RESEARCH PEER EXCHANGE: *IMPLEMENTATION, PERFORMANCE MEASURES, AND THE VALUE OF RESEARCH*

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January 2018

prepared by
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CTC & Associates, LLC

RESEARCH PROGRAMS

MDT

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Montana Department of Transportation Research Peer Exchange: Implementation, Performance Measures, and the Value of Research

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16. Abstract

The Montana Department of Transportation (MDT) Research Program hosted a peer exchange in Helena, Montana, from September 12-14, 2017. The objective for the peer exchange was to explore best practices on implementation, performance measures, and the value of research. MDT compiled and shared questions participants submitted prior to the peer exchange, and discussion around these questions constituted a large portion of the event. Out of the formal presentations and informal Q-and-A, participants concluded the peer exchange by sharing their takeaways on these three topics, including their planned next steps upon return to their own organizations.

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Introduction

The Montana Department of Transportation (MDT) Research Program hosted a peer exchange in Helena, Montana, from September 12-14, 2017. The peer exchange was aimed at exploring best practices on implementation, performance measures, and the value of research. Representatives from six other state DOTs (including one online participant), the Federal Highway Administration (FHWA), two from the Transportation Research Board (TRB), and two research consulting firms joined MDT to share experiences and lessons learned.

Objectives and Structure

As reflected in the agenda (Appendix A), the peer exchange centered around the three central topics:

- Implementation
- Performance measures
- Value of research

In advance of the meeting, MDT sent a survey on the three focus areas to the AASHTO Research Advisory Committee (RAC). The results of which were used to select peer exchange team members and can be found at https://research.transportation.org/rac-survey-detail/?survey_id=364.

Selected participants submitted questions they had in these three areas that they wished to discuss further in an open forum. MDT compiled and shared these questions, and discussion around these questions constituted a large portion of the peer exchange.

Out of the formal presentations and informal Q-and-A, participants concluded the peer exchange by sharing their takeaways on these three topics, including their planned next steps upon return to their own organizations.

MDT's formal report out on this peer exchange to upper management will follow at a later date.

Peer Exchange Participants

The peer exchange brought together representatives from six visiting state DOTs, Montana Department of Transportation, Federal Highway Administration-Montana Division office, National Cooperative Highway Research Program, Transportation Research Board Technical Services Division, and two transportation research consulting firms. Below is list of all participants.

Montana Department of Transportation
Sue Sillick, Research Programs Manager
Craig Abernathy, Experimental Programs Manager
Mike Dyrdahl, Management Information and Support Bureau Chief

Visiting State DOT Research Programs
Patrick Cowley, Innovations and Implementation Manager, Utah Department of Transportation
Cynthia Jones, Research Program Manager, Ohio Department of Transportation
Hafiz Munir, Research Manager, Minnesota Department of Transportation
Emily Parkany, Research Manager, Vermont Agency of Transportation
Kevin Pete, Project Portfolio Manager, Texas Department of Transportation
Crystal Stark-Nelson, Contract Specialist VIII – Team Lead, Texas Department of Transportation
David Stevens, Research Project Manager, Utah Department of Transportation

Additional Visiting Agencies and Organizations
Jason Bittner, Principal and Practice Area Lead, Applied Research Associates, Inc.

James Bryant, Senior Program Officer, Transportation Research Board
Waseem Dekelbab, Senior Program Officer, Transportation Research Board
Brian Hirt, Research and Writing Manager, CTC & Associates LLC
Bob Seliskar, Civil Rights, Freight, and Research Specialist, Federal Highway Administration-Montana Division

Online Participant
Stefanie Potapa, Research Project Engineer, New Jersey Department of Transportation

Left to right: Brian Hirt, Bob Seliskar, Waseem Dekelbab, Crystal Stark-Nelson, Sue Sillick, Cynthia Jones, Patrick Cowley, Emily Parkany, Hafiz Munir, James Bryant, Jason Bittner, David Stevens, Kevin Pete. Not pictured: Stefanie Potapa.

Peer Exchange Presentations

During the morning and early afternoon of the first day of the peer exchange, participants gave prepared presentations of approximately 15 minutes in length to provide their viewpoints on the three main topics of the peer exchange: implementation, performance measures, and the value of research. Presentations detailed existing processes, future goals, and ongoing challenges at participants' organizations, as well as individual perspectives of the attendees. All of these presentations appear in Appendix B.

Peer Exchange Findings

In advance of the peer exchange, MDT asked participants to send in questions they wanted to discuss in the area of implementation, performance measures, and the value of research.

MDT compiled these into a master list of 79 questions, which participants discussed in detail throughout the afternoon of the first day and during the entire second day of the peer exchange. Appendix C includes the verbatim discussion of the questions. A summary of the discussion follows, organized by topic and sub-topic:

Topic 1. Implementation

- General
- Funding
- Planning
- Processes
- Tracking
- Reporting
- Staff
- Implementation Success

Topic 2. Performance Measures

- Identifying and Tracking
- Collecting
- Displaying and Using

Topic 3. Value of Research

- Concepts
- Calculating and Communicating Value
- Roles

Topic 4. Cross-topic and General

Topic #1: Implementation

General

- Implications of the term "**implementation**" for different participants:
  - "Early money is like yeast."
  - The presentations were food for thought; some participants' definitions are evolving.
  - Some thought it is helpful not to have the original researcher lead implementation. The focus of implementation can be significantly different from the original research.
  - Implementation includes verification of practice.
- **Technology transfer** (champions, fact sheets, posters) is an important step, but still just one of many aspects leading to implementation.
- For new staff, AASHTO's Research Program and Performance Management (RPPM) website has a page of **implementation resources** (http://rppm.transportation.org/communicatingvalue/Implementation/Forms/AllItems.aspx).
- **Recommendations on how to implement results** are more appropriate coming from the agency rather than the researcher; they might come from research staff, a technical advisory panel, or a champion in a functional area. Researchers may make recommendations, but it's the agency who

owns the results and needs to derive benefit. It is likewise the agency's role, rather than the researcher's, to develop the implementation plan.

- The group reviewed **FHWA's Technology Readiness Level scale** (https://www.fhwa.dot.gov/advancedresearch/trl_h.cfm) and whether it could be used to assess readiness of transportation research results for implementation. Several participants favored the concept but thought it might be overly detailed, and "basic research" is commonly not on the spectrum of what DOTs perform.

Funding

- The group discussed whether State Planning and Research **(SPR) funds** could be used **for standalone implementation projects**. Different decision-makers at FHWA have different views on this point, and despite at least one FHWA Division representative saying that this is not allowed, other states have used and continue to use SPR funding for implementation projects. Federal language was reviewed, and the team looked at differences between pilot projects versus mass deployment. The issue was not resolved, and interest in the topic remains keen. **Note:** After the peer exchange, a discussion on this topic ensued between FHWA and RAC with the result that "implementation" is not a SPR-eligible activity. What many of us think of as implementation, is considered to be "development", which is a SPR-eligible activity. As stated above, further guidance from FHWA is pending.
- Funding for implementation is commonly **funded separately from a research project**, especially, if the implementation can't be defined up front. Also, committing funds before knowing whether implementation is feasible and desirable may tie up funds unnecessarily. Some agencies always fund these as separate projects.
- Getting **funding from a DOT functional area** to pay for implementation of relevant research is not common, though in-kind support (like traffic control) is common. Sometimes a functional area will conduct its own targeted research activity and implement the results independently.

Planning

- It may be appropriate to include **outside parties as part of a project review committee** or implementation review committee, since this can foster important stakeholder buy-in.
- To make **implementation coordination seamless with the research project**:
  - Staff responsible for implementation should be involved as early as possible in a research project.
  - The staff member who wrote the project idea should be involved in the beginning and throughout. Rely on champions as implementers, and have an implementation team in case any individual leaves.
  - Understand that sometimes implementation won't happen because of changes in circumstances or priorities, or due to the nature of research, there are no results to implement.
- Strategies to **engage the research customer** after a project is complete include good communication and use of performance measures to see if (and how) the research is being used. The technical advisory panel should remain active after completion of research to help drive engagement and implementation efforts.
- For **leadership engagement** in particular, program implementation support may be more important than specific project support. There may be politics and multiple agencies involved. Good communication with leaders and the entire agency is vital.
- **Identify champions** through constant dialogue and showing field staff that the research program can be of value; many innovations come from district offices. For a specific project, the research project manager may be better positioned than the implementation coordinator to identify a champion.

- **Illinois DOT's Implementation Worksheet** (http://www.idot.illinois.gov/Assets/uploads/files/IDOT-Forms/BMPR/BMPR%20RC006.docx) can be useful, but possibly a burden or too formal in its existing form for some agencies.
- Previous projects are a good reference for **determining resources needed for implementation**, but with an understanding that every project is different. This determination is difficult for many agencies.

Processes

- The group discussed if implementation should be a **need-driven process or institutionalized** at a program level by DOTs.
    - A need for one district might not be a universal need—an innovation or pilot in one region may find resistance elsewhere in the state.
    - It may start as needs-based, and then evolve into institutionalized. Also, having an institutionalized process can be helpful, even if it isn't used every time, because it gives a path forward.
    - If a customer doesn't "bite," it's OK for a research office to let go of a possible implementation. The research office must help assure management understands that not every project will be implemented.
- The team discussed the **appropriate timeframe for implementation**. The group acknowledged that it can vary significantly depending on the type of research and type of implementation.
- When trying to foster **implementation of research from other states'** or elsewhere, it can be challenging to get the right information into the right hands at a DOT due to information overload; emails often go unread, and results could be marketed to other agencies better.
    - An implementation coordinator can play a role in getting research results (or two-page briefs, webinars, etc.) to the right people.
    - Typically, other states' research is just a starting point to start the conversation and get people thinking about how it would be adapted for their own state.
- **Dedicated implementation funding** through NCHRP Project 20-44 was noted as a way to help implement NCHRP research results in particular.

Tracking

- Successful **implementation tracking requires buy-in from participants** on its value, because such tracking does require effort.
- It can be **hard to identify (and therefore track) research deployment** beyond initial deployment.
- The team discussed several **tracking efforts and systems**:
    - Minnesota's ARTS system, developed in-house
    - Ohio's ARMS system, developed in-house using .NET technology
    - Utah's Access system

    Issues with these and other systems include dependence on contractors, learning curve to learn and use systems, need to create and update documentation, interface with DOTs' other systems, IT support, and development and maintenance costs.
- It can be difficult to conduct periodic (such as five-year) retrospective surveys to track implementation. **Annual or ongoing efforts** are more work but ultimately may be more effective.

- It is important to **share the tracking results beyond research** to the rest of the agency. This can be done through regular communications, dashboards, conferences, or other methods.

Reporting

- The responsibility for **final reporting of implementation data** can be shared between the DOT research office, the functional area/champion, and the researcher; this varies from state to state, and can depend on whether this is written into the contract.

Staff

- It is unlikely that there will be a **standard job title** across agencies for the position of implementation coordinator/manager/engineer/specialist/etc.
- Having an **implementation coordinator who is well connected within an agency** is a key job requirement; an in-house hire makes sense.

Implementation Success

- See the RAC survey results conducted on implementation by Montana: https://research.transportation.org/rac-survey-detail/?survey_id=364.
- There is a tendency to go toward **shorter summaries** (2-pages briefs rather than 8-page executive summaries) to best communicate results for implementation. It can be useful for an investigator to draft these, but ultimately these must reflect the needs of the agency: "How does this research help us?" Videos can be effective as well. Such communication tools can be built into the research contract, but this is only done by some DOTs.
- It was generally agreed that implementation success is more likely when **implementation support is provided by the researcher** as one of the research contract tasks. SHRP2 was noted as a model of this.
- Studying examples where **implementation was not successful** can be valuable if it provides insights into barriers and how to overcome them.

Topic #2: Performance Measures

Identifying and Tracking

- Ideally performance measures should be **benchmarked**, but may simply be **tracked** when benchmarking cannot be achieved. For some types of measures, benchmarking doesn't make sense. Also, it takes time to develop appropriate benchmarks. Performance measures need to be tracked for a while before they can be benchmarked.
- In some cases **performance indicators** may be studied in lieu of performance measures.
- Several states conduct a **satisfaction survey or exit interview** after a research project. It can be given to the panel members or program customers.
- The group brainstormed **favorite and noteworthy performance measures**, particularly those that could be collected for minimal cost. Performance measures mentioned include: number of students/professionals trained, number of researchers engaged, on-time/on-budget, downtime during the research, outstanding projects, research backlog, research customers served, overhead costs, time to contract, and agency engagement.
    - Which efforts are billed to overhead versus to a project can vary by agency or project.

- Time to contract varies as well. Some states measure this and others don't, and the start time can be defined in different ways (signature on contract, letter to proceed). Circumstances beyond the research department's control can sometimes delay the start of a project.
- Outstanding projects and projects per investigator can help an agency determine when to hold back on awarding new projects to an investigator.

- Some "performance measures" may just be tracked without benchmarking, because benchmarking may not make sense. For example, is it important or controllable the number of problem statements received or the number of graduate students trained in any given year. Generally, **performance measures related to contract measurement** (tasks completed on time and on budget, receipt of timely quarterly technical progress reports, etc.) are valuable but not sufficient on their own.
- It might be helpful to **standardize research performance measures** at a national level, but there has not been any push for this from FHWA or elsewhere.

Collecting

- Collecting (and reporting) performance measures can be **time consuming**. It's important to periodically assess whether a measure is providing valuable data; if not, stop measuring it. By contrast, when a measure is valuable, take steps to report it broadly (in annual reports, for example).
- Measuring the **performance of research results in implementation** (rather than research program performance measures) is a challenge. It may require dedicated funding to the investigator to quantify an effect before-and-after implementation. Complicating factors:
  - The amount of time needed—possibly on the order of years—to gather such measures.
  - The need to identify the right measures; they may not be what was anticipated in a research project. A project champion can help with this.
- **Benefit-cost analysis** may be part of a research report (some states require this), with a caveat that these are sometimes based on estimated or projected figures.
- Measures of **agency engagement** include participation on project panels, new staff involvement on projects, involvement in projects by new functional areas, diversity of participants (age, gender). Satisfaction surveys can also be helpful.
- It may be easier to start collecting performance measures at the **program level and then move to the project level**.

Displaying and Using

- Some agencies **share measures publicly**, most commonly through annual reports, and others do not. These are sometimes shared among states via the AASHTO research listserv.
- Program performance measures can serve as a **good baseline** and illustrate the **overall success of the program over time**.
- However, research program performance measures (for example, a measure of implemented research) can sometimes lead to **inappropriate or unrealistic targets** (for example, a target to implement 100 percent of research results). Moreover, the ultimate ability to implement research is typically out of the hands of a research program.
- **Benefit-cost measures** in particular tell the story of what is being implemented and how cost effective such efforts are.
- Keep in mind that **different stakeholders** will be interested in different performance measures.

- The group looked at **existing DOT performance measure dashboards**; while none of these currently show research measures, they were found to be effective and could possibly be adapted for research measures. It is necessary to think about what kind of story you want to tell through a dashboard. Dashboard examples include:
    - Virginia: http://dashboard.virginiadot.org/Pages/Performance/Performance.aspx
    - North Carolina: https://www.ncdot.gov/performance/
    - Connecticut: http://www.ct.gov/dot/cwp/view.asp?a=3815&q=448402
    - Kansas: https://kdotapp.ksdot.org/perfmeasures/
    - Georgia: http://www.dot.ga.gov/BS/Performance

Topic #3: Value of Research

Concepts

- One conceptualization of value of research was that value equals the "**benefit-cost ratio, plus quality**." The group referred to Utah DOT's presentation and a long list of important but non-quantifiable benefits that inform the value of research. Anecdotal evidence plays a role in determining the value of research.
- **Value of research and impact of research** are related. The group favored the concept of impact as the "benefit part of the benefit-cost ratio."

Calculating and Communicating Value

- Calculating the **value of a research program** should include *all* the services it provides, including those beyond strictly research, like library services.
- **Calculating the value of research** remains a challenge. Starting with terminology, it might not be clear what is meant by "value of research": value of a project, value to customers, value of the program?
- Typically among participants, value has been calculated at the **project level**. When a project is shown to have little or no value, this commonly triggers a follow-up to determine why that is the case.
- **Benefit-cost ratios can be improved** by clarifying when the cost savings are agency costs, user costs or both.
- There are different strategies for determining **which projects to highlight** when communicating the value of research. It depends on the story the agency wants to tell. It might include big-hitting projects with high savings, or ones that are highly topical. Sharing "home runs" provides a model for the kind of high-value work that research can deliver.
- The group discussed **AASHTO's annual High Value Research** awards program and the strategies for having a project selected as a winner. There are differences in voting among the four regions, but it was thought that submitting a handful of projects was better than submitting only one.
    - States that win these awards leverage them as much as possible, sharing notices with executives, writing articles in newsletters, and funding researchers of winning projects to present at TRB.
- **Ohio's guide to TRB**, featuring Ohio researchers and Ohio-related researchers, was seen as a best practice for communicating valuable research showcased at a national level.

