

DECISION SUPPORT TOOLS BASED ON ITS DATA ARCHIVES

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ITS Data

- Video and data collected from ITS devices
- New technologies promise even more data
- Archive and use of data is expected to increase
- Examples of data use
 - Decision support for operation (on-line and off-line)
 - Performance measurements
 - Traffic analysis and transportation planning
 - Assessment of impacts and effectiveness



FDOT Data Archives

- SunGuide TMC software databases
 - Detailed incident management data
 - Daily 20-sec traffic detector measurements
- STEWARDS - long-term archive of traffic detector measurements
 - Data retrieved, filtered, cleaned, imputed, aggregated, and stored for future use

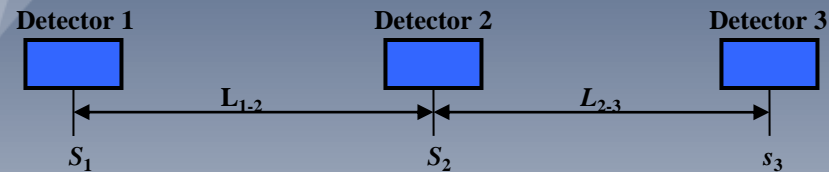


Data Post-Processing

- Need to identify errors and missing detector data in both real-time and off-line applications
 - Data filtering
 - Data smoothing
 - Temporal and spatial aggregation
 - Temporal-spatial data imputation

