

Report No. UT-1X.XX

RESEARCH IMPLEMENTATION AND LEADERSHIP ENGAGEMENT: 2012 UDOT RESEARCH PEER EXCHANGE, OCT 29th–31st, 2012

Prepared For:

Utah Department of Transportation
Research Division

Submitted By:

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**Draft Report
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16. Abstract This report discusses the proceedings and recommendations of the 2012 UDOT Research Peer Exchange. The 2012 UDOT Research Peer Exchange took place in October of 2012. Representatives from eight different state DOTs, as well as representatives from four federal agencies, gave presentations on the implementation of research in his or her organization. Participants also attended the UDOT Annual Conference where they presented a condensed version of their state or agency's implementation of research and were able to see the inner workings of the Utah Department of Transportation. On day three, participants provided feedback for UDOT on how they could improve their research program. Participants then discussed leadership, how it fostered research implementation, and vice versa. Top suggestions for involving leadership were gathered from each participant at the end of the exchange. The participants were asked to focus on four areas: Implementation, Innovation, How Leadership Affects Research, and How Research Affects Leadership.			
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ACRONYMS

AASHTO.....	American Association of State Highway and Traffic Officials
ACS.....	Adaptive Control Software
AMS.....	American Management System
CMCG.....	Construction Machine Control Guidance
CUTC.....	Council of University Transportation Centers
DOT.....	Department of Transportation
FAA.....	Federal Aviation Administration
FHWA.....	Federal Highway Administration
GIS.....	Geographic Information Systems
GPS.....	Global Positioning System
IDOT.....	Iowa Department of Transportation
IT.....	Information Technology
ITD.....	Idaho Transportation Department
LSF.....	Living Snow Fences
LTAP.....	Local Technical Assistance Program
LTTP.....	Long Term Pavement Performance
MAP-21.....	Moving Ahead for Progress in the 21 st Century
MDT.....	Montana Department of Transportation
MnDOT.....	Minnesota Department of Transportation
MUTCD.....	Manual on Uniform Traffic Control Devices
NHTSA.....	National Highway Traffic Safety Administration
NTSB.....	National Transportation Safety Board
ODOT.....	Oklahoma Department of Transportation
OMS.....	Order Management System
PMS.....	Pavement Management System
RAC.....	Research Advisory Council
RAP.....	Reclaimed Asphalt Paving
RD&T ²	Research, Development, and Technology Transfer
RITA.....	Research and Innovative Technology Administration
RRC.....	Research Review Committee
SDDOT.....	South Dakota Department of Transportation
SHRP 2.....	Strategic Highway Research Program 2
SPR.....	State Planning & Research
TRB.....	Transportation Research Board
TRID.....	Transportation Research International Documentation
UAV.....	Unmanned Ariel Vehicle
USDOT.....	United States Department of Transportation

USU.....Utah State University
UTC.....University Transportation Center
UTC.....Utah Transportation Center
WyDOT.....Wyoming Department of Transportation

EXECUTIVE SUMMARY

This report discusses the proceedings and recommendations of the 2012 UDOT Research Peer Exchange. The 2012 UDOT Research Peer Exchange took place from October 29th to November 1st, 2012. Representatives from eight different state DOTs, as well as representatives from four federal agencies, gave presentations on the implementation of research in his or her organization. Participants also attended the UDOT Annual Conference where they presented a condensed version of their state or agency's implementation of research and were able to see the inner workings of the Utah Department of Transportation. On day three, participants provided feedback for UDOT on how they could improve their research program. Participants then discussed leadership, how it fostered research implementation, and vice versa. Top suggestions for involving leadership were gathered from each participant at the end of the exchange. The participants were asked to focus on four areas: Implementation, Innovation, How Leadership Affects Research, and How Research Affects Leadership.

Implementation can occur in a variety of ways, from complete or partial implementation down to the suggestion that none of the research be adopted if it is not found to be useful to the DOT. Participants agreed that research projects need a champion for implementation to be successful and that person is vital to the projects implementation. Communication and support within the DOT was found to be the most important factor for innovation. Some of the best innovation comes from the work site and if there is not communication with workers some of the best ideas can be overlooked. In addition, some of the riskiest ideas can be overlooked if management does not have the support necessary to take those risks. For implementation to occur an informed champion must be given talking points to keep the research at the forefront of the decision-makers agenda.

Research affects leadership because it is necessary to have leaders who understand the research program and are capable of analyzing the program to identify and address shortcomings. The researcher is also in a position to offer objective suggestions that will improve a research program and make it easier for research to be conducted. In addition, leaders need their researchers to provide talking points, so that the research agenda may be easily explained to

individuals who do not necessarily have a research background or may otherwise not understand the research at hand. In most DOTs, leadership is the greatest influence of research. In order to achieve the desired goals, leaders must provide a clear and concise picture of their vision. They must also be open and accommodating to their researchers and enable them to conduct cutting edge research. Participants repeatedly stressed that communication of expectations, progress, and delivery was vital to the success of a research program. Throughout the process, management needs to stay apprised of the status of the research.

1.0 INTRODUCTION

Pursuant to 23 Code of Federal Regulations 420.209 (a)(7), as a condition for approval of FHWA planning and research funds for research activities, a State is required to conduct peer exchanges every five years as required by FHWA's Office of Research Development & Technology Transfer (RD&T²). The objective of the peer exchange program is to give State transportation agencies a means to improve the quality and effectiveness of their research management processes. A peer exchange is a practical and effective tool to foster excellence in research, development, and technology transfer program management by providing an opportunity for panelists to share best practices and management innovations with each other. Outside managers are invited to meet with the host agency to discuss and review its RD&T² management process or provide ideas in a specific focus area. Information on the host agency's policies and procedures is shared with panel members prior to the meeting. During the peer exchange, panel members may meet with managers, staff, stakeholders, and customers to gain further insight into the host agency's program. The information gathered from the exchange is documented in a written report and presented to agency management.

