Integration with Urban Models
Are Dueling Models Good or Bad and What Can They Learn from Each Other?

THE MARYLAND EXPERIENCE

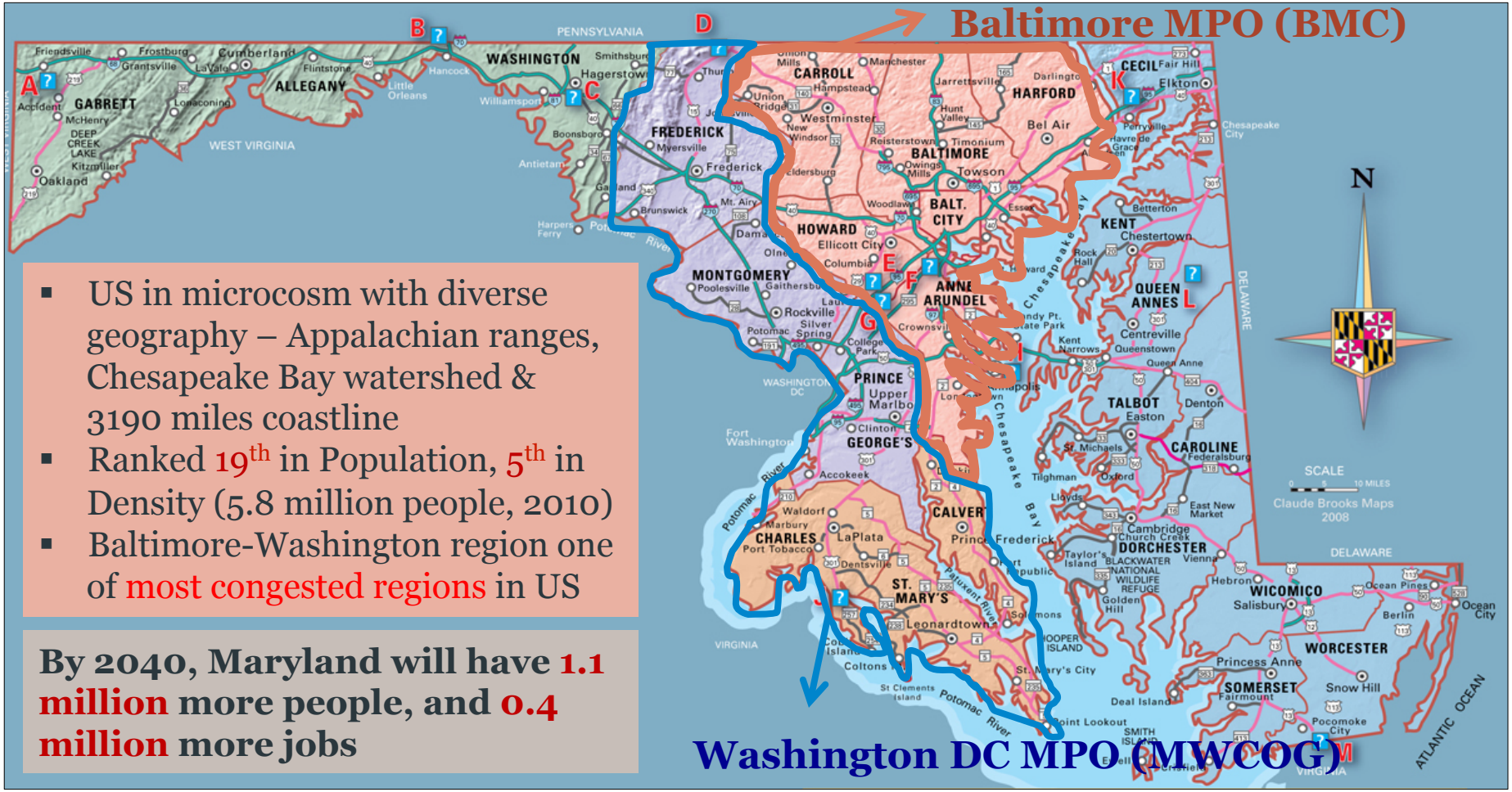
14TH TRB PLANNING APPLICATIONS CONFERENCE

