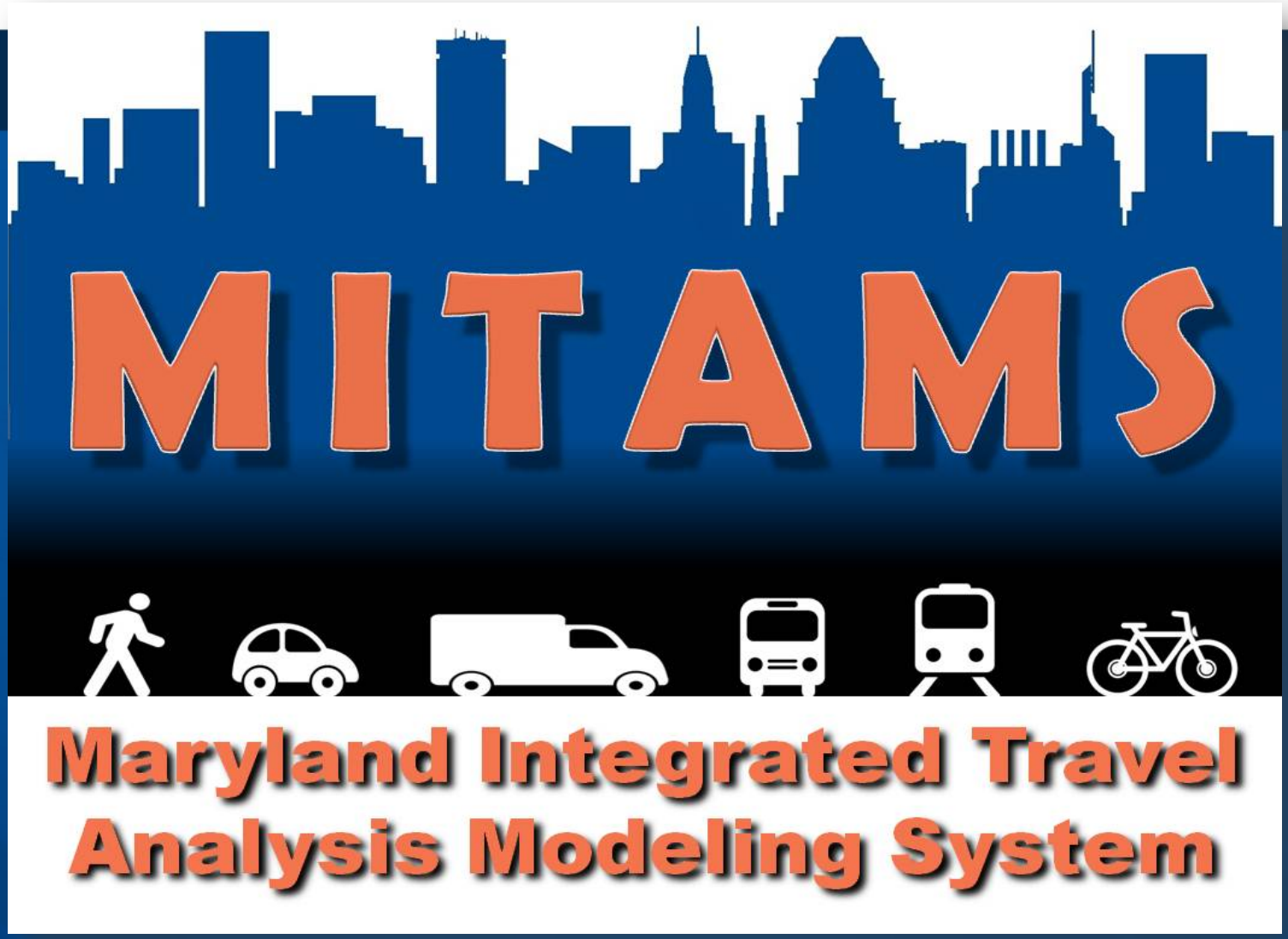
http://mitams.org



Agenda

- Agency Needs and Expectations
- Data hub and Multi-Resolution Networks
- Sequential InSITE ABM-DTALite integration
- Day-to-Day and Within-Day SILK AgBM-DTALite Integration
- ARPA-E iPretii Technology (Application)

Agency Needs and Expectations

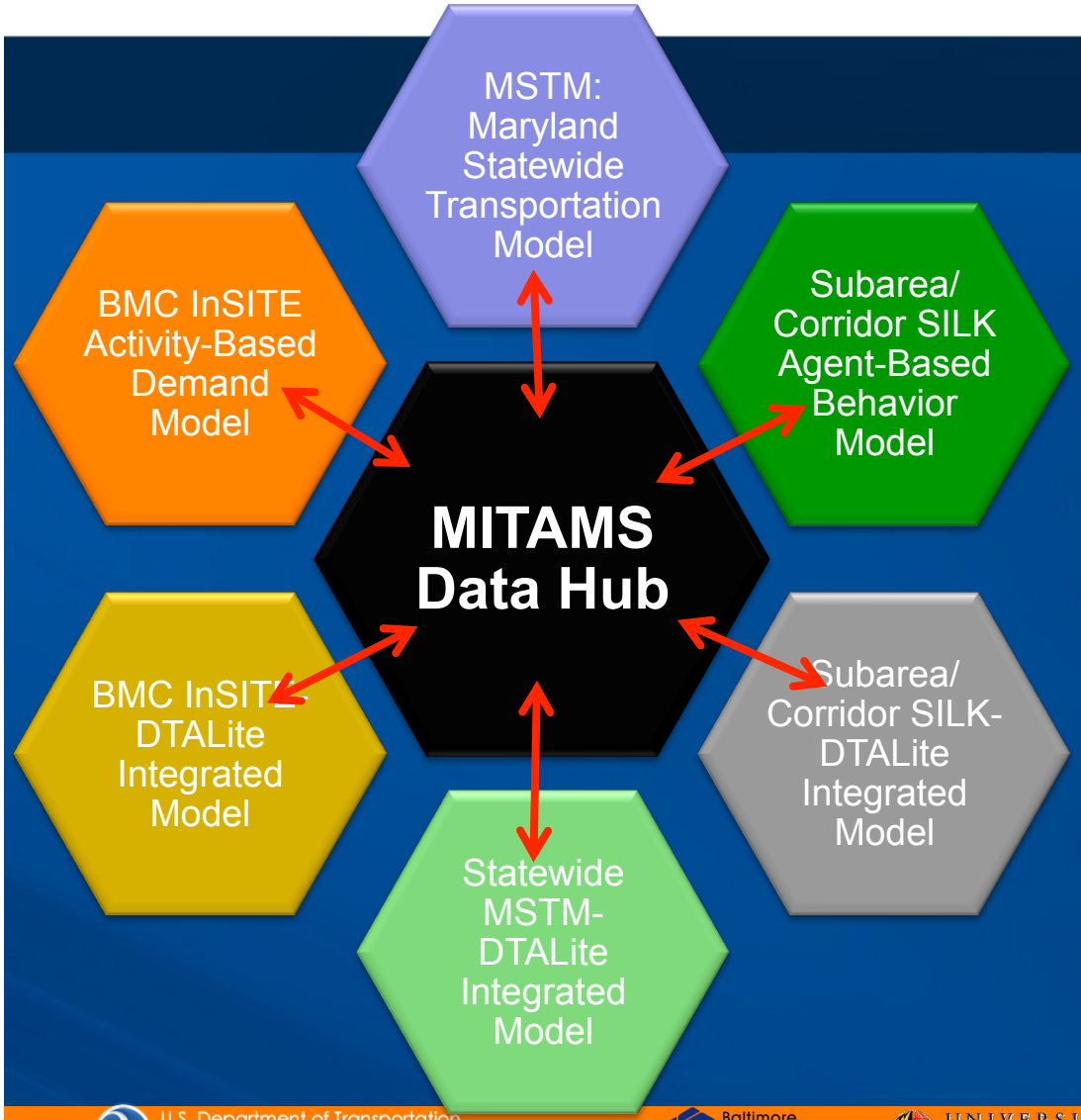
Maryland State Highway Administration (Lead agency)

