

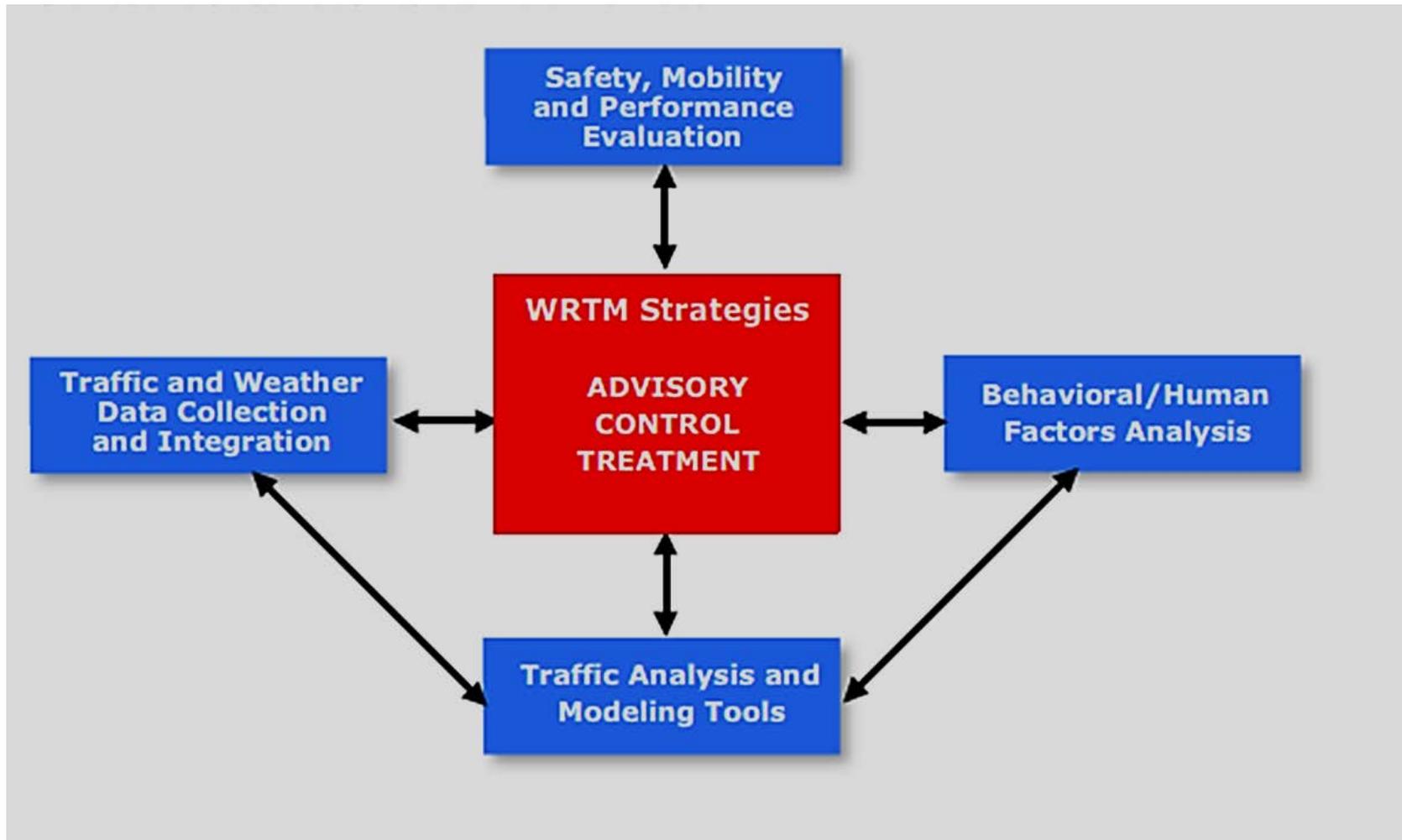
Weather Responsive Traffic Management (WRTM)

ROEMER ALFELOR
Federal Highway Administration

RWM Virtual Stakeholder Meeting
August 25, 2015



WRTM Framework



Traffic Analysis and Modeling

- **Empirical Studies of Weather and Traffic**
 - *Speed, Volume, Capacity, Density*
- **Microscopic Analysis of Traffic in Inclement Weather**
 - *Car Following, Gap Acceptance, Lane Changing*
- **Traffic Estimation and Prediction**
 - *Weather-Sensitive Traffic Estimation and Prediction System (TrEPS)*



Traffic/Weather Data Collection and Integration



- **Weather Integration in TMC's**
 - TMC Self-Evaluation and Planning Guide
 - Sacramento, Kansas City, CO Springs, Wyoming, Louisiana