Roles

- Participants discussed methods for **soliciting problem statements**; some have a completely open solicitation, in which case a DOT champion might need to be identified.
- It might be desirable to **ask investigators to document the value of research**, but it would be reasonable to ask for this upfront and pay for it.
- Montana has begun including a **formal cost-benefit and return-on-investment analysis** with its research projects, performed by the investigator.
- One could **ask agency engineers to document the value of research**, but this may require a degree of speculation that some are unwilling to make.
- **Balancing research across functional areas** can be challenging. It's important to make sure that different areas are served (understanding that some areas have a more natural need for research than others). However, for small programs, this may not be feasible.
    - Having an individual championing multiple research projects can be a job strain.
    - Areas whose research topics are repeatedly not selected may become discouraged from making future submissions.
    - The distribution of research across functional areas is often driven by executive priorities for research.
    - A "road show" to DOT offices, including regions, can help reach and engage new customers and areas. Having a research presentation at a new employee orientation is another successful approach.

Topic #4: Cross-topic and General

- There may be opportunities to **enhance IT systems** to maximize tracking implementation, benefits/impacts, and performance measures, but these will likely be very state- and system-specific.
- **States with limited resources** should focus on the greatest need and concentrate their program on what's most important. "You can't do everything."
- It is important to **involve practitioners in identifying research needs**. At multiple states, need identification is done through a sit-down discussion that includes DOT staff across functional areas and university staff.
- **Prescribed consistency across DOTs** in the areas of implementation, performance measures, and value of research is both unlikely and undesirable. Programs' and customers' needs are too different from state to state. It's important to share best practices, as in this peer exchange and other forums, and let participants take home best practices that are most applicable and most likely to succeed.
- It was suggested that implementation, performance measures, and value of research might be "**three legs of a stool**" which cannot stand with any leg missing.
- **Skills needed** for a transportation research program in a modern age:
    - Ability to communicate verbally—and a desire to talk to everyone.
    - Ability to communicate with clear and compelling writing.
    - Creativity—an eye for new ways to get things done.

- Ability to articulate a vision of what a research program should be.
- A sense of ownership among research customers: the research project is for their benefit.

- **Capabilities** that participants **wish their organization had** (or had more of) now:
  - IT support.
  - Library science skills; a library.
  - Social media skills.

Participant Takeaways

Although this was MDT's peer exchange, all participants were asked to submit their questions on the three main topic areas of implementation, performance measures and the value of research, so that the peer exchange would be valuable to all participants. The group had strong discussion about each area and learned from the ideas and experiences shared throughout the two and a half days of the event. Each participant identified several practices and ideas that they plan to consider for improving the effectiveness of their research programs, as listed below.

Jason Bittner – Applied Research Associates, Inc.

Overall/Cross-Topic

- Definitions of these terms is critical.
- Minnesota has a lot of tools and supporting internal structure to provide implementation, performance measures, and valuing research support.
- Context is critical, there is no one size fits all approach.
- The time is long past when we can just complete work and assume that it will sell itself; this takes work.
- People's beliefs serve as "perceptual screens" and framing is as important as the calculation.
- When discussing value and implementation, don't forget to include the "other side"/alternatives.
- Don't overestimate the impacts by using difficult to support numbers and materials.
- Develop a "Strategy of Synergy" by using multiple channels of communication – reports, newsletters, executive summaries, etc.
- Review the survey results – it is a treasure trove of information and individual ideas.
- Use interns.
- Consider authoring a synthesis statement on use of implementation and value of research tracking tools; performance dashboards.
- Complete the revisions to the NCHRP peer exchange best practices report.
- Identify and catalog sheets and templates; maybe a call for specific information on RPPM.
- Consider research effort on satisfaction surveys best practices.
- Ability to adapt and observe, not react.

Implementation

- Need to have some consistent approaches to implementation projects – NCHRP 20-44 is blossoming, but still some inconsistency in what you can and cannot fund.
- Both active and passive activities are important.
- Encourage participation on NCHRP panels to help facilitate implementation activities – perhaps agencies can require this as they bring back the research.

- Implementation engineer duties and job descriptions as part of the NCHRP 49-07: Managing Transportation Research Programs Synthesis statement work.

Performance Measures

- There is a difference between measures and indicators.
- What you measure you can manage.
- Need to remain cognizant of the costs of collection.
- Consider research needs statement on cost to collect performance measures data.
    - Definitions; RPM; PM101 from past website efforts; needs to also include consideration on why we collect the materials.

Value of Research

- Including general programmatic issues - -i.e. library services, local management, and experimental features – might not show up unless you make a special case.
- Systematic processes are needed and once you set it up, the timeframe should be clear. 5 years might be the best.

Notes to Montana

- Small staff; succession planning is important; interns and temporary/shared staffing considerations.
- Might be wise to document practices for communication, road shows, etc.
- Strong FHWA support and influences.
- Strong national presence.
- Keep up the good work.

James Bryant – Transportation Research Board

- TR News website – They don't release the full PDF version of the TR News until four months after it's published. See if there is a way to get it to the Research folks. They get hard copies, but they want an electronic copy sooner.
- Look at developing curated TRB annual meeting programs for state agencies. So folks can pull who from their state are presenting. Make it available at the TRB portal. It may be a table or something else.
    - OH – Any chance that can happen in the next two months? James – Any peer exchange participant should send him an email and he will pull a table for you.
- Doing a search and curate a table on implementation and innovation presentations, posters, and activities for the TRB Annual Meeting. He will find out what's going on there related to these topics and will send a list to folks.
    - He will ask folks if it was helpful. Also, did you (or your state's attendees) learn about anything that your state would want to implement? He would be happy with knowing what folks found interesting and might implement.
        - UT tracks what their folks learned and implemented from the TRB annual meeting. He will send to James for the past few years. Patrick – Send the peer exchange attendees his document of process. After the TRB Annual Meeting, the UT attendees meet every other month as a group to discuss what they learned and what they are doing with it. He will send this process to the group. The process is changing as they want to mentor younger folks in the agency about national membership.
- Think about the possibility of having a workshop on implementation issues engaging lots of different agencies (NCHRP, AASHTO, CUDC, FHWA, TRB Tech committees, Research and Education section) and consultants who are doing the work. Pick broad topics, presentations on them, then workshop style discussions. Maybe actions that will come out of it.

  - UT will be doing this in the fall, on a smaller scale. They will have their stakeholders discuss what Research can do for them to get better problem statements. If successful, he will share with James.
  - James - Any thought, ideas or suggestions for this, let James know.
- Think about if there is a need within TRB standing committees a task force or standing committee on implementation.
  - Sue - They talk about this in both the Tech Transfer Committee and the Conduct of Research Committee.
  - Jason – Start as a special committee to plan the conference and follow up on it.
  - James – Will make sure there is a balance between DOT, academia and consultants.
  - James - Implementation becoming a national focus and may need a way to coordinate those efforts.

Patrick Cowley – Utah Department of Transportation

- Review existing projects and determine if necessary to identify research vs. implementation.
- Review the TRL-H scale and determine applicability to our program.
- Reach out to the Regions to get more involvement in developing problem statements.
- Use the Implementation Worksheet and update throughout the research process.
- Hold champions and subject matter leads responsible for reporting on implementation especially after final research report.
- Create one, two, or four page fact sheets for each research project to help in communication.
- Involve the PMs in tracking implementation.
- Consider adding specific implementation language to our contracts.
- Consider using satisfaction surveys on a more regular basis.
- Clearly identify performance measures and performance indicators.
- Track contract time.
- Consider having PI develop the benefit analysis estimate as part of the research project.
- Create "Guide to TRB" books for TRB attendees.
- Review and put into place Implementation Engineer duties.
- Review and share TAC roles and responsibilities.
- Identify ways to engage research customers – See Montana's suggestions.

Waseem Dekelbab - TRB

- Read the presentation that the AASHTO SCOR chair, Brian Ness, gave at the July RAC meeting. Reach out to Utah to see how they calculate benefit-cost (ROI) for a project. FHWA needs to be more involved with the states – borrow numbers from them, such as cost, because the states have this information (even though the information is different for every state).
- Be better at updating NCHRP 20-44 Moving Research Into Practice.
- Surprised that folks not aware of Research Ready Results, Paths to Practice, and other publications that are available on the TRB website. They assume folks would know about it because they on the TRB site or in TR News. He will ask folks what they need or if they even know about it.
  - James Bryant will look into the several month lag that occurs between when the TR News table of contents is sent out electronically and when the full articles are available. Several participants expressed frustration with this situation.
- Work with Sue Sillick (MT) on new AASHTO team building efforts. The link between AASHTO committees and TRB committees (and expand to associations, consultants and other stakeholders). This is related to the mapping efforts Sue is doing. (TRC committee).

Brian Hirt – CTC & Associates LLC

Overall/Cross-Topic

- Are implementation, performance measures and value of research three legs of a stool? I'm convinced they go together somehow, but I still think we're figuring out how...
- ...However, two observations about how a few pieces fit together were compelling:
  - Impacts are the benefits (qualitative and quantitative) part of the benefit-cost ratio.
  - Value is the benefit-cost ratio plus quality.
- The ways that a state DOT research program can approach any issue that it is facing are highly dependent on the size of its staff and budget.
- Several tools that were mentioned seemed like they would be most useful to any agency if they could be "right sized" to meet that agency's specific needs. Four that come to mind from different discussions throughout the peer exchange:
  - FHWA's 9-point Technology Readiness Level (TRL).
  - Illinois DOT's Implementation Planning Worksheet.
  - Minnesota DOT's Automated Research Tracking System (ARTS).
  - Utah DOT's Socrata dashboard data analysis tool.
- Making clarifications in language was important throughout the group's discussions to make clear and important distinctions. For example:
  - Research project value vs. research program value.
  - Measuring contractual performance vs. measuring performance of implemented results.
  - Value of quantifiable benefits vs. qualitative benefits.
- The first word in the phrase "problem statement" seems to be out of favor for some people/organizations, but I think that recognizing a problem is a vital part of innovation. Understanding the root problem ("What's isn't right?"; "What could be better?") enables a lot of possible paths forward, whereas starting out with a possible solution can quickly narrow the number of paths.
- Montana mentioned that the technical panel for a research projects can recommend changing a project scope or even canceling a project. That struck me as an important aspect of project oversight.

Implementation

- Utah's exercise in asking people in the DOT functional areas to list their primary concerns is an interesting approach to understanding needs across an agency and knowing what kinds of research results to watch for.
- It was suggested that having lots of good connections across a DOT was a primary qualification for an implementation coordinator role, and that rings true.
- The states will likely not settle on standard name for the implementation specialist / implementation coordinator / implementation engineer / implementation manager. And that's OK.
- It is not a correct assumption that every project should or will be implemented.
- From the same discussion: Confirming current practice with research is a valid form of implementation.
- "Passing the baton" is a great analogy for the implementation handoff.

Performance Measures

- Montana's short performance measures reports use sound engineering economic analysis principles to provide cost-benefit and return-on-investment analyses. They are to-the-point and well-documented, making the results believable and compelling.
- DOTs' front-facing dashboards (see Virginia, North Carolina, South Carolina) are not currently tied to research, but they appear to be very effective communication tool that could be adapted to high-level research metrics.

Value of Research

- To attach the proper significance to stated quantified benefits (and by extension, benefit-cost ratios), TRB and Utah mentioned distinguishing user benefits from agency benefits.
- Remaining questions on the value of research: What's the quantifiable value of confirming current practice through research? How does that play into benefit-cost or return-on-investment calculations?

Cynthia Jones – Ohio Department of Transportation

- Schedule meetings with research staff and DOT leadership
  - Discuss learnings and next steps
  - Inquire on inclusion in FHWA/DOT Stewardship Agreement
- Develop glossary including a graphic to describe the interrelationship of these concepts:
  - Research.
  - Implementation.
  - Performance measure.
  - Technology Transfer.
  - Development.
  - Deployment.
  - Return on Investment.
  - Benefit/Cost.
  - Value of Research.
- Develop Research Vision:
  - Research is the solutions center for ODOTers to learn, explore and gather information to do their work more effectively.
- Review current practice
  - Compare current practice to the 2016 ODOT Research Manual Chapters 6 and 7 on Implementation and Technology Transfer.
  - Project:
    - Implementation Assessment (beginning at start up meeting).
    - Implementation Plan (after project close out).
    - Develop an exit survey (based on Montana).
  - Program:
    - Implementation activities list.
    - Annual Implementation Summary.
    - Historical Report.
  - Design a simple implementation tracking system that is realistic for Research to maintain.
  - Begin consolidating the project implementation activities into a programmatic view.
  - Include implementation summary in the Annual Report.
- Review Peer Exchange presentations to further consider information:
  - Specific examples:
    - MNDOT Seven Step process.
    - TXDOT Performance Measures.
    - TXDOT Value of Research matrix.
  - Broadly define the program we want to use, and that new leadership will see in January 2019.
  - Realistically assess performance measures to support that story.
  - Test the measures for two months.
    - Design a dashboard for Research web site. Consider Socrata that Utah uses.
  - Thank you to research technical team after project close out, with link.
  - Develop graphics to assist sharing concepts.
  - Annual Report

Hafiz Munir – Minnesota Department of Transportation

- Assessment of implementation – Projects have or haven't been implemented. Do a survey and create a list of projects for each topic area in the last five years and see if they have been implemented. Figure out how to improve that process.
- MT's experimental features plan and report – This is interesting; he will explore it for Minnesota's research program.
  - Don't put a lot of text in reports and add more pictures.
- Illinois DOT's Implementation Worksheet – Will look at this and compare to what Minnesota has, in order to improve their tracking (tab in ARTS database). Have it available as a fillable PDF, so staff can fill it out onsite and enter the information in ARTS.
- David Pamplin's and Mary Huie's guidance on implementation and how SPR funding can be used. He often gets asked about what qualifies for SPR funding related to implementation. When people use their site to put forward an implementation project, they think that Research funds will be used (SPR funding) but some projects not eligible. Then the staff is disappointed. He would like more clarification from the top down.
- Benefits vs. the value of research discussion was good. He will follow up with Utah about their quantitative analysis. He would like an assessment tool at the end (worksheet or software program) to plug in numbers and calculate benefits. He wants it to have a broad application so it works for most projects.
- Need to qualify performance measures or goals for the Research program.
- Improve the engagement portion of the implementation engineer's job. More communication to MnDOT staff from him.
- Continue to work with the folks that are willing to work with them on implementation.
- Consider using an implementation planning worksheet.
- What are the funding resources available for implementation? 20-44 and other sources?
- Learn from benefits quantification they have recently started using and improve where they can.

Emily Parkany – Vermont Agency of Transportation

From the State and Participant Presentations

- From research to implementation you need to carefully "pass the baton." Both sides need to carefully handle during the transition.
- In Montana, the project champion chairs the RAC. [RAC roles and responsibilities are available on RPPM.]
- With SPR funding request, Montana turns in an Annual Accomplishments Report. [Later discussion confirmed that this is analogous to Vermont's Work Plan "narrative" and each state has slightly different ways to do this. See note below about NHI's Research 101 class.]
- Several states mentioned their FHWA-mandated Research Manual and how often it's updated.
- MN travelers are required to write Out of State Trip Reports to justify their travel.
- OH has categories of Implementation: knowledge enhancements, cost savings, time savings, and leverage.
- In OH, research that comes from Districts leads naturally to implementation—Central Office-led projects are less applied.
- MT and OH both provide a SPR EA to TAC members for their time on TAC activities.

Implementation

- There are 60 items related to Implementation on the RPPM.
- Some states are able to modify projects towards the end to add implementation activities.
- The July/August issue of TR News is on Implementation.

- Don't pay for deliverables if not happy. Ask the researchers to revise before paying the invoice.
- There was a discussion of the Illinois Implementation Worksheet that I'm impressed with—update throughout the project.
- Some states do surveys of the implementation of "old" research projects.
- Get on the agenda of agency meetings to show value of research/Try to talk about research to different agency "all hands" meetings: "construction folks eat up the experimental features projects."
- Tech Briefs: OH, MT, TX the researcher drafts; CTC & Associates does tech drafts for MN, MI, NCHRP. CTC & Associates interviews the agency champion and then the PI for the two-page fact sheets. Comment that what the PI thinks is important may not be what the agency thinks is important. MT, TX have a four page format. Sue (MT) has an implementation report template.
- RPPM may have some implementation templates.
- OH does some implementation reports in house.
- Consider the Technology Readiness Levels.
- Share NCHRP 20-44.
- Need FHWA guidance about whether SPR money can be used for implementation.
- Do an exit survey of all panelists/TAC members at end of project. Survey internal and external customers about how have we done? What should we improve? Questions about the project, implementation, and staff support. The results can be shared with new people like a new state bridge guy.
- NH, OH, UT do program-level surveys.
- VT could do a survey of Symposium participants and then ask more-general research Qs like what they think of the research program and how we're helping people (consider MT exit Qs).
- Take the NHI Research 101 online class (for FHWA personnel but RAC members are encouraged to take it to understand the requirements).