- Performance based planning and programming
- Increased focus on operations and mainstreaming TSM&O
- System efficiency and reliability are key drivers

Baltimore Metropolitan Council (Partner agency)

- Improve simulation capacity in estimating duration and location of delay
- Improve travel time estimates by time of day
- Improve volume and LOS measures (reliability) abandoning V/C ratios
- Travel Demand Management policies, especially pricing.

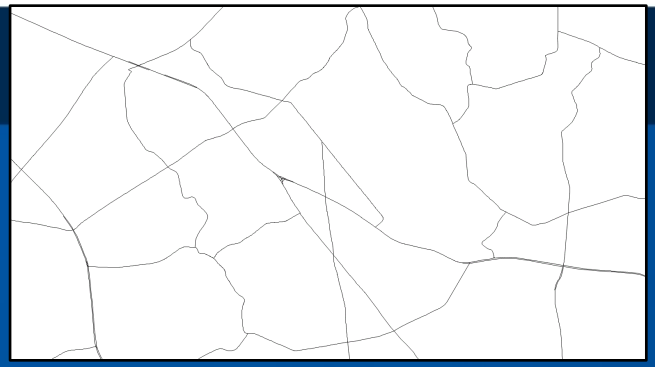
Overall design of Data Hub and 3 Levels Model Integration

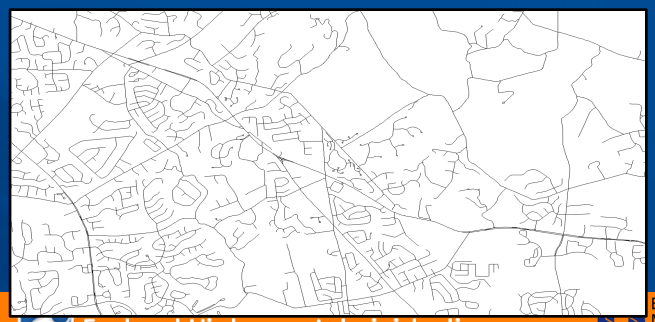


Three Levels of Model Integration

1. **Statewide: MSTM-DTALite**
2. **BMC MPO: InSITE ABM-DTALite**
3. **Subareas/Corridors SILK AgBM-DTALite**

Data Hub: Multi-Resolution Network





1. Macroscopic

- Regional Evaluations
- Project Screening
- Long Distance Travel
- Title Sheet Forecasts

2. Mesoscopic

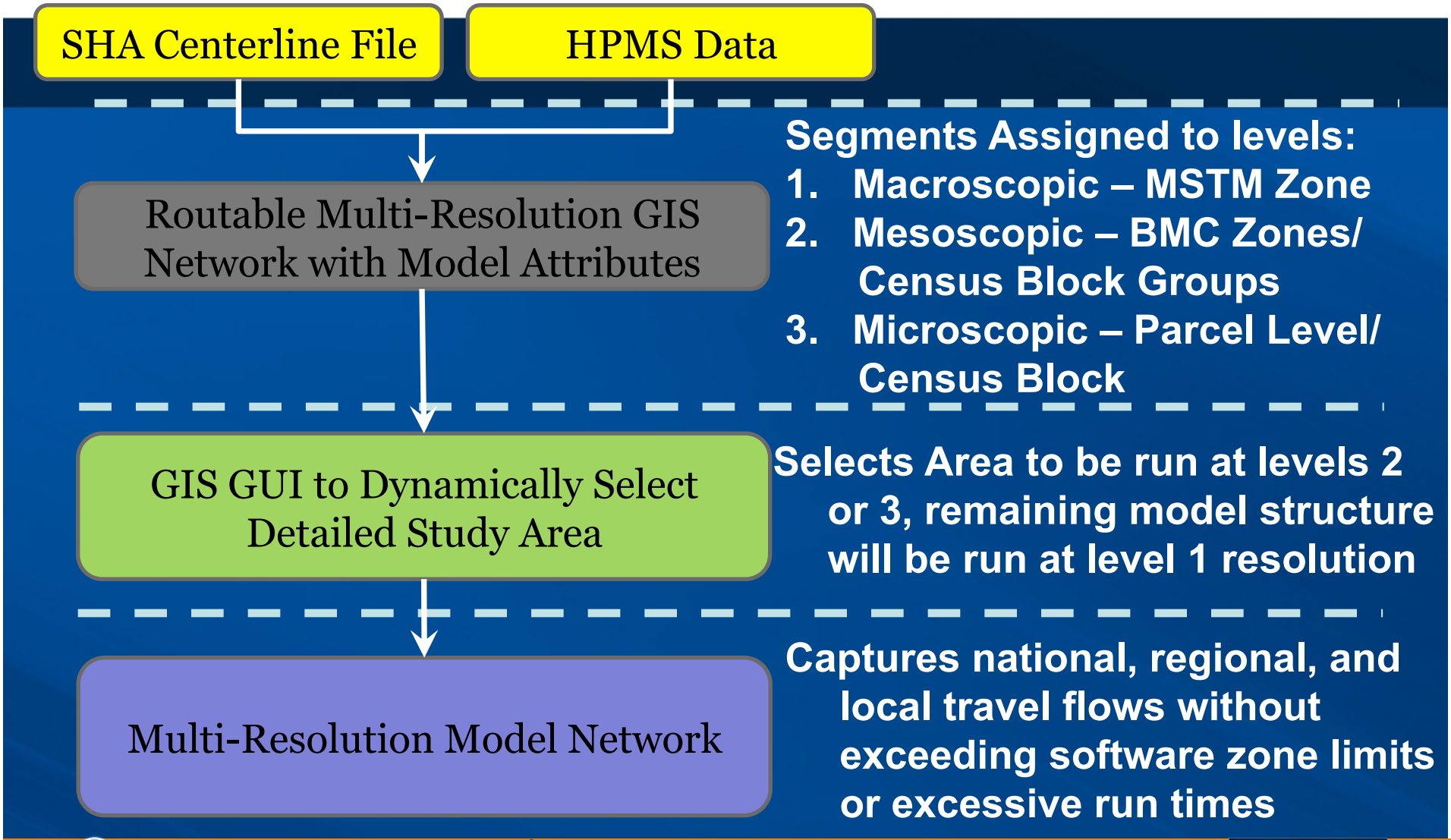
- Dynamic Traffic Assignment
- Project Forecasting
- Turning Movement Forecasts
- Transit Evaluations

3. Microscopic

- TOD Studies
- Active Transportation Evaluation
- Transportation /Land Use Studies
- Microsimulation

Federal Highway Administration
Baltimore Metropolitan Council
University of Maryland
Arizona State University
Cambridge Systematics

Data Hub: Multi-Resolution Network



Data Hub: Multi-Resolution Network

Summary

1. The network file contains a variety of attributes (from sources such as HERE, INRIX, Centerline, HPMS) required for DTA, model calibration and validation.

