RESEARCH

UDOT

Keeping Utah Moving

Utah Department of Transportation - Research Division
4501 South 2700 West - P.O. Box 148410 - SLC,UT 84114-8410

Report No. UT-17.08

UDOT RESEARCH PEER EXCHANGE, OCTOBER 12-13, 2016: IMPLEMENTATION, STATE DOT LIBRARY, NATIONAL COMMITTEES, AND STATE TRANSPORTATION INNOVATION COUNCIL

Prepared For:

Utah Department of Transportation
Research Division

Submitted By:

Utah Department of Transportation
Research Division

Authored By:

Cameron Kergaye
Jason Richins
Kevin Nichol
Thomas Hales
David Stevens
Joni DeMille
Vincent Liu

Final Report
February 2017

Disclaimer

The authors alone are responsible for the preparation and accuracy of the information, data, analysis, discussions, recommendations, and conclusions presented herein. The contents do not necessarily reflect the views, opinions, endorsements, or policies of the Utah Department of Transportation or the U.S. Department of Transportation. The Utah Department of Transportation makes no representation or warranty of any kind, and assumes no liability therefore.

Acknowledgments

The authors acknowledge the U.S. Department of Transportation, Federal Highway Administration (FHWA) for funding this peer exchange, and the peer exchange participants for making the peer exchange a success.

Technical Report Abstract

1. Report No. UT-17.08	2. Government Accession No. N/A	3. Recipient's Catalog No. N/A
4. Title and Subtitle UDOT RESEARCH PEER EXCHANGE, OCTOBER 12-13, 2016: IMPLEMENTATION, STATE DOT LIBRARY, NATIONAL COMMITTEES, AND STATE TRANSPORTATION INNOVATION COUNCIL		5. Report Date February 2017 6. Performing Organization Code N/A
7. Author(s) Cameron Kergaye, Jason Richins, Kevin Nichol, Thomas Hales, David Stevens, Joni DeMille, Vincent Liu		8. Performing Organization Report No. N/A
9. Performing Organization Name and Address Utah Department of Transportation 4501 South 2700 West P.O. Box 148410 Salt Lake City, UT 84114-8410		10. Work Unit No. 5H07665H 11. Contract or Grant No. N/A
12. Sponsoring Agency Name and Address Utah Department of Transportation 4501 South 2700 West P.O. Box 148410 Salt Lake City, UT 84114-8410		13. Type of Report & Period Covered Final October 2016 14. Sponsoring Agency Code PIC No. AM16.06
15. Supplementary Notes Prepared in cooperation with the U.S. Department of Transportation, Federal Highway Administration and the peer exchange participants.		

16. Abstract

The Utah Department of Transportation (UDOT) held a Research Peer Exchange on October 12-13, 2016, in downtown Salt Lake City. The focus topics or "themes" for the peer exchange included the following:

- Supporting Implementation During and After Research
- Modernizing the State Transportation Library
- National Committees Involvement
- State Transportation Innovation Council (STIC) Efforts

Participants included UDOT Research Division staff, UDOT Program Development leadership, and representatives from the FHWA Utah Division, Arizona DOT, California DOT, Illinois DOT, Minnesota DOT, Nevada DOT, Oklahoma DOT, Texas DOT, the National Cooperative Highway Research Program (NCHRP) of the Transportation Research Board (TRB), the FHWA/Turner-Fairbank Highway Research Center, and the USDOT/National Transportation Library. This report documents the process, presentation summaries, and key findings from the peer exchange.

17. Key Words Research, Peer Exchange, Implementation, Transportation Library, National Committee, State Transportation Innovation Council		18. Distribution Statement Not restricted. Available through: UDOT Research Division 4501 South 2700 West P.O. Box 148410 Salt Lake City, UT 84114-8410 www.udot.utah.gov/go/research		23. Registrant's Seal N/A
19. Security Classification (of this report) Unclassified	20. Security Classification (of this page) Unclassified	21. No. of Pages 43	22. Price N/A	

Table of Contents

Introduction

This report documents the process, presentation summaries, and key findings from the Utah Department of Transportation (UDOT) Research Peer Exchange held October 12-13, 2016, in downtown Salt Lake City. The focus topics or "themes" for the peer exchange included the following:

- Supporting Implementation During and After Research
- Modernizing the State Transportation Library
- National Committees Involvement
- State Transportation Innovation Council (STIC) Efforts

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 participate in peer exchanges of its research management process and of other State DOTs' programs on a periodic basis. According to the FHWA publication number FHWA-HRT-10-048 (June 2010), entitled "State Planning and Research Guide for Peer Exchanges," a State must hold a research peer exchange periodically, which means at least every 5 years, if not more frequently, and entails at least a 2- to 3-day agenda.

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. The information gathered from the exchange is documented in a written report and presented to agency management.

The UDOT Research staff followed the following key steps in preparing for the 2016 peer exchange:

- Developing a list of likely focus topics for the peer exchange, based on UDOT's areas of desired improvement for the research program
- Soliciting of AASHTO RAC members for interested individuals to participate in the peer exchange and share their experience regarding the focus topics
- Following up with interested peer exchange participants and solidifying the attendee list
- Informing and including UDOT Program Development leadership and FHWA Utah Division staff in the peer exchange agenda
- Selecting meeting dates and securing a hotel and meeting room for the peer exchange
- Making travel arrangements for the out-of-state participants
- Solidifying the list of focus topics
- Providing an agenda and instructions on presentations to participants

Participants

The following out-of-state panel members participated in the peer exchange:

- Dianne Kresich, Research Center Manager, Arizona DOT
- Pete Zaniewski, Safety Innovation & Cooperative Research, California DOT
- Ryan Culton, Research Implementation Engineer, Illinois DOT
- Linda Taylor, Director of Research Services & Library, Minnesota DOT
- Mitch Ison, Research Librarian, Nevada DOT
- Teresa Stephens, Research Engineer, Oklahoma DOT
- Rocio Perez, Interim Director-Research and Technology Implementation Division, Texas DOT
- Joe Adams, Research Project Manager, Texas DOT
- Waseem Dekelbab, Senior Program Officer/Implementation Coordinator, NCHRP
- Mary Huie, Innovation Management Program Manager, FHWA/Turner-Fairbank Highway Research Center
- Leighton Christiansen, Data Curator, USDOT/National Transportation Library (participated via web conference, Oct. 13)

John Haynes, Research & Innovation Program Manager with the FHWA Utah Division, participated in the peer exchange.

The following people from UDOT participated in the peer exchange:

- Nathan Lee, Program Development Director
- Cameron Kergaye, Research Director
- Joni DeMille, Librarian
- David Stevens, Research Project Manager
- Kevin Nichol, Research Project Manager
- Jason Richins, Research Project Manager
- Tom Hales, Research Project Manager
- Vincent Liu, Research Implementation Engineer

The peer exchange participants are pictured below.

Peer exchange attendees:
Front (L-R): Joni DeMille, Nathan Lee, Jason Richins, Mary Huie, Dianne Kresich, Teresa Stephens, David Stevens
Back (L-R): John Haynes, Rocio Perez, Tom Hales, Vincent Liu, Joe Adams, Ryan Culton, Mitch Ison, Kevin Nichol, Pete Zaniewski, Linda Taylor, Cameron Kergaye, Waseem Dekelbab
Not Shown: Leighton Christiansen

Agenda

This peer exchange was comprised of two days of meetings in which participants took turns presenting information on their respective research, implementation, innovation, and library programs. The peer exchange participants also had several opportunities during the meetings for questions and group discussion. The final agenda for the peer exchange is included in Appendix A. Following are summarized proceedings from each day of the peer exchange. Copies of the presentation slides from the peer exchange may be obtained from the UDOT Research Division or the individual participants.

Day 1: October 12, 2016

Introductions

The peer exchange began with participants providing introductions and each giving a brief overview of their agency and research program. Following are some highlights from the introductions:

- UDOT has seven people in their Research Division, all attending the peer exchange. This includes a research director, four research project managers, an implementation engineer, and a librarian. Utah has a relatively small population in a large state. UDOT has 1,600 employees and operates 16,000 highway lane miles. UDOT's strategic goals include zero fatalities, optimize mobility, and preserve infrastructure. Their vision is "Keeping Utah Moving".
- The Texas DOT (TxDOT) research program only works with state-supported colleges and universities in Texas, and there are 34 of these. Many of their research project managers are Project Management Professionals (PMP)®. They also evaluate new products in construction, with the cost largely covered by product suppliers.
- California DOT (Caltrans) has a very large research program and staff.
- Arizona DOT (ADOT) has a new manager (Dianne Kresich) of their Research Center. They have a small staff.
- The Oklahoma DOT (ODOT) research program was recently moved from Materials & Research to the Research & Implementation Office.
- Minnesota DOT (MnDOT) has a large research/library program and staff, including MnDOT research projects and the Local Roads Research Alliance projects. The research program is included in department-wide strategic planning to identify value and benefit of each program. MnDOT is currently developing a department research strategic plan, to be completed in January 2017. MnDOT puts $1M to implementation each year. They lead some big Transportation Pooled Fund projects. The research office has their own marketing and contracts groups. MnDOT goes out for a RFP every five years to establish university master agreements. Any university in the US is allowed to propose for this opportunity. The universities with approved master agreements are eligible to bid on research need statements, which are posted each year.
- Nevada DOT (NDOT) has a good library program, and Mitch Ison has been there for a few years. The research program oversees the library and also the qualified products list related to new product evaluation.
- Illinois DOT (IDOT) has an implementation engineer (Ryan Culton) in their Research Bureau. They have an intergovernmental agreement with universities, and a university currently provides research project management services for IDOT.