1.1 Peer Exchange Panel Members

The 2012 Research exchange was composed of ten panel members. There were seven DOT's represented from five different FHWA regions (Regions 5, 6, 7, 8, and 10) and four federal agencies/programs were represented (SHRP 2, FHWA, TRB, and USDOT). Brief biographies of the participants are provided below.

Ron Curb (Oklahoma Department of Transportation)

Mr. Ron F. Curb has worked for the Oklahoma Department of Transportation for over 29 years. He has transportation experience in bridge design, traffic engineering and transportation planning & research. He has managed the Engineering Services Branch's Research and Traffic Data Analysis sections since 2006. In Oklahoma, he is a licensed Professional Engineer and Certified Public Manager.

Jerry DiMaggio (SHRP2)

Mr. Jerry DiMaggio is currently the Implementation Coordinator of the SHRP 2 program for TRB in Washington DC. He retired from FHWA in 2008 where he served as a Principal Bridge Engineer and National Program Manager for Foundation and Geotechnical Engineering. Jerry has worked on approximately 1000 projects in all 50 states, Central and South America and several Middle Eastern countries.

Stephen Maher (Transportation Research Board)

Mr. Maher is responsible for the leadership and management of design engineering technical standing committee and task force activities; development and conduct of the design engineering portion of the TRB Annual Meeting and other national and international conferences and workshops; worldwide response to design engineering inquiries; design related journal publications, electronic circulars and webinars; and a portion of the TRB Annual Field Visit/Research Correlation Services Program with state department of transportation and other sponsor agencies, universities and institutes.

Timothy McDowell (Wyoming Department of Transportation)

Mr. McDowell has been the administer the development and production of the Statewide Transportation Improvement Program for the State of Wyoming. He is responsible for administering the Research and Development program for WYDOT. He has been employed with the Wyoming Department of Transportation for 34 years with experience in construction and maintenance prior to present position.

John Moulden (Federal Highway Administration)

Mr. Moulden trained as a research psychologist with degrees from Johns Hopkins Univ. and Penn State Univ. Prior to FHWA, he was President of the National Commission Against Drunk Driving; Special Assistant to Chairman of the National Transportation Safety Board (NTSB), President, Transportation Safety Associates (consulting co.); and research psychologist at NHTSA (USDOT).

Linda Narigon (Iowa Department of Transportation)

Ms. Narigon is a Licensed Professional Engineer in Iowa and serves as Iowa DOT's SPR Part II Administrator and Research Implementation Engineer. Linda is a member of TRB's Hydrology, Hydraulics, and Water Quality Committee and a majority of her career has been in Water Resources and Floodplain Modeling. Linda joined Iowa DOT's Research Office in 2011.

Daris Ormesher (South Dakota Department of Transportation)

Mr. Ormesher has worked in the Office of Research for the South Dakota Department of Transportation since 1989. Prior to that he worked as a Geotechnical Engineer for Woodward Clyde in Omaha, Nebraska. He has a bachelors degree in Geological Engineering. His area of expertise is geotechnical engineering but has worked on a variety of projects covering topics from pavement materials to organizational health.

Ned Parrish (Idaho Department of Transportation)

Mr. Parrish has worked as the Research Program Manager at Idaho Department of Transportation since 2007. His responsibilities include management of ITD's Research Program, coordination of efforts to identify department research needs and priorities, and development and monitoring of research contracts. Mr. Parrish also serves as the Department's representative on local, state, and national research committees.

Nicole Peterson (Minnesota Department of Transportation)

Ms. Peterson has been with the Minnesota Department of Transportation for 14 years. She has worked primarily in their Metro District in traffic, design and project management. She joined Research Services in their Central Office a year ago as the Research Management Engineer.

Sue Sillick (Montana Department of Transportation)

Ms. Sillick has been with the Montana Department of Transportation for over 18 years and is currently the Research Programs Manager at the Montana Department of Transportation. Her responsibilities include managing the research, development, and technology transfer programs of MDT. Prior to this position, Sue was a project manager in the research programs.

Kevin Womack (RITA)

Dr. Womack has been the Associate Administrator for Research, Development, and Technology, previously he was a Professor of Civil Engineering and Director of the Utah Transportation Center at Utah State University. Dr. Womack received his Bachelor of Science degree (1980) and Ph.D. degree (1989, civil engineering) from Oregon State University, with a Masters degree in civil engineering from the University of Pennsylvania (1985). He was elected a Fellow in the American Society of Civil Engineers in April of 2010. Dr. Womack is a registered professional engineer in the State of Oregon.

1.2 Other Peer Exchange Participants

Kevin Heaslip (Utah State University)

Dr. Heaslip is an Assistant Professor at Utah State University and the Associate Director of the Utah Transportation Center (UTC). His research areas include resiliency, alternative fuel sources, safety and automation. Dr. Heaslip served as a facilitator to the 2012 Research Peer Exchange.

Cameron Kergaye (Utah Department of Transportation)

Dr. Kergaye has been with UDOT for over twenty years and has worked in many different disciplines including design, construction and materials. He has also worked on I-15 reconstruction and in engineering services and project management. He began his position of Director of Research in the fall of 2010.

Kevin Nichol (Utah Department of Transportation)

Mr. Nichol is a Research Project Manager for UDOT. His previous experience has included planning, local government engineering, and stormwater management. He is also an advisory member of the UDOT Standards Committee.

Becky Winstead (Utah State University)

Ms. Winstead is the Utah State University TIMELab coordinator and Staff Assistant for Utah LTAP. Ms. Winstead served as a facilitator for the 2012 Research Peer Exchange.

