RWMP Connected Vehicle Research Track

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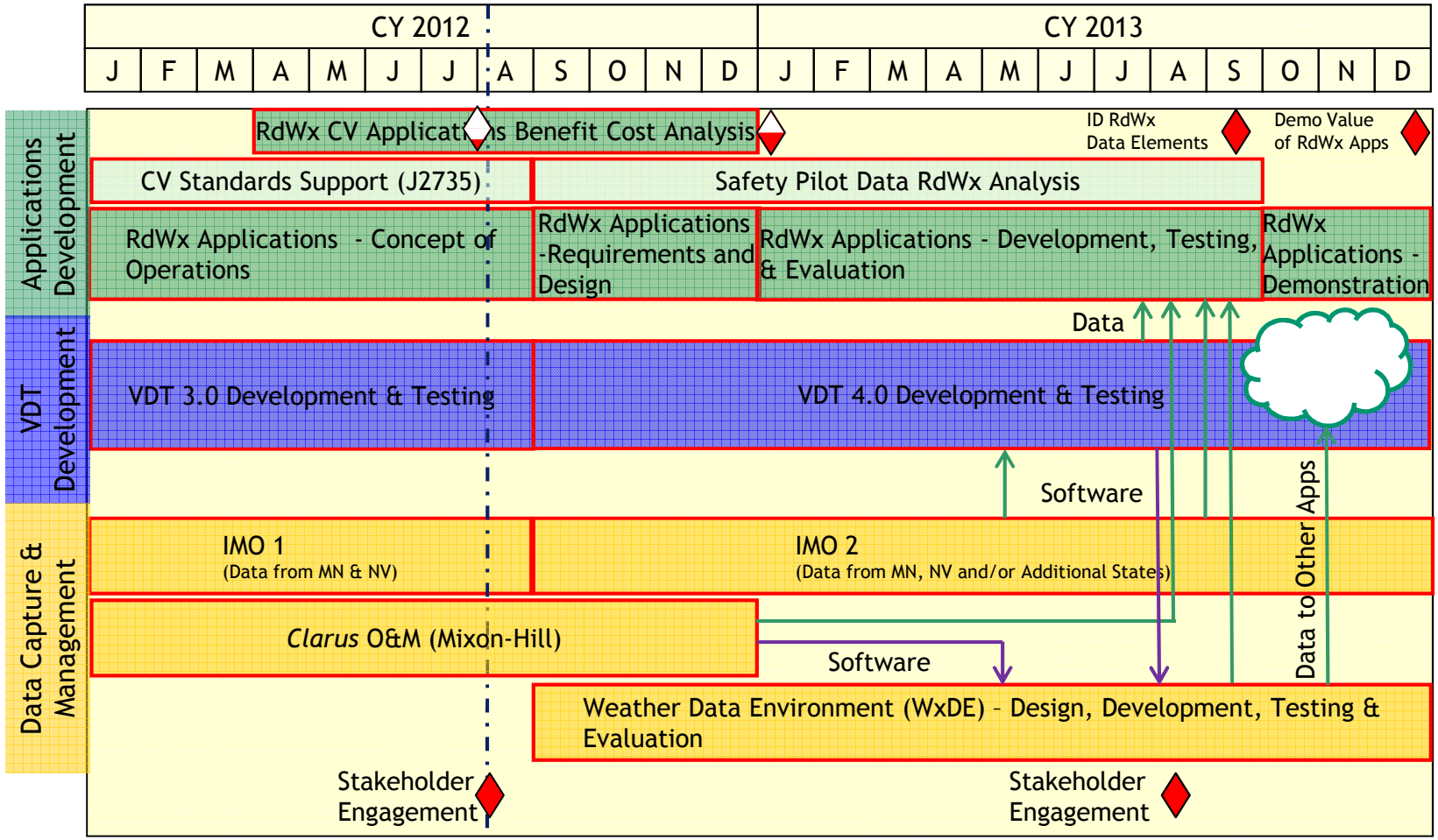
Connected Vehicle Research Goals

All efforts support two goals:

1. Identify weather-related data elements to be included in the USDOT (NHTSA) Rulemaking decision

2. Demonstrate the value of connected vehicle data via the development, test and evaluation of a few key applications

Research Roadmap



Objective: Demonstrate road weather-specific benefits of connected vehicle data capture and management, leveraging investments in *Clarus*, MDSS, VDT, WDE and prototype applications.

