important
2. **Voter / taxpayer direct input**
3. **Principles / values** (e.g., sustainability, economic benefits, equity, etc.)
4. **Elected officials' priorities**



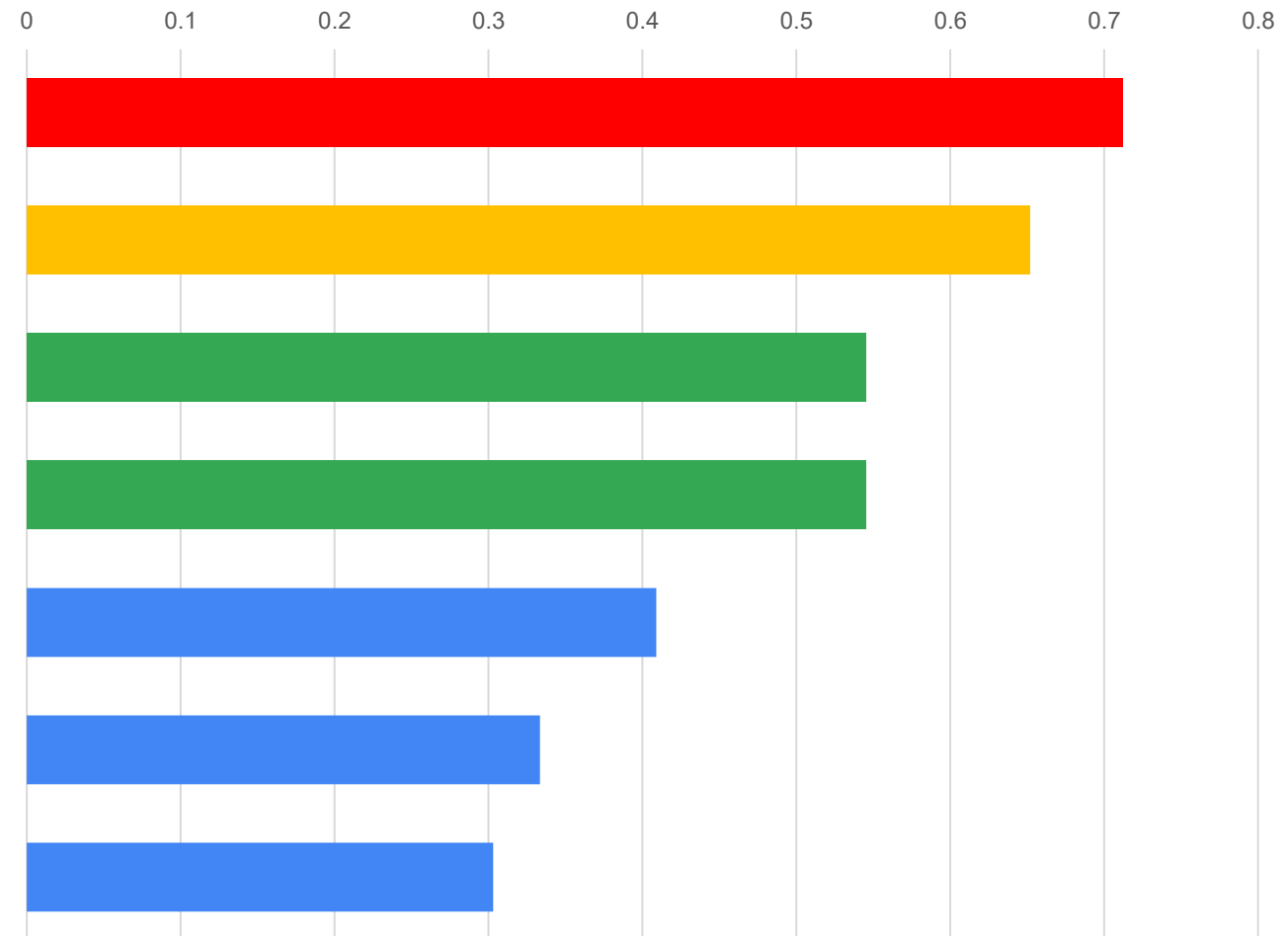
MODELING FOR SPECIAL STUDIES

1. Subarea Plans
2. Transit Studies