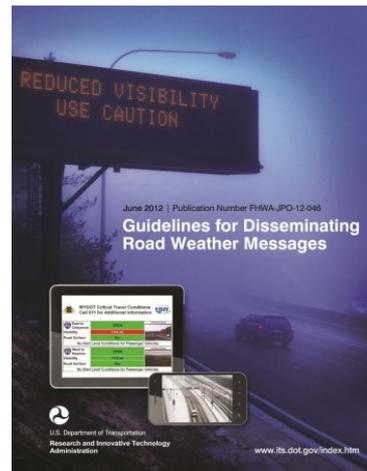
- **Data Sources for WRTM**
 - Data Mining and Gap Analysis for WRTM
 - Application of Mobile Data for WRTM Studies

- **Baselining Current Road Weather Information**



Human Factors Analysis

- **Traveler Requirements for Road Weather Advisory and Control Information**
- **Guidelines for Disseminating Road Weather Messages**



Recent Activities

- **2nd National WRTM Workshop/Stakeholder Meeting, Sept. 2013, Salt Lake City, UT**
- **Guidelines for VSL Implementation during Wet Weather**
- **WRTM Webinar Series (NTOC, ITS T3 Program)**
- **Advanced WRTM Strategies Implementation**
 - **Citizen Reporting Program (Utah DOT)**
 - **Traffic Signal Control (Utah DOT)**



Current/Future Activities

- **WRTM Implementation Projects**
 - Oregon
 - Michigan
 - Wyoming
 - South Dakota
- **Analysis, Modeling and Simulation Test Beds for RW Connected Vehicle Applications (Chicago, Phoenix)**
- **WRTM Web-based Course (CITE Program)**
 - Sept 2015 (free to transportation agencies)
- **3rd National WRTM Workshop (Oct 20-21, Kansas City, MO)**



Weather Responsive Traffic Management (WRTM) Implementation Projects

Oregon DOT

- Developed and implemented WR ATM System in Oregon (SR 217)
- Implemented Weather-related VSL and DMS's

Michigan DOT

- Developed and implemented WR Traveler Information System using Fixed and Mobile Road Weather Observations
- Road weather info provided on MiDrive Website and DMS's

South Dakota DOT

- Used mobile observations from maintenance vehicles to improve traffic and maintenance operations during weather events
- Road weather forecasts on website, 511 and mobile applications

Wyoming DOT

- Used observations from WyDOT plow vehicles to improve condition reporting and traveler information systems
- Road weather info provided on website and DMS's

All 4 projects already completed and evaluated. Reports forthcoming.



CHICAGO ANALYSIS, MODELING AND SIMULATION (AMS) TESTBED

- One of the 6 Testbed Sites identified to analyze Connected Vehicle DMA and ATDM applications
- The Chicago Testbed is dedicated to testing CV weather-related applications under different weather conditions.
- **DMA Applications:**
 - INFLO
 - SPD-HARM
- **ATDM Strategies:**
 - **ATM:** Dynamic Shoulder Lanes, Dynamic Lane Use Control, and Adaptive Traffic Signal Control.
 - **ADM:** Dynamic Routing
 - **Weather Related Applications:** Emergency Parking Management, Traffic Signal Preemption for Winter Maintenance Vehicles, Snowplow Routing, Anti-icing and Deicing Operations.



Contact: Roemer Alfelor



Road Weather Management Capability Maturity Framework (CMF)

ROEMER ALFELOR
Federal Highway Administration

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Capability Maturity Assessment

- A consistent and structured evaluation or assessment of a process
- Guides an agency towards a higher level of implementation, standardization, and return on investment.
 - Incremental actions that build upon existing successes
 - Defines priorities based on clear identification of possible capability improvements

