WRTM Performance Measurement State of Practice, Overview

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Talking Technology and Transportation (T3) Webinar

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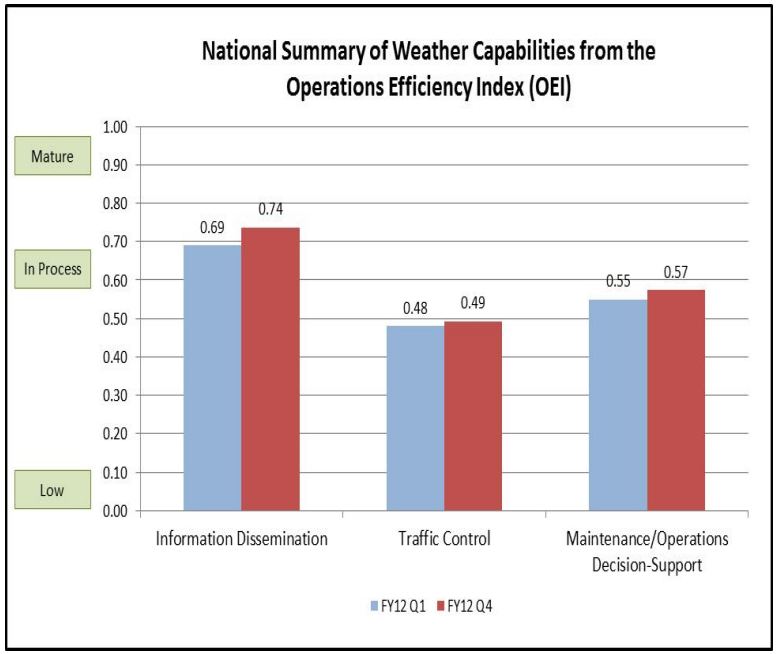
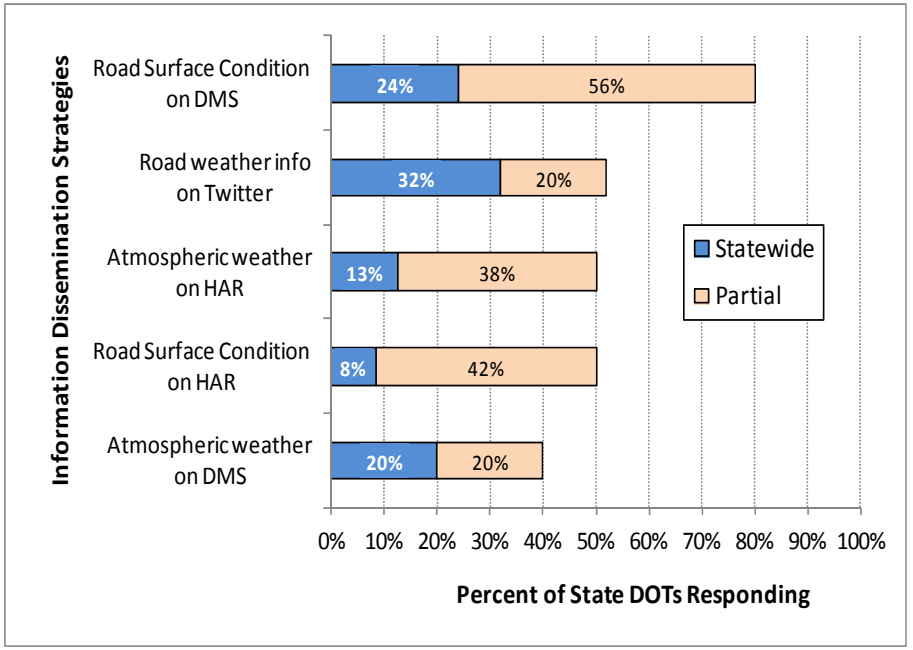
1:00pm – 2:30pm EDT

Operational Deployment of WRTM is Growing



Measure: Weather Capabilities Assessment in Top 40 Metro Areas



Measure: Percent of State DOTs Indicating Extent of Deployment of Selected Information Dissemination Strategies: 2013

- Further progress since 2007 in the deployment of road weather information to the traveling public, though direct comparisons are difficult given differences in the surveys conducted in 2007 and 2013 and the response rates for these surveys
- Several strategies are still in partial deployment and not deployed Statewide (where needed)