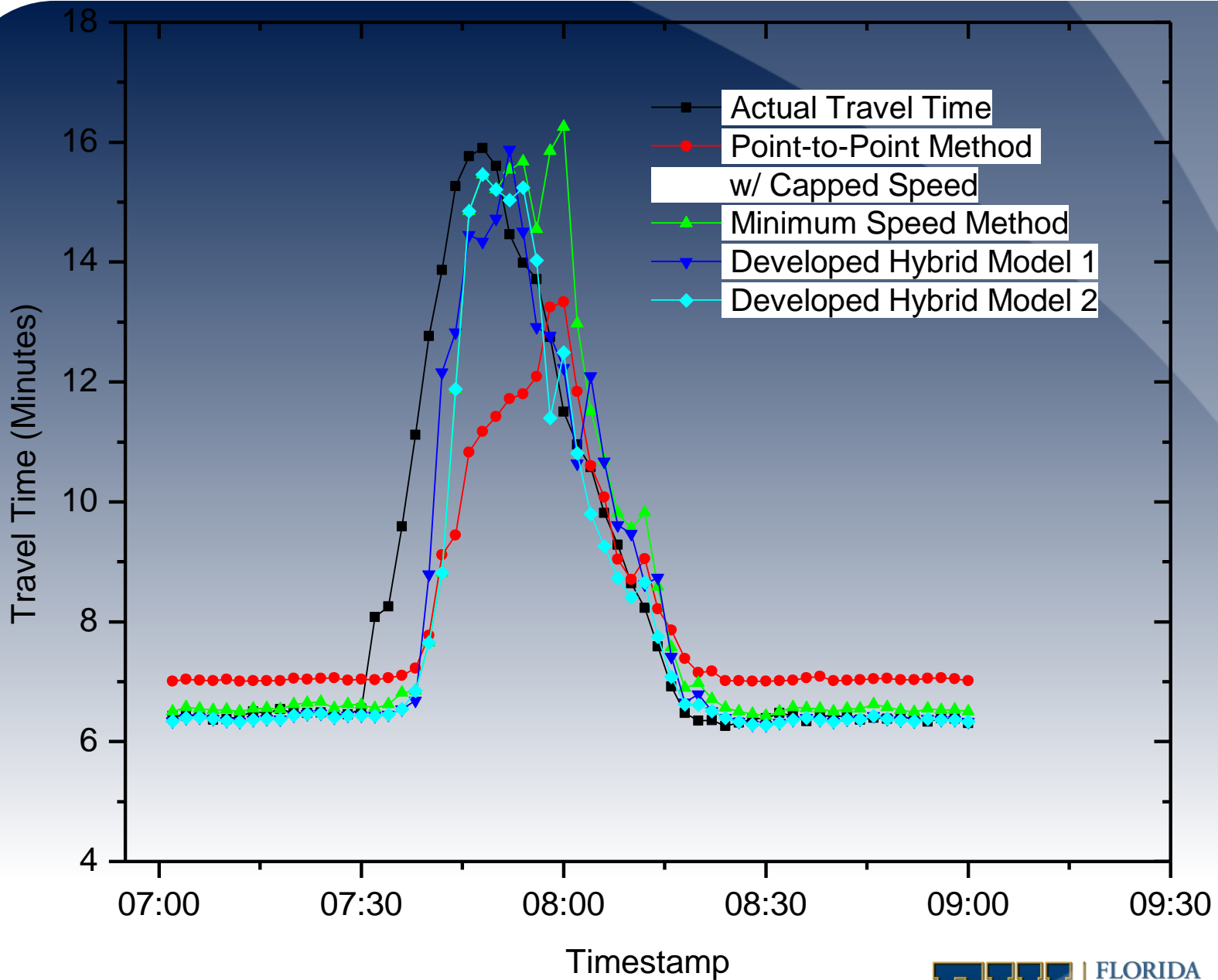
Travel Time Estimation

- Speed-based Methods and traffic flow theory-based methods



- Speed-based methods accuracy drops in congested and particularly in incident conditions
- traffic-flow theory methods for congested conditions has been proposed
- Impacts of data imputation method, smoothing, updating interval, link length, detector errors, etc.