Table 1- 2012 UDOT Peer Exchange Attendees

2012 UDOT Peer Exchange Attendees		
Name	Affiliation	Title
Ron Curb	Oklahoma Department of Transportation	Engineering Manager II - Research
Jerry DiMaggio	SHRP2 Program/TRB	SHRP2 Implementation Engineer
Kevin Heaslip*	Utah State University	Assistant Professor
Cameron Kergaye	Utah Department of Transportation	Research Manager
Stephen Maher	Transportation Research Board	Senior Program Officer
Tim McDowell	Wyoming Department of Transportation	State Programming Engineer
John Moulden	Federal Highway Administration	National Partnership Program Manager
Linda Narigon	Iowa Department of Transportation	Research Implementation Engineer
Kevin Nichol	Utah Department of Transportation	Research Project Manager
Daris Ormesher	South Dakota Department of Transportation	Research Engineer
Ned Parrish	Idaho Transportation Department	Research Program Manager
Nicole Peterson	Minnesota Department of Transportation	Research Management Engineer
Sue Sillick	Montana Department of Transportation	Research Programs Manager
Becky Winstead*	Utah State University	Staff Assistant 3
Kevin Womack	USDOT/RITA	Associate Administrator for Research & Development

* indicates facilitator

2.0 FOCUS

Representatives from the states of Oklahoma, Wyoming, Iowa, South Dakota, Idaho, Minnesota, Montana, and Utah were present along with federal representatives from the Strategic Highway Research Program 2 (SHRP 2), the Transportation Research Board (TRB), the Federal Highway Administration (FHWA), and the Research and Innovation Technology Administration (RITA) from the United States Department of Transportation. The focus of the exchange was “Research Implementation and Leadership Engagement.”

On day one of the exchange, each participant gave a 20-minute presentation on how research was implemented in his or her organization and the role that leadership played in that implementation. On day two, participants attended the Utah Department of Transportation Annual Conference where they presented shortened versions of their presentations to transportation professionals from around the state of Utah. Participants were also invited to look around the conference so that they would have a greater understanding of how UDOT functions and become familiar with the research that is being done in Utah. On day three, participants engaged in a wrap up of the exchange. They addressed the following questions:

- “How does research support your leadership?”
- “How does your leadership support research?”
- “What are your top suggestions for involving your leadership?”

3.0 PROCESS

The Utah Department of Transportation (UDOT) held a Research Peer Exchange on October 29-31, 2012 in Salt Lake City, Utah. To prepare for the exchange, the team received a package of information including the following:

- Travel information
- A tentative meeting agenda (Appendix A)
- A contact list of participants (Appendix B)

3.1 Presentations

As part of the exchange, participants were asked to give twenty minute presentations about their programs innovations and implementations. Following each presentation was a brief discussion of the research program. This allowed participants the ability to highlight innovations and implementations that have been successful within their respective organizations. This gave the panel members different perspectives on how to be successful in their research programs.

3.2 UDOT Annual Conference

On day 2, the participants were given the opportunity to present an abridged version of their presentations at the UDOT Annual Conference. This gave transportation professionals from different areas the ability to see what is being done nationwide in the area of transportation research. For the panel members, it gave them the ability to receive feedback from all levels of personnel that may be impacted by implementation of their research. This was a unique forum for communication between the research team and the field worker.

3.3 Deliverables & Debriefing

Day 3 allowed wrapped up the exchange by regrouping the panel to offer an observations and suggestions for the UDOT research team. They were asked a series of questions by the facilitators that provoked conversation about what was learned at the exchange and how the Peer Exchange process aided in furthering research innovation & implementation.

4.0 FINDINGS

4.1 Best Practices Observed From Presentations

The presentations of all participants in the 2012 UDOT Research Peer Exchange are summarized in the following section. They are listed alphabetically by the presenter's last name. The complete presentations are in Appendix C.

4.1.1 “Integration of Implementable Research in Oklahoma” Ron Curb (Oklahoma DOT)

An overview of the implementation options in Oklahoma was presented followed by a discussion of focus topics for the implementation of research.



Implementation Options

- There are instances where change is not justified
- Feedback can be considered implementation
- New engineering guidelines were created
- Technology transfer can be considered implementation

The Long Term Pavement Performance (LTPP)

- Used in the development of useful software tools, manuals and guidance documents.
- Been in operation for over 25 years, millions of measurements on pavement

Implementable Research

- New product evaluation program
- Transportation pooled fund studies
- University Research - Collaboration with eight different universities
- AASHTO technology implementation group

Integration Focus Topics

- Road Pavement Profilometry (Timeline integration)

- Purchased equipment for profilometry and calibrated the equipment
 - Followed FHWA incentive program and shared results
 - Hosted a Webinar on the topic 10/23/12
 - In the process of establishing a certification procedure
- Pavement Design (Collaborative)
 - Pavement design guide in need of updating/ overhaul
 - Built test track in 2000 and continue to test experimental pavement cycling
- Scour Stop (Independent)
 - A transition mat to replace hard armor
 - Placed in ditches and river banks to slow or stop erosion
- Quick New Product Implementation
 - MIT Scan T2 (Measures thickness without coring)
 - Pipe Underdrain Inspection Service (On Demand, DVD recording)
- Continuous Implementation
 - Herbicide research & roadside vegetation management

4.1.2 “Implementing SHRP 2 Products: Secrets to Success” Jerry DiMaggio (SHRP2)

SHRP2 is a special-purpose research program that follows a non-traditional approach to meet customer-oriented goals. Currently, 27 states participate in the program, which engages in 100+ research projects, produces 65+ useable products, and are partners for prioritizing implementation. SHRP2 focuses on four areas: safety, renewal, reliability, and capacity. An overview of their three year plan was provided and is summarized below.