Performance Measures

- Definitions—what's a measure, what's an indicator, what's the goal of measuring? How much time to collect?
- Some discussion of useful PMs to track, use, and share (see Qs).
- Santiago Navarro has a suite of tech transfer performance measures.
- MT has Performance Measures reports. You can find the two recent reports under Planning (Rest Areas) and the last project under Structures, Phase III. Assumptions for these reports come from agency engineers. www.mdt.mt.gov/research.

Value of Research

- Utah presentation has a slide on non-quantifiable benefits from research that are not in cost/benefit analysis that I plan to use for my presentations on September 28.
- Patrick from UT: "Impact is the benefit part of benefit/cost."
- Collect anecdotes about value of research.
- Impact is a PM outcome. Quantitative values are good, but qualitative is also important. UT uses a grading scale A, B, …
- TX: Value is benefit/cost plus quality.
- Value of research —beginning of project; also valuable at end of project.

General Discussion

- My question: "What should a small state do?" Figure out what is the biggest interest in the state. What do people need? Leverage others: researchers need to capture the implementability of projects. Leverage the TAC. Concentrate. A small state can't do everything; pick things to focus on. Determine

what is important to folks and start building. Ask "How can I help you?" Start with small successes. One suggestion: Are there pieces of NCHRP or NETC projects that can be valuable—adapt to VT?
- Think of Implementation, Value of Research and Performance Measures as a three-legged stool.
- Research skill sets: Sell the program/communication/relationship building. Need a sense of creativity and openness to new ideas. Serve the entire department. Articulate a vision of what we want the program to do: ambition, tenacity, vision, and intellection. Ownership to guide the research. Tech editor/tech writer. "Ability to respond and adapt but not react"—James Bryant
- Ohio Functional Areas do summary sheets for their research summit.
- Ask MT for a Word version of their experimental features report so that we can use the format.
- Scaling: We learned about lots of tools (examples: MN ARTS for project tracking, Technology Readiness Levels, Illinois Implementation Worksheet, Annual Reports, research newsletters, tech briefs for all projects, State-specific TRB Guides, Dashboards) but they need to be scaled for each state. I'm happy for the exposure here, but I don't think that I can implement all in the short term. Context is critical.
- Concern about small-state succession planning.
- TR News 1997: Benefits of Research Part I and Part II: State and Federal Perspectives

Kevin Pete – Texas Department of Transportation

- How is implementation funded, if separate from the original research project? When David Pamplin (for Jack Jernigan) of Turner Fairbanks Highway Research Center (TFHRC) FHWA came to visit the NJDOT Research Office on May 16, 2017, I was surprised to hear David Pamplin say that implementation-exclusive research projects cannot use SPR funds.
- There are additional Performance measures we need to consider such as:
  - # of research projects competed on time.
  - # of projects implemented.
  - Distribution of projects by agency division and office.
  - Final report published.
- Review and utilize similar post-implementation measures to confirm/verify benefits. Reach out to Utah for a copy of their survey (5Yr).
- Consider utilizing MT DOT survey for measuring project team (PI and internal participants).
- Develop media/marketing presents leveraging internal communications division.
  - Obtain listing of Texas TRB presenters.
  - Developing Newsletter.
- Defining success early for each project!!!!

Stefanie Potapa – New Jersey Department of Transportation

- Implementation report as a final deliverable.
- Incorporating a performance measure-style component to our final reports, when appropriate.
- The importance of developing program-wide performance measures by collecting data over the years to determine if there is a trend or cycle that can be benchmarked.
- Experiences and lessons learned from Minnesota related to their ARTS database. Incorporating implementation and performance measures into whatever research project/program tracking system they eventually adopt.
- Learning about, and hopefully acquiring, David Pamplin's written guidance regarding what is considered implementation vs. technology transfer, etc. and SPR-fundable.

Bob Seliskar – FHWA-Montana Division

- Recognizing the individuality of state research programs, FHWA needs to provide clear guidance regarding regulations and implementation. Can we improve Q&A's and/or case studies to assist states?
- Examine the division tech transfer process for research projects, experimental features. Bring in Operation Engineers and stakeholders for presentations.
- Look at the future of performance measures in Research. What is appropriate?
- Revisit the Research 101 course and give a summary to division office.
- For future peer exchanges in other program areas, bring in private sector and national program managers to bring another perspective to the discussion.

Sue Sillick – Montana Department of Transportation

- Where appropriate, consider providing more progress reports on research projects, such as through a brown bag gathering.
- Revisit the development and implementation definitions using Technology Readiness Levels, and adjust process documents accordingly.
- Develop implementation process categories with definitions.
- Develop implementation product categories with definitions.
- Review implementation tracking forms, templates, and plans, and develop for MDT.
- Share information on NCHRP 20-44 with staff to help facilitate the implementation of NCHRP projects.
- Identify useful (research staff and MDT management) performance measures to track.
- Increase effort to identify projects up front that lend themselves to quantitative performance measures.
  - Technical Panel.
  - Research Staff.
  - Researcher – Add this component to the proposal guidelines.
- Be careful to ensure realistic project performance measures, reporting user costs separately.
- Consider adding some quantitative measure to qualitative benefits, such as a grading system.
- Over a period of a few years, based on the tracked performance measures, develop goals, as appropriate.
- Consider retrospective reviews of performance measures (periodic, rolling…) to determine if we realized the estimated benefits.
- Develop a template for MDT's performance measures reports, with the research logo.
- Collect anecdotes regarding the value of research projects; this helps to communicate value for both research projects and the research program.
- Investigate shorter marketing pieces on the value of research, such as MnDOT's Research At-A-Glance.
- Investigate the use of research dashboards.
- Continue to work on identifying and implementing a research program and project management system.
- Produce annual reports on a more regular basis.
- Update the Research manual and submit to FHWA for approval.
- Investigate a graphic illustrating the relationship among implementation, performance measures, and the value of research.
- Prepare a MT guide to TRB for each annual meeting.

Crystal Stark-Nelson – Texas Department of Transportation

Implementation

- It is a good practice to include implementation into the research project in order to emphasize the incentive and benefits of a high quality resolution (research results); otherwise leaves the results to "die on the vine."
- Including Implementation into the research project avoids the appearance of scope creep.
- It is essential to consistently and effectively inform the champion/sponsor throughout the research project in order to see the results integrated throughout the agency (i.e. districts); thereby producing an evidential basis of quality result(s) and provides an active voice for "buy in" from other Districts.
- In order to be successful, it is necessary to strategically provide a knowledge transfer mechanism highlighting research and implementation in agency and division newsletters, brochures, dedicated web pages "with links to the PSR and/or final report", while including agency communication division personnel in order to exhibit to leadership, district personnel, policy makers (legislators) and the public of the quality results and division accomplishments and sustainability.
- Implementing other research efforts administered outside of your state may warrant further review to see what works for your state when considering weather conditions, funding for larger DOT divisions, and the like.

Performance Measures

- Performance Measures can be viewed at two intervals 1) per project and 2) programmatic.
- Tracking of performance measures can become an administrative burden for larger DOTs which lends to doing "what makes sense" such as setting forth a requirement threshold, such as "term of one year or more,"
- Measuring time to contract has two prongs: 1) can render negative results since other dependency factors have to be considered such as legal personnel review/input and contractor personnel negotiations outside of the Research Supervisor (30+ days); and, 2) can render positive results by keeping the project focused on the outcome (research results) and provides a stronger position for negotiations.

Value of Research

- Value is not only quantitative and should enfold a measure for qualitative metrics, such as political and user end benefits.
- Value of research, while may require additional task and funding, could produce a strong positioning for the sustainability of the program when considered at the forefront and at the conclusion of the project.

David Stevens – Utah Department of Transportation

Implementation

- Consider using an implementation planning worksheet during each research project and making it a living, changeable document. (Similar to Illinois DOT.)
- Consider doing an Implementation Report directly after the research and final report are completed, to select some of the recommendations from the researcher for implementation and make a plan for these. (Similar to MDT.)
- Develop "derivative" products necessary to enable implementation of research results, separate from the final report and likely involving the researcher. (Similar to MDT and TRB.)
- Consider tracking research benefits and implementation progress in our research projects database. (Similar to MnDOT.)

- Consider adopting successful implementation strategies shared in the NCHRP "Paths to Practice" case studies.
- Obtain clarification on which implementation activities are eligible for SPR funding.
- Make implementation tracking worthwhile by communicating successes at various meetings and conferences for the department.
- Consider creating a 2-page summary for each completed research project (or implementation project) and sharing these online. (Similar to MDT and MnDOT.)

Performance Measures

- Select meaningful performance measures within three research program areas: input/resources, output, and outcome. (Similar to MDT.)
- Consider one performance measure being 90% deliverables on-time, tracked monthly. (Similar to TxDOT.)
- Consider doing exit surveys at the end of research projects to obtain feedback from all involved. (Similar to MDT.)
- Review the FHWA requirement for an Annual Performance and Expenditure Report (APER) for SPR-funded activities, and update our processes accordingly. (Similar to TxDOT and others.)

Value of Research

- Consider having the researcher provide a benefit/cost or value of research estimate at the end of the research, such as MDT's Performance Measures Reports using standardized economic formulas. (Similar to MDT, MnDOT, Ohio DOT, others.)

APPENDIX A

Montana Department of Transportation (MDT)
Research Peer Exchange Agenda
September 12th-14th, 2017
Location: Best Western – Great Northern, Helena, MT

Tuesday, September 12th	
8:00am - 8:15 am	Housekeeping, Welcome, and Introductions
8:15 am – 9:45 am	Implementation, Performance Measures, and the Value of Research Presentations ➢ MT – Sue Sillick ➢ OH – Cynthia Jones ➢ MN – Hafiz Munir ➢ TX – Kevin Pete/Crystal Stark-Nelson
9:45 am - 10:15 am	Networking Break
10:15 am – 12:00 pm	Implementation, Performance Measures, and the Value of Research Presentations ➢ UT – David Stevens & Patrick Cowley ➢ VT – Emily Parkany ➢ TRB – Waseem Dekelbab and James Bryant ➢ Applied Research Associates (ARA) – Jason Bittner ➢ CTC & Associates – Brian Hirt
12:00 pm - 1:00 pm	Networking Lunch
1:00 pm - 2:45 pm	Implementing Research Results Discussion: Review Survey Results and below Questions/Discussion Topics
2:45 pm – 3:15pm	Networking Break
3:15 pm – 4:45 pm	Implementing Research Results Discussion (cont.)
4:45 pm – 5:00 pm	Recap of Day and looking Forward to Tomorrow
6:00 pm -	Networking Team Dinner
Wednesday, September 13th	
8:00 am – 10:00 am	Research Performance Measures Discussion: Review Survey Results and below Questions/Discussion Topics
10:00 am - 10:15 am	Networking Break
10:15 am - 12:00 pm	Research Performance Measures Discussion (cont.)
12:00 pm - 1:00 pm	Networking Lunch
1:00 pm - 3:00 pm	Determining the Value of Research Discussion: Review Survey Results and below Questions/Discussion Topics
3:00 pm - 3:15 pm	Networking Break
3:15 pm – 4:45 pm	Determining the Value of Research Discussion (cont.)
4:45 pm – 5 pm	Recap of Day and looking Forward to Tomorrow
Thursday, September 14th	
8 am – 11 am	Peer Exchange Report Contents

APPENDIX B

Peer Exchange Presentations

- Jason Bittner – Applied Research Associates, Inc. – pg. 23
- James Bryant and Waseem Dekelbab – Transportation Research Board – pg. 29
- Patrick Cowley and David Stevens – Utah Department of Transportation – pg. 38
- Brian Hirt – CTC & Associates LLC – pg. 45
- Cynthia Jones – Ohio Department of Transportation – pg. 54
- Hafiz Munir – Minnesota Department of Transportation – pg. 63
- Emily Parkany – Vermont Agency of Transportation – pg. 77
- Kevin Pete and Crystal Stark-Nelson – Texas Department of Transportation – pg. 82
- Sue Sillick – Montana Department of Transportation – pg. 93

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ARA
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Implementation Performance Measures Value of Research

A brief presentation at the Montana DOT Peer Exchange

September 12, 2017

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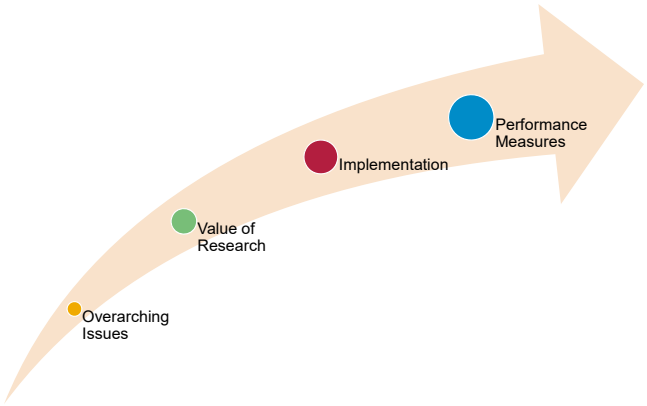

Critical issues as I see them

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Context Matters

Overarching issues make a lot of difference

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3

INNOVATIVE SOLUTIONS TO COMPLEX PROBLEMS

Organizational functions change the way we look at these issues

Culture will eat strategy

Size of staff

Executive management support

Skill sets

University prowess

External funding sponsors

Community engagement

FHWA interactions

Legislative direction

Familiarity

And on, and on.

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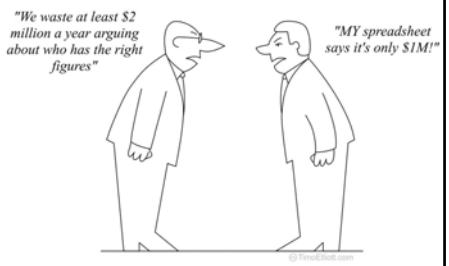
Value of Research

The time is long past when the value of the research will simply sell itself with no additional effort



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INNOVATIVE SOLUTIONS TO COMPLEX PROBLEMS

Communicate within values and theories

People's beliefs serve as "perceptual screens"
Framing is as important as the calculation
Provide tangible benefits
Don't forget to include the "other side"/alternatives
Don't overestimate the impact

Develop a "Strategy of Synergy"
- Multiple channels of communication
- Cumulative impacts are greater than the sum

Knowledge is a scarce national resource.

W. Edwards Deming, engineer, professor and consultant

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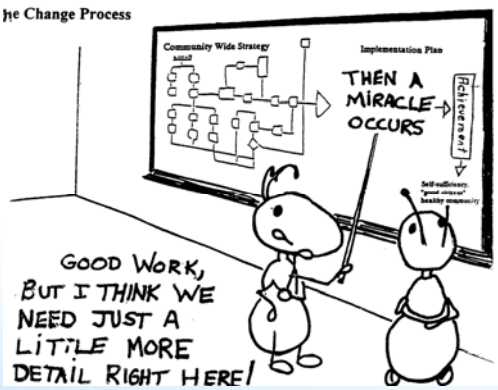
Implementation

Ideas are easy; implementation is hard.



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INNOVATIVE SOLUTIONS TO COMPLEX PROBLEMS

Types of research matter

BASIC RESEARCH: driven by the researchers (including "blue sky" thinking) and conducted by the researchers, maybe with SOME contribution by the end users

DEVELOPMENT RESEARCH: driven by the END USERS, conducted by the researchers (gives the "mortar" that puts together the different existing projects to produce the end results that the end user needs)

IMPLEMENTATION: driven by the END USERS and conducted by the END USERS, with SOME contribution of the researchers

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INNOVATIVE SOLUTIONS TO COMPLEX PROBLEMS

Implementation requires care and tending

Clearly defined responsibility / assignments
Understanding the end user
Follow-up and attention
Time and resources
Variety of delivery mechanisms
Communication and collaboration
Team efforts – no solos
Energy and enthusiasm

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INNOVATIVE SOLUTIONS TO COMPLEX PROBLEMS

Performance Measures

If you can't measure it, you can't manage it

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INNOVATIVE SOLUTIONS TO COMPLEX PROBLEMS

Choose measures carefully

- Choose Resource Allocation, Process, and Output metrics, and monitor them regularly (quarterly or semi-annually)
- Set minimum standards and improvement goals for each metric
- Communicate performance expectations to staff: metrics, standards, goals, timelines
- Have a systematic process to implement promising research results and products

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Closing Thoughts

"I know nothing about the subject,
but I'm happy to give you my expert opinion."