- FHWA/TFHRC is led in their Innovation Management efforts by Mary Huie. She has previous experience with assisting states with setting up their State Transportation Innovation Councils (STICs).
- NCHRP has a new position of Implementation Coordinator filled by Waseem Dekelbab. He also still works as a Senior Program Officer in bridges/structures with NCHRP. He looks forward to networking with state DOT implementation coordinators.
- In SPR2-funded research efforts, FHWA Utah Division is represented by John Haynes, who is also involved in Every Day Counts (EDC) and use of T^2 funds.

Supporting Implementation During and After Research

Presenters shared information from their research and implementation processes. Presentations addressed the following questions and other unique aspects of the respective programs:

- What is your process for implementing research results?
- If you have an implementation engineer/coordinator, what is their role?
- What support is necessary for successful implementation?
- What implementation planning and tracking tools do you use, such as forms and databases?
- What successes have you had with implementing research results?
- What challenges have you had with implementing research results?

Presentation Summaries

Utah DOT

Tom Hales presented information on UDOT's research program. The implementation engineer position is new to UDOT Research, and Vincent is new to the position. He will promote and facilitate research implementation efforts. UDOT budgets about $700,000 per year for new research projects and currently manages about 100 research projects and field evaluations of various sizes. Tom gave an overview of UDOT's research prioritization process (UTRAC) which involves an annual workshop with a good variety of subject areas, agencies, and audiences represented. Research problem statements are submitted in advance by any interested party and then presented and prioritized at the workshop.

Vincent Liu shared information on UDOT's process for research implementation, an emerging area of emphasis for UDOT. Having "implementation in mind" starts with the research problem statements, including a brief statement on how the research results will be implemented. Prioritization voting for problem statements includes rating scales for Implementation (potential) as well as Importance. Implementation is also kept in mind when developing scopes for newly selected research projects, including planning for a useful final report and other deliverables. UDOT Research is working on an implementation planning

process that will help transition from research to implementation, and achieve implementation success as defined for the project. UDOT's implementation challenges include the newness of the implementation engineer position, lack of a mechanism to track implementation, infrequent evaluation of research implementation benefits, and communication of implementation efforts.

Kevin Nichol presented information on a recent "Benefits of Research" study that focused on several completed UDOT research projects/reports from 2009-2012 and evaluated benefit-to-cost ratios. This study has been done at UDOT four times since 1995. The recent study showed $68.2M in benefits and B/C of 14. Less than half of projects completed could be evaluated for B/C due to the champion not being available to provide feedback, and other factors. Several benefit types were identified, from highway design advancements, to traffic congestion mitigation, to crash severity reduction. The research program was shown to have useable outcomes and products, and a recommendation was made for additional resources for implementation of research deliverables.

The following comments and group discussion were collected during this presentation:

- A question was asked about whether the UTRAC research prioritization process could align or meet together with the Utah STIC process. TxDOT is working more on this alignment in their programs this year.
- A question was asked about how long the Request for Proposal (RFP) process takes after new research projects are selected. ODOT takes six weeks for the RFP process. UDOT infrequently uses an RFP process since most of the new research projects are awarded to the professor/consultant who submitted the selected problem statement.
- A question was asked about whether UDOT budgets for research that includes implementation. UDOT sometimes builds implementation into the research effort, depending on the project budget and deliverable types. MnDOT helps push implementation in relevant techniques (e.g., inspecting and painting bridges) and by identifying "implementation opportunities" for each research project. MnDOT allocates $1M/year for implementation and solicits proposals from staff on possible options. All research projects identify benefits and implementation opportunities. These options are discussed at the end of the project, and the implementation plan is developed when possible.

Arizona DOT

Dianne Kresich emphasized that implementation begins at the beginning, including the research problem statement that asks the right questions and helps to "Envision Successful Implementation". Genuine commitment is also needed from an executive-level sponsor (the true "implementer"). Each ADOT research project manager guides projects toward implementable results. They also monitor implementation efforts and document these, for each resulting recommendation, in the ResearchTrack database (MS Access).

ADOT conducted a study in 2014 on Implementation of Research at ADOT (Project SPR-727), evaluating the previous10 years of research projects in terms of which research recommendations were implemented and the resulting impacts to ADOT. Current stakeholders were interviewed and surveyed. Good qualitative implementation rates (at least 75%) for research recommendations were obtained for most topic areas, as shown in the table below.

Implementation Rate by Topic Area

Emphasis or topic area	Number of studies for which feedback obtained	All or some recommendations implemented	No recommendations implemented	Implementation rate
Environment	24	22	2	**92%**
ITS	16	10	6	**63%**
Maintenance	5	4	1	**80%**
Materials	11	8	3	**73%**
Structures & Roadway	7	6	1	**86%**
Traffic & Safety	23	19	4	**83%**
Planning & Administration	29	21	8	**72%**
• P&A: Communications	5	4	1	80%
• P&A: MVD	4	1	3	25%
• P&A: ECD	8	6	2	75%
• P&A: Planning & Transit	9	7	2	78%
• P&A: General	3	3	0	100%
Summary	**115**	**90**	**25**	**78%**

The ADOT implementation study identified two common reasons for non-implementation of research recommendations: limited resources and required changes in legislation. Non-implemented research could still be high quality research with some value to ADOT. As a result of the implementation study, ADOT has begun monitoring implementation with three post-project meetings with research staff and the Sponsor: prior to report publication, a 30-90 day review, and a 12-18 month review. In each meeting they design or review an implementation plan and discuss benefits and impacts. They also track implementation and include meeting notes in their ResearchTrack database. They are still trying to define potential benefits and return-on-investment (ROI) for projects. ADOT would like to have a useful implementation plan in each final report.

The following comments and group discussion were collected during this presentation:

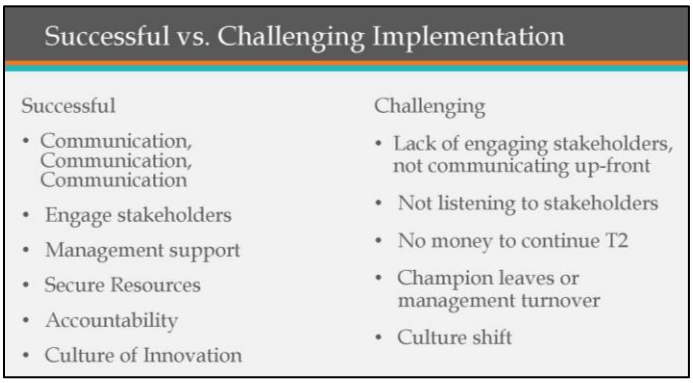
- TxDOT recommended that the ResearchTrack database could include a specific pick list of typical benefits and dollar ranges for research implementation data. TxDOT noted that they require the research consultant to include a Value of Research task in their scope.

- IDOT, MnDOT, and TxDOT commented on the implementation plan process. It's important to have the research consultant inform and help with the implementation plan, but the state DOT should be fully responsible for the implementation plan.
- TxDOT requires an implementation plan from the research consultant, and they typically sole source the Implementation Project to the consultant (projects range $60K-$750K each).

Illinois DOT

Ryan Culton shared that before beginning a research project, IDOT focuses on implementation when considering research needs and outputs, evaluating problem statements, and scoping new projects. It's important to have a project champion and to be flexible enough to change scope to meet their needs. Good planning will help to make the desired output a reality. During the research IDOT uses an Implementation Planning Worksheet, a living document that is updated regularly. This tool is included in Appendix B and includes areas to explain the expected benefits. They monitor the project attending progress meetings, ask questions, and lay out solutions for potential barriers. After the research is completed, IDOT "closes the deal" by acting while the information is fresh and on people's minds. This includes supporting project champions, finding money and resources, and helping with technology transfer, marketing, communications, and training. Implementation funding is typically state funds. Then 6-12 months after implementation has begun, they interview the practitioners, stakeholders, and champions to assess benefits of the research and ongoing implementation.

At IDOT the Research Implementation Engineer facilitates the implementation findings and new technology into practice and assesses the long-term and short-term benefits. Effective communication skills and technical competence are key for this position. Implementation tracking tools include the Implementation Planning Worksheet, an Excel spreadsheet for tracking status, and an Access database (historical record). Ryan shared some traits of successful implementation efforts and traits of more challenging implementation (see list at right). Good communication is key, along with management support and securing money and other resources.