Development of a Three-Year Plan

- Includes safety, product development, product implementation, marketing, IT support, and program management.
- Find target audience & barriers to implementation
- User support, training, marketing of the program
- Conducting implementation workshops & strategy sessions
- Implementation of an evaluation process

4.1.3 “TIMELab Research: Assessment of Sign Retroreflectivity Compliance for Development of a Management Plan” Kevin Heaslip (USU)

The Transportation Infrastructure Management and Engineering Laboratory (TIMELab) specializes in transportation operations, intelligent transportation systems, transportation maintenance & asset management, alternative fuels, and automation & electrification. The lab is part of the Utah Transportation Center which is a member of the Mountain Plains Consortium Regional UTC and has received \$4.9M in funding since 2008. An overview of research on retroreflectivity was provided.



Retroreflectivity (MUTCD Minimum Standard)

- Collected data on sign type, sheeting type, orientation, etc.
- Utah has 91% compliance, Type I sheeting needs replacing (98% failure)
- Blanket replacement needed, inventory should be in OMS
- QR code for new and replacement installations that will provide sign information
- Nighttime visual inspection is effective (Engineering interns)
- USU is in the process of developing a mobile app to collect and archive sign data

4.1.4 “Assisting State DOTs Deploy Research” Stephen Maher (TRB)

Return on research investments only occur when research is put into practice. Researchers must direct how the product can best be put into practice but other agencies. However, the cost of implementation can be an additional \$10M to implement



research, in addition to \$10-14M previously funded to conduct the research. Practice ready papers are selected for the TRB Annual Meeting and are indexed in TRID, by March of each year. All papers on the Annual Meeting Compendium of Papers are indexed in TRID as well. A discussion on deployment and implementation strategies followed.

Deployment

- Practitioners need to be brought on board early in research
- Cost of deployment of a research can be as much as 10x the cost of research
- Marketing & Communications are imperative
- “Research Pays Off” in TRB circulations highlights research implementation
- Database of practice ready papers on TRB site that is easily searchable
- “You don’t have to do research to implement research”

Different Forms of Implementation

- Tech assistance
- Standards, specs, guides, and manuals
- Follow on research
- Training and education

4.1.5 “WyDOT Research Center” Tim McDowell (Wyoming DOT)

An overview of WyDOT Research was presented focusing on the business aspect of research. Research should be profitable and should consider uncertainties including: politics, price volatility, legalities, environmental factors, and right of way issues. These include:

- Reduction in design time
- Utilization of revenue projections in the “pipeline”
- Utilization of critical project draining approach
- Reduction in holding costs
- Effective utilization state funds



Evaluating the Department of Transportation Research Programs (A Study Conducted by the University of Wyoming)

- Objective: Evaluate methodology & make recommendations
- Push for outcome based research
- Evaluation done in 2007 resulted in 10 performance measures
 - Group projects by strategic intent and project category
 - 8 out of 10 performance measures were utilized
 1. Number of needs statements submitted
 2. Outcomes of the research projects
 3. Number of research reports completed each year
 4. Percentage of administrative costs to project funding
 5. Funds requested vs. funds available
 6. Percentage of projects completed on time and on budget
 7. Cost benefit analysis for projects and the research program
 8. Additional evaluations & analysis

WyDOT Research Program

- Funds \$1M in research annually
- Research Advisory Council (RAC) meets four times per year
- Mission Statement: *“To enhance the economic well-being and quality of life in Wyoming by working with public and private partners to produce a safe and efficient transportation system”*
- 82% of funding is contracted research, 16% pooled fun studies, and 2% in-house
- Safety projects have the greatest funding (wildlife is it’s own category)
- 9/15 contracted research projects were solicited by WyDOT
- There are three outcome categories (knowledge, product & standards)
- Completion rate of 63/65 in 3 years. (All pooled studies went over time)
- They have decreased administrative costs from 18.6% to under 10%
- There is a post research performance evaluation to be completed
- Improving online access to research reports a priority

WyDOT Conclusions:

- Overall, quite effective and proactive
- 80% of projects from 2005-2010 were being implemented
- 100% of pooled fund and in-house projects were funded
- 85% of contracted research was funded
- 100% of contracted and pooled research projects were completed within budget (88% within timeline)
- Research projects averaged a 96% on performance evaluations in phase 1
- Research projects averaged a 83% on performance evaluations in phase 2
- For pooled fund projects, the RAC should receive a formal presentation before voting on budget/ time extensions
- Performance evaluations should be implemented within WyDOT's research program

4.1.6 “Every Day Counts Technology Initiative” John Moulden (FHWA)

The need for the Every Day Counts Technology Initiative this emphasized by an implementation time of 12 years for all 50 states to implement SuperPave technology. The mission of the initiative is *“To identify and deploy readily available innovation and operational changes that will make a difference and to identify policy or operational changes required to advance system innovation in the longer term”*. To accomplish this, there should be a continuous collaboration with all stakeholders. All accelerated deployment innovations were selected in collaboration with stakeholders.



Selection Criteria:

- Market ready and meets the needs of the user
- Compliments strategic goals
- High success potential and ability for widespread application
- Adequate deployment and technical support
- Can work with other technologies
- Measurable outcomes and opportunities to enhance further deployment efforts

- Meets legal/ regulatory requirements
- Resource and support partners available
- There are 8 stakeholder technical panel members

Warm Mix Asphalt

- Allows a reduction in asphalt mixture production and placement temperatures
 - Better compaction
 - Less worker fatigue
 - Less fossil fuel consumption and reduction in CO₂
 - Longer paving season
 - Longer hauling distances
- Production temperatures reduced by 30-70°F

Precast Bridge Elements

- Prefabricated bridge elements and systems manufactured on-site or off-site, under controlled conditions, and brought to the job location ready to install
 - Minimizes traffic & community impact
 - Improves construction zone safety
 - Improves bridge designs constructability
 - Increases quality & lowers life-cycle costs