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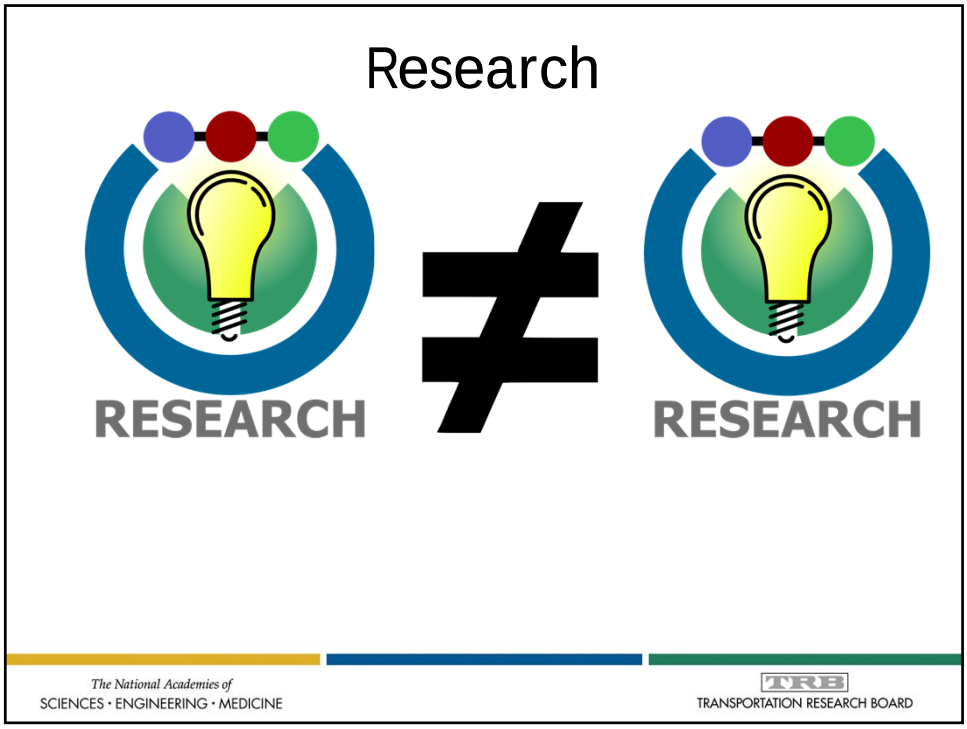
TRANSPORTATION RESEARCH BOARD

Implementing Research
Montana Peer Exchange
September 12 - 14, 2017

Research

Diligent and systematic inquiry or investigation into a subject in order to discover or revise facts, theories, applications, etc.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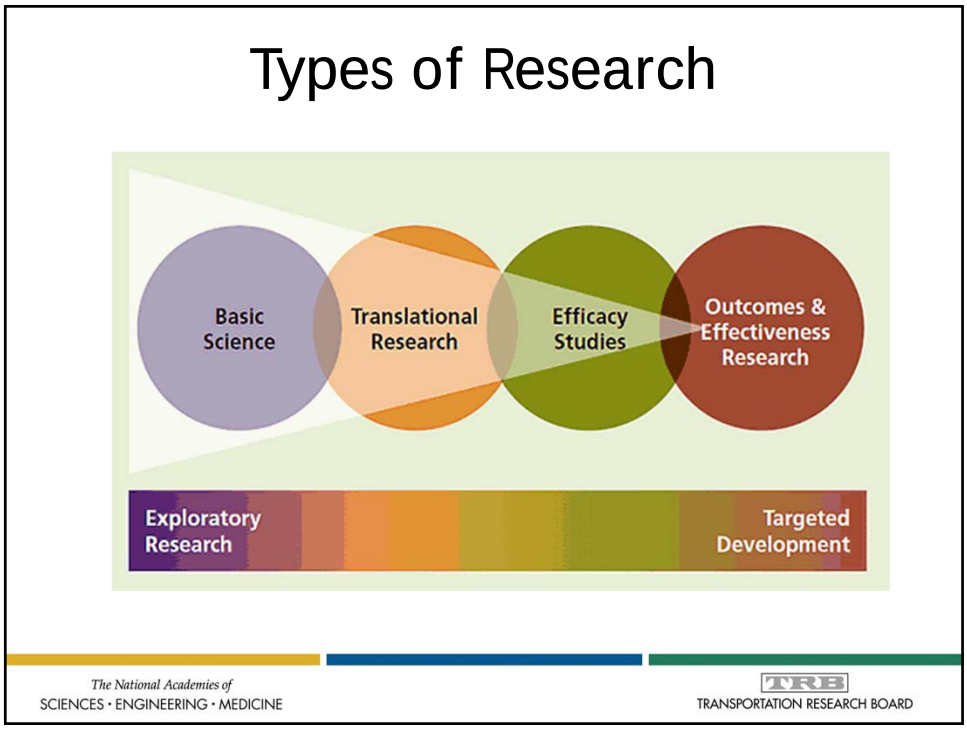
Types of Research
Basic Science
Translational Research
Efficacy Studies
Outcomes & Effectiveness Research
Exploratory Research
Targeted Development
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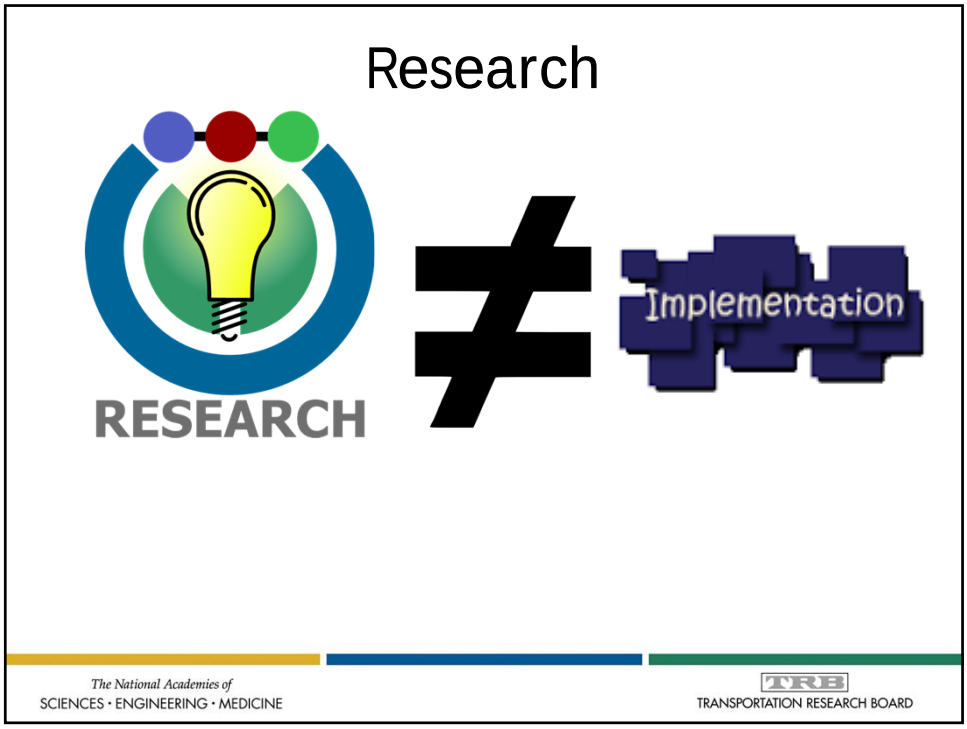
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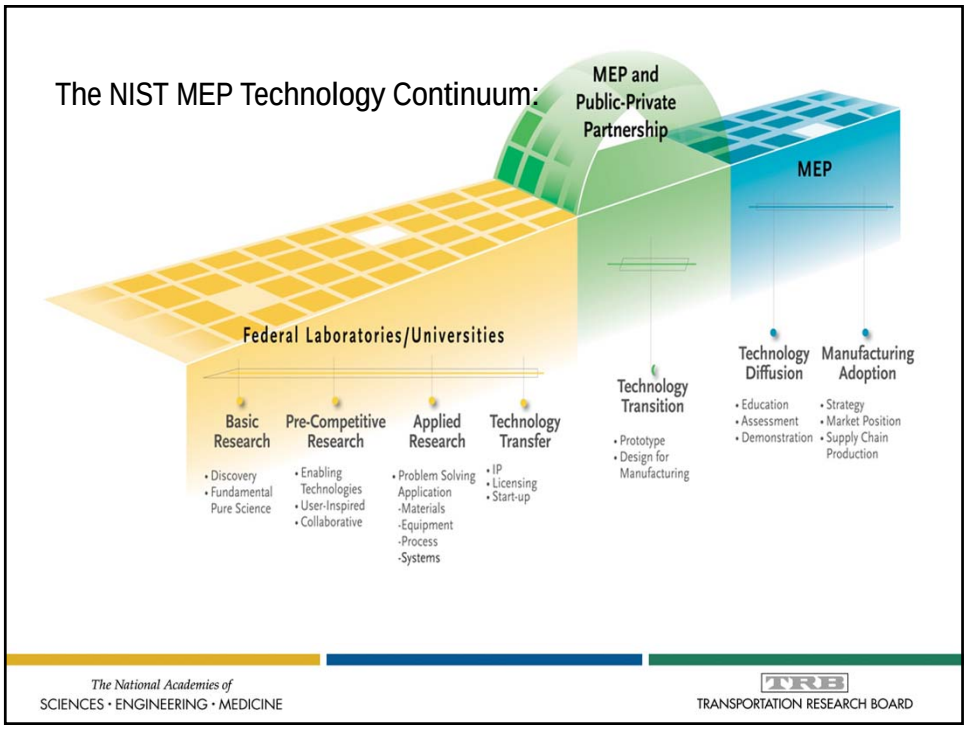
The NIST MEP Technology Continuum:
MEP and Public-Private Partnership
MEP
Federal Laboratories/Universities
Basic Research
• Discovery
• Fundamental Pure Science
Pre-Competitive Research
• Enabling Technologies
• User-Inspired
• Collaborative
Applied Research
• Problem Solving Application
-Materials
-Equipment
-Process
-Systems
Technology Transfer
• IP
• Licensing
• Start-up
Technology Transition
• Prototype
• Design for Manufacturing
Technology Diffusion
• Education
• Assessment
• Demonstration
Manufacturing Adoption
• Strategy
• Market Position
• Supply Chain Production
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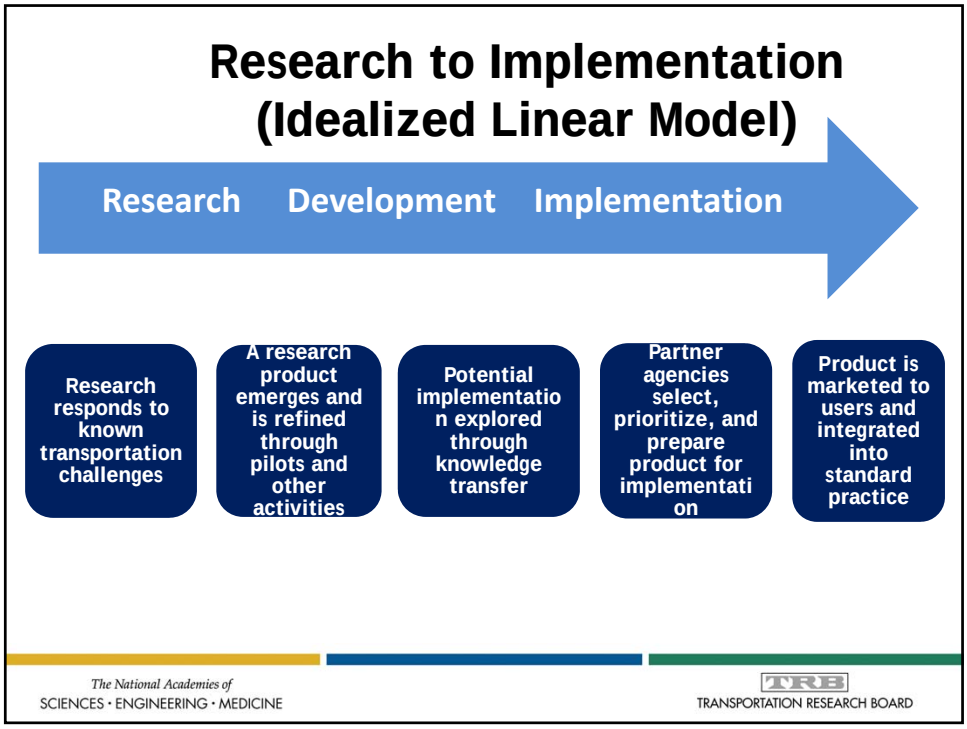
Research to Implementation
(Idealized Linear Model)
Research
Development
Implementation
Research responds to known transportation challenges
A research product emerges and is refined through pilots and other activities
Potential implementation explored through knowledge transfer
Partner agencies select, prioritize, and prepare product for implementation
Product is marketed to users and integrated into standard practice
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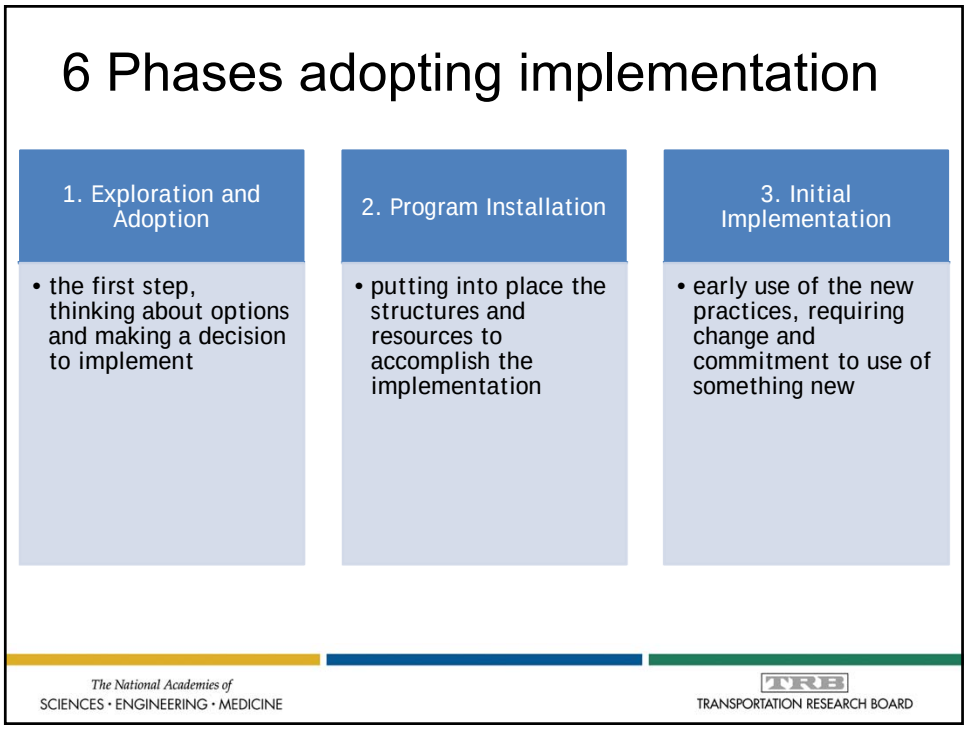
6 Phases adopting implementation
1. Exploration and Adoption
• the first step, thinking about options and making a decision to implement
2. Program Installation
• putting into place the structures and resources to accomplish the implementation
3. Initial Implementation
• early use of the new practices, requiring change and commitment to use of something new
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6 Phases of adopting implementation

4. Full Operation	5. Innovation	6. Sustainability
• experienced change, learning the new way of doing things is integrated into practitioner and organizational and community practice	• evaluation of practice over a sufficient time to determine if the new practice is beneficial to users	• ensuring long-term survival and continued effectiveness.

