
Modeling HOT Lanes in MITSIMLab and DynaMIT-P

Vaibhav Rathi¹
Haris Koutsopoulos²

¹Massachusetts Institute of Technology

²Northeastern University

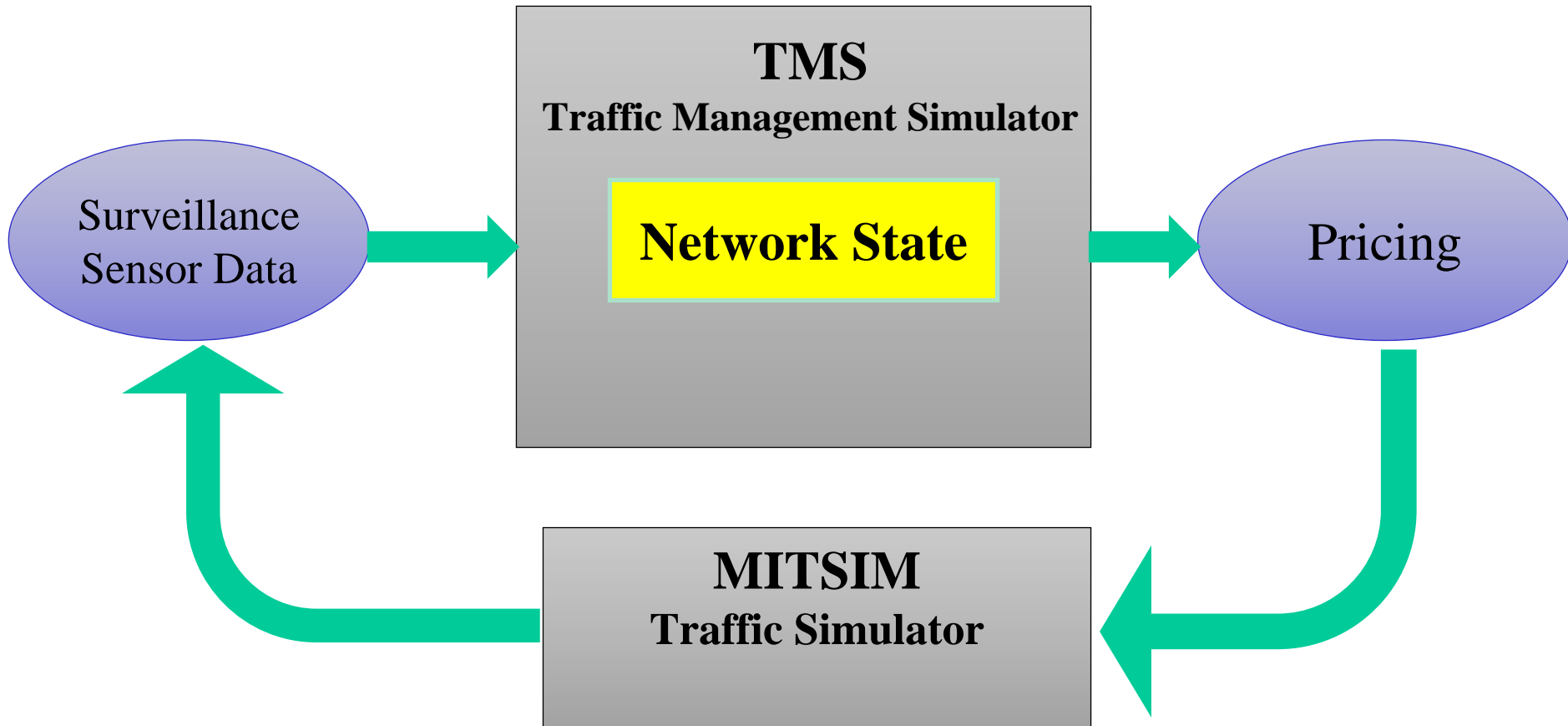
MITSIMLab Capabilities

- Operational analysis
- HOV vehicle classes
- HOV lanes
 - Restricted
 - Unrestricted
- ETC capabilities
- Sensor/surveillance system
 - Point
 - Point-to-point
- Network state (congestion levels)
- Incident simulation and response

MITSIMLab Capabilities

- Models
 - Flexible route choice models
 - Pre-trip
 - En-route
 - Driving behavior
 - Lane choice
 - Compliance
- Pricing strategy
 - Exogenous
 - Temporal
 - Spatial
 - Endogenous (strategy specific)
- Information dissemination

