Using Mobile and Crowdsourced Data for Weather Responsive Management Strategies

An EDC-5 Joint Initiative Webinar
Weather-Responsive Management Strategies | Crowdsourcing for Operations

July 18, 2019
Poll #1: Please identify your organization type

A. State DOT
B. Local Agency
C. Federal Government
D. Private Contractor/Consultant/Vendor
E. Academia
F. Industry/Trade Association
G. Others
Topics

• EDC Program and Initiatives Overview
• WRMS and Crowdsourcing Deployment Use Cases
  • Use of Field Data (Wyoming DOT)
  • Use of Crowdsourced Data (Utah DOT)
  • Use of 3rd Party Data (Kentucky TC)
• Q&A
• Wrap-Up and Upcoming Activities
Speakers

FHWA Every Day Counts Round 5 Innovation Teams

James Colyar
FHWA Innovative Operations Strategies Program

Roemer Alfelor
FHWA Road Weather Management Program

Implementers

WYOMING DOT
Vince Garcia, GIS/ITS Program Manager
Ali Ragan, Project Manager

KENTUCKY TRANSPORTATION CABINET
Randi Feltner, Transportation Engineering Specialist
Chris Lambert, IT Data Systems Specialist

UTAH DOT
Lisa Miller, Traveler Information Manager
“Every Day Counts” (EDC) Program

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
- 5th Round (2019 – 2020) – 10 innovations
- To date: 4 rounds, over 40 innovations

For more information: https://www.fhwa.dot.gov/innovation/

Today’s Focus:
Weather-Responsive Management Strategies (WRMS)
Crowdsourcing for Operations
Weather-Responsive Management Strategies (WRMS)

Use of road weather data from mobile sources and connected vehicle technologies to:
- Improve existing traffic and maintenance management strategies in inclement weather
- Reduce weather-based environmental impacts on the transportation system

Mitigates the impact of numerous unsafe conditions:
- Winter weather (snow, ice, sleet)
- Hurricanes
- Flooding
- Fog

Source: Michigan DOT
WRMS Strategies

Traffic Management Strategies
• Motorist Advisory and Warning System
• Signal Timing and Ramp Metering
• Variable Speed Limit
• Road/Lane Closure
• Traffic Diversion
• Vehicle Restriction

Maintenance Management Strategies
• Anti-icing and De-icing
• Plowing and Snow Removal
• Route Optimization/Vehicle Tracking
• Debris Removal
• Water Drainage Maintenance
• Vegetation Control

Source: Arizona DOT
WRMS Data Sources

- Vehicle-based Road Weather Sensors
  - Friction, Temperature, Precipitation, Snow Depth, etc.
- On-board cameras
- Global Positioning System receivers/AVL Systems
- Electronic tablets
- **Cell Phones and Personal Digital Assistants (PDA)**
- Third party data providers
- Vehicle Controller Area Network (CAN) Bus

*Sources: Wyoming DOT, Nevada DOT, City of West Des Moines, IA, Utah DOT*
Poll #2: What are your agency sources of mobile road weather data? *(Pick all the apply)*

A. Vehicle-based Road Weather Sensors  
B. On-board cameras  
C. Global Positioning System receivers/AVL Systems  
D. Electronic tablets, Cell Phones and Personal Digital Assistants (PDA)  
E. Third-party data providers  
F. Not collecting mobile road weather data
WRMS Deployment States

Across the country WRMS is being implemented for a variety of events:

- Winter weather
- Flooding
- Dust Storms
- Wildfires
## WRMS Deployment Examples

<table>
<thead>
<tr>
<th>State</th>
<th>Services</th>
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<tbody>
<tr>
<td>Michigan</td>
<td>Traveler Information System (DMS, Website, Mobile App)</td>
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<td>Roadside Maintenance</td>
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<td>Minnesota</td>
<td>Web-Maintenance Decision-Support System (WebMDSS)</td>
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<td>Motorist Advisory Warning and 511 Traveler Information</td>
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<td>Fleet Management and Vehicle Maintenance Info</td>
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<td>Nevada</td>
<td>Winter Maintenance Treatment Recommendations</td>
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<td>Material Usage Tracking</td>
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<td>Traveler Information System</td>
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<tr>
<td>South Dakota</td>
<td>Traveler Information System (Condition and Threat Forecasts)</td>
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<td>Utah DOT</td>
<td>Traveler Information using Data from Mobile App</td>
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<td>Wyoming DOT</td>
<td>Dynamic Message Signs (Traveler Information)</td>
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<tr>
<td></td>
<td>Variable Speed Limit</td>
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<tr>
<td>City of West Des Moines, IA</td>
<td>Traveler Information</td>
</tr>
<tr>
<td></td>
<td>Material Management</td>
</tr>
<tr>
<td></td>
<td>Snow Plow Location/Route Optimization</td>
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</table>
What Exactly is Crowdsourcing?