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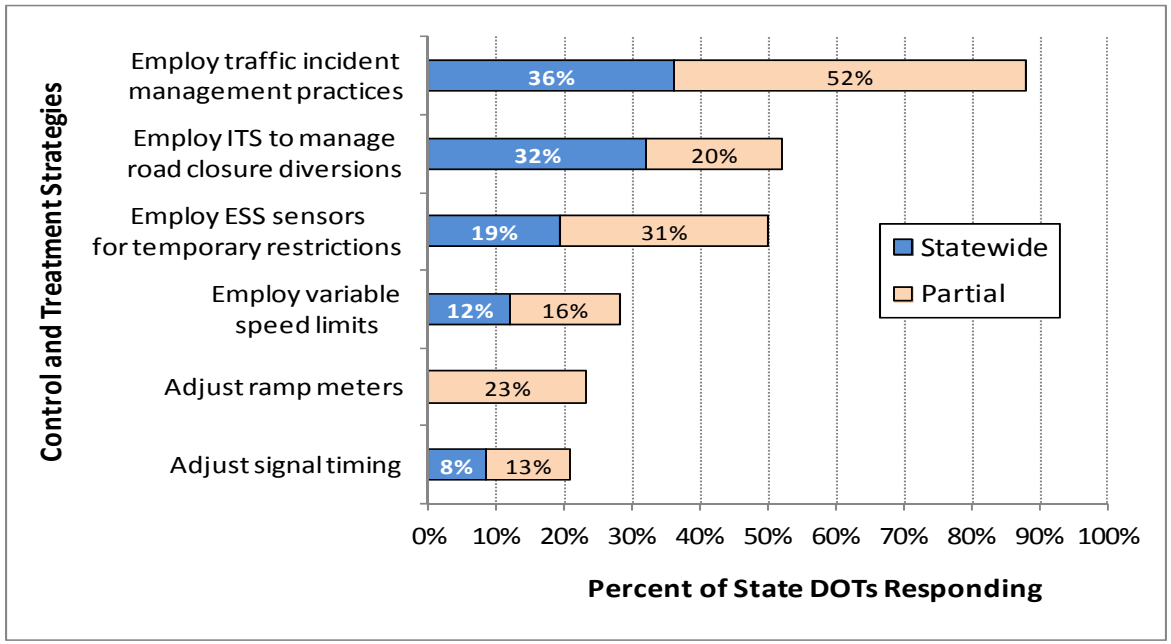


Measure: Percent of State DOTs Indicating Extent of Deployment of Selected Control and Treatment Strategies: 2013

- Most widely deployed, either partially or Statewide (88 percent of State DOTs), are traffic incident management practices in response to inclement weather
- Adjusting signal timing at intersections in response to weather remains relatively rare, with twenty-one (21) percent of State DOTs deploying this strategy either partially or Statewide
- The use of the other control and treatment strategies falls in between these two strategies

Performance Measurement Need

- Ensure that WRTM is having the desired effect and outcomes
- Provide information to prioritize resources and justify future investments
- Provide hard evidence of performance and benefit
- Encourage wider deployment of WRTM strategies serving national transportation goals.

Outputs versus Outcomes for WRTM

Output Measures

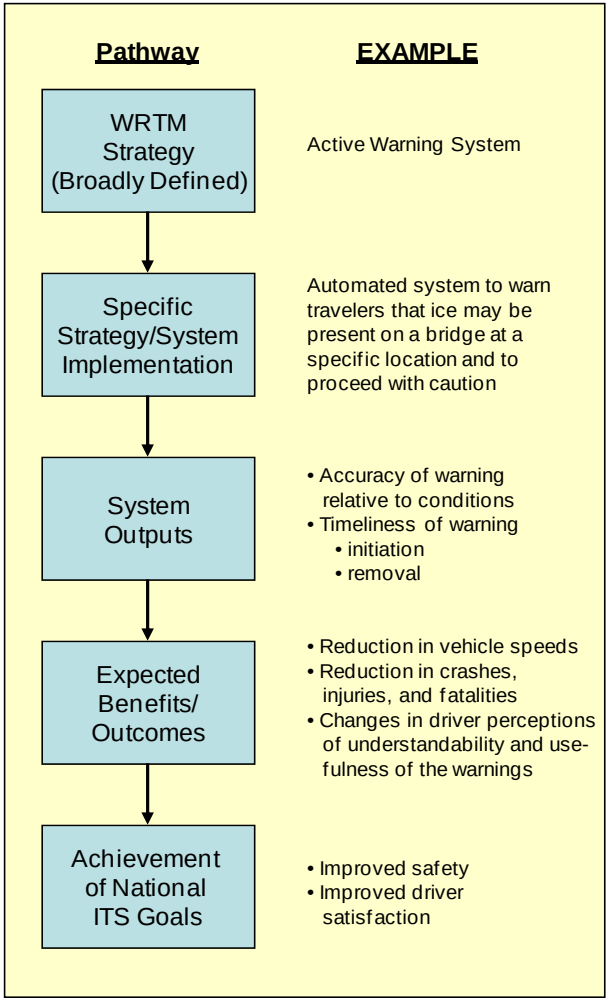
- Includes measures like timeliness, accuracy, activations.
- “Did the system work?”
- Easier to collect and report
- Important to determine the pathway to benefits
- Straightforward