Geosynthetic Reinforced Soil

- Fast, cost-effective bridge support method using alternating layers of compacted fill and sheets of geotextile reinforcement to provide bridge support.
 - Eliminates approach slab or construction joint at the bridge-to-road interface
 - Reduced construction time (complete in 10 days)
 - 25-60 % less cost depending on standard of construction
 - Less dependent on weather conditions
 - Flexible design (easily modified for unforeseen site conditions)
 - Easier to maintain because of fewer parts
 - Built with common equipment and materials

Safety Edge

- Sloped pavement edge at a 30° angle
 - Allows drivers more controlled re-entry back onto the roadway after tire drop off
 - Reduces crashes due to edge drop-off and uncontrolled recovery
 - Minimal cost (less than 1% on 2-lane highway)
 - Consolidated edge and reduction in edge raveling
 - Increases durability

Adaptive Traffic Control Technology

- ACS measures traffic flow and adjusts signal timing to promote smooth flow of traffic along arterial streets
 - ACS improves travel time reliability
 - Reduces congestion and creates a smooth traffic flow
 - Increases long-term viability of traffic signal operations
 - Widely deployable using existing control equipment

Round-Two Initiatives:

- Reduce project delivery time and construction time
- Innovative contracting
- Safety
- Environment
- Mobility

New website will go live at TRB Annual Meeting January 2013

4.1.7 “Transportation Research Innovation & Implementation: Promising Research” Linda Narigon (Iowa DOT)

Iowa focused their research and innovation presentation on the safety of teen drivers in the State of Iowa. By having the youngest national driving age, Iowa has placed a great deal of



importance on keeping teens safe behind the wheel. Because of this, their research has gained national recognition and been implemented by American Family Insurance - Teen Safe Driver Program.

Iowa's Main Focus Areas

- Safety, Winter maintenance, Structures, and Concrete pavements
- In addition, human factors and intelligent construction are growing areas

Iowa's Graduated Drivers License

- Emerged from research in the 1990's (implemented in 1999) and evaluated several times since
- More than a 50% decrease in moving convictions involving 16-year-old drivers from its implementation through 2004.
- 36% of 14-year-old drivers involved in crashes were alone despite restrictions
- Use of video in teen driving – age vs. experience
 - 50% of participants received no feedback
 - 50% received a video of their driving that was watched with their parents
 - “Unsafe events” triggered recording of a 20 second clip (Sudden breaking, acceleration or swerving) -8 seconds before and 4 seconds after trigger event
 - Parents received a weekly report card that described data in a narrative form
 - Crashes increase 10-fold when the teen begins driving alone and then decreases at a moderate rate over several years
 - More young passengers lead to more crashes
 - Most serious crashes occur before midnight
 - User acceptance is critical for success
- Three groups monitored (90 participants total)
 - 14.5-15.5 year olds
 - 16 year olds who never held a school license
 - 16 year olds who have had a school license for at least 4 months
- Timeline
 - 4 weeks of no feedback (Baseline pre-intervention)

- 16 weeks of feedback
- 4 weeks of no feedback (Baseline post-intervention)
- Conclusions
 - Dramatic change in driver behavior was noted with the feedback
 - Age made no significant difference in the number of events
 - A distraction was present for 23% of events

Go-Team Project

- Evaluation of the context and detail of fatal teen crashes
- The “Go-Team” was assembled with experts in driver behavior, Iowa crash data, traffic engineering, and logistics
- Purpose of the Go-Team was to examine crashes as quickly as possible and gather as much information as possible to examine causation.
- Collision had to involve at least one driver under the age of 19
- 88 Fatal crashes
- Resulted in legislative changes that yielded a significant decrease in fatalities

4.1.8 “Successful UDOT Research Projects” Kevin Nichol (Utah DOT)

UDOT gave an overview of projects that have been successful for UDOT’s research program. The purpose was to give participants the ability to see Utah’s research accomplishments.



UAV Technology

- Goal: Improve high-resolution imagery along highway corridors
- Hand launched/ autonomous
- Low cost, but requires FAA approval

Native Fish Passage

- Goal: Improve upstream passage through culverts of non-salmonid native fishes in an economical fashion

- In lab testing discovered that small fish do best with a natural substrate that scales to size of fish and field tests corroborated lab results

Construction Machine Control Guidance

- Goal: Develop procedures to use CMC
- Developed guidelines
- Refined implementation
- Recommend inspector training
- Outlined survey control needs

Wildlife Crossing Structures

- Goals: Identify ideal culverts for wildlife
- Found ideal size and shape to encourage use of culverts

Benefits of Research

- 46 deliverables
- \$4.81M spent, estimated \$80.8M cost benefit (17:1)
- Highest cost benefit was on large projects & safety

4.1.9 “SDDOT Research Implementation Process” Daris Ormesher (South Dakota DOT)

The focus of the South Dakota presentation was an overview of the research process from inception to implementation. It showed the checks and balances practiced by South Dakota and how the different roles influenced research innovation and implementation.



Research Roles

- Research review board
 - Secretary of Transportation, SDDOT Region and Division Directors, Federal Highway Administration Representative, County Representatives, and the South Dakota Board of Regents

- Roles within the Process
 - Office of Research (manage & perform research)
 - Technical Panels (monitor & evaluate research)
 - Universities & Consultants (suggest & perform research)

Research Process

- Conception, Definition, Execution, Implementation, Tracking, and Evaluation
- Everything is reported back to the research review board during the research process

Implementation Process

- Plan approval
- Research summary, objectives & outcomes and products defined
- Target audience is identified
- Implementation approach is outlined
- Implementation roles & responsibilities are defined
- A schedule is set
- Resources are listed with an estimated cost and the source of funding
- The tasks are monitored by their progress & percent completion
- Impact areas are evaluated

4.1.10 “Study of ITD’s Maintenance and Pavement Management Needs” Ned Parrish (Idaho Transportation Dept.)