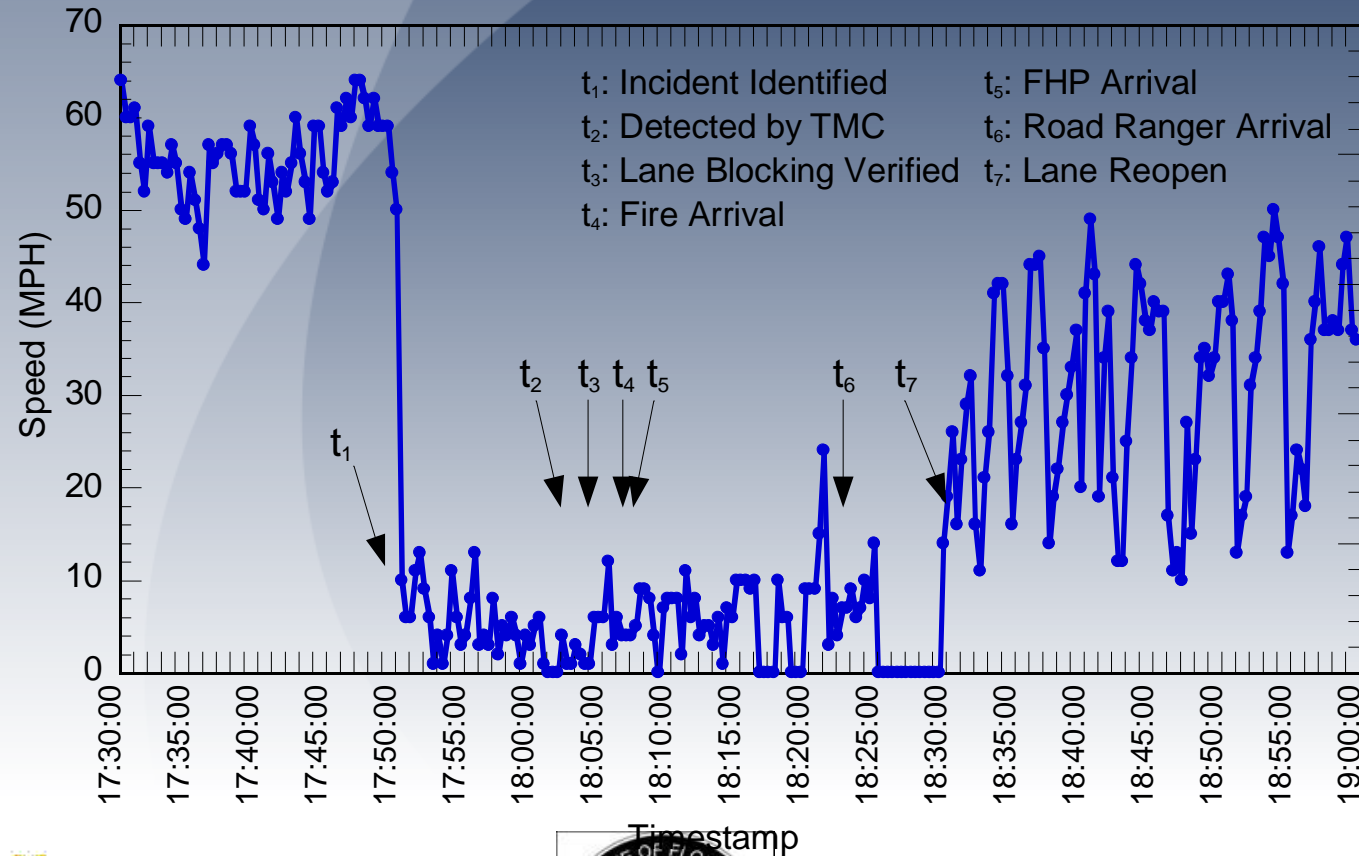


Time Lag of Recording Incidents

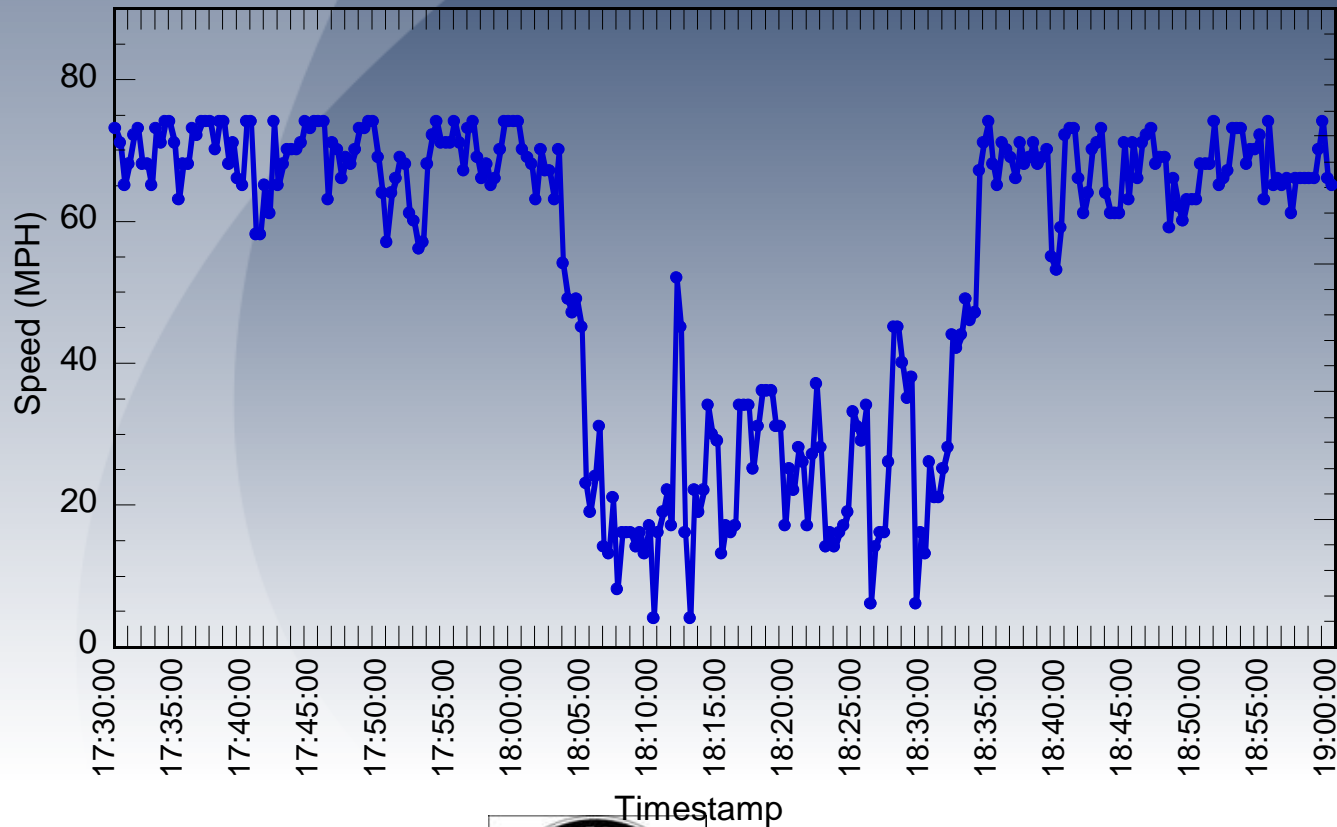
- Estimation of time lag between the occurrence of the incident and the time it is recorded in central software
- Based on traffic detector and Incident data
- A regression model was developed to estimate time lag based on influencing factors
- Time of day found to be an important contributing factor to the time lag