Outcomes

- Includes measures like changes to speeds, speed variability, delays, crash frequency/severity
- “Did the system have an impact”
- Harder to collect and quantify
- Require the development of evaluation framework

Pathway to Benefits

- WRTM strategies create outcomes in different ways
- Understanding the pathway to benefits is critical to measuring performance
- Follow a structured process to demonstrate results



Categories of Performance

- Mobility
- Safety
- Traveler/Customer
- Agency Performance
- Cost-effectiveness

Typical Data Requirements

- System Installation/Implementation Details
- System Operations Records
- Traffic Data
- Crash and Safety Data
- Weather Data
- Traveler/Customer Satisfaction Data
- Agency Performance Data

Ongoing Challenges

- Seasonal variability in weather year to year
- Unclear understanding of how a particular WRTM strategy might yield benefits
- Quantifying the “do-nothing” response
- Lack of baseline data on travel safety
- External factors often confound the effects of WRTM strategies

Examples of System Performance Outcome measures during Weather Events

Strategies	Traffic Flow Impacts	Reporting State
Low Visibility Warning Systems	More uniform traffic flow reduced speed variability by 22 percent speeds increased 11 percent.[1]	Salt Lake City, Utah
Highway Advisory Radio	1/3 of Commercial Vehicle Operators (CVOs) reported (when interviewed) that they would change routes based on road weather information provided.[2]	Washington
High Wind Warning System	90 percent of motorists surveyed indicated they would slow down in response to messages displayed .[3]	Oregon
Road Weather Information Systems and Highway Advisory Radio	56 percent agreed the information helped them avoid travel delays.[4]	Washington
Weather Related Signal Timing	Reduced vehicle delay by 8 percent and vehicle stops by over 5 percent.[5]	Minneapolis/St. Paul
En-Route Weather Alerts and Pavement Condition Information	Average vehicle speeds decreased by 23 percent when traffic managers displayed condition data during high winds (i.e., wind speeds over 20 mph).[6] Average speeds were 12 percent lower when the system was activated during high wind events occurring simultaneously with moderate to heavy precipitation.[7] Average speeds declined by 35 percent when warnings were displayed on the signs when the pavement was snow-covered and wind speeds were high.[8]	Idaho
	In light rain condition, the 85th percentile speed decreased by 8 percent and speed variance was reduced from 6.7 mph to 5.7 mph.[9] During heavy rain, the 85th percentile decreased by 20 percent and speed variance was reduced from 6.1 to 5.6 mph.[10]	Florida

- Limited examples of capacity and reliability improvements observed in the literature
- Reliability improvements have mostly been attributed to pre-trip and en-route traveler information
- Very few agencies track reliability measures, and even the ones that do, do not distinguish between the various causes of reliability

Available Guidance
FHWA-JPO-11-086

Active Warning Systems

Description: Active warning systems could supplement passive warning signs with flashing beacons to alert travelers that the conditions specified on the static sign are currently in effect. Additionally, an active warning system could include a changeable message sign activated automatically or manually from an operations center. The flashing beacons may be activated either manually by operators in a traffic management center or by field personnel based on observed conditions, or automatically if tied to a road weather monitoring system (such as a flood detection stream gauge or a high wind detection system).

Examples of Strategy Applications:

- Ice on a bridge
- High winds in a defined location
- Static sign with flashers warning about a specific condition in a specific location
- CMS with specific weather-related messages
- Manual or automated system implementation

Key Inputs:

- Operational procedures that guide manual operation of the system
- Operator training
- Sensors that measure and report on road weather conditions or automatically trigger a message sign
- Time stamped archived road weather condition information (appropriate to site locations, and before, during and after warning time periods)
- Traffic condition information

Key Output MOEs:

- Timeliness of issuance of warning
- Timeliness of removal of warning
- Accuracy of warning relative to conditions
- Time lag between when weather condition threshold exceeded and operator action taken

Data Requirements:

- System record (or operator log) of all warnings issued in a defined period (message content)
- System record (or operator log) of dates and times warnings were issued
- System record (or operator log) of dates and times warnings were removed
- Reports from field, or traveler surveys/interviews, of warning appropriateness for conditions
- System record of date and time of first receipt of condition indication that triggered the warning

Key Outcome MOEs:

- Reduction in vehicle speeds in area of warning
- Reduction in number of crashes, injuries and fatalities (in proximity to warning system)
- Reduction in mobility impairments (throughput, speeds maintained)
- Changes in driver perceptions of understandability and usefulness of warning

Data Requirements:

- Traffic information at warning site (type, speed, flow, etc.) from field sensors or reports
- State records of crashes, injuries, fatalities, in area of warning, under defined weather conditions
- Traveler survey/interviews that measure whether warning was properly interpreted and understood, and how useful drivers found the warning

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