3. Bike/Ped Plans
4. Toll Studies



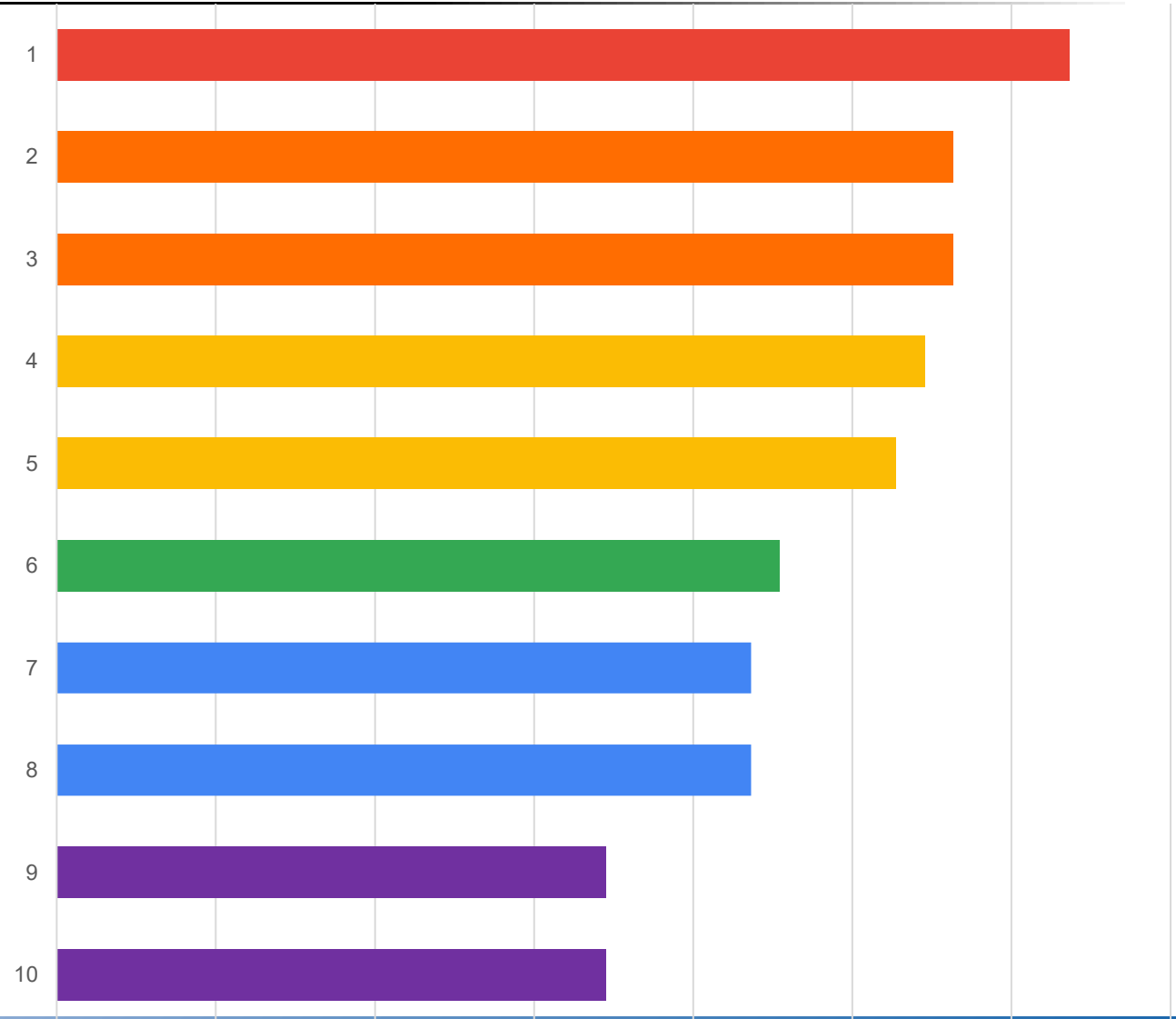
IMPORTANCE OF NEW/OTHER MODEL ANALYSES

1. **Traffic Impacts**
2. **Land Use Scenarios**
3. **Accessibility**
4. **Benefit-Cost**
5. *Modal Investment Strategies*
6. *Technology/Trends*
7. *Equity Analysis*



