Aurora Program minutes

Aurora Board Meeting
March 26-29, 2012 – Salt Lake City, Utah, USA

Individuals Participating in the Meeting:

Dawn Gustafson, Michigan DOT
Jason Norville, Pennsylvania DOT
Tina Greenfield, Iowa DOT
Curt Pape, Minnesota DOT
Max Perchanok, Ontario MOT
Travis Lutman, North Dakota DOT
Mike Adams, Wisconsin DOT
Jack Stickel, Alaska DOT&PF
Robbie Prezioso, Virginia DOT
Leigh Sturges, Utah DOT
Gabe Guevera, FHWA
Sheldon Drobot, NCAR
Mike Chapman, NCAR
Ralph Patterson, University of Utah
Steve Albert, WTI
Neal Hawkins, Iowa State University
Chris Albrecht, Iowa State University
John Horel, University of Utah (Wednesday only)

I. Open and General Items

Aurora Chair Dawn Gustafson began the meeting by welcoming everyone and asking the board to briefly review the meeting agenda. The agenda was then approved by the board as the order of business for the week. *A copy of the agenda is attached to these minutes*. Chris Albrecht then asked for discussion of any outstanding issues concerning past meetings and actions. None were noted.

II. Project Updates

Chris Albrecht provided the attendees with a summary of the latest status report on each ongoing research project. *A copy of this summary is attached to these minutes as Attachment A.* Details of project project-specific discussions follow:

Project 2000-01 – Benchmarking the Performance of RWIS Forecasts: Max Perchanok reviewed this effort, noting that it was complete and ready for final approval by the board. After a short discussion of the final report, the board voted to close this project and list it as completed.

Project 2007-01 – RWIS Equipment Monitoring System, Phase 2: Jack Stickel reviewed this project, as well as the overall need for health of network reporting by member states. He noted that a mini-meeting was held the day prior, and it was clear from that discussion that recent developments concerning Clarus will have a significant impact on this effort. A lengthy discussion followed, wherein the board discussed both Meso-West and Clarus capabilities in this area. Jack then noted that he would have a draft of the concept of operations to the project team by mid-April. Later in the meeting, Dr. John Horel reviewed the capabilities of the Meso-West system and how it may serve the needs of the member agencies. *A copy of his presentation is attached to these minutes as Attachment B.*

Project 2007-04 – Development and Demonstration of a Freezing Drizzle Algorithm: Max Perchanok discussed this research, noting that the project was now about 90% complete. He also noted that he and Chris Albrecht had met with Leon Osborne of UND via teleconference concerning finishing up this effort. A lengthy discussion followed. As a result of the discussion, the group decided to wait and see what UND produces in the next few months.

Project 2007-05 – Multiple-Use ITS Data Collection Sites: Jack Stickel reviewed this project. He noted that the project was broken into two phases, with a survey first, then an assessment later. As a result, Chris Albrecht had drafted a scope that was sent to the project team. The board agreed that Jack should go ahead with using InTrans for this first phase.

Project 2008-01 – Development of a National Road Weather Testing Facility: Tina Greenfield noted that the project team held a mini-meeting, where many things were discussed. Among them, she noted, was the report that WTI had developed previously that documented capabilities of various university testing facilities. After a long discussion, it was noted that WTI would supply the project team with the report for their review. It was noted that this information could eventually be incorporated into the knowledge base in some sort of matrix or "searchable" table.

Project 2008-03 – MDSS Demonstration in Ontario: Max Perchanok reviewed the project, noting that a mini-meeting was held for this effort, which was Ontario's in-kind contribution for 2008 through 2010. He also listed several specific accomplishments and the upcoming plan for a demonstration and evaluation. He also noted that MDSS had strong support in the Province of Ontario.

Project 2009-01 – Summary and Comparison of Agency Experiences with Sensors: Dawn Gustafson reviewed the history of this project, noting that the project team had decided to re-scope it to look at several sensors, rather than just the Lufft R2S. Dawn also noted that she had started a spreadsheet similar to the Clear Roads database they had developed for materials and equipment. After some discussion, Dawn noted that she would send the spreadsheet to Chris for distribution to the board members.

Project 2009-04 – Road Weather Education Enhancements and Dissemination: Dawn Gustafson reviewed this project. She noted that the training materials collected would be posted on the knowledge base website. She also noted that there would be one more request for materials. Chris also noted that he would "advertise" the collection of these materials through the next e-news.

Project 2009-05 – Further Development of PPAES: Leigh Sturges briefly reviewed progress of this effort to date. She noted that the effort is moving forward through work being done at UND, with a final product scheduled to be due soon. Leigh also noted that she would follow up with Jeff Tilley at UND on progress.

Project 2010-01 – Enhancements of AI/RWIS CBT: Tina Greenfield noted that this project was still progressing well. A lengthy discussion followed, wherein the group discussed ongoing maintenance of the CBT materials. Lee Smithson, who is leading the effort within AASHTO, was not in attendance, so specifics on the CBT sections were not discussed.

III. Project Updates (continued)

Project 2010-02 – Mobile-Weather Data Collection Guidelines: Curt Pape noted that a mini-meeting was held prior to the board meeting to discuss this effort. As a result of the meeting, he added, the team agreed that there was a strong link needed with specifications and guidelines from the connected vehicle initiative. In addition, the team agreed that a synthesis was the most likely first step in this effort. A lengthy discussion followed, wherein data parameters and interoperability between sensors on maintenance vehicles were discussed.

Project 2010-03 – Results-Based Winter Road Maintenance Standards: Max Perchanok reviewed this effort. He noted that Dr. Fu had been making very good progress on the research. He also noted that he and Dr. Fu were planning to coordinate this research with an effort being done through FHWA by Booz Allen Hamilton.

Project 2010-04 – RWIS Sensor Density and Location: Max Perchanok reviewed this project, noting that the student at the University of Waterloo had provided a scope for this effort based on the results of his work on Project 2000-01. Chris Albrecht noted that the project team had already seen the scope previously. After a discussion and a few comments by the project team, the board agreed that contracting with the University of Waterloo would be okay once the minor comments were addressed. In addition, Travis Lutman and Leigh Sturges were added to the project team. Max Perchanok noted that he would coordinate the changes to the scope.

Project 2010-05 – Determining RPU and Sensor Failure: Jack Stickel noted that he had been in contact with someone about an existing NCHRP effort by Purdue University that could potentially fulfill this project's goals. After a short discussion, the group agreed to make sure this was not possible before looking at other options. Jack agreed to look into possible options to complete this effort.

Project 2011-01 – Third Peer Exchange: Chris Albrecht noted that the 2011 event was considered a success by the coordinating committee. After a short discussion, wherein it was noted that the summary documents from the event were complete, the board voted to consider this project complete.

Project 2011-02 – RWIS Training Tool: Tina Greenfield reported on this effort, noting that a mini-meeting was held previously. Specifically, she noted that she had sent the draft scope to the project team, but was still waiting on responses/comments. Once she gets input, the project should be ready for RFP.

Project 2011-03 – Instruction for Migrating to Open RWIS: Tina Greenfield noted that this project was not very far along, but the team did discuss what issues or problems the project should document. After discussing the idea of specific case studies, a few agencies were identified. These were Iowa, Utah, Quebec, Wisconsin, and Michigan. It was also noted that looking at how other industries approached open architecture could be a later phase of this project.

Project 2011-04 – Study of MDSS Costs: Mike Adams reviewed this project, noting that a survey would be the first step to take. Questions/topics include hardware, software, training, and other ongoing costs, Mike added. Mike noted that he would work on this survey in the coming weeks.

Project 2011-05 – Funding Source Identification: Jack Stickel reviewed the scope of this project, but noted that no new progress had been made recently in moving it forward.

IV. FY2012 Project Start-Up and Scheduling

Chris Albrecht then reviewed the projects voted on for the FY2012 research program. After a lengthy discussion, and consideration of what Clear Roads was funding for FY2012, the board agreed that the five highest ranking projects would be the only projects for the current year. Each of the projects was then discussed. Details of the discussions follow:

Project 2012-01 – Validate the Accuracy of Pavement Condition Predictions from Various Sources: Max Perchanok reviewed the background to this effort, noting that the idea originally came out of the third peer exchange. Max noted that MDSS of various types combine RWIS forecasts with rules of practice, real-time plow and salt records, and other information to predict the current and future snow/ice status of the pavement during storms. This effort, he added, is needed to close the loop on the "open loop" status of pavement forecasting by validating the accuracy of the pavement condition predictions and provide confidence in the MDSS recommendations. After a short discussion, it was noted that the project team would consist of Max Perchanok, Dawn Gustafson, Leigh Sturges, Tim Peters, Curt Pape, Mike Adams, and Gabe Guevera.

Project 2012-02 – Winter Severity Index, Phase 2: Tina Greenfield reviewed this project. She noted that this idea also came out of the September 2011 peer exchange in Montana, and would on the system developed under Aurora Project 2004-04. If this system can be expanded in use by other non-Aurora agencies, the team can determine if revisiting the index is necessary, she added. The project team was set as Tina Greenfield, Max Perchanok, Curt Pape, and Mike Adams.

Project 2012-03 – Cameras and Operational impact of Remote Road Conditions: Leigh Sturges was identified as the project champion for this effort. She noted that Utah DOT and a private contractor have developed a low-cost live PTZ camera system to monitor road conditions at locations not covered by conventional traffic cameras or RWIS sites. This project, she added, would identify efficiencies gained, impacts on road condition, costs, cost avoidance, and document the model for other agencies to follow. After a short discussion, Leigh Sturges was joined on the project team by Travis Lutman, Mike Kisse, Curt Pape, Robbie Prezioso, and Jack Stickel.

Project 2012-04 – Communicating and Publicizing Road Weather and Operations information: Joe Doherty was identified as the project champion for this effort. He noted that this was another peer exchange topic, noting that this research would likely compile the best practices on how road weather information is being transferred to the proper stakeholder groups. It was also noted that Jack Stickel, Jason Norville, Dawn Gustafson, and Tim Peters were on the project team.

Project 2012-05 – Seasonal Weight Restrictions Demonstration: Max Perchanok reviewed the background on this project. He noted that this research idea came out of the March 2011 *Clarus* group meeting in Colorado as a potential extension of use case #2. The objective, he added, is to validate the predicted thaw depths and restriction dates recommended using the *Clarus* EICM approach and alternative, degree-day based approaches to provide an understanding of reliability of different approaches in setting restrictions. It was noted that Max would be joined on the project team by Travis Lutman, Mike Kisse, Mike Adams, Jack Stickel, and Dawn Gustafson.

V. Program Administration and Financial Status

Chris Albrecht noted that the administrative contract was well under budget so far this year. He then asked if there were any other questions or issues the board would like to discuss. A few minor issues were discussed. The group also discussed the next management contract, noting that they would need to decide in the next few months what to do after 2012. Tina, Dawn, and Leigh volunteered to lead this effort.

VI. National Initiatives and Partnerships

Although national-level issues were to be discussed during the later joint meeting with the Clear Roads board, a few topics were briefly discussed. First, Max Perchanok reviewed TRB committee activities, especially noting the upcoming international conference in Coralville, Iowa. Next, Sheldon Drobot gave a brief presentation on the latest forecasting research at NCAR. *A copy of his presentation is attached to these minutes as Attachment C.*

Mike Adams then reviewed the latest with the MDSS pooled fund group, which Wisconsin DOT had been involved with since 2009. He noted that most of the work under the study was complete, with most agencies now evaluating its overall value. In Wisconsin, he added, MDSS was fully deployed in the 2010-2011 winter season with 415 forecast routes and 321 tracking routes across the state. Finally, Gabe Guevera reviewed a few of the FHWA Weather Team initiatives. In particular, he reviewed more of the connected vehicle effort, Clarus, road weather courses, and performance measurement. *A copy of a handout used by Gabe is attached to these minutes as Attachment D.*

VII. WTI Membership and Transcend

Next, Steve Albert from the Western Transportation Institute gave a presentation on capabilities and research at WTI and its Transcend facility. *A copy of his presentation is attached to these minutes as Attachment E.*

VIII. Future Aurora Meetings and Calls

The board then discussed potential dates and locations of the next on-site meeting. After a lengthy discussion, the group agreed to meet in Toronto in late September or early October. Chris Albrecht noted that he would follow up with members concerning travel and work with Max Perchanok on setting dates and hotel specifics.

IX. FHWA and the Future of Clarus

This agenda item was discussed in length earlier in the meeting under items II and VI.

X. Other Aurora Program Business

No other business was discussed. The group then adjourned the formal portion of the Aurora board meeting.

XI.–XVI. Joint Meeting with Clear Roads

Over the next two days, the Aurora Board met jointly with the Clear Roads board to discuss issues of common interest to both groups. The Clear Roads attendees were:

- Cliff Spoonemore, Wyoming DOT
- Paul Brown, Massachusetts DOT
- Ron Wright, Idaho DOT
- Mike Lashmet, New York DOT
- Annette Dunn, Iowa DOT
- Brian Burne, Maine DOT
- Tim Croze, Michigan DOT
- Tom Peters, Minnesota DOT
- Allen Williams, Virginia DOT
- Tim Chojnacki, Missouri DOT
- Mike Mattison, Nebraska DOT
- Caleb Dobbins, New Hampshire DOT
- Larry Gangl, North Dakota DOT
- Charles Goodhart, Pennsylvania DOT
- Monty Mills, Washington DOT
- Kyle Stollings, West Virginia DOT
- Mike Sproul, Wisconsin DOT
- Lynn Bernhard, Utah DOT
- John Scharffbillig, APWA
- Rudy Persaud, FHWA
- Lee Smithson, AASHTO
- Colleen Bos, CTC & Associates

Aurora FY2012 Funded Projects Review – Chris Albrecht reviewed the five research projects recently funded by Aurora under FY2012. When applicable, the project champions elaborated on the scopes and objectives of the new efforts. The five projects noted were:

- Project 2012-01 – Validate the Accuracy of Pavement Condition Predictions from Various Sources
- Project 2012-02 – Winter Weather Severity Index, Phase 2
- Project 2012-03 – Cameras and Operational Impact of Remote Road Condition
- Project 2012-04 – Communicating and Publicizing Road Weather and Operations Information to Decision Makers and Public Stakeholders
- Project 2012-05 – Seasonal Weight Restrictions Demonstration

Clear Roads FY2012 Funded Projects Review – Colleen Bos then reviewed the new projects funded by Clear Roads. *A list of these projects is attached to these minutes as Attachment F*.

Review of Current Aurora Projects in Progress – After a short break, Chris Albrecht reviewed all ongoing Aurora research projects underway. Once again, project champions provided detail on progress.

Review of Current Clear Roads Projects in Progress – Colleen Bos reviewed the ongoing Clear Roads efforts in a similar fashion as Chris did. *A list of these projects is attached to these minutes as Attachment G.*

2011 Peer Exchange Follow Ups – Next, Chris Albrecht reviewed the 2011 Peer Exchange resulting actions and research needs statements assigned to both Aurora and Clear Roads. Chris noted that nearly a dozen research ideas were assigned to Aurora for consideration and discussion, many of which were funded recently. Similarly, Clear Roads was assigned nearly 20 needs statements. In addition, the group discussed the possibility and potential structure of a fourth peer exchange, likely to be held in 2013. Overall, the group felt it was a good idea, although the format may need to change slightly.

Round Robin – Representatives from both pooled fund groups shared the latest news from their agencies regarding road weather and winter maintenance.

Discussion Regarding Environmental Impact – Paul Brown from Massachusetts DOT led a group discussion on environmental impacts of winter maintenance. Among the items discussed were excessive alt use on high volume roadways and problems with shade cover along urban roadways impacting effectiveness of anti- and de-icing chemicals.

Wrap Up – Cliff Spoonemore and Dawn Gustafson briefly reviewed the events of the joint meeting and thanked the attendees for their participation.