Dynamic Pricing Simulation in MITSIMLab



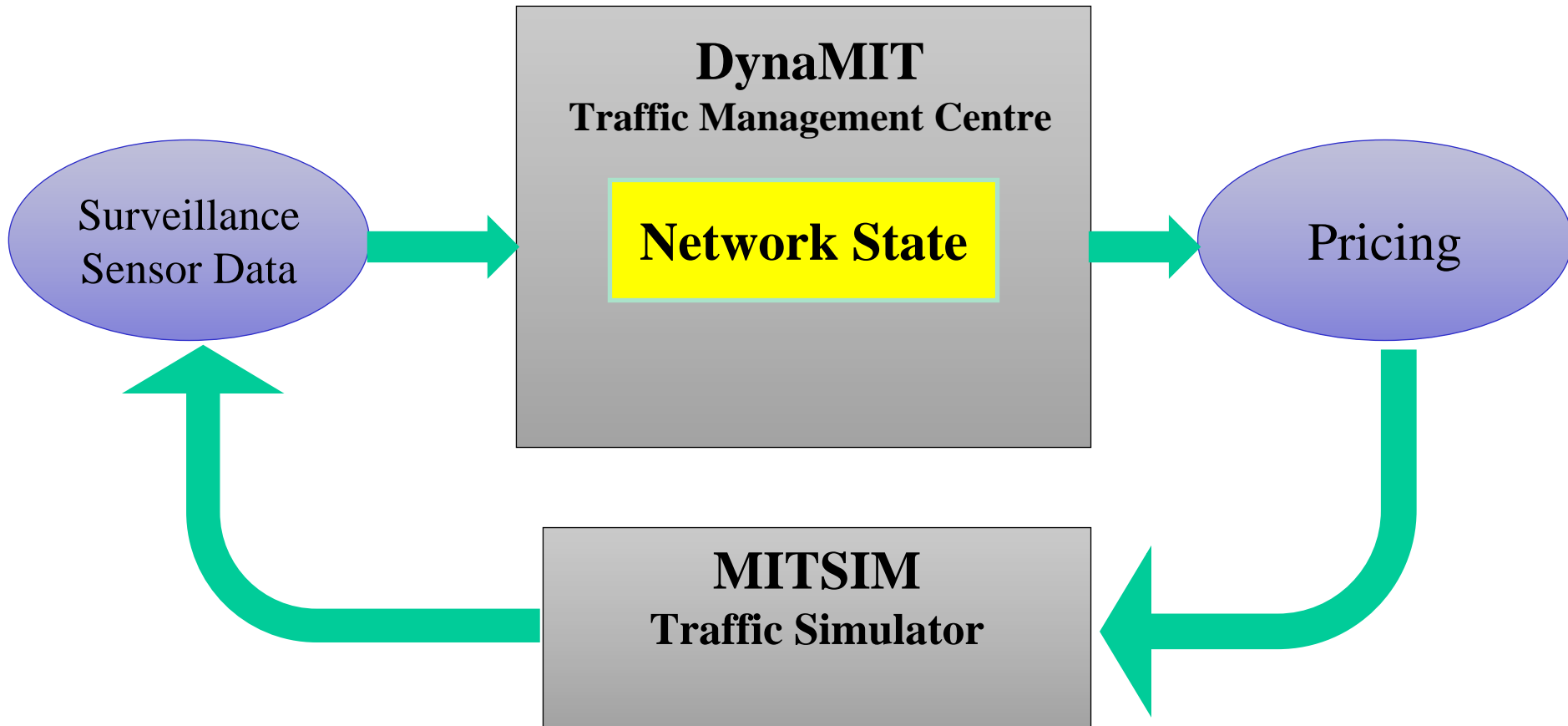
DynaMIT HOT Capabilities

- Short-term planning
- HOV links and HOV vehicle classes
- Travel choices
 - Route choice models (pre-trip, en-route)
 - Departure time choice
- Detailed travel behavior models
 - Zone-specific socioeconomic characteristics
 - Value of time
 - Income
- Pricing strategy
 - Exogenous
 - Endogenous (strategy-specific)
- Real time incident management and control
- Linked to MITSIMLab (closed-loop)

