

# A Road Weather Research Agenda

## Results of the Road Weather Policy Forum



Held November 8-9, 2010  
Washington, DC





# The Road Weather Challenge

Weather is the second largest cause of nonrecurring congestion, accounting for 25 percent of all such delays. Every year motorists endure one billion lost hours due to delays caused by snow, rain, ice, wind, and fog.

But bad weather is more than aggravating – it's dangerous! Weather plays a role in 24 percent of all crashes – approximately 1.5 million of them. Each year, on average, 7,130 people were killed and 673,000 were injured between 1995 and 2008 in weather-related crashes. The annual economic costs of these deaths and injuries is estimated at \$42 billion.<sup>1</sup>

Furthermore, according to a report done by IHS Global Insight for the American Highway Users Alliance, the economic costs of disruption from a single snow storm can be colossal – in some states, lost wages, retail sales, and tax revenues can total \$300-\$700M in just one day. In addition, state and local agencies spend more than \$2 billion per year on snow and ice removal alone.

<sup>1</sup>Federal Highway Administration Road Weather Program.

## There is a Solution

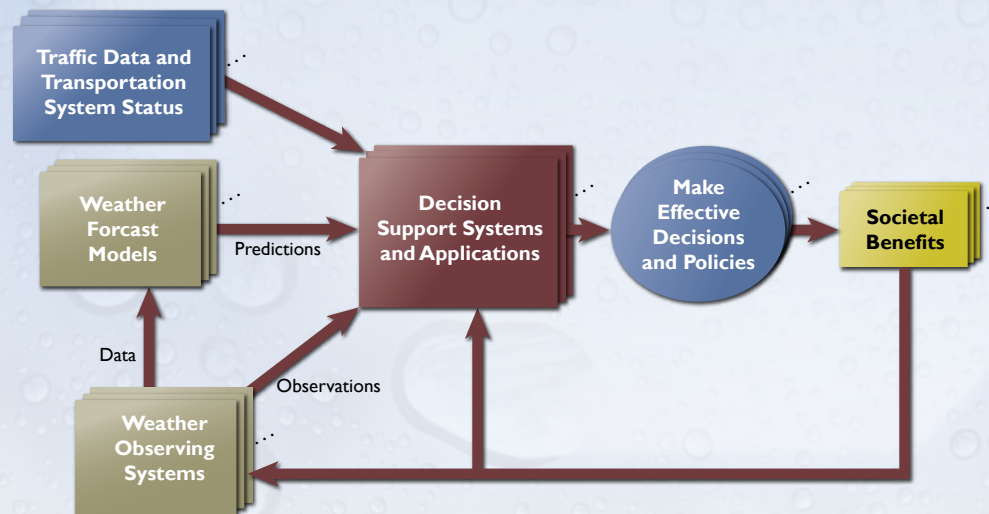


The good news is that these problems are surmountable thanks to rapid changes in technology and advances in communications which are revolutionizing the vehicle and infrastructure environments. The U.S. DOT's intelligent transportation systems (ITS) program is exploring new enabling platforms that will allow Road Weather managers to manage traffic and fleets, and motorists to make better decisions. In addition, it will provide new vehicle-to-vehicle and vehicle-to-infrastructure communications that will conceivably add millions of mobile sources of weather data on the road – where people drive.

## The Road Weather Research Framework

Applied road weather research has already proven time and again to save money and lives. Under the ITS program new road weather applications will pay even greater dividends. However, to harness this emerging capability to reduce weather-related traffic congestion and improve road safety requires that we continue a vigorous program of applied road weather research.

The overall road weather framework starts with the end in mind – societal benefits – and works backwards. In order to achieve societal benefits, decision-makers need easy to understand, actionable information. Good predictive weather models must be fed by real-time observations, and coupled with knowledge of what's happening on the transportation system. This will enable the most effective management of the transportation system based on current and near-future weather conditions.





# Research Needs

Since the road weather framework has to provide a clear path from research and development to operations and back again, it has to exist in the context of the industry's broader research needs and be flexible over time. The following research needs emerged from the Policy Forum:

## An Understanding of User Needs is Lacking

**Policy Statement:** A better understanding is needed of how users can incorporate the how, why, when, and where of actionable road weather information, including messages, formats, and timing.

