Road Weather Management – Recent Research Results from the United States

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Presentation Contents

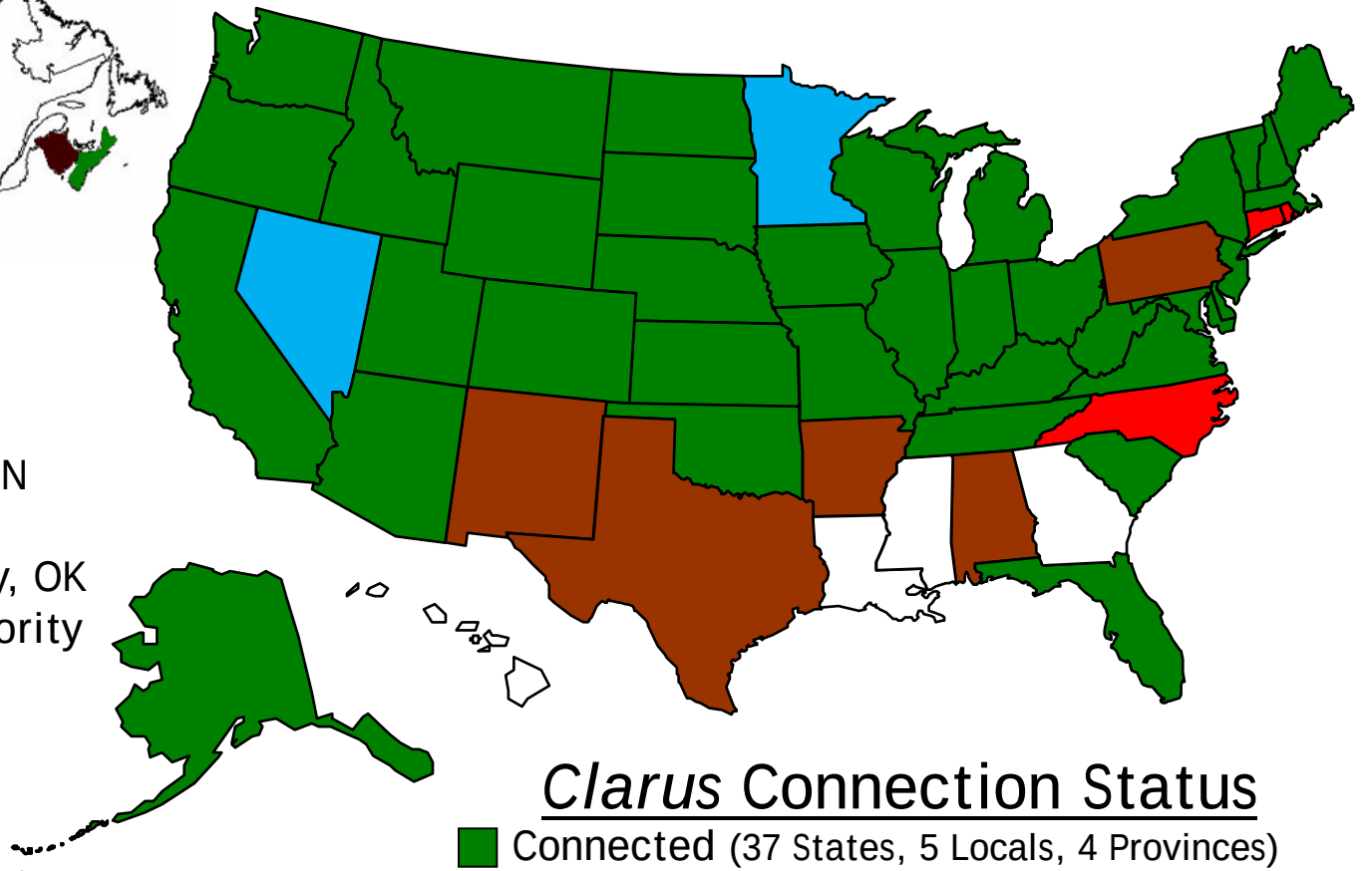
- *Clarus* Overview and Results of the Regional Demonstrations
- Weather Responsive Traffic Management
- Road Weather and Connected Vehicle

The *Clarus* System

www.clarus-system.com

- A database management system for all surface transportation weather observations in North America
- One database removes borders
- Provides advanced quality checking for both atmospheric & pavement data
- Includes extensive metadata

Participation Status for *Clarus* as of April 25, 2012



Local Participation

- City of Indianapolis, IN
- McHenry County, IL
- City of Oklahoma City, OK
- Kansas Turnpike Authority
- Parks Canada