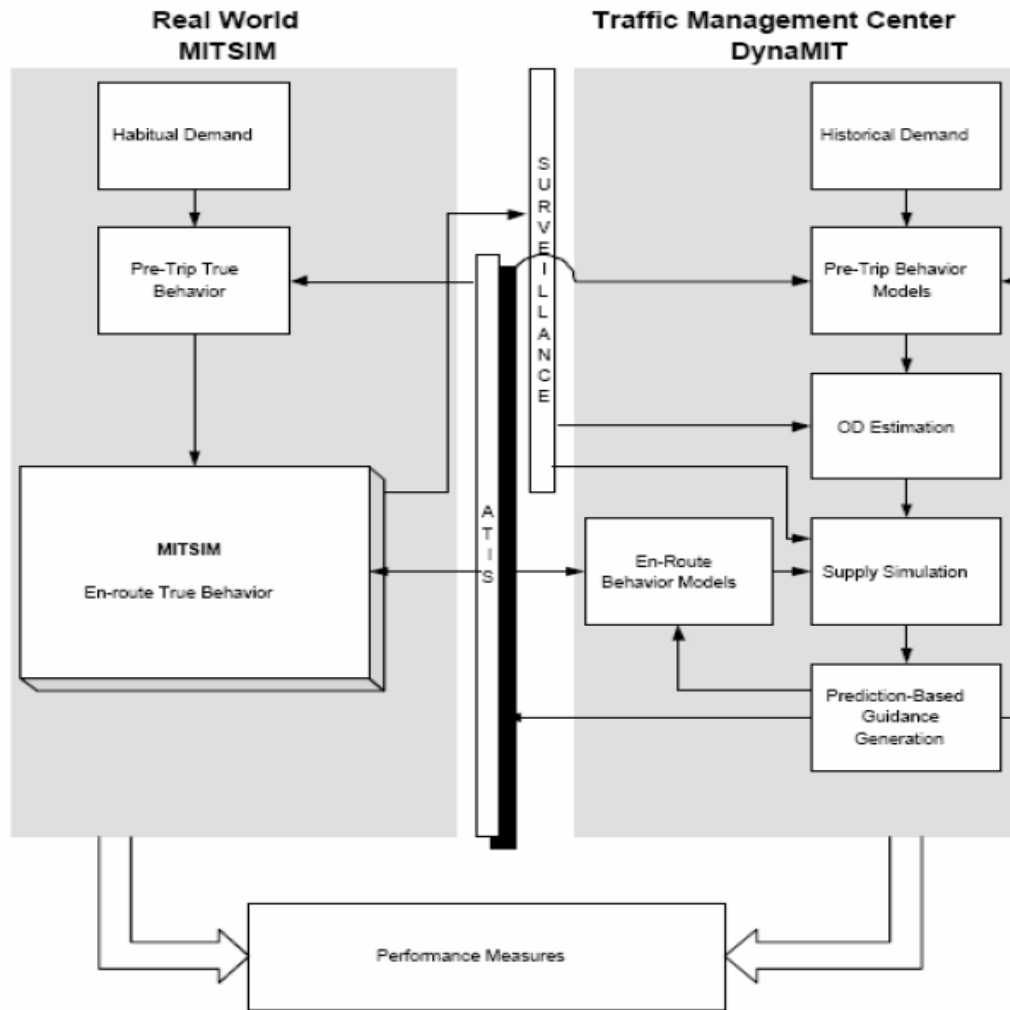
Related Activities

- MIT Portugal Program
 - Enhance and extend simulators to analyze congestion pricing
- Proposed Tasks
 - Enhanced travel choice models
 - Route choice
 - Mode choice
 - Departure time
 - Destination
 - Modeling effect of congestion pricing on user response
 - Heterogeneity of willingness-to-pay and value of time
 - Optimal pricing mechanisms