2. It allows quick sub area analyses by leveraging the three levels of the network at different resolutions.

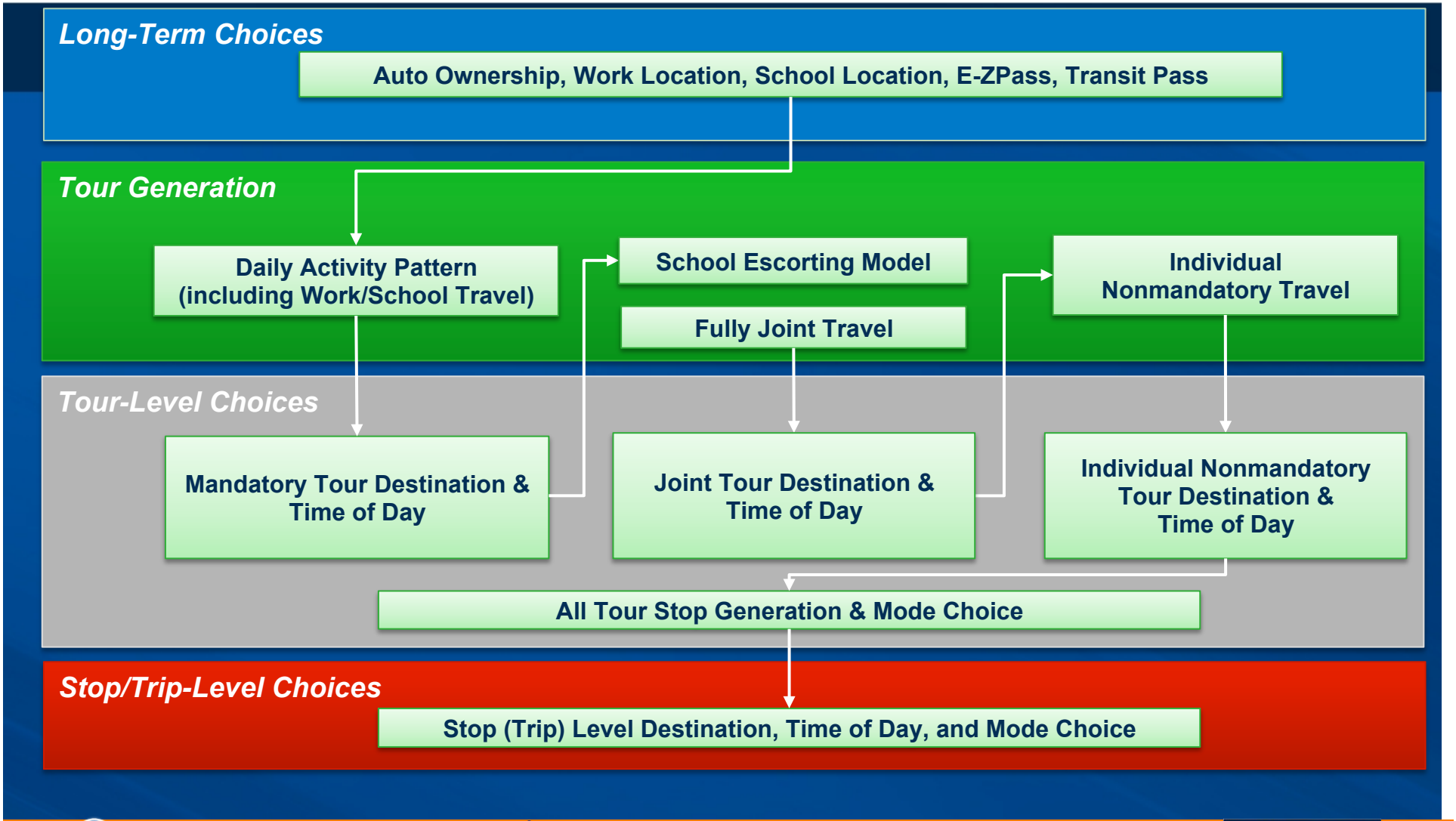
3. Reduces the need to add details to the network on an ad-hoc basis to support project level forecasting and analysis.

Current MITAMS C10 Approach

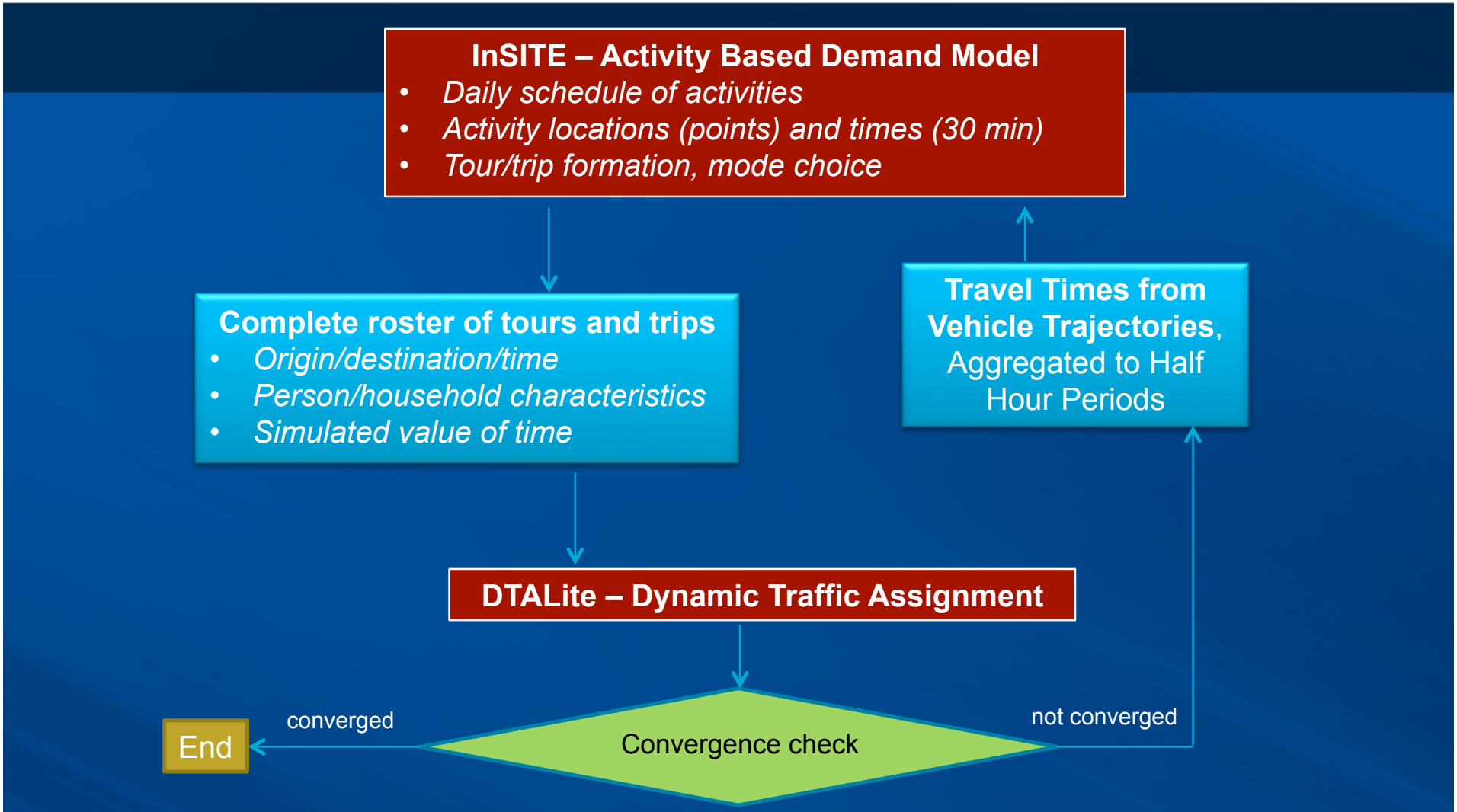
Three integrated models:

a. InSITE-DTALite – BMC MPO
b. SILK AgBM-DTALite – Subareas/Corridors
c. MSTM-DTALite – Statewide MD

BMC InSITE Activity-Based Model



InSITE-DTALite: Sequential Integration



InSITE-DTALite ABM Features

- **Disaggregate demand at all levels**
  - Travel and Activity analyses for different population segments
- **Chaining of trips according to temporal and spatial constraints**
  - Dependency in the decisions of travel and activity participation
  - Decisions based on time available to travel and location of activities
- **Fine time resolution for the demand**
- **Activity-based Accessibility Measure**
  - Utility-based measure considering constraints, scheduling, and preferences of the travelers.

InSITE-DTALite Model Innovations

- **Simulated Values of Time**
  - Captures the heterogeneity in VOT by agents and travel purposes
  - Support the analysis of tolling scenarios and others.

- **Intra-Household Interactions**
  - Decisions based on lifestyle choices and household constraints
  - Participation in joint activities and joint travel.

- **Convergence Paradigm**

InSITE-DTALite Applications

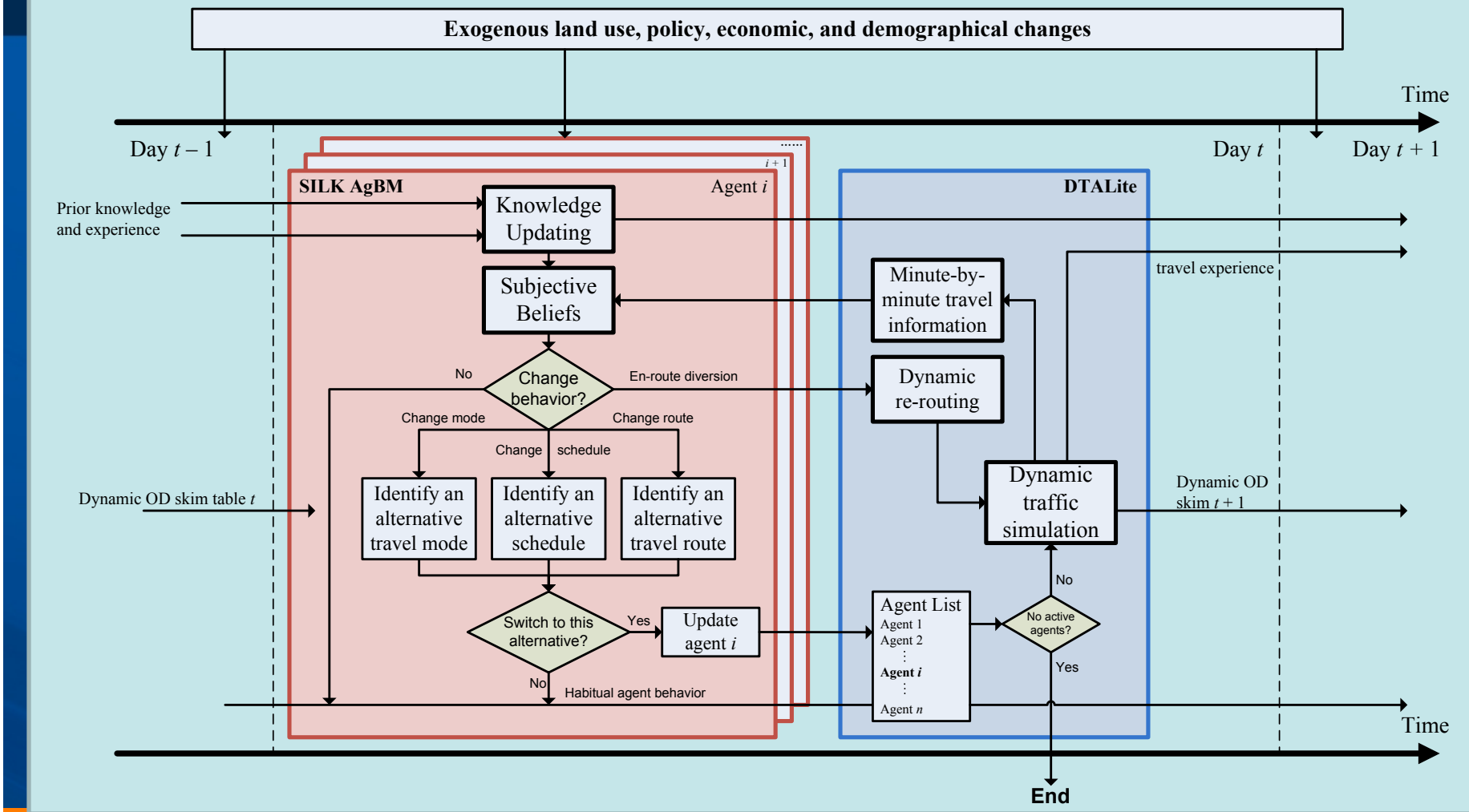
- **Corridor planning studies**
  a. Tolling/HOV/HOT Lane analysis
  b. Low cost improvements analysis – bottleneck mitigation
  c. Land use change – Development impacts
  d. Mobile Source Emissions – Hot spot analysis improved drive cycles, VMT mix
  e. Transit improvements – bus only lanes/bus on shoulder
  f. Traffic management and operations – CMP, ITS,
- **Regional planning studies**
  a. Land use Transportation connection – access to jobs, combined cost of transportation and housing
  b. Demographic structure changes – aging of the population and travel
  c. System performance – evaluation of LRP goals and objectives
  d. Goods movement (SHRP2 C20 grant – Freight tour roster)
  e. Pricing Policy – Trust fund evaluation (VMT tax)
  f. And others.