IMPORTANCE OF EXPLICITLY MODELING

1. Intersection Turn Lanes
2. Multituse Paths
3. Sidewalks
4. Roundabouts
5. Amazon, Spark, etc.
6. Park & Ride / Carpooling
7. Bike Lanes
8. Food Delivery
9. Ridehailing
10. Autonomous Vehicles



OTHER RESPONSES

- Rated need for latest science and technology (AI) very high
- Rated need to report benefits/impacts by detailed demographics only moderate
- All agreed that a short (<4 hr) runtime should be the goal

TAKE AWAYS

- All agree that technical analysis is important
 - Most thought further investment in technical analysis could benefit planning for the region
- Important additional analyses identified
 - Subarea plans
 - Traffic impacts
 - Land use scenarios
 - Intersection operations
 - Bike / pedestrian planning
- Model users want short run times and more spatial resolution

OVERVIEW OF WORKSHOP



WORKSHOP AGENDA

- Crash Course in the History of Travel Modeling & the KRTM
- Spectrum of Model Designs
- Model Uses
- Key Model Design Decisions
- Data
- Costing Options

THE EARLY YEARS

- **1950's – The First Models**

- Detroit, Chicago, etc., developed models to design Interstate highways in and through their regions

- **1960's – Transit**

- San Francisco adds a mode choice step and forecasts ridership for the new BART trains

- **1970's – Federal Standardization**

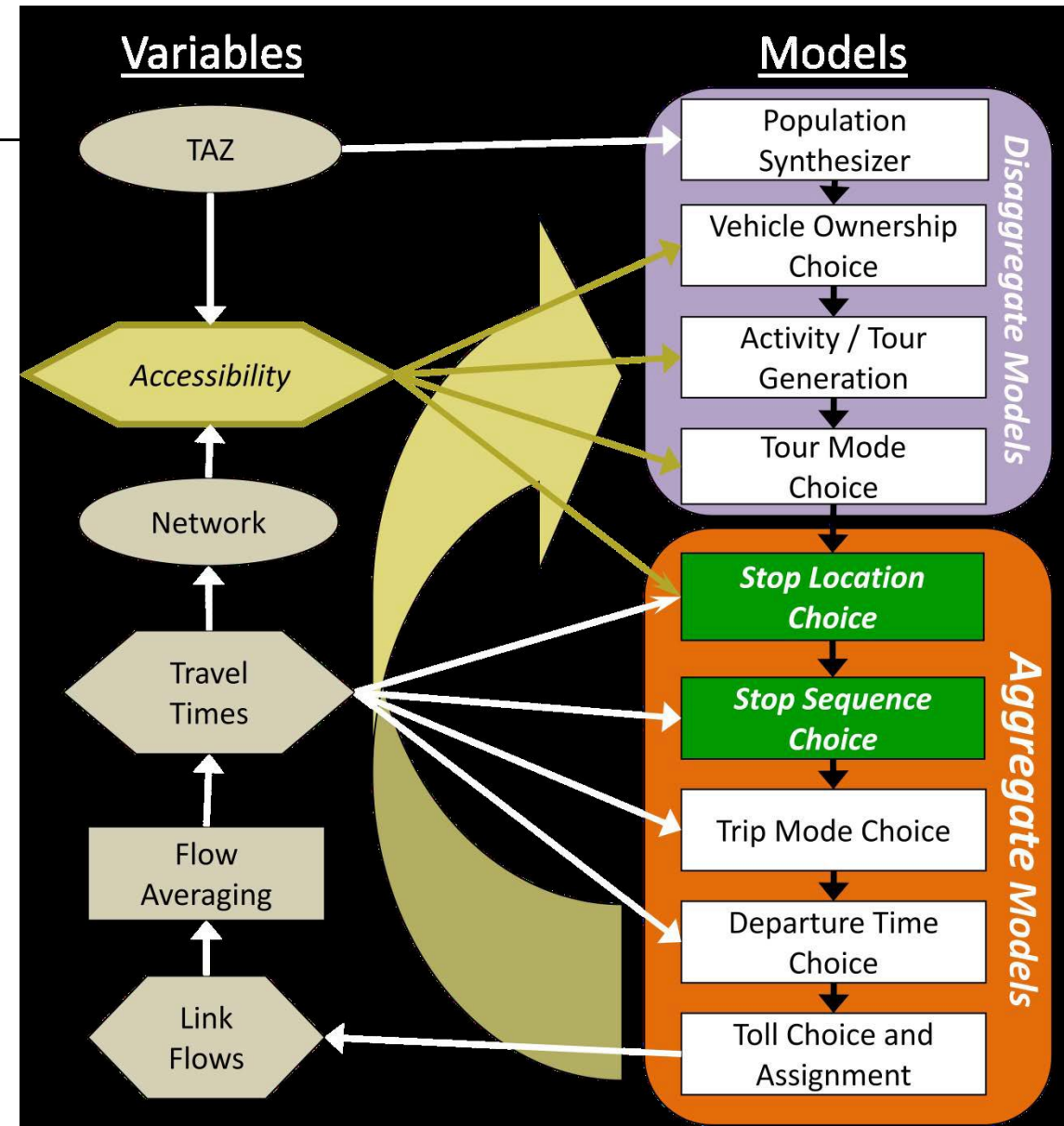
- FHWA develops and provides a standard urban model (for mainframes)
- The standard model becomes known as the “Four Step Model”
- Feds also standardize benefit-cost methodology
- Academics recognize issues with Four Step Model and theorize Activity-Based