Idaho’s research program recently had a complete overhaul of its maintenance and pavement management systems. The process of evaluating the old system, reporting the findings and implementing the new system was documented in this presentation.



- Project was funded in 2007 with a budget of \$75,000
- Interviewed 40+ staff about management practices
- Researched best practices from other states

- Maintenance management is top priority.
 - Should be accessible to all staff
 - Linkage to PMS, AMS & GIS
 - Easy of use a priority
 - Maintenance management costs: \$2.7M one time cost and \$300,000 annual maintenance

Current Pavement Management System

- Meets some needs but system lacks tools and accessibility
- District 6 pilot projects helps, but not for statewide use
- Pavement management costs: \$950,000 one time cost, \$50,000 annual license
- Research addressed the lack of maintenance management system decommissioned in 2005
- Limits of current pavement management system
- Research had high level champions and was supported by staff
- Competitive bid process made for high quality contractors for research and development
- Research provided the information needed to overhaul the current system
 - Limitations of current system
 - Best practices from other states
 - Agency needs
 - Cost estimate
- Documentation of audit recommendations
 - Research results were presented to the Idaho Transportation Board
 - DMV fees increased to cover the cost
 - Executive order to implement the system
 - Implementation took about two years, completed under budget
 - Personnel structure was integral to the success of the project
 - Communication with users in each district to understand user needs
 - “Super user” assigned to each district
 - Continuing research for improvement of systems

4.1.11 “Stewards of Transformative Change: How Minnesota Facilitates Progressive Research and Implements Innovative Ideas” Nicole Peterson (Minnesota DOT)

The focus area of this presentation was successful research and implementation of Minnesota’s research program. This not only focused on specific projects that were completely successful, but also projects that encountered difficulties along the way and how they were overcome.



MnDOT Overview

- State highway maintenance
- Operations, design and construction
- Multimodal system support and development
- Financial aid for local roads
- Funding \$10.8M per year
 - 30% State research program
 - 27% Local roads research board
 - 29% FHWA
 - 3% Cooperative program for transportation research & studies
 - 10% Other

Largest amount is spent on administration followed by materials & construction then traffic & safety

Research Management

- Identify and track needs, Develop & fund projects, Execution, and Implementation

Evaluating the Cost & Benefits of Living Snow Fences (LSF)

- Average of 8 fatalities/ year because of hazardous road conditions
- 40% of hazardous locations contracted would save \$1.3M/year
- MnDOT pays farmers to leave a standing row of corn as a snow fence
- LSF improves road conditions and lowers maintenance costs

- MnDOT experienced difficulties contracting farmers
- MnDOT determined that the payment was not sufficient
- MnDOT contracted for a LSF calculator that located the most problematic sites and optimized the payments
- Solutions for the LSF project
 - Payment- more flexibility in payment and a better valuation of the land, maintenance, and inconvenience of the LSF
 - Prioritization- Target high incidence landowners with a bonus incentive
 - Promotion- Educational materials to farmers, door to door visits, incentives and training
- Next actions
 - Modifications based on recommendations
 - Snowplows equipped with GPS to show where LSF are needed
 - Research best plant species for LSF

Impacts of Playground Warning Signs on Vehicle Speed

- Residents request the signs for local playgrounds
- Agencies want to install minimum number of signs
- The objective was to evaluate the efficacy of the signs on vehicle speed
- Findings of the Playground warning sign research
 - Signs did not affect average vehicle speed
 - Vehicle speed correlated to playground traffic & activity
- Resulted in a handbook outlining preferred sign placement for engineers
- Gave government officials the knowledge to address citizen requests

Standard Sumps and the SAFL Baffle as Economical Solutions for Stormwater Treatment

- Goals:
 - Minimize the sediment and effects of storm water run-off and comply with state and federal environmental regulations
 - Evaluation of current sumps and sumps with a SAFL baffle to increase sediment retaining efficacy

- What was learned:
 - The baffle was effective in increasing sediment capture and minimizing washout
 - Shallow sumps still had a high washout rate, but increasing the diameter can mitigate it
- Resulted in 50+ SAFL Baffle installations.
- Average equipped sump reduced sediment removal to ¼ its previous cost
- Licensed the SAFL Baffle to Upstream Technologies
- Barr Engineering has developed software for sizing manholes and SAFL Baffles
- Shows the benefits of collaborations for optimizing commercialization

4.1.12 “Implementation of Research Results at MDT” Sue Sillick (Montana DOT)

Management involvement and support, an enthusiastic champion, personnel involvement, coordination and collaboration, implementation consideration, product development, and the tools and funding required for implementation are the things necessary for any project to be successfully implemented within a research program. The projects overviewed in this presentation had all of these characteristics.



Overview of MDT Research

- Federal funding of \$2.3M in 2013
- \$1.2M in earmarked funding & \$786,000 in pooled funding studies
- Research is directed by MDT executive management
- Focuses on the customer and funds applied and implementable research
- Continuous process & program improvement

Research Projects Program

- Solves problems, objective reporting, improves efficacy and efficiency
- Research review committee (RRC)
 - Determines priority
 - Approves funding
 - Reviews progress and implementation recommendations

- Technical panel
 - One assigned to each research project
 - Oversees the project from inception to implementation
 - Determines research needs & products necessary for implementation
 - Develops scope
 - Determines research venue
 - Reviews projects & makes implementation recommendations
- Implementation
 - Always deliberated throughout the project
 - Management involvement
 - Need a champion
 - Always consider implementation in every stage of the project
 - Eliminate barriers
 - Provide the tools and funding necessary for implementation

Montana Rest Area Design

- Usage evaluated (water & effluent flow, pedestrian & vehicle traffic)
- 10 Guidelines developed
- Overhauled 6 rest areas to make them more efficient
- Designed one new rest area using guidelines
- Reasons for success
 - Management involvement
 - Coordination and collaboration
 - Implementation considered from the beginning
 - Developed products for implementation
 - Tools and funding provided for implementation