Sensor & Station Count

2,435	Sensor Stations (ESS)
54,195	Individual Sensors
178	Vehicles

Clarus Connection Status

- Connected (37 States, 5 Locals, 4 Provinces)
- Connected plus vehicles (2 states)
- Pending (5 States, 3 Locals, 1 Province)
- Considering (3 States, 1 Local)

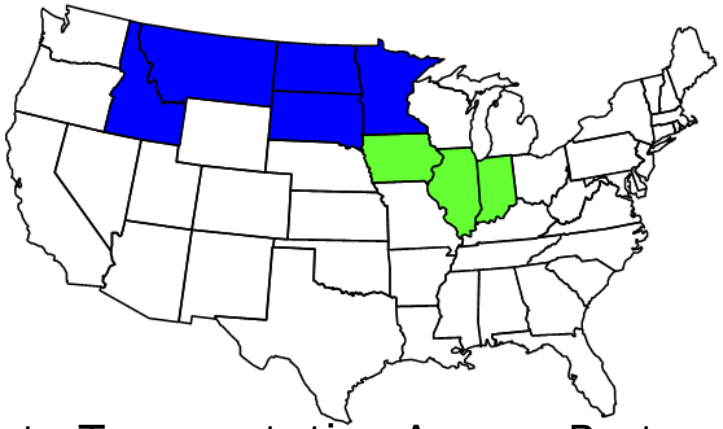
Clarus Regional Demonstration

5 Use Case Scenarios

1. Enhanced Road Weather Forecasting Enabled by *Clarus*
2. Seasonal Weight Restriction Tool
3. Non-winter Maintenance & Operations Tool
4. Multi-state Control Strategy Tool
5. Enhanced Road Weather Content for Traveler Advisories

Meridian Team
Scenarios 1, 2, 5

Mixon Hill Team
Scenarios 1, 3, 4



State Transportation Agency Partners

UC #1:
Enhanced Road Weather Forecasting

- *Clarus* observations improved the Local Analysis and Prediction System
  - 65% improvement estimating surface temperature 30% of the time
- *Clarus* observations neither helped nor hurt atmospheric weather models (WRF)
- *Clarus* observations improved the performance of road condition models
- Mixed results when used in a precipitation estimation tool

UC #2:
Seasonal Weight Restriction Tool

- Advance notification of sub-surface conditions was recognized by the State DOT managers as a real and new benefit
- They did not impose restrictions for 14 days following an early warming spell in February
- They placed restrictions at least 7 days in advance
- Commercial vehicle operators see value in better timing decisions

UC #3:
Non-winter Maintenance & Operations Tool

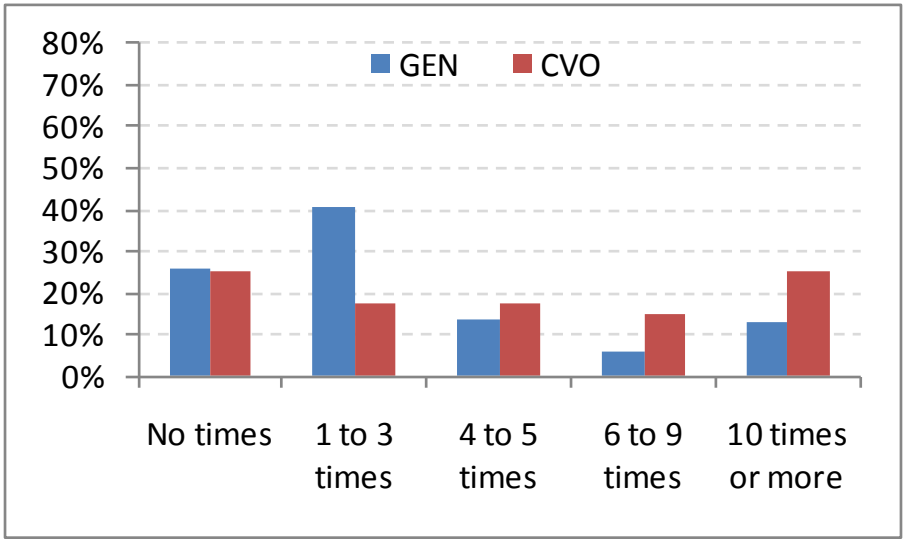
- No major differences were observed in schedule adjustments
- Iowa DOT and Illinois DOT noted that the tool and the concept should be easy to adopt if some software issues were resolved
  - Maintenance supervisors provided numerous suggestions that led to software enhancements, though the tool was not fully refined for operational use
- Focusing on high-priority maintenance activities can help generate support for the tool

UC #4:
Multi-state Control Strategy Tool

- Best suited for use in dispatch centers
- Agencies want information about forecasted impacts of weather
- Interviewees unclear on the value of the tool when compared to several existing interfaces between stakeholders that promote information sharing
- Value of weather information is greater when integrated with existing processes and tools