MAY 5-9, 2013
COLUMBUS, OHIO

SHA State Highway Administration
Maryland Department of Transportation

MARYLAND

About Maryland and the MPO regions



- US in microcosm with diverse geography – Appalachian ranges, Chesapeake Bay watershed & 3190 miles coastline
- Ranked 19th in Population, 5th in Density (5.8 million people, 2010)
- Baltimore-Washington region one of most congested regions in US

By 2040, Maryland will have 1.1 million more people, and 0.4 million more jobs

About Maryland DOT and SHA

MDOT and its modals oversee all aspects of transportation in MD

SHA operates, maintains and rebuilds the numbered, non-toll routes - 17,000 lane-miles and 2,576 bridges.

SHA roads carry 65 percent of the state's traffic and 85 percent of its truck freight.

Two major transit systems: MTA in Baltimore and WMATA in the DC region.

Port of Baltimore is the fastest growing port in US . BWI Airport served 22.4 million passengers in 2011.

MARYLAND SHA HIGHWAYS

MTA Maryland MASS TRANSIT

TRANSPORTATION AUTHORITY

MARYLAND AVIATION ADMINISTRATION

MVA MOTOR VEHICLE ADMINISTRATION

PORT OF BALTIMORE 1706

MARYLAND DEPARTMENT OF TRANSPORTATION

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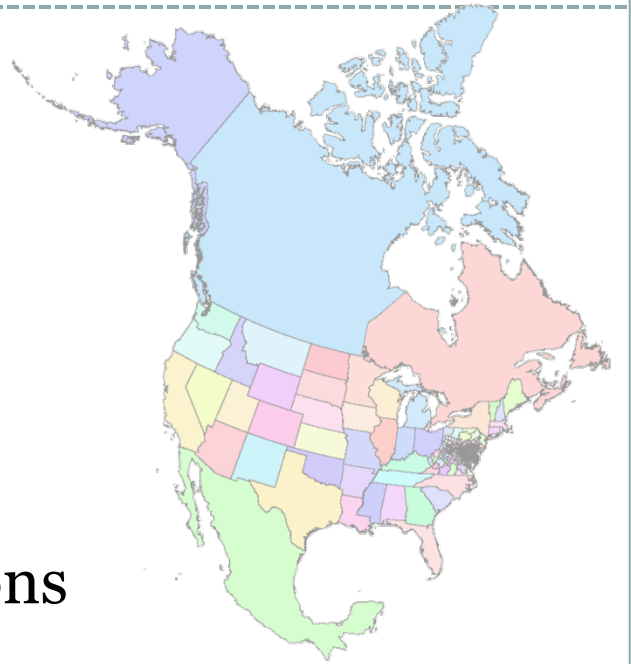
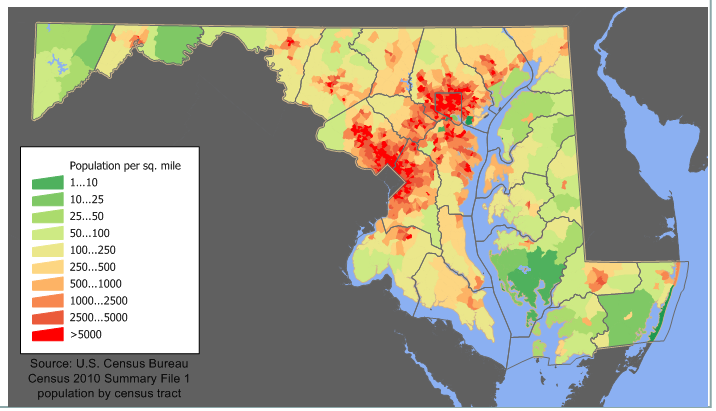
Key Drivers for MD Statewide Transportation Model

GOAL: To support multimodal transportation planning decisions in Maryland by providing reliable and consistent travel forecasts and analysis capabilities



