Findings and Lessons from an MDSS Winter Deployment: MaineDOT

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MDSS System Background

• DTN Meteorlogix WeatherSentry used by MaineDOT Scarborough crew in Portland, ME area during winter 2006-07

• System offered:
  – Forecasts of storm start & end times
  – Precipitation type and amount
  – Air and pavement temperature
  – Bridge frost
  – Treatment recommendations
  – NWS information on a GIS platform
  – Storm alerts (via web, e-mail, text messages)
  – Multiple forecast points
  – Weather conditions, patterns, trends
Map of Study Route (~12 miles)
Assessment Approach

• Initially planned as a benefit-cost assessment with before-after design and hypothesis tests
  – Not a feasible approach in limited time period due to lack of baseline collection and data collection time constraints
  – Current usage not conducive to “with or without” study with adjacent routes

• Changed scope to a case study with lessons learned

• Methodology was an intensive reconstruction of each storm event
  – Tracked resource usage (materials, equipment, labor)
  – Debriefing interviews after each storm event to record storm details, information used, role of the MDSS, actions taken
  – Retrospective assessment of what crew would have done in the absence of an MDSS
Winter Storms of 2006-07, Portland, ME

Start dates for 18 winter storm events
(reconstructed first 12 in detail)
Findings and Lessons

- Southern Maine’s maritime climate made storm forecasting particularly difficult
  - The MDSS was more accurate forecasting the start time of a storm (which was very important to Maine DOT) than the precipitation type and amount

Lesson:

- MDSS forecast accuracy and consistency are important factors leading to user trust and confidence
  - Local observational data are an essential ingredient in support of accurate forecasts
  - Crews are more likely to follow MDSS recommendations when its forecasts and treatment recommendations appear accurate
  - Crews need to be willing to follow MDSS recommendations in order to fairly assess their value
Findings and Lessons (continued)

• The first season using an MDSS can offer a valuable learning experience
  – MaineDOT saw this as a step toward integrating route-specific weather and pavement condition information along with region-wide NWS forecasts on a GIS platform
  – First time users have a chance to experiment with the MDSS and explore its potential

Lesson:

• There is a lot of information to get used to. Experience working with the service and training by MDSS vendor are needed to achieve the full potential of an MDSS
  – Crews need to understand the “pathways to benefits”
  – On-going vendor support is essential
  – Learning and fully accepting a new MDSS will take time
Findings and Lessons (continued)

• The MaineDOT crew intentionally applied more materials than the MDSS recommended
  – The crew historically uses more materials in their road treatments, to avoid having to play “catch up” if conditions worsen
  – Treatment recommendation protocols were placed in the MDSS based on state-wide average treatments.
  – The statewide averages were low for the study location, which is a priority corridor in Maine

Lesson:

• An MDSS needs to be configured to fit local conditions as well as national best practices
  – A finely tuned MDSS can offer savings in labor and materials.
  – DOTs should work closely with the MDSS vendor to develop customized recommendations which incorporate local conditions as well as national/state-wide best practices
Findings and Lessons (continued)

• MDSS alerts warning of an approaching storm are useful
  – Forecast of precipitation type, amount and timing
  – Signals a need to consult MDSS in detail

• Too many alerts can be distracting and not useful

Lesson:

• Carefully select alert parameters and timing that will be most helpful in making road treatment decisions
  – Consider alerts outside the immediate maintenance area to provide earlier warnings
  – Only issue alerts when conditions or forecast have changed
  – Only issue alerts when conditions vary significantly between forecast points
Findings and Lessons (continued)

• MaineDOT found an MDSS more useful at the front end of a storm than during the storm
  – Current condition information was not well integrated
  – The maintenance crew was too focused on “fighting the storm” to have time to effectively make use of an MDSS

Lesson:

• To be useful during the storm, the integration of prior pavement treatment data, current conditions, and forecasts into an MDSS, allowing forward corrections, is essential
  – Crews need to learn how to evaluate and interpret MDSS forecast trends to use that information in on-going decision making during a storm
Findings and Lessons (continued)

• The MDSS was used by MaineDOT as one of several “tools” in their toolbox, including:
  – Various weather forecasting services
  – Other nearby maintenance crews
  – Neighboring states
  – On-the-road observations and experienced judgment
  – The Augusta control center (which also tracked the MDSS)

Lesson:

• An MDSS is an important new tool being added to the road weather management tool box
  – An integrated platform for forecast display and analysis
  – New capabilities not previously available (pavement temperature and bridge frost forecasts, historical trends, alerts)
  – Offers educational/training value
Final Thoughts from Maine Assessment

• An MDSS offers important new benefits
  – An integrated GIS platform that state DOTs can use to assess a variety of weather data
  – A new perspective, efficient strategies, and potential cost savings for state-wide road maintenance
  – Consistent treatment recommendations based on best practices
  – Educational and training value for management and crews

• The needs for winter maintenance decision support tools are likely to vary from state to state
  – From a basic weather forecasting / observation tool to a fully elaborated MDSS tool
  – This suggests the value of encouraging different kinds and complexities of tools that provide viable choices to meet different needs
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