The practice of addressing a need or problem by enlisting the services of a large number of people via technologies. Crowdsourcing:

- Addresses a need or problem outside of an organization’s resources or means by distributing the workload across a large group of people.

- Leverages the collective wisdom and unique insights of a crowd.

- Uses technology and new forms of communication and interaction to document, share, and reflect on the world.
Real-Time Monitoring: A Weakness in Transportation Operations

There are 4 primary limitations in our typical approach to real-time monitoring:

- Big gaps in geographic coverage
- Lags in timeliness of information
- Cost to build-out and maintain field equipment
- Jurisdictional stovepipes

These limitations reduce the ability to efficiently and (cost) effectively detect and respond to incidents as well as manage demand, work zones, road weather, and planned events.

Source: FHWA
Sources of Data

• Acquired from third-party data providers
• Collected from specially developed mobile apps or mobile infrastructure
• Extracted from social media platforms

Data is sourced whenever and wherever people travel.
Crowdsourcing Overcomes Monitoring Challenges

Because data is sourced whenever and wherever people travel, crowdsourcing...

Eliminates Geographic Gaps
- Find out what happens between sensors
- Find out what happens in rural regions, arterials, and other streets with few sensors
- Find out what happens beyond jurisdictional boundaries

Improves Information Timeliness
- Data can be pushed real-time to TMC

Improves Cost-effectiveness
- Some data is free, little cost to ‘ingest’ data
- Some data at cost point better than new monitoring infrastructure outlays
- Archived data can be used to improve planning for operations and long term planning

Source: Unsplash
Crowdsourcing Improves TSMO Applications

Other possible applications include freight management, work zone management, and performance assessment and reporting.
EDC-5 Crowdsourcing for Operations Innovation

Innovation Goal

To increase the number of agencies that use crowdsourcing to better operate the transportation system through new, cost-effective, and proactive operational strategies and applications.

The National Team is helping 30+ States and local agencies with:

- Understanding operational gaps or needs
- Identifying the right application & data
- Fostering executive & technical buy-in
- Developing technical/programmatic skills
- Defining data management processes
- Navigating funding and procurement
- Assessing architecture approaches

Innovation Goal

To increase the number of agencies that use crowdsourcing to better operate the transportation system through new, cost-effective, and proactive operational strategies and applications.
## EDC-5 Crowdsourcing State Advancement Goals

<table>
<thead>
<tr>
<th>Stage</th>
<th>Leap (9 states)</th>
<th>Jump (17 states)</th>
<th>Walk (6 states)</th>
<th>Stand (21 states)</th>
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<td>DE, KY, ME</td>
<td>CT, GA, IA, IN, NJ, PA</td>
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<td>DC, IL, LA, MD, MT, VT</td>
<td>MA</td>
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<td>HI</td>
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<tr>
<td>Not Implementing</td>
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### EDC assistance priority

<table>
<thead>
<tr>
<th>EDC assistance priority</th>
<th>1&lt;sup&gt;st&lt;/sup&gt; Priority</th>
<th>2&lt;sup&gt;nd&lt;/sup&gt; Priority</th>
<th>3&lt;sup&gt;rd&lt;/sup&gt; Priority</th>
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</thead>
<tbody>
<tr>
<td>Leap</td>
<td>advance two stages in any application</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jump</td>
<td>advance one state in any application</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walk</td>
<td>make progress within a stage for an application</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Leap** = advance two stages in any application
- **Walk** = make progress within a stage for an application
- **Jump** = advance one state in any application
Resources and Technical Support Activities

- Webinars
- Workshops
- Peer exchanges
- On-site technical assistance
- Training materials/training
- Case studies
- Fact sheets
- Marketing materials