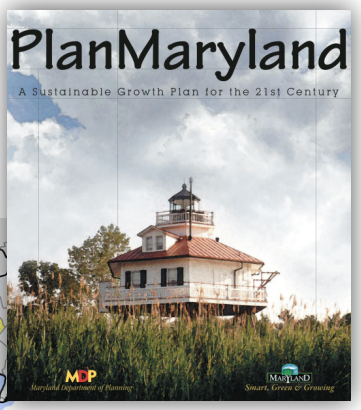
- Statewide Vision/Policy Goals
- Travel demand on corridors, rural regions
- Freight Planning
- Transportation System Performance
- Long range and Scenario Planning
- Common cross agency platform
- Inform MPO models for externals



Key Drivers (continued)

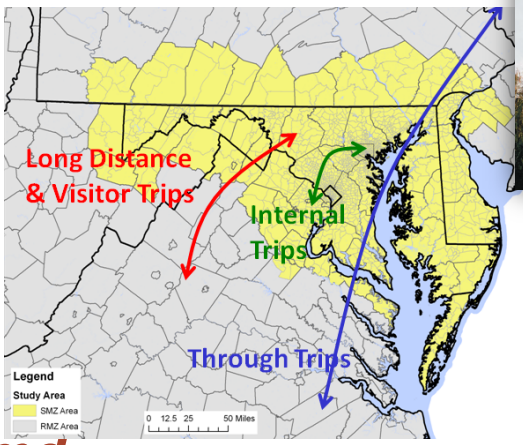
Land Use Policy

- Land Use & Transportation Connections
- Smart Growth Policies/ Local Zoning
- Job/Housing balance



Long Distance Travel

- East Coast through trips
- Impact from projects in other states
- Multi-state Corridor projects



Regionally Significant Land Use and Network Changes

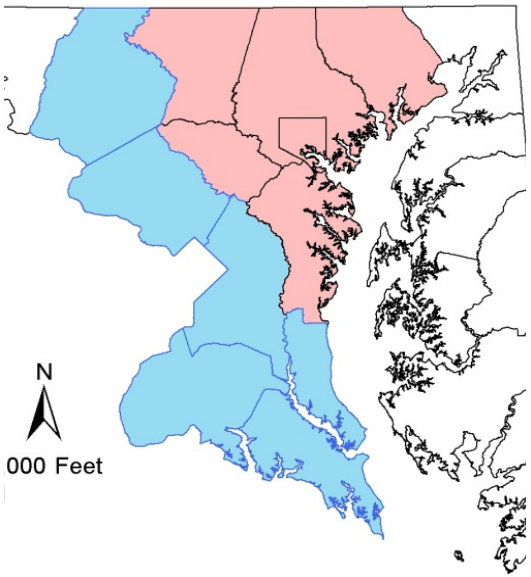
(BRAC, ICC, TODs, Port Expansion, VA HOT Lanes)

❖*Impacts of Investment Levels*

❖*Normalization of Outcomes* (regions/ corridors)

MWCOG and BMC MPO Model Features and Capabilities

- **Well established trip based 4 step models with gravity formulation, nested logit structure and TOD assignments with feedback loops**
- Similar travel regions, transportation systems, supply and demand challenges
- Overlapping modeled region, travel markets, share joint household surveys and cooperative land use forecasts based on local inputs
- Same software platform
- Used for NEPA and transit studies within MPO



SHARES COMMON GOAL FOR PROVIDING AIR QUALITY CONFORMITY AND ATTAINMENT FOR THE REGIONS

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Limitations of the MPO Models in terms of Statewide Priorities

- Geographic coverage and resolution around model boundaries
- Limited emphasis on long distance and visitor travel, intercity travel
- Less detail on freight demand
- Limited information on through travel (person and freight)
- Differences in socioeconomic and network assumptions outside MPO boundaries, external station assumptions etc.