Implementation? (Example)

SHRP2

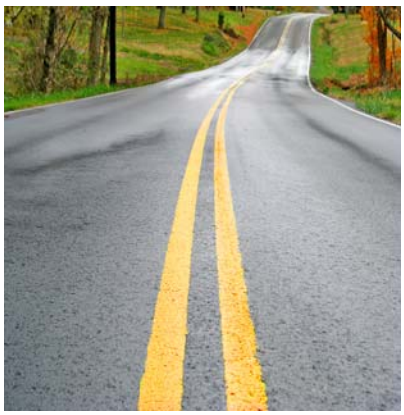
Research (2007 - 2013)
- 100+ research projects
- Administered by TRB

Development

Conversion of research results into 65± products that are usable by implementing agencies
- Pilot testing and refinement of products

Implementation
- Partner agencies prioritize products for implementation
- State DOTs and other agencies integrate products into current transportation practices

Implementation Defined (SHRP2)



1. Implementation is the **routine use** of a SHRP2 product
2. Carried out by **State DOTs** and other implementing agencies
3. Focus on **high-priority products** for national adoption, with lesser efforts on other products

Development Activities

- **Activities include development of:**
  - **Guidebooks**
  - **Training programs**
  - **Model specifications and/or standards**
  - **Web tools**
  - **Webinars and workshops**
  - **Pilot tests of products**

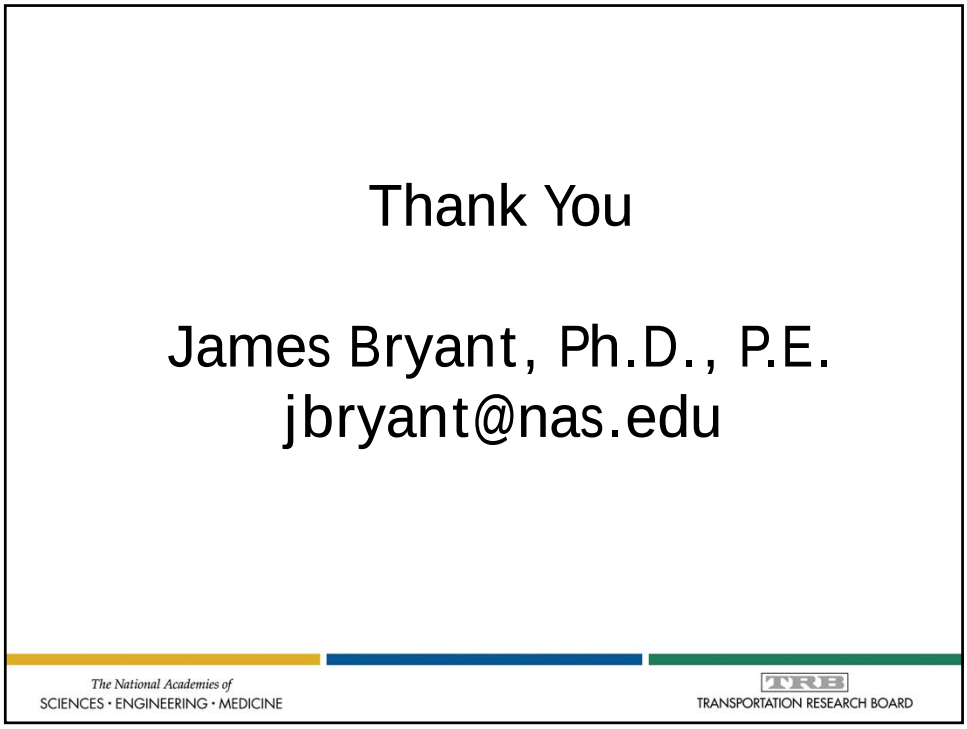
Implementation Keys to Success

- What's missing in our traditional technology deployment approaches? We have been working at this for over 100 years.
- Know the Audience and Stakeholders: Assumptions
- Innovation Continuum: **Define products. Additional developmental activities are always needed.** Many products are new processes/procedures
- Define Success: have realistic expectations, locate champions and lead users, don't under estimate IT complexities
- Develop and execute strategic and tactical plans
- Manage deployment progress and budget
- Monitor and evaluate tactics and outcomes

Context and People

- Implementation must account for the economic, cultural, institutional, political, and technological context in which the innovation will be introduced
  - ➢ *Technologies must be adapted to actual context*
  - ➢ *Institutional innovation may required adapting the* context itself
- Face-to-face interaction is critical
  - Meet users, see innovations in practice, learn limitations
  - Funds for travel, scan tours, loaned staff

Working together – Researchers & Implementers


Thank You
James Bryant, Ph.D., P.E.
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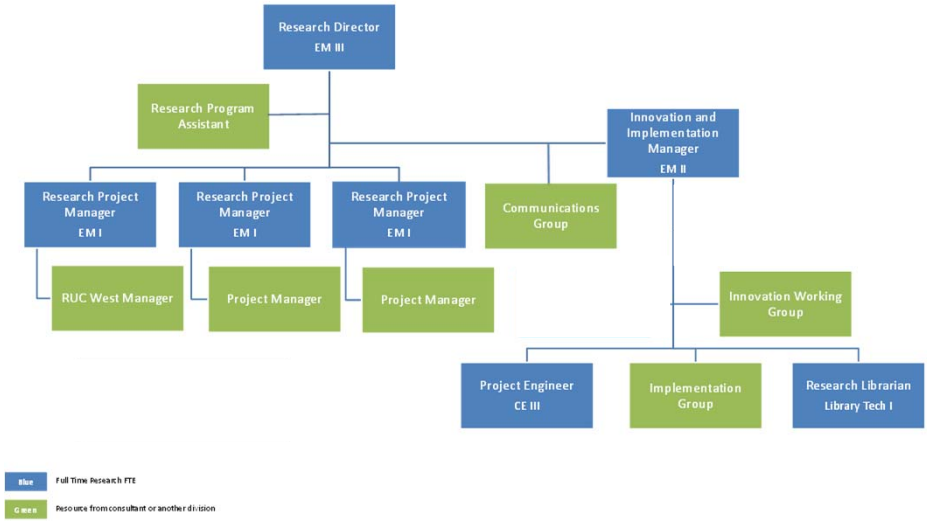
Utah DOT
Research and Innovation

IMPLEMENTATION, PERFORMANCE MEASURES, AND VALUE OF RESEARCH

PATRICK COWLEY & DAVID STEVENS

SEPT. 12, 2017

Utah Department of Transportation
Division of Research and Innovation



What We Do:

Implementation

Research Projects, TRB idea implementation, Innovation & Efficiencies

2016 UDOT research peer exchange best practices

Define as using the **results or products** from research projects.

Each project could have unique implementation goal: what success looks like.

Each project will have its own implementation planning worksheet, updated periodically.

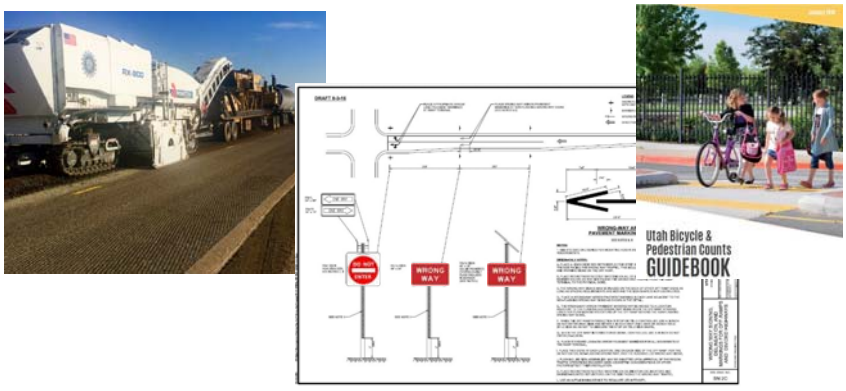
Keys we've identified for successful implementation of research results

Implementation

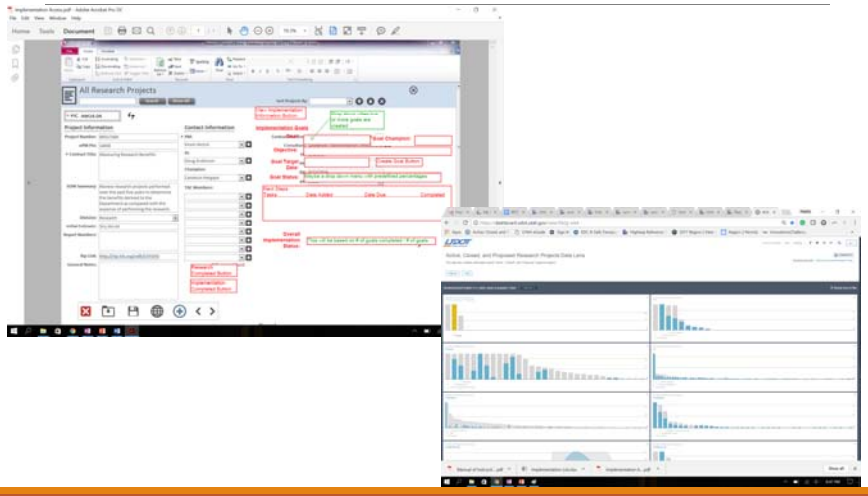
Keys for successful implementation:

- Clear research objectives
- Implementation planning
- Leader support in multiple divisions
- Implementation steps in research
  - Draft specification or design
  - Manual or training
  - Marketing
- Implementation opportunities

Implementation



Performance Measures



Performance Measures

Prioritizing research needs
- Importance and Implementation (rankings)

Conducting and managing research
- Scope, Schedule, and Budget

Implementation
- Benefit/Cost

Performance Measures

Implementation results

Funding adherence

Schedule adherence

Program feedback
- Peer exchange program
- Project level survey
- Benefit-cost studies

Value of Research

Benefit/Cost =

Number x Value x Percentage

Contract + TAC + PM costs

Note: Total program B/C includes projects where benefits could not be identified.

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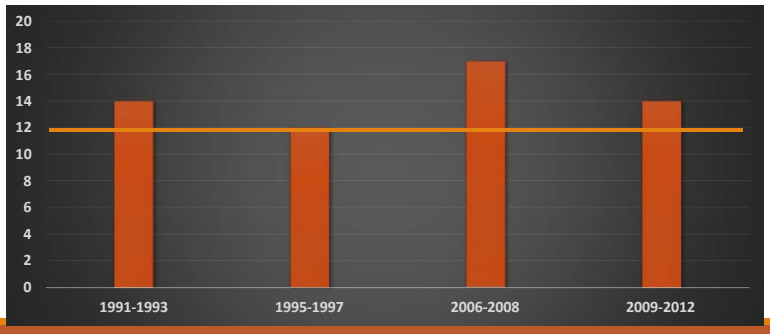
Value of Research

2016 –B/C ≈ 14 on 66 projects worth $68.2 million

2010 – B/C ≈ 17 on 41 projects

2000 – B/C ≈ 12 on 22 projects

1995 – B/C ≈ 14 on 18 projects



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Value of Research

Program-level Benefit-Cost study done about every 5 years for recent years' research projects.

Lessons learned in this process plus most valuable research

Value has two meanings: Time and money savings, and intrinsic value to our customers.

Qualitative Benefits

- Pavement & bridge life extension
- Improved rehab & maintenance methods
- Highway design advancements
- Traffic control enhancements
- More efficient & trained staff
- Reduced materials costs
- More efficient equipment
- Better utilize existing equipment
- Improved management
- Congestion mitigation for commuters
- Crash avoidance
- Noise reduction
- Avoid inefficient highway expenditures
- Modify standards to eliminate poor designs
- Replace specs that are unsuccessful
- Reassign staff where not productive
- Find alternatives to inferior technologies
- Informed staff & stakeholders
- Understanding industry advancements
- Knowledge of future trends & challenges
- Construction zone enhancements
- Crash severity reduction

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Value of Research

Key Question:

Are we providing our customers with a quality product?

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Technical communications for transportation professionals

Value of Research

Fitting Together the Puzzle…

Brian Hirt
Montana DOT Peer Exchange
September 12-14, 2017

An imperfect analogy

John Wanamaker

> Half the money I spend on advertising is wasted; the trouble is I don't know which half.

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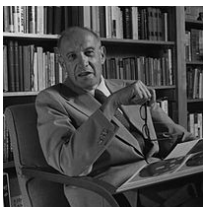
In our terms

- There is a wide belief within the DOT community that **research is valuable**.
  - First, how do we **show this to be true**?
  - Second, how do we **measure the value**?

> If you can't measure it, you can't manage it.



Peter Drucker

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Pieces of the same puzzle

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Pieces of the same puzzle

- Implementation is **outcome-based**
- Performance measures are **metrics-based**
- Neither is perfect
  - Does putting research to work necessarily equate to value?
  - Does a single improved metric mean overall system improvement? And can metrics always be tied back to research?
- But they're a good place to start

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National efforts to establish value of research

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AASHTO

- Value of Research Task force
- Compendium of High Value Research
  - Since 2009
  - States submit projects — **self identifying**
  - States vote on top 16 projects — **peer identifying**
  - Some use of quantifiable benefits
  - "Better, Faster, Cheaper" compendium
  - Brochures
- Online Resources

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NCHRP

- *Evaluating Implementation of NCHRP*
  - 2014 report
  - Approach: NCHRP Outreach to customers
    - Interviews
    - Surveys
  - Products
    - 4-page brochure: "Implementing NCHRP Research: Proven Practices, Avenues for Improvement"
    - "Paths to Practice" case studies
  - Recommendations incorporated into NCHRP Implementation Facilitation Plan 2015-2020

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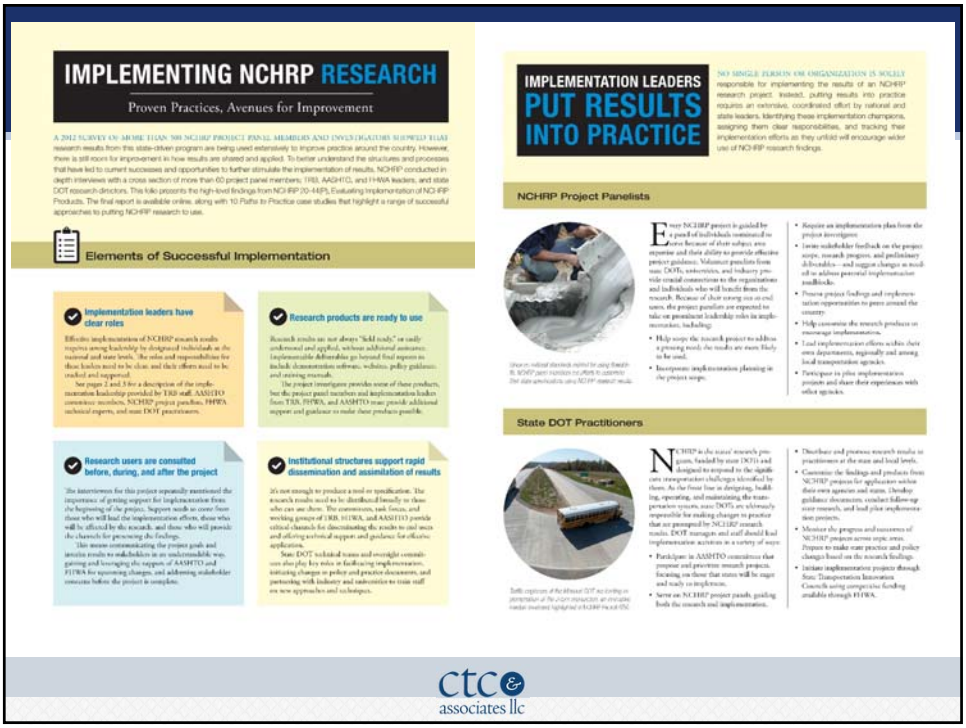

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TRB Senior Staff

TRB senior staff play a critical role in coordinating the implementation of NCHRP research. As the facilitators for NCHRP project panels, they guide many of the key decisions that impact implementation success, from the selection of engaged project panelists to the scoping of relevant research plans. They serve as the go-to source for information on project goals and progress, making them key leaders in implementation planning and coordination.

- Work with the project panels to ensure that implementation planning is incorporated into the scoping of the research project.
- Communicate project status, expected results, and implementation goals within TRB, to AASHTO committees, and to relevant FHWA offices.
- Help task forces plan implementation support materials and follow-up activities.
- Ensure stakeholders are aware of implementation opportunities and pilot efforts underway at state agencies.
- Track the steps being taken to implement results, and monitor the need for assistance.
- Identify project funds or other resources to support dissemination and technology transfer efforts, such as communication materials, webinars, peer exchanges, training courses, and pilot projects.

FHWA Executives and Staff

FHWA representatives participate in over NCHRP project panels, providing both subject area guidance and national context for the work being done. Their visible and vocal support for the research, both while it is underway and when the findings are ready to be shared, is critical for user acceptance and confidence in going forward with implementation. Additional implementation leadership provided by FHWA should include:

- Submit problem statements for funding consideration by NCHRP, as inspired by FHWA research roadmaps and a keen understanding of state DOT obligations, challenges, and goals.
- Develop and update guidance documents using NCHRP research results.
- Encourage research-driven changes in practice among state DOT executives and FHWA staff.
- Use NCHRP research as the technical basis for national initiatives.
- Lead marketing efforts to promote new products and practices resulting from NCHRP research, leveraging state connections with FHWA resource centers and division offices.
- Document and share implementation successes through lead state and pilot initiatives.
- Provide resources for state adoption of innovations through the Save Transportation Innovation Council Incentive Program.