THE FOUR STEP MODEL

- Trip Generation – How many trips do people make?
- Trip Distribution – Where do they go?
- Mode Choice – Do they drive / ride the bus, etc.?
- Traffic/Transit Assignment – What roads/routes do they use?

THE KRTM HYBRID MODEL

- Developed in 2009 from household survey data from 2000 & 2008 (2006 base year)
- More accurate than preceding four-step model
- Transit and walk/bike modes
 - Sensitive to walkability
- More realistic representation of special populations (seniors, low income, students)



ADVANTAGES OF HYBRID OVER TRADITIONAL

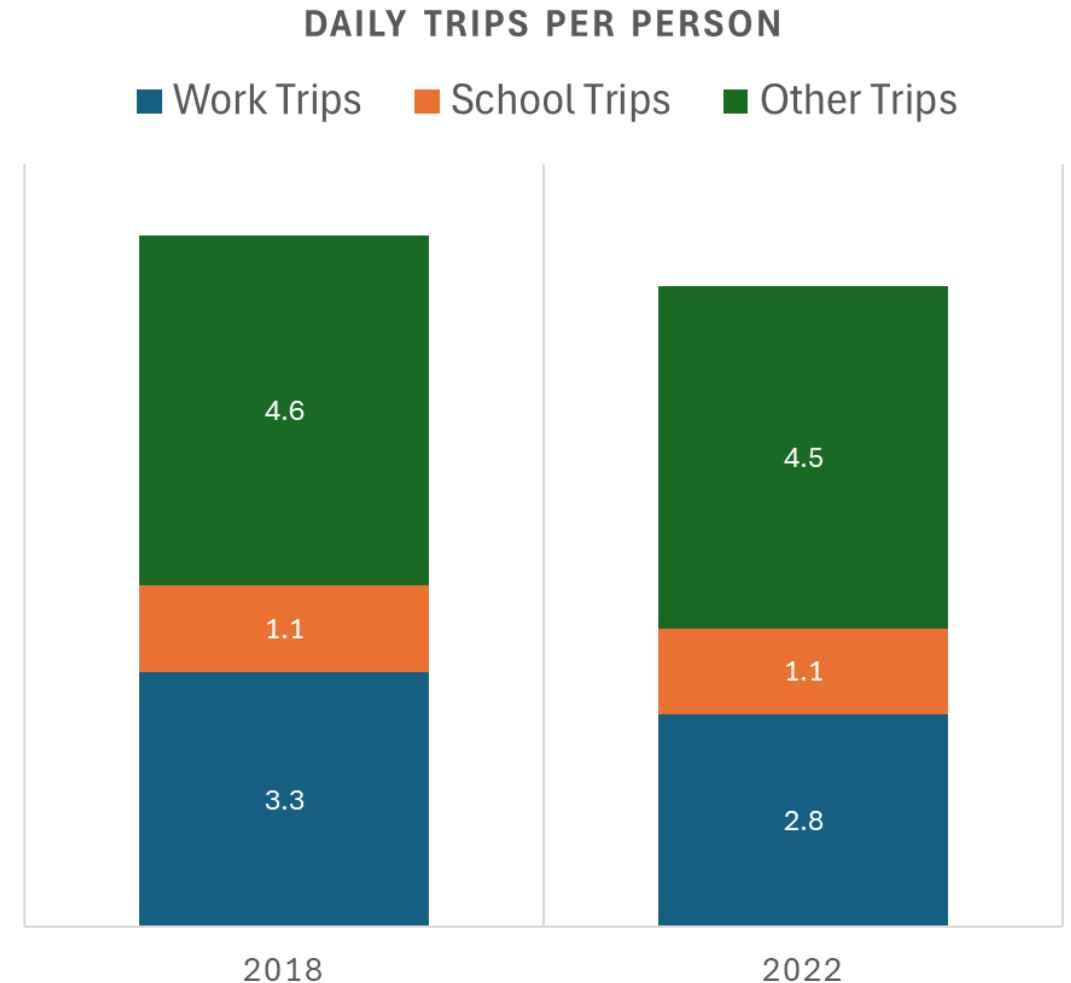
- **Guarantee of physically possible** travel patterns
- Sensitivity to **gas prices**, parking costs and tolls
- **Transit, bicycle** and **pedestrian** travel
- Sensitivity to **urban design** / built environment
- More realistic representation of **seniors**, the poor...
- More accurate **commuting patterns**, **traffic impacts** and **travel times**
- Ability to predict shifts in the **timing of travel**
- Improved **truck** models