The Statewide Model

COMPLIMENTS MPO MODELING EFFORTS IN A COLLABORATIVE FRAMEWORK BOTH FROM INSTITUTIONAL AND TECHNICAL STANDPOINT

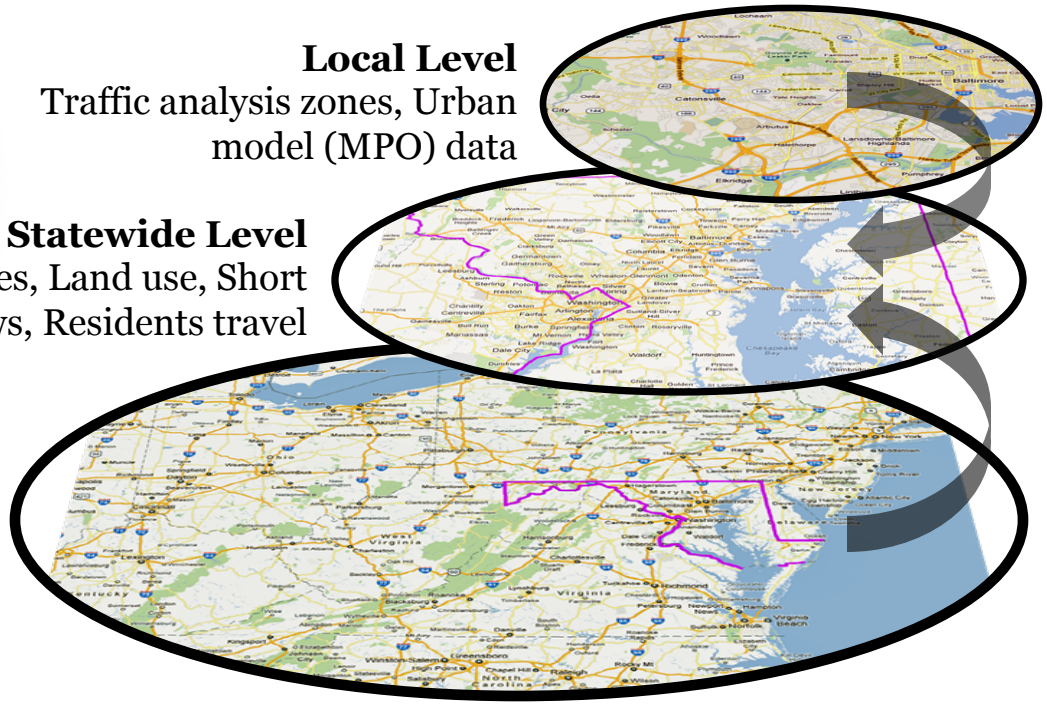
Maryland Statewide Transportation Model (MSTM)

Multi-layer travel demand model working at *national*, *statewide* and *regional* levels to forecast and analyze key measures of transportation system performance.

Local Level
Traffic analysis zones, Urban model (MPO) data

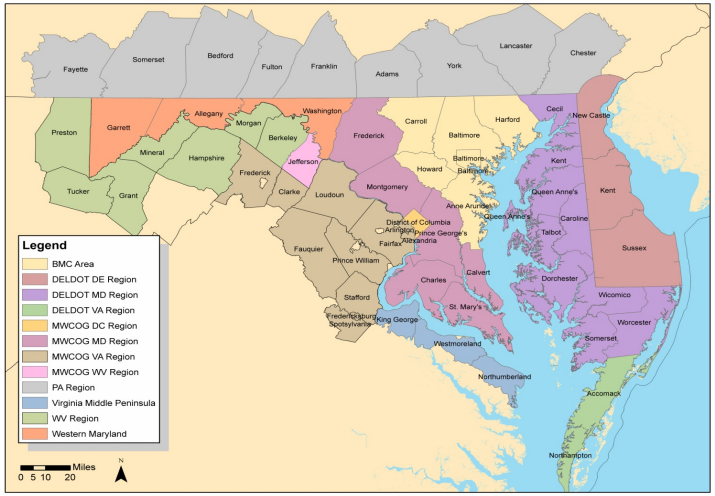
Statewide Level
Aggregated MPO zones, Land use, Short distance flows, Residents travel

National Level
Counties and States, Economic forecasts, Long distance flows, Visitor travel