Agenda

Aurora Program Board Meeting

March 26-29, 2012
Hotel Monaco, Salt Lake City, Utah, USA

AGENDA

Monday, March 26, 2012:

7:00 Group Business Dinner

Tuesday, March 27, 2012:

	8:00	**Project Mini-Meetings**	
	8:00	Project 2007-01	Jack Stickel
	8:30	Project 2007-05	Jack Stickel
	9:00	Project 2008-01	Tina Greenfield
	9:30	Project 2008-03	Max Perchanok
	10:00	***Break***	
	10:30	**Project Mini-Meetings (continued)**	
	10:30	Project 2010-04	Max Perchanok
	11:00	Project 2011-02	Tina Greenfield
	11:30	***Group Lunch***	
I.	**1:00**	**Open and General Items**	
	1:00	Introductions and review/approval of agenda	Dawn Gustafson
	1:10	Review of previous minutes and actions	Chris Albrecht
II.	**1:20**	**Project Updates**	
	1:20	2000-01 - Benchmarking … RWIS Forecasts	Max Perchanok
	1:40	2007-01 - RWIS Equipment Monitoring 2	Jack Stickel
	1:50	2007-04 - Freezing Drizzle Algorithm	Max Perchanok
	2:00	2007-05 - Multiple Use ITS Sites	Jack Stickel
	2:10	2008-01 - National Testing Program	Tina Greenfield
	2:20	2008-03 - MDSS Demo in Ontario	Max Perchanok
	2:30	2009-01 - Comparison of Sensors	Dawn Gustafson
	2:40	2009-04 - Road Weather Education Enhancements	Dawn Gustafson
	2:50	2009-05 - Further Development of PPAES	Leigh Sturges
	3:00	2010-01 – Enhancements of AI/RWIS CBT	Tina Greenfield
	3:10	***Break***	

III.	**3:25**	**Project Updates (continued)**	
	3:25	2010-02 – Mobile-Weather Data Collection Guidelines	Curt Pape
	3:35	2010-03 – Results Based Maintenance Standards	Max Perchanok
	3:45	2010-04 – RWIS Sensor Density Study	Max Perchanok
	3:55	2010-05 – Determining RPU and Sensor Failure	Jack Stickel
	4:05	2011-01 – Third Peer Exchange	Tina Greenfield
	4:15	2011-02 – RWIS Training Tool	Tina Greenfield
	4:25	2011-03 – B/C of Open RWIS	Tina Greenfield
	4:35	2011-04 – Study of MDSS Costs	Mike Adams
	4:45	2011-05 – Funding Source Identification	Jack Stickel
IV.	**4:55**	**2012 Project Start-Up and Scheduling**	Chris Albrecht
	5:30	***Adjourn***	
	6:30	***Group Dinner***	

Wednesday, March 28, 2012:

V.	**8:00**	**Program Administration and Financial Status**	Chris Albrecht
	8:00	Discussion of membership payments, contributions, and agreements	
	8:15	Discussion of program expenditures	
	8:20	Discussion of contracting issues	
	8:25	Discussion of future management contract	
VI.	**8:15**	**National Initiatives and Partnerships (5 minutes each)**	
		ENTERPRISE, MDSS, NTCIP	Curt Pape
		TRB Task Forces and Committees, ITS America	Max Perchanok
		AMS	Sheldon Drobot
		Clear Roads	Jason Norville
		AASHTO/SICOP, PNS, SIRWEC	Chris Albrecht
		Other Initiatives/Groups	All
	10:00	***Break***	
VII.	**10:15**	**WTI Membership and Transcend**	Steve Albert
VIII.	**10:45**	**Future Meetings and Calls**	Dawn Gustafson
IX.	**11:00**	**FHWA and Future of Clarus**	Chris Albrecht
X.	**11:30**	**Other Business**	All Participants
	12:00	***Group Lunch***	

XI.	**1:00**	**Joint Meeting with Clear Roads**	All Participants
	3:00	***Break***	
XII.	**3:15**	**Joint Meeting with Clear Roads (continued)**	All Participants
	5:00	***Adjourn***	
	7:00	***Group Dinner (Joint with Clear Roads)***	

Thursday, March 29, 2012:

XIII.	**8:00**	**Joint Meeting with Clear Roads (continued)**	All Participants
	9:30	***Break***	
XIV.	**9:45**	**Joint Meeting with Clear Roads (continued)**	All Participants
	12:15	***Group Lunch***	
XV.	**1:00**	**Joint Meeting with Clear Roads (continued)**	All Participants
XVI.	**2:00**	**Meeting Follow-Up and Other Aurora Items**	Chris Albrecht
	2:30	***Adjourn***	

Aurora Program Board Meeting

March 27-29, 2012
Hotel Monaco, Salt Lake City, Utah, USA

ATTENDING

Name, Agency	Arrive / Depart	Notes
Travis Lutman, North Dakota DOT	24th pm / 29th pm	5 nights *
Max Perchanok, Ontario MOT	25th pm / 29th am	4 nights *
Curt Pape, Minnesota DOT	25th pm / 30th am	5 nights *
Tina Greenfield, Iowa DOT	26th am / 30th am	4 nights *
Mike Adams, Wisconsin DOT	26th pm / 29th pm	3 nights *
Jack Stickel, Alaska DOT&PF	26th pm / 30th am	4 nights *
Robbie Prezioso, Virginia DOT	26th pm / 30th am	4 nights *
Jason Norville, Pennsylvania DOT	26th pm / 31st am	5 nights *
Dawn Gustafson, Michigan DOT	27th am / 30th pm	3 nights *
Chris Albrecht, ISU/CWIMS	25th pm / 30th am	5 nights (alternate billing)
Gabe Guevera, FHWA	26th pm / 29th am	3 nights (alternate billing)
Steve Albert, WTI	26th pm / 29th pm	3 nights (alternate billing)
Neal Hawkins, ISU/CWIMS	27th am / 29th am	2 nights (alternate billing)
Leigh Sturges, Utah DOT	-	-
Sheldon Drobot, NCAR	-	-
Mike Chapman, NCAR	-	-
Ralph Patterson, University of Utah	-	-

* Paid through ISU master account

NOT ATTENDING

Joe Doherty, New York DOT
Tim Peters, Illinois DOT
Abner Johnson, Ohio DOT

March 23, 2012

Attachment A

Aurora Program - Ongoing Project Status

March 27, 2012

FY 2000 through FY 2007

- 2000-01: Benchmarking of RWIS Forecasts ($50,000 in-kind) = 100% complete
- 2007-01: RWIS Equipment Monitoring System, Phase 2 ($135,000) = 5% complete
- 2007-04: Development of a Freezing Drizzle Algorithm ($85,000) = 90% complete
- 2007-05: Multiple-Use ITS Data Collection Sites ($15,000) = 15% complete

FY 2008

- 2008-01: National Road Weather Testing Program ($11,000) = 20% complete
- 2008-03: MDSS Demonstration in Ontario ($75,000 in-kind) = 25% complete

FY 2009

- 2009-01: Summary and Comparison of Sensors ($55,000) = 50% complete
- 2009-04: Road Weather Education Enhancements ($20,000) = 35% complete
- 2009-05: Further Development of PPAES ($83,000) = 50% complete

FY 2010

- 2010-01: Enhancements of AI/RWIS CBT ($50,000) = 65% complete
- 2010-02: Mobile-Weather Data Collection Guidelines ($25,000) = 10% complete
- 2010-03: Results Based Winter Road Maintenance Standards ($120,000) = 75% complete
- 2010-04: RWIS Sensor Density Grid ($100,000) = 5% complete
- 2010-05: Determining RPU and Sensor Failure ($5,000) = 10% complete

FY 2011

- 2011-01: Third Peer Exchange ($30,000) = >95% complete
- 2011-02: RWIS Training Tool (200,000) = 10% complete
- 2011-03: Benefit/Costs and Instruction for Migrating to Open RWIS ($75,000) = 5% complete
- 2011-04: Study of MDSS Costs ($20,000) = 5% complete
- 2011-05: Funding Sources Identification ($5,000) = 5% complete

Project Status Report

March 21, 2012

Project: 2000-01: Benchmarking the Performance of RWIS Forecasts

Champion: Max Perchanok, Ontario Ministry of Transportation

Status:

- NCAR completed surface temperature verification analyses for the Maritime Provinces and Finland. These were the only suitable locations where data was obtained.
- The University of Waterloo was tasked with linking the verification results with mapping layers from which they could test the association of trends in RWIS forecast accuracy with geographical factors.
- ***The University of Waterloo has included a proposal for Project 2010-04 with the draft final report for 2000-01.***
- ***The revised final report was sent to Chris Albrecht for distribution to the entire board.***
- ***Dr. Fu presented to the board on February 1, 2012.***
- ***Chris Albrecht forwarded the final report to the board on March 20.***
- ***The full board will vote on approval of the final report at the March 2012 board meeting in Salt Lake City, Utah.***
- University of Waterloo submitted a proposal for 2010-04. The proposal follows on work completed in project 2000-01, using data, information and contacts generated in that project. It will be reviewed by the project committee at a mini-meeting prior to the Salt Lake meeting, with the intention to prepare a work assignment with the University.

Approximate % Complete: 100 %

Recommendations: X continue as planned
____ continue with modifications
____ discontinue

Additional Comments:

- This is an in-kind project for Ontario Ministry of Transportation for FY2000 and FY2001.
- ***The Aurora board voted to amalgamate Projects 2000-01 and 2010-04 at the spring 2011 meeting because both the data and methods of analysis used in 2000-01 are highly suited to the objectives of 2010-04.***
- The completed report for 2000-01 fulfills MTO's in-kind obligation for that project.
- ***After reviewing the proposal, the board will decide whether to fund 2010-04 as an ongoing project.***
- Project Team: Max Perchanok (champion), Mike Adams, Curt Pape, Jeff Tilley, Sheldon Drobot, Dan Huang

Project Status Report

March 20, 2012

Project: 2007-01: RWIS Equipment Monitoring System, Phase 2

Champion: Jack Stickel, Alaska Department of Transportation and Public Facilities

Objective: to expand the RWIS Equipment Monitoring System in four areas:

- Include in-commission rate reports with the percent of time the site was fully operational or degraded by no data received, incomplete data, or incorrect/suspicious data.
- Implement the specific changes to the RWIS Data and Reporting System proposed by Aurora member states.
- Evaluate how site performance by sensor can be added to the application.
- ***Complete a Concept of Operations, system architecture, implementation plan, and deployment (assuming sufficient funding) for ingesting Clarus System quality checking output online.***

Status:

- This project has absorbed the discontinued Project 2005-01: Development of a RWIS Quality Assurance Monitoring System that was intended to develop a system that is modular to allow installation with different host organizations and platforms, expandable for incorporating additional quality assurance modules, accessible via the web, and holds historical database of quality assurance reports for future reference. The revised scope of this project will incorporate the Clarus System quality checking output for objective #4.
- ***A detailed analysis of the Clarus System quality checking output will be completed, then a draft scope of work will follow.***
- ***Chris Albrecht has proposed a project call and will schedule a mini-meeting for the Salt Lake City meeting in March 2012 to discuss a revised scope and RFP.***

Approximate % Complete: 5 %

Barriers/Issues: need a final scope of work as a basis for an RFP

Recommendations:
- X continue as planned
- ____ continue with modifications
- ____ discontinue

Additional Comments:

- This project was funded for $25,000 in FY 2007 and for an additional $10,000 under FY 2008.
- This project has also been combined with Project 2005-01 and its $100,000 in funding.
- ***The total project budget is $135,000.***
- Project Team: Jack Stickel (champion), Dawn Gustafson, Curt Pape, Mike Adams, Tina Greenfield, Joe Doherty

Project Status Report

March 21, 2012

Project: 2007-04: Development and Demonstration of a Freezing Drizzle Algorithm

Champion: Max Perchanok, Ontario Ministry of Transportation

Status:

- After a conference call on December 9, 2011, UND has recently agreed to accept the extension on mutually agreeable terms, with a new completion date of June 30, 2012.
- Leon Osborne has been working with Jeff Tilley to obtain all the project data. He has the 2007-2009 season, but does not yet have 2009-2010.
- ***The first task for the extension is to provide us an outline of what will be in the report. Leon did that on the phone and will send it in email to Max. Max was quite happy with what Leon described on the phone and it addresses the issues that held this project up in the past.***
- ***A contract extension until June 30, 2012 was signed on December 29, 2011 with the terms:***
  - ***Provide a partial draft and a full table of contents for the report prior to beginning the final analysis and report writing.***
  - ***Timelines were created for the remaining tasks.***
  - ***Payment of remaining funds upon acceptance of the completed report.***
- ***Leon Osborne has taken on responsibility for the project, will complete any required analysis and will write the report.***
- ***Leon and Max talked through a report outline on Feb. 7 and Max accepted it. A written version was provided on March 20. Leon plans to have the project completed by April 30, 2012.***

Approximate % Complete: 90 % (Phase 2)

Barriers/Issues: Lack of project documentation has required significant spin-up on project activities, data collection, and analyses conducted prior to January 2012. This has slowed initial progress more than expected. Impacts are lessening with time and more rapid progress is now being made. Still needing the calibration report from NCAR.

Recommendations:
- X continue as planned
- _____ continue with modifications
- _____ discontinue

Additional Comments:

- ***This project was funded for $15,000 in FY 2007 and $70,000 in FY 2008, for a total of $85,000.***
- Phase I was completed in October 2008
- ***If UND agrees to the terms of extension then the project will be completed.***
- Project Team: Max Perchanok (champion), Curt Pape, Mike Adams, Sheldon Drobot, Leon Osborne

Project Status Report

March 20, 2012

Project: 2007-05: Multiple-Use ITS Data Collection Practices

Champion: Jack Stickel, Alaska Department of Transportation and Public Facilities

Status:

- The overall objective of this project remains the same – use RWIS sites for different types of data collection. The goals, however, have been slowly evolving over the past two years. The current project goal is to integrate non-intrusive traffic data collection devices into a RWIS site.
- There is a realization that each DOT has unique IT infrastructure, power, communication, traffic data needs, and contractual relationships. There needs to be different, specific solutions to meet these challenges. Therefore, the two goals for project are:
  - Document existing DOT programs for non-intrusive traffic data collection among AURORA states. This would include Utah, New York, and Iowa.
  - Develop a software solution for full Wavetronix integration for the SSI Linux RPU (LX-RPU). A prototype would be deployed for an Aurora state (Alaska); other Aurora states would be eligible to follow on at a reduced cost. Alaska DOT has a quote for the LX-RPU integration and is ready to go to work.
- The non-intrusive RWIS traffic integration from other states could be documented as part of Aurora Project 2009-03 "*Knowledge Base for RWIS"*.
- Other options for this project would include air quality monitoring for: Ozone O3, Nitrogen Dioxide O2, Carbon Monoxide CO, Volatile Organic Compounds VOC, Carbon Dixoide CO2, Sulpher Dioxide SO2, Hydrogen Sulphide H2S, Particulate PM10, PM2.5
- ***A revised draft scope has been drafted by InTrans for review by Jack Stickel and the project team.***
- ***A project mini-meeting has been scheduled for the March 2012 Utah board meeting.***

Approximate % Complete: 15 %

Barriers/Issues: Final scope of work needs to be approved by the project team

Recommendations:
- X continue as planned
- ____ continue with modifications
- ____ discontinue

Additional Comments:

- ***This project was funded for $35,000 in FY 2007. This amount was reduced to $15,000 at the September 2010 board meeting.***
- Project Team: Jack Stickel (champion), Tina Greenfield, Joe Doherty, Curt Pape, Dawn Gustafson

Project Status Report

March 21, 2012

Project: 2008-01: Development of a National Road Weather Testing Program

Champion: Tina Greenfield, Iowa Department of Transportation

Objective: The purpose of this project is to fund Aurora to market the idea of a national testing program to various audiences and sources of support. A national network of facilities can help states and agencies find appropriate and well-suited providers for transportation weather research.

Status:

- This project was first mentioned at the National Winter Maintenance Peer Exchange in Ohio in August of 2007. Other winter maintenance testing needs were also brought up in the peer exchange round-table discussions. These needs were assigned to AASHTO/SICOP at the December, 2007 meeting.
- After hearing support for a national facility from Clear Roads members, Tina helped arrange a conference call between champion members from Clear Roads, AASHTO, SICOP, PNS, and Aurora to discuss possible cooperation and coordination on our "national facility" projects. This group decided cooperation was beneficial and began working on a draft document describing the facility.
- ***The idea of a single facility morphed into the idea of a consortium or board of experts which can help requestors of research find appropriate facilities.***
- ***Clear Roads has committed funding. The group was waiting to hear back about additional funding from PNS.***
- ***Chris Albrecht forwarded materials concerning a testing facility database to the project team.***
- This project is on hold waiting to see what role the Knowledge Base will play in this issue.
- ***A project mini-meeting has been scheduled for the March 2012 Utah board meeting.***

Approximate % Complete: 20 %

Barriers/Issues: Waiting on direction of the Road Weather Knowledge Base effort

Recommendations:
- X continue as planned
- ____ continue with modifications
- ____ discontinue

Additional Comments:

- This project was funded for $1,000 in FY 2008.
- This project was funded for an additional $10,000 in FY 2009.
- Project Team: Tina Greenfield (champion), Jack Stickel, Max Perchanok, Lee Smithson

Project Status Report

March 20, 2012

Project: 2008-03: MDSS Demonstration in Ontario

Champion: Max Perchanok, Ontario Ministry of Transportation

Status:

- ***A five-year demonstration and implementation project has been submitted to MTO senior management for Central Agency funding approval. Approval is anticipated in April.***
- The project is a phased implementation of components including; treatment recommendations based on integrated road-weather forecast and rules of practice, alternative user-input treatments, tracking and prediction of road condition indicators, prediction of conditions and treatments on road segments between RWIS stations, automated feedback of treatments undertaken and actual road conditions, automated tracking of road condition performance measures against standards, tracking of road salt use against weather-specific benchmarks, archiving of information, and dashboard displays of summarized information for contract oversight staff. It includes a requirement to integrate RWIS and AVL information from various service providers and to host the system on an external web site.
- An RFP process will be used to award the work to an external service provider. It will include components for validation, performance measurement of the system, and requirements for continuous calibration and improvement of models used.
- ***The five year demonstration ending in 2016 will provide practical experience with MDSS to MTO, municipalities and maintenance contractors, and will result in a contract specification for future services.***
- MTO's weather service provider conducted an independent, limited-scope demonstration and proof-of-concept based on the NCAR approach, with two Area Maintenance Contractors and two municipalities, January-March 2012 and will report on results in May.
- ***A project mini-meeting has been scheduled for the March 2012 Utah board meeting.***

Approximate % Complete: 25 %

Recommendations:
X continue as planned
____ continue with modifications
____ discontinue

Additional Comments:

- ***Funding of $75,000 in-kind will cover Ontario's membership for FY 2008 through FY 2010.***
- ***The project did not begin until 2011, but will cost more than $75,000. The in-kind accounting will require adjustment once project costs are known in early 2012.***
- Project Team: Max Perchanok (champion), Curt Pape, Dawn Gustafson, Jack Stickel, Sheldon Drobot

Project Status Report

February 1, 2012

Project: 2009-01: Summary and Comparison of Agency Experience with Sensors

Champion: Dawn Gustafson, Michigan Department of Transportation

Objective: The objective of this project is to develop a matrix that will summarize different agencies' experiences with sensors used in road weather information data collection.