HISTORY OF THE HYBRID KRTM

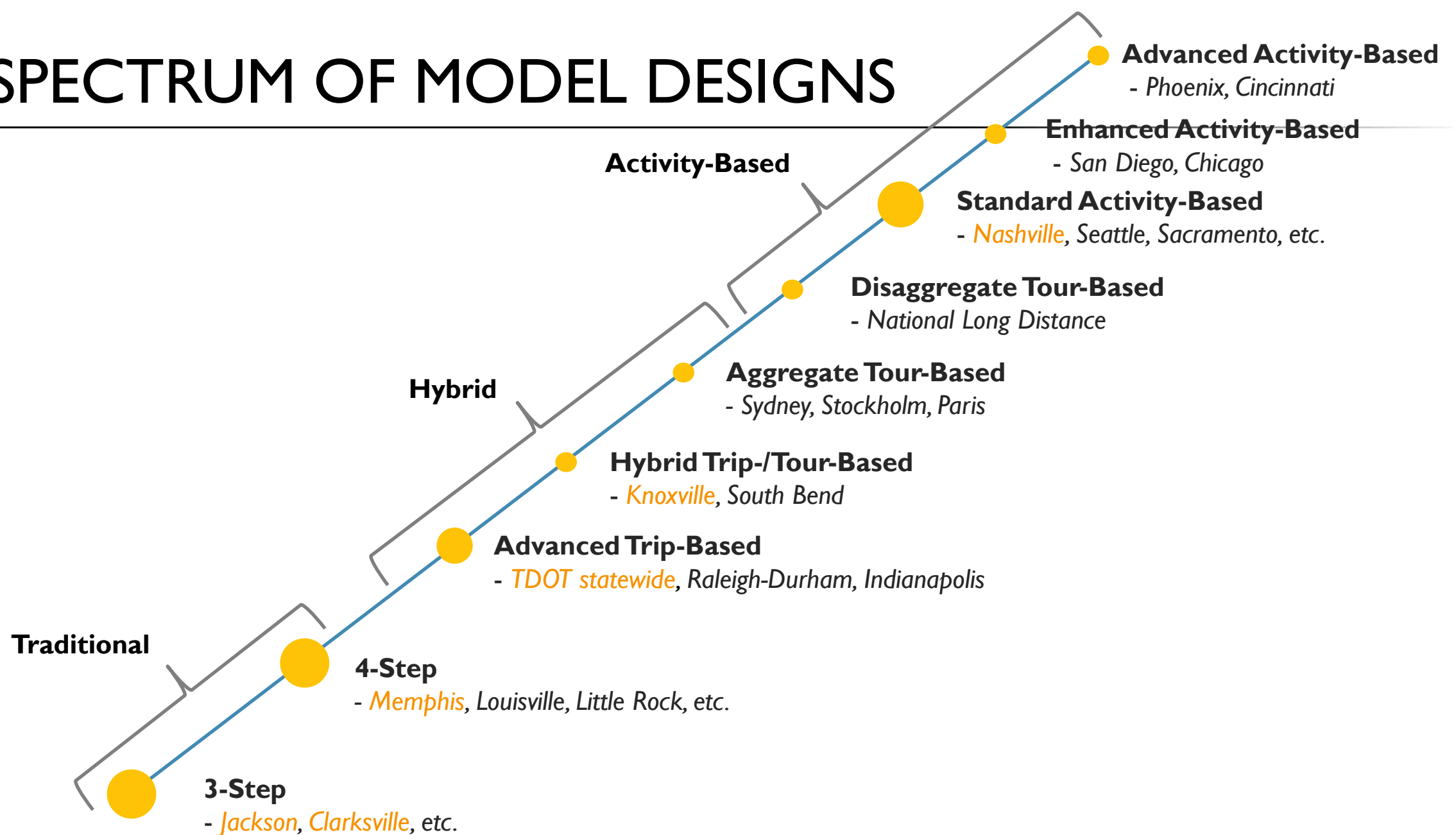
- 2009 – Base year 2006 – Model developed
- 2012 – Base year 2010 – Model expanded to cover LAMTPO
- 2020 – Base year 2018 – Update base & forecast years
- 2024 – Base year 2022 – Update base & forecast years
 - New module for remote work-from-home
 - Recalibration to post-COVID travel patterns