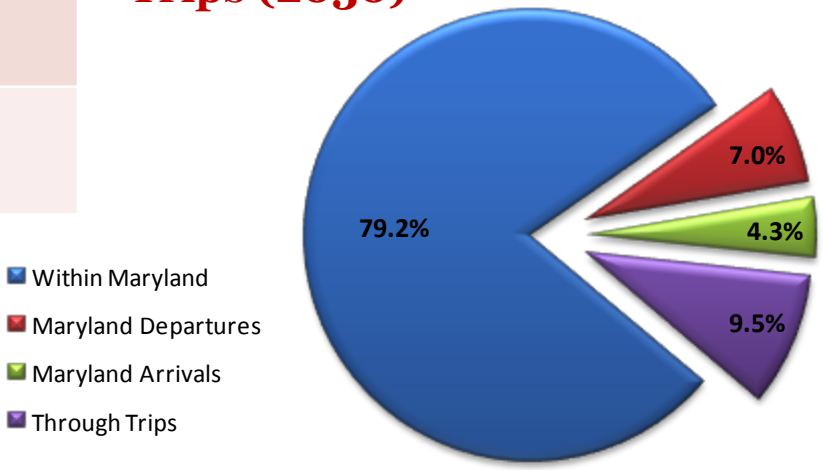


Maryland Baseline Travel Demand Projections

Performance Measure	% Increase (2007-2030)
Auto Trips	12%
Truck Trips	**61%**
Vehicle Miles of Travel	34%
Vehicle Hours of Delay	67%
Congested Lane Miles	**64%**
Through Travel (E-E)	**52%**

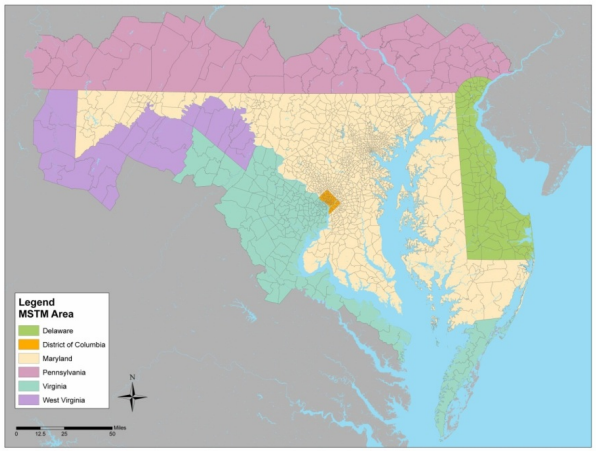


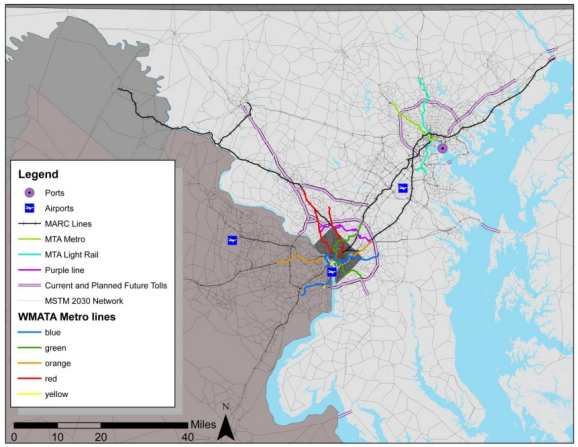
Summary of Daily Person Trips (2030)



Key Challenges-Data Fusion

- Land use definitions (e.g. employment: BEA/BLS)
- Network attributes were different
- Coding transit network (different naming conventions)
- Zoning considerations on overlapping areas
- Outside MPO boundaries: depend on Census data
- Outside state to work with other DOTs
- MD Developed a “Reconciliation procedure: A step by step guide”