First Upstream Detector



Detector in the Opposite Direction



Benefit-Cost Analysis of IM

- Based on detailed incident management database
 - incident duration, frequency, other attributes by incident type.
- Delay, emission, fuel consumption, safety, and user monetary benefits due to incident duration reduction

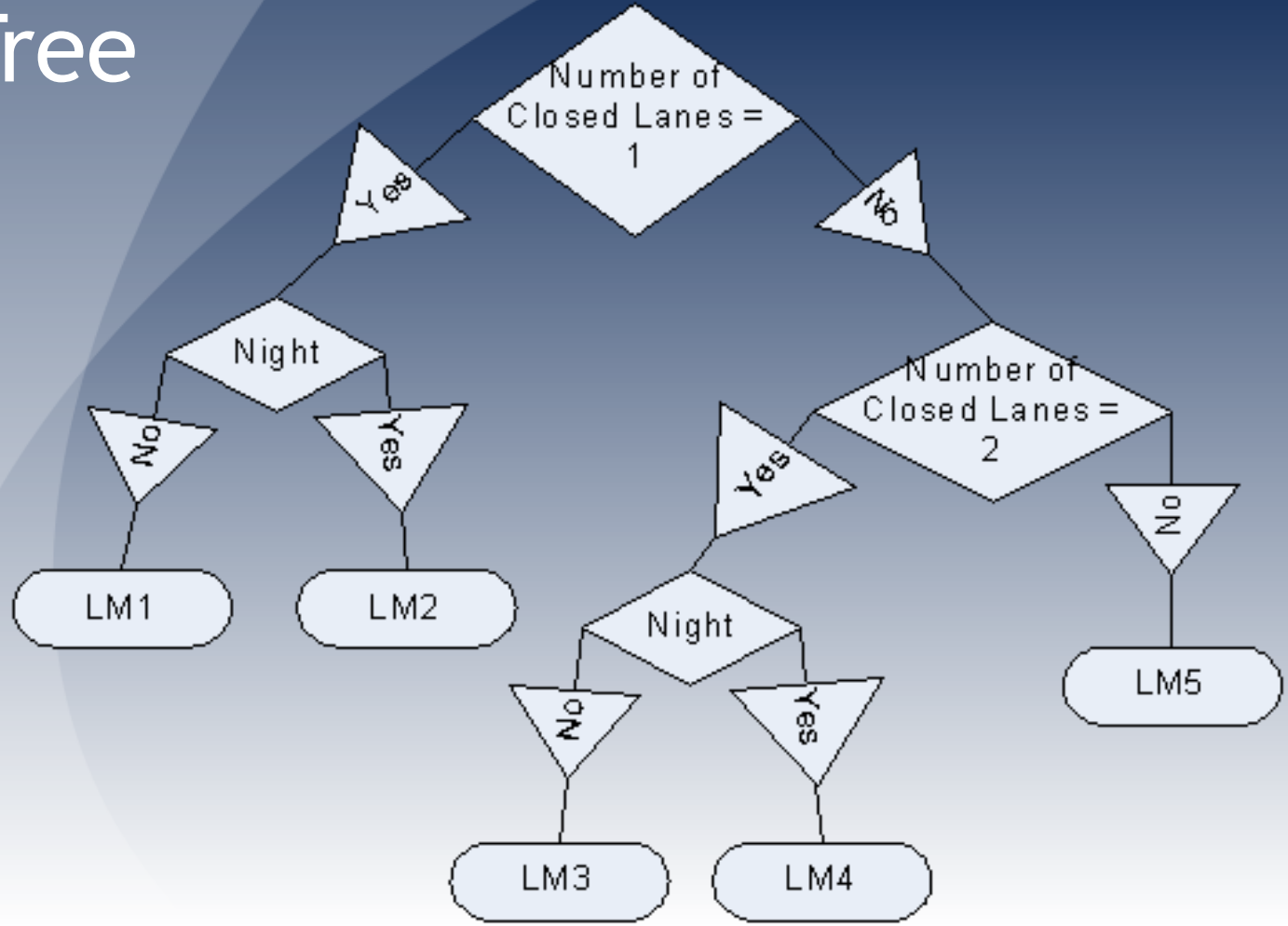


Incident Duration Prediction

- Predicted lane blockage duration model using M5P tree
- Predicted incident response time using cross-classification model