2024 MINOR UPDATE - DECREASED TRIP-MAKING

- Traffic counts (corroborated by surveys from other regions) revealed that trip-making in region in 2022 had fallen to 8.4 trips per day vs. 9.1 trips per day in 2018
 - 16.4% decrease in work trips
 - 7.5% overall decrease versus 2018
- Mostly work from home



SPECTRUM OF MODEL DESIGNS



KEY MODEL DESIGN DECISIONS

- Framework
 - Hybrid
 - ABM
- Temporal & Operational Resolution
 - Turning lane configurations?
 - Signal timings?
 - DTA?
- Post-Processing Tools
 - Air Quality
 - Accessibility
 - Benefit-Cost
- Coverage
 - Lakeway?
 - Pigeon Forge/Gatlinburg?
- Spatial Resolution
 - Number of Zones
 - All-Streets & Microzones?
- Delivery Truck Modeling?
- Technology
 - Use of new AI methods?

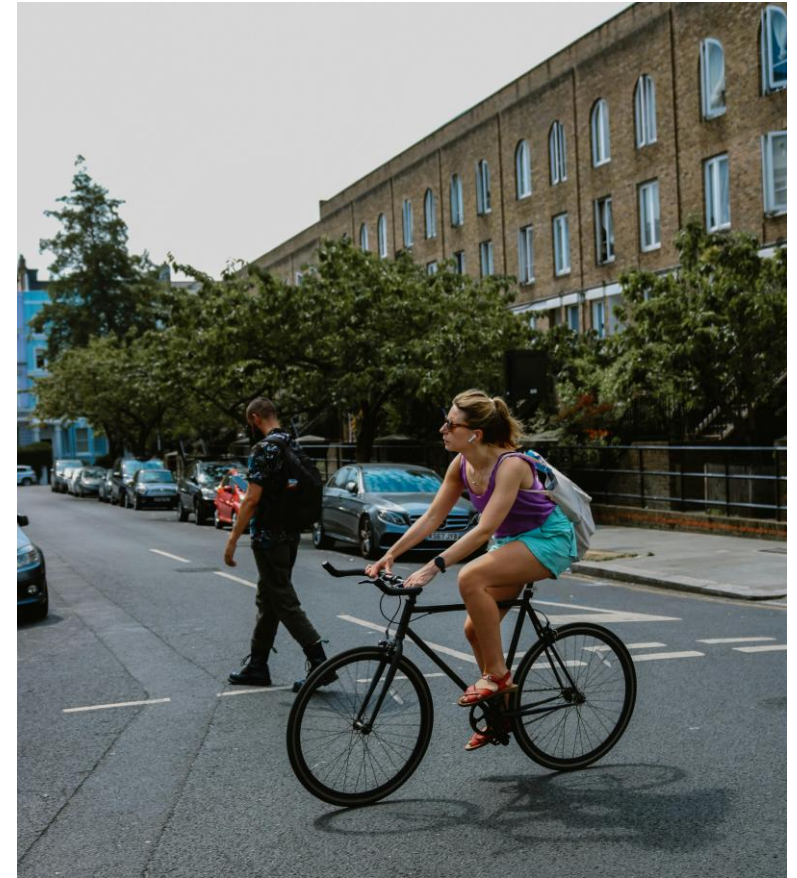
OPERATIONAL MODELING & DTA

- Current model only knows intersection control type (i.e., signal vs. stop sign vs. roundabout)
- Additional information can be incorporated
 - Turn lane configurations
 - Signal timings
 - Turn bay lengths
- 2D and 3D Animation



WALK & BIKE MODELING

- Current model only predicts total walk & bike trips produced by residents of each zone
- Some MPOs are attempting to model bicycle and pedestrian improvements like bike lanes & multiuse paths, but this requires investments in both data and modeling