Ryan gave two examples of implementation efforts at IDOT. Implementation of the Construction Scheduling Expert System project, produced with the intent of transferring historical and institutional knowledge, was less successful. One year after training and a user manual were provided to the Districts, no one was using the system and there was no IT support from the principal investigator. A more successful implementation example was the Flashing Yellow Arrows for Protected/Permissive Left Turn Control project. Research demonstrated that left-hand turn related crashes were reduced significantly, and changes were made to the design manual. Implementation was successful for this project due to effective

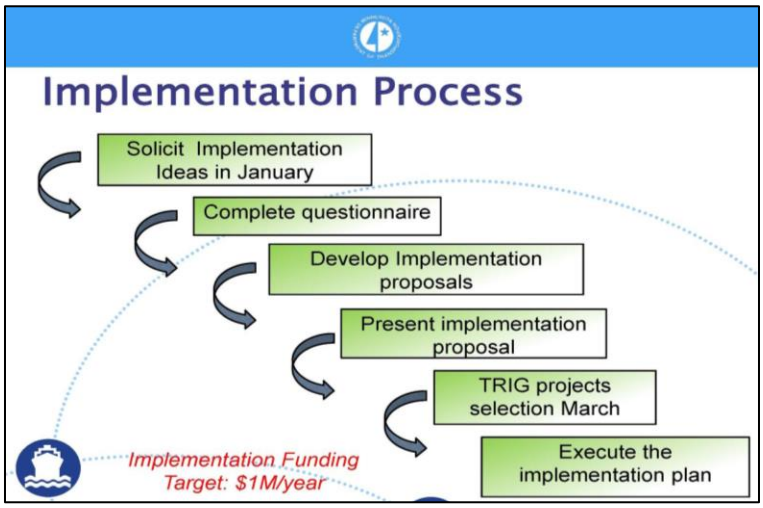
technology transfer through a series of webinars, supported with implementation funding, as well as dedicated project champions and excellent communication.

The following comments and group discussion were collected during this presentation:

- A question was asked about how IDOT prioritizes their implementation projects. For IDOT implementation projects that involve Information Technology or training require more funding.

Minnesota DOT

Linda Taylor presented a list of successful implementation factors. Some of these included dedicated funding, addressing a problem or need, connection to research, and a strong internal champion. MnDOT has dedicated $1M of state and federal funding for implementation each year. They will consider funding any implementation effort with a research connection. This and other criteria are listed in the MnDOT Implementation Project Guidelines, included in Appendix B. MnDOT has a formal process starting with implementation idea solicitation and running through project selection and executing the implementation plan (see diagram at right). The Transportation Research and Innovation Group (TRIG) is a governing board that selects implementation projects in March, coinciding with the timing of the completed TRB Annual Meeting and available year-end money.



Sources of MnDOT implementation ideas include Ideascale (the MN Transportation Research Collaboration Site), the Local Road Research Board (LRRB) and focus groups, TRIG, Research Implementation Committee (RIC, subgroup of LRRB), out-of-state trip reports, and completed research. LRRB focus groups generate several ideas and need statements each year. Implementation is incorporated throughout the research cycle. MnDOT has a $12-14M/year research program with 240+ active projects. The Research Governing Board looks to research proposals, project updates, and trip reports for implementation ideas and opportunities.

The MnDOT implementation engineer has many responsibilities, some of which include coordinating an annual implementation program solicitation, identifying implementation needs and opportunities by working with specialty offices or districts, reviewing completed projects, writing the implementation plans with champions, helping with consultant selection, facilitating funding committee meetings, and assisting Technical Advisory Panels (TAPs) with

implementation activities.

Linda showed a list of several successful implementation projects at MnDOT. She highlighted four recent ones in which they pilot-tested the research results: GPS Mower Pilot Project, UAV/Drones for Bridge Inspection, Sinusoidal 'Mumble' Rumble Strips, and Disc-Shaped Compact Tension Test for Asphalt Pavements. Videos about these and other projects can be viewed at YouTube.com/MnDOTResearch. MnDOT captures these videos while implementation projects are in progress. They use a database for tracking research and implementation projects, the Automated Research Tracking System (ARTS). It includes the project plan and benefits information, similar to the implementation planning form used by Illinois DOT. MnDOT deploys benefits evaluation in some implementation project scopes. Some of their challenges to implementation include quantifying benefits, tracking final results, Champion leaves position, and full-scale deployment funding.

MnDOT uses technology transfer and effective marketing and outreach to help make implementation efforts successful. This includes LTAP, new training, newsletters, blog, email, social media, webinars, videos, website, conferences, handbooks , and decision tools. MnDOT and LRRB share some of these products. Linda shared an example of marketing in a media campaign for a mobile application developed to help blind pedestrians through work zones.

California DOT

Pete Zaniewski shared some Caltrans processes and his perspective. He pointed out that each state DOT research program has its strengths. The Caltrans research office has 90 project managers, and most are mainly contract managers. Pete suggested that it may be better to embed the research project managers in the technical divisions, such as Structures and others, where the problem or research need can best be understood and addressed. This would smooth the transition between the scope plan and the implementation plan. For implementation of research, Pete has observed some things that work well and some that do not. Support needed for successful implementation includes a quality product or service, a champion, a customer representative, and resources. Pete shared examples of two-page project descriptions that they use to communicate research and implementation efforts; these are called "Research Notes" and "Research Results".

Caltrans has an Implementation Plan Form and an Implementation tab in their Research Project Management Database (RPMD) to help track implementation progress. These resources are used less frequently than they had hoped (one more form). Pete explained that he also helped put together an implementation plan/process for NCHRP project panel members from Caltrans to follow, including a yearly update. The plan form asks several questions, such as how the NCHRP product will be used at Caltrans and how it will become part of Caltrans' business practices. Some people followed through on this at Caltrans. Caltrans also tried having an Implementation Coordinator, but this did not work well.

Pete shared some examples of successful research implementation at Caltrans, including those involving total control (ShakeCast and Structures research project manager),

customer pull (Maintenance), and training (Ca4PRS). Some challenges to implementation that Caltrans has experienced include roadblocks from naysayers, change in management, training needs, legal issues, and intellectual property (IP) issues. Regarding IP issues, Pete pointed out that they recommend waiving everything but state and federal mandates. Pete also shared some information on how Caltrans has been successful with implementation/deployment programs such as the second Strategic Highway Research Program (SHRP2), Highways for Life, Every Day Counts (EDC), and Accelerated Innovation Deployment (AID) Demonstration.

The following comments and group discussion were collected during this presentation:

- A comment was shared about how MnDOT requires each traveler to the TRB Annual Meeting or other national conferences to submit a trip report to highlight what they learned and what they plan to do with the knowledge.

Oklahoma DOT

Teresa Stephens gave an overview of ODOT's process for implementation of research results. They have an implementation idea solicitation cycle, with prioritization voting by subject matter experts. Chosen projects are dependent on available funding for that year. ODOT's Implementation Engineer is Gary Hook. He is the point of contact for implementation projects. In 2016 they had four implementation projects, and in 2017 they have two projects. Each project panel meets to receive updates and information regarding successes and failures. Support necessary for successful implementation includes positive results in order to "sell" the new technology/practices to the rest of the agency, and compelling answers for ODOT leadership on how this will save time, save lives, and/or save money. Good research makes good implementation.

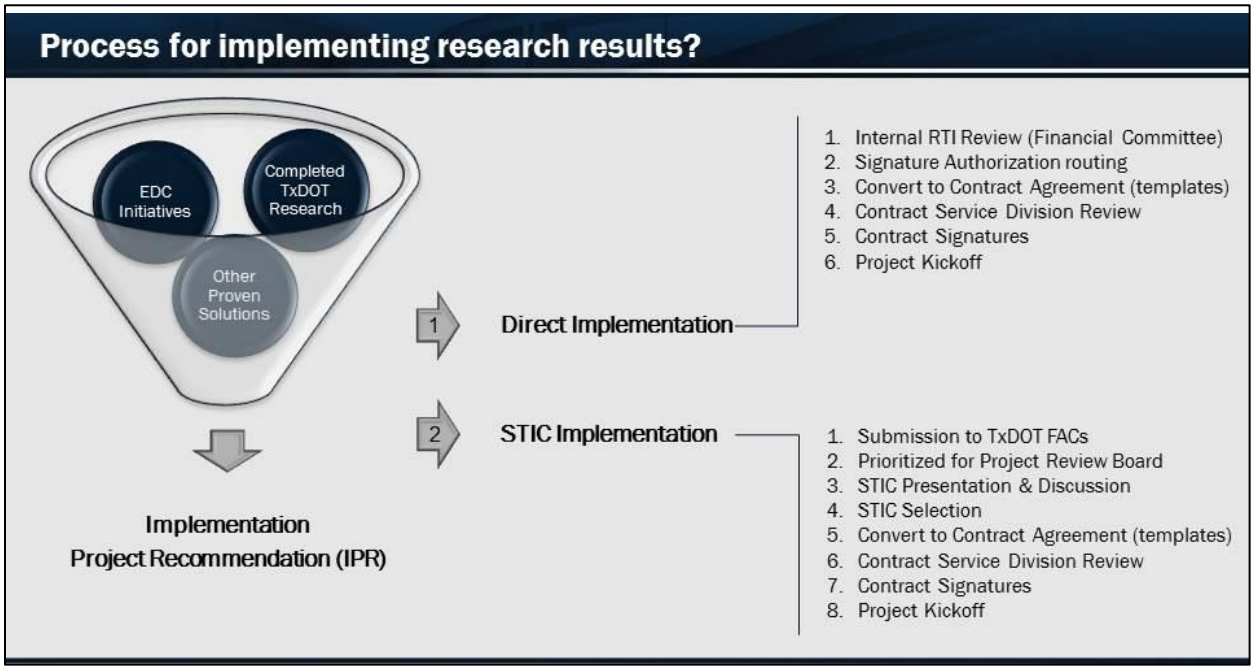
Oklahoma's implementation program is relatively small, and they use simple spreadsheets to track their budgets and progress. They use a standard Topic Statement form that the ODOT staff member or potential Principal Investigator submits for implementation consideration. The same form is used for Research ideas and for Implementation ideas. The submitter checks one box or the other and then describes the proposed project. The Topic Statements are reviewed annually by the Research Steering Committee.

