



# The Maintenance and Operations Decision Support System (MODSS):

## Advancing Road Weather Decision Support

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## Historical Perspective

Federal Highway Administration's Road Weather Management Program:

- 🚗 Develop an understanding of how weather and road conditions impact the nation's roadways
- 🚗 Determine how best to mitigate road weather impacts

In 2001, FHWA initiated a program to develop a winter road Maintenance Decision Support System (MDSS).

- 🚗 Construct a functional prototype MDSS that could provide objective guidance to winter road maintenance decision makers concerning the appropriate treatment strategies to use to control roadway snow and ice during adverse winter weather events
- 🚗 Provide a system that would serve as a catalyst for additional research and development by the private sector



## Historical Perspective

### The MDSS:

- Real-time observations
- Weather forecasts
- Road condition forecasts
- Recommended treatments



To date, four versions of the MDSS prototype code have been made freely available to the surface transportation stakeholder community, with the last release (MDSS Release-4) occurring in the spring of 2006. MDSS Release-5 is slated for Fall 2007.



# System Output

## Plow route specific information

### Weather parameters

- Air temperature
- Relative humidity
- Wind speed and direction
- Precipitation type, rate, accumulation

### Road Parameters

- Road temperature
- Bridge temperature
- Bridge frost potential
- Blowing snow potential
- Road contamination & chemical concentration

### Treatment recommendations

- Treatment type (plow, chemical, pre-treat, etc.)
- Treatment amount
- Treatment location





# Advancing Road Weather Decision Support

The MDSS project has shed light on the need for decision support tools for other categories of roadway transportation decision-makers such as:

- Traffic management personnel
- Emergency management personnel
- Construction supervisors and crews
- Maintenance practitioners (beyond snow and ice control)

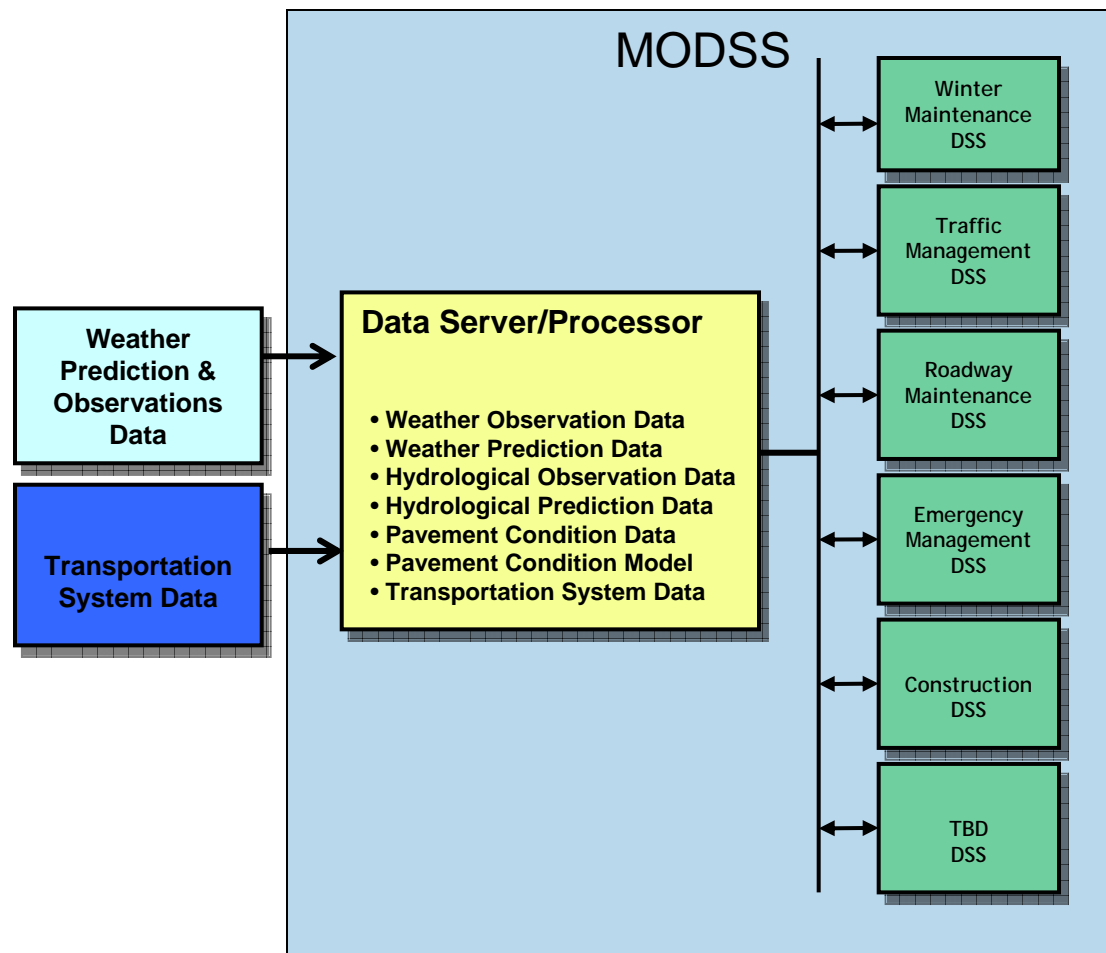
Broad needs and requirements met by current and new road weather decision support systems:

- Centralized weather support
- Enhanced strategic planning capacity
- Improved tactical response capability
- Improved adverse road weather notification
- Operation-specific decision support guidance



# Advancing Road Weather Decision Support

The Maintenance and Operations Decision Support System (MODSS)





## Basic MODSS Characteristics

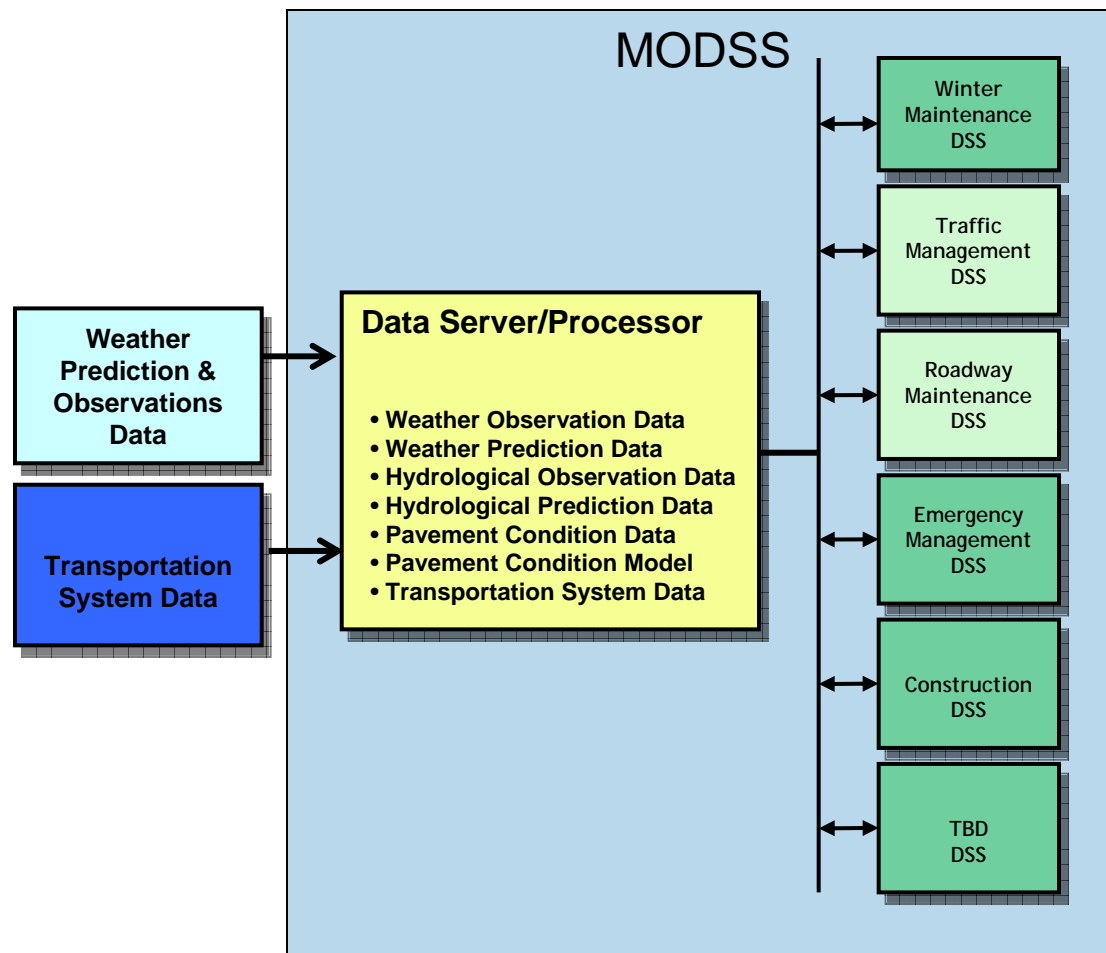
- Rapid updates should be provided (minutes not hours)
- Extreme quality control should be employed
- Historical data should be available (event review)
- Data export should support common formats (xml, shape files, etc.)
- Automated alerts should be provided (user defined thresholds)
- Design should support tactical (0-3 hrs) and planning horizons (1 to 5 days)
- An *event planner* feature should be provided





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# Foundation for Roadway Maintenance and Traffic Management Decision Support Systems

## **Preliminary User Needs Assessment Report**

- Surface Transportation Weather Decision Support Requirements (STWDSR) (Mitretek)
- Integration of Emergency & Weather elements into Transportation Management Centers (Battelle)
- Weather Responsive Traffic Management (Cambridge Systematics)
- Best Practices for Road Weather Management (Mitretek)
- Weather Information for Surface Transportation (NOAA)
- Where the Weather Meets the Road (National Academies)
- WeatherShare (Western Transportation Institute)
- Missouri Weather Response System (Mixon/Hill)

