Enhancing Road Weather Management during Wildfires and Flash Floods through New Data Collection, Sharing, and Public Dissemination Technologies

CENTER FOR TRANSPORTATION RESEARCH

Kenneth Perrine, Chandra R. Bhat (PI), Christian Claudel, Natalia Ruiz-Juri, Kamryn Long, Abduallah Mohamed, Tian Lei, Kamran Khan, and Jonathan Butler

THE UNIVERSITY OF TEXAS AT AUSTIN

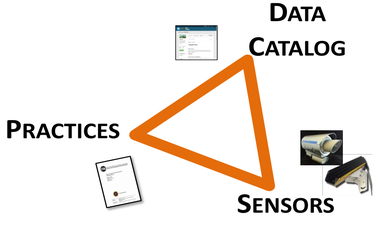
OBJECTIVES

(1) Identify challenges, benefits, and strategies for data collection and sharing to maximize the ability for TxDOT and partnering agencies to improve responses to extreme weather events.

(2) Explore new methods and technologies to find effective ways to disseminate weather-related roadway information to the public.

BACKGROUND

- Extreme weather events such as **wildfires**, **flash floods**, and **freezes** have a significant impact on safety and mobility throughout Texas.
- This project focuses on:
  - Data collection, analysis, and sharing
  - Information dissemination
  - Deliverables
- To achieve these, researchers:
  - Examined **best practices** in roadway operations during extreme weather events:
    - Literature search
    - Stakeholder meetings
  - Built a **data catalog** to benefit roadway operations and post-event analysis
  - Evaluated **sensor** technologies to help with operational decision-making and public information dissemination in rural and urban areas

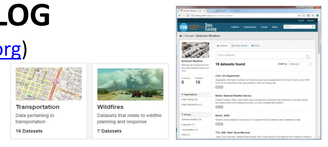


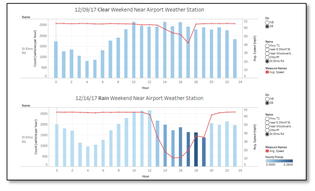
BEST PRACTICES

- **Collaborate** on inter-agency emergency response.
- Complement traditional outlets such as VMS and HAR with **mobile technologies** and **social media**.
- Be **resilient** to failures in data communications.
- Protect **sensitive data**, and data quality.
- Develop **performance metrics** to assess success and justify expenditures.

DATA CATALOG

- Curated data sources (http://catalog.utnmc.org)
- Requires active, ongoing **maintenance**
  - Evaluate updating strategies.
  - Look at governance strategies.
- Evaluated improvements in **analysis** and decision-making capabilities
- **Data fusion** experiment:
  - Combined weather rainfall with IH 35 work zone trailer data
  - Fully interactive in Tableau



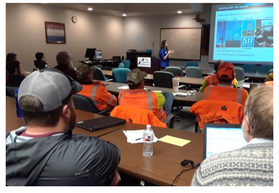


SENSORS

- Learning deployment strategies based on unique, regional needs:
  - **Isolated**
  - **Cluster**
  - **Corridor**
  - **Mobile**
- Understanding **features** and **performance**
- Newer technologies may be **cheaper**, but may incur a shorter lifecycle.
- Total cost: **equipment**, **installation**, **maintenance**
- Locations of interest:
  - Abilene District
  - Travis County and vicinity

TRAINING WORKSHOPS

- Contents:
  - Part 1: **New Sensor Technologies**
  - Part 2: **Data**, **Decision-making**, and **Dissemination**
- Objective: Introduce processes and challenges for **deploying sensors** and **using data**
- Conveying key concepts for a successful sensor deployment and data analytics practice



RECOMMENDATIONS

- Sensor data and outputs from decision support systems need to be **integrated** into TxDOT IT architecture and existing software systems.
- Data needs to be **archived** and accessible for analysis and validation purposes.
- Methods for improving coverage and **reliability** of sensor data should be refined to detect sensor faults and failures, and to maintain a quality suitable for decision-making and forecasting.
- Well-defined **performance metrics** help in understanding the reliability and value of a sensor network, as well as to justify the expense for future expansion.
- Processes need to be developed further for more widely **disseminating** relevant information and data to the traveling public.
- **Streamline** data pipelines and **decision-making processes** in TxDOT roadway operations and partnering agencies.

TxDOT RTI EDC-5 PROJECT

- Scheduled for **May 2018-2020**, it continues efforts begun in this project, leveraging sensor deployments
- Demonstrates a **weather roadway management strategy** in an operational environment: a **freezing** roadway information system:
  - Reduce anti-icing and de-icing (brine) usage.
  - **Optimize** fleet vehicle mileage and personnel time.
  - Closely **track weather conditions** on vulnerable roadway.
  - Improve **information reporting** to travelers.
  - Applicable to other weather phenomenon
- Additional studies:
  - US best practices
  - Workflows and IT policy
  - Performance metrics
  - Decision support
  - Data resiliency
  - Archiving

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