One ODOT implementation success is the Road Runner 3 Traffic Counting and Classification System. Success in this implementation is aided by an active project panel and is proven by the accuracy of the data, saved man-hours by the organization, and fewer hours spent correcting errors. One implementation failure at ODOT is an anti-icing system on bridges. The design and materials were poor, there was no maintenance, and there was a lack of communication and coordination with the Structures division.

Going forward ODOT plans on holding a workshop after research projects are completed, with potential implementation ideas to be presented to the project panel and interested parties. They continue to focus on items that are able to be used in their agency.

Texas DOT

Joe Adams shared information on TxDOT's process for implementing research results. The process starts with the Implementation Project Recommendation (IPR) form. Items on the form could include FHWA EDC initiatives, completed TxDOT research, and other proven solutions. TxDOT puts $3M annually toward implementation projects through Direct Implementation and STIC Implementation. Direct and STIC implementation processes each have their own list of necessary steps for review through project kickoff, as illustrated in the diagram below.



TxDOT is already doing the Direct Implementation. They are starting the STIC Implementation process in October 2016. Their STIC is the sounding board for STIC implementation ideas and will meet approximately quarterly. Review of projects includes financial or return-on-investment evaluation to help prioritize the projects. Many signatures are needed on the IPR including the Chief Engineer, since TxDOT typically sole sources implementation projects to the original university consultant from the research stage. TxDOT implementation projects are each funded on average at the $200,000 to $300,000 level. Functional area committees meet as often as three times per year to review problem statements, EDC's and IPR's to evaluate and rank implementation proposals to be presented to the STIC or directly implemented by TxDOT Research and Technology Implementation (RTI).

Joe gave an overview of the IPR form. It describes what the funding will go toward and other aspects of the project. It also includes expectations of the university consultant and TxDOT and a schedule of implementation activities and deliverables. Another implementation planning tool that TxDOT uses is a Value of Research (VoR) Analysis. It identifies what champions want to see from implementation, both qualitatively and quantitatively. Then the consultant projects what the success will be in those measures. For the Project Review Board

meeting preparation, TxDOT functional area committees help review the IPR's via SurveyMonkey tools. TxDOT shared an example IPR, an example VoR, and an example proposal evaluation survey with the peer exchange participants.

Texas delayed engagement with the STIC program to ensure statewide alignment with industry, federal and other state agency partners. They are now starting with collaboration with FHWA for greater innovation focus at TxDOT. They are also using STIC as a marketing mechanism for TxDOT research results.

TxDOT has no specialized implementation personnel. They used to have an Implementation Engineer but no longer. They changed to having the research project managers facilitate and guide implementation projects too. For TxDOT, successful implementation requires executive support, standardization (IPR and contract review), and resource commitment by TxDOT subject matter experts. Scheduled communication is also key throughout the project cycle. Research mentoring and networking occurs when subject matter experts bring young employees/engineers to project panel meetings to learn the process, value, and innovative culture.

Tools that TxDOT uses for managing implementation projects are based mainly on SharePoint and some Excel. Joe showed the TxDOT Research website and highlighted features that help promote and communicate implementation. Some of these include a YouTube channel with Video Summary Reports 2-4 minutes in length, the Research Library website, and an interactive online Research Project Map. Most implementation projects have the video summary made during the project to assist with promotion of the solution. They have several examples of successful implementation.

NCHRP Implementation

Waseem Dekelbab of NCHRP gave an overview of the NCHRP's approach to "Active Implementation" and related Frameworks, based partially on a 2005 monograph by the National Implementation Research Network. Many viewpoints come from all the states to NCHRP, and NCHRP selected a systematic approach to address these viewpoints. Active Implementation involves combining Effective Products, Effective Implementation, and Enabling Contexts to produce Intended Outcomes. Five Active Implementation Frameworks were presented: (1) Effective Products, (2) Implementation Stages, (3) Implementation Drivers (Competency, Organization, and Leadership), (4) Implementation Teams, and (5) Product Feedback. If any one of the three Implementation Drivers is hindering or weak, then the possible implementation outcome could be medium or low instead of high. The most effective Implementation Teams are those that have a "Collective Impact with Collaborative Action".

Waseem pointed out that ad hoc implementation has variable activities and provides incremental change. Systematic Active Implementation of NCHRP research is better since it will provide an implementation infrastructure within the state DOTs (policy, guidance, training, etc.) and dedicated funding and expertise (e.g., NCHRP 20-44, SHRP2, FHWA Every Day Counts) to

accelerate implementation. AASHTO SCOBS and other committees have helped produce useful tools from NCHRP research for state DOTs to use. An effective implementation process flow includes Technology Transfer (communications), Adoption (decision), and Implementation (innovation in use). Technology transfer includes various implementation strategies and activities, some of which include knowledge transfer, training, demonstrations, communications, and marketing. Some of these implementation activities are being built into the scope of NCHRP projects.

The NCHRP Project 20-44(P) produced a December 2014 report that provides structural support for systematic implementation of NCHRP research results by state DOTs. This includes leadership involvement for change, being aggressive in sharing findings, a focus on ready-to-use products, and a formal mechanism for evaluating the needs. The NCHRP 20-44 Implementation Support Program now has $2M per year to facilitate implementation of NCHRP research results. There were 90 NCHRP products in 2016. Rather than split the implementation funding among all of these, NCHRP will focus most of it on AASHTO-related products. NCHRP will involve AASHTO Technical Committees and RAC in deciding which NCHRP products are worth implementing. This will involve RAC members completing a product rating sheet for NCHRP projects based on readiness, resource availability, expected return on investment, and other criteria. A diagram illustrating the NCHRP Active Implementation Frameworks and Processes is included in Appendix B. The makeup of NCHRP implementation teams would change based on the implementation stage, as shown in the table below.

NCHRP IMPLEMENTATION TEAMS

Implementation Frameworks		Exploration Stage	Product Development Stage	Initial Implementation Stage	Full Implementation Stage
Effective Product		Problem statement submitters, TRB RAC, SCOR, FHWA, NCHRP STAFF	Panel Members NCHRP Research Team FHWA AASHTO TCs	NCHRP Research Team FHWA AASHTO TCs	DOTs AASHTO FHWA
Implementation Drivers	Competency	Problem statement submitters, SCOR	Research Team NCHRP	AASHTO TCs FHWA, NCHRP	DOTs
	Organization	Problem statement submitters, SCOR	Research Team NCHRP	AASHTO TCs FHWA,NCHRP	DOTs
	Leadership	Problem statement submitters, SCOR	Research Team NCHRP	AASHTO TCs FHWA	DOTs
Product Feedback		N/A	N/A	NCHRP	DOTs, NCHRP

Welcome to Utah! – Leader Presentation

Nathan Lee of UDOT presented some interesting facts about Utah and an overview of UDOT. He emphasized that this peer exchange presented attendees with opportunities to innovate, by "opening the door" to new ideas. UDOT's Mission is "Innovating transportation solutions that strengthen Utah's economy and enhance quality of life." Its strategic goals are (1) Zero Crashes, Injuries, and Fatalities; (2) Optimize Mobility; and (3) Preserve Infrastructure. Nathan pointed out three paradigms of change for transportation: automation, electrification, and mobility as a service. He highlighted a few examples of innovation at UDOT:

- Connected and Autonomous Vehicles - UDOT is participating in a truck platooning project with Peloton Technology, with a favorable environment for policy and economic growth.
- Reflectorized Tape Around Signal Heads - UDOT learned about this proven safety countermeasure on a traffic management scan tour and implemented it widely.
- LiDAR and Big Data - UDOT uses statewide highway survey with mobile LiDAR and photo-logging for pavement condition, roadway geometry, and feature inventory. Information is organized in GIS Data Portal (UGate) and in UPlan interactive GIS.
- Automatic Vehicle Location for Snow Plows - The UDOT Traffic online application now includes location of snow plows and real-time road conditions.
- Traffic Management Innovations - All Utah cities share the same ITS communications, with 93% of UDOT signals connected and 78% of non-UDOT signals connected. UDOT implemented traffic signal performance measures for more arrivals on green.
- Adaptive Signal Control in Moab Near National Parks - UDOT used adaptive control and achieved better throughput of Main Street traffic.

Group Wrap-up on Implementation

Each agency shared their top ideas or take-aways noted from the Implementation presentations and discussions.