Topics

- Road Weather connected vehicle applications
  - Concept of Operations
  - Benefit/Cost Analysis
- Vehicle Data Translator (VDT) 3.0 development
- Integrating Mobile Observations (IMO) project - lessons learned

RdWx CV Apps ConOps

- *Vision for Use of Connected Vehicle Data in Practical Road Weather Applications* (NCAR)
  - Focused on practical applications of VDT outputs
  - Five applications: MMS, MDSS, EMS, ATIS, Freight
  - In process of being published (FHWA-JPO-12-040)
- RdWx CV Applications ConOps (Booz Allen)
  - Scenarios / use cases based on:
    - NCAR'S High-level Vision Document
    - Established ties to DCM, DMA, V2I Safety, AERIS
  - Completion date expected August, 2012

RdWx CV Applications

- Enhanced Maintenance Decision Support System
- Information for Maintenance and Fleet Management Systems
- Variable Speed Limits for Weather-Responsive Traffic Management
- Motorist Advisories and Warnings
- Information for Freight Carriers
- Information and Routing Support for Emergency Responders

RdWx CV Apps B/C Analysis

- Estimate potential national costs and benefits resulting from the implementation of RdWx connected vehicle applications
- Being developed in two phases:
  - Phase I
    - Focuses on safety aspects of the applications
    - Due late August, 2012
  - Phase II
    - Focuses on mobility and environmental aspects
    - Due for completion December, 2012
- Will help establish the most critical weather-related vehicle data elements

Next Steps in Support of the USDOT (NHTSA) Rulemaking Decision (1/2)

- Support Safety Pilot data mining and analysis to understand impact of road weather in improving safety
  - Supplement Volpe's analysis with specific focus on weather data
- Support related standards development efforts
  - Focus on identifying road weather related vehicular data needs for improving safety

Next Steps in Support of the USDOT (NHTSA) Rulemaking Decision (2/2)

- Define data needs via application development
  - Develop ConOps and engage stakeholders to validate RdWx applications (i.e. vehicle data) needs and benefits
  - Identify specific weather-related vehicle data requirements for RdWx applications
  - Develop, test and evaluate RdWx applications and algorithms to understand the usefulness of weather-related vehicle data
  - Conduct controlled experiments to characterize specific weather-related vehicle data elements