Status:

- ***Past Actions: This project was originally established to summarize and compare the Lufft R2S and other sensors. It was determined that this evaluation can be completed as a white paper. Decision was made to move this project forward to include the creation of a matrix that will compare different sensors with different agencies' experiences.***
- Lufft R2S evaluation: TBD
- Potential questions include; how integration was accomplished, an inventory of sensors used/tried, and experiences with various sensors.
- Comparison Matrix: Matrix developed by Clear Roads was used to begin development of a matrix of sensors. Draft was sent to team for review and revised.
- Matrix was modified from comments received. A tab was added to the bottom of the spreadsheet for Sensor Types.
- ***Next Steps: The team will need to create a list of sensors/vendors that will be included in the initial deployment. The spreadsheet should be sent to all Aurora and Clear Roads members for their input.***
- ***Dawn Gustafson noted that they may need some assistance from InTrans in following up on content in the coming months.***

Approximate % Complete: 50 %

Barriers/Issues: None

Recommendations:
X continue as planned
____ continue with modifications
____ discontinue

Additional Comments:

- ***This project was funded for $55,000 in FY 2009***
- Project Team: Dawn Gustafson (champion), Curt Pape, Jack Stickel, Joe Doherty

Project Status Report

March 8, 2012

Project: 2009-04: Road Weather Education Enhancements and Dissemination

Champion: Dawn Gustafson, Michigan Department of Transportation

Objective: The objective of this project is to develop methods and/or materials to disseminate existing road weather and RWIS educational materials. This project idea stemmed from the 2007 peer exchange, and it was considered to present this topic for discussion again at the 2009 peer exchange for additional input into the project's focus.

Status:

- Questions that need answers
  1. What materials need to be covered by this umbrella?
  2. What materials are out there, but are difficult to access?
  3. What educational materials are lacking and need to be developed?
- Mike Adams had shared that the Wisconsin DOT library would be able to perform a literature search and assist in developing and distributing a survey for the group free of charge, so the group agreed to proceed through them for Phase I. The literature search completed by Wisconsin DOT. In general, most information obtained showed heavy use of AASHTO AI/RWIS training. Does this provide what is needed? Can we set up some guidance as to what training would be helpful for AI or RWIS (individually)?
- To date, it has been decided that:
  - ***A training section will be included under the 'wiki'***
  - Include all materials such as power points, hand outs, etc. Each must be dated
  - After materials are collected, answer - "What gaps still exist?"
  - Review TCCC website and Peer Exchange information
  - Each survey respondent will be contacted to see if they are willing to share training materials.

Approximate % Complete: 35 %

Barriers/Issues: None

Recommendations: X continue as planned
____ continue with modifications
____ discontinue

Additional Comments:

- ***This project was funded for $20,000 in FY 2009***
- Project Team: Dawn Gustafson (champion), Max Perchanok, Ralph Patterson, Jeff Tilley, Mike Adams

Project Status Report

February 1, 2012

Project: 2009-05: Further Development of Pavement Precipitation Accumulation Estimation System

Champion: Leigh Sturges, Utah Department of Transportation

Objective: The two primary objectives of this project are the utilization of RWIS data within PPAES and the blending of PPAES products produced using different observation platforms.

Status:

- Algorithm Development: Refinement of the blending of radar and surface precipitation occurrence and rate analyses software.
  - Added functionality to find the effective range of each individual radar for four quadrants.
  - Added a correction step to ensure consistency between radar- and surface observation-estimated precipitation fields. Corresponding analysis values obtained using radar and surface observations are compared and the mean difference between these values, for each radar, is determined. Then, radar- and surface-based analysis fields are corrected such that consistent analyses are produced.
- Validation Activities: Completed data-denial validation scheme, with performance measures and summary scores for the 20 test cases currently being computed.
- Challenges Encountered: When altering the PPAES blending algorithm, efficiently deriving and applying a correction to each individual radar can be challenging.
- Schedule:
  - Complete flat terrain testing of the current version of PPAES, including validation (contingency table-based and summary performance metrics) and subsequent refinement based on results of the validation).
  - ***Begin work on software to handle complex terrain issues. This is a task that will involve multiple quarters of work.***
- ***Leigh Sturges received some documentation on this effort from Jeff Tilley at UND.***

Approximate % Complete: 50 %

Barriers/Issues: None

Recommendations: X continue as planned
____ continue with modifications
____ discontinue

Additional Comments:

- ***This project was funded for $83,000 in FY 2009***
- Project Team: Leigh Jones (champion), Jack Stickel, Jason Norville, Mike Adams

Project Status Report

February 1, 2012

Project: 2010-01: Enhancements of AI/RWIS CBT

Champion: Tina Greenfield, Iowa Department of Transportation

Status:

- ***This was the #1 Ranked Peer Exchange Project from 2009.***
- Lee Smithson, Steve Lund, and Bill Hoffman presented a resolution (asking permission) at the Summer AASHTO SCOM Meeting this past July in Savannah, to have AASHTO ask State DOT's to contribute $3,750 for this CBT enhancement.
- So far 29 state DOTs have contributed to the fund.
- Tina has reviewed three of the web-ized CBTs.
- GanTek will finish the other operations CBTs before he starts on the AI/RWIS CBT. So far he has finished three of the operations CBTs and has nearly completed a fourth CBT. Various folks in the state DOTs are testing them.
- The following CBTs have been completed are being reviewed by various state DOTs:
  - Blowing Snow Mitigation
  - Deicing
  - Equipment Maintenance
  - Performance Measures in Snow and Ice Control
  - Proper Plowing Techniques
  - Selecting Snow and Ice Control Materials to Mitigate Environmental Impacts
  - Winter Maintenance Management
- ***The re-development of the Anti-icing/Road Weather Information System (AI/RWIS) CBT is well underway.***

Approximate % Complete: 65 %

Barriers/Issues: None

Recommendations:
- X continue as planned
- ____ continue with modifications
- ____ discontinue

Additional Comments:

- ***This project was funded for $50,000 in FY 2010***
- Project Team: Tina Greenfield (champion), Dawn Gustafson, Dean Kernan, Mike Adams, Max Perchanok, Jeff Tilley, Bill Hoffman
- ***Partners include Clear Roads and AASHTO representatives as well.***

Project Status Report

March 21, 2012

Project: 2010-02: Mobile-Weather Data Collection Guidelines

Champion: Curt Pape, Minnesota Department of Transportation

Status:

- Bill Hoffman had suggested teaming up with the AASHTO equipment group to accomplish the goals of this project.
- This project is a sister project 2010-04.
- The first step will likely be a synthesis.
- Paul Brown, Clear Roads Chair, will be hosting a vendor workshop at the Clear Roads Winter Meeting in Virginia to discuss how the vendors will begin working with DOTs on Open Architecture and Open Data Platforms.We should get some very good information on how best to create guidelines for Mobile Weather Data Guidelines.
- ***Curt Pape has taken over as project champion.***
- ***A mini-meeting will likely be held in Utah.***

Approximate % Complete: 10 %

Barriers/Issues: None

Recommendations:
- X continue as planned
- ____ continue with modifications
- ____ discontinue

Additional Comments:

- This project was funded for $25,000 in FY 2010
- ***Project Team: Curt Pape (champion), Max Perchanok, Gabe Guevera, Joe Doherty, Leigh Sturges, Li Fu, Sheldon Drobot***

Project Status Report

March 23, 2012

Project: 2010-03: Results Based Winter Road Maintenance Standards

Champion: Max Perchanok, Ontario Ministry of Transportation

Status:

- Analysis of Safety Benefit of Winter Maintenance – Models were expanded to include 31 highway sites across Ontario. A model was completed that relates hourly collision frequency to weather, RSI, traffic exposure, site calibration, seasonal and within-storm time trend. Another model relates collision severity to road type, number of lanes, speed limit, RSI, site geometry, driver and vehicle characteristics, and traffic exposure. The models were applied to estimate the incremental safety benefit in using an average, within-storm LOS standard in addition to the existing standard of bare pavement regain time following the end of a storm.
- Analysis of Mobility Benefit of Winter Road Maintenance – In a paper to be presented at the TRB international conference, models were expanded, employing a matched-pair technique, to predict changes in traffic volume and speed with and without snow events, as a function of weather, RSI, V/C ratio, and site-specific calibrations. A case study estimates the incremental mobility benefits (for travel demand and travel time) in using an average, within-storm LOS standard in comparison with the 8-hour standard of bare pavement regain time following the end of a storm at a highway network level.
- The safety and mobility models will be improved by developing case studies in which the observed accident rate are mobility benchmarked to the observed, event-based RSI. Changes in accident rate or mobility will then be estimated for selected, across-the-board improvements in RSI. This will relate RSI levels to safety and mobility levels, and facilitate a cost-benefit analysis for level of service vs safety and mobility. Safety and mobility levels associated with various storm types or severity will also be estimated.
- ***Cost Model – This work is at a beginning stage, with planned completion in mid-2012 and presentation at TRB in 2013. The purpose is to predict the change in cost of providing winter maintenance, with a change in standards or level of service. The model will incorporate weather severity, road class or traffic level, service standards and maintenance practices, and may include the development of an input-output type model similar to predict the road conditions resulting from a set of maintenance practices applied to a road-weather scenario.***
- Benchmarking of Performance Measures (Liping Fu, Feng Feng, Raqib Mian, and MTO)
  - Traction-based classifiers for snow cover were presented at TRB2009 and 2010 and at PIARC2010, An analysis of speed as a performance measure using the Iowa data is nearing completion. Traction measurements were compared with a spectral sensor, highlighting how measures can differ (submitted for Aurora 2007-02).
  - A web-cam based classifier for snow cover was developed in 2010 (Mian MSc Thesis).
  - A Road Surface Index was developed to relate visual descriptors to traction levels.
  - Additional data were collected this winter to compare and inter-calibrate performance measures based on conventional bare pavement reports, web-cam and multi-sprectral camera-based reports, traction based reports, and plow movement based reports. This will be completed in May and presented at an MTO meeting in early June.

Approximate % Complete: 75 %

Recommendations: X continue as planned
____ continue with modifications
____ discontinue

Additional Comments:

- ***This project was funded for $120,000 in FY 2010***
- ***MTO funding schedule ends March 31 2012.***
- Aurora funding continues another year.
- Project Team: Max Perchanok (Champion)**,** Dawn Gustafson**,** Joe Doherty**,** Sheldon Drobot**,** Neal Hawkins, Chris Albrecht

Project Status Report

March 21, 2012

Project: 2010-04: RWIS Sensor Density Grid

Champion: Max Perchanok, Ontario Ministry of Transportation

Status:

- The board voted to amalgamate 2000-01 and 2010-04 at the spring 2011 meeting because both the data and methods of analysis used in 2000-01 are highly suited to the objectives of 2010-04.
- The University of Waterloo was asked to include a proposal for 2010-04 with the report for 2000-01. The completed report for 2000-01 will fulfill MTO's in-kind obligation for that project.
- ***A proposal for 2010-04 was forwarded to the project team on March 20 by Chris Albrecht.***
- After reviewing the proposal, the board will decide whether to fund 2010-04 as an ongoing project.
- ***University of Waterloo submitted a proposal for a comprehensive, 2-year project that will provide an understanding of how the accuracy of RWIS information varies with station spacing and location in different climate zones, and of the relation between network accuracy and cost. The study uses theoretical models to provide a framework for understanding, and analyses of RWIS data to develop practical tools and guidelines for planning an RWIS network.***
- ***The proposed work follows on work completed in project 2000-01, using data, information and contacts generated in that project. It will be reviewed by the project committee at a mini-meeting prior to the Salt Lake meeting, with the intention to prepare a work assignment with the university.***

Approximate % Complete: 5 %

Barriers/Issues: None

- ***Work plan requires interaction with Aurora members at several intervals and will require scheduling at future Aurora meetings.***
- ***Need to update project team list.***

Recommendations:
- X continue as planned
- ____ continue with modifications
- ____ discontinue

Additional Comments:

- ***This project was funded for $100,000 in FY 2010***
- The board voted to amalgamate 2000-01 and 2010-04 at the spring 2011 meeting because both the data and methods of analysis used in 2000-01 are highly suited to the objectives of 2010-04. U Waterloo was asked to include a proposal for 2010-04 with the report for 2000-01. The completed report for 2000-01 will fulfill MTO's in-kind obligation for that project.
- Project Team: Max Perchanok (champion), Jack Stickel, Curt Pape, Dawn Gustafson, Mike Adams, Jason Norville, Jeff Tilley, Tina Greenfield, Mike Kisse

Project Status Report

December 9, 2011

Project: 2010-05: Determining RPU and Sensor Failure

Champion: Jack Stickel, Alaska Department of Transportation and Public Facilities

Background: Determining the life expectancy of ITS devices such as RWIS RPUs and sensors would help anticipate the mean time between failures and help agencies plan for funding, maintenance, procurement, and replacement. This process is being examined under NCHRP 8-71 - Methodology for Estimating Life Expectancy of Highway Assets, which looks at determining the life expectancy for major assets, investigating the benefits of maintenance actions, and documenting the impact of life expectancy. The report is anticipated soon. A similar project could be accomplished for RWIS devices. Purdue University is doing the NCHRP 8-71 work. Since they have experience in this area, it is likely that (1) they can do the work, and (2) would be interested in the project. I doubt the $5,000 allocated for the Aurora project would cover the work, so this is an area the board would need to discuss. Funding for maintenance and replacement of ITS devices is covered in the FHWA Office of Operations Transportation Systems Management & Operations Operating Cost Eligibility Under the Federal-Aid Program. Interpretation, rationale, examples, and questions about ITS)deployments are covered. Key elements that are applicable for RWIS deployments include typical elements that are eligible, typical elements that are not covered, spare parts, and Congestion Mitigation and Air Quality (CMAQ) Improvement Program. The FHWA division offices have a great deal of discretion and flexibility in determining the eligibility of specific activities, the allowances for preventive maintenance in Title 23 USC 116(d), and other Federal-policies.

Status:

- Jack Stickel has noted an NCHRP project being conducted by Purdue University that this effort may be able to build on.
- There are several contract mechanisms for Purdue University to do the work:
  - Aurora could contract with Purdue for the work. Some state DOTs are able to contract with universities directly.
  - It is possible to transfer the Aurora funds to NCHRP under a task order to extend NCHRP 8-71. This process would have to be approved by the NCHRP's panel approval and guidance.

Approximate % Complete: 10 %

Barriers/Issues: None

Recommendations:
X continue as planned
____ continue with modifications
____ discontinue

Additional Comments:

- This project was funded for $5,000 in FY 2010
- Project Team: Jack Stickel (champion), Tina Greenfield, Jason Norville, Sheldon Drobot

Project Status Report

December 27, 2011

Project: 2011-01: Third Peer Exchange

Champion: Tina Greenfield, Iowa Department of Transportation

Background: Aurora has been actively researching a number of surface transportation weather projects; while Clear Roads is researching materials, equipment, and practices related to winter maintenance operations. Unfortunately, information and research results sometimes do not reach end users in all states or at different agency levels. The winter maintenance community needs to be more aware of the research conducted by Aurora and Clear Roads and other research organizations and take a more active role in requesting research to meet winter operational needs. Therefore, the objective of this project is to conduct a National winter maintenance meeting for Aurora, Clear Roads, SICOP, PNS and the FHWA to share research results from the Peer Exchanges held in 2007 and 2009, get updates from each snow-belt state, and discuss other issues related to winter snow removal operations. Each state will be given the opportunity to send one representative to the meeting and states that have members on the Aurora or Clear Roads boards will be able to send their representative.

Status:

- The successful event was held in September 2011.
- Aurora and Clear Roads will need to coordinate on sharing of event costs.

Approximate % Complete: >95 %

Barriers/Issues: None

Recommendations:
- X continue as planned
- ____ continue with modifications
- ____ discontinue

Additional Comments:

- This project was funded for $30,000 in FY 2011.
- Aurora, Clear Roads, PNS, SICOP and FHWA would be equal partners in developing the agenda for the multi-day meeting.
- Project Team: Tina Greenfield (champion), Dawn Gustafson, Tim Peters

Project Status Report

March 22, 2012

Project: 2011-02: RWIS Training Tool

Champion: Tina Greenfield, Iowa Department of Transportation

Background: It is often the case across states and even within states that winter maintenance supervisors or foremen do not have a consistent understanding of RWIS and weather information in real-world decision making. Training may be administered but it is difficult to determine how much is retained, whether understanding was reached, and which parts of the training were successfully integrated into decision making practice. Therefore it is difficult to assess supervisor/foremen competency and it is difficult to tailor training to their needs. This is especially a problem when hiring new staff or hiring contractors because there are few tools to evaluate their ability to perform as required. This project involves the creation of a supervisor evaluation tool which can measure a supervisor's ability to incorporate RWIS and risk management into their decision making process.

Status:

- This project is estimated to last 3 years.
- ***A draft scope/concept drawing was sent to the team for review.***
- Tina needs their comments so we can get the project going.
- ***A project mini-meeting has been scheduled for the March 2012 board meeting in Utah.***

Approximate % Complete: 10 %

Barriers/Issues: None

Recommendations:
- X continue as planned
- ____ continue with modifications
- ____ discontinue

Additional Comments:

- This project was funded for $200,000 in FY 2011.
- Project Team: Tina Greenfield (champion), Max Perchanok, Mike Kisse, Jack Stickel, Mike Adams

Project Status Report

February 1, 2012

Project: 2011-03: Benefit/Costs and Instruction for Migrating to Open RWIS

Champion: Tina Greenfield, Iowa Department of Transportation

Background: The objective of this project is to create a do-it-yourself guide for RWIS sensors, servers, data bases, web displays, etc. This project concept could possibly be added as an extension to the 2009-03 Wiki database project.

Status:

- This project is new for FY 2011.
- The project team needs to schedule a call or meeting to discuss this effort.

Approximate % Complete: 5 %

Barriers/Issues: None

Recommendations:
X continue as planned
____ continue with modifications
____ discontinue

Additional Comments:

- ***This project was funded for $75,000 in FY 2011.***
- Project Team: Tina Greenfield (champion), Dawn Gustafson, Jason Norville, Jack Stickel, Mike Kisse, Travis Lutman

Project Status Report

February 1, 2012

Project: 2011-04: Study of MDSS Costs

Champion: Mike Adams, Wisconsin Department of Transportation

Background: This project concept was presented as a concern at the 2009 Peer Exchange and ranked at #9 among those ideas. The objective of this effort is to determine the upfront costs vs. long-term benefits for implementing MDSS systems. Also, determine necessary equipment, how to best equip the trucks, and quantify secondary benefits of equipping the fleet for MDSS. Initially this project will require a survey of the states. Aurora will team up with Clear Roads and MDSS Pooled Fund to realize this project's goals.