Portable Concrete Barriers

- Problem identified by construction crews, chief engineer requested the research
- Combined inventory with research for improvements

Ride Specification Review

- Compare MDT with state of the practice
- Developed the test method, manual, ride specifications, implementation activities, and a final report
- Changed ride specifications and pay adjustments
- Trained personnel

Temporary Erosion and Sediment Control

- State of the practice, user survey and organizational structure review
- Completed two manuals, fact sheets and detail drawings
- Implemented a training program
- Generated two reports
- Conducted a two year implementation review
 - Added staff and a rate schedule committee
 - Revised the construction manual
 - Continued use of training

Experimental Projects Program

- In house research
- Annual meeting
 - Discusses design, construction, maintenance
 - Communicates information on experimental projects
 - Gives feedback
- Performance measures
 - Number of topic statements, Number of projects, Expenditures by subject area
 - On time, budget, scope
 - Cost sharing and partnerships
 - Overhead costs
 - Exit surveys
 - Number of publications
 - Implementation

4.1.13 Kevin Womack (RITA)

Dr. Womack focused his discussion on the need for research to be marketed and communicated effectively.

Without effective communication of the research payoffs

there is a concern that the agencies in control of funding will make budget cuts that will negatively impact research innovation and implementation. Documentation of research benefits is imperative to its survival.



U.S. Department of Transportation

**Research and Innovative Technology
Administration**

- RITA coordinates modes.
- Questions are brought to RITA in regards to research.
 - “What’s the value on research?”
 - “What’s the return on investment?”
 - Gave typical answers “Hard to gauge”
 - Need to be concerned that this question keeps getting asked
- Research is a first cut in budgets (MAP21 is helpful)
- Had staff put together a briefing book for Washington of 150 success stories
- Implementation and value of research at RAC meeting
- Without implementation, value cannot be calculated
- Research HUB (Database of all federally funded research projects, outcomes & implementation)
- SHRP2 has an implementation component to the program.
- Researcher should work with DOT to implement the research and document it’s benefits.
- Have higher expectations of researchers to help to implement.
- If not implemented, have an explanation (no funding etc.)
- Funding is at risk if there is no measurable value
- UTC’s are filling out forms for DOT (Implementation forms)

4.2 Impressions of UDOT and Evaluation of the Exchange

4.2.1 Question: “What are your suggestions for UDOT’s research, annual conference or anything other aspects?”

The main suggestion by participants for the UDOT annual conference was to label conference sessions in such a way that attendees are interested in the product (highlight research topics not research itself). A good way to market research to the people that need to see it is to make sure that the conference is putting forward their research in a way that allows people to see the value. Having a research member involved in the planning will allow them to give a venue to show these advantages as opposed to being a footnote at the conference.

Additionally there were suggestions for the UDOT website. The website should be broadened so that it is easily understood that UDOT is not the only entity conducting research. Highlighting the contracted agencies carrying out the research will allow a greater understanding of how research is conducted for UDOT. Additionally, new research innovations should be highlighted on the front page of the website so that the payoff of the research investment is seen immediately.

Other suggestions included that innovation needs to be trained. It is often thought that it will happen automatically and that is not a realistic way of thinking. There are ways to encourage innovative behaviors. One such way is to have an award offered yearly for innovative thinking and leadership. This is not something that has to be limited to UDOT employees, but should extend to private companies and universities.

Having the correct people involved can make a large difference. If you have people involved that are a part of the selection process, it can help to prioritize your research. Also, utilizing various committees such as RAC or AASHTO will allow you to promote your projects to people who have an interest in the area.

Another aspect to be considered is what kind of need there is for the research. Targeting a national audience lends itself to a greater likelihood of funding. If you focus on regional needs, you significantly narrow your audience.

It has been suggested that the term marketing is not appropriate for what researcher need to do to champion their work. Jerry DiMaggio (SHRP 2) suggested that “Outreach and Communication” might be a better route to take. This allows researchers to change their tone from one of boasting, to more of an informative perspective. This can be done in a newsletter or on the website. The newsletter should be targeted to audiences that would be interested so that there is not an overload of information. Targeting will allow the information to reach the people necessary and make it more likely that the research will get a champion.

To gain recognition, there were several suggestions for UDOT. One was to brand their research. One way to do this is to make sure that all presentations are given in the same format. Also, plan to have someone to market and obtain “visuals” of research being done. Having various photo or video shoots throughout the project will ensure that people are able to see and grasp the work that is being done.

The last suggestion for UDOT was that they have greater communication between their engineers and learn how to communicate what is being done as well as communicate what needs to be done. It is imperative to be able to relate the needs of the engineers and workers to the consumer. That will also include the ability to equip management with several talking points that they can easily remember and use in unexpected circumstances. It is helpful to be able to successfully champion a project when you run into someone in an unexpected place.

There was also praise from the 2012 Exchange participants in regards to UDOT’s research program.

- “UDOT does have a culture of innovation and sees itself as a leader in moving transportation forward” –Ned Parrish (ITD)
- “UDOT has a reputation for innovation nationally.” –Jerry DiMaggio (SHRP 2)

- “This is purely a function of who is leading UDOT right now” – Kevin Womack (RITA)
(In regards to John Njord and Carlos Braceras)

4.2.2 Question: “How does research support your leadership?”

The overwhelming theme when participants were presented with this question was communication. There were examples of visiting the regions to understand their needs and even talking to the workers on site, offering them an environment where they would feel comfortable giving voice to their ideas. There was also the implementation of a research review board. Many DOT’s met with their boards on a quarterly, monthly or as needed basis. Ormesher (SD DOT) referred to the Research Review Board as “Problem-Solvers”. They are called in whenever a problem is encountered, whether it is project related, personnel, or even upper management related.