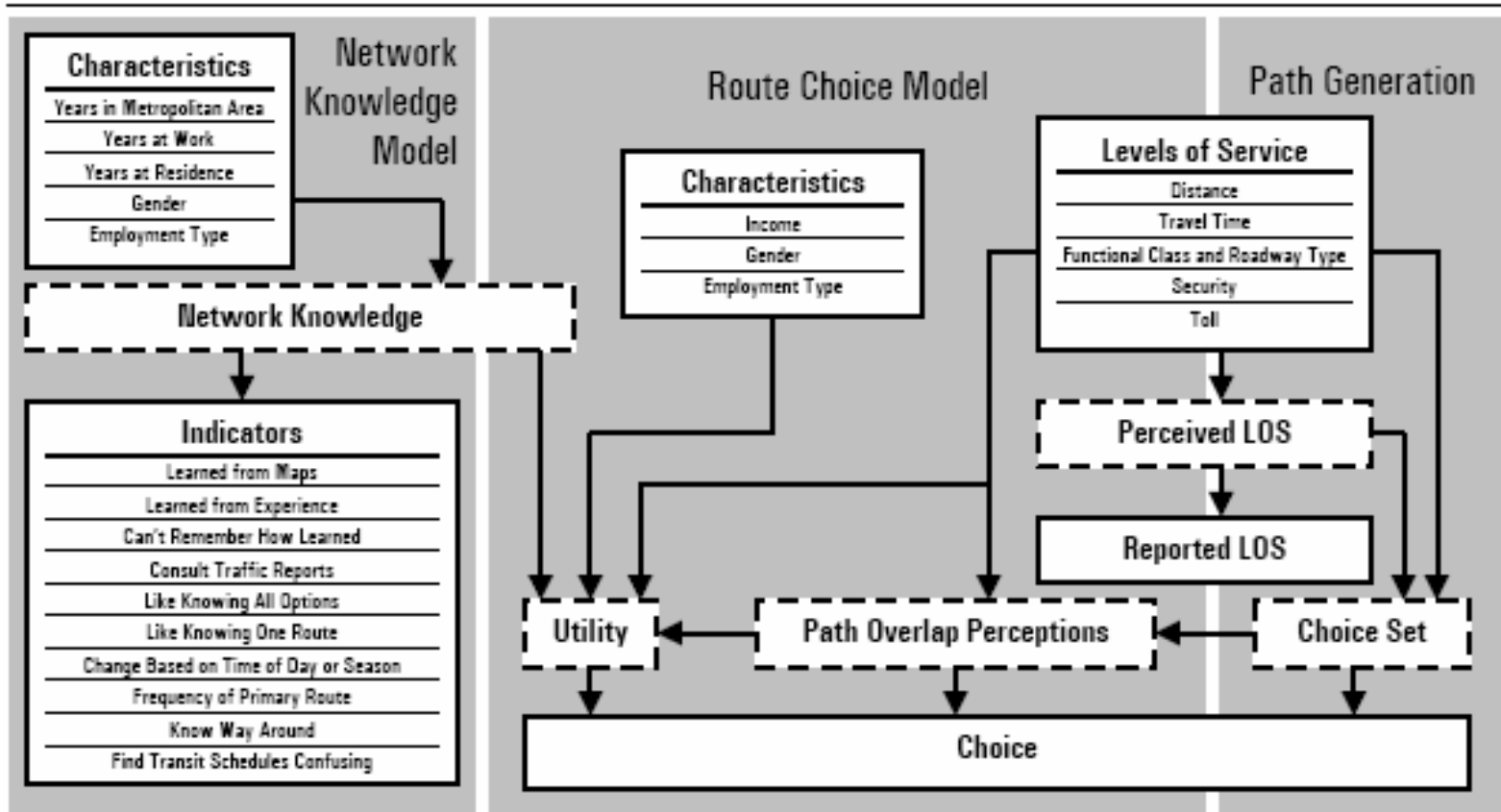
Dynamic Pricing Simulation using MITSIM and DynaMIT