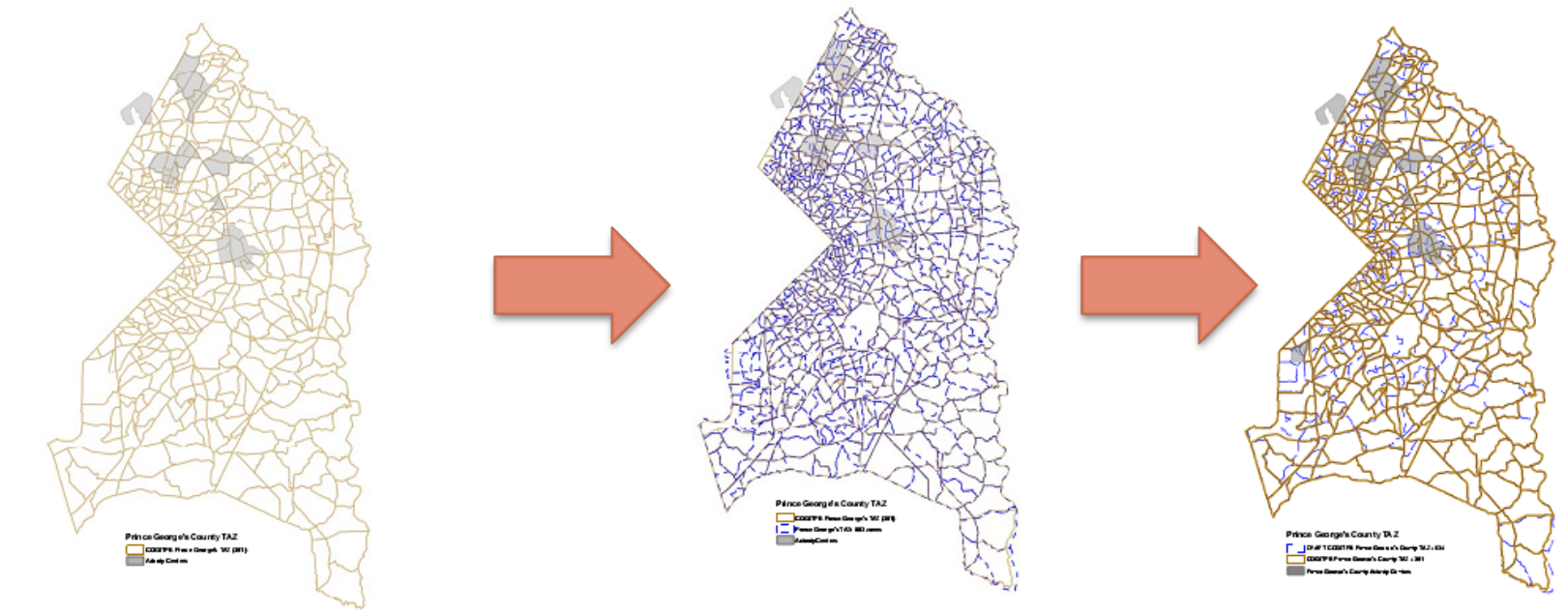


State	SMZ
MD	1151
VA	171
PA	55
WV	30
DE	97
DC	84
Total	1588

Key Challenges-Model Integration

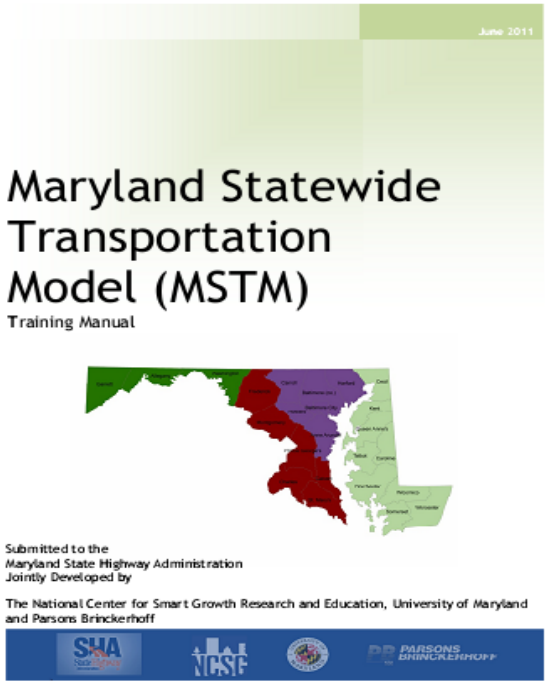
- When MPOs change the zone structure, reconciliation to be reviewed
- With CLRP updates network needs to be reviewed
- Creating a master network synchronous with MPOs
- When MPOs change modeling approach
- Difficult to compare results