M5P Tree



Factors Impacting Duration

- Number of closed lanes
- Time of Day
- Environmental factors
- Incident type
- Activated incident management processes
- Incident attributes



Secondary Crash Estimation

- Model to predict potential secondary incidents using logistic regression model for secondary crash likelihood
- Factors affecting the secondary incident probability:
 - queue length
 - whether the incident is an accident
 - the period of the day at which the incident occurs, and
 - the specific corridor on which the incident occurs.
- Model predicts the probability of secondary incidents range between 1.2% and 33.6%



Diversion Levels

- Determine the level of diversion of traffic due to congestion, using the mainline detector data
- Use detector data and incident data
- Regression analyses to determine influencing factors



Utilization of ITS Data for Modeling

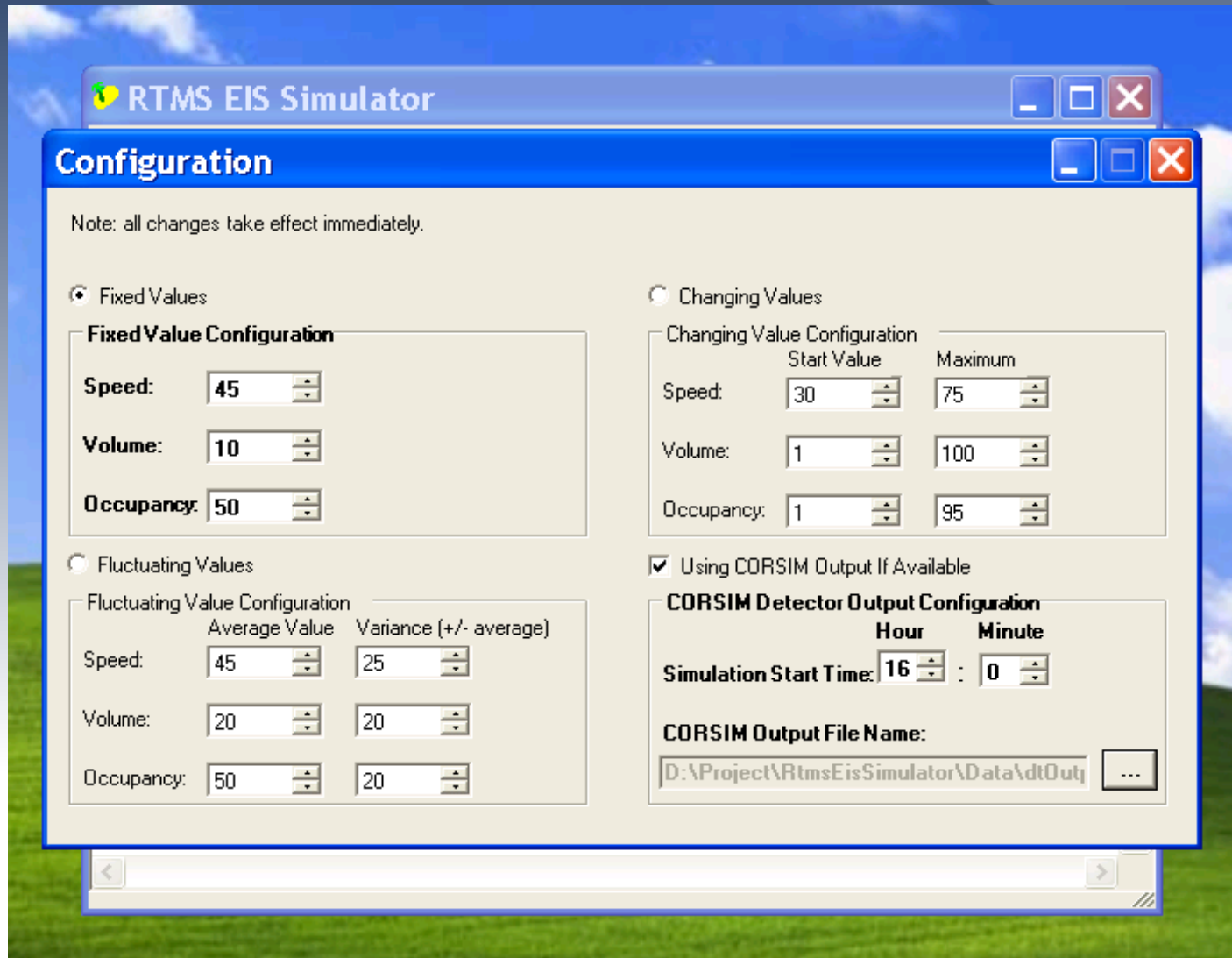
- Tools and procedures developed to allow the utilization of ITS data for model development and calibration
 - Planning, Macro, Meso/DTA, Micro
- Pattern clustering, time segmentation, spatial balancing, estimating missing information