EDC-5 Crowdsourcing website
https://www.fhwa.dot.gov/innovation/everydaycounts/edc_5/crowdsourcing.cfm

EDC-5 WRMS website
https://www.fhwa.dot.gov/innovation/everydaycounts/edc_5/weather_strategies.cfm

*COMING SOON* WRMS Toolkit
one-stop source for all WRMS implementation-related materials
Deployment Funding Sources

State Transportation Innovation Councils (STIC) Incentive Program
- Up to $100,000 per STIC per year to standardize an innovation
- [https://www.fhwa.dot.gov/innovation/stic/](https://www.fhwa.dot.gov/innovation/stic/)

Accelerated Innovation Deployment (AID) Demonstration Program
- Up to $1 million available per year to deploy an innovation not routinely used
- [https://www.fhwa.dot.gov/innovation/grants/](https://www.fhwa.dot.gov/innovation/grants/)
WYDOT Road Condition Reporting App and Wyoming 511 for Crowdsourced Data

Vince Garcia and Ali Ragan
WYDOT
WYDOT RCR: Overview

- Tablet-based app installed in maintenance vehicles that allows two-way information sharing
- Developed the application with funding from a WRTM grant
- Conops October 2013, development started early 2014, pilot deployment December along I-80 and parts of I-25
- Sole-source contract with AVL Vendor CompassCom, developed with sub NeoTreks
- WYDOT owns the code
WYDOT RCR: Goals

- Reduce radio traffic
- Streamline TMC processes
- Improve timeliness, accuracy of condition reporting
- Provide more information to maintenance workers
- Increase efficiency
- Improve roadway safety
WYDOT RCR: Reporting

- Road conditions
- Atmospheric conditions
- Variable speed limit suggestions
- Rock fall
- Crashes
- Debris on highway
- Damage to WYDOT maintained roadway elements
- More
WYDOT RCR: Situational Awareness

Wyoming511 for Crowdsourced Data for Weather Responsive Management Strategies (WRMS)
WYDOT RCR: Situational Awareness
WYDOT RCR: TMC Integration

Public Information Systems

- Phone
  - Iteris
- Website
  - WYDOT
- Email/Text
  - GovDelivery
- Mobile App
  - NeoTreks
- Highway Advisory Radio
  - WYDOT

Alerts TMC Operators Via TRAC

- VSL
- DMS
- Incidents
WYDOT RCR: TMC Integration

Transportation Reports and Action Console (development)
TRAC Task List

<table>
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<tr>
<th>PK</th>
<th>Priority</th>
<th>Source</th>
<th>District</th>
<th>Description</th>
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<th>Claimed</th>
<th>Completed</th>
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<tr>
<td>55063</td>
<td>High</td>
<td>Plow 1</td>
<td>1</td>
<td><strong>10-60: Crash</strong> Cheyenne - I-80 West Lower - Westbound at Reference Marker 382.3 Blockage: Driving Lane Plow license plate: H 0080 Operator: Alison L. Helgoth Ragan Shop: Cheyenne, Dept. 1035</td>
<td>N/A</td>
<td>2018-09-14 13:19:46 by aliran</td>
<td>55063</td>
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<tr>
<td>55061</td>
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<td>1</td>
<td><strong>VSL Recommendations</strong> I-80 West Lower - Cheyenne</td>
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<td>2018-09-14 09:04:21 by aliran</td>
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</tr>
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</table>

Wyoming511 for Crowdsourced Data for Weather Responsive Management Strategies (WRMS)
WYDOT RCR: TMC Integration

10-13: Cheyenne - I-80 West Upper
at Reference Marker 357.1 at 41.116895/-104.897229
Road Code: CHEYI80WHARI
Conditions: 8-3, 9-4
DMS: D000033 at I-80 WB 336.1 (Buford) Laramie Upper, D000035 at I-80 WB 343.7 (Harriman) Cheyenne Upper, D002833 at I-80 WB 341 (Remount), D000034 at I-80 EB 341.6 (Harriman) Cheyenne Lower
Reported by plow: H 0080
Operator: Alison L. Helgoth Ragan
Timestamp: 2018-09-14T09:04:37.000
Current time: 2018-09-14T09:04:36.843
WYDOT RCR: Evaluation Highlights

In a same-storm comparison:
- Number of road reports submitted doubled
- Number of requested VSL changes increased by 3 times

82% maintenance staff said App easy to use
89% of TMC operators said that the agency is better off with the App.
Wyoming511: Overview

WARNING!
Make sure your phone volume is on in order to hear the Hands Free Eyes Free notifications.