Status:

- ***This project was funded for $20,000.***
- A web survey will most likely be the first step under this effort.
- ***Mike Adams will be drafting questions as a starting point for this effort.***

Approximate % Complete: 5 %

Barriers/Issues: None

Recommendations:
- X continue as planned
- ____ continue with modifications
- ____ discontinue

Additional Comments:

- This project was funded for $20,000 in FY 2011.
- Project Team: Mike Adams (champion), Mike Kisse, Jason Norville, Sheldon Drobot

Project Status Report

December 13, 2011

Project: 2011-05: Funding Sources Identification

Champion: Jack Stickel, Alaska Department of Transportation and Public Facilities

Background: Road weather management programs and Road Weather Information Systems (RWIS) can tap into various federal funding sources. This includes standard funding allocations and grant allocations. These sources are not well known to all agencies.

Objective: This project will compile potential funding sources and approaches that state department of transportation agencies can tap to fund the road weather management program. This would include funding partnerships, grants, standard allocations, and shared cost opportunities.

Status:

- This project will involve surveying the Aurora member agencies on the funding sources they use, how to tap into them, and the processes they use to secure the funding
- The resulting document would describe the funding sources, the approaches agencies used to tap into funding, and the process they used to secure funding.
- ***Jack Stickel noted using ISU as a resource to accomplish this project.***
- ***The resulting document would be posted on the Knowledge Base web site.***

Approximate % Complete: 5 %

Barriers/Issues: None

Recommendations:
X continue as planned
____ continue with modifications
____ discontinue

Additional Comments:

- ***This project was funded for $5,000 in FY 2011.***
- Project Team: Jack Stickel (champion), Joe Doherty, Jason Norville, Lee Smithson

FY 2012 Discussion

1. ***Candidate H: Validate the Accuracy of Pavement Condition Predictions from Various Sources ($100,000)***

2. ***Candidate G: Improved Winter Severity Index / Winter Weather Severity Index, Phase 2 ($5,000)***

3. ***Candidate D: Cameras and Operational Impact of Remote Road Condition ($20,000)***

4. ***Candidate F: Communicating and Publicizing Road Weather and Operations Information to Decision Makers and Public Stakeholders ($30,000)***

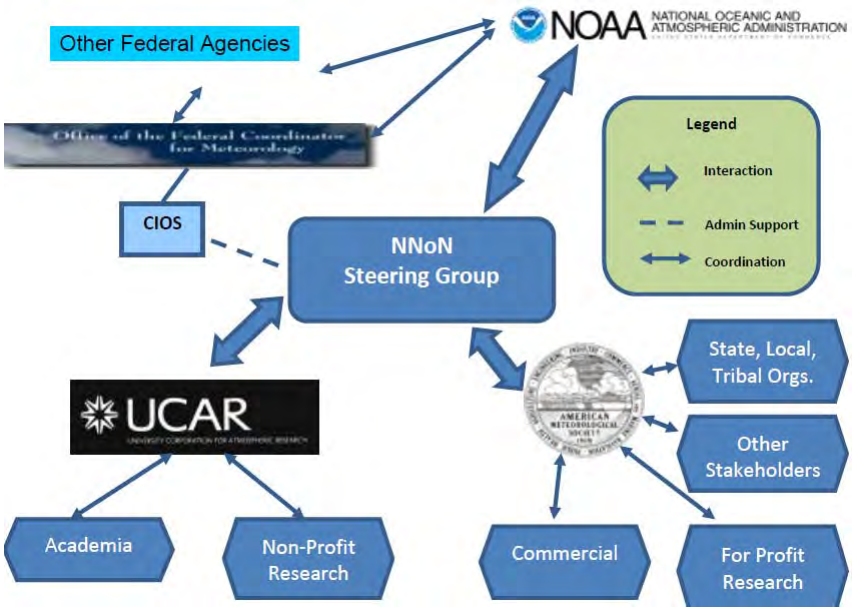
5. ***Candidate A: Seasonal Weight Restrictions Demonstration ($250,000)***

We mentioned funding $5,000 for Leigh to participate if Clear Roads funds their own version of our ***Candidate I (Synthesis of Best Practices in Pass Operations)***.

Also, I had an interesting talk with Bob Younie last week. After having Paul Trombino present at the seminar a couple of weeks ago, I think Iowa could take advantage of some of his main areas of interest. He mentioned winter maintenance and weather quite a bit. We may want to talk with Clear Roads about this. We could combine the goals of one or both ***Candidates B (Revisiting Winter Road Condition Terminology) and C (Using Social Media in Winter Operations)*** into the fourth project above and try to work with Annette to make Iowa a testbed of using social media. I think the director may be supportive in this.

Finally, we may also want to consider meeting the goals of ***Candidate J (Make the Aurora Winter Severity Index Available to All)*** through the second project above. This would assume other agencies may want to fund their own access to the Accuweather index.

Attachment B

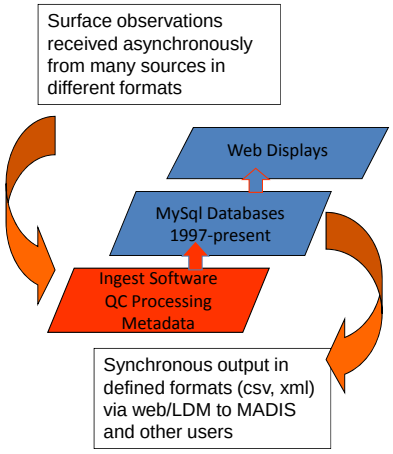


- **Subcommittee on Energy and Environment Hearing - How NOAA Procures Data for Weather Forecasting**
- Subcommittee on Energy and Environment | 2318 Rayburn House Office Building Washington, DC 20515 | Mar 28, 2012 2:00pm
- ***To Observe and Protect: How NOAA Procures Data for Weather Forecasting***

MesoWest

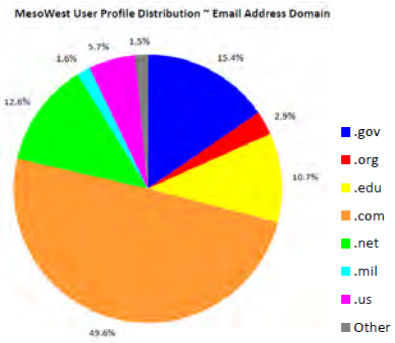
http://mesowest.utah.edu

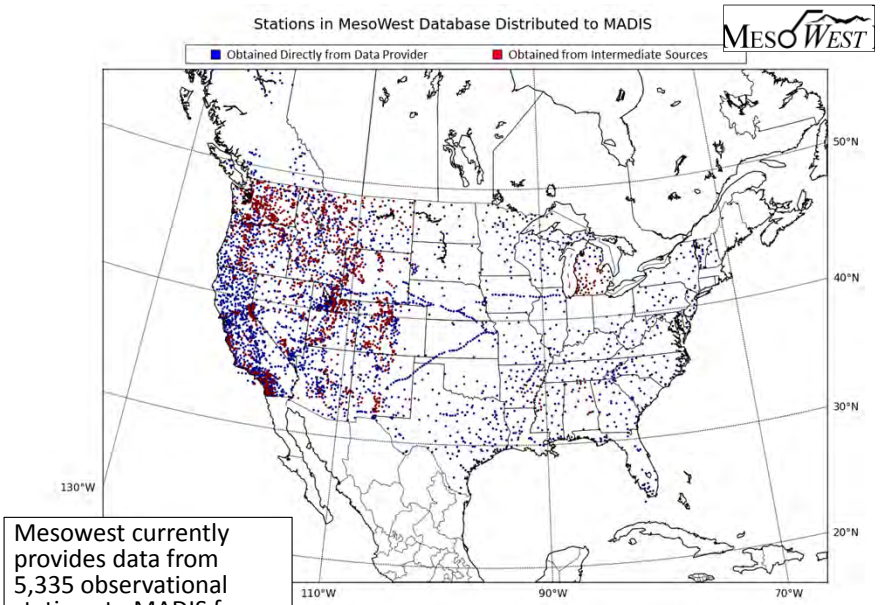
- Goal: promote and support access, storage, and use of weather observations across the nation
- Collect provisional data as they become available from hundreds of sources
- Archive the data in relational databases
- Provide access to the data via the web and through variety of data pushes and pulls



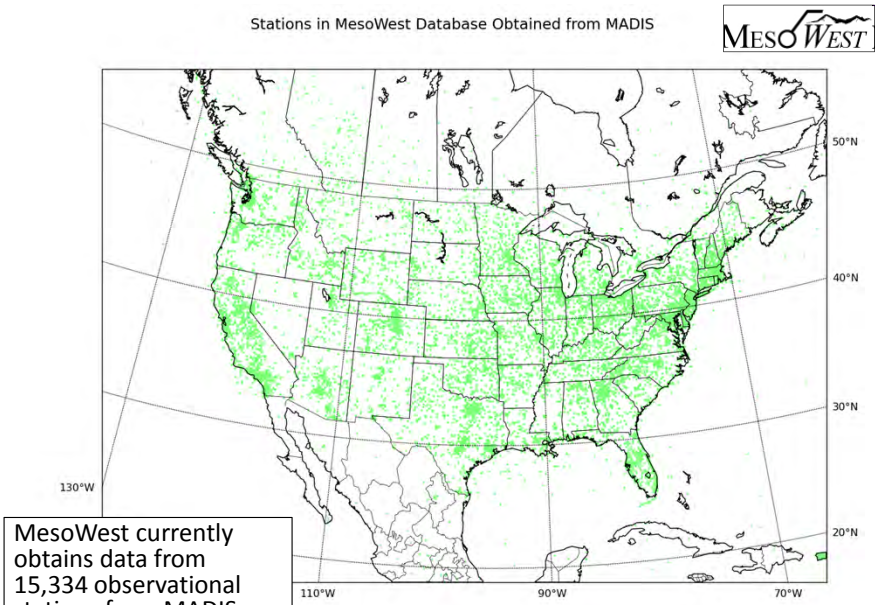
MesoWest Users

- Google analytics
  - (Sep 1 2009-Oct 28, 2011)
- 10 million page views
- 463,000 visitors
- 207,000 visited 200+ times
- 9,000 people built profiles



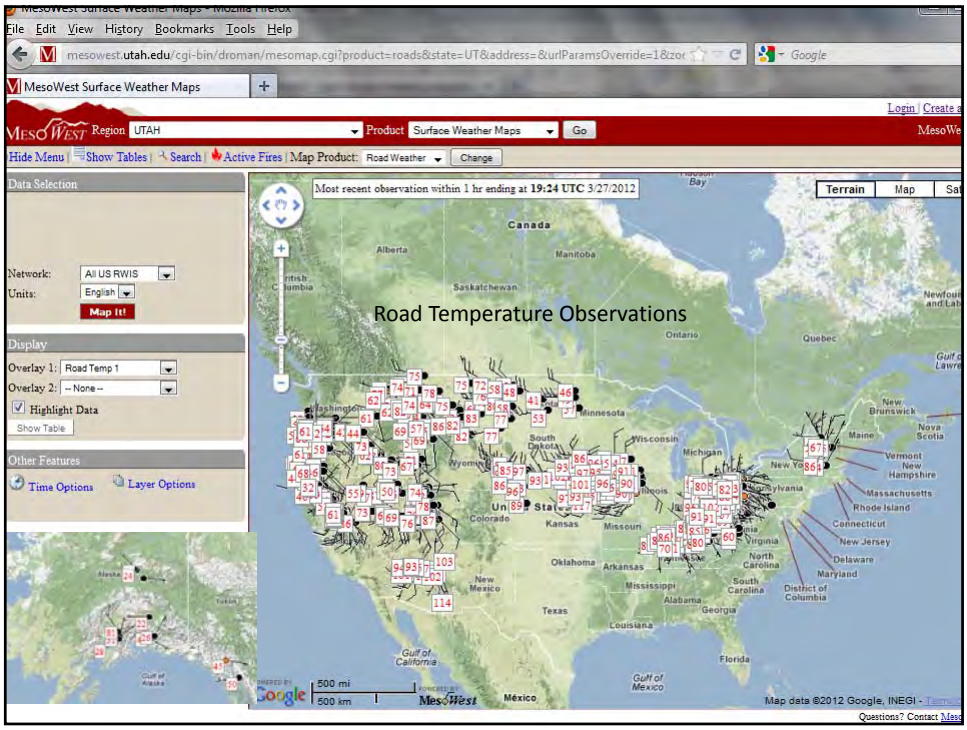


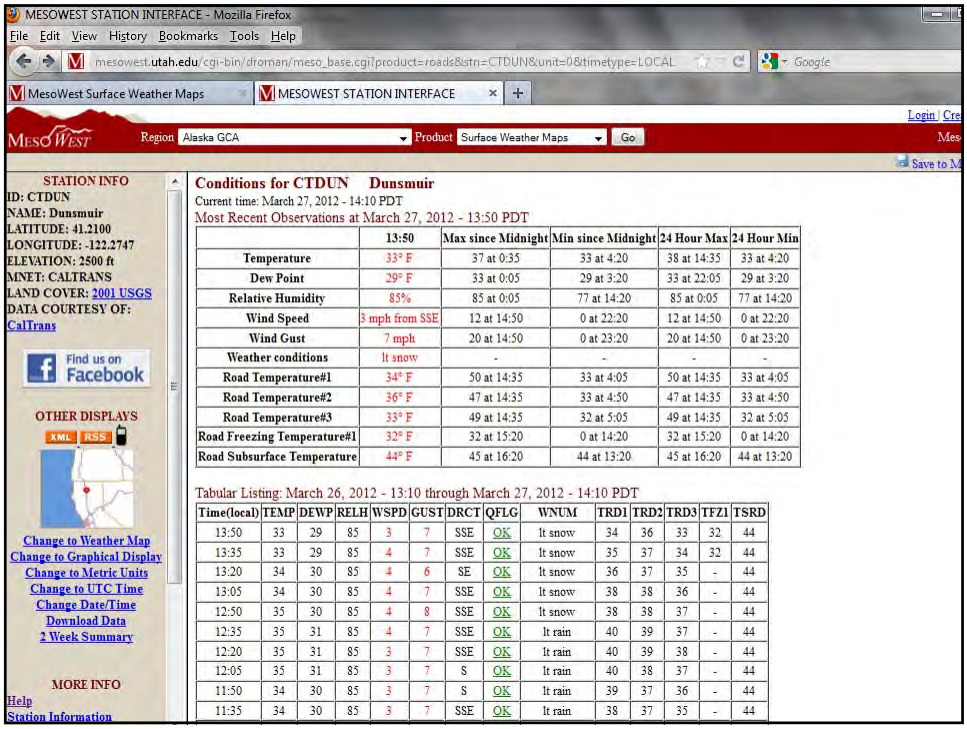
Mesowest currently provides data from 5,335 observational stations to MADIS from 100 different networks.



MesoWest currently obtains data from 15,334 observational stations from MADIS from 45 networks.