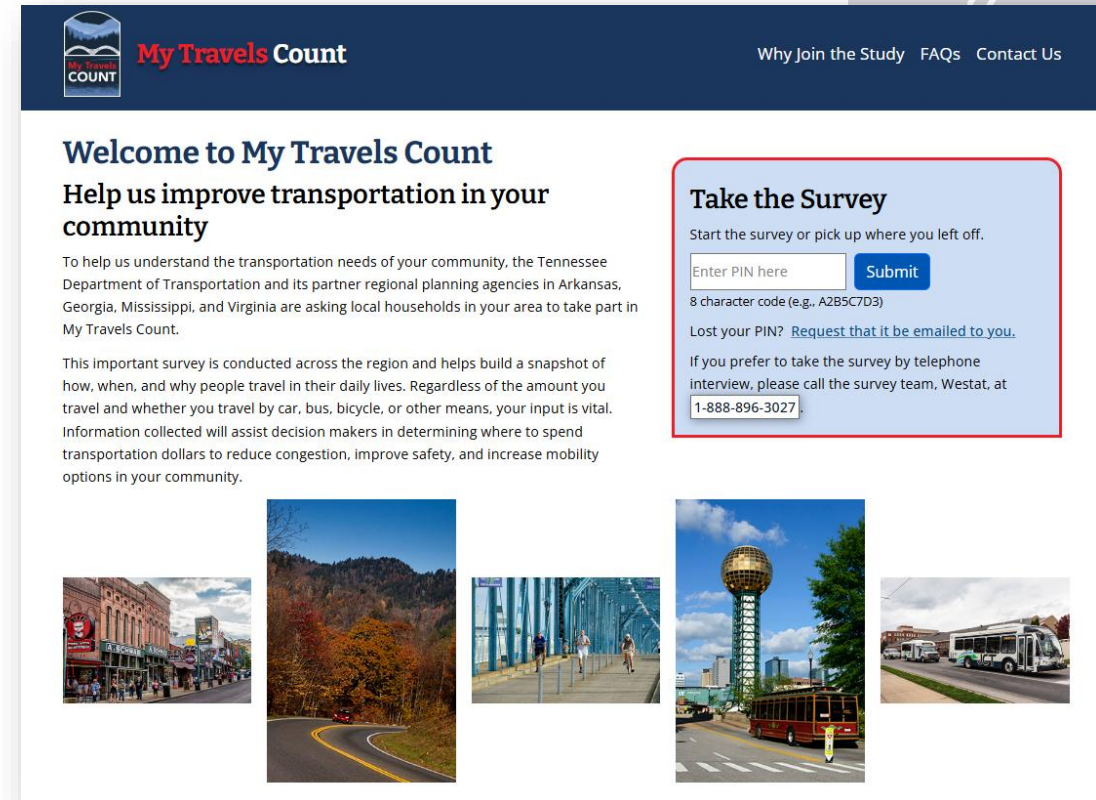


INVESTMENT CHOICES AND USE CASES

		Import	Framework		Technology	Spatial Resolution		Temporal Resolution			Post-Processing Tools		
			Hybrid	ABM	AI	# of Zones	Microzones	Turn Lanes	Timings	DTA	Air Quality	Accessibility	Benefit-Cost
Core / Required Uses													
	Air Quality Conformity	10	★★★	★★★	+	+		+	+		+++		
	Deficiency Analysis for MTP	10	★★★	★★★	++	+		+	++			+	
	Project / Design Forecasts	10	★★★	★★	+++	+		+	+	+++			
Special Studies													
	Subarea Studies	8.1	★★	★★	+++	+++		++	+	++			
	Transit Studies	6.9	★★	★★	+	+	+					+	
	Bike / Ped Plans	6.7	★★	★★	++	+	+++	+	+			+	
	Toll Studies	3.3	★★	★★★	++	+		+	+	+++		+	
New / Alternative Uses													
	Traffic Impacts	7.6	★★	★	+++	++		+++	++	+++			
	Land Use Scenarios	7.0	★★★	★★★	++	+		+			+		
	Accessibility	4.6	★★★	★★★	+++	++		+	+			+++	
	Benefit-Cost	4.6	★★★	★★★	++	+		+	+		+	++	
	Modal Investment Strategy	3.9	★★★	★★★	++	+	+++	+	+		+	++	
	Technology / Trends	3.7	★★	★★★	+					++	+		
	Equity Analysis	3.5	★★	★★★	+	+	+			+		++	
Data Needs			☒☒	☒☒☒	☒☒	☒☒	☒☒☒	☒☒	☒☒☒	☒☒☒	☒☒	☒	
Data Costs			\$\$\$	\$\$\$\$	\$								
Development Costs			\$\$\$	\$\$\$\$	\$	\$	\$\$	\$\$	\$\$\$	\$\$\$	\$	\$\$	
Runtime			🕒	🕒🕒🕒		+			+	++	+	++	

Summary & Next Steps

- Model Visioning/Scoping Final Report:
 - Summarize workshop findings
 - Analysis of pros and cons for various model update approaches
 - Identify Data Needs and Costs
- New Regional Household Travel Survey Underway – My Travels Count
 - Complete by end of 2025, Will Provide Primary Data to Develop new Model
 - 3,000 sample Target in KRTM Area – roughly 1,000 collected in Spring, will resume in Fall
- Plan to Release Model Update RFP following completion of Household Survey with Refined Scoping and Final Budget once Modeling Consultant Retained