Arizona DOT

- Problem statements can also be used for implementation projects
- Use an implementation team to be successful, similar to NCHRP
- Systematic active implementation provides an infrastructure for success
- Keep the implementation process and forms simple and incorporate them in existing processes
- There is much to learn on benefit-cost evaluation of research implementation, along with some lingering discomfort with benefit-cost estimates/projections
- Do not shortchange qualitative data on research and implementation

California DOT

- Interested in UDOT's latest investing in mobile LiDAR

- TxDOT's online Research Project Map
- Tracking snow plows with GPS and AVL (UDOT)

Illinois DOT

- Cycle of selection for implementation (based on multiple states)

Minnesota DOT

- Look at completed projects from a few years back to evaluate/track actual implementation
- Program-level assessment and benefits
- Project-level success stories, such as UDOT's big data management and UPlan

Nevada DOT

- UDOT's UTRAC workshop process would be worth trying at NDOT
- MnDOT's ARTS project tracking system
- TxDOT's online Research Project Map

Oklahoma DOT

- Include benefits of research in work plans, to highlight the good work we are doing

Texas DOT

- Joe Adams: Consider MnDOT's CTAP/LTAP and sharing of research results, implementation, training, and marketing. Look at Caltrans' concept of embedded research project manager in Structures and consider which method is most successful, one-functional or cross-functional.
- Rocio Perez: Better define the research project up front, and then cancel fewer. Consider one deliverable in contracts be an implementation plan with value of research, and discuss in closeout meeting too. Look at the report-out concept from state DOT's conference travel experiences, where they share ideas learned with the DOT team.

Utah DOT

- Nathan Lee: Research Division is a great wealth of knowledge. Consider the duration of tracking implementation versus when the initiative becomes standard practice. Implementation engineer can be a valuable position.
- Cameron Kergaye: Do not limit implementation to state DOT research results (MnDOT). Likes MnDOT's sinusoidal mumble strips. List of questions can be used to prepare NCHRP panel members for successful implementation (Caltrans).
- Kevin Nichol: Several models are available for tracking implementation, useful in augmenting UDOT's project management database.
- Jason Richins: Appreciated learning about a few successful research/implementation projects from other states, including the MnDOT mobile app to help blind pedestrians.

- Tom Hales: In tracking implementation, use database inputs wisely with some level of detail. Consider using an implementation worksheet. To promote implementation, check with champions a few months after research is complete for progress report and feedback. Likes TxDOT's map of research projects. Consider videos on projects.
- Vincent Liu: Implementation plan is valuable; plan early. Leader support and marketing are important for implementation.
- Joni DeMille: Marketing is important and could include in-house webinars and videos. Emphasize the pursuit of innovation as a means of saving money, time and lives rather than pursuing it as an end in itself.
- David Stevens: Envision successful implementation (ADOT). Identify implementation opportunities on each research project (MnDOT). Likes IDOT-style implementation planning worksheet with expected benefits. Look into MnDOT-style TRIG governing board for selecting research and implementation projects. Likes ODOT's topic submission form for including the option for proposed Research or Implementation project.

NCHRP

- Use a Qualified Products List to prioritize implementation projects (similar to MnDOT) in the eligibility criteria used for RAC evaluation

FHWA Utah Division

- Include the STIC in review of research problem statements, similar to TxDOT
- Include focus areas for problem statements based on strategic goals of the state DOT

FHWA/Turner-Fairbank Highway Research Center

- Have implementation be part of research (renewed emphasis), since research can quantify the value
- Consider research as being the leader of STIC since they understand reporting needs and value
- Have identified implementer or sponsor starting early in the process, similar to ADOT

Day 2: October 13, 2016

Modernizing the State Transportation Library

Presenters shared information on their transportation library services. Presentations addressed the following questions and other unique aspects of the respective programs:

- How does your library support your DOT and other customers?
- How have you increased the relevance of your DOT library?
- Which improvements have been most beneficial: improving/adding services, equipment, collections, electronic materials, etc.?
- What support is necessary for successful modernizing of your DOT library?
- What challenges have you had with modernizing your DOT library?
- What additional changes are you planning to make to your DOT library?

Presentation Summaries

Utah DOT

Joni DeMille presented information on UDOT's library: its history and funding, current services and future plans. The library was established in honor of Lester Farnsworth Wire, the Utah inventor of the traffic signal, at which time a modest amount of money was secured to help ensure its ongoing yearly operation. The library currently provides typical services and amenities such as Interlibrary Loans, literature searches, a conference area, and a quiet work area as well as other services such as facilitating Extreme Engineering brown-bag presentations and book discussions. Leadership discussion books, audio books, and professional engineering (PE) exam reference materials are the most popular items used from the library.

Plans are underway for remodeling/rearranging the library space in connection with other building renovations that are planned to occur. Current goals associated with this planned remodeling are to provide a more open space and "library" feel, make emphasis on electronic formats, better focus acquisitions on specific needs, and build a relationship with UDOT's new Learning Center. Current challenges in meeting these and other goals are the limited funding available, keeping up with technology changes, and maintaining leadership support.

The following comments and group discussion were collected during this presentation:

- Pete Zaniewski suggested one way to promote the library is to encourage UDOT employees to use the Library for literature and information searches. It was noted that along these lines, Minnesota and Texas have their library staff do all the research problem statement literature searches.
- Rocio Perez recommended increasing marketing efforts to make others aware of what services we offer in the library.

Nevada DOT

Mitch Ison presented on his experience of bringing the NDOT library from “a closet with books” to its current state of relevance within the department. The library supports the department primarily with a physical collection, electronic resources, and magazines. Professional exam preparation materials are the most sought after items. His focus to this point has been on the agency as a whole and he is now focusing on reaching out to the individual districts. They also do research and interlibrary loans.

The NDOT library is responsible for the department blog, which helps maintain the relevance of the library. They include New Materials announcements. They have also found participating in the Online Computer Library Center (OCLC) helps, since it allows a trained librarian to do the searches and downloads from the various catalogues in a way that engineers would struggle to do. Also, being responsible for the department’s ASTM Compass subscription could save money over individuals doing standalone downloads (about 1,300 last year) at $30 each.

Mitch listed upper management buy-in and understanding, strong support from some key stakeholders, and a perceived usefulness of the library as the necessary components needed for library modernization efforts. He listed challenges of limited cooperation with universities and the state library, distances between the DOT headquarters and the district offices, and an attitude of “Can you just print that for me?”

Mitch floated the idea that there should be greater cooperation between DOT libraries, a consortium possibly, to save money through bulk buying efforts. NDOT plans on doing a department needs survey regarding library services.

Oklahoma DOT

ODOT’s library is allocated at the University Transportation Center (UTC), which helps make the library more useful and visible. They have great collaboration with the university library as well. Teresa Stephens offered that the ODOT library provides one-sheet summaries for research projects. About 25 percent of their resources are now available online. ODOT is also having an ongoing discussion on the costs of ASTM Compass downloads, with the determination that it will save money for the ODOT library to host a single subscription, rather than several groups within the department each having a copy. She is exploring the issue of duplication of resources across the department. When the library receives emails about publications from TRB, etc., these are presorted and only forwarded to targeted individuals, rather than sending out department-wide distributions.

The Library and UTC host an annual open house at the library and invite department staff, consultants, contractors, and so forth to attend and learn about the services and resources that the ODOT library provides. The ODOT Executive Director and other senior leadership attend the open house and support maintenance of the library collection. The library also

reaches out to individuals retiring from the department and offers to catalogue any historical documents and information they may have in their offices.

Teresa stressed that when forwarding information from TRB and the like, that articles need to be targeted specifically to technical experts to limit the amount of material people get.

Minnesota DOT

Linda Taylor first presented the staffing and budget arrangements for the MnDOT library consisting of 5 full-time employees with 1 part-time employee and a total operating budget of approximately $500K annually. MnDOT does not use federal SPR funding for library staff but instead uses MnDOT operating dollars. Library services provided included reference questions, literature searches, Interlibrary Loans, periodical distribution, access to online searchable databases, and hosting events. They provide support to not only MnDOT but also local cities and counties, consultants, universities, transportation professionals, and the general public. They have increased usage and relevance of the library by providing ASTM portal demonstrations, AASHTO digital publications, Minnesota digital library subject searches, leadership development resources, and reading materials to support areas, among other services.

They have made it standard practice to contact every new MnDOT employee to find their interests and ways they can support them in future efforts. They are currently evaluating the ASTM DOT Compass Portal for future use and relevancy. Their leadership development program provides resources and support in leadership, managing, supervising and financial management.

Some of their most beneficial improvements have been redesigning the library facilities, updating their website, conducting a Library Return on Investment Study, updating their listings in TRB's Research-in-Progress (RiP) and TRID databases, and incorporating RefTracker. RefTracker is software they use to track library use and user requests, which gives useful statistics. As part of the library facilities they provide conference rooms, work spaces, network workstations, wireless internet access, and a printer, fax, and copying center. They ensure that their reference desk is always staffed by rotating through their staff to be sure someone is always available to provide assistance. Their 2013 Library Return on Investment Study found that for every $1.00 spent on library staff and materials, there is a $1.90 in benefit to MnDOT. MnDOT is working on a Library Strategic Plan based on user input.

