FHWA Maintenance Operations Update

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FHWA Office of Operations

July 25, 2018
Outline

• EDC-4: Weather Savvy Roads
• EDC-5: Weather Responsive Management Strategies
• Other Road Weather Management Activities
• Work Zone Management Update
Road Weather Management Program Update
Every Day Counts (EDC) 4: Weather Savvy Roads
What is Every Day Counts?

State-based model to identify and rapidly deploy proven but underutilized innovations to:

- shorten the project delivery process
- enhance roadway safety
- reduce congestion
- improve environmental sustainability

- EDC Rounds: 2-year cycles
- Currently 5th Round (2019-2020) - 10 innovations
- To date: 4 Rounds, 46 innovations
Innovation Deployment Stages

- Not Implementing
- Development
- Demonstration
- Assessment
- Institutionalized
EDC-4 Initiative (2017-2018)

Weather Savvy Roads - Promotes adoption of two distinct road weather management solutions:

(1) **Pathfinder** - brings together DOTs and the National Weather Service to provide consistent messaging on adverse weather and road conditions.

(2) **Integrating Mobile Observations (IMO)** - advanced vehicle-based technologies for road weather data collection and applications.
Video overview of FHWA’s WSR

https://www.youtube.com/watch?v=VecXvUwMcGc&amp;t=18s
What is Pathfinder?

- **Collaboration** between the National Weather Service (NWS), State DOTs, and support contractors to share and translate forecasts into consistent public transportation impact messages.

- Disseminates road weather information that is:
  - clear,
  - concise,
  - consistent, and
  - impact-based.

**Intended Outcome** - Drivers are well informed and able to make safe and efficient travel decisions.
Pathfinder Core Partners

- **National Weather Service:** Experts at weather forecast

- **Private Sector Weather Providers:** Experts at road weather forecasts

- **State DOTs:** Experts at operating and maintaining the roadways - knowledgeable about the state of the roadways and the impact to the traveling public

- **State Emergency Managers:** included in core partners to coordinate activities during high impact events

- **Public Information Officers:** sends the message to the media & public
Why Do We Need Pathfinder?

“[W]e [forecasters] were very clear snow would begin between 4-6 a.m., which it did. We were very clear accumulating snow would coincide with commuting time - which it did. We were very clear the commute would be a difficult one - which it was.

But in spite of this “clear” forecast, many motorists, school systems, and governments treated Tuesday morning’s rush hour like any other. Somewhere the message that the roads would be horrible did not reach the masses.

But I think where we all erred was in the messaging. Our forecast wording - across the board - did not convey the necessary sense of urgency. We did not say in a consistent, unified way it could be really bad Tuesday morning: stay off the roads if possible and wait the storm out.”

Washington Post 1/7/2015

Travelers need to know:
- Timing, location and duration of weather event
- Impact of weather on road conditions
- Impact of agency maintenance and traffic management actions
- If messages are consistent across multiple sources
Pathfinder Document

- Describes 8 basic steps and associated requirements
- Provides examples from State DOT implementations
- Characterizes agency organizational structure
- Companion workbook walks team through the implementation process
8-Step Implementation Process

1. Identify **partners**
2. Determine qualifying collaboration **events**
3. Select **communication media** and set procedures
4. Establish **point person** at each participating partner
5. Synchronize **forecast** schedules
6. Establish **definitions** and create shared **resources**
7. Create shared Impact **message** for the public
8. Conduct post event **review** and data **archiving**
Utah DOT Pathfinder Implementation Outcomes

- Well forecasted, unified messages
- Reduction in VMT during snow events
- Public is more apt to modify their travel plans
  - Changed schedule
  - Changed route
  - Did not travel
  - Used transit
- Trust is built among the public if all sources state the same road impacts
- DOT Maintenance is more effective, with less congestion on the roads
- Improved safety and mobility overall
What is Integrating Mobile Observations (IMO)?

Weather and road condition data collection from fleet vehicles for a more comprehensive view of network conditions

Advanced, vehicle-based technologies are deployed to collect, transmit, and use weather, road condition, and related vehicle data

Intended Outcome - Utilizing enhanced data for more informed system management (maintenance, traffic, asset, performance)

Source: Wyoming DOT
Why implement IMO?

- Aid salt reduction strategies
- Optimize maintenance resources
- Generate actionable, automated alerts and messages
- Provide traveling public timely and valuable information

Improve efficiency, enhance effectiveness, increase accountability
IMO System Components

• On-board Systems & Graphical User Interface (Front-end)
• Communication platform
• Data processing Servers (Back-end)
IMO Pilot Testbeds

Three states explored the feasibility of using vehicle-based data to improve transportation safety & mobility.