The screenshot shows the 'My Travels Count' website. At the top is a dark blue header with the 'My Travels Count' logo on the left and links for 'Why Join the Study', 'FAQs', and 'Contact Us' on the right. The main content area has a white background. On the left, a section titled 'Welcome to My Travels Count' with the subtitle 'Help us improve transportation in your community' explains the survey's purpose and provides a paragraph about its importance. On the right, a red-bordered box titled 'Take the Survey' contains a form with an 'Enter PIN here' input field, a 'Submit' button, and instructions about the 8-character PIN and a telephone interview option. At the bottom, there are five small images: a street scene with shops, a winding road through autumn foliage, a blue pedestrian bridge, a red trolley on a street, and a white bus.

My Travels Count

Why Join the Study FAQs Contact Us

Welcome to My Travels Count

Help us improve transportation in your community

To help us understand the transportation needs of your community, the Tennessee Department of Transportation and its partner regional planning agencies in Arkansas, Georgia, Mississippi, and Virginia are asking local households in your area to take part in My Travels Count.

This important survey is conducted across the region and helps build a snapshot of how, when, and why people travel in their daily lives. Regardless of the amount you travel and whether you travel by car, bus, bicycle, or other means, your input is vital. Information collected will assist decision makers in determining where to spend transportation dollars to reduce congestion, improve safety, and increase mobility options in your community.

Take the Survey






Start the survey or pick up where you left off.

Enter PIN here

8 character code (e.g., A2B5C7D3)

Lost your PIN? [Request that it be emailed to you.](#)

If you prefer to take the survey by telephone interview, please call the survey team, Westat, at 1-888-896-3027.



CONTACTS

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