Arizona DOT

Dianne Kresich discussed the operations and highlights of the ADOT library. The ADOT library is overseen by the ADOT Research Center. For most of its existence, the library employed one full-time librarian and actively updated and cataloged library holdings. Typical services provided were literature searches, Interlibrary Loans, document retrieval, database subscriptions, and notifications of new materials. A Library Needs Analysis (Project SPR-737, published Sept. 2016) was conducted by the ADOT Research Center where existing practices, staff information needs, and effective practices were identified.

In the analysis a survey of all ADOT employees (~4,000 people) was administered with about a 10% response rate. It was found that of the responding employees about 63% use the internet to search for information, as opposed to 26% that turn to other people, and only 8% that use the ADOT Library when seeking information. They found that manuals, handbooks and training guides were the predominant type of information that employees seek or need. It was discovered that 60% of the respondents did not know about the library or its available services, while 40% found information on their own, and 21% did not think the library offered what they needed.

The ADOT Librarian recently retired and the position is not being filled. In the absence of a librarian, it was determined to focus on hosting specialty items for ADOT and providing mandatory services. The importance of maintaining cooperative relationships with other libraries and related organizations was emphasized in order to provide essential library services. Recommendations from the library analysis gave consideration to expanding the librarian role, should the position ever be filled, to support ADOT research project functions (such as research literature searches) and to include the librarian on ADOT project teams related to information management and technology and knowledge transfer. The importance of marketing was noted in order to raise awareness of the Library and inform customers of library services and resources.

USDOT/NTL

Leighton Christiansen of the National Transportation Library shared his insights based on his prior work experience with the Iowa DOT Library, where he spent about four years enacting the library's strategic goals of modernizing the library collection, including updating their e-catalog, supporting the department's Office of Research, working to distribute library services throughout the Iowa DOT, providing education, and strengthening partnerships. He tuned in via web conference for the morning of October 13. Leighton highlighted the importance of having meaningful vision and mission statements specific to the state DOT library as part of a strategic plan and tied to the DOT goals. Iowa DOT's vision statement for 2012-2016 was "Enhancing information retrieval for Iowa transportation professionals." Iowa DOT did a formal assessment of their library in 2014 using a patron survey, technology assessment, and disaster planning (Project TR-670, see also 2016 TRB poster paper P16-3827). This provided a useful, high-level understanding of patron needs and the physical and electronic collection values and costs.

Leighton highlighted some of the ways the Iowa DOT library supported the department, including vetting of new research proposals, literature searches, research repository and RiP/TRID updates, and data management planning. They increased their relevance of their library through closer alignment with the Research Office, improved reference request speed, doing the library assessment, increasing electronic access to collections with the help of interns, and providing search training to Iowa DOT offices.

Leighton stressed that nothing gets on the Internet without human effort, something that is often overlooked and undervalued, and that the vast majority of the information that is there is actually on the “Dark” Internet, information which is only available through subscription services and not searchable through Google. He lobbied for a “collaboratorium” to work together on the vast task of digitizing information from the DOTs. He worked to upload any Iowa DOT reports and was able to clean out much of the hard copies in the library of TRB and FHWA publications by locating and indexing corresponding online versions. One thing that he didn’t worry about digitizing was microfilm, except on an as-needed basis, because the media is still the best long-term storage material. Leighton had worked to tighten the relationship with the research division, stressing the cost savings and greater thoroughness of having a trained librarian perform literature searches on their behalf over each engineer doing his or her own.

Group Wrap-up on Library Modernization

Each agency shared their top ideas or take-aways noted from the Library presentations and discussions.

Arizona DOT

- Impressed with what the energy of a librarian can do similar to Iowa DOT
- Important to encourage active users of the library
- Wished they had known about the Return on Investments study conducted by MnDOT to help with changes that have recently occurred in ADOT

California DOT

- Linking libraries together

Illinois DOT

- Likes the idea of having the library be responsible for doing literature searches for the Research group to help increase that service provided
- Likes idea of creation of a data management infrastructure utilizing the libraries and connecting them together

Minnesota DOT

- Provide professional development hour (PDH) availabilities for webinars and training
- Incorporate Lynda.com and other training
- Digitize older material

Nevada DOT

- Incorporate 2-page research highlights
- Conduct a Return on Investment study
- Incorporate the use of interns for library functions
- Develop a summary of practice

Oklahoma DOT

- Incorporate a Blog on the Research website

- Conduct a Return on Investment study

Texas DOT

- Joe Adams: Likes idea of pooling together of libraries in some sort of consortium.
- Rocio Perez: TxDOT library is offsite, so not a lot of people visit it. Conduct survey to see how the library can better provide support to its target audience.

Utah DOT

- Joni DeMille: Highlight hot topics on website. Use library to host receptions and gatherings.
- Joni DeMille and Tom Hales: Contact and provide letter to new employees to introduce to library and solicit interests and ways to support in future.
- Cameron Kergaye: Provide support for technical writing.
- Kevin Nichol: Make use of library interns.
- David Stevens: Periodically have a department-needs survey to get an idea of the DOT's needs. Have an annual open house at the library to promote research and library services (i.e. Pi day). Modernize the library to keep it alive.
- David Stevens and Vincent Liu: Put more effort into marketing and finding the right person to do it effectively.
- Vincent Liu: Increase efforts in multimedia and social media, etc.

NCHRP

- Libraries are under pressure to provide unique service beyond Google search

FHWA Utah Division

- A lot of what is available digitally is available by PDF which can be hard to read on some devices. It would be worth looking into ways of making that work better.

FHWA/Turner-Fairbank Highway Research Center

- There is a greater use/need for libraries internationally, not as much from FHWA.

USDOT/National Transportation Library

- Marketing is not optional for libraries. It is critical to be relevant.
- How far can you go digital -- or rather the question should be how far should you go digital? It is hard to go 100% digital.

"Driving Innovation" – Overview of National Transportation Innovation Efforts

John Haynes and Mary Huie of FHWA presented on Transforming Transportation Through Innovation. They began with the following thought, "Resist CHANGE and DIE. Accept CHANGE and Survive. Lead CHANGE and Thrive." The basic idea from this is that those who lead through innovation (or change) will be those that thrive and become the leaders for the rest

of the industry. The following national resources are available to transportation groups to facilitate innovation: Authorization, STIC Network, Every Day Counts, AID Demo, and Other Resources. John mentioned that there has been a shift of oversight from FHWA to the state DOT's in an effort to help stretch the infrastructure dollars. To help promote innovation, the FAST Act was passed in 2015 which provides 5 years of funding certainty for infrastructure planning and investment and authorizes $305B to be used over that time frame.

The importance of creating a culture of innovation was emphasized. A "culture of innovation" effort was begun by several outside organizations such as, ACEC, ASCE, AASHTO, and many others. The goal of STIC (State Transportation Innovation Councils) is to foster a culture of innovation through leadership. It was pointed out that for states to have success with this the following ingredients are important; 1) well organized, 2) broad stakeholder engagement, 3) defined processes and procedures, 4) performance monitoring, and 5) engaged leadership.

The Every Day Counts (EDC) initiative was highlighted. Some of the goals to help create a culture of innovation include: 1) accelerating innovation deployment, 2) shortening the project delivery process, 3) improving environmental sustainability, 4) enhancing roadway safety, and 5) reducing congestion. The Accelerated Innovation Deployment (AID) program was also highlighted which makes available up to $1M per grantee with a 20% State match. Its goals include fostering innovation in highway transportation, focusing on EDC, and providing funding access to state DOT's, local governments, Federal Land Agencies, and Tribal Governments. The goal with this program is to deploy initiatives as quickly as possible. The Increased Federal-Share program was also briefly discussed which allows for an increased Federal share of up to 5% for use of innovative techniques.

National Committees and State Transportation Innovation Council (STIC) Efforts

Presenters shared information on their national committee and STIC efforts. Presentations addressed the following questions and other unique aspects of the respective programs:

National Committees

- How does your DOT benefit from national (AASHTO and TRB) committee participation?
- What link do you see between your DOT research program and your DOT's national committee participation?
- What recommendations do you have for better utilizing DOT members on national committees?
- Do you use them to write national and state research problem statements, help with voting on these, and/or contribute innovations to your DOT that were marketed in national meetings and projects?

STIC

- How does your state's STIC function?
- How is your STIC associated with your Research Branch?
- How are your state DOT executive leaders involved with your STIC?
- What successes have you had with your STIC?
- What challenges have you had with your STIC?
- What recommendations do you have for others regarding establishing a successful STIC?

Presentation Summaries

Utah DOT

David Stevens and Jason Richins presented information on UDOT's national committee and STIC efforts. David outlined that UDOT has good representation on national committees and subcommittees (60 people on AASHTO, 22 on TRB, and 23 on NCHRP). In a poll of these committee members, the benefits they identified to UDOT were the opportunity to learn from other states and share UDOT's own expertise, having a voice in the formulation of national standards and policies, and the opportunity for networking. The UDOT Research Division facilitates communication within the department about national committee activities and membership opportunities and will be coordinating with the proposed Innovation Working Group to further promote and champion innovative concepts coming out of these committees.

