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Incorporating Reliability Performance Measures in the Planning and Programming Processes

**SHRP 2 L05**

*presented to*
SHRP 2 Reliability Technical Coordinating Committee

*presented by*
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January 23, 2011

Transportation leadership you can trust.
What We’ll Cover

- Overview of approach
- Status of tasks
- Valuing travel time reliability
- Case study approach
- Framework development
The Team

- Cambridge Systematics
- Parsons Brinkerhoff
- Sharp & Company, Inc.
- Texas Transportation Institute
- Arun Chatterjee (consultant)
Project Objective:

To develop the means—including technical procedures—for state DOTs and MPOs to fully integrate mobility and reliability performance measures and strategies into the transportation planning and programming processes.

This will allow operational improvements of all types (including capital projects and other expenditures) to be considered in planning and programming along with more traditional types of project investments.
Status of Tasks

Phase I

- Literature review complete
- State-of-the-practice survey complete
- Identified potential case studies and validation approach for Phase II
- Draft Interim Report submitted

Phase II

- Draft reliability framework submitted
- Technical reference in progress
- Memorandum on agency communication & coordination in progress
- Draft handbook in progress
Many regions report on reliability, but there remains a gap in its use in formal transportation planning.

There is no experience with using long-range transportation planning models to directly estimate reliability.

Most of the performance measures that have been identified are developed from continuous data:

- Roadway detectors up to now
- Private vendor probe data a new resource

Most of the reliability estimates can be monetized.
State of the Practice Survey

- Total of 92 responses received (29 DOTs and 39 MPOs)
- Larger agencies are more likely to collect travel time data, track performance measures, and define and measure reliability
- Less than 25% of agencies monetize reliability or use it in their planning and programming process
- More than half are currently tracking or plan to track reliability
- Reliability is identified as a goal or objective in an agency’s LRTP or CMP, but is seldom used to prioritize projects
- Obstacles include lack of data availability, newness of the subject area, and lack of staff
Reliability Measures and Strategies

- Reliability Performance Measures
  - Buffer Index
  - Failure/On-Time Measures
  - 80th Percentile Travel Time Index (TTI)
  - Planning Time Index
  - Skew Statistic
  - Misery Index

- Clear link between improvement strategies and reliability
  - M&O strategies do not impact underlying cause of congestion, but are critical for addressing reliability
  - V/C ratios can be used to implement M&O strategies at times and locations most vulnerable to flow breakdowns
SHRP 2 Project L11 estimated the value of reliability using the innovative/nontraditional approach of options theory.

Research team conducted a meta-analysis of past studies:

- Studies compared by looking at the Reliability Ratio (VOR/VOT; VOT is the value of average travel time)
- Reliability is measured in different ways by these studies – important to know for application
- Far fewer studies for the VOR for freight
Preliminary recommendations:

» Reliability ratio for auto = 0.90 – 1.25
» Reliability ratio for bus = 0.85 – 1.15

Work that needs to be completed:

» Application of L11 method to more case studies
» Develop reliability ratio range for freight
  • Studies indicate substantial difference based on commodity
» Narrow passenger ranges
Organized around work products and processes within the planning process

- Different scales of work products create different needs

Integration touches multiple issues

- Technical – tools/procedures to address reliability
- Institutional – coordination with appropriate other groups, agencies
- Cultural – readiness of agencies to change
# Framework Development

## Relationship between Products and Processes

<table>
<thead>
<tr>
<th>Products</th>
<th>Set goals and objectives</th>
<th>Identify needs and deficiencies</th>
<th>Evaluate program trade-offs</th>
<th>Identify improvement strategies and projects</th>
<th>Evaluate and prioritize projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>State LRTP</td>
<td>Universal</td>
<td>Frequent</td>
<td>Rare</td>
<td>Rare</td>
<td>Rare</td>
</tr>
<tr>
<td>MPO LRTP</td>
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<td>Frequent</td>
<td>Some</td>
<td>Frequent</td>
<td>Some</td>
</tr>
<tr>
<td>Congestion management process</td>
<td>Some</td>
<td>Universal</td>
<td>Rare</td>
<td>Universal</td>
<td>Some</td>
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<tr>
<td>STIP/TIP</td>
<td>Rare</td>
<td>Never</td>
<td>Rare</td>
<td>Universal</td>
<td>Universal</td>
</tr>
<tr>
<td>Project plans/environmental review</td>
<td>Rare</td>
<td>Rare</td>
<td>Never</td>
<td>Universal</td>
<td>Frequent</td>
</tr>
<tr>
<td>Other specialized plans</td>
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<td>Never</td>
<td>Some</td>
<td>Rare</td>
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<tr>
<td>ITS Plans</td>
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<td>Universal</td>
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<td>Some</td>
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<tr>
<td>Plans for Operations</td>
<td>Some</td>
<td>Frequent</td>
<td>Never</td>
<td>Frequent</td>
<td>Some</td>
</tr>
<tr>
<td>Level</td>
<td>Data</td>
<td>Technical Capability</td>
<td>Resources</td>
<td></td>
<td></td>
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<td>--------</td>
<td>-------------------------------------------</td>
<td>---------------------------------------------</td>
<td>------------------------------------------------</td>
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</tr>
<tr>
<td>Good</td>
<td>Limited travel time data, possibly only traffic counts</td>
<td>No model available Limited familiarity with statistical methods</td>
<td>Small scale study or limited resources for technical analysis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Better</td>
<td>Some continuous travel time data, but mostly traffic counts</td>
<td>Travel demand model available Some familiarity with statistical methods</td>
<td>Reasonable resource and staff capacity to do technical analysis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Best</td>
<td>Significant continuous travel time data and traffic counts</td>
<td>Travel demand models and simulation models available Very familiar with statistical methods</td>
<td>Significant resources</td>
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</table>
Case Study Approach

- Validate draft handbook around actual planning work products
  - Up to 5 sites
  - One or more work products (LRTP, CMP, TIP, etc.) per site

- Selection criteria
  - Understanding of reliability
  - Area size and density of development
  - Number of jurisdictions
  - Agency type – DOTs and MPOs consulted for all case studies
  - Geography

Case study sites have to be willing and active participants
Next Steps

- Draft framework for integrating reliability into the planning/programming process – January 2011
- Draft handbook – February 2011
- Case study validation – March 2011-October 2011