Traffic Management Center Simulation

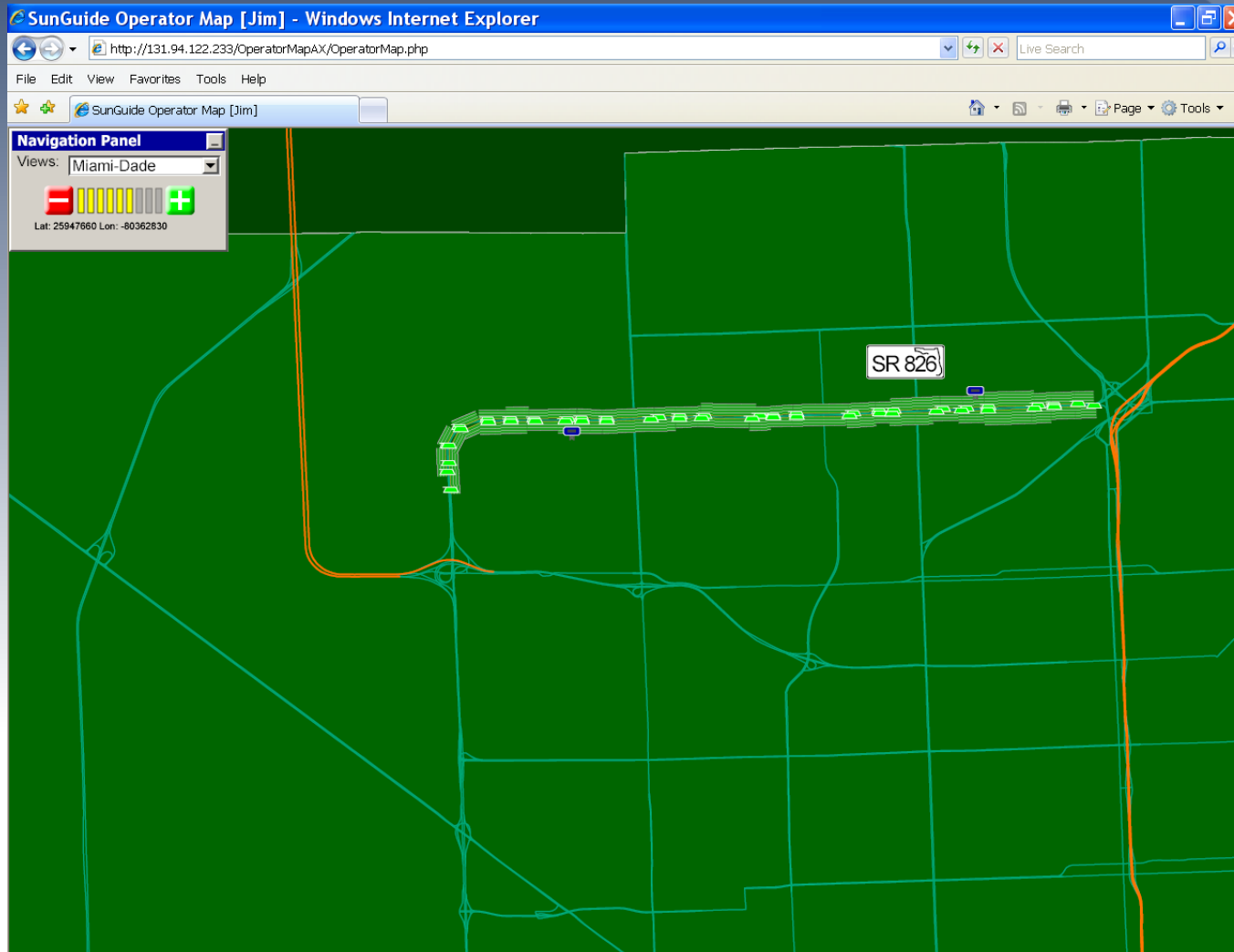
- Development of software that allow exchange of data between the TMC software and virtual detectors/readers in the simulation to allow testing modules in a virtual testing environment