Closed Loop Evaluation Framework

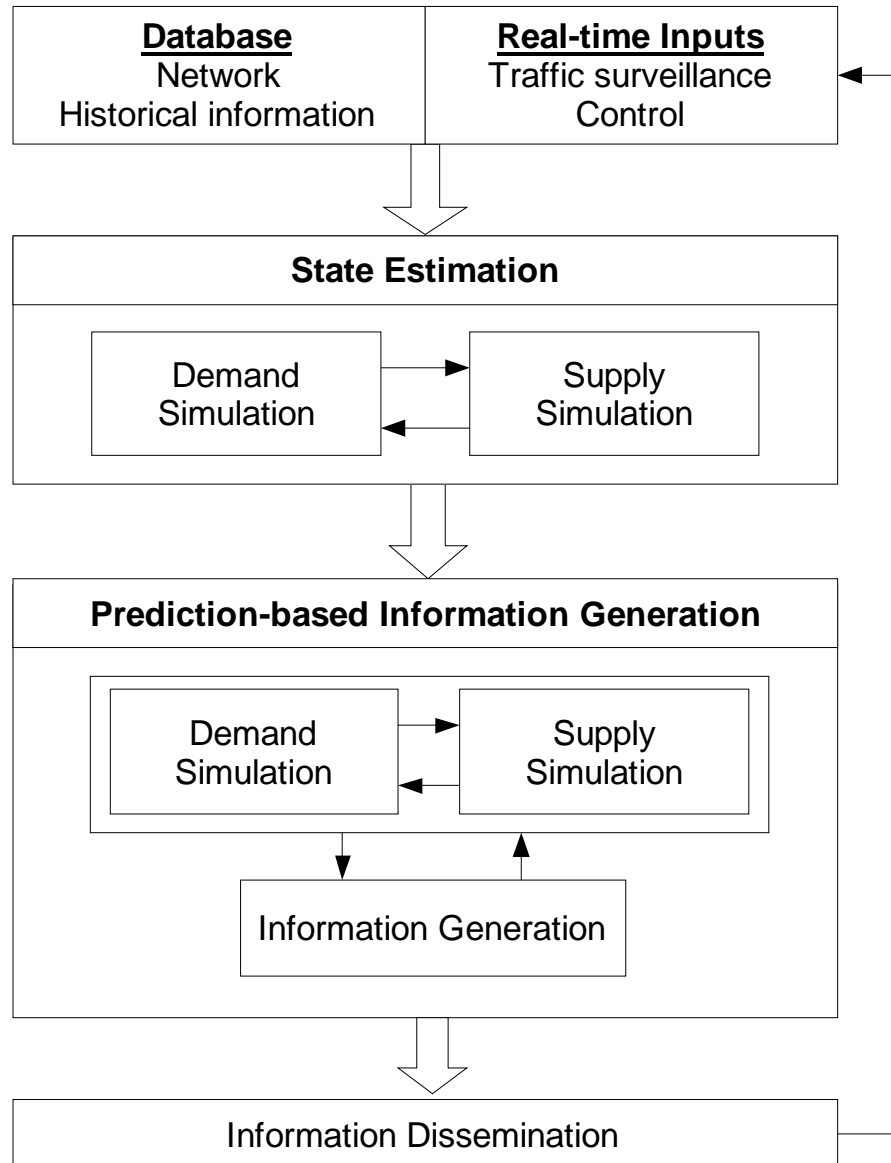


Route Choice Framework



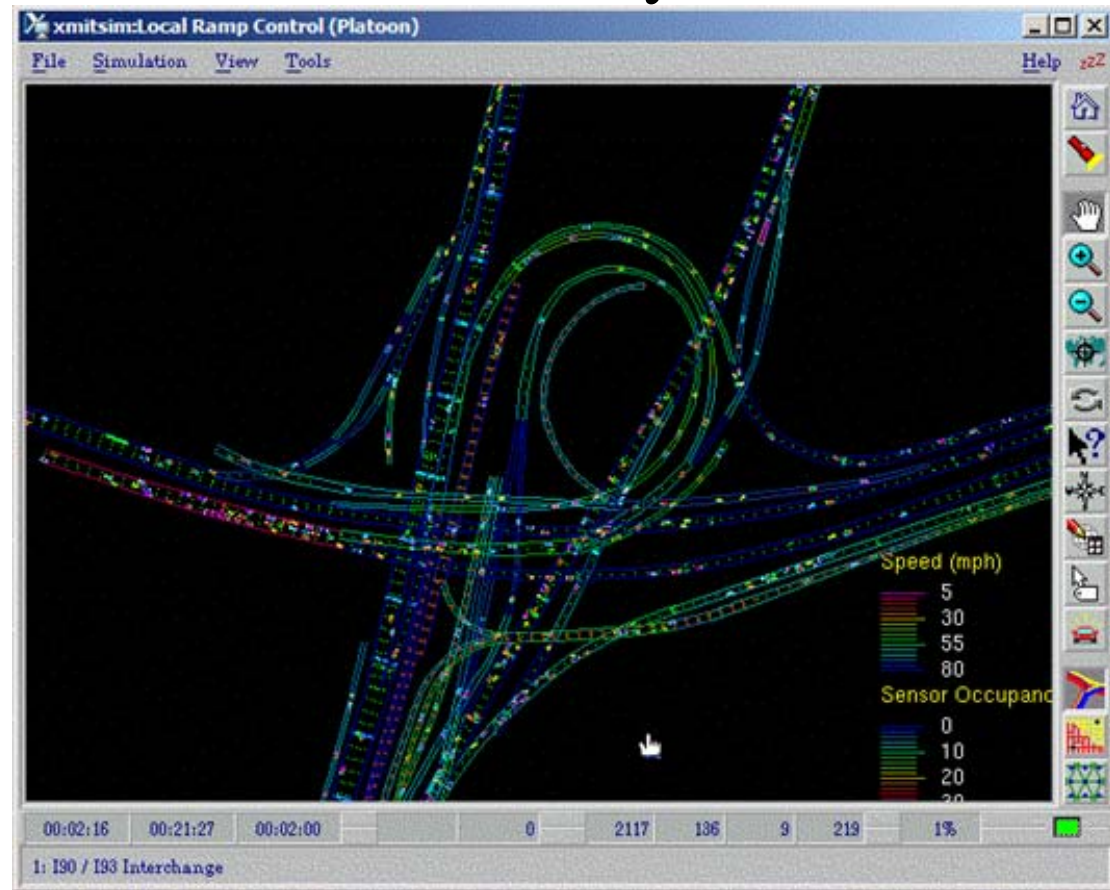
Notes: Latent variables are shown in dashed boxes.