SILK AgBM-DTALite Overview

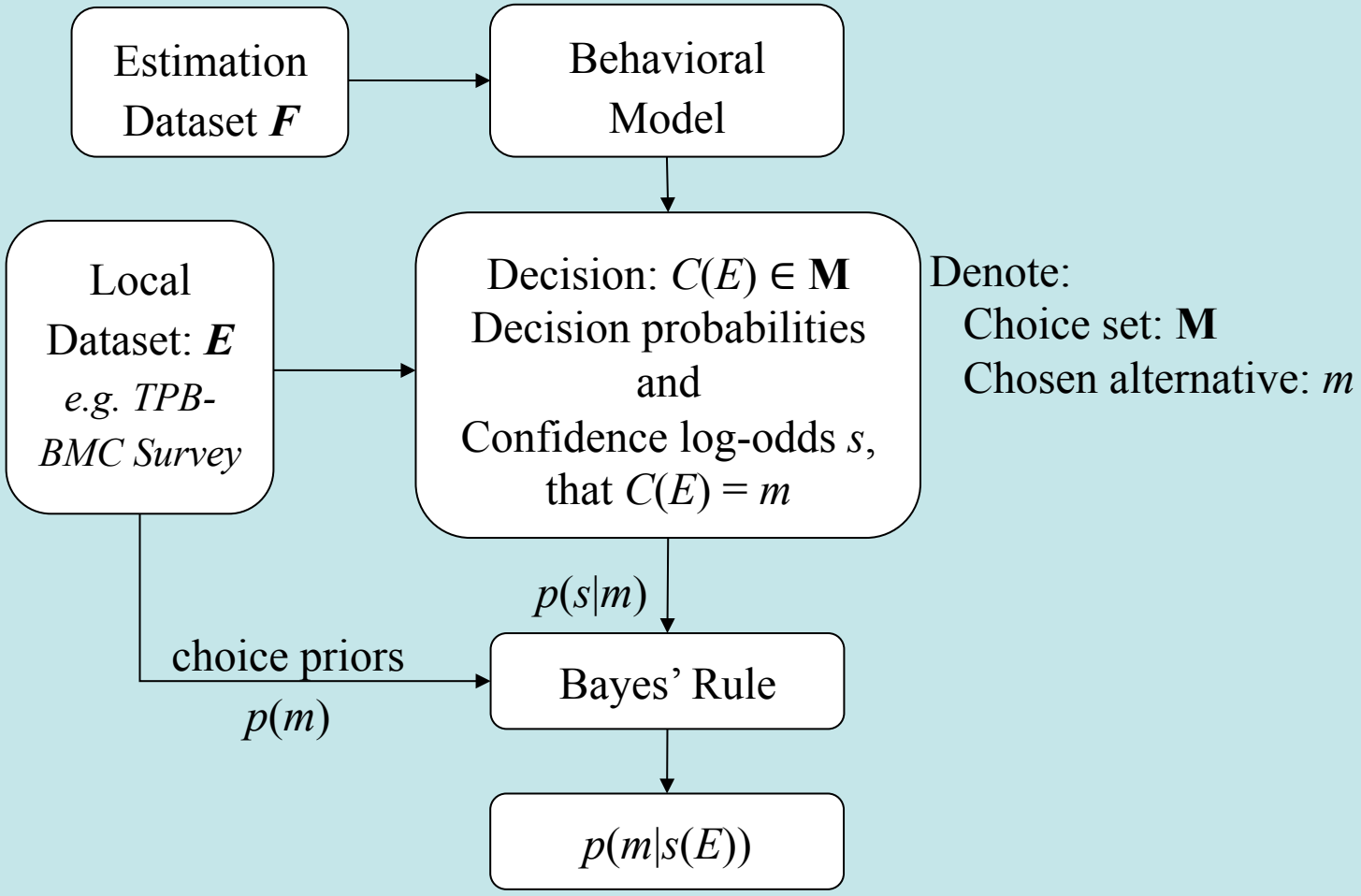
1. Two levels of integration
- Day-to-day integration
- Within-day integration

2. Travel behavior dimensions
- Mode/departure time/route choices
- En-route diversion

SHA SILK Agent-Based Model



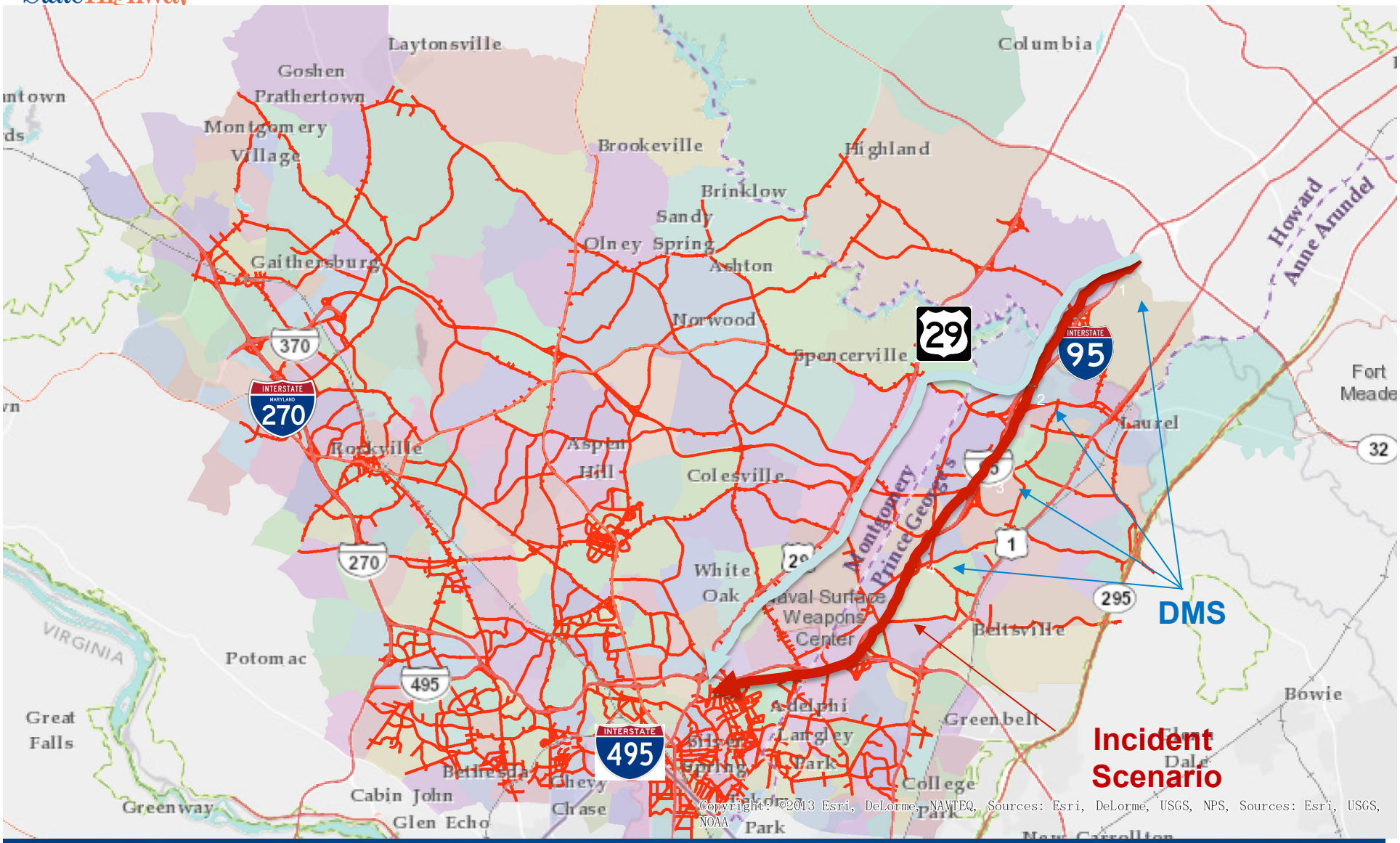
Model Re-calibration using Limited Local Data