DOT Obs Disseminated to MADIS	DOT Obs Received from MADIS
Arizona California Montana Nevada Oregon Utah Vermont Washington	Alaska Colorado Idaho Indiana Iowa Kentucky Maine Maryland Minnesota Nebraska New Hampshire North Dakota Ohio Virginia West Virginia Wisconsin Wyoming





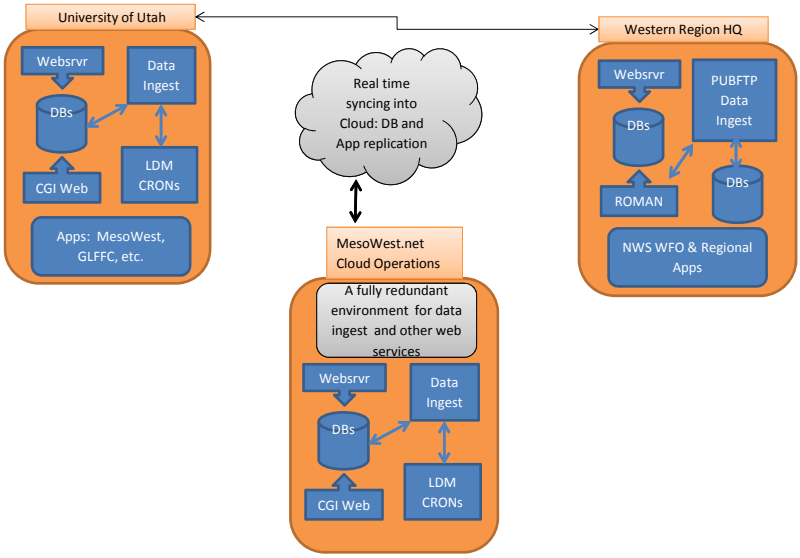
	13:50	Max since Midnight	Min since Midnight	24 Hour Max	24 Hour Min
Temperature	33° F	37 at 0:35	33 at 4:20	38 at 14:35	33 at 4:20
Dew Point	29° F	33 at 0:05	29 at 3:20	33 at 22:05	29 at 3:20
Relative Humidity	85%	85 at 0:05	77 at 14:20	85 at 0:05	77 at 14:20
Wind Speed	3 mph from SSE	12 at 14:50	0 at 22:20	12 at 14:50	0 at 22:20
Wind Gust	7 mph	20 at 14:50	0 at 23:20	20 at 14:50	0 at 23:20
Weather conditions	lt snow	-	-	-	-
Road Temperature#1	34° F	50 at 14:35	33 at 4:05	50 at 14:35	33 at 4:05
Road Temperature#2	36° F	47 at 14:35	33 at 4:50	47 at 14:35	33 at 4:50
Road Temperature#3	33° F	49 at 14:35	32 at 5:05	49 at 14:35	32 at 5:05
Road Freezing Temperature#1	32° F	32 at 15:20	0 at 14:20	32 at 15:20	0 at 14:20
Road Subsurface Temperature	44° F	45 at 16:20	44 at 13:20	45 at 16:20	44 at 13:20

Time(local)	TEMP	DEWP	RELH	WSPD	GUST	DRCT	QFLG	WNUM	TRD1	TRD2	TRD3	TFZ1	TSRD
13:50	33	29	85	3	7	SSE	OK	lt snow	34	36	33	32	44
13:35	33	29	85	4	7	SSE	OK	lt snow	35	37	34	32	44
13:20	34	30	85	4	6	SE	OK	lt snow	36	37	35	-	44
13:05	34	30	85	4	7	SSE	OK	lt snow	38	38	36	-	44
12:50	35	30	85	4	8	SSE	OK	lt snow	38	38	37	-	44
12:35	35	31	85	4	7	SSE	OK	lt rain	40	39	37	-	44
12:20	35	31	85	3	7	SSE	OK	lt rain	40	39	38	-	44
12:05	35	31	85	3	7	S	OK	lt rain	40	38	37	-	44
11:50	34	30	85	3	7	S	OK	lt rain	39	37	36	-	44
11:35	34	30	85	3	7	SSE	OK	lt rain	38	37	35	-	44

MySQL Databases

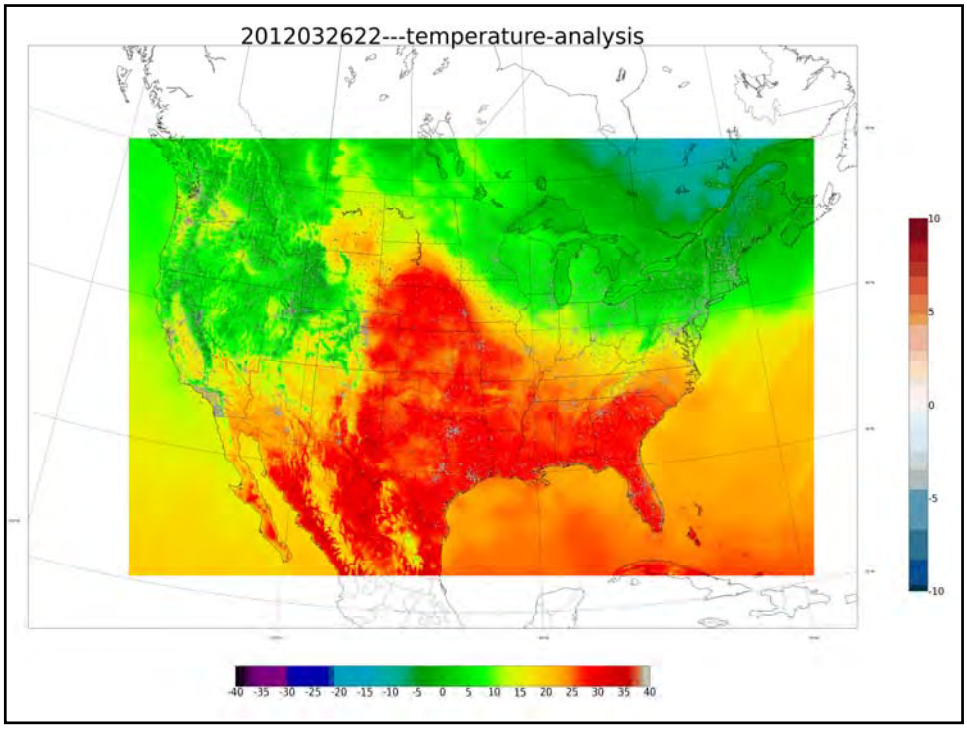
- Legacy databases:
  - all observations stored in YR/MO tables for groups of stations
  - Extensive metadata tables
- New databases:
  - all variables for all times for each station
  - Quality Control (QC) tables for each stations with flags for all variables and times
  - Expanded metadata database with growing metadata content
  - Able to handle publicly accessible and restricted access observations

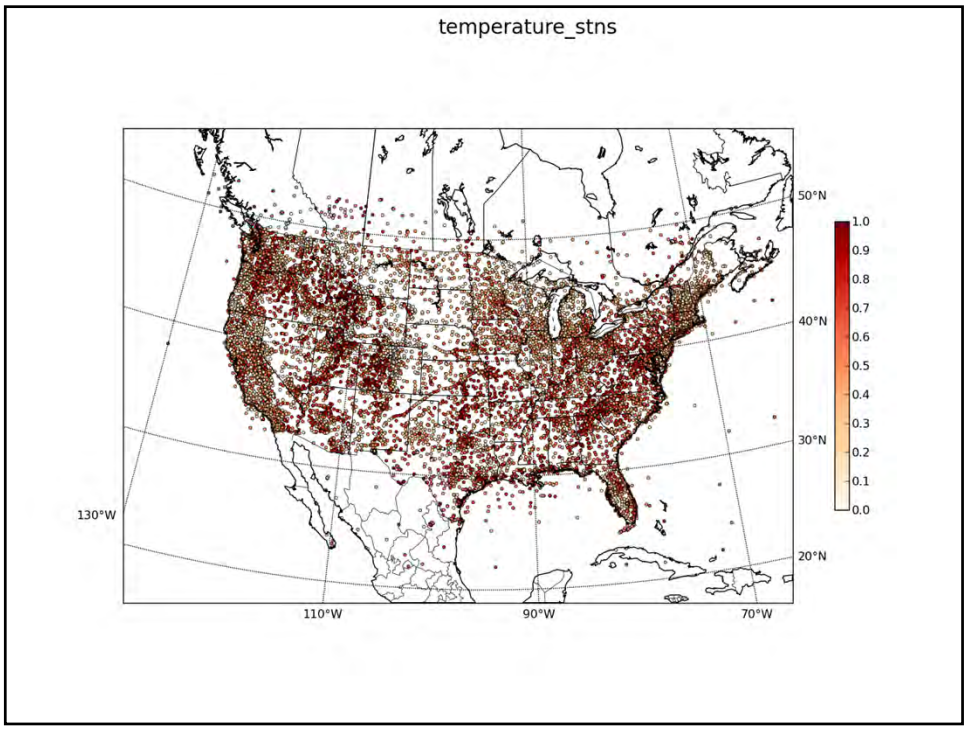
MesoWest Infrastructure

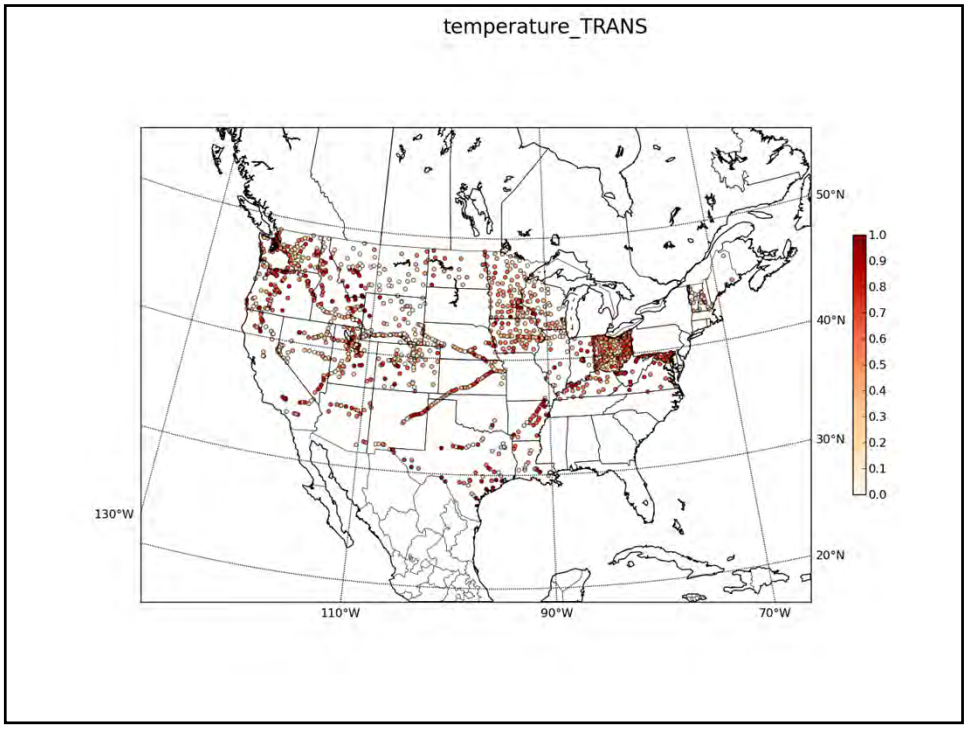


Real-Time QC

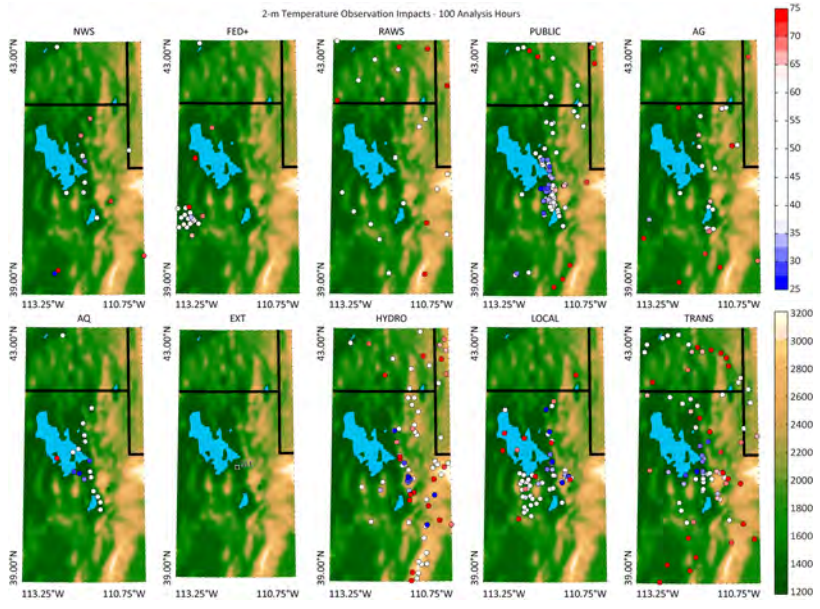
- Typical QC checks applied to the data
- Running T, Td, Wind analyses at 2.5 km every hour
- Computing adjoint impact for each analysis
- Accumulating statistics on impact and observation bias for each day and over 3-week period
- Extensive graphics & text files being generated
- http://gl2.chpc.utah.edu/uu2dvar/


2012032622---temperature-analysis
10
5
0
-5
-10
-40 -35 -30 -25 -20 -15 -10 -5 0 5 10 15 20 25 30 35 40


temperature_stns
50°N
40°N
30°N
20°N
130°W
110°W
90°W
70°W
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0

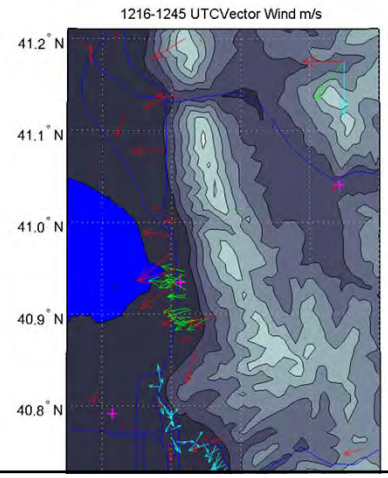


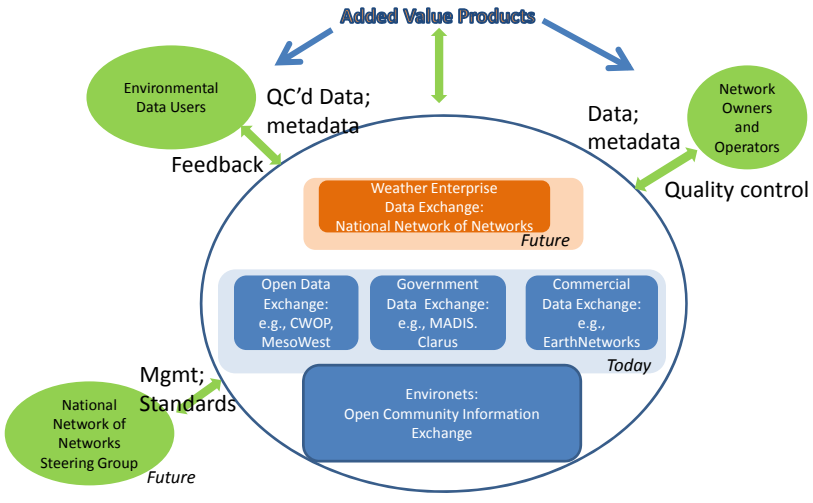
Tyndall and Horel (2012)



Mobile Obs

- MoPed system may be appropriate
- MesoWest has some capabilities to deal with moving reports from specific vehicles





NOT ready for release!

Attachment C

Assessing & Improving the NWS Point-and-Click Webpage Forecast Information

Julie L. Demuth[*], Douglas C. Hilderbrand[**], Jeffrey K. Lazo[*], and Rebecca E. Morss[*]

[*]National Center for Atmospheric Research, Societal Impacts Program (SIP)
[**]NOAA's National Weather Service

25 January 2012, AMS, New Orleans, LA

Motivation

A key goal of weather forecasting is to serve society by communicating useful information that enhances people's decision-making and reduces their risk to life, property, and harm.

- Forecasting hazardous weather is ***central*** to NWS's mission of protecting life and property
- But, forecast utility is only realized if information is ***communicated effectively***

  → multi-dimensional idea … we're just taking a small bite

Motivation

- Weather.gov is the face of NWS
- NWS point-and-click (PnC) page is a key channel for conveying local forecasts, including hazardous weather forecasts

Overarching goal

Conduct robust, representative research to guide NWS policy changes for improving communication effectiveness of PnC forecast information

Research approach

- Data collection – Multiple methods and multiple steps
  - Exploratory research to identify main problems according to ***users***
    - Focus groups, usability testing, initial survey (controlled, internet-based)

Essential steps → e.g., icons aren't the problem we thought they are … rather, key issue is poor communication of hazardous weather!

  - Follow-on, targeted research to address specific problems—i.e., the communication of hazardous weather info on the PnC page
    - 2 follow-up surveys (controlled, internet-based)
- Theoretical and empirical guidance
  - Information design, usability, cognitive theory of multimedia learning, uses and gratifications theory, credibility

Sampling

- Target population → all users of NWS PnC pages, but no complete list of all users exists
- Developed sampling frame
  - Posted recruitment text on ***every*** PnC webpage for 7 weeks
  - 88,000+ people nationwide submitted contact information

Key results – Exploratory research

- Hazardous weather info is not effectively communicated on PnC
  - ***Existence*** of hazardous weather threat and ***details*** can be unclear and cumbersome to access
  - ***Temporal*** and ***spatial*** information about hazardous weather is not explicitly conveyed on PnC page

Follow-on surveys – Hazardous Wx

- Experimental design in a survey
  - Manipulate variables (holding everything else constant)
    → then measure an outcome
    → then examine the effect
  - Allows for ***causal*** inference

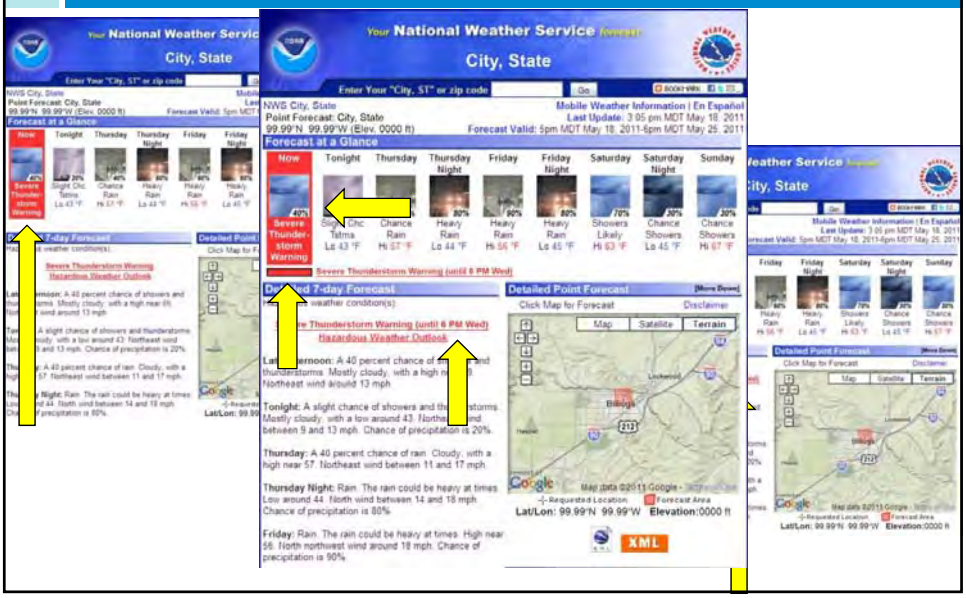
- Conducted 2 parallel surveys to explore hazardous weather communication
  - Short-fuse event (severe t-storm warning) – Invited 9558; final ***n=4239***
  - Long-fuse event (flood watch) – Invited 4777; final ***n=2081***

Short-fuse – Severe t-storm warning

- 2 x 2 x 2 factorial design – 3 information pieces (variables) each with 2 levels (with/without)
  - Box – to convey threat timing and existence
  - Bar – to convey threat timing and existence
  - Until text – to convey threat end time
- Total of 8 different designs; each respondent gets only 1

	No Box		Box	
	Bar	No Bar	Bar	No Bar
Until	Forecast 1	Forecast 2	Forecast 3	Forecast 4
No until	Forecast 5	Forecast 6 (status quo/control)	Forecast 7	Forecast 8