Report Inaccuracy
Repeat Last Update
Data Last Updated: 2:21 PM

Refresh Location
Send My Location

Photo Submitted 3:49 p.m. November 24, 2018
Wyoming511: Reporting Conditions

Submitted 1:15 p.m. March 6, 2018
Wyoming511 Reports: Avalanche

User comment: avalanche blocking half the road about 1 mile up the Snake River Canyon past Alpine.

Submitted 11:48 p.m. February 14, 2019
Wyoming511 Reports: Crash

Submitted 9:03 p.m. March 13, 2019

Submitted 2:02 p.m. June 3, 2019

Submitted 4:05 p.m. May 10, 2019
Wyoming511 Reports: Stopped Traffic

Submitted 9:20 a.m. March 19, 2019

Submitted 2:41 p.m. January 24, 2019

Submitted 6:53 p.m. January 21, 2019
Wyoming511 Reports: Road Conditions

Submitted 7:40 p.m. February 2, 2019

Submitted 10:40 a.m. February 22, 2019

Submitted 7:22 p.m. May 26, 2019
Wyoming511 Reports: WYDOT Employees

Submitted 11:43 a.m. March 14, 2019

Submitted 9:20 a.m. May 29, 2019

Submitted 4:38 p.m. April 13, 2019
Wyoming511 Reports: Nonsense

Submitted 1:23 p.m. December 13, 2018

Submitted 2:41 p.m. December 29, 2018

Submitted 9:23 p.m. February 14, 2019

Submitted 10:41 a.m. February 25, 2019

Report 912959: Stranded at Saratoga Springs Resort!!!! Please keep the roads closed for another couple days!!!!
Status: New
Road: at
District: 0, County
Latitude: 41.452938, Altitude:
Submitted Timestamp: 2019-02-14 11:16:41.200
Digitized Timestamp: 2019-02-14 11:15:23 (when the picture was taken, in the device’s time zone)
Source: samsung/SM-G965U
Location: -106.801073 41.452938

View Report Details
Wyoming511: Reporting Truck Parking

Wyoming511 for Crowdsourced Data for Weather Responsive Management Strategies (WRMS)
Wyoming511: Reporting Truck Parking

Truck Parking Locations

Truck Parking Reports

- 1 (12)
- 2 (5)
- 3 (3)
- 4 (2)
- 7 (1)
- 12 (1)
- 29 (1)
Wyoming511: Reporting Truck Parking

Wagonhound Rest Area

Road Status
- Open
- Closed to Light, High-Profile Vehicles
- Closed Directionally
- Closed

Parking Report
- Full Parking Lot
- Only a Few Spaces Available
- Spaces Available

- 1 (12) - 2 (5) - 3 (3) - 4 (2) - 7 (1) - 12 (1) - 29 (1)
Wyoming511: Next Steps

- Image credits
- Encouraging agency use
- Sharing photos not posted to the public with emergency managers
Citizen’s Reporting and Winter Operations

Messaging for Behavior Change

Lisa Miller
Utah Department of Transportation

July 18, 2019
<table>
<thead>
<tr>
<th>Name of Resort</th>
<th>Country</th>
<th>annual snowfall in inches (in)</th>
<th>annual snowfall in meters (m)</th>
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<tbody>
<tr>
<td>Mt Baker</td>
<td>USA</td>
<td>641</td>
<td>16.3</td>
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<tr>
<td>Mt Rainier</td>
<td>USA</td>
<td>624</td>
<td>15.85</td>
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<td>Alyeska</td>
<td>USA Alaska</td>
<td>600</td>
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<td>Alta Utah</td>
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<td>Snowbird Utah</td>
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<td>Solitude Utah</td>
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<td>Aspen</td>
<td>USA</td>
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<td>Portillo</td>
<td>Chile</td>
<td>295</td>
<td>7.5</td>
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Weather and Travel Time Reliability

Travel Time Index (systemwide)