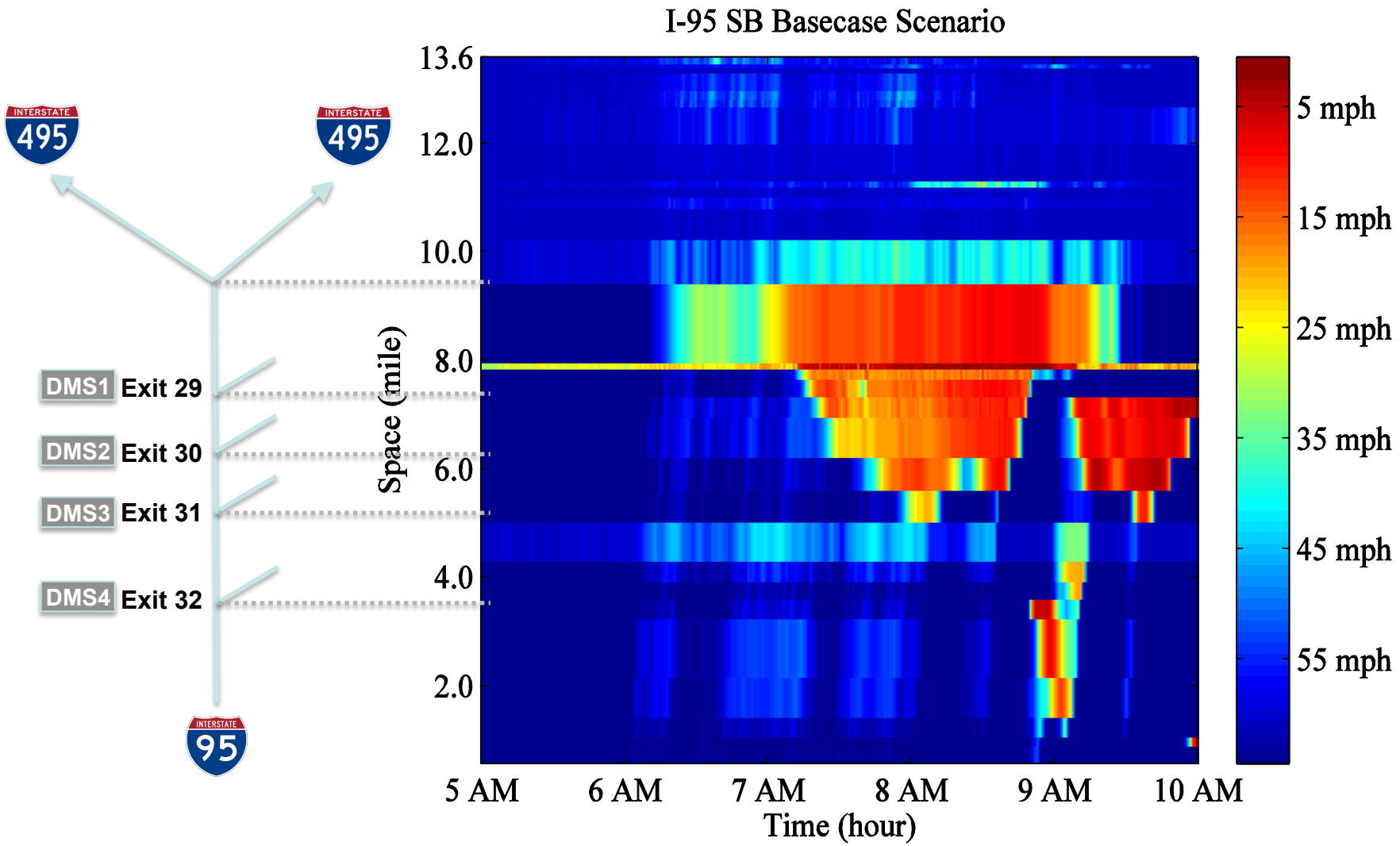
Model Applications

- Applications in transportation planning and TSM&O traffic management
  - Multimodal shifts and peak spreading in a future year scenario (completed)
  - Mode/route/departure time responses to land and urban development (completed)
  - Real-time responses to VMS, ramp metering, dynamic lane control, etc. (ongoing)
  - Work zone management (Future)