Short-fuse – Severe t-storm warning



Long-fuse – Flood watch

- 2 x 2 factorial design – 2 variables (types of information), each with 2 levels (with/without)
  - Bar – to convey timing and existence of threat
  - Until text – to convey end time of threat
  - NO box!
- Total of 4 different designs; each respondent gets only 1

	Bar	No Bar
Until	Forecast 1	Forecast 2
No until	Forecast 3	Forecast 4 (status quo/control)

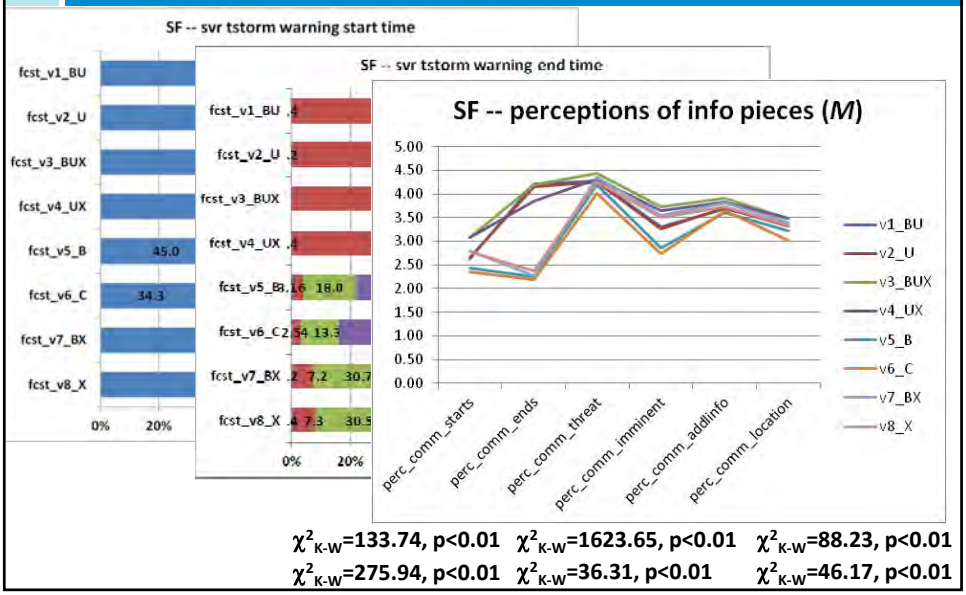
Long-fuse – Flood watch

Outcome variables

- Hazardous weather info is not effectively communicated on PnC
  - ***Existence*** of hazardous weather threat and ***details*** can be unclear and cumbersome to access
  - ***Temporal*** and ***spatial*** information about hazardous weather is not explicitly conveyed on PnC page

- Notice the threat?
- Perceptions of info
  - E.g., how to get details of threat, imminence of threat, usefulness of info
- Understanding of threat timing

Results – The nitty gritty



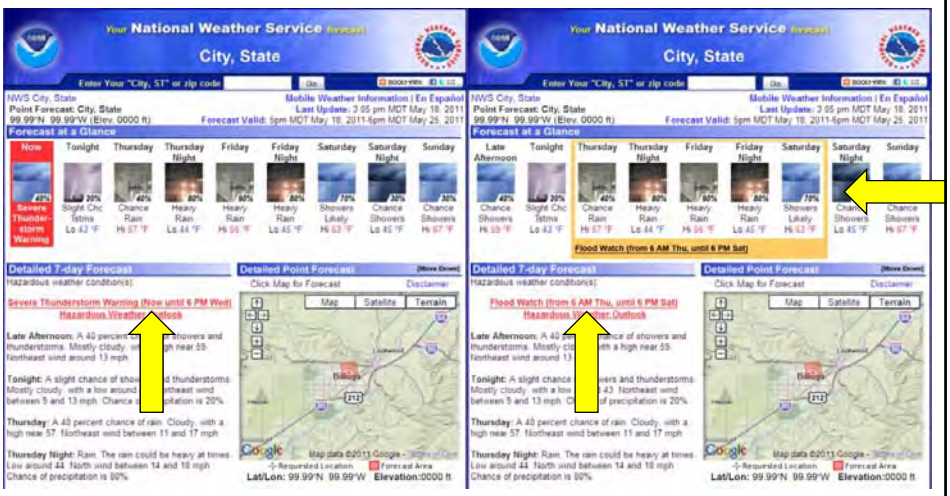
$\chi^2_{K\text{-}W}$=133.74, p<0.01 $\chi^2_{K\text{-}W}$=1623.65, p<0.01 $\chi^2_{K\text{-}W}$=88.23, p<0.01

$\chi^2_{K\text{-}W}$=275.94, p<0.01 $\chi^2_{K\text{-}W}$=36.31, p<0.01 $\chi^2_{K\text{-}W}$=46.17, p<0.01

Results → The punchline

- Current forecast (status quo) → poorest overall
- Bar → not effective (!) in helping people notice the threat, understand timing, and not perceived favorably
- Until text → mostly effective; exception is it seems to make people think the threat is already in effect
- Box → mostly effective; minor hiccup is may be confusing some people about the threat end time when coupled with the "until" information

Next steps –Survey slated for Feb



Next steps – Continue analyzing <u>all</u> data

- PnC users' characteristics
  - Experience with PnC page
  - Socio-demographics (age, gender, employment, sector, etc.)
- PnC users' attitudes and behaviors
  - Reasons for using PnC page
  - Frequency of use of different parts of the PnC page
  - Preferences for adding/removing PnC information
  - Usability of the page
  - Etc.

Summary

- Key elements to robust, successful research
  - Theoretical foundation from communication field
  - Rigorous methods
  - Exploratory research steps and multiple follow-up steps
  - Collaborative effort between NWS and NCAR
    - Operational meteorology and communication science
  - Recognizing that our hypotheses may be wrong!
    - *"The great tragedy of Science—the slaying of a beautiful hypothesis by an ugly fact."* -Thomas Henry Huxley

Critical when NWS policy changes are on the line … especially policy that affects people's lives and well-being!

Thank you!

- **Contact**
  - Julie Demuth – jdemuth@ucar.edu
  - Doug Hilderbrand – douglas.hilderbrand@noaa.gov
- **Acknowledgements**
  - Funded by NWS's Office of Science and Technology (OST) & Office of Climate, Water, and Weather Services (OCWWS)
  - Thank you to Bradley Akamine, Bob Bunge, Dennis Cain, Cindy Halley Gotway, Andy Horvitz, Eli Jacks, Ron Jones, Mark Mitchell, Jen Sprague, Taylor Trogdon, & many others!

NCAR

Attachment D

USDOT ROAD WEATHER MANAGEMENT PROGRAM UPDATE

http://www.ops.fhwa.dot.gov/weather/index.asp

January 2012

The Road Weather Management Program focuses on stakeholder coordination, applied research and technology transfer, performance measurement, training and education. The following material summarizes our current efforts.

- **The Road Weather Management Program and the Connected Vehicle:** The Road Weather Management Team and the ITS JPO have an aggressive program to explore the opportunities to collect weather and road condition data from vehicles, and to use that data to feed into enhanced road weather applications (e.g., decision support systems). Specific efforts taking place include the development of version 3.0 of the Vehicle Data Translator (VDT), which processes vehicle probe data and turns it into useable weather and road condition observations. We are in the process of developing or enhancing advanced decision support systems in coordination with the Minnesota and Nevada State DOT's. Under this effort, we are incorporating data collected from their mobile fleets into the VDT and *Clarus*, and will ultimately feed it into an advanced decision support system such as MDSS, MMS or ATIS.
  - **Just published:** ***The Vehicle Data Translator V3.0 System Description*****, FHWA-JPO-11-127**

- ***Clarus* Initiative:** *Clarus* is an ITS R&D initiative aimed at improving the accuracy and timeliness of road weather information made available to road users and operators and to build the road weather observational database that supports the development of "anytime, anywhere road weather information." Thirty-eight state DOTs, five local agencies and four Canadian provinces have connected 2,338 ESS to Clarus for a total of 52,748 individual sensors (refer to the *Clarus* Web Portal at: www.clarus-system.com). The *Clarus* Regional Demonstration has been completed. We tested and evaluated four advanced decision support tools using *Clarus* data to improve mobility and safety under adverse weather conditions. Eight additional projects were funded to make use of the *Clarus* data in innovative ways. The FHWA continues to work very closely with National Oceanic and Atmospheric Administration (NOAA) to transition the *Clarus* system to an operational status under NOAA, while also continuing to improve upon the observations via ongoing research efforts. Additional information about the initiative can be found at: www.its.dot.gov/clarus/index.htm.

- **Decision Support Systems:**
  - Version 6.0 of the Maintenance Decision Support System (MDSS) Federal Prototype was released in the fall, 2009. V6.1 is available upon request
  - The electronic version of the *MDSS Deployment Guide* has been published (NTL ID 30467)
  - Work is underway to post the code of the four decision support tools from the *Clarus* Regional Demonstrations onto a soon-to-be-unveiled U.S.DOT Open System Portal. These tools include: the seasonal load restriction tool, the multi-state control strategy tool, the maintenance and operations decision support tool, and enhanced road weather content for travel advisories. Stand by for further details.

- **1201 Rule - Guidance for Road Weather Traveler Information Systems:** Guidance material is being developed to help agencies meet the requirements of the 1201 Rule for real-time traveler information reporting of hazardous weather conditions.

- **Road Weather Management Best Practices:** This often-used resource is in the process of being updated to reflect the latest advancements in Road Weather Management. Solutions deployed by State DOTs are being documented, capturing a range of advisory, control and treatment actions.

- **RWIS Environmental Sensor Stations (ESS)**
  - Revised ESS Siting Guidelines (Version 2.0) was published electronically: (NTL ID 30705)
  - We are pursuing the development of an appendix on non-intrusive sensors
  - *Weather or Not? State Liability and Road Weather Information Systems* published by NCSL, 2010 http://www.ncsl.org/documents/transportation/Weather_or_Not_Full_Report_Rall_04.30.10.pdf
  - **NTCIP 1204 Updates:** NTCIP 1204, the Environmental Sensor Station Interface Standard, is going to be updated to reflect changes in sensors. AASHTO, one of the agencies responsible for this standard, will be putting together a working group to add features and make corrections to the 1204 standard. For those that are interested in participating in the working group, please contact Gabe Guevara at gabriel.guevara@dot.gov.

Documents with NTL ID numbers can be accessed at **http://ntlsearch.bts.gov**, then do an advanced search on "NTL Record ID," Title or pub number

- **Road Weather Resource Identification Tool**
  - Version 3.0 is downloadable from the RWM website (www.fhwa.dot.gov/weather) with more resources (from existing 600+ to 900+) and improved links to the documents.

- **Courses**
  - ***Principles and Tools for Road Weather Management***
    - Classroom & web-based versions are available from the National Highway Institute and the Consortium for ITS Training and Education (CITE), respectively
  - ***Introduction to RWIS Equipment and Operations***
    - CITE developed a web-based version (based on the one previously developed by ITS America & ITS Rocky Mountain); the course is available in the CITE website.
  - ***Weather Responsive Traffic Management***
    - A blended web-based course on WRTM is being developed through the University of Maryland CITE (Consortium for ITS Training and Education) Program. The course will help traffic managers and practitioners identify and implement proactive WRTM strategies and evaluate their effectiveness.
  - **Two courses address the link between the National Weather Service (NWS) and State & local DOTs:**
    - The first course is aimed at transportation professionals to educate them about NWS products and services. It's available as a CD from FHWA or online at **www.meted.ucar.edu/dot**.
    - The second course is aimed at NWS forecasters to educate them about the needs of public safety officials working at State and local departments of transportation. It was developed by the NWS, Warning Decision Training Branch, and can be found at: **http://www.wdtb.noaa.gov/courses/RoadWeather/**

- **Weather-Responsive Transportation Management (WRTM) – ongoing studies:**
  - **Weather and Traffic Analysis - Incorporate Weather Impacts In Traffic Estimation and Prediction Systems:** The goal of this study is to determine how pre-trip and en-route weather information affects travel demands and traffic flows, and incorporate this knowledge in dynamic traffic assignment and prediction models like DynaSMART and DynaMIT. A report was completed on September 2009; follow-up work is currently underway to test and evaluate Weather-responsive TrEPS in major US cities.
  - **Developments in Weather Responsive Traffic Management Strategies:** The goal of this study is to document the state of the practice in Weather Responsive Traffic Management, develop procedures for evaluating and measuring the benefits of WRTM Strategies and develop Concepts of Operations and General Functional Requirements for New and/or Improved WRTM strategies. A workshop was held in Nov. 2011 and some action items were identified and planned for implementation.
  - **Weather and Traffic Analysis - Human Factors:** This study looks at human factors in road weather advisory and control information. The objectives are to identify traveler requirements for weather information (both pre-trip and en-route) and determine the most effective messages and methods for communicating weather information. The final report including preliminary design guide for road weather information was published in May 2010. Follow-up work to test and evaluate the guidelines is expected to begin before end of FY2012.
  - **Mobile Data for Weather-Responsive Traffic Management Studies:** This study is looking at existing and potential sources of mobile weather and traffic data that can be used as inputs for WRTM studies. The research will demonstrate the use of some of the mobile data for traffic prediction and estimation during adverse weather conditions.

- **Road Weather Management Performance Measures**
  - Published the Road Weather Management Performance Measures report (*Road Weather Management Performance Metrics*, NTL ID 30472) and then quantified the 11 measures (*Road Weather Management Performance Metrics: Implementation and Assessment*, NTL ID 31611).
  - Completed a research study to characterize the quality and availability of current road weather information (*Baselining Current Road Weather Information*, NTL ID 30164 & 31065). Follow-on work to develop a database and conduct a 2010 survey was completed, the report is available from NTL ID 37840.

- **Upcoming Events**
  - April 30-May 2, 2012 – Intl. Conf. on Winter Maintenance & Surface Transportation Weather, Iowa City, IA
  - May 23-25, 2012 – SIRWEC Biannual Conference
  - July, 2012 – AASHTO/TRB Maintenance Management Conference, Seattle WA

Documents with NTL ID numbers can be accessed at **http://ntlsearch.bts.gov**, then do an advanced search on "NTL Record ID," Title or pub number

Attachment E

TRANSCEND: National Testing Facility

Built to meet your needs

MONTANA STATE UNIVERSITY | College of ENGINEERING | Western Transportation Institute

Overview

- Facility Background
- Vision and Focus
  - We built it to meet your needs
- Challenges to Working Together
- Next Steps

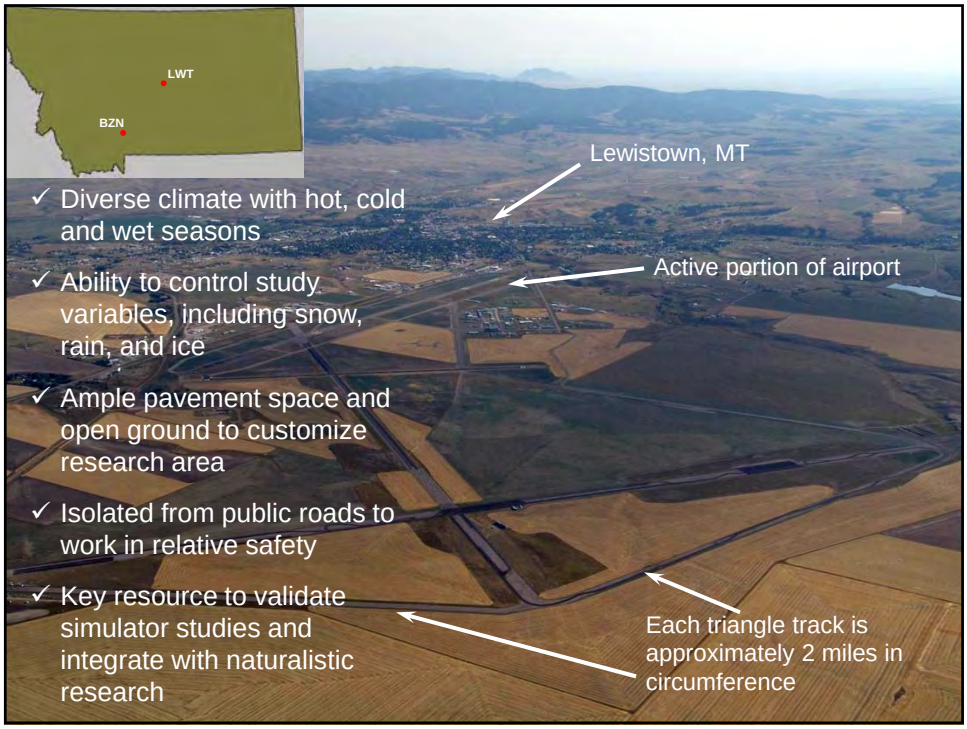
MONTANA STATE UNIVERSITY | College of ENGINEERING | Western Transportation Institute

