Session 5: Weather and Traffic
Data Integration

Overview
Weather and Traffic Data Integration into TMCs

- Traffic Data & Transportation System Status
- Weather Forecast Models
- Weather Observing Systems

Scope of Information Integration

Decision Support Systems & Assessments

Societal Benefits

People & Policies

On-going feedback to optimize value and reduce gaps
Weather Information Integration
- Enhancing the use of weather information in TMC Operations
- Scalable approach to integration of various available weather sources

Clarus Initiative
- National network of near real-time, quality checked road weather observation data
- Ongoing development of Clarus-enabled applications

Data Sources, Needs and Requirements
- Baselining current road weather information
- Data Mining and Gaps Analysis
- Application of Mobile Data for WRTM Studies
WEATHER INFORMATION INTEGRATION IN TMC OPERATIONS
Examples of Weather Integration in TMC Operations

- Increased internal weather information resources (e.g. camera imagery, use of satellite and ASOS data, etc.)
- Increased use of external weather information and forecasts
- Expanded availability of weather information
- More frequent weather forecasts (occasional to continuous)
- Use of more road weather observations
- Greater coordination of weather information within TMC, with maintenance, meteorology staff

Level 1 Cable channel or subscription weather information vendor providing general weather information

Level 2 Internet provided weather radar or satellite image on video wall

Level 3 Field observers or ESS network providing scheduled road or driving condition reports

Level 4 Vendor provided daily surface transportation weather forecasts and observed weather conditions

Level 5 Meteorologist, located within TMC, forecasting and interpreting weather
Integration Activities with TMCs

- **Sacramento, California Regional TMC**: Implemented and evaluated the performance of a weather alert notification system.

- **Kansas City Scout TMC**: Integrating weather event forecast information into their Advanced Traffic Management System (ATMS).

- **Colorado Springs TMC**: Conducting a pilot study on winter weather arterial signal timing in one of their city grids.

- **Louisiana statewide TMCs**: Completed a comprehensive statewide self-evaluation and integration plan across their four TMCs.

- **Wyoming Statewide TMC**: Expanding road weather information sensor coverage and implementing additional variable speed limit notification system in key corridors.

- **Redding, California TMC**: Completed their self-evaluation but resource limitations prevented them from completing an integration plan.
Supporting TMCs in Achieving Higher Levels of Weather Integration

• The Self-Evaluation and Planning Guide is available for download at:
  
  http://www.ops.fhwa.dot.gov/weather/tmctool/registration.htm

• Steps in the Process:

  Self-Evaluation ➔ Integration Plan ➔ Plan Implementation
The Clarus System is an experimental product and is being used for evaluation and demonstration purposes only. This is provided as a public service.

No warranties on accuracy of data are intended or provided. See link to contributor’s data disclaimer in metadata file contrib.csv.

Federal Highway Administration
Research & Innovative Technology Administration
The Clarus Initiative

• Clarus is an R&D initiative to demonstrate and evaluate the value of “Anytime, Anywhere Road Weather Information” provided by both public agencies and the private weather enterprise to transportation users and operators.
What is *Clarus* System

“Robust data assimilation, quality checking, and data dissemination system that could provide near real-time atmospheric and pavement observations from the collective state's investments in road weather information system, environmental sensor stations (ESS) as well as mobile observations from Automated Vehicle Location (AVL) equipped trucks”
Participation Status for *Clarus* as of August 24, 2011

**Canadian Participation**

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

**Clarus Connection Status**
- **Connected** (37 States, 5 Locals, 4 Provinces)
- **Connected plus vehicles** (1 state)
- **Pending** (4 States, 3 Locals, 1 Province)
- **Considering** (3 States, 1 Local)

**Sensor & Station Count**
- 2,253 Sensor Stations (ESS)
- 52,471 Individual Sensors
- 81 Vehicles
Coverage of *Clarus System*
The potential of *Clarus*
Clarus Regional Demonstrations

- Use Case 1: Enhanced Road Weather Forecasting Enabled by Clarus
- Use Case 2: Seasonal Weight Restriction Decision Support Tool
- Use Case 3: Non-winter Maintenance and Operations Decision Support Tool
- Use Case 4: Multi-state Control Strategy Tool
- Use Case 5: Enhanced Road Weather Content for Traveler Advisories
**Clarus-enabled Applications**

- New Brunswick-Nova Scotia Clarus Integration Plus (AMEC)
- One-Stop Shop for Rural Traveler Information (Western Transportation Institute)
- The Integration of Multi-State Clarus Data into Real-time and Archived Regional Integrated Transportation Information System (RITIS) Data Visualization Tools (University of Maryland – CATT Laboratory)
- Research on Clarus System Data (integration of Clarus system data with the Data Transmission Network road segment alerting engine – Telvent)
- Integrating Clarus Weather Station Data and State Crash Data into a Travel Decision Support Tool (Michigan Technological University)
- Passenger Bus Industry Weather Information Application (GST, Inc)
- Application of Clarus System Data to the Improvement of Mobile ESS Utilization (University of North Dakota)
ANALYSIS OF DATA SOURCES, NEEDS, REQUIREMENTS
Establishing a baseline for current road weather information

• **Accuracy/Precision** – The “closeness” between an observed or forecasted condition and the actual condition;

• **Completeness** – Whether there was adequate information to fulfill users’ requirements;

• **Relevance** – The fit of the information to the users’ needs

• **Currency/Latency** – The age of the information;

• **Timeliness/Reliability** – Whether there was consistent and on-time delivery of information; and

• **Ease of Use** – Whether it was easy to obtain, interpret, and use the information.

Data Mining and Gap Analysis

• Conduct a comprehensive search and documentation of traffic and weather data in the United States and abroad that could be used for WRTM

• Establish contacts with organizations that have suitable traffic data on inclement weather and determine procedures/requirements to obtain these data;

• Identify critical gaps in regards to the collection and processing of traffic data on inclement weather conditions

• Recommend strategies and generate guidelines for gathering and processing data that will be used in WRTM studies.

Application of Mobile Data for WRTM

• Identify and explore a range of mobile platforms as a source of robust data

• Develop algorithms and processing capabilities to translate the mobile data into useable weather and road condition observations