AASHTO Committee Members

AASHTO standing committees, subcommittees, and technical committees are integral to the successful implementation of NCHRP research. State DOT members of these groups have a vested interest in seeing the results of research applied as their agencies, base the technical expertise to oversee the research, and often make the final recommendations for official AASHTO specifications and guidance documents. Their leadership roles in implementation should include:

- Submit NCHRP problem statements based on committee members' experience and ongoing evaluation of current AASHTO specifications, standards, and guidance.
- Review interim and final project deliverables. Provide feedback to the NCHRP project panels and TRB staff liaisons.
- Plan ahead to incorporate NCHRP project findings into AASHTO documents. Work with NCHRP project panels to address potential challenges for state implementation.
- Work with TRB to develop implementation tools, such as webinars and software, that will improve understanding of the research and use of the results.

MILESTONES FOR IMPLEMENTATION

Implementation activities should be an integral part of every step in the life cycle of a research project. Coordinated efforts by multiple national and state leaders from the beginning to the end of the project will enhance the likelihood of successful application of NCHRP research results. These milestones are key checkpoints for tracking implementation progress and anticipating missed resource needs.

Implementation Focus for Project Milestones

Project selection
Fund projects that are in broad demand and ensure the research plans address pressing needs. States will be more eager to implement the results.

Panel formation
Select a mix of subject area experts—some to provide technical guidance and others to provide real-world grounding—to ensure the results are implementable. Make sure that panel members understand their leadership role in implementation and are willing and able to help disseminate the findings.

Scoping the work plan
Include deliverables that will support use of the results, such as specification language, software tools, training materials, and dissemination audiences. Identify potential institutional, financial, and technical challenges to implementing the findings and make plans to address them.

Research in progress
Involve potential end users well before the project concludes by sharing preliminary results with state DOT subject area experts and inviting feedback about potential changes to practice from industry representatives. Work with AASHTO and FHWA to plan for updates to national guidance documents. Establish user-liaison groups and implementation task forces when needed.

Final deliverables
Develop an implementation plan for distributing final results, supporting state customization efforts, and responding to requests for technical assistance. Work with investigators to translate findings for use by state and national organizations. Develop a range of communication materials to promote the findings and enhance end users.

Dissemination and technology transfer
Provide technical guidance and support for communicating project results and encouraging implementation at the state and local levels. Consider follow-up projects to aid technology transfer.

Paths to Practice Case Studies

These two-page case studies, available online, describe in detail a range of specific ways that NCHRP implementation leaders have taken to apply research results.

- National Partners Drive NCHRP Implementation
- States Span Effective Use of NCHRP Products
- A Revolution in Highway Safety Planning
- Updating the Authoritative Guide on Capacity
- Standards and Training for Sewer Permission
- Optimizing AASHTO's Bridge Software
- How to Minimize Delving's Environmental Impact
- Passing Flowable Fill Guidance to Work
- Research Makes the Case for Roundabouts
- Safer Intersections for Rural Highways

ACKNOWLEDGEMENT OF SPONSORSHIP This work was sponsored by the American Association of State Highway and Transportation Officials, in cooperation with the Federal Highway Administration, and was conducted in the National Cooperative Highway Research Program, which is administered by the Transportation Research Board of the National Academies.
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NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM
PATHS TO PRACTICE

TRB TRANSPORTATION RESEARCH BOARD OF THE NATIONAL ACADEMIES

Highway Capacity Manual

Updating the Authoritative Guide on Capacity

The Highway Capacity Manual is the go-to source for information about evaluating the capacity of transportation facilities. The latest edition provides practitioners with the most up-to-date analytical tools by incorporating more than $5 million in NCHRP research and drawing on a broad and extensive effort by the transportation community.

"The HCM's new multimodal analysis tools look at the urban environment from the point of view not just of traffic engineers but of travelers."

"The manual is larger than any one committee."

Responding to Evolving Practices

For more than 60 years, the Transportation Research Board's *Highway Capacity Manual* (HCM) has provided engineers with state-of-the-art techniques for analyzing the capacity and level of service for transportation facilities, including roadways, intersections, and roundabouts. The HCM is the definitive guide for transportation engineers worldwide who wish to determine how much traffic a transportation facility can safely accommodate at a prescribed level of service, defined by such performance measures as average traffic speed and travel time.

However, as methods for evaluating capacity and level of service evolve, updates to the HCM are needed to provide transportation practitioners with the best available analytical tools. Since its first publication in 1950, the HCM has seen five editions, the most recent issued in 2010 (www.trb.org/Main/Blurbs/164718.aspx). TRB's 2010 update to the HCM:

- For the first time, provides users with a method for an integrated multimodal analysis of urban streets.
- Addresses active traffic management such as managed lanes and smart lanes.
- Gives planners the tools to quickly determine the size of future facilities.
- Includes an electronic volume with comprehensive case studies.

Paths to Practice

Incorporating a broad range of NCHRP research findings

The 2010 HCM was a major undertaking, incorporating more than $5 million in research from 10 NCHRP projects and two FHWA projects.

One of those projects, NCHRP Project 03-02, exposed default values for analyzing capacity and level of service. Engineers use default values—such as passenger car equivalents and free-flow speeds—when there is insufficient local field data for analysis. The defaults in the previous edition of the HCM did not fully reflect the variety of traffic conditions across the United States and sometimes yielded analyses of limited usefulness.

"NCHRP 03-02 helped improve the accuracy of the most significant default values for the HCM," says John Zegeer, principal investigator for NCHRP 03-02, and senior principal engineer in Kittelson & Associates. "This makes analyses of capacity and level of service much more reliable."

Another project, NCHRP 03-04, developed a companion guide to the HCM on how to apply its methodologies to real-world problems. "Prior to the 2000 edition, the HCM only provided simple example problems to illustrate methodologies," says Tom Creasey, transportation planning manager with Stantec. Creasey chaired the NCHRP 03-04 panel and is secretary of the TRB Highway Capacity and Quality of Service of Urban Streets Committee, which oversees the HCM. "The companion guide relocates users on how to use the HCM for complex problems that require more than plugging numbers into formulas," Creasey says.

Creasey was also a member of the panel for NCHRP 03-70, which incorporated

(continued)

Updated worldwide, the Highway Capacity Manual is the definitive guide for determining the capacity and level of service for transportation facilities.

Implementation Strategies AT A GLANCE

- **Cooperative National Effort:** Updating the Highway Capacity Manual involved broad collaboration among TRB, AASHTO, FHWA, and other transportation stakeholders.
- **An Ongoing Research Commitment:** Refining and building on previous work facilitated the implementation of past successful research.
- **Keeping Users in Mind:** Transportation practitioners were consulted at multiple stages of the revision process to make sure the new HCM would meet their needs.
- **Dissemination through Partners:** TRB's capacity committee and the Institute of Transportation Engineers used webinars and other channels to share updates and facilitate use of the new HCM.

NCHRP—Transportation research that works

Objective national highway research since 1962 • Focused on practical problems of state DOTs • Contract researchers competitively selected • Overseen by balanced panels of technical experts • Reviewed by TRB highway specialists

methods for the multimodal analysis of urban streets. "The HCM's new multimodal analysis tools look at the urban environment from the point of view not just of traffic engineers but of travelers," he says. "The multimodal analysis tools were created based on how drivers, pedestrians, bicyclists, and transit users rated their experience of trips." The update will make the HCM far more useful to planners, helping them to evaluate the trade-offs involved in how various modes share an urban street.

"The manual is larger than any one committee," says Ray Derr, transportation planning manager with Stantec and chair of the HCQS Committee, which oversees the HCM. "The complexity path relocates users on how to use the HCM for complex problems that require more than plugging numbers into formulas," Creasey says.

Creasey was also a member of the panel for NCHRP 03-70, which incorporated

(continued)

A collaborative effort by the transportation community

The HCM is a definitive guide that embodies decades of research. Updating it was an enormous effort that involved the cooperation of TRB, AASHTO, and FHWA over a number of years. "The manual is larger than any one committee," says Ray Derr, transportation planning manager with Stantec and chair of the HCQS Committee, which oversees the HCM. "The complexity path relocates users on how to use the HCM for complex problems that require more than plugging numbers into formulas," Creasey says.

Creasey was also a member of the panel for NCHRP 03-70, which incorporated

(continued)

NCHRP and FHWA Research for the 2010 HCM Update

- NCHRP Project 03-60, Capacity and Quality of Service of Interchange Ramp Terminals
- NCHRP Project 03-60A, Validation and Enhancement of the Highway Capacity Manual's Interchange Ramp Terminal Methodology
- NCHRP Project 03-64, Highway Capacity Manual Applications Guide
- NCHRP Project 03-65, Applying Roundabouts in the United States
- NCHRP Project 03-70, Multimodal Level of Service Analysis for Urban Streets
- NCHRP Project 03-75, Analysis of Freeway Weaving Sections
- NCHRP Project 03-79, Measuring and Predicting the Performance of Automobile Traffic on Urban Streets
- NCHRP Project 03-82, Default Values for Capacity and Quality of Service Analyses
- NCHRP Project 03-85, Guidance for the Use of Alternative Traffic Analysis Tools in Highway Capacity Analyses
- NCHRP Project 03-92, Production of the Year 2010 Highway Capacity Manual
- Two FHWA projects: Evaluation of Safety, Design, and Operation of Shared-Use Paths; and Active Traffic Management Measures for Increasing Capacity and Improving Performance

"Focus groups provided critical insights into the content and organization of the manual."

Among many other updates, the 2010 Highway Capacity Manual gives users tools to incorporate bicycle and pedestrian planning into their traffic engineering decisions.

coordinated by ITE, as well as ITE meetings, according to Derr. "The HCQS is a very busy committee," he says. "Dissemination is a big part of their job."

"The manual has a huge amount of weight. It's widely used by both local agencies and state DOTs to determine how to keep traffic moving."

Another major route for the impact of the HCM is companion software developed and maintained by the University of Florida's McTrans Center. "The Highway Capacity Software is frequently updated and faithfully implements HCM procedures," Derr says, "giving transportation professionals an important tool for applying HCM methodologies."

Implementation Success

Because of its wide use and impact on transportation professionals worldwide, the HCM is a excellent example of a successful implementation of NCHRP research. "It would be hard to think of a better implemented project than the HCM," Creasey says. "Not only does it meet a demonstrated need, but it has met the challenge of accommodating more and more needs in response to feedback from the user community."

The result is a manual that is increasingly useful to engineers with each update. "The latest edition significantly changes how engineers evaluate the possible effects of highway projects," says Zegeer. "It gives them better tools than ever for evaluating capacity and quality of service."

ACKNOWLEDGEMENT OF SPONSORSHIP This work was sponsored by the American Association of State Highway and Transportation Officials, in cooperation with the Federal Highway Administration, and was conducted in the National Cooperative Highway Research Program, which is administered by the Transportation Research Board of the National Academies.
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NCHRP / ACRP

- *Development of a Systematic Approach for Tracking the Impacts of TRB Cooperative Research Programs*
  - 2016 Report
  - Examined research impacts measurements in other sectors domestically and globally
    - Interviews
    - Literature search
  - Proposed plan and strategies

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NCHRP

- *Evaluating Impacts of the U.S. Domestic Scan Program's Technology Transfer Model*
  - 2013 TRB Paper in *Transportation Research Record*
  - Analysis of six early scans
    - Participants – surveys, webinars, interviews
    - Nonparticipants (second-hand users) – surveys
    - Asked about **value** and **after-action**
  - Conclusions

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Other efforts

- FHWA Research & Technology Evaluation Program

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Other efforts

- State Efforts—2015 AASHTO RAC session

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The puzzle, revisited…

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Thanks!

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402-770-9067

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Montana Peer Exchange: Ohio DOT

CYNTHIA JONES
OHIO DEPARTMENT OF TRANSPORTATION
SEPTEMBER 13, 2017

Focus Areas

- Implementation
- Performance Measures
- Value of Research

Implementation

- HISTORY
- CATEGORIZATION
- INTENTION
- SOLICITATION
- PROPOSALS

Implementation - History

- 2009: new implementation position created
- Peer Exchanges
  - 2011: in California
  - 2013: in Florida
- 2012: able to fill that role in April
- Retrospective on projects completed 2007 – 2012
- 2014: Created two Project Manager roles and lost this implementation role

Implementation - Categories

- Defined categories:
  - Knowledge enhancement
  - Cost Savings
  - Time Savings
  - Leverage
- Other measures:
  - Specifications
  - Policies and Procedures
  - Students engaged

Implementation - Intention

- Definition: Using what we have learned
- Ownership:
  - Project manager
  - Researcher
  - Technical team
  - DOT leadership
- Process
  - Discussed and encouraged throughout project life cycle
  - District research naturally leads to implementation

Implementation - Solicitation

Research Program has funding available to help streamline and improve or solve work processes to ensure Ohio's transportation system meets the evolving needs of our residents and the traveling public. Detail the description of the idea/problem/process/product

- How is ODOT currently handling this
- What goal do you envision to get out of this research
- Define specific research items/tasks must be considered
- How can this benefit ODOT? Cost savings/improve quality/efficiency/safety/policy change

Implementation - Proposals

- Proposal includes Benefits/Potential Application of Research Results and Research Deliverables
- Quarterly Report – any implementation this quarter?
- Final Report – Recommendations for Implementation of Findings
  - Steps needed
  - Expected benefits
  - Potential risks and obstacles, with overcoming strategies
  - Potential users and impacted organizations
  - Suggested time frame and estimated costs
  - Recommendations how to evaluate ongoing performance

Performance Measures

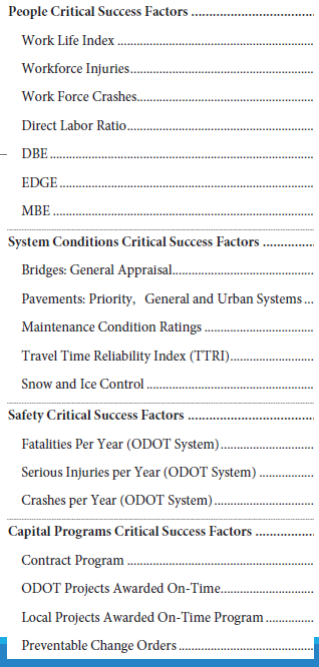
- HISTORY
- AGENCY
- VALUE

PM - History

- 2010: began Annual Report
- 2012: interest in program measures
  - Contracting time
  - Funds spent

PM – Agency

- Critical Success Factors
  - People
  - System Conditions
  - Roadway Safety
  - Capital Program
- Research is not identified
- Research can impact all of these



People Critical Success Factors
- Work Life Index
- Workforce Injuries
- Work Force Crashes
- Direct Labor Ratio
- DBE
- EDGE
- MBE

System Conditions Critical Success Factors
- Bridges: General Appraisal
- Pavements: Priority, General and Urban Systems
- Maintenance Condition Ratings
- Travel Time Reliability Index (TTRI)
- Snow and Ice Control

Safety Critical Success Factors
- Fatalities Per Year (ODOT System)
- Serious Injuries per Year (ODOT System)
- Crashes per Year (ODOT System)

Capital Programs Critical Success Factors
- Contract Program
- ODOT Projects Awarded On-Time
- Local Projects Awarded On-Time Program
- Preventable Change Orders

PM - Value

- Consistency
- See trends
- Redirect staff
- Discuss with leadership

Value of Research

- ANECDOTAL
- ESTIMATING
- LEADERSHIP SHIFT
- CONNECTING TO INTERNAL COMMUNICATIONS
- VISIBILITY

Value - Anecdotal

- Customers who implement tell others
- Leadership sees that research impacts agency
- Research has advocates

Value - Estimating

- Cultural hesitance
- Sometimes no direct comparisons
- What wasn't used
- Quantities
- Costs
- Risks

Value – Leadership Shift

- Political Agency
- January 2011 new Governor & DOT Director
- January 2019 new leadership
- How do we share our value
- How do we tell a compelling story

Value - Communications

- District Research results
- Advocates share:
  - excitement about results
  - Value of process
- The Loop videos
- Team Up ODOT presentations

Value - Visibility

- 2013 -> 2017: evolution of acceptance
- High impact projects including:
  - Enterprise Architecture
  - GPS/AVL
  - Stream Channel Mitigation
- Governance
  - Approves projects
  - Directs Technology Council for research implementation
  - Operating results

Research Implementation, Performance Measures and Value of Research

Hafiz Munir, Ph.D., PE | Research Manager
MnDOT Research Service & Library

DEPARTMENT OF TRANSPORTATION

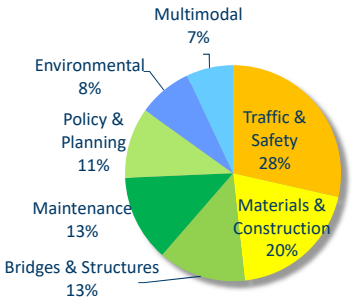
Outline

- Program Overview
- Implementation Process
- Benefit Quantification
- Performance Measures/Tracking
- PM & Q Implementation Sub-group

MnDOT Research Program

Administer MnDOT Research and LRRB

- Prioritized Ideas
- Need Statements
- Research Proposals
- Research & Implementation



Implementation is incorporated throughout the research cycle

RS & L Section

RESEARCH MANAGEMENT

- Helps articulate your research needs
- Finalizes research work plans
- Manages research projects
- Research and Implementation

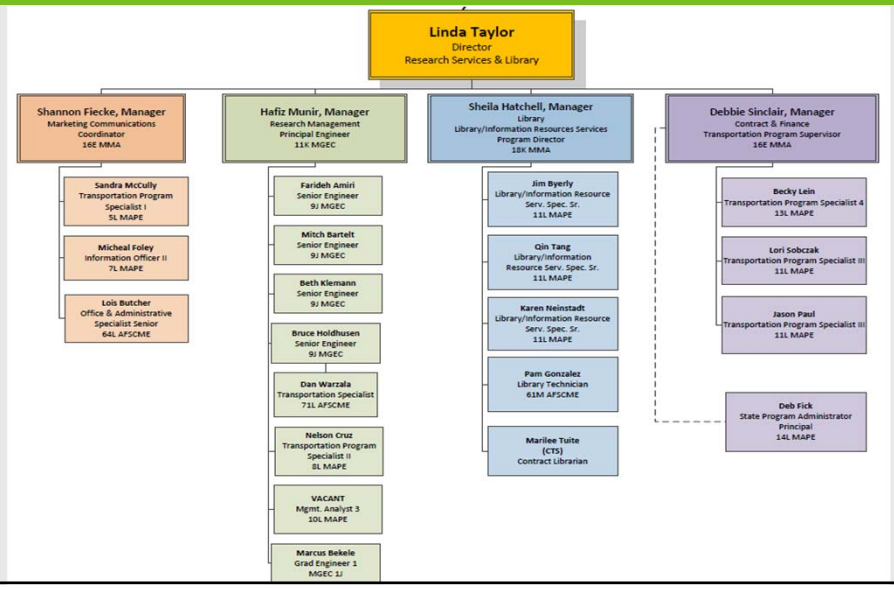
FINANCE & CONTRACT SERVICES

- Assists with contracting and funding issues

MARKETING & COMMUNICATIONS – provides information and results to transportation practitioners and the general public

LIBRARY – a great resource

Research Services & Library



Implementation?