Jason talked about Utah's State Transportation Innovation Council and how it had been recently reorganized, including a more active role for UDOT Research. He listed past STIC projects, AID projects, and SHRP2 projects that UDOT has worked on. Jason outlined that the current STIC efforts are focused on securing strong support from senior department leadership, utilizing subject matter experts to champion innovative ideas, pushing TRB Annual Meeting and EDC Summit attendance, and planning ahead for grant and incentive submission deadlines.

The following comments and group discussion were collected during this presentation, all regarding national committee involvement:

- One of the comments from the group included the importance of recommending and grooming younger members for the committees to leverage knowledge transfer strategically.
- Another commenter pointed out that AASHTO membership is based on status within the DOTs, which changes with promotions and transfers, while TRB membership is based on expertise and can be maintained through job changes.
- One commenter asked why the committees don't do a better job of letting the DOTs know what is going on so that NCHRP and policy votes can be better informed.

California DOT

Pete Zaniewski touched on state DOTs' participation in national committees and suggested the need to evaluate what benefits are available from such participation. He noted that the links between the research program and the committees are not very good because they are not tied in with the needs at the local DOT levels. It was suggested that it can be advantageous to encourage NCHRP committee involvement be part of a project to help facilitate the funding of that involvement. When reviewing NCHRP problem statements, Caltrans splits them up based on the subject areas and encourage those that are on TRB committees in those areas to be a part of those reviews.

For those that are on TRB committees, Caltrans has a list of questions used to approve their involvement and determine how the information will get disseminated back to their department. Essentially they want to know: 1) What is going on in your Committee?, 2) What do you want to accomplish?, 3) How are you going to do this?, and 4) How are you sharing within Caltrans? It was discussed how it is important for those going to the committee meetings to come back and have a forum to relay information back to the department. Pete talked about how for a short time they tried hiring a student to interview TRB Committee attendees to capture information of what they learned from their participation.

Pete also highlighted the California STIC efforts. Caltrans incorporated steering committee and workgroup members to help compile lists of proven technologies from within Caltrans, EDC, and other states to incorporate into their department through the STIC opportunities. It was suggested to try to narrow down those people that are likely to be active and vested in participation of committees, and to utilize TRB while covering travel costs for those that are on committees. The California STIC focuses on priority innovations and how they can move those forward.

The following comments and group discussion were collected during this presentation, all regarding national committee involvement:

- MnDOT encourages TRB and other national travelers from their department to report "actionable items" to their leadership when they return from national meetings.

Group Wrap-up on National Committees and STIC Efforts

Each agency shared their top ideas or take-aways noted from the presentations and discussions on National Committees and STIC Efforts.

Arizona DOT

- Culture of innovation

California DOT

- Figure out what you want to do with the STIC, one step at a time
- Determine how the rest of the state benefits from the STIC

Minnesota DOT

- Need to find out more about how to be involved/engaged with the STIC process

Nevada DOT

- Make more efforts to foster the culture of innovation

Oklahoma DOT

- Provide one website to access the state's information regarding STIC

Texas DOT

- Joe Adams: Look into utilizing AID funding. Understand how the initiatives tie together to promote innovation.
- Rocio Perez: (She shared some additional slides on the TxDOT STIC.) TxSTIC Council consists of 21 committee members (19 organizations). It is anticipated they will have meetings every 4 months, beginning in October 2016 to organize and kickoff the STIC. The LTAP Center in Texas helps TxDOT make their STIC successful. TxDOT also incorporates their research and implementation projects and opportunities in their STIC efforts.

Utah DOT

- Jason Richins: Utilize an intern to get feedback from committee participants.
- Joni DeMille: Utilize intern idea for even more than just committee participation.
- Tom Hales: Encourage committee involvement to be part of a project to help with funding.
- David Stevens: Have national committee members report to state DOT leadership about their "actionable items" obtained from attending national meetings. Have the STIC focus on how they can move selected innovations forward. Think about how to move forward with the STIC plan one baby step at a time.

FHWA Utah Division

- Consider what type of problem the STIC can help with

FHWA/Turner-Fairbank Highway Research Center

- Look at it as a bigger problem, more than just STIC

UDOT's Own Recommendations for Possible Action Items

After the peer exchange, the UDOT Research Division staff met and proposed several recommended action items for the UDOT Research program as a result of what was learned during the peer exchange. These are listed below in no particular order of priority. UDOT Research staff and UDOT senior leaders will discuss these further and assign priority and available resources geared toward improving programs, products, and services to benefit UDOT and our stakeholders.

Supporting Implementation During and After Research

Program Management:

- Commit resources and funding to our implementation program.
- Research project managers can help implement research results.
- Prioritize and fund implementation projects in an annual process, possibly with the UTRAC research prioritization process or with the new Innovation Working Group.
- Consider adding an implementation project option to the UTRAC research problem statement form.
- Consider including NCHRP's "enabling context" aspect of implementation along with the right product and the right people.

Planning:

- Have a project-specific implementation plan: "Envision successful implementation" and "Identify implementation opportunities".
- Use an effective Implementation Planning Worksheet on every research or implementation project, with benefits expected (see worksheet from Illinois DOT).

Tracking:

- Develop a tool/database to track implementation, or add implementation steps and tracking to our existing research project database.
- About 6-12 months after research is done and implementation has begun, interview stakeholders and champions on implementation progress.

Technology Transfer and Marketing:

- Do more, constant marketing.
- Put hot research topics on the UDOT Research website.
- Consider doing better technology transfer including marketing, communication, and training.
- Consider using 1-2 page Tech Briefs to market completed research projects.
- Consider using YouTube video clips to highlight our research projects and implementation efforts.
- Look into the TxDOT online tracking of implementation in GIS for sharing progress.
- Follow MnDOT's example by implementing any good things from anywhere.
- Look into sharing MnDOT's success with sinusoidal rumble "mumble" strips.

Modernizing the State Transportation Library

Marketing:

- Do more, constant marketing.
- Consider using the library and social media to help advertise the Research program.
- Consider using a research blog to share UDOT research and library news instead of a newsletter.
- Contact new employees with useful information on the library and the Research program.
- Host more events in the library to encourage awareness and use.
- Hold an annual library open house to market Research processes and library services.
- Consider doing a department-needs survey regarding UDOT library services.

Services and Collections:

- Consider joining a consortium of state DOT libraries to pool funds and share subscriptions, digital purchases, and other resources.
- Teach others how to effectively use information search services online.
- Advertise literature search capabilities.
- Consider consulting out larger literature searches and state of the practice studies for about $15,000 each.
- Include ASCE and ASTM digital and other resources in the library that are not being hosted by other UDOT divisions.
- Look into doing more webinars and final research presentations in the library to highlight research results and provide continuing education opportunities for UDOT engineers.
- Consider re-establishing State Library cataloging with our library collection and making this information searchable online.
- Consider operating the library on a larger budget.

National Committees and STIC Efforts

National Committees:

- We could have an intern contact TRB committee members from UDOT and interview them about their experiences on the committees.
- Provide opportunity for UDOT's national committee members to report on "actionable items" to Senior Leadership after returning from national conferences and committee meetings.

STIC Efforts:

- Encourage Utah's STIC to focus on priority innovations and "what we can do to move this innovation forward".
- STIC members could attend the annual UTRAC council meeting for approval/discussion of new research projects, and the UDOT's TRB travelers' report in the Leadership Team meeting.
- Possibly expand Utah's STIC to be larger like TxDOT's.

Appendix A - Agenda

FINAL Agenda – UDOT Research Peer Exchange, October 12-13, 2016

Location: Salon Lake Marriott Downtown at City Creek, 75 South West Temple, SLC, UT
*Note: All scheduled meetings, breakfasts, and lunches will be held in **Salon G**.*

Participants (20):

- UDOT Research Staff: Cameron Kergaye (Research Director), David Stevens, Joni DeMille, Kevin Nichol, Jason Richins, Tom Hales, Vincent Liu
- John Haynes, FHWA Utah Division
- Nathan Lee, UDOT Program Development Director
- Dianne Kresich, Arizona DOT
- Pete Zaniewski, California DOT
- Ryan Culton, Illinois DOT
- Linda Taylor, Minnesota DOT
- Mitch Ison, Nevada DOT
- Teresa Stephens, Oklahoma DOT
- Rocio Perez, Texas DOT
- Joe Adams, Texas DOT
- Waseem Dekelbab, NCHRP
- Mary Huie, FHWA/Turner-Fairbank Highway Research Center
- *Leighton Christiansen, USDOT/National Transportation Library (web conference, Oct. 13)*

Tuesday, October 11: For those who are available and interested, meet in the hotel lobby at 6:00 PM to walk to a nearby restaurant for dinner.