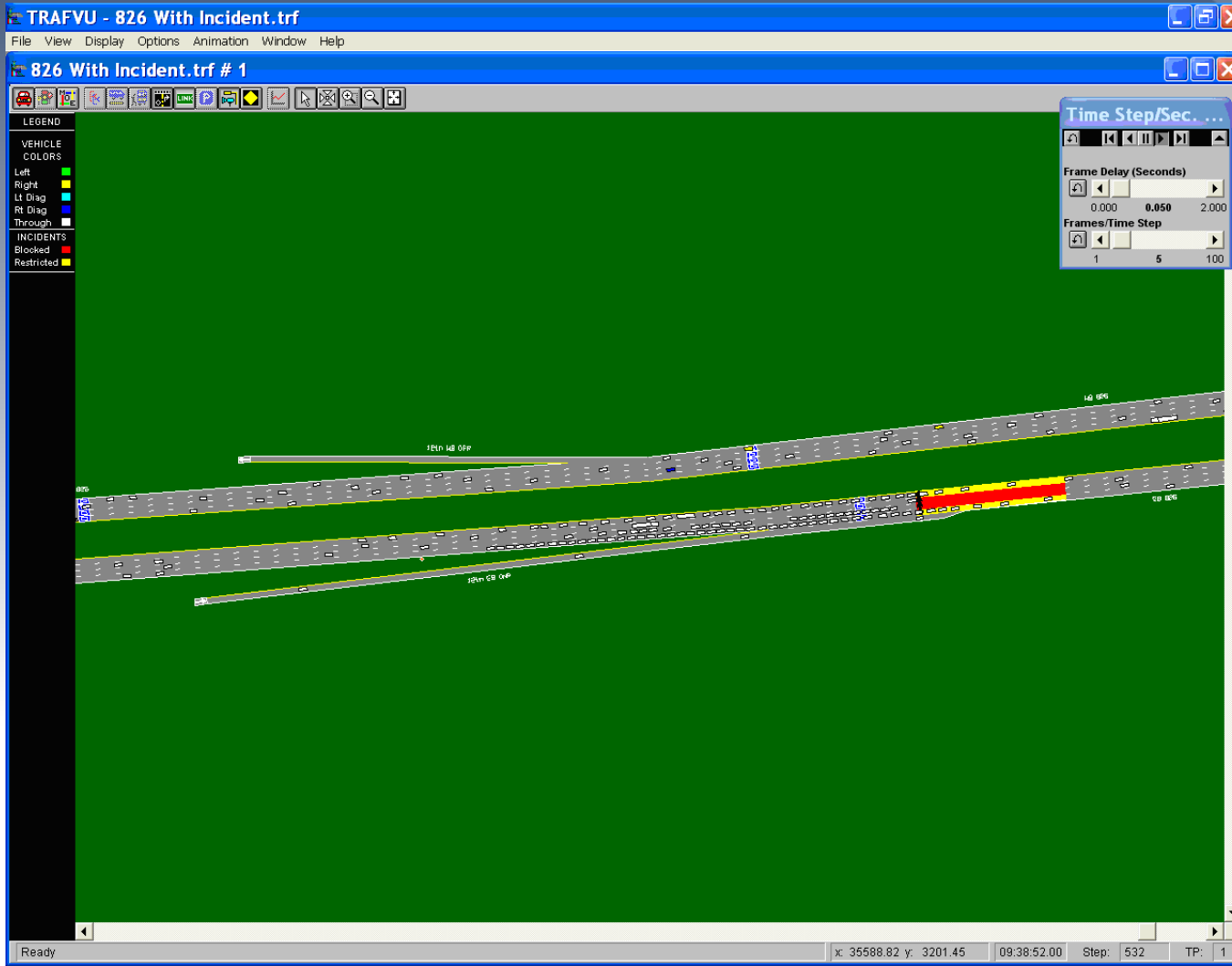
RTMS Simulator



Linked Virtual Detectors



CORSIM Incident Scenario



SunGuide Incident Scenario TT based on CORSIM



Summary

- Combining incident management and traffic detector data archives allow the development and application of powerful decision support tools
- The ITS data archives have the potential to provide cost-effective and detailed information for the development of the decision support tools and estimation algorithms