VDT 3.0

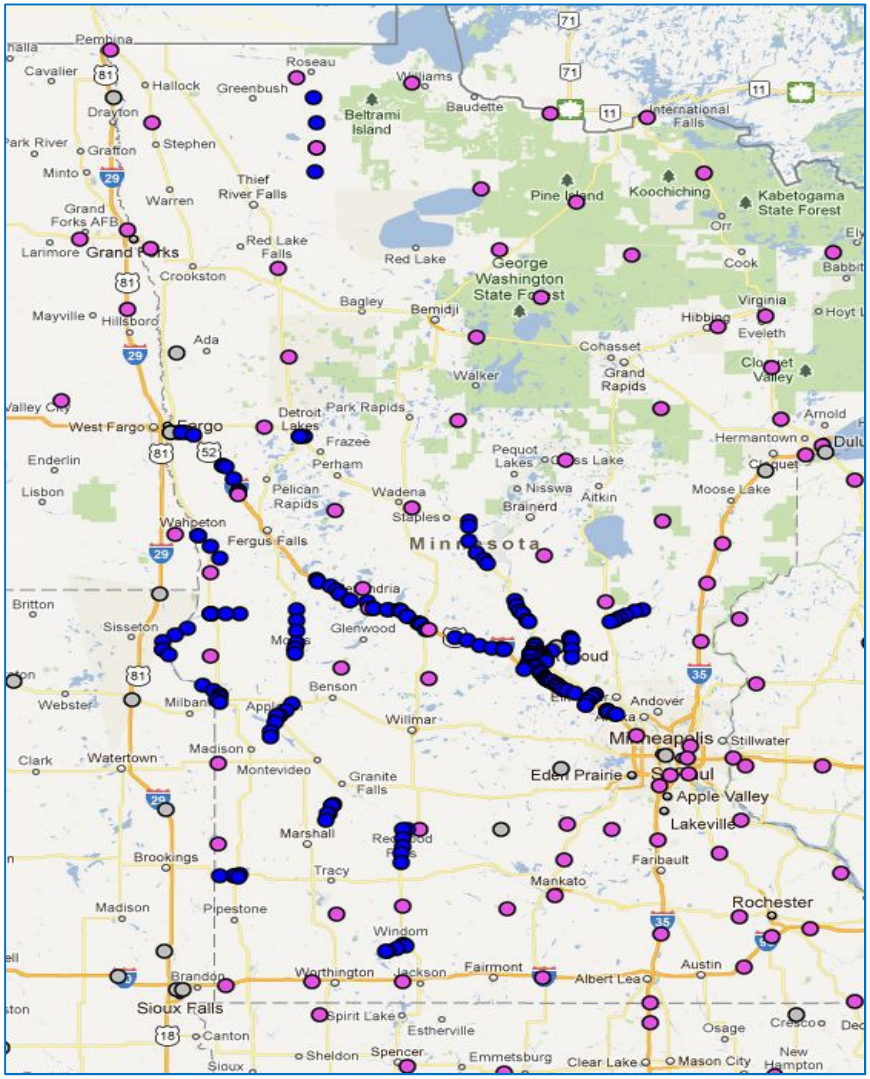
- Published *The Vehicle Data Translator V3.0 System Description* (FHWA-JPO-11-127)

- Improvements over VDT 2.0:
  - Enhanced ability to ingest additional probe data elements and data from ancillary sensors and systems (RH, T_{Pvmnt}, Engine Data, Radar, Satellite, *Clarus*, MADIS…)
  - Use Weather Forecasts as inputs
  - Improved and additional Quality Checking Routines
  - Higher confidence in the VDT outputs (Pavement Condition, Visibility, Precipitation type/Rate, etc…)
  - The timeliness/latency and size of the data from IMO states seems adequate, considering the abnormally light winter