- Road snow (both commutes)
- Freezing rain event
- Road snow (AM)
- All day snow
- Road snow/ice (AM commute)
- Road snow (AM commute)
- Heavy valley rain / mountain snow

Economic Impact of Road Weather Events

Economic impact in Utah for a 24 hour statewide winter storm

Total Economic Impact

- $66.36 million
  - **Wages & Salaries**
    - $42.81 million
  - **Retail Sales**
    - $18.26 million
  - **Federal Taxes**
    - $3.32 million
  - **State and Local Taxes**
    - $1.98 million

**States and provinces covered by the study include:**
- Illinois, $400 million lost per day
- Indiana, $157 million lost per day
- Iowa, $70 million lost per day
- Kentucky, $96 million lost per day
- Maryland, $184 million lost per day
- Massachusetts, $265 million lost per day
- Michigan, $251 million lost per day
- Minnesota, $167 million lost per day
- Missouri, $162 million lost per day
- New Jersey, $289 million lost per day
- New York, $700 million lost per day
- Ohio, $300 million lost per day

**Pennsylvania, $370 million lost**
- Utah, $66 million lost per day
- Virginia, $260 million lost per day
- Wisconsin, $149 million lost per day
- Ontario, $474 million lost per day
- Quebec, $250 million lost per day

**Source:** American Highway Users Alliance performed by IHS Global Insight (2009)
Program Goals

- To provide consistent, reliable, accurate and timely information concerning roadway conditions to the traveling public.
- The Utah Citizen Reporter Program allows trained members of the public to report road and weather conditions on any of our over 140 segments that we collect data on.
- During the winter months (November – April) UDOT will be using road condition and weather reports to supplement other reporting. This information will be used on the UDOT Traffic website, 511 phone system and UDOT Traffic app.
- This project is NOT for dispatching plow operators.
- This project IS for trained volunteers to assist UDOT by providing timely and accurate information based on their observations.
Pilot Year

Public Information Messaging Triangle

- What Happened?
- What is Happening?
- What is UDOT doing to help solve the problem?
- How does it affect me?
- What does the public want to know?

Source: WRTM CITE Course
Public Facing Information
Training Program

- Introduction and Thank You
- Wyoming ECAR Program
- Reporter Selection Process/Criteria
- Program Goals
- Types of Road Users in Utah
- Safety!
- Type of Information to Report
- Definitions of Road Conditions
- Definitions of Weather Conditions
- UDOT Winter Operations information
- Driving Safe around Plows
- The Citizen Reporting app
The Reporting App

UDOT Citizen Report

Where and When
SR-201 Salt Air to Salt Lake
Report Time 10/16/13, 1:25 PM

Conditions
Road Dry
Weather Partly Cloudy

Comments (Tap to enter additional info)
Submit

Select Segment

SR-20 1-15 to Top of Bear Valley
SR-201 Salt Air to Salt Lake Last report: 10/16/13, 1:25 PM
SR-210 Lower Little Cottonwood Canyon
SR-210 Upper Little Cottonwood Canyon
SR-224 Kimba Jct to Park City
SR-224 Park City to Provo
SR-226 to Snowbasin
SR-24 Hanksville to Provo
SR-24 Loa to Hanksvile
SR-24 Richfield to Logan
SR-248 Quins Jct to Richfield

Examples

Road Conditions
The following images present examples of road conditions.

Dry

Wet

Weather Condition
Clear
Partly Cloudy
Overcast
Rain
Mixed Rain And Snow
Snow
Fog
Blowing Snow

Examples

Submit
Cancel
Statistics

- Pilot Program launched winter 2012-2013
  - 100 UDOT employee reporters

- Program launched to the public winter 2013-2014
  - End of season, 475 reporters
  - 135 of 145 routes covered by at least 1 reporter
  - 0.03% of reports submitted were determined to be inaccurate
  - Over 1800 reports submitted

- 2018 - 2019 Statistics
  - End of season, over 1000 reporters
  - 143 of 145 routes covered by at least 1 reporter
  - 0.05% of reports submitted were determined to be inaccurate
  - Over 5200 reports submitted
Statistics

Citizen Reporter App downloads by month

![Graph showing Citizen Reporter App downloads by month with iPhone and Android downloads distinguished.]
Benefits to Coordinated Messaging