COG Old Zones(381 TAZs) Intermediate Step COG New (883 TAZs)

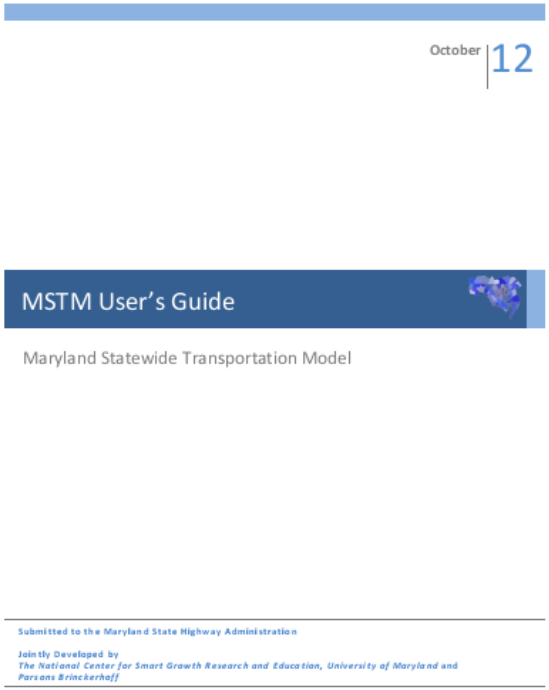


Key Challenges-Coordination

- Keeping up with MPOs and neighboring State DOT models
- Involving smaller MPOs and rural counties for better data
- Constantly hosting meetings to learn from each other
- Workshops/ presentations/ Unified Plan Work Program activities



COMMUNICATION IS KEY TO THE SUCCESS OF THIS COLLABORATIVE EFFORT



Learning Through Regional Coordination (1)

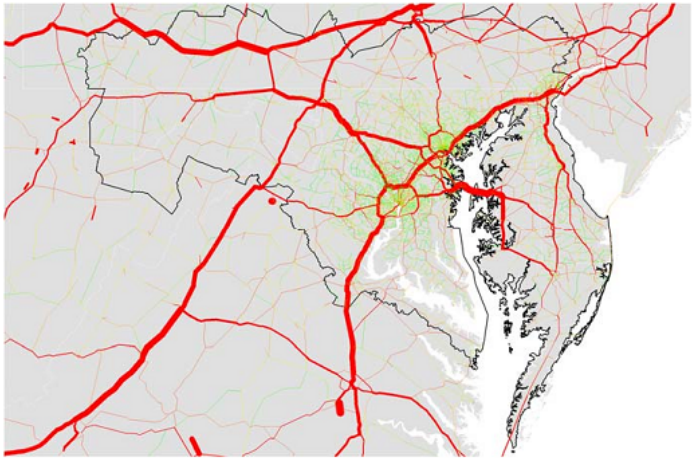
A Win-Win Strategy

For MPOs

- MPOs gain additional information from the statewide model on
  - Long distance travel
  - Non-MPO areas
  - External station forecasts

- Better decision making on freight travel
  - External trips
  - Detailed freight movement

- Take advantage of new modeling approaches/ state resources (e.g. destination choice, mode choice, centerline data)