UC #5: Enhanced Road Weather Content for Traveler Advisories

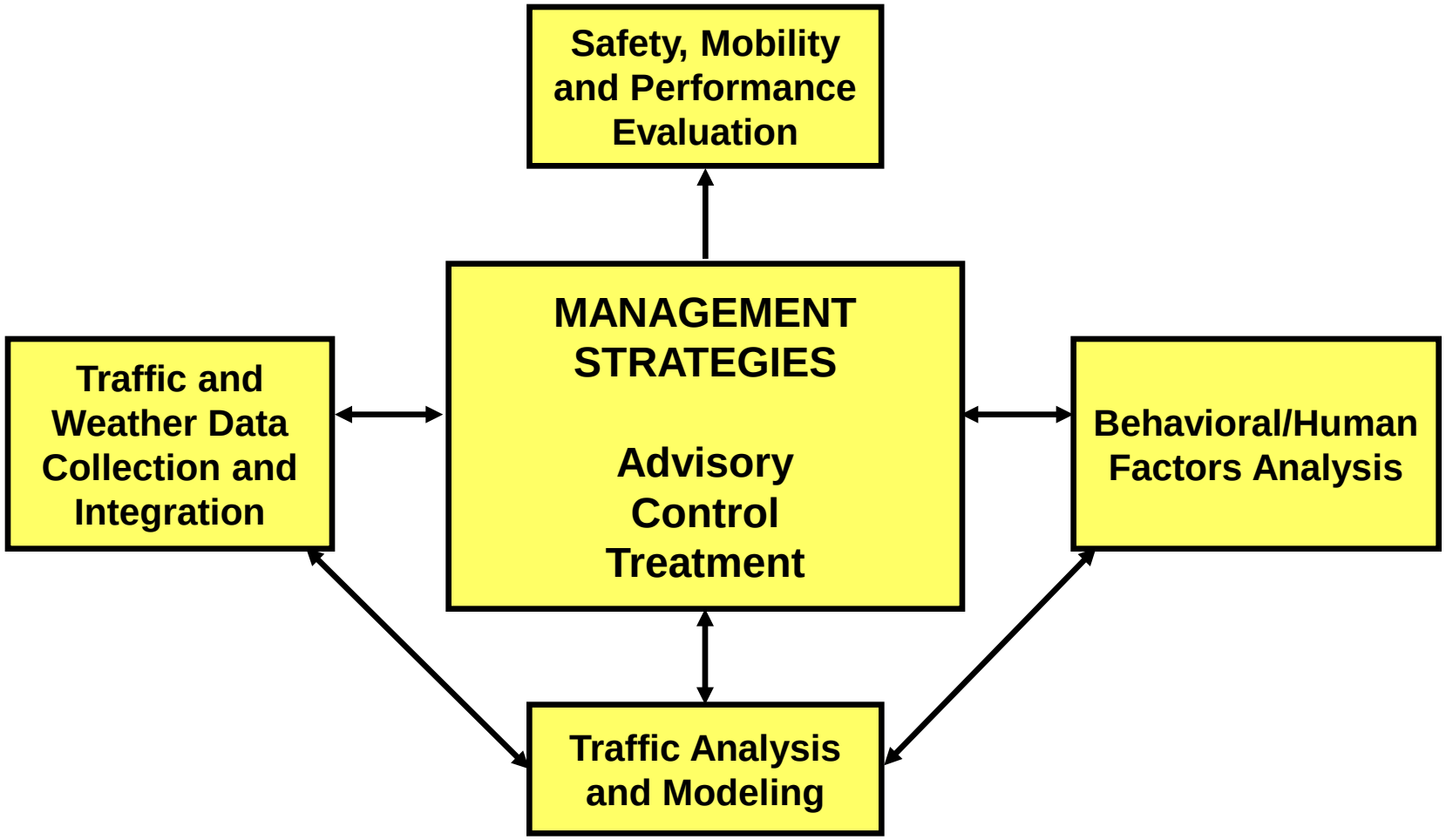
- Travelers valued pavement condition forecasts
- Visual images preferred; travelers liked the radar loop (trend) forecast
- CVOs desire 12-24 hour advance notice for planning
- Uniformity of information across states is important to CVOs
- Number of times that respondents said they used information to change their travel (see chart)
- 74% said they adjusted travel plans or execution based on the road weather information



Clarus Regional Demonstrations – Overall Conclusions

- The value of road weather observations is clearly quantified
- Generally, state DOTs participating in the evaluation have positive reactions to the tools
  - Some of the tools are closer to operational and deployment readiness than others
- Layering of information is critical. Users prefer to be able to choose the information being displayed
- Developing an effective end-user interface is critical to the success of the applications

