SHRP 2 Project L38

Pilot Testing of SHRP 2 Reliability Data and Analytical Products

Florida International University
AECOM Technical Services, Inc
HNTB Corporation

In Collaboration with
Florida Department of Transportation District 6

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Research Team

• FDOT District 6 in Miami
• Florida International University
• AECOM - General Consultant of ITS Operational Support Services for FDOT District 6
• HNTB - TSM&O consultant for D6
Research Principals

- The research team will work closely with FDOT District 6 traffic operations, planning, and design offices and other FDOT regional TSM&O partners.

- The results will be shared with other regions in Florida with the support of the central office of the FDOT.

- FDOT has invested heavily in developing data collection and integration tools. The integration of SHRP 2 products into these tools will fill major needs and will take these tools to the next level.
ITSDCAP

- Fuse and archive data from multiple sources and utilize advanced methods for performance measurement and decision support for performance management
  - Data capture, fusion, and grouping
  - Performance measurements (mobility, reliability, safety, emission, fuel consumption)
  - Data mining
  - Modeling and analysis support
  - Visualization

- Originally desktop application but recently a subset of it has been made web-based
ITSDCAP Desktop Interface

Data Capture Performance Measures Data Mining Model Support ITS Evaluation Map Visualization

Mobility Travel Time Reliability Safety Energy and Emission

Data Source: CDW Data
District: D6
Roadway: I-95 NB
Start Location: MP5.175 (NW 46 ST)
End Location: MP11.82 (NORTH OF NW 1)
Start Date: Thursday, July 01, 2010
End Date: Tuesday, December 31, 2013
Start Time: 6:00 AM
End Time: 9:00 AM
Day Type: Monday
Free-flow TT: 6

Performance Oriented Reliability Measures:
- Standard Deviation/Variance
- Buffer Index (Mean)
- Buffer Index (Median)
- Failure/On-Time (% of Trip ≤ (1.1 * Median TT))
- Failure/On-Time (% of Trip ≤ (1.25 * Median TT))
- Planning Time Index (95% TT Distribution)
- Planning Time Index (90% TT Distribution)
- Planning Time Index (80% TT Distribution)
- Skew Statistics (90% Median)/(10% Median)
- Misery Index (Avg. 5 Highest TT)/(Free Flow TT)

Result Display
Display Format: Graph

Graph showing various reliability measures for different travel times.

- Standard Deviation
- PTI95
- PTI90
- PTI85

Values range from 0 to 1.2.
Web-Based ITSDCAP
TTR Metrics for I-95
PTI 85 (I-4 EB)

![Graph showing PTI 85 (I-4 EB) with different line types representing Normal, All, Congestion Crash+Normal, and Crash+Normal.

Time vs. PTI85 chart with data points and lines indicating traffic congestion levels at various times throughout the day.]
Data from Multiple Sources

- SunGuide data (TSS, TVT data, incident, DMS, etc.)
- Central data warehouse
- FHP incident database
- FDOT planning statistics office data
- Weather data
- Managed lane dynamic congestion pricing rates
- Work zones → D6
- Crash data/CAR System
- 511 data
- INRIX data
- AVL/AVI data
IRISDS

• Proof of concept
  • Sharing of information from multiple agencies in **real-time**
  • Decision support systems

• Can be used as a tool for Integrated Corridor Management and RTSM&O.
Incident Impacts and Index

Event Info:
Conditions: dry sunny day
Severity: Minor
Current Event Status: Unresolved
Duration Since Beginning: 60.09 minutes

Predicted Total Duration: 245.56 minutes
Secondary Crash Probability: 3.46%
Anticipated Queue Length: 0.00 miles
Average Diversion Rate: NA

Traffic Info During Incidents:

Traffic Info Contour:

Simulate
Travel Time based on Transit AVL
Test Corridors

- I-95 between SR 836 and GGI (Freeway)
- SR 826 (Freeway)
- SR 7 (Arterial)
- Route bundle
  - I-95 general purpose lane
  - I-95 managed lane
  - SR 7
Tested Products

- Modify the existing modules in ITSDCAP and IRISDS to estimate reliability based on L02 methodology
  - Based on point detectors and INRIX for freeways
  - Based on INRIX for arterials
- Utilize L08 methodologies for freeways and arterials
- Utilize L07 to assess potential improvement alternatives
- Utilize L05 products to support the various business processes of the FDOT
Approach Highlights

- TR-PDF under different regimes (as recommended by L02) will be derived based on data and modeling
  - A decision support tool will be developed to determine the conditions that the actual travel rate (ATR) of segments and routes are within the acceptable DTR window (based on data archive and real-time data)
  - Support off-line planning, operation, and design decisions
- Comparison of the reliability of the I-95 corridor before and after implementing various strategies - subject to data availability
Approach Highlight (2)

- Real-time component in IRISDS when ATR is expected to exceed DTR

- The sketch planning methods of the L07 project and the L08 project methods will be integrated with ITSDCAP to allow understanding the causes of unreliability

- Improvement strategies including those in L07 will be examined with inputs from project stakeholders to identify potential alternative mitigation actions

- The strategies will be evaluated using L07 and L08 products and the implementation of results will be investigated
Tasks 1-3

• Task 1: Attending project briefing

• Task 2: Development of revised research plan and concept of operations - based on Task 1, FDOT TSM&O program inputs, and FDOT TMC operation management inputs

• Task 3: Data compilation and integration - additional data collection and processing
Task 4 Baseline Reliability and Alternative Strategy

- In addition to the reliability metrics in ITSDCAP, reliability will be measured by % of trips with ATR within the allowable DTR.

- Integration and use of L07 and L08 products with ITSDCAP- modeling support module will provide data and generate scenario. Outputs will be imported to ITSDCAP to display.

- Assess existing conditions and perform before/after evaluation of implemented strategies.

- Influencing factor Analysis.

- Assessment of identified improvements based on L07 and L08.

- IRISDS will be modified to alert agencies when the system become unreliable.
Tasks 5-8

• Task 5: Preparation of interim report

• Task 6: Utilization of reliability analysis in the decision-making Process - based on L05 products and involvement of TSM&O agencies

• Task 7: Evaluation of the functionality and Outcomes of the products

• Task 8: Draft Final Report