Integrating Mobile Observations Project (IMO) - Lessons Learned

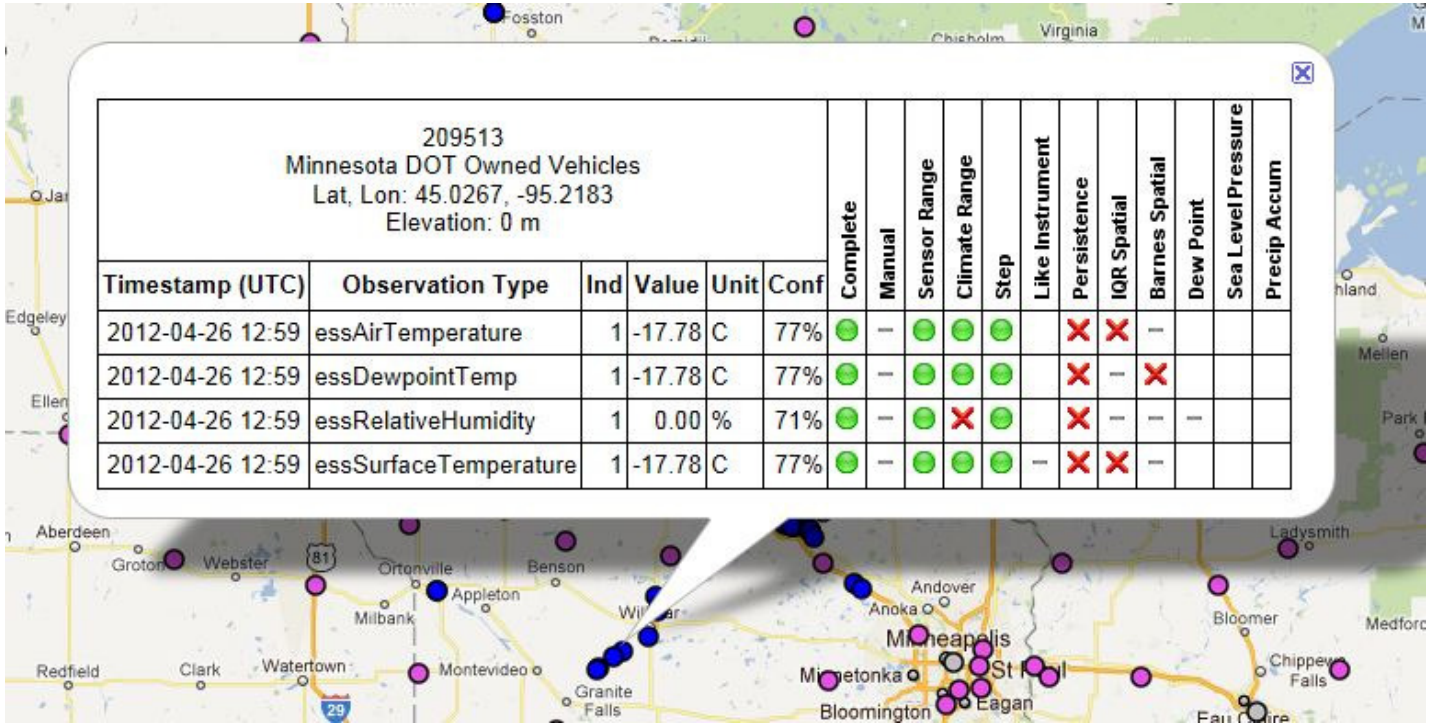
- CAN-Bus/OBD data from vehicle probes is relatively easy to get and transmit
- Decoding/interpreting the Parameter Group Numbers (PGNs) and Suspect Parameter Numbers (SPNs) is **very difficult**
- The effort has resulted in **significant progress** identifying Wx-relevant PGNs and SPNs and creating a data dictionary, but there's still room for improvement
- CAN-Bus/OBD data was successfully transmitted over 700MHz radio and Common Cellular Carrier Networks
- Mobile data has been successfully integrated into *Clarus* and a couple of state applications