- **Unified Message**
  - Informed Travelers
  - Optimize Mobility
- **Sharing Resources**
  - Share weather observations
  - Shared tools
- **Improved Safety, Mobility, and Economy**
  - Consistent impact messages can reduce traffic demand, with the ultimate goal of saving lives and property and minimizing the impact of weather events
- **Negligible costs**
January 2013 Case Study

- **Driver Awareness and Response to Winter Storms Study**
  - UDOT, NWS, & U of Utah
  - Barjenbruch et al. 2016 (Weather, Climate, & Society)

- **Two events were surveyed**
  - Heavy snow - PM commute
  - Freezing rain - AM commute

- **400 surveys completed per event**
  - Awareness of weather forecast
  - Sources of weather & road info
  - Modification of travel plans
Self-Reported Behavior Change

Many indicated that they modified their travel plans

<table>
<thead>
<tr>
<th>Type of Change</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changed schedule</td>
<td>62%</td>
</tr>
<tr>
<td>Changed route</td>
<td>26%</td>
</tr>
<tr>
<td>Did not travel</td>
<td>13%</td>
</tr>
<tr>
<td>Used mass transit</td>
<td>6%</td>
</tr>
</tbody>
</table>

Most heavily utilized sources

Personal sources – 59%
Local TV – 57%
Local radio – 43%
Government sources – 27%
Actual Behavior Change

Travel Data across Salt Lake County

Weather Conditions on 1/10/2013
- Noon: 49 F, dry and partly sunny
- 2 PM: 36 F, dry conditions
- 5 PM: 2” per hour snowfall rates

- Commute shifted by 2 hours
- Significant volume decrease
- Supports reported behavior
  - Predictor of behavior change

Red – Dry commute peak
Blue - Day of storm commute peak
Questions?

Weather plays a role in 25% of all crashes.

The annual cost of weather-related crashes is $42 Billion.

On average, in weather-related crashes each year:
- 7,400 people are killed
- 629,000 people are injured.

Weather causes 25% of all non-recurring congestion delays. The total delay is about 5 billion hours per year.

Lisa Miller
Utah Department of Transportation
Traveler Information Manager

lisamiller@utah.gov
(801) 887-3761

www.udottraffic.utah.gov/training/citizenreporter
Roadway Weather

Decision Support: Integrated Third-Party Data
Data System

Chris Lambert
Third Party
- HERE Traffic Speeds
- Waze Incident Reports
- Waze Traffic Speeds
- iCones Speeds
- KYMesonet
- CoCoRahs
- Doppler Radar

KYTC
- TOC Reports
- TRIMARC Reports
- Snow Plows (AVL)
- Roadway Weather Stations
- County Activity Reports
- Dynamic Message Signs
- Truck Parking
- Twitter
Real-Time, Big Data Architecture

• Cloudera.com
  • Kafka: Data Aggregation
  • Spark: Processing, Harmonization
  • Hadoop: Cold/Warm Storage, Processing Historic Data

• Elastic.co
  • Elasticsearch: Hot Storage / Indexing
  • Kibana: Dashboards

• ESRI.com
  • ArcGIS Online: Mapping
  • ArcGIS Online: Data Sharing
When you say “Big Data”?

<table>
<thead>
<tr>
<th>Source</th>
<th>Records per Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>HERE</td>
<td>2.5 billion</td>
</tr>
<tr>
<td>Waze Jams</td>
<td>128 million</td>
</tr>
<tr>
<td>Waze Incidents</td>
<td>180 million</td>
</tr>
<tr>
<td>AVL (Snow Plows)</td>
<td>175 million</td>
</tr>
<tr>
<td>All Others</td>
<td>123 million</td>
</tr>
<tr>
<td><strong>Total Records and Storage:</strong></td>
<td><strong>3.1 billion and 3TB(x3)</strong></td>
</tr>
</tbody>
</table>
Publicly Shared Data Layers

• All Third Party Data (unless restricted)
• All KYTC Data
• Combined / Consolidated Layers:
  • Work Zones
  • Crash Reports
  • Speeds
  • Roadway Weather Information
Roadway Weather Layer