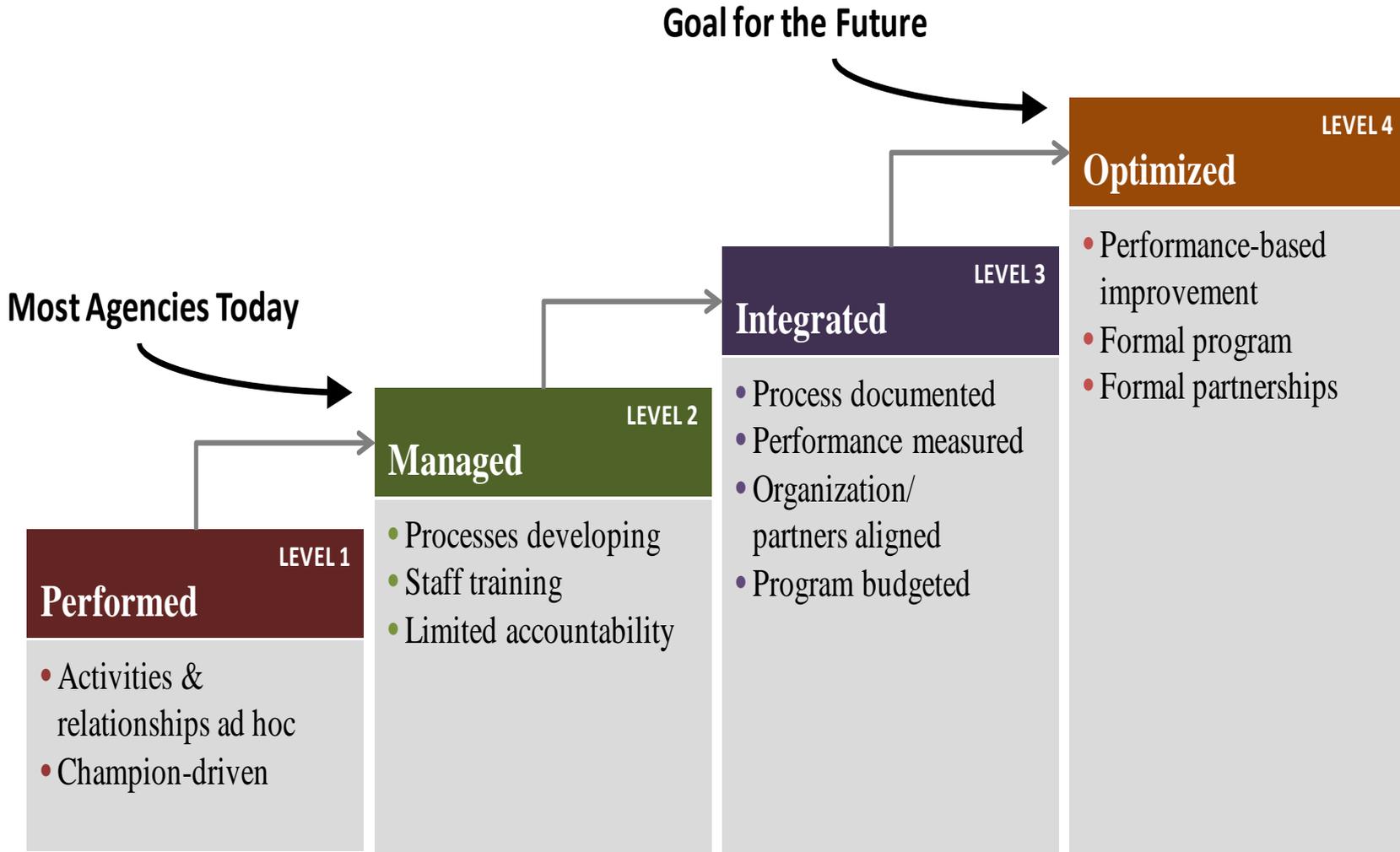


Operations Capability Areas

<p><i>Business Processes</i></p>	<p><i>Systems & Technology</i></p>	<p><i>Performance Measurement</i></p>
<ul style="list-style-type: none"> • Planning • Scoping • Programming/Budgeting • Project development 	<ul style="list-style-type: none"> • Regional architectures • Systems engineering • Standards/Interoperability 	<ul style="list-style-type: none"> • Measures definition • Data acquisition • Measures utilization
<p><i>Culture</i></p>	<p><i>Organization/ Workforce</i></p>	<p><i>Collaboration</i></p>
<ul style="list-style-type: none"> • Technical understanding • Leadership/Championship • Outreach • Program Status/ Authorities 	<ul style="list-style-type: none"> • Program status • Organizational structure • Recruitment and retention • Staff development 	<ul style="list-style-type: none"> • Public safety agencies • Local government/MPO • Outsourcing/PPP



Levels of Maturity



FHWA Program Area CMF's

- Traffic Incident Management
- Planned Special Events
- Work Zone Management
- **Road Weather Management**
- Traffic Signal Management
- Traffic Management



RWM CMF Development Team

- **Consultant**

- Battelle
- ICF Kaiser
- TTI
- HNTB

- **FHWA**

- Roemer Alfelor
- Paul Pisano
- Joe Gregory
- Jim Hunt
- Wayne Berman

- **Stakeholders**

- Jack Stickel (Alaska DOT&PF)
- Ben Dow (APWA, City of Fargo)
- Denise Markow (NH DOT)
- Phil Anderle (CO DOT)
- Denise Inda (NV DOT)
- Larry Dunn (Natl Weather Service)
- Ralph Patterson (Narwhal)



Elements of RWM CMF

- 6 dimensions and 4 levels of capability
- 20 assessment questions related to all dimensions
- Capability levels are determined based on responses
- Approx. 140 improvement actions to move from one level to another in each dimension.
- Choice of actions depends on agency priorities and resources



Project Timeline

- July 2014 – Preliminary CMF developed based on discussions with development team
- Aug 2014 – Preliminary CMF presented at RWM Stakeholder Meeting in Salt Lake City
- Dec 2014 – CMF Validation Workshop in Denver, CO
- May-Dec 2015 – National Deployment Workshops
 - Idaho DOT (Sept. 24, 2015)
 - Wyoming DOT (Sept. 29, 2015)