**Minnesota DOT**
- ~590 Vehicles
- Data
  - Air Temperature
  - Relative Humidity
  - Surface Temperature
  - Wiper Status
  - Brake Status
- Camera Images
- AVL, Cellular, & DSRC

**Michigan DOT**
- ~15 IMO Vehicles + 310 Snow Plows
- Data
  - Air Temperature
  - Relative Humidity
  - Surface Temperature
  - Brake Status
  - Accelerometer
- Camera Images
- Cellular, DSRC, & WiFi

**Nevada DOT**
- ~60 Vehicles
- Data
  - Air Temperature
  - Relative Humidity
  - Surface Temperature
  - Wiper Status
  - Diagnostics Status
- Radio, Cellular, & DSRC

Source: FHWA
Nevada IMO System Framework

Applications & Management Strategies
- Winter Maintenance
- Treatment Recommendations
- Material Usage Tracking
- Traffic Management
- Traveler Information
- Data Management Systems
- Weather Data Environment
- Vehicle Data Translator

In-Vehicle Equipment
- Weather sensors
- Vehicle sensors (OBU, CANBus)
- Equipment sensors (spreader)
- Location sensor (GPS)
- Radio(s)

Source: Nevada DOT
Michigan IMO System Framework

Source: Michigan DOT
IMO Captured Images

Source: Michigan DOT
Examples of Motorist Advisory and Warnings (MI)

- Variable Speed Limit Sign
- Severe Weather Warning Sign
- Dynamic Message Sign

WHITE OUT CONDITIONS ON I-94
REDUCE SPEED

SLIPPERY ROADS
WB I-94
REDUCE SPEED

Source: Michigan DOT
Michigan DOT Website
IMO Deployment States

IMO Adoption (23)
Active but not Adopting Under EDC-4
Not Implementing
Weather Savvy Roads Toolkit

- **IMO Materials**
  (https://go.usa.gov/xnS8V)
  - Getting Data into the Weather Data Environment
  - Leveraging Communication Systems – Nevada DOT Case Study
  - Using the National Architecture for Implementing WSR
  - WSR Benefits and Costs

- **Pathfinder Materials**
  (https://go.usa.gov/xnS8m)
  - Pathfinder Overview
  - Colorado’s Pathfinder Process
  - Managing the Total Solar Eclipse – Wyoming DOT Case Study
  - WSR Benefits and Costs

https://go.usa.gov/xnSqy
EDC-5: Weather-Responsive Management Strategies

• One of 10 initiatives selected for 2019-2020
• Focuses on using mobile and connected vehicle data for traffic and maintenance management during weather events
• Includes 2 types of strategies
  ✓ Traffic Management (Advisory and Control)
  ✓ Maintenance Management (Snow and Ice Control)

https://www.fhwa.dot.gov/innovation/everydaycounts/edc_5/weather_strategies.cfm
Weather-Responsive Traffic Management Guidelines

- Provides guidance to agencies on using CV data for WRTM
- Describes required capabilities
- Identifies appropriate pathways for implementation
- Provide concepts and examples of CV-WRTM applications

# EDC-5 Innovation Deployment Team

<table>
<thead>
<tr>
<th>Role</th>
<th>Team Member</th>
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<tbody>
<tr>
<td><strong>Lead</strong></td>
<td>Roemer Alfelor (FHWA HQ - RWM Team)</td>
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<td></td>
<td>Paul Pisano (FHWA HQ - RWM Team)</td>
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<td><strong>FHWA Team</strong></td>
<td>Gabriel Guevara (FHWA HQ - RWM Team)</td>
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<td></td>
<td>Ray Murphy (FHWA Resource Center)</td>
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<td></td>
<td>Kevin Moody (FHWA Resource Center)</td>
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<td></td>
<td>Sharon Gordon (FHWA Center for Local Aid Support)</td>
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<td><strong>AASHTO</strong></td>
<td>Rick Nelson (AASHTO)</td>
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<tr>
<td><strong>State DOT</strong></td>
<td>Steve Cook (Michigan DOT)</td>
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<tr>
<td></td>
<td>Vince Garcia (Wyoming DOT)</td>
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<td></td>
<td>Rodney Schilling/Ambere Angel (Nevada DOT)</td>
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<td></td>
<td>Joe Huneke (Minnesota DOT)</td>
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<tr>
<td><strong>Local Agency</strong></td>
<td>Bret Hodne (West Des Moines, IA)</td>
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<tr>
<td><strong>Support Contractor</strong></td>
<td>Rachel Ostroff (ICF)</td>
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<td></td>
<td>Cindy Auten (ICF)</td>
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<td></td>
<td>Deepak Gopalakrishna (ICF)</td>
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<td>Fred Kitchener (McFarland)</td>
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<td>Brenda Boyce (BAH)</td>
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EDC-5 Summits