Another form of communication that was offered was the publication of a newsletter. This is something that conveys what is being done in research. It was recommended to do targeted circulation so that the subscribers don’t begin to ignore the emails. Maher mentioned that in Virginia, they go as far as to have the governor issue a press release about the research being conducted.

Awards were also given in two different states honoring research innovation, giving recognition and inspiring people to come to the research division with innovative ideas. These were given annually and to entities not necessarily within the DOT. In Wyoming, their LTAP has the “Show Me” award, presented to anyone who finds a better way of doing something.

Another underlying current, was to offer assistance whenever possible. Reducing red tape to allow a project to move forward is essential. Also making sure that you say yes as often as possible. With this it may need to be altered to a “Yes. But...” but offering a yes is appreciated by the people you work with. It allows them to see you as someone who is enabling their success instead of putting up barriers.

4.2.3 Question: “What would be the one thing from senior leadership that you would like to see?”

Senior leadership can provide strategic direction to the DOT research department in order to match research goals with the goals of the greater organization. Nearly every DOT representative in the room echoed this sentiment. Also, they need support to take chances in their research. There was the feeling of an inability to take risks and therefore “play it safe”, leading to less innovation.

It was also mentioned that there seemed to be a lack of regional champions. Because of this, there are regional needs that are not being addressed by the DOT. Perhaps the staff presenting an urgency of the research needed and its payoff upon completion could also help.

4.2.4 Question: “How does research support your leadership?”

When it comes to research supporting leadership, research funding is a large contributor. DiMaggio (SHRP 2) pointed out that UDOT has not participated in the SHRP 2 implementation program. Parrish mentioned that he has been struggling with getting information about the SHRP 2 program. At this time, Sillick (MDT) mentioned that in her attempts to get research funding from SHRP 2, she has been denied because of the geographical size of Montana. Narigon mentioned the turnover of RAC members and thought this might be a reason for the problems with information dissemination. Concluding remarks showed that there need to be more efforts in linking leadership of the DOT to the research programs.

4.2.5 Question: “What type of relationships do you have with your UTC’s?”

This discussion came about in regards to research funding. In addition to SHRP 2, the UTC program is a good opportunity for research funding for state DOTs. There seems to be a good working relationship between the DOT’s and their respective UTC’s. As the program has developed after the most recent round of awards, the disagreements have been able to be worked out and they are working well for the DOT’s. The one complaint across the board in working

with a UTC has been the writing of final reports. The way the university system is set up, there is no credit given to a university researcher for a report at the end of a research study. As a result of this, the reports being turned in are subpar and often need to be rewritten. The University system is unlikely to change its requirements, and so the task falls to the DOT to get an acceptable report. McDowell (WyDOT) suggested that the report should be written into the budget from the beginning. Narigon (IDOT) stated that they put a technical writer into the budget of every project to teach technical writing skills. She also suggested that perhaps a few states could pool funds to hire on a fulltime technical writer.

Writing seems to be the largest problem when working with universities. There is no incentive from the university who is ultimately responsible for the researchers employment. It seems that many university researchers are delegating writing to graduate students who have English as a second language. Native English speakers, however, seem to write just as poorly. It is a problem that will need to be continually addressed.

4.2.6 Question: “What are your top suggestions for involving your leadership”

The most recommended topic seemed again to fall on communication. Communication was broken down into subcategories such as researcher engagement, getting to know all new management in a timely fashion, and monthly meetings between researchers, project managers, and the review boards. It was suggested that serving on a national board (NCHRP, FHWA) would help with the communication between the DOT and funding agencies.

Documentation is also vital to the success of leadership. Being able to have a successful report that others can emulate can be very beneficial. Maher (TRB) also suggested the publishing of an annual accountability report that will show the benefits of the research being conducted. This stresses the importance of being able to market what your successes in research are and how they have benefitted the consumer.

Tuesday, Oct. 30

(UDOT Annual Conference, South Towne Expo Center, Sandy, UT)

- 7:00 - 7:30 AM Shuttle to Conference Center
- 7:30 - 8:00 AM Breakfast Provided at the Conference Center
- 8:00 - 12:00 PM Peer Exchange Presentations - 10 Minutes/Participant
~8:00 - 9:30 Moulden, Maher & DiMaggio (35)
~10:00 - 10:50 Sillick, Parrish, Narigon, & Curb (44)
~11:00 - 11:50 Ormesher, McDowell, Taylor, & Nichol (53)
- 12:00 - 1:00 PM Lunch Provided at the Conference
- 1:00 - 5:00 PM Breakout Sessions (See Information Provided)
~Participants may attend up to three sessions.
- 5:30 - 7:30 PM Dinner Banquet at Conference
- 7:30 - 8:00 PM Shuttle Returns to Hotel

Wednesday, Oct. 31

(Little America Hotel - Uintah Room)

- 7:30 - 8:30 AM Breakfast Provided in the Uintah Conference Room
- 8:30 - 9:00 AM Discussion & Impressions of the UDOT Annual Conference
- 9:00 - 10:30 AM Engaging Your Leadership in Research
~How does research support your leadership?
~How does your leadership support research?
~Top suggestions for involving your leadership.
- 10:30 - 10:45 AM Break
- 10:45 - 12:00 PM Lessons Learned from the Peer Exchange
- 12:00 - 12:30 PM Summary Remarks
- 12:30 - 1:30 PM Boxed Lunch Provided
- 1:30 - 4:30 PM Tour of UDOT's CFI, DDI & TOC *(Optional)*
- 7:00 - 10:00 PM Utah Jazz vs. Dallas Mavericks Basketball Game *(Optional)*

APPENDIX B: CONTACT LIST OF PARTICIPANTS

2012 UDOT Research Peer Exchange Attendees		
Name	Affiliation	Email
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APPENDIX C: PRESENTATIONS