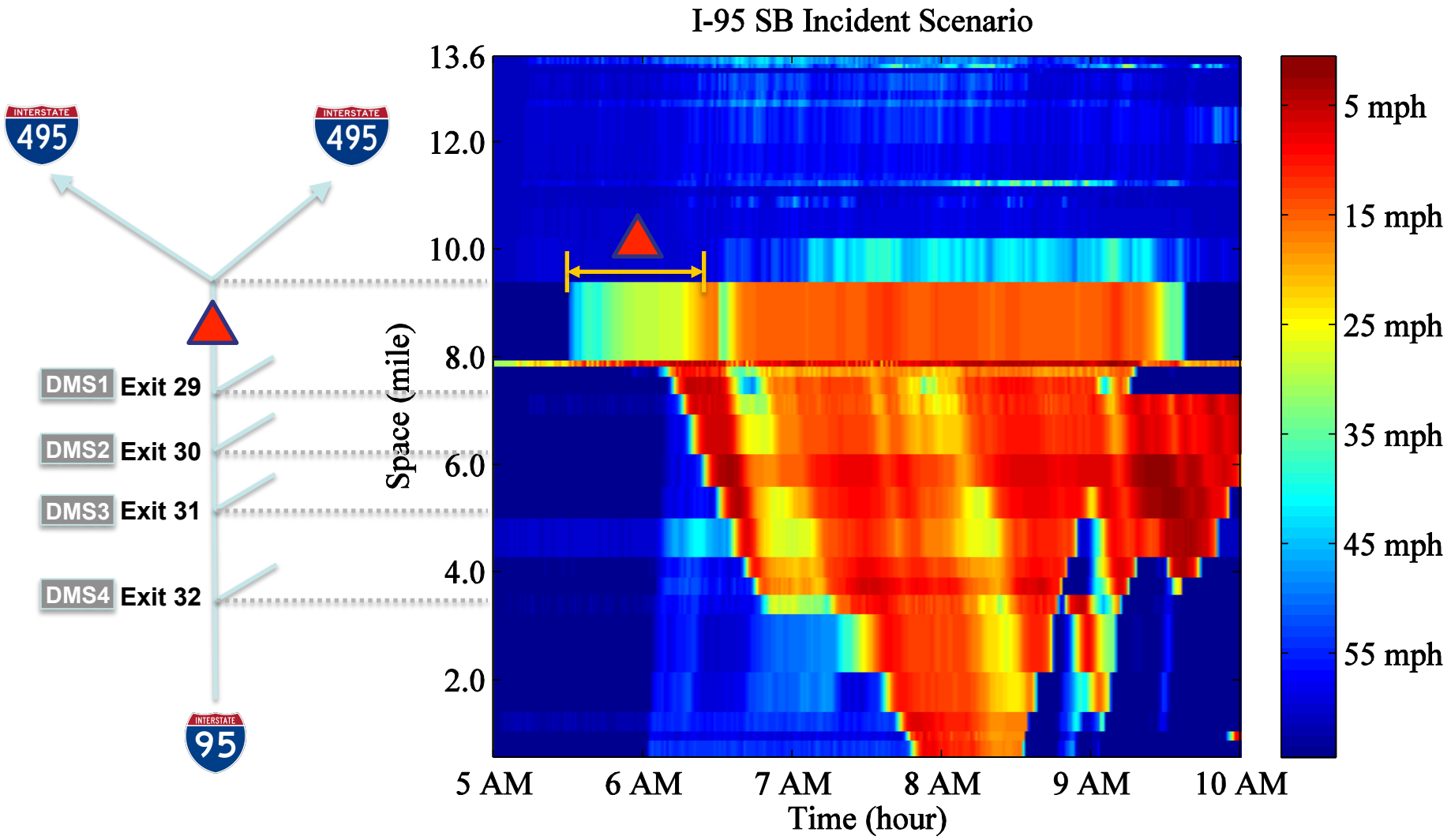
Application: Traffic Management



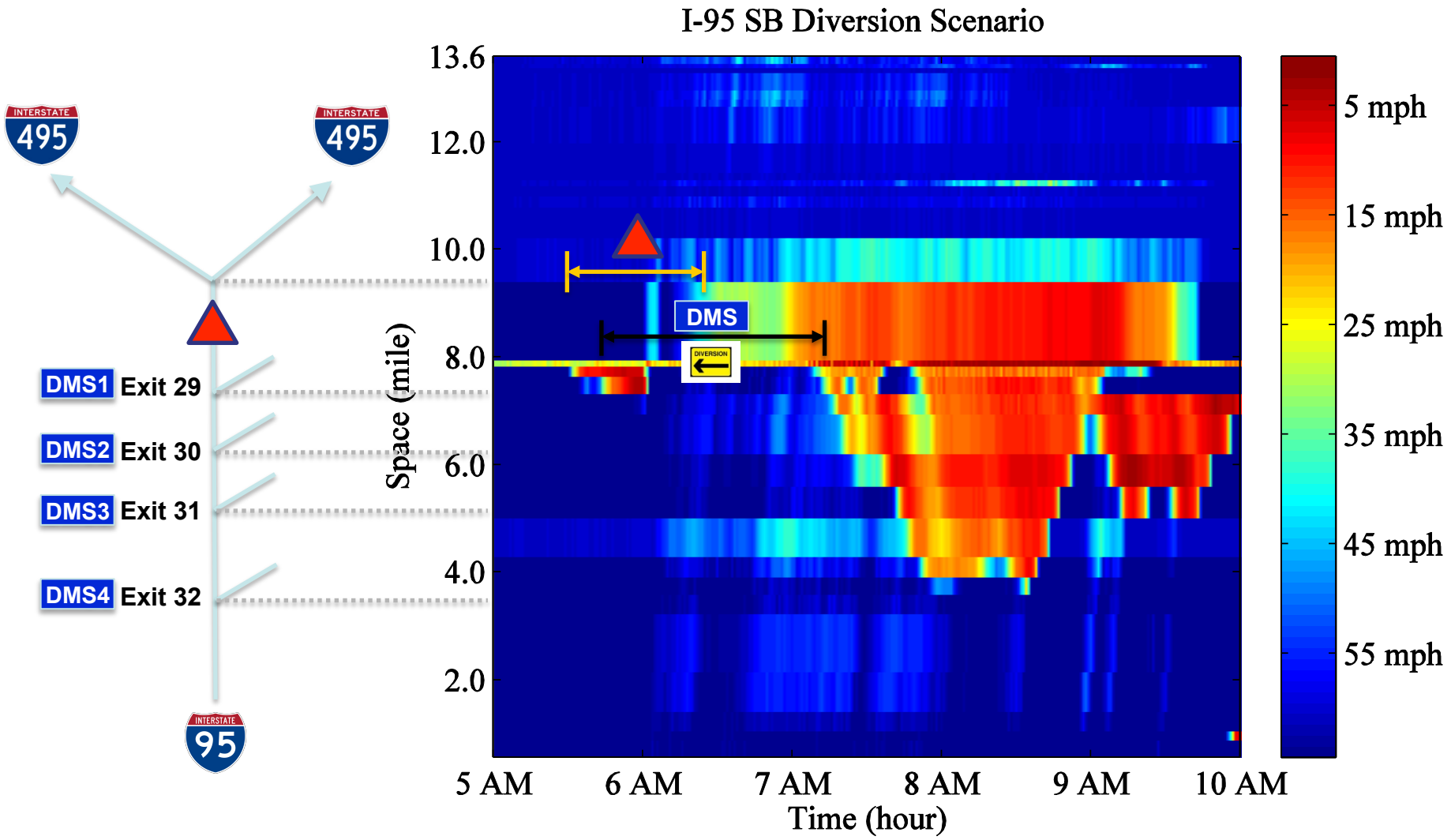
Congestion: Baseline Scenario



Accident without Re-Routing



With DMS Traffic Management



iPRETII

Nov. 2015~May 2018

Integrated,

Personalized,

REal-time

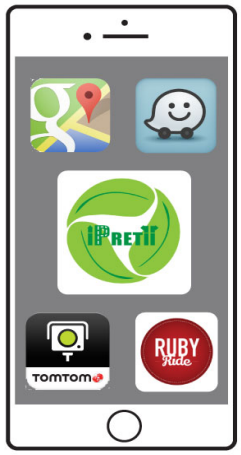
Traveler

Information and

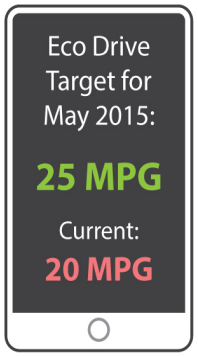
Incentive

Incentive Structure

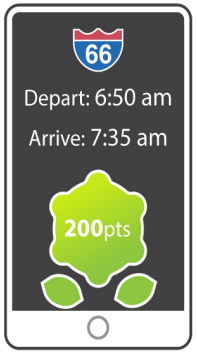
- Personalized information
- Customized incentives
- Loyalty program
- Gaming
- Social networking
- Peer influence