**EDC-5 Summit Locations**

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<tr>
<th>Region</th>
<th>Dates</th>
<th>Hotel Location</th>
<th>States</th>
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<tbody>
<tr>
<td>DC</td>
<td>Thurs/Fri Oct 18-19</td>
<td>Hilton Baltimore, Maryland</td>
<td>(9) DC, DE, VA, MD, NJ, PA, OH, WV, FLH</td>
</tr>
<tr>
<td>North</td>
<td>Wed/Thur Oct 24-25</td>
<td>Hilton Albany, New York</td>
<td>(7) ME, NH, VT, NY, MA, CT, RI</td>
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<tr>
<td>Mid-America</td>
<td>Mon/Tues Oct 29-30</td>
<td>Sheraton Westport St. Louis, Missouri</td>
<td>(13) ND, SD, NE, KS, OK, TX, MN, IA, MO, WI, IL, IN, MI</td>
</tr>
<tr>
<td>West</td>
<td>Thurs/Fri Nov 8-9</td>
<td>DoubleTree by Hilton Portland, Oregon</td>
<td>(14) WA, OR, CA, NV, AZ, UT, NM, CO, WY, MT, ID, AK, HI, WFL, CFL</td>
</tr>
<tr>
<td>South</td>
<td>Tues/Wed Nov 27/28</td>
<td>The Florida Hotel Orlando, Florida</td>
<td>(12) PR, VI, FL, LA, MS, AR, AL, GA, SC, NC, TN, KY</td>
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RWM CMF Workshops

- Evaluate and enhance agency RWM capabilities through interactive discussions and list of prioritized actions
- Conducted 12 workshops in 11 States
- Recently kicked-off new RWM CMF task for 8 additional workshops (MD on Aug 27)
- Adding climate overlay

Contact Roemer Alfelor to request a workshop.
Recent Products/Activities

• Integrated Model for Road Condition Prediction (IMRCP)
  – Implementation in Kansas City (underway)

• Pikalert (VDT)
  – Implementation in Wyoming DOT CV Pilot Deployment

• Webinars
  – RWM Regional Roundtable Meetings (April 2018)
  – Effective Weather Messaging Webinar (April 2018)
  – CV-WRTM Implementation (April 2018)
  – TSMO and Extreme Weather (June 2018)

• Pathfinder Summit Meeting
  – June 26-27, 2018, Salt Lake City UT
Upcoming Activities

- IMO Peer Exchange and Demo Workshop
  - Aug 7-8, 2018, Des Moines, IA
- RWM Stakeholder Meeting
  - September 18-20, 2018, Louisville KY
- 2019 RWM Performance Measures Update
  - To start September 2018
- RWM Training Courses
  - Transitioning CITE Courses to NHI courses (web-based)
Work Zone Management Update
Work Zone Data initiative

- Enables sharing of Work Zone Activity Data (WZAD - the “what”, “where”, and “when” of work zones) through the development of a national **WZAD specification**.
- Results in real-time, accurate, and comprehensive data in an open, standard format.
- **Activities:**
  - Develop critical documents such as a Concept of Operations for standardized WZAD, a data dictionary, and an Implementation Guide
  - Extensive coordination with stakeholders, including:
    - Stakeholder Engagement - Presentations, webinars, workshops
    - WZAD Pilots to demonstrate and evaluate the process
    - Symposium at National Work Zone Management Conference (Sept. 11, 2018)
Work Zone ITS Planning Tool

- Work Zone ITS (WZITS) Planning Tool implements the logic and methodology described in the FHWA WZITS Implementation Guide
  - Guides through the 6-step WZITS decision-making process
  - Documents decisions made with supporting information
- Available for download and use from USDOT’s Open Source Application Development Portal (OSADP)
  - https://www.itsforge.net/index.php/community/explore-applications#/40/150
- FHWA is sponsoring several demonstration workshops around the country
  - If you are interested in participating in one of these workshops contact your Division Office representative or Jawad Paracha (jawad.paracha@dot.gov).
NCHRP Synthesis 49-04: Very Short Duration Work Zones

Survey on Temporary Traffic Control Methods:
- Activities performed by maintenance crews
- How those activities are set up
- Factors considered in decision-making
- Agency policies and support documents
- Innovations to reduce exposure and/or enhance visibility,
- Lessons learned
- Worker training

Contact:
LuAnn Theiss, TTI, 979.845.9949, L-Theiss@tti.tamu.edu
Other Work Zone Activities

- **Work Zone Capability Maturity and Process Review Workshops**
  - 12 workshops completed
  - 7 more planned over the next 12 months
- **Targeted Work Zone Engagement**
  - Top 10 states (TX, FL, CA, IL, GA, PA, OH, OK, IN, TN)
  - Targeted Workshops and State Specific WZM Action Plans
- **Work Zone Management Stakeholder Meeting**
  - September 13, 2018 in Herndon, VA (near Dulles airport)
  - Discussion with State DOT practitioners on hot WZM issues
  - The Stakeholder Meeting is part of the National Work Zone Management Conference (September 11-13, 2018)