Key user groups include:

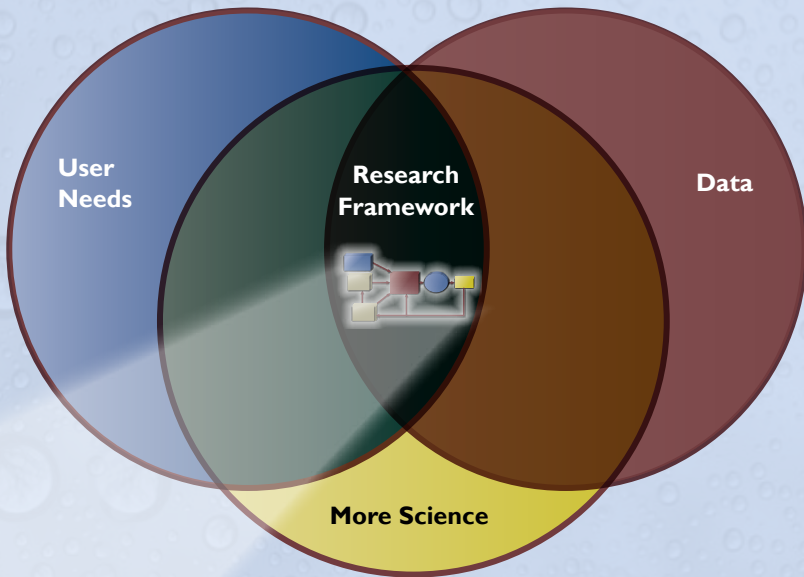
- Freight shippers and truckers (dispatchers/drivers)
- Emergency service providers (dispatchers/police/fire/rescue)
- Transit (dispatchers/drivers/customers)
- General public (motorists: commuters/recreation, etc.)
- DOT Maintenance Managers (snow plow drivers/mowers/painters/resurfacers/etc.)
- DOT Traffic Managers (Freeway operators/arterial operators/incident response/etc.)

## More Science is Needed

**Policy Statement:** A focus on the core scientific problems is needed, relating both to surface weather, and its impact on the transportation system.

Scientific questions include:

- Social science and human factors
  - ◆ Message content
  - ◆ Information overload
  - ◆ Driver distraction
- Boundary layer modeling
  - ◆ Nowcasts for weather hazards
  - ◆ Actionable alerts
  - ◆ Situational awareness
- Transportation system optimization
  - ◆ Traffic management
  - ◆ Road conditions and feedback
- Decision support for high-impact events



## Data on Road Weather are Insufficient

**Policy Statement:** Current weather data need to be structured and augmented to meet the needs of science and users. Questions include what data are available now, and what are missing with respect to all concerns, including human factors, end users, weather models, and transportation system status.

Data concerns include:

- Collection
- Quality and quality control
- Availability
- Optimal use of mobile observations



**Indiana DOT  
saved over \$10  
million using the  
Maintenance  
Decision Support  
System in one winter**



# Roles and Responsibilities

Meeting the road weather challenges will take a multisectoral approach, spanning transportation, weather, and research and development. Since people and institutions will drive change, clear direction for the public, private, and academic sectors are vital to achieve the necessary cultural shifts. Different sectors will need to work together within well defined lines of responsibilities and mutual respect for everyone's roles.

- Public Sector (transportation and weather governmental agencies)
  - ◆ Fund and coordinate high-risk research
  - ◆ Enable core capabilities of private sector
  - ◆ Facilitate training and technology transfer
  - ◆ Focus on transportation system management
- Private Sector (transportation and weather service providers)
  - ◆ Continuously survey markets to determine commercial need
  - ◆ Leverage public sector research for commercial applications
  - ◆ Develop weather and traffic decision support systems for State DOTs
- Academia and Education
  - ◆ Conduct basic and applied research
  - ◆ Develop road weather curricula for both traffic engineering and meteorological programs
  - ◆ Use nongovernmental organizations to educate motorists, truckers, and students on road weather topics through articles, public service announcements, and other communications means
  - ◆ Create safe driving campaigns for motorists in inclement weather situations



## Road Weather Cuts Across All Aspects of the U.S. DOT Strategic Goals

### Economic

**Competitiveness** – Promote transportation policies and investments that bring lasting and equitable economic benefits to the nation and its citizens through a reliable and consistent transportation system under all weather conditions.

**Safety** – Improve public health and safety by reducing weather-related fatalities and injuries on the transportation system.

**State of Good Repair** – Ensure the United States proactively maintains its critical transportation infrastructure in a state of good repair, such as through maintaining a satisfactory level of service in winter without damaging infrastructure.

### Livable

**Communities** – Foster livable communities through place-based policies and investments that increase transportation choices and access to transportation services, such as through enabling more mode choices and better travel decisions based on real-time road weather information.

### Environmental

**Sustainability** – Advance environmentally sustainable policies and investments, such as through Maintenance Decision Support Systems (MDSS) salt and chemical management programs, and reduce carbon and other harmful emissions from transportation sources, such as promoting smoother traffic flows and eco-driving regardless of weather conditions.

**Policy Forum** – The Road Weather Policy Forum was the culmination of a series of stakeholder meetings conducted over the summer and fall of 2010. The meetings involved U.S. Federal transportation and weather agencies, as well as state departments of transportation, the private sector, users, and academia.

For questions, comments, or more information, please contact:

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