**Stakeholder meetings in late February and early March 2007 to validate and refine the weather and road condition information needs**

**Concept of Operations (ConOps) currently under development**



# Roadway Maintenance Decision Support System

## Road weather based guidance in support of:

- Surface Repair

  - Preventative/Routine Maintenance

    - Crack Sealing
    - Fog Seals
    - Chip Seals
    - Microsurfacing
    - Thin Lift Overlays

  - Reactive Maintenance

    - Pothole Patching
    - Pavement Blowups

- Lane Striping

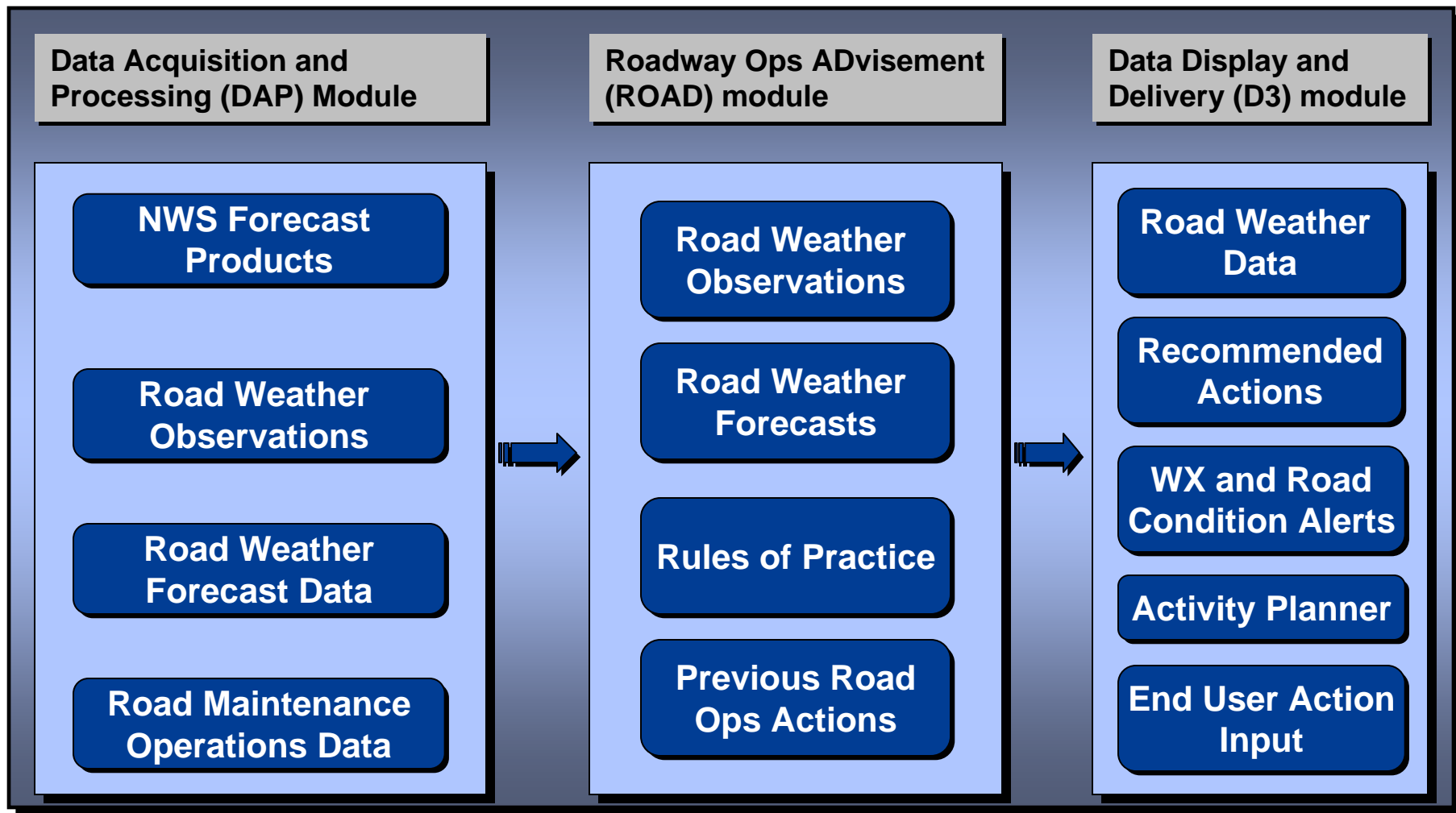
- Mowing

- Weed Spraying





# Roadway Maintenance Decision Support System Framework





# Traffic Management Decision Support System

## Road weather based guidance in support of:

- Traveler Information
- Control Strategies
  - Signal Timing
  - Ramp Metering
  - Road Closures
  - Traffic Routing
  - Etc.
- Incident Management





# Traffic Management Decision Support System Framework