Minnesota observations in *Clarus*



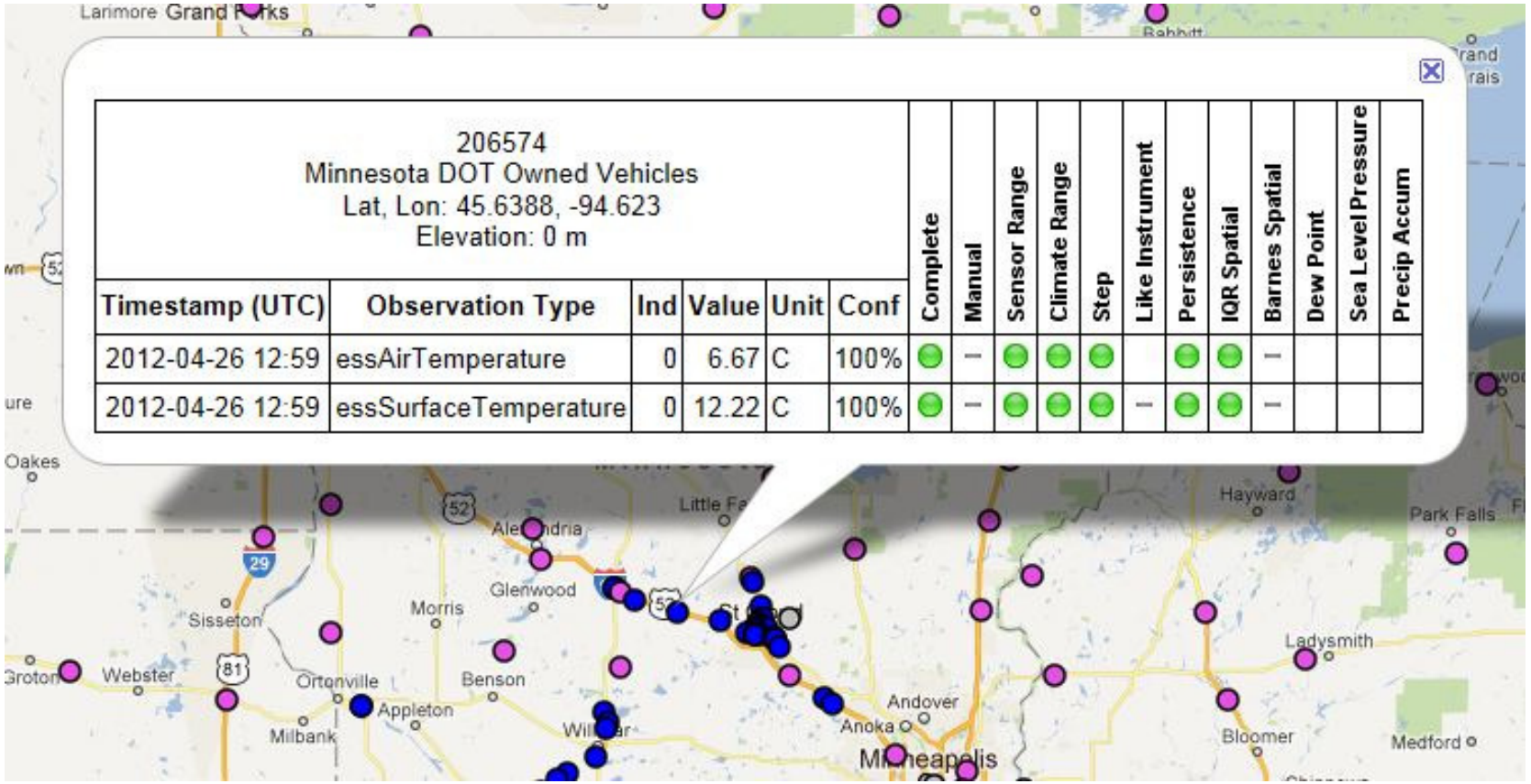
Pink – Fixed
Blue - Mobile

Mobile Data in *Clarus*

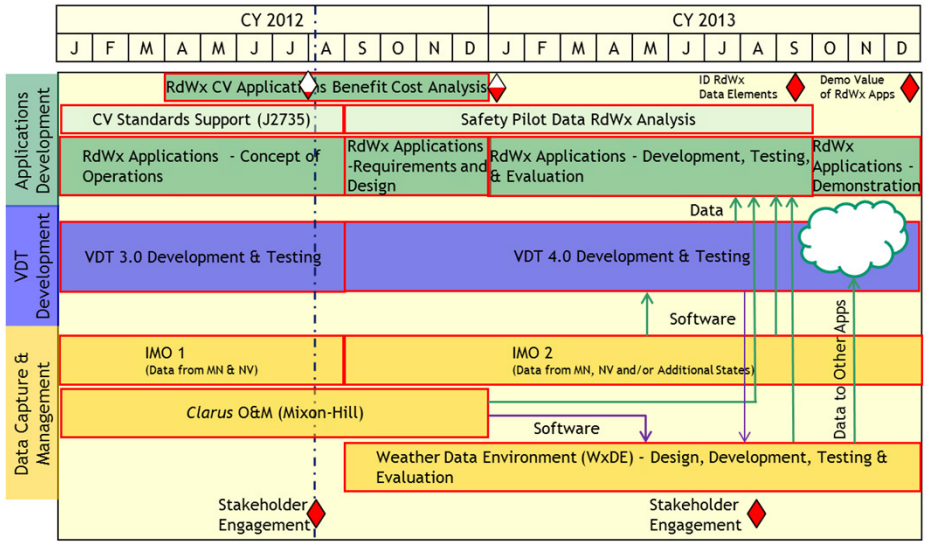


Note: similar to the QC done by *Clarus* on stationary data, the VDT performs quality checking test on the mobile data and flags it accordingly; it is not the intent for the VDT to diagnose the cause of the failure.

Mobile Data in *Clarus* - continued



Need Your Feedback



- What are we doing right?
- What are we doing that you think is unnecessary?
- What are we missing?