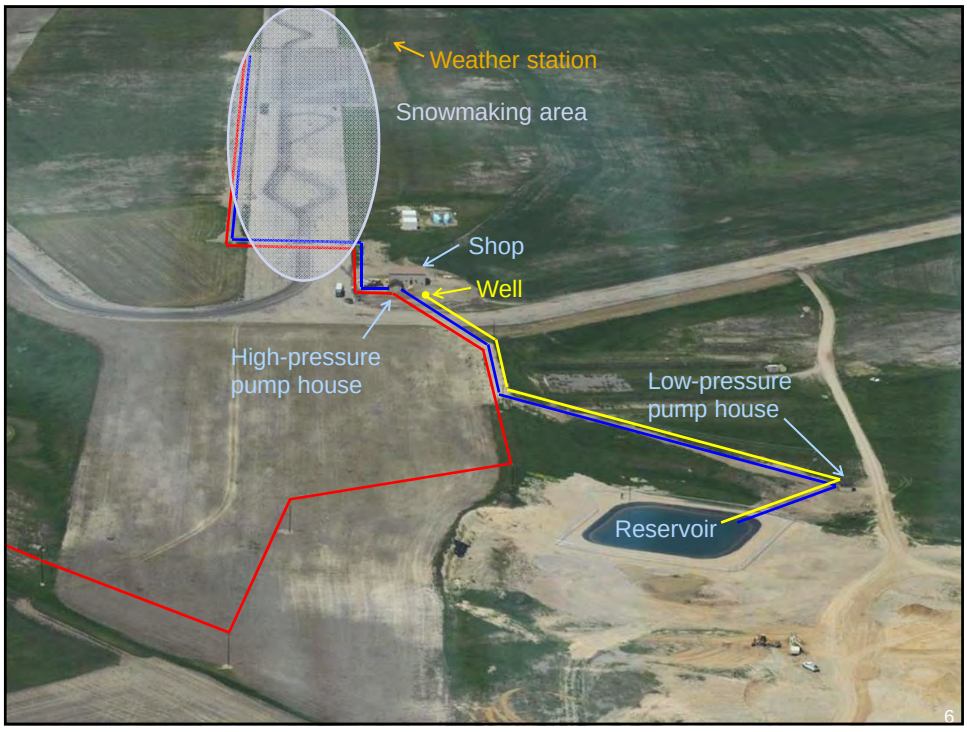
Transcend's History

- Idea began back in 2003…
- Secured seed money in 2006 and surveyed winter maintenance community about needs
- 1st Peer Exchange 2007 – Columbus, OH
  - Priorities included: National test facility
  - Test the effectiveness of winter maintenance treatments
  - Establish research guidelines, protocols and procedures
- Peer Exchange 2011 – Bozeman, MT
  - Received very positive feedback from attendees
- Built facility to meet those needs

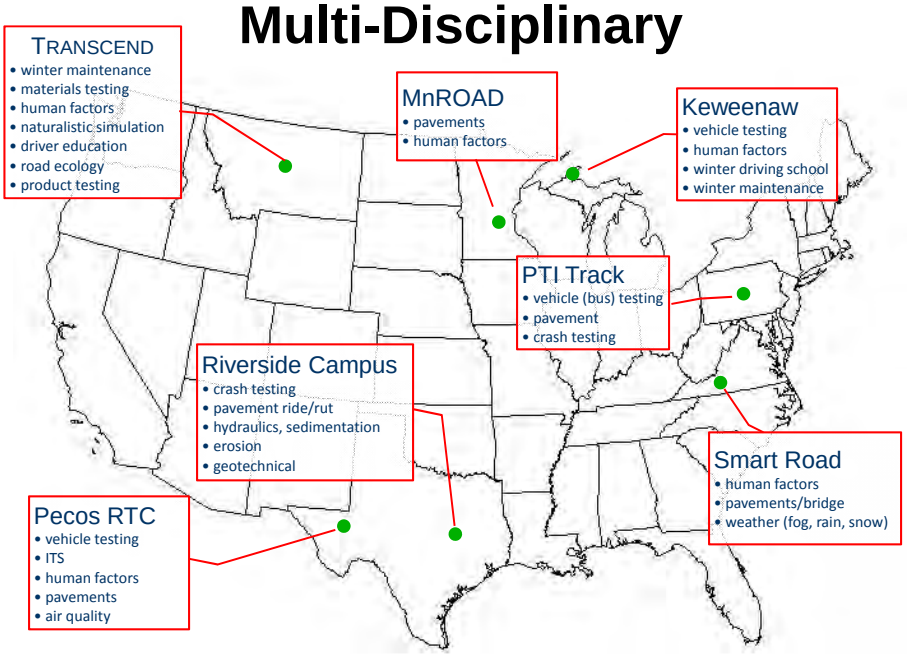
MONTANA STATE UNIVERSITY | College of ENGINEERING — Western Transportation Institute

Eli Cuelho – TRANSCEND Manager
Western Transportation Institute
Montana State University - Bozeman


LWT
BZN
Lewistown, MT
Active portion of airport
✓ Diverse climate with hot, cold and wet seasons
✓ Ability to control study variables, including snow, rain, and ice
✓ Ample pavement space and open ground to customize research area
✓ Isolated from public roads to work in relative safety
✓ Key resource to validate simulator studies and integrate with naturalistic research
Each triangle track is approximately 2 miles in circumference


Weather station
Snowmaking area
Shop
Well
High-pressure pump house
Low-pressure pump house
Reservoir
6

Multi-Disciplinary



TRANDSCEND's Uniqueness

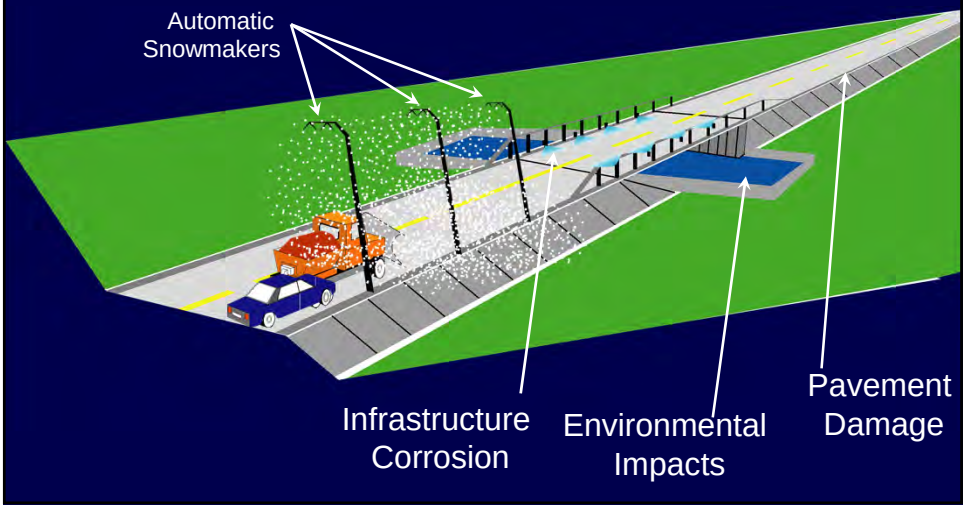
Features	TRANSCEND	MnROAD	Smart Road	PTI Research & Testing Track Facility	Texas A&M Riverside Campus
Paved Driving Surfaces	✓	✓	✓	✓	✓
Comm. backbone	✓	✓	✓		
Severe Winter Testing Environment	✓	✓			
Snow Machines	✓		✓		
Highway & Airport geometry	✓				✓
On-going Geotech research	✓				✓

Conceptual Research Project

Driver Performance and Training

Product Testing

Winter Maintenance



Testing and Research Equipment Capabilities

- Snowplows
- Liquid deicer trailer
- Liquid and solid deicer storage
- Data collection and storage systems
- Instrumented vehicles
- Weather stations
- Halliday friction wheel
- Camera
- Heated lab/shop/office space

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Western Transportation Institute

Test Beds

- Full-scale geosynthetic reinforcement testbed
- Vegetation management testbed
- Road dust testbed
- Road-animal detection systems testbed
- Alternative materials testbed
- Intelligent vehicle research and data transfer platform

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Subzero Science & Engineering Research Facility

Structures Lab

Climate Simulation

Main Lab Area

Clean Room

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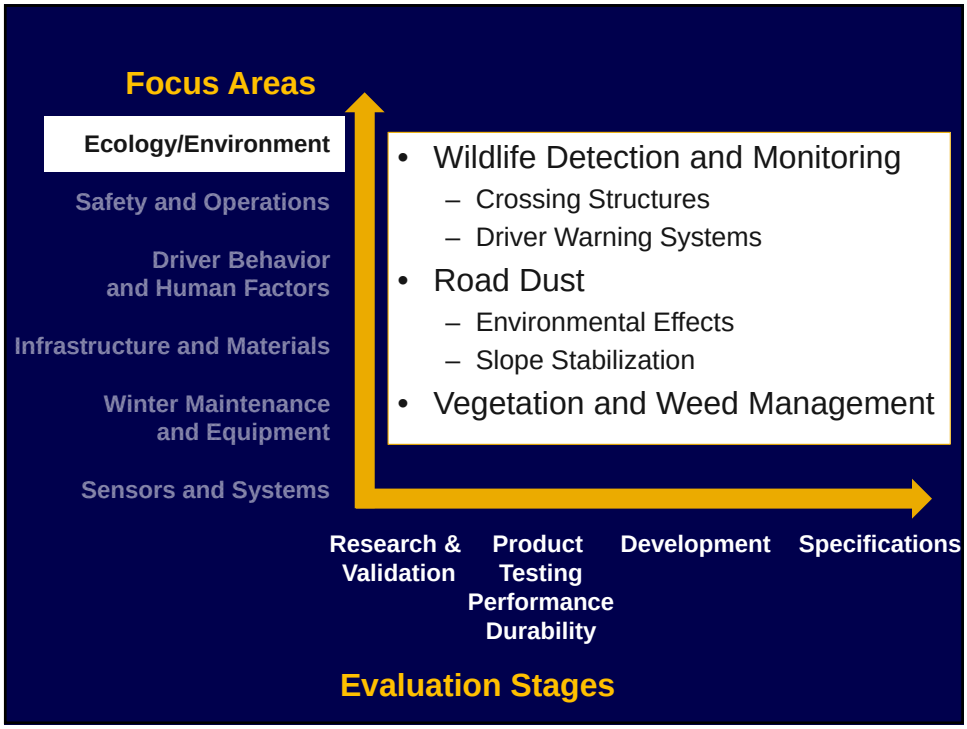
13

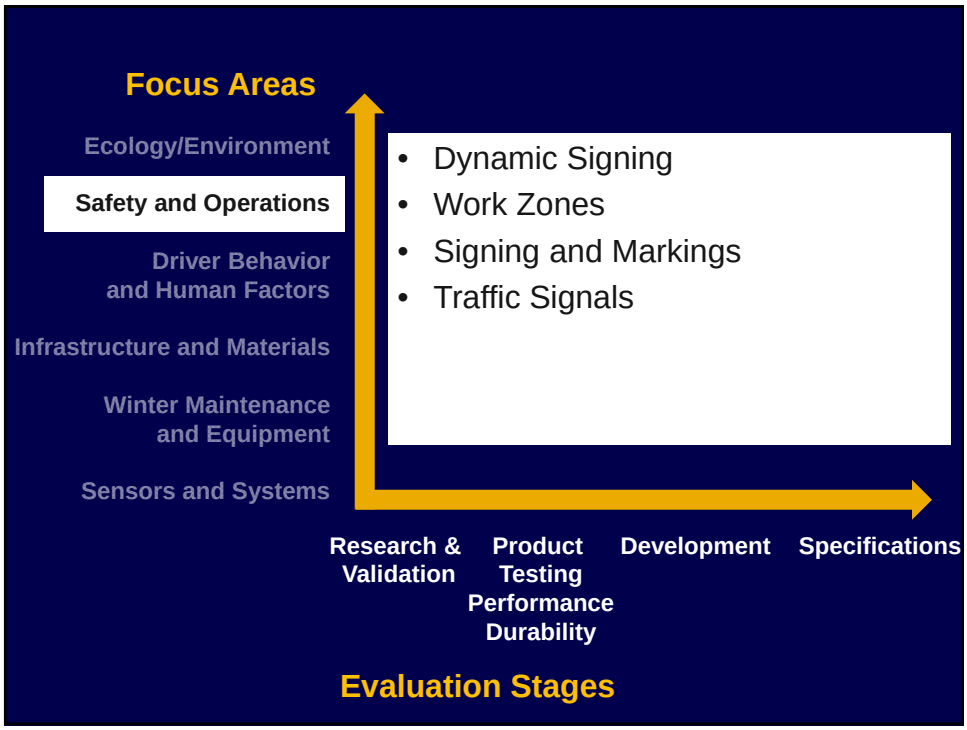
Focus Areas

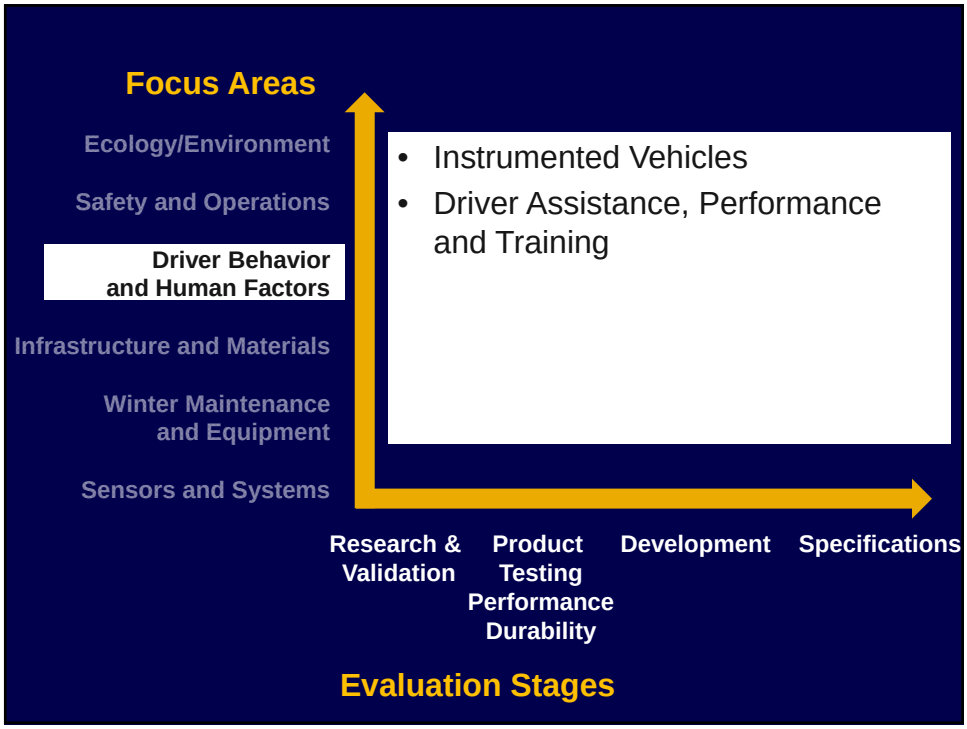
- Ecology/Environment
- Safety and Operations
- Driver Behavior and Human Factors
- Infrastructure and Materials
- Winter Maintenance and Equipment
- Sensors and Systems

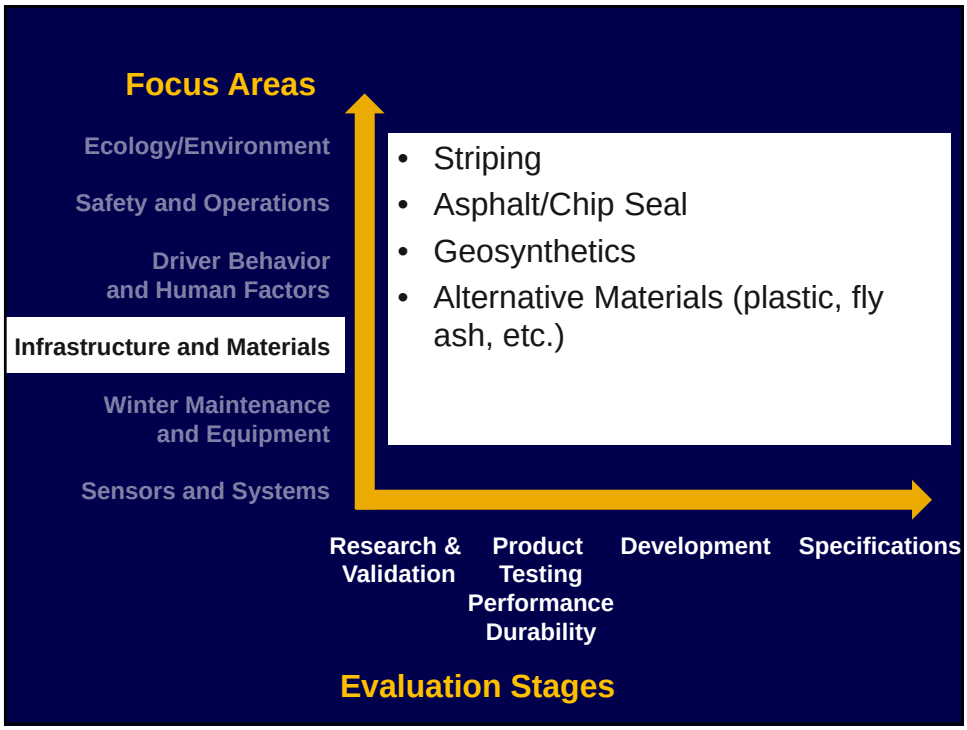
Research & Validation → Product Testing (Performance, Durability) → Development → Specifications