- Putting new ideas, technologies, and research results into day-to-day practices to improves MnDOT operation and business practices
- Should solve a long term problem or change how we do business or make a difference
- Implementation projects help save lives, time, money, or resources
- Scalable and deployable
- Collaborative approach

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Implementation Program Overview

- Develop projects for MnDOT Districts/Offices & locals
- Build on past research or innovation
- Provide funding and staff resources
- Our role is to provide assistance
- Require a committed champion or TL or has staff support
- About 10 projects per year – big or small
- Projects typically last 1-2 years
- Funding decisions made by TRIG or LRRB-RIC

Types of Projects

Can do,,,

- Manual or best practices guides
- Training curriculum or video
- New technology pilot
- Pilot new practice or test
- Validate a proof-of-concept
- Evaluate innovative equipment

Can't do,,,

- Standard equipment purchases
- Mass deployment
- Basic research

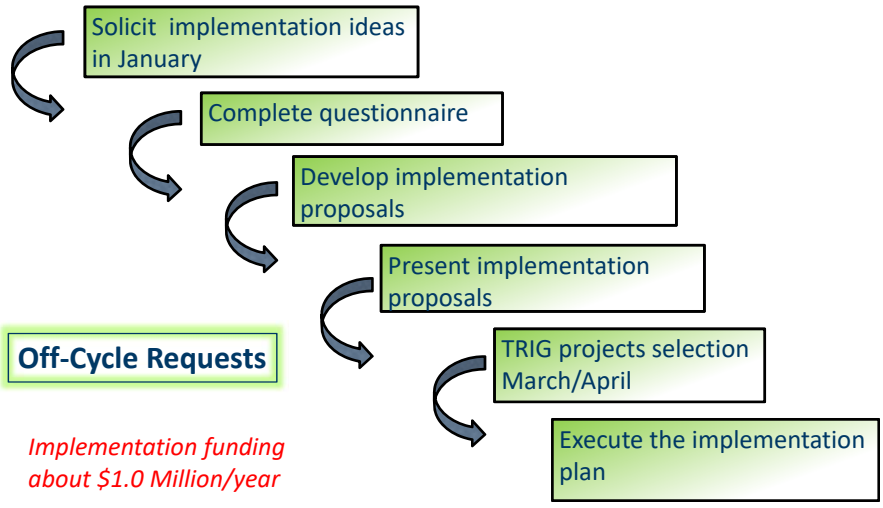
Technology Transfer Products

Implementation Project Ideas

Sources:

- IdeaScale Website
- Focus Groups (LRRB)
- Completed Research Projects, Close-outs/Evaluations
- Facilitated Discussions
- TRIG or LRRB and/or LRRB-RIC
- Out-of-State Trip Reports
- Research Synthesis
- Research Proposals – a new step

Implementation Project Development Process



Implementation Proposal Development

- Implementation plan/project proposal must include
  - The opportunity, its application, and past efforts
  - Advisors, stakeholders and others
  - Work plan tasks and budget
  - Innovation products
  - Communication plan
  - Future steps to deploy the innovation

Implementation Engineer Responsibilities

- Coordinates annual implementation program solicitation
- Works with specialty offices, districts and locals
- Reviews completed projects & closeout information for possible implementation opportunities
- Assists project champions/TLs in developing implementation plans
- Facilitates funding boards/committee meetings

Benefits and Implementation Tracking

- Developed a process for quantifying the benefits of our research work
- Identify opportunities early in the process
- Added a new step in research proposals process
- Potential implementation & benefit opportunities are identified in the research proposal
- Electronically tracked in Automated Research Tracking System (ARTS)
- Have quantified benefits on a few selected projects

ARTS Benefit Information

Benefit Options

- Construction savings
- Decrease engineering/ administrative Costs
- Decrease lifecycle costs
- Environmental aspects
- Impact on MnDOT policy
- Increase Lifecycle
- Operation and maintenance savings
- Safety
- Technology
- User Benefits

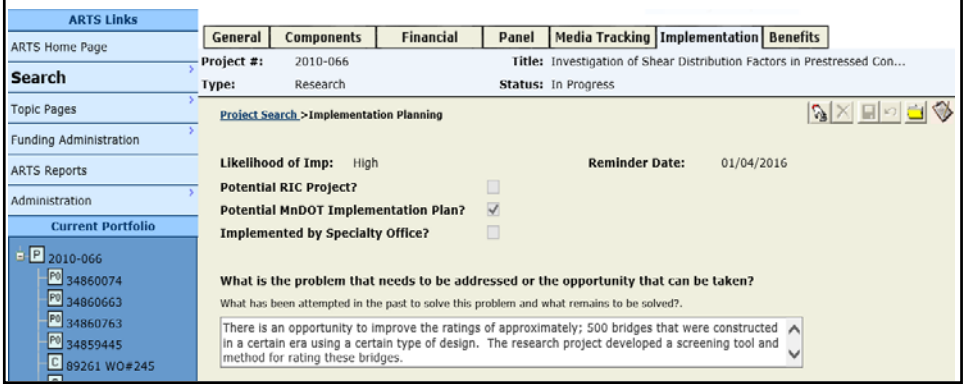
Project Number: 2015-032 **Status:** In Progress **Type:** Other Implementation
Title: Enhanced Pipe Inspection
Prog Number(s): MPR-5(010)

Contract #	Status	Effective Date	Expiration Date	Vendor
1002140	Active Project	5/24/16	7/31/17	None

App	Category	Impact	Quant. Rating Possible	Calculated By	Comment
Yes	Construction Savings (Materials, labor, equipment,time,quality)	High	Yes	Consultant	calculate the cost of a few problem projects, where multiple culverts had to be replaced due to construction defects, and the savings if those had not occurred
No	Decrease Engineering/Administrative Costs (Planning/design costs, paperwork)	N/A	No	N/A	
No	Decrease Lifecycle Costs	N/A	No	N/A	
No	Environmental Aspects (Pollution, hazardous waste reductions, recycling)	N/A	No	N/A	
No	Impact on MnDOT Policy	N/A	No	N/A	
No	Increase Lifecycle	N/A	No	N/A	
Yes	Operation and Maintenance Savings (Materials, labor, equipment, time)	Medium	Yes	Consultant	Better quality inspections for project scoping and maintenance planning, less uncertainty equals less cost in planning and design.
No	Safety (Reduction of crash frequency and/or severity)	N/A	No	N/A	
No	Technology (Technology transfer, new materials, new methods)	N/A	No	N/A	
No	User Benefits (Time, dollars)	N/A	No	N/A	

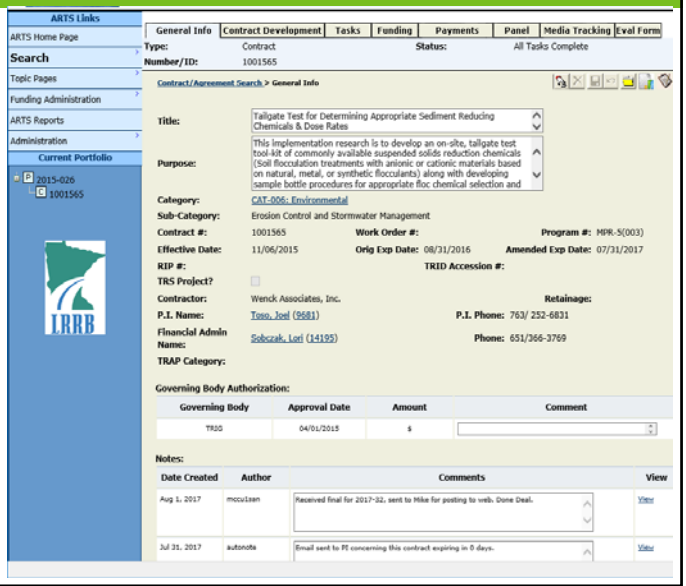
ARTS Implementation Information

- What is the problem that needs to be addressed?
- What needs to be accomplished to facilitate implementation?
- Identify the end-user products.
- Who are the stakeholders?
- List of the steps that will be required to implement research results.



Performance Measures Tracking

- Track performance measures for all projects in ARTS
- Tasks & scopes
- Budget & payments
- Task deliverables & % completed
- Timeliness
- Reports, publication
- Opportunities
- Documentation



Successful Implementation Projects

Maintenance

- GPS Mower Pilot Project
- Living Snow Fence using Willow Shrubs
- Lidar Guardrail Inventory

Bridge

- 3D Underwater Laser Scanner Equipment
- Bridge Maintenance Painting & Test Site Implementation
- UAV/Drones for Bridge Inspection

Materials

- Disc Shaped Compact Tension Test for Asphalt Pavements
- Design Guide for Ultra-thin and Thin Concrete Overlays

Traffic

- Sinusoidal Rumble Strip Design
- Automatic Flagger Assistance Devices (AFADs)
- Smart Signal System Implementation

Marketing Efforts

- Published final report
- Newsletters, reports, etc.
- Social Media/Blogs
- Webinars/Videos
- Outreach activities
- Website
- Presentations, conferences, booths, etc.
- News channels

The Research 'News Bureau'

Blog

Newsletter

Email

Social Media

New Videos

AFADs

FYA Tool & Video

- Automatic Vehicle Location for MnDOT Mowers
- AFADs: Automatic Flagger Assistance Devices
- Roundabout Myths
- Rumble Strips: Saving Lives in Minnesota
- Flashing Yellow Arrows Time-of-Day Tool

YouTube.com/MnDOTResearch

Challenges with implementing research results

- Quantifying benefits
- Tracking final results
- Staffing issues
- Lack of buy-in
- Long term funding for full scale deployment

Factors Associated with Successful Implementation Projects

- Dedicated funding
- Addresses a problem or need
- Research connection
- Demonstrate application
- Scaled appropriately
- Department priority
- Dedicated internal champion
- Support from District and/or Specialty Offices
- Technology transfer

Implementation Sub-group Feedback

1. What are the overarching concerns or challenges with research implementation in your agency's research program(s)?
2. What would you like to see as products of this subgroup?
3. Are there any past ideas or topics that this group can build on?

Georgia	Kansas	B.T. Harder, Inc.
Illinois	Mississippi	FHWA
Indiana	Ohio	
Wisconsin	South Dakota	
West Virginia	Utah	

Feedback Summary - Challenges

- Communication/coordination
- Tracking of progress/measures
- Documentation of research benefits, especially B/C
- Commitment
- Staffing (availability, changes)
- Lack of resources - $s, staff
- Ability to present facts
- Availability of time
- Training
- Other factors

What products they would like to see?

- Sharing best practices, policies, processes, tools, etc.
- Guidance for calculating B/C
- Compilation of initiatives from other state DOTs
- A streamlined process
- Case studies
- Documentation of successful practices
- Lessons learned from established implementation programs
- Coordination to implement national research results

DEPARTMENT OF TRANSPORTATION
Questions?
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On the web: mndot.gov/research

VERMONT

VTrans Research: Implementation, Performance Measures, Value of Research

Dr. Emily Parkany, P.E
Research Manager
Policy, Planning & Research Bureau
Vermont Agency of Transportation (VT AOT)

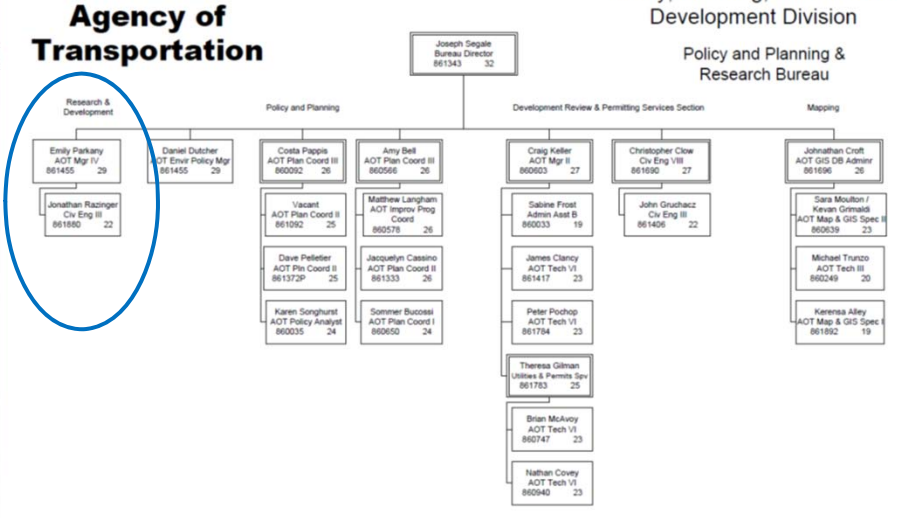
VTrans

VERMONT

Agency of Transportation

Policy, Planning, & Intermodal Development Division

Policy and Planning & Research Bureau



VTrans Working to Get You There FY17

About Me

- Started Feb. 1, moved to VT a week before
- Came from University of Virginia where I managed a research program with six universities—MATS UTC
- Previously Virginia LTAP Director, federal government contractor in D.C., assistant professor of civil engineering at Villanova and UMass
- Congestion pricing/travel behavior dissertation, also ITS/traffic/safety engineer

Research Manager

- $1.2M budget (25% of state SPR funds)
- 42% to TRB, NCHRP, AASHTO TSPs
- 58% to manage Research Projects (internal and external)
- NETC ($100,000/year)
- UVM ($300,000/year)+

Implementation

- Thinking of tech transfer as a step towards implementation
- Trying to have implementation as part of all projects
- Confused about when it's appropriate to have a separate implementation project
- New project: Implementation of Intelligent Compaction

VTrans Research Symposium

- September 28
- Over 30 posters including research (mostly external) and STIC-related posters
- Categories: structures, materials/pavements, planning and safety, environmental and snow/ice
- In conjunction with STIC Annual Meeting
  - Need a research lifecycle presentation
  - Need 15 minutes of "research to implementation"

Implementation Query: Recent Result

- A hydrology project just finished which predicts additional extreme weather/rainfall
- Suggests a need to increase design factor of culverts and bridges by 1.5
- Hydraulics engineer figures that large culverts are already over-designed for other reasons
- So how should we disseminate to bridge people and others?
- Does implementation mean changing practice? Is that realistic based on one research project?

Performance Measures

- Contract performance measures
  - QRs and reports delivered as needed
- By emphasizing PMs and deliverables-based invoices, is it possible that you may not be getting best-quality research?
  - Deliverables are rushed and may not be comprehensive
  - Limited chance for scope creep and spending more time on more promising tasks

Value of Research

- Hoping that VOR comes out of tech transfer activities like the Symposium
- Eager to show others at VTrans that research is helpful and valuable
- Currently nomenclature/ID problem: others at Agency identify themselves as:
  - "Traffic research"; "highway research"
- If we do less field research, are we as valuable?