Overall DynaMIT Framework



MITSIMLab

- Microscopic Traffic SIMulation Laboratory
- Computer laboratory for ITS
 - Design
 - Evaluation
 - Development of new technologies



Required Functionalities

- Definition of HOV vehicle classes and HOV lanes in network
- Access type
 - Discrete points
 - Unrestricted
- Pricing strategy
 - Time of day
 - Link based
 - Path based
 - Distance based
 - Congestion based (dynamic)

Required Functionalities, cont'd

- Modeling
 - Mode choice (planning)
 - Route choice (including HOT)
 - pre-trip
 - en-route
 - User response to pricing
 - Driving behavior
 - Merging/Lane selection
- Dissemination of information to travelers

DynaMIT

Demand

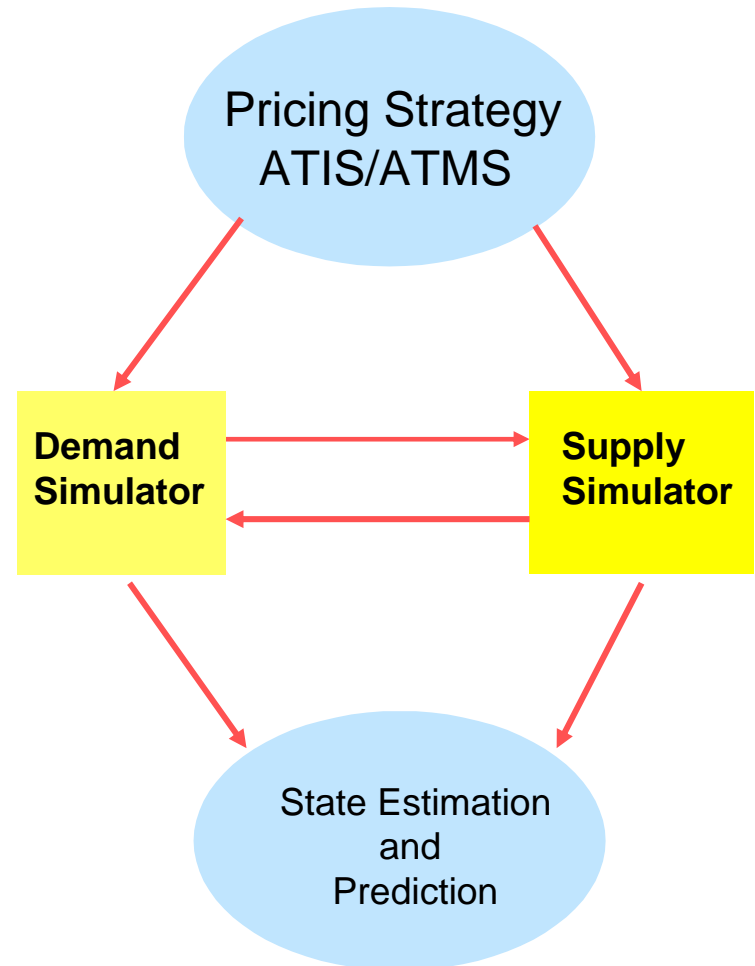
- Origin-destination flows
- Micro simulator of travel choices
- Origin-specific socioeconomic characteristics

Supply

- Mesoscopic Traffic simulator

Demand-Supply Interactions

- Traffic estimation and prediction



HOT Applications

- Operations Analysis
 - MITSIMLab
- Planning
 - DynaMIT-P

DynaMIT-P

- Traffic estimation and prediction
- Short-term planning applications