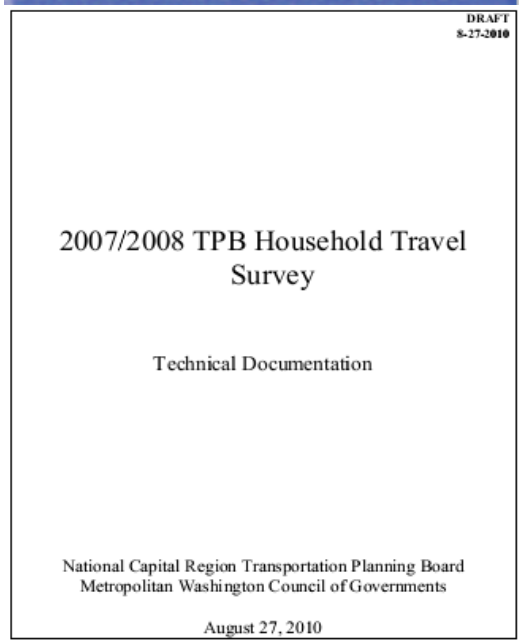
Learning Through Regional Coordination (2)

A Win-Win Strategy

PlanMaryland
For a sustainable future

For state agencies

- MPOs control totals as guideline for validation
- Advantage of using MPO Household Travel Survey data
- Obtaining zone and network data as they are available
- Avoid redundant coordination/ processes
- A synergy working hand-in-hand for transportation planning related activities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8-27-2010

2007/2008 TPB Household Travel Survey

Technical Documentation

National Capital Region Transportation Planning Board
Metropolitan Washington Council of Governments

August 27, 2010

Common Elements

Both statewide models and MPO models driven by

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For a sustainable future

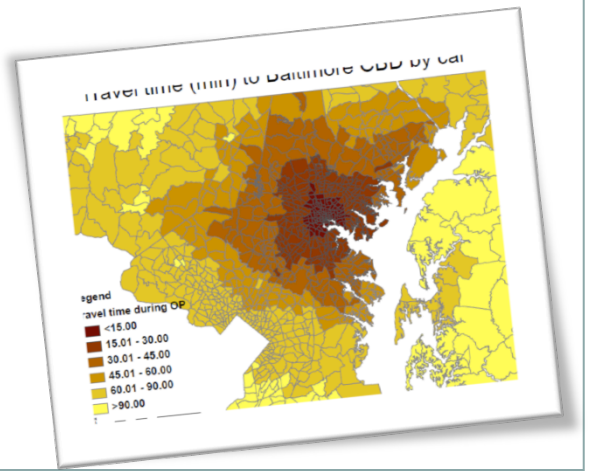
- Vision and goals at a state/ regional/ local level
- Local and state transportation needs and priorities
- **Data and Performance Measure** driven decision-making

Data Needs for Model Development

- Behavioral data (household travel surveys, stated/ revealed surveys etc.)
- Network data, land use data, economic data
- External data (freight, other indicators etc.)

Data Needs for Model Calibration/ Validation

- Traffic and Transit demand for base year
- Trip generation comparisons, trip length frequency distributions etc.



Common Features and Use

- Calibration
  - For calibration purposes a number of MPO data sources are used in the SW model
  - For long distance and truck trips MPO models use SW model results
- Validation
  - For validation purposes the SW model is compared to urban area MPO models
  - In cases of different results, reconciliation approach is used
- Application
  - For project planning studies requiring NEPA, MPO models are used
  - For corridor studies, rural area modeling, long range planning and scenario planning purposes, statewide model is used

Cross Walk Between Models

- Networks and zones
  - One to one relationship of networks and zones between MPO and SW models
- Socio-Economic (SE) data
  - For consistency purposes SE data from MPO models are brought to same units (ex. BEA versus BLS; and HH by workers)
- Screenlines
  - Screenline traffic volumes from MPO models are captured in SW models for validation
- Model Outputs
  - Other model outputs such as control totals for trip production, distribution, and mode choice is used for reconciliation

Next Steps

- Synergistic approach to make sure data and modeling needs are met from both model platforms
- Develop formal guidelines for closer tie-ins
- Continued collaboration for MAP-21 requirements, state, regional and local goals
- Opportunities for broader integration with mega-region models, enhancements for sub-area travel demand
- Continued automation of processes

GOAL IS TO DEVELOP PROCESSES AND PRODUCTS THAT COMPLIMENT RATHER THAN DUPLICATE EFFORTS

Thank You!

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