- Air Temperatures
- Pavement Temperatures
- Quantified Doppler Imagery
- Interpolated CoCoRahs
- Measured Wind Speeds
- Dew Point
- User Reported Actual Snowfall
- Forecasted Precipitation
- Severity Index
Roadway Weather: Data Goals
Roadway Weather: Snow and Ice
Roadway Weather: Interpretation
Roadway Weather: Snow and Ice
Operations
Randi Feltner
A Bit About KYTC Snow & Ice Operations

- 120 Counties
- 12 Districts
- 60,000+ lane-miles
- Terrain level in Western KY, elevations above 4,000 ft in Eastern KY
- ~1,100 state trucks, ~400 contract trucks
  - All state trucks model year 2012 and newer have AVL
  - Contractors are a work in progress

Limited Resources, Challenges
- Budget
  - Legislators
- People
  - Hiring
- Materials, Cost
  - $81-$105/ton
Material Use
Current Use of Snow & Ice Data

• Publish Accurate, Timely, and Relevant Information
• Provide Real-Time Fleet Management
• Dashboard for Decision Making
• Visualize 12-16 Hours of Rolling Data
• Provide Unlimited Look-Up
## Current Use

<table>
<thead>
<tr>
<th>Location</th>
<th>Activity</th>
<th>Precip</th>
<th>Internal Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>District 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>District 2</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>District 3</td>
<td></td>
<td></td>
<td></td>
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<td>District 4</td>
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<td>District 5</td>
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<td>District 6</td>
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<td>District 7</td>
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<td>District 8</td>
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<td></td>
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<tr>
<td>District 9</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>District 10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>District 11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jackson</td>
<td>Patrolling</td>
<td>2 trucks</td>
<td>26 degrees</td>
</tr>
<tr>
<td>District 12</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

View on GoKY

View on SNIC Dashboard

Enter a Weather Response Status
Road Weather Data Goals

• Publish Accurate, Timely, and Relevant Information
• Provide Real-Time Fleet Management
• Publish treatment of routes - AVL
• Automated Social Media Posts
• Develop WSSI and Performance Measures
• Automated Alert Emails
  • Temp drops with precip or dew point, Rain amounts & high water
• Automated Record Keeping
  • When & Where, Materials
• Expand this into ALL Road Weather and Operations
  • FEMA/FHWA-ER
  • All Operations/Construction
  • Safety Projects – HSIP
Road Weather: Flooding

39,231 hits

flood

waze_alerts

Selected Fields

Available Fields

Popular

kytcCityTxt

kytcCountyName

kytcDateExists2mUTC per day

CONTACT INFORMATION

Randi Feltner, randi.feltner@ky.gov
Chris Lambert, chris.lambert@ky.gov

Twitter: @KYTC
Facebook: /kytc120
What TSMO strategies do you currently use crowdsourced data for? (Pick all that apply)

A. Traveler information
B. Incident management
C. Road weather management
D. Work zone management
E. Signal timing management
F. Performance assessment and reporting
G. Transportation planning and modeling
H. Freight operations
I. Other strategies
J. Not using crowdsourced data
K. Not sure whether we use crowdsourced data
Q&A and Wrap-Up
Upcoming Events

Crowdsourcing Workshops

- **Austin TX (July 24th)**, ITE Annual Meeting (1-4pm)
  - To Register: https://ecommerce.ite.org/imis/iCommerce/Events/Event_Display.aspx?EventKey=ITE2019AM

- **Cleveland, OH (Sept 19th)**, Ohio LTAP, (9am – 4 pm)
  - To Register: https://ltap.enrollware.com/enroll?id=3088101

2019 Road Weather Management Stakeholder Meeting

- **Phoenix, AZ (Aug 27th to 29th)**, Hyatt Regency Phoenix
  - To Register: https://www.eventbrite.com/e/2019-road-weather-management-stakeholder-meeting-tickets-62171569839

WRMS Training and Technical Assistance

- To request WRMS technical assistance, workshops, or other training opportunities contact Roemer.Alfelor@dot.gov
Contacts

Crowdsourcing

James Colyar
James.Colyar@dot.gov
(360) 753-9408

Paul Jodoin
Paul.Jodoin@dot.gov
(202) 366-5465

WRMS

Roemer Alfelor
Roemer.Alferor@dot.gov
(202) 366-9242

For more information on the EDC Program

www.fhwa.dot.gov/innovation/everydaycounts/

Email: https://www.fhwa.dot.gov/innovation/

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