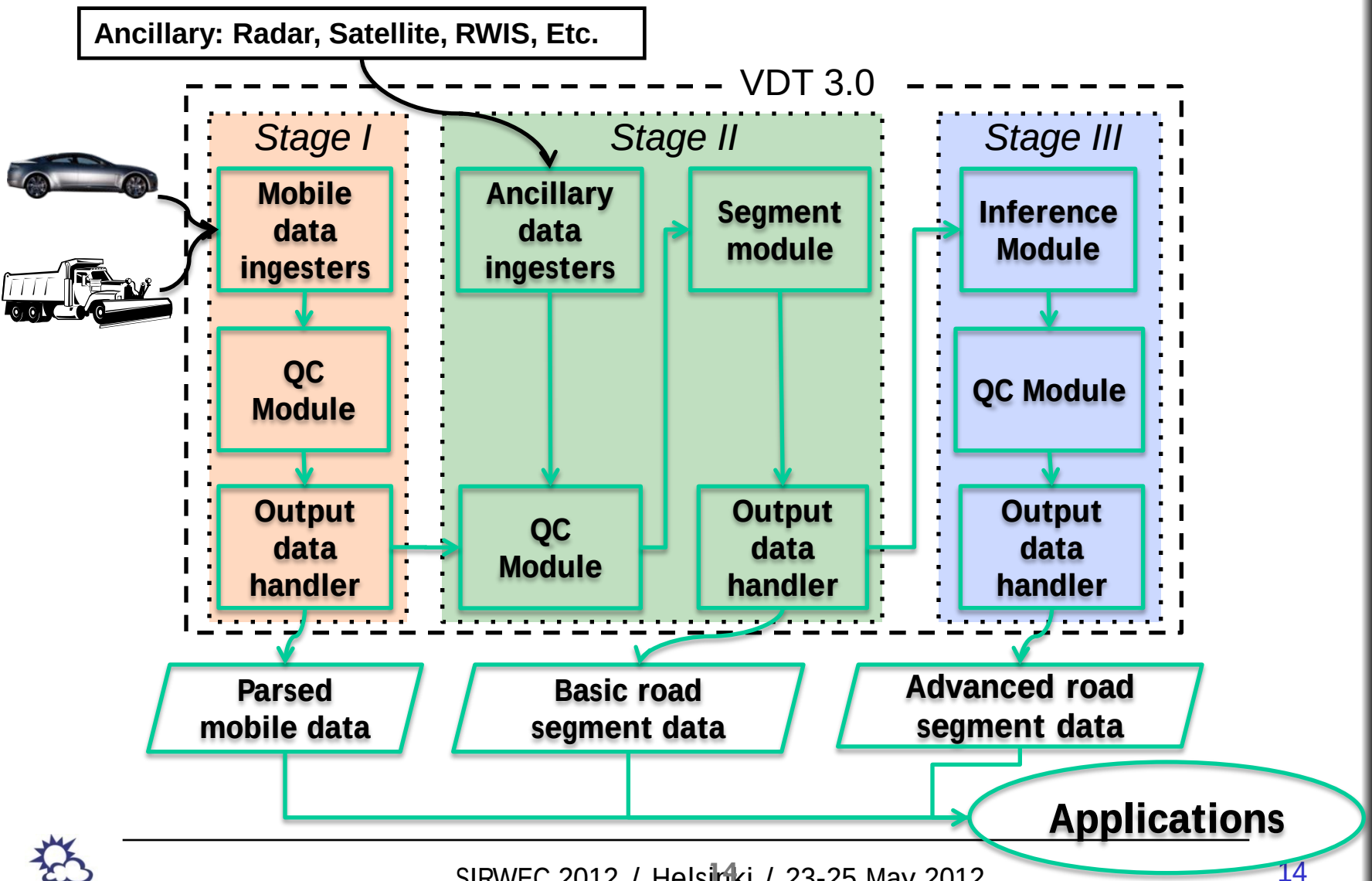
Weather Responsive Traffic Management



Connected Vehicles & Weather: Research Goals

- **COLLECT:** Identify and explore a range of mobile platforms as a source of robust data
- **PROCESS:** Develop algorithms and processing capabilities to translate the mobile data into useable weather and road condition observations
- **DISSEMINATE:** Incorporate these observations into useful applications (e.g., management systems and decision support tools)

Vehicle Data Translator



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Connected Vehicles & Weather: Applications

- Road weather alerts and warnings
  - Short time horizon (e.g., minutes)
  - Medium and long horizon alerts and warnings
- State DOT-based applications
  - Maintenance Decision Support Systems (MDSS)
  - Maintenance & Fleet Management Systems
  - Weather Responsive Traffic Management
- Freight-specific applications
- EMS/First Responder applications

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