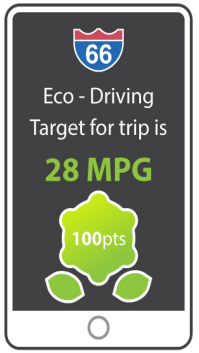


Long-Term Incentives

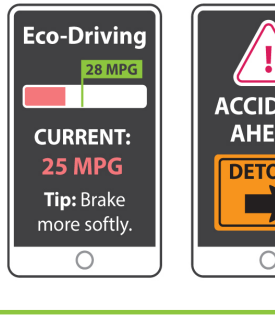


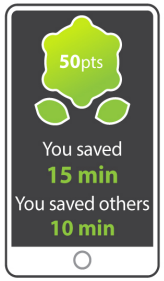
Pre-Trip Incentives



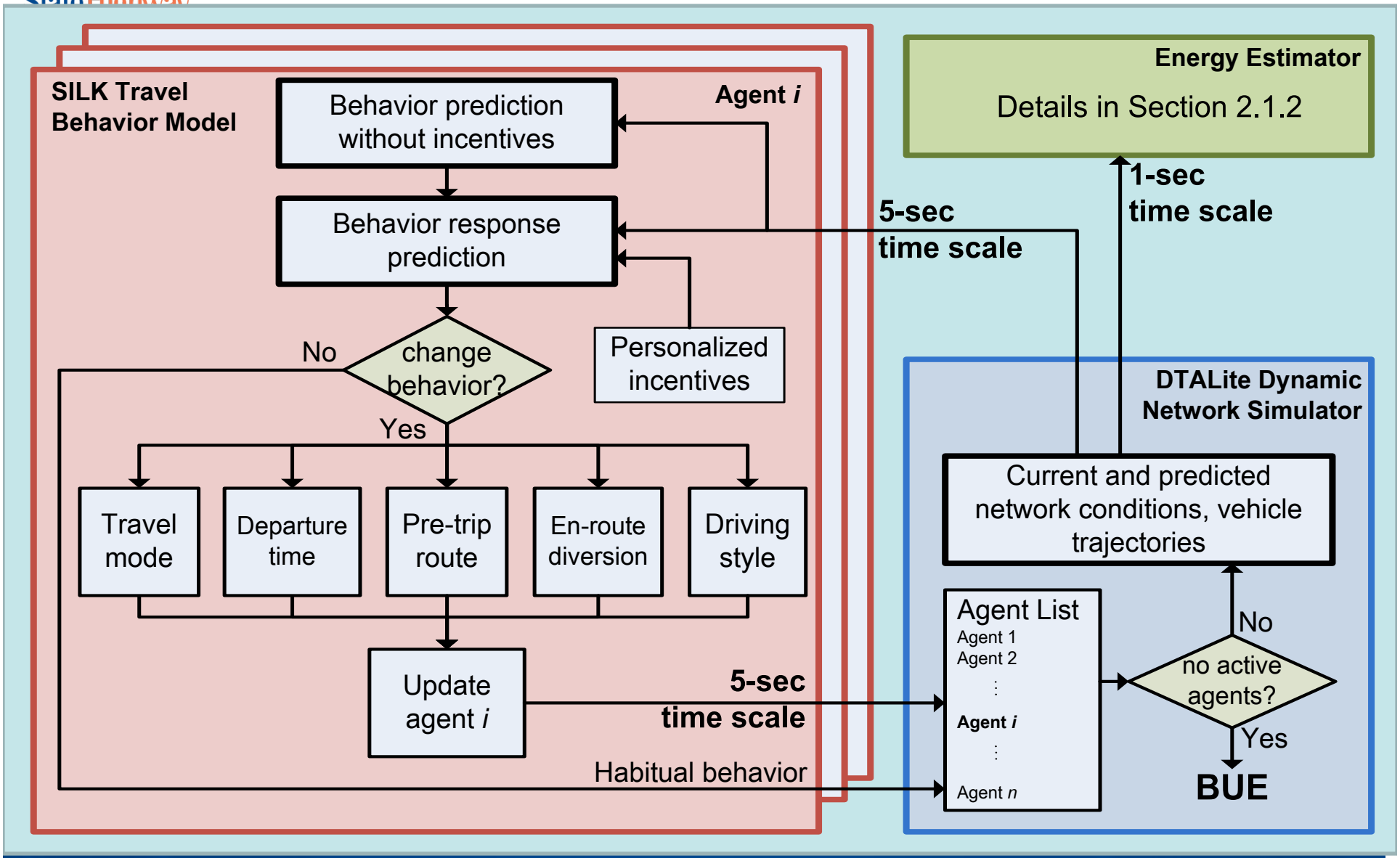


Real-Time Incentives

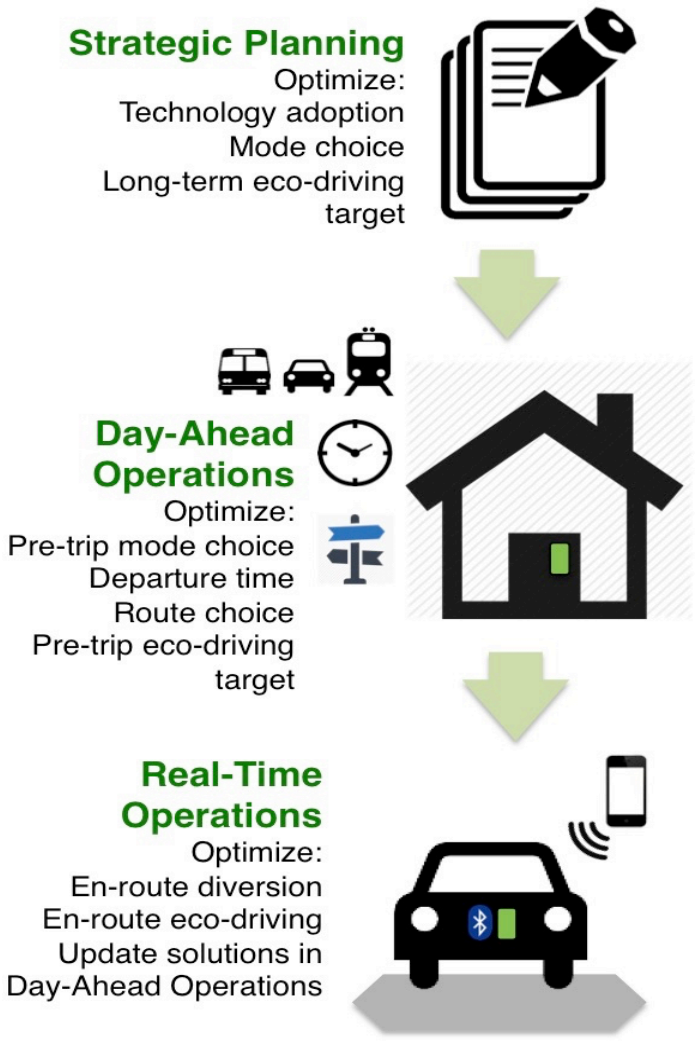




System Model



Control Optimizer



Control Decisions

- Whether or not to incentivize a particular user
- Which travel choice(s) to influence
- Type and intensity of personalized incentive to be delivered.

Key Performance Targets

- Computational efficiency
- Solution quality
- Robustness
- Redundancy and resilience
- Accomplishing control objectives with minimum resource

Thank You!

Questions, Comments, and Suggestions are Welcome. Please Contact:

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