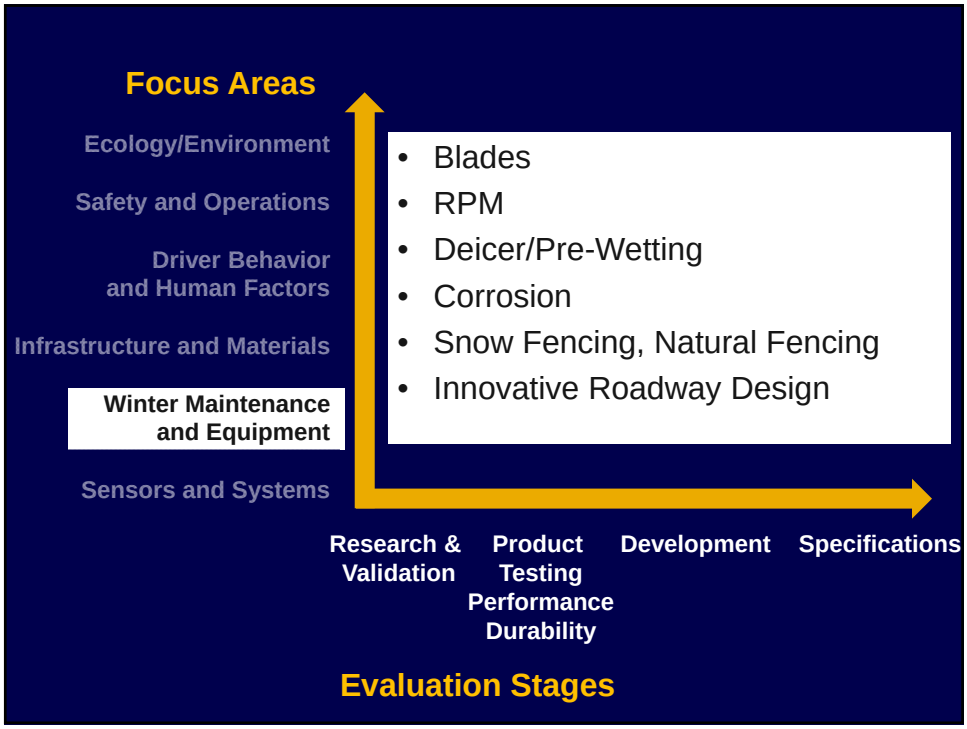
Evaluation Stages

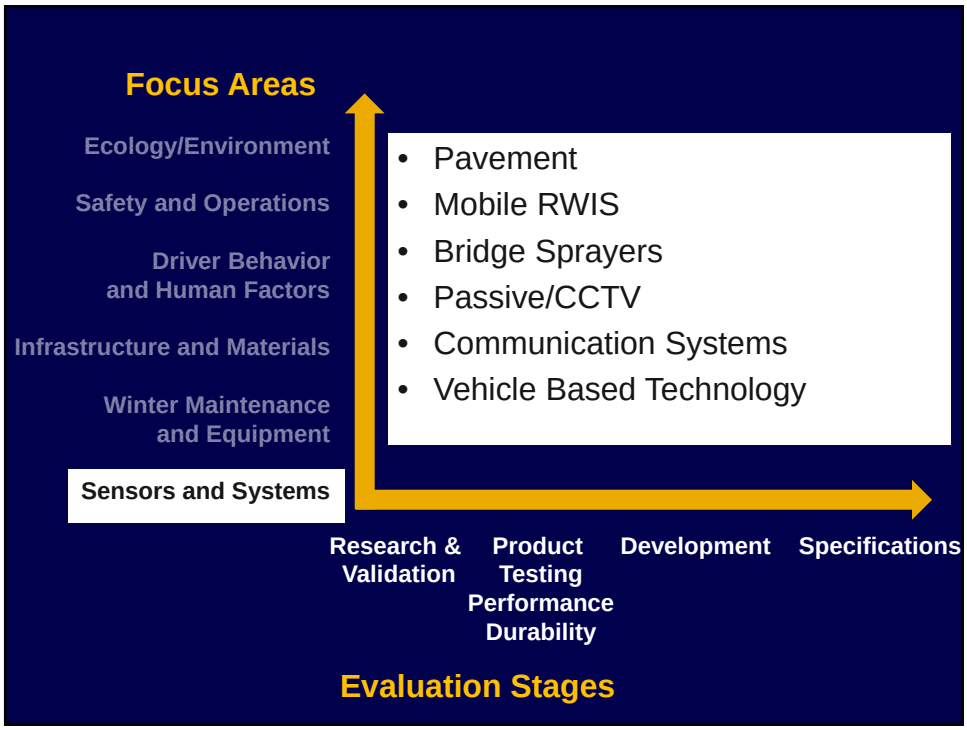

Focus Areas
Ecology/Environment
Safety and Operations
Driver Behavior and Human Factors
Infrastructure and Materials
Winter Maintenance and Equipment
Sensors and Systems
• Wildlife Detection and Monitoring
– Crossing Structures
– Driver Warning Systems
• Road Dust
– Environmental Effects
– Slope Stabilization
• Vegetation and Weed Management
Research & Validation
Product Testing Performance Durability
Development
Specifications
Evaluation Stages

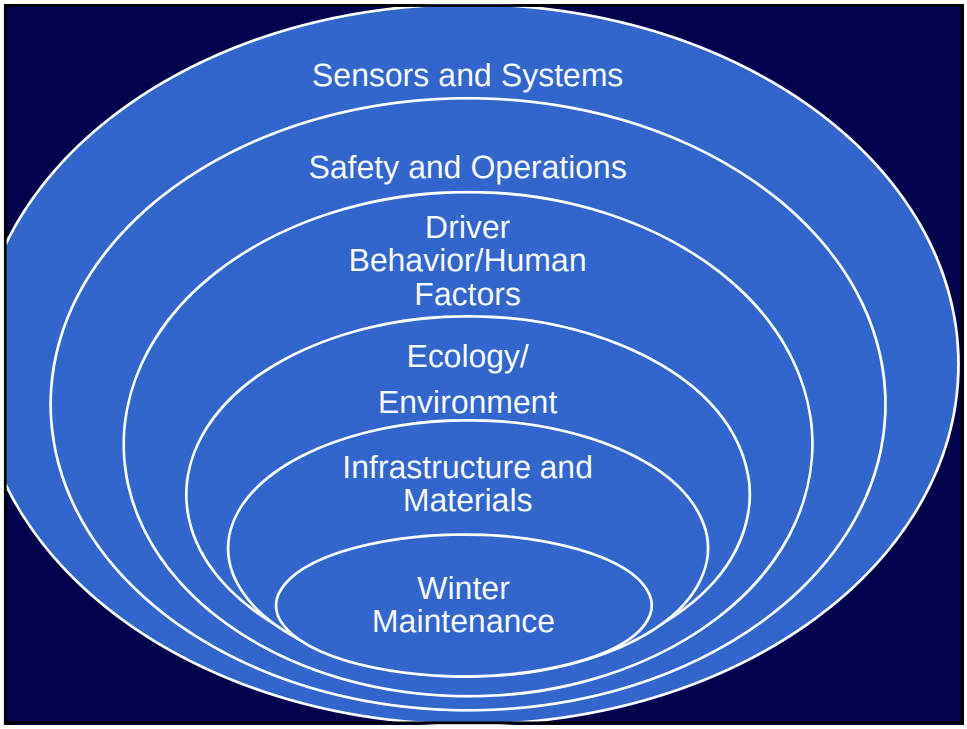

Focus Areas
Ecology/Environment
Safety and Operations
Driver Behavior and Human Factors
Infrastructure and Materials
Winter Maintenance and Equipment
Sensors and Systems
• Dynamic Signing
• Work Zones
• Signing and Markings
• Traffic Signals
Research & Validation
Product Testing Performance Durability
Development
Specifications
Evaluation Stages

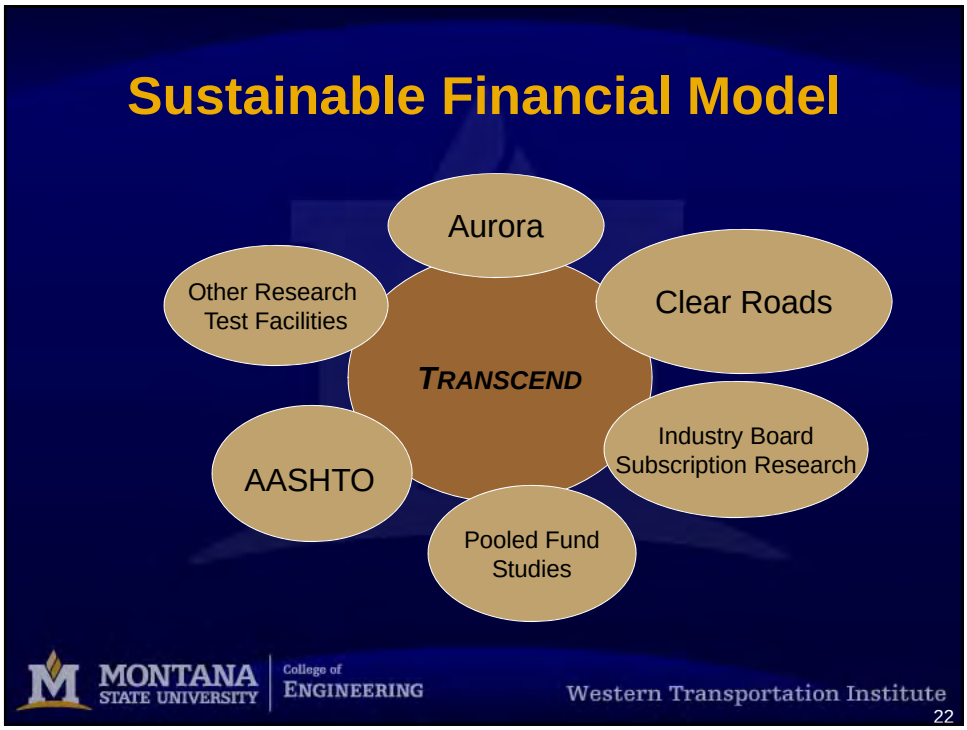

Focus Areas
Ecology/Environment
Safety and Operations
Driver Behavior and Human Factors
Infrastructure and Materials
Winter Maintenance and Equipment
Sensors and Systems
• Instrumented Vehicles
• Driver Assistance, Performance and Training
Research & Validation
Product Testing Performance Durability
Development
Specifications
Evaluation Stages


Focus Areas
Ecology/Environment
Safety and Operations
Driver Behavior and Human Factors
Infrastructure and Materials
Winter Maintenance and Equipment
Sensors and Systems
• Striping
• Asphalt/Chip Seal
• Geosynthetics
• Alternative Materials (plastic, fly ash, etc.)
Research & Validation
Product Testing Performance Durability
Development
Specifications
Evaluation Stages


Focus Areas
Ecology/Environment
Safety and Operations
Driver Behavior and Human Factors
Infrastructure and Materials
Winter Maintenance and Equipment
Sensors and Systems
• Blades
• RPM
• Deicer/Pre-Wetting
• Corrosion
• Snow Fencing, Natural Fencing
• Innovative Roadway Design
Research & Validation
Product Testing Performance Durability
Development
Specifications
Evaluation Stages


Focus Areas
Ecology/Environment
Safety and Operations
Driver Behavior and Human Factors
Infrastructure and Materials
Winter Maintenance and Equipment
Sensors and Systems
• Pavement
• Mobile RWIS
• Bridge Sprayers
• Passive/CCTV
• Communication Systems
• Vehicle Based Technology
Research & Validation
Product Testing Performance Durability
Development
Specifications
Evaluation Stages


Sensors and Systems
Safety and Operations
Driver Behavior/Human Factors
Ecology/ Environment
Infrastructure and Materials
Winter Maintenance


Sustainable Financial Model
Aurora
Other Research Test Facilities
Clear Roads
TRANSCEND
Industry Board Subscription Research
AASHTO
Pooled Fund Studies
MONTANA STATE UNIVERSITY
College of ENGINEERING
Western Transportation Institute
22

Will this model work for you?

- Competitive Process vs. Extension of Staff
- TRANSCEND is a tool for you to use
  - How can we make it available to you?
    - Inter-agency agreements?
    - Federal designation/agreement

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How can we help make your jobs easier?

- Vendor claim verification
- University quality research in a realistic setting
  - Real world solutions
- On-call availability to conduct small research projects

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2011 WM Research Priorities

1	How Effective Are Existing Application Rates for Salt?	Clear Roads
6	Research Design Concepts That Can Be Incorporated into Roadway Construction to Assist in Winter Operations	SICOP
8	Mechanical Snow Removal Strategies and Opportunities	Clear Roads
9	Quantifying Salt Concentration On Pavement (alternative to sensors)	Clear Roads/Aurora/SICOP
18	Field Validation of Lab Research	SICOP
19	Cathodic Protection of Maintenance Vehicles to Reduce Corrosion	Clear Roads
23	Chip Seal Effects to Plow Blades	Clear Roads
24	Cost-benefits of Gradation Specification for Mined Salt	Clear Roads

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Industry Board Program

- Access to testing facility and staff
- Contact with students
- Annual fee $25K
- Develop Industry meetings
- Two days consultation
- Confidentiality (no public funds)

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What is next?

- Aurora/Clear Roads Board Agenda item?
- Develop MOU
- Initiate pooled fund project

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Attachment F

2012 Clear Roads Funded Projects

Project/Description	Funding
Pacific Northwest Snowfighters (PNS) The purpose of this project is to identify funding for PNS and to structure a relationship between PNS and Clear Roads. Without a steady and reliable source of funding to continue its core mission, PNS could lose the ability to keep the specifications and the Qualified Product List (QPL) viable as a standard for other states and provinces to rely upon. This project would ensure that PNS could continue to coordinate materials testing and standards for deicing chemicals. **Project Subcommittee:** Monty Mills, Ron Wright, Justun Juelfs, David Wieder, Lynn Bernhard	$25,000 per 2 years
Establishing Effective Salt and Anti-icing Application Rates This goal of this project is to establish new guidelines for applying the latest methods, procedures and materials available in snow and ice operations. Researchers would establish effective material application rates for a broad range of chloride-based anti-icing and de-icing products, develop a crosscheck list to recommend alternative products to chlorides that provide similar results, and develop guidelines for the use of these products, including when best to apply them and how much is effective for specified winter storm categories. **Project Subcommittee:** Paul Brown, Monty Mills, Annette Dunn, Larry Gangl, Allen Williams, *David Wieder, Max Perchanok, Mark DeVries, and Wilf Nixon**	$150,000
Snow and Ice Chemical Application Rate on Open Graded Friction Course Pavements, Gap Graded Pavements and Nova Chip Treated Roads. The goal of this project is to identify the best methods for treating Open Graded Friction Course pavements, Gap Graded pavements and Nova Chip treated roads. Currently, field personnel are reporting several issues relating to pavement performance when applying deicing chemicals on these pavements. For example, the road appears to refreeze more quickly, stays wet longer, and requires 25-30% more de-icing chemical. This project would investigate these concerns and propose mitigating treatment options. **Project Subcommittee:** Mike Lashmet, Tim Chojnacki, Paul Brown, Tim Croze, Cliff Spoonemore, Troy Whitworth	$200,000
Snowplow Operator and Supervisor Training The objective of this project is to create training courses for operators and supervisors using all the best training materials and practices from all the Clear Roads states. It would organize them into classroom courses that could be utilized by any Clear Roads member state. **Project Subcommittee:** Mike Sproul, Justun Juelfs, David Wieder, Troy Whitworth, Curtis Sanchez (UDOT), Mike Lashmet, Cliff Spoonemore, Monty Mills, Dave Frame	$100,000
Comparison of Salt Distribution Systems The goal of this project is to determine which salt distribution systems are the most effective at reducing bounce and scatter. The scope would involve finding as many types of salt distributions systems in use as possible and then picking several of the most common types of systems to perform a field evaluation at different application speeds. **Project Subcommittee:** Tim Croze, Lynn Bernhard, Paul Brown, Mike Mattison, Tim Chojnacki, Allen Williams, Tim Peters, Jack, Utah DOT	$150,000
Improving Snow Plow Design The goal of this project is to identify new materials, technologies, designs and other components for snow plows and rate them according to performance criteria. Researchers would develop a matrix of the designs, materials and technologies tested and their performance characteristics. The proposed matrix would help agencies determine which of the latest commercially available innovations could be used to optimize their snow removal operations. **Project Subcommittee:** Annette Dunn, Randy Gray (Maine DOT), Caleb Dobbins, Mike Mattison, Steve Spoor (Idaho DOT), John Scharffbillig, Lynn Bernhard, Jeff Pifer.	$50,000

Attachment G

March 2012

CLEAR ROADS
research for winter highway maintenance

RESEARCH IN PROGRESS

Understanding the True Costs of Snow and Ice Control Operations
Expected results: A tool that will help winter highway professionals better understand the true costs for snow and ice removal, make cost comparisons at a high level with other states, and help communicate with policy makers about the impacts of different budget levels and staffing models.
Expected completion date: September 2013

Mapping Weather Severity Zones
Expected results: A map that depicts the average winter weather severity across the US in a manner similar to the plant hardiness zone maps used for agriculture. This will give agencies a better ability to compare their operations with other states that have similar weather severity in order to identify opportunities for reducing spending that will not negatively impact level of service
Expected completion date: September 2012

Cost-Benefit Analysis Toolkit: Phase II
Expected results: An updated version of the Cost-Benefit Analysis Toolkit with enhanced features and expanded functionality to include additional materials, equipment and methods.
Expected completion date: February 2013

Determining the Toxicity of Deicing Materials
Expected results: A concise quick-reference guide that summarizes the toxicity rankings of deicing chemicals and helps winter highway maintenance managers consider both expected levels of service and potential harm to the environment when selecting a deicer to use.
Expected completion date: February 2013

Development of a Totally Automated Spreading System
Expected results: Guides to aid DOTs in adopting automated dispensing systems cost-effectively. The project will provide short-term guidance on retrofitting existing equipment. It will also identify the best equipment and practices, and will include recommendations for ordering equipment for new systems that take advantage of the most advanced technology.
Expected completion date: March 2013

RESEARCH TO AWARD

- **Environmental Factors Causing Fatigue in Snowplow Operators**
  Expected start date: March 2012
- **Snow Removal at Extreme Temperatures**
  Expected start date: April 2012

2012 Clear Roads Funded Projects

Project/Description	Funding
Pacific Northwest Snowfighters (PNS) The purpose of this project is to identify funding for PNS and to structure a relationship between PNS and Clear Roads. Without a steady and reliable source of funding to continue its core mission, PNS could lose the ability to keep the specifications and the Qualified Product List (QPL) viable as a standard for other states and provinces to rely upon. This project would ensure that PNS could continue to coordinate materials testing and standards for deicing chemicals. **Project Subcommittee:** Monty Mills, Ron Wright, Justun Juelfs, David Wieder, Lynn Bernhard	$25,000 per 2 years
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