Wednesday, October 12:
Facilitator: Cameron Kergaye; Note-takers: David Stevens, Joni DeMille

Time	Segment Description	Presenting
7:30-8:30 AM	**Continental Breakfast** provided and networking	
8:30-9:40 AM	***Introductions –*** *5 min. presentations without slides, addressing the following:* · Overview of each agency and research program	Cameron Kergaye, UDOT AZ, CA, IL, MN, NV, OK, and TX DOTs NCHRP FHWA-UT FHWA/TFHRC USDOT/NTL
9:40-10:00 AM	**Break**	

10:00 AM-Noon	***Supporting Implementation During and After Research –*** *20 min. presentations with slides + 10 min. Q&A each, addressing the following:* · What is your process for implementing research results? · If you have an implementation engineer/coordinator, what is their role? · What support is necessary for successful implementation? · What implementation planning and tracking tools do you use, such as forms and databases? · What successes have you had with implementing research results? · What challenges have you had with implementing research results?	Kevin Nichol, Tom Hales, & Vincent Liu, UDOT Dianne Kresich, ADOT Ryan Culton, IDOT Linda Taylor, MnDOT
Noon-1:00 PM	**Lunch** provided and networking	
1:00-1:45 PM	***NCHRP Implementation –*** *35 min. presentation with slides + 10 min. Q&A, addressing the following:* · How does NCHRP focus on implementation during and after research? · How can state DOTs benefit from this focus on implementation by NCHRP?	Waseem Dekelbab, NCHRP
1:45-3:15 PM	***Supporting Implementation During and After Research, continued –*** *20 min. presentations with slides + 10 min. Q&A each*	Pete Zaniewski, Caltrans Teresa Stephens, ODOT Rocio Perez and Joe Adams, TxDOT
3:15-3:35 PM	**Break and Group Photo**	
3:35-3:50 PM	***Welcome to Utah! –*** *Leader presentation*	Nathan Lee, UDOT Program Development Director
3:50-5:00 PM	***Group Wrap-up on Implementation –*** *Each agency to share the top three ideas noted from the Implementation presentations and discussions; no presentation slides needed*	
5:30-7:30 PM	**Dinner** with the group at a nearby restaurant – meet in the hotel lobby at 5:30 PM (travelers pay your own way and UDOT will reimburse dinner per diem)	

Thursday, October 13:

Facilitator: Cameron Kergaye; Note-takers: Kevin Nichol, Tom Hales

Time	Segment Description	Presenting
7:00-8:00 AM	**Continental Breakfast** provided and networking	
8:00-9:40 AM	***Modernizing the State Transportation Library –*** *20 min. presentations with slides + 5 min. Q&A each, addressing the following:* · How does your library support your DOT and other customers? · How have you increased the relevance of your DOT library? · Which improvements have been most beneficial: improving/adding services, equipment, collections, electronic materials, etc.? · What support is necessary for successful modernizing of your DOT library? · What challenges have you had with modernizing your DOT library? · What additional changes are you planning to make to your DOT library? *(Web conference for this morning, for Leighton Christiansen to participate)*	Joni DeMille, UDOT Mitch Ison, NDOT Teresa Stephens, ODOT Linda Taylor, MnDOT
9:40-10:00 AM	**Break**	
10:00-11:00 AM	***Modernizing the State Transportation Library, continued –*** *20 min. presentations with slides + 5 min. Q&A each (+ web conference)*	Dianne Kresich, ADOT *Leighton Christiansen, USDOT/NTL*
11:00 AM-Noon	***Group Wrap-up on Library Modernization –*** *Each agency to share the top three ideas noted from the Library presentations and discussions; no presentation slides needed (+ web conference)*	
Noon-1:00 PM	**Lunch** provided and networking (+Voluntary: Video recording of individual feedback)	
1:00-1:30 PM	***"Driving Innovation" – Overview of National Transportation Innovation Efforts –*** *20 min. presentation with slides + 10 min. Q&A*	John Haynes, FHWA-UT Mary Huie, FHWA/TFHRC

1:30-2:30 PM	***National Committees and State Transportation Innovation Council (STIC) Efforts –*** *20 min. presentations with slides + 5 min. Q&A each, addressing the following:* <u>National Committees</u> · How does your DOT benefit from national (AASHTO and TRB) committee participation? · What link do you see between your DOT research program and your DOT's national committee participation? · What recommendations do you have for better utilizing DOT members on national committees? · Do you use them to write national and state research problem statements, help with voting on these, and/or contribute innovations to your DOT that were marketed in national meetings and projects? <u>STIC</u> · How does your state's STIC function? · How is your STIC associated with your Research Branch? · How are your state DOT executive leaders involved with your STIC? · What successes have you had with your STIC? · What challenges have you had with your STIC? · What recommendations do you have for others regarding establishing a successful STIC?	David Stevens & Jason Richins, UDOT Pete Zaniewski, Caltrans
2:30-2:50 PM	**Break**	
2:50-4:00 PM	***Group Wrap-up on National Committees and STIC Efforts –*** *Each agency to share the top three ideas noted from the presentations and discussions on National Committees and STIC Efforts; no presentation slides needed*	
5:00 PM	Dinner on your own or as decided by the group still in town	

Thank you for participating in the UDOT Research Peer Exchange!

Appendix B - Key Tools and Handouts

Illinois DOT - Implementation Planning Worksheet

Minnesota DOT - Implementation Project Guidelines

NCHRP - Active Implementation Frameworks and Processes

Illinois DOT - Implementation Planning Worksheet

Illinois Department of Transportation

Implementation Planning Worksheet

PART I: Project Information		
Research Project Title	Date	Project Number
		R27 -
Principal Investigator	TRP Chair	
What are the project's expected implementable outcomes?		
Is this research project conducive to implementation? ☐ Yes ☐ No	If yes, please continue below. If no, please explain here:	

PART II: Project Deliverables			
A. List the project's deliverables			
Description	Est. Due Date (mm/yyyy)	PI	TRP
1.		☐	☐
2.		☐	☐
3.		☐	☐

PART III: Implementation		
A. List all activities required to implement the expected outcomes and project deliverables listed above. Completion dates are tentative for active projects.		
Activity	Contact Name	Est. Due Date (mm/yyyy)
1.		
2.		
3.		

B. List any implementation challenges and potential solutions.	
Challenges	Solutions
1.	1.
2.	2.
3.	3.

C. List all IDOT office(s) that may be impacted by this research implementation.		
Internal IDOT Office(s)	Contact Name	TRP Member?
1.		☐
2.		☐
3.		☐
4.		☐
5.		☐

PART IV: Benefits Assessment	
Explain the benefits that the research will have for each applicable assessment category below. If an Assessment Category does not apply of is not significant, then leave that section blank.	
Assessment Categories	**Explanation of Benefits (include explanation of the Quantitative Impact, if possible)**
Construction Savings (materials, labor, equipment, time, quality)	
Decrease Engr. / Admin. Costs (planning/design costs, paperwork)	
Decrease Lifecycle Costs	
Environmental Aspects (pollution, hazardous waste, reduction, recycling)	
Impact on IDOT Policy	
Increase Lifecycle	
Operation and Maintenance Savings (materials, labor, equipment, time)	
Safety (reduction on crash frequency and/ or severity)	
Technology (technology transfer, new materials, new methods)	
User benefits (time, dollars)	
Directions: Please return the completed form to both the Research Implementation Engineer in the Bureau of Research - DOT.BMPR.RESEARCH@illinois.gov, and the Illinois Center for Transportation at ICTProjectManagement@illinois.edu. If you have any questions, please contact the Research Implementation Engineer via email at DOT.BMPR.RESEARCH@illinois.gov or at 217-785-4888.	

**Note - The IPW is considered to be an extension of the project work plan, updated as needed throughout the project.*

Minnesota DOT - Implementation Project Guidelines

MnDOT Implementation Project Guidelines

1. **Address Problem or Need -** The proposal needs to clearly state the problem being solved, the opportunity or need that is being satisfied.

2. **Research Connection**
   The Implementation proposal must have a connection to a national, state or local research project that has been completed. Examples of research can be linked to any of the following federal, state or local programs:
   a. Federal Research
      i. NCHRP project or other Federal Cooperative Research Programs
      ii. Pooled Fund Project (MnDOT lead, MnDOT participation in pooled fund project/program, or single state project)
   b. State Research
      i. MnDOT Research Project
      ii. Other State DOT Research Project
      iii. Intelligent Transportation System (ITS) Inst. or MN Guidestar Program
      iv. MnDOT's Maintenance New Technology Research and Equipment Committee (NTREC) program
      v. MnDOT's Pavement Research Facility - (MnROAD)
   c. Local Research
      i. Local Road Research Board (LRRB) research projects

3. **Demonstrate Application –** The proposal needs to indicate how the results of the implementation project will be used or applied within the department. State how the results could lead to full implementation in day-to-day practice and whether there is commitment to support implementation statewide, and how the benefits can be quantified.

4. **Internal Champions –** implementation proposals must identify a MnDOT staff person as the project manager to move forward for funding consideration, and it is helpful to identify a management champion at the DE, ADE or Office Director level.

5. **Other Considerations:**
   Equipment purchases
   a. Should be kept to a minimum and only include items necessary to support the implementation project.
   b. Can be used as seed money to demonstrate the viability of the equipment. Pilot projects proposed should be limited to a specific area or location.
   c. Not intended as a funding source for full deployment of equipment through the state.
   d. Can't be used to supplement equipment budget.

   Construction Projects
   e. Extremely difficult to use research dollars to fund construction projects. This should be discussed at the conceptual stage to determine feasibility.

NCHRP - Active Implementation Frameworks and Processes