Contact Information

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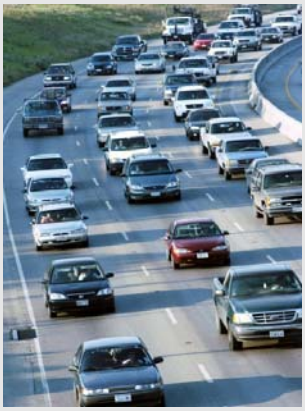
Research Manager
emily.parkany@vermont.gov
(802) 272-6862

TEXAS DEPARTMENT OF TRANSPORTATION



MDOT RESEARCH PEER EXCHANGE

September 12-14, 2017
Helena, Montana

Texas State Planning and Research (SPR) Program

Research

History

- Commission Minute Orders from 1948 to 1997
- Provides TxDOT the authority to contract with Texas colleges and universities for transportation-related research
- Legislative Appropriations Request (LAR) submitted to Governor identifies a strategy for Research

SPR Funding

Source of Federal Funding

- US Code, Title 23, "Highways"
- Funds apportioned to states - 2% used only for planning and research activities.
- Not less than 25% of the SPR funds apportioned to a state for a fiscal year shall be used for research

Value to TxDOT and State

Research:

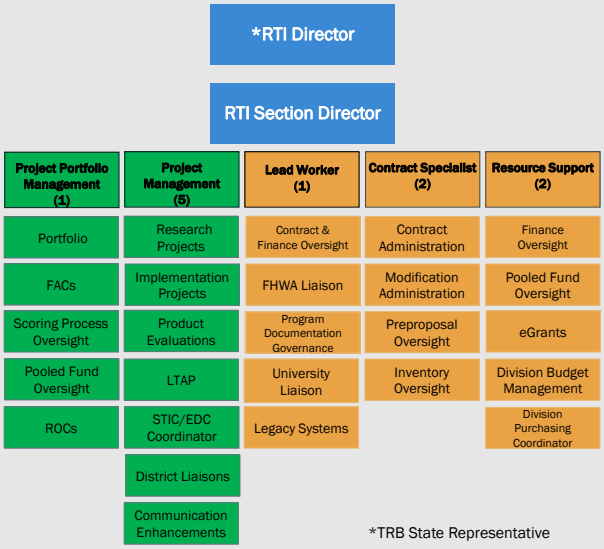
- Develops application for advanced technologies
- Contributes to the high quality of Texas transportation facilities and services
- Assists the state in meeting needs created by growth and changing technologies
- Ensures that transportation research funds are available to Texas universities in order to assure high quality research results

Aligns to TxDOT Goals and Objectives:

-Optimize System Performance - Deliver the Right Projects -Focus on the Customer
-Foster Stewardship -Preserve our Assets -Promote Safety
-Value our Employees

2

RTI Organization Chart



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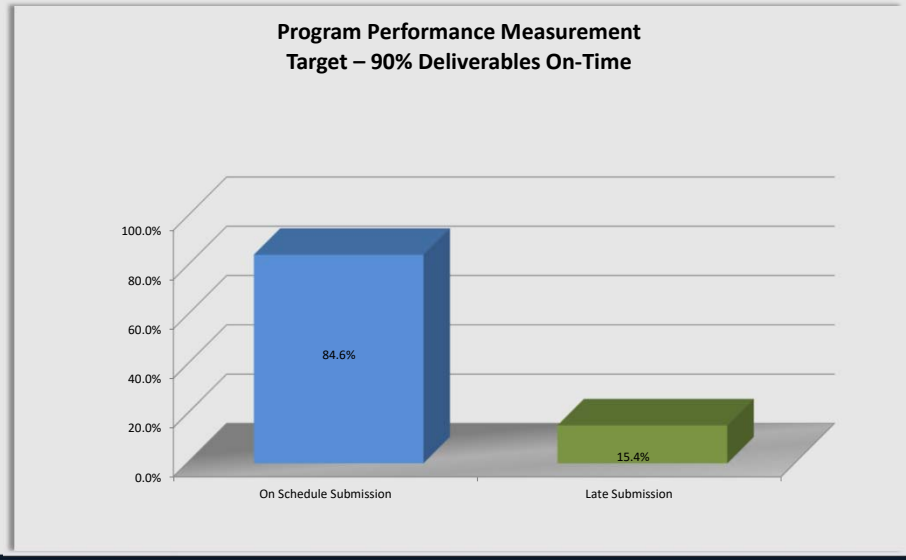
Performance Measures

4

Performance Measurements



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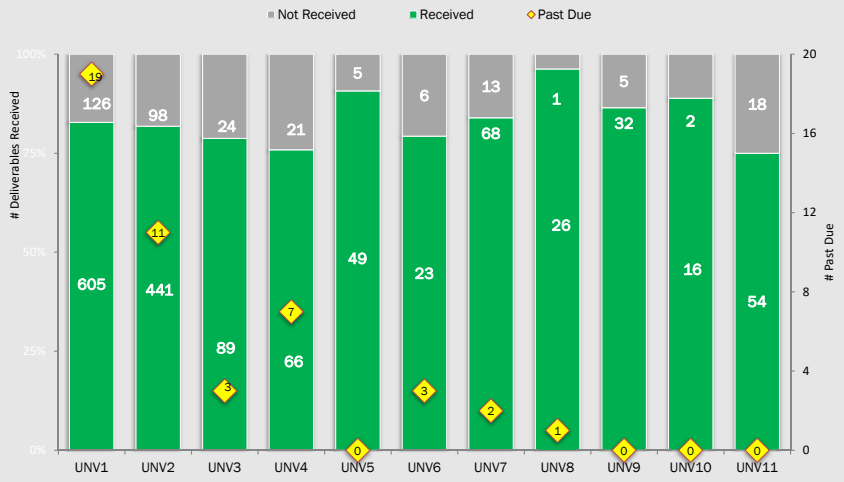
Deliverables Status By University YTD



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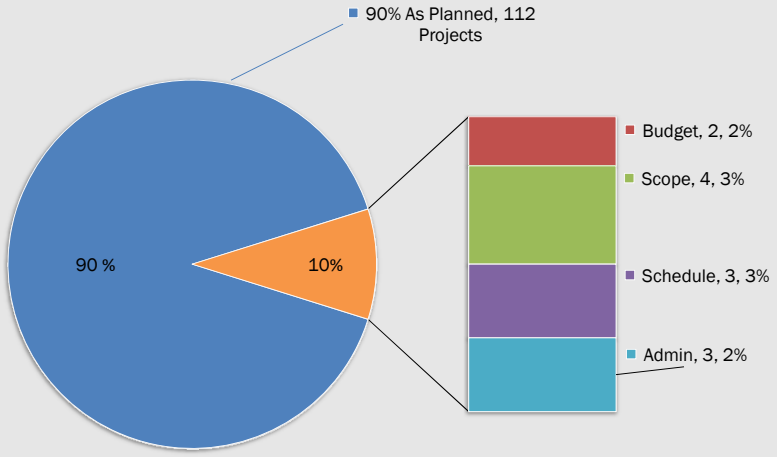
Deliverables Status By University - Current Month

Univ. Projects with # Deliverables Past Due (>1)			
Univ.	**Projects #**	**Projects**	**# Past Due**
UNV4	0-9911-15	Support Contract	2
UNV6	0-6815	Overlay Test Fatigue	2
UNV7	0-6916	Seismic Vulnerability	2

Division Measures		
Metrics	Target	Actual
# Invoice Time by Division	<9	7.0

7

Percentage of Amendments by Constraints YTD



124 Active Projects *

8

Implementation

9

Implementation Projects

Project Monitoring Committee

- ❑Assigned to every project
- ❑Technical Subject Matter Experts (SME)
- ❑Reviews proposals
- ❑Oversight of projects from kick-off to implementation
- ❑Monitors Project Progress
- ❑Reviews technical reports and advises on course of corrective actions; if applicable
- ❑Makes recommendations for implementing results

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Project Implementation

Implementation Project Recommendation (IPR) Approval

- ❑Reviewed and approved at several levels - the DD/DE of the Office of Primary Responsibility (OPR) and the Executive Sponsor.
- ❑Two main contracting processes for Implementation Projects:
  1. If university involvement is needed to implement a research product, the work is generally sole-sourced to the university that developed the product.
  2. If the product did not come from a research project, a competitive RFP is generally issued for university support for implementation activities.

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Implementation Projects

- ➢Most implementation projects stem from products delivered from TxDOT/University's research program.
- ➢Projects become eligible for implementation when projects are complete and findings are favorable and ready for integrating into operations.
- ➢The implementation project is typically integration of a product, new method or process, or innovation into department operations.
- ➢An implementation project may also be developed to aid in the implementation of a product or innovation from a non-TxDOT program or source.

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Value of Research

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Value of Research

- Determining value allows practitioners to investigate benefits that might not have seemed obvious at project inception.
- Value
  - turns the subjective into the objective, which can often turn uncertainty into support.
  - builds stakeholder support for projects and to further research if new phases or possibilities arise.
  - can uncover additional benefits.
- Value of research is broken down into two areas:
  - Qualitative -- Economic
- The beneficiaries of the benefit areas include:
  - TXDOT -- State of Texas -- Both

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Value of Research

Benefit Area	QUAL	ECON	Both	TxDOT	State	Both
Level of Knowledge	X			X		
Management and Policy	X			X		
Quality of Life	X			X		
Customer Satisfaction	X			X		
Environmental Sustainability	X				X	
System Reliability		X		X		
Increased Service Life		X		X		
Improved Productivity and Work Efficiency		X		X		
Expedited Project Delivery		X		X		
Reduced Administrative Costs		X		X		
Traffic and Congestion Reduction		X			X	
Reduced User Cost		X			X	
Reduced Construction, Operations, and Maintenance Cost		X			X	
Materials and Pavements		X			X	
Infrastructure Condition		X				X
Freight movement and Economic Vitality		X				X
Intelligent Transportation Systems		X				X
Engineering Design Improvement			X			X
Safety			X			X

- Project champions and sponsors select the Qualitative and Economic benefit areas when a project statement or implementation recommendation is selected to be a project.

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Value of Research

- Qualitative value
  - Subjective benefits
  - Influencing Decisions & Intangible Benefits
  - Intangible Assets
  - Discussed in Technical Memo
- Economic value
  - Variables entered into the VoR WS to calculate:
    - Net Present Value
      - Cost Benefit Analysis
      - Cost Benefit Ratio
    - Total Savings (Benefits)
    - Payback Period.
  - Variable Justification discussed in Technical Memo

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Value of Research

	Project #					
	Project Name:					
	Agency:					
			Variable Amounts			
Economic Benefit Area	#1	#2	#3	#4	#5	Totals
System Reliability						$ -
Increased Service Life						$ -
Improved Productivity and Work Efficiency						$ -
Expedited Project Delivery						$ -
Reduced Administrative Costs						$ -
Traffic and Congestion Reduction						$ -
Reduced User Cost						$ -
Reduced Construction, Operations, and Maintenance						$ -
Materials and Pavements						$ -
Infrastructure Condition						$ -
Freight movement and Economic Vitality						$ -
Intelligent Transportation						$ -
Engineering Design Improvement						$ -
Safety						$ -
					Total	$ -

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Value of Research

Estimate the life of the benefits

Length of the Project

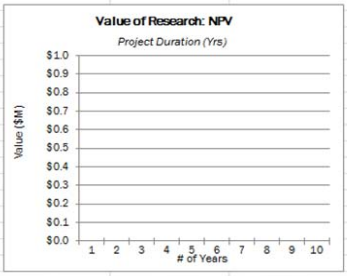
	Project #			
	Project Name:			
	Agency:		Project Budget	$ -
	Project Duration (Yrs)	0.0	Exp. Value (per Yr)	$
	Expected Value Duration (Yrs)	0	Discount Rate	0%
Economic Value				
	Total Savings:	$ -	Net Present Value (NPV):	$ -
	Payback Period (Yrs):	#DIV/0!	Cost Benefit Ratio (CBR, $1 : $___):	#DIV/0!

Cost of the Project

Economic Benefit Variables Total, from previous tab

Discount Rate of 5% is used by Federal Agencies.

Years	Expected Value
0	$0
1	$0
2	$0
3	$0
4	$0
5	$0
6	$0
7	$0
8	$0
9	$0
10	$0



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Value of Research

Total savings from implementation to being a normalized practice.

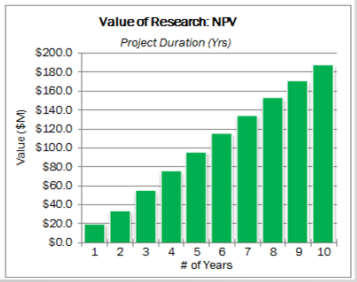
Length of time to pay the cost of the project.

Project #	0-6880		
Project Name:	Full Depth Reclamation in Maintenance Operations using Emerging Technologies		
Agency:	TTI	**Project Budget**	$ 4,475,781
Project Duration (Yrs)	5	**Exp. Value (per Yr)**	$ 14,960,000
Expected Value Duration (Yrs)	10	**Discount Rate**	3%
Economic Value			
Total Savings:	$ 213,894,219	**Net Present Value (NPV):**	$ 187,418,464
Payback Period (Yrs):	0.299183	**Cost Benefit Ratio (CBR, $1 : $___):**	$ 42

Estimated savings in today's dollars.

Benefit per $1 spent.

Years	Expected Value
0	$8,980,000
1	$11,970,000
2	$14,960,000
3	$23,930,000
4	$23,930,000
5	$23,930,000
6	$23,930,000
7	$23,930,000
8	$23,930,000
9	$23,930,000
10	$23,930,000



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Questions

Questions?

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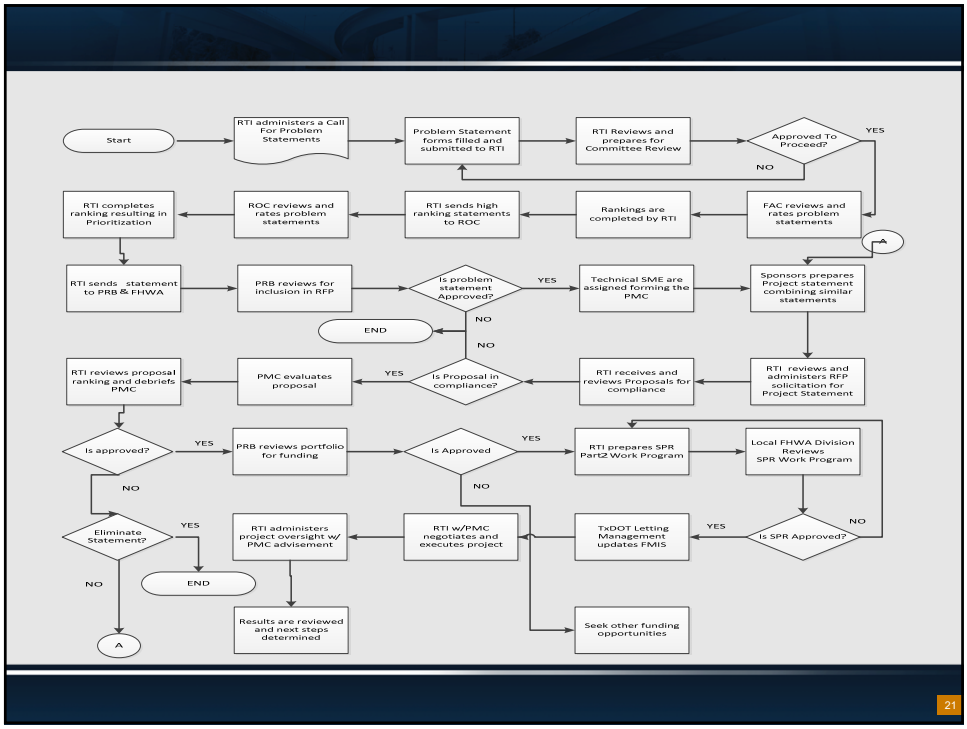

Start
RTI administers a Call For Problem Statements
Problem Statement forms filled and submitted to RTI
RTI Reviews and prepares for Committee Review
Approved To Proceed?
YES
NO
FAC reviews and rates problem statements
Rankings are completed by RTI
RTI sends high ranking statements to ROC
ROC reviews and rates problem statements
RTI completes ranking resulting in Prioritization
A
Sponsors prepares Project statement combining similar statements
Technical SME are assigned forming the PMC
Is problem statement Approved?
YES
NO
END
PRB reviews for inclusion in RFP
RTI sends statement to PRB & FHWA
RTI reviews and administers RFP solicitation for Project Statement
RTI receives and reviews Proposals for compliance
Is Proposal in compliance?
YES
NO
PMC evaluates proposal
RTI reviews proposal ranking and debriefs PMC
Local FHWA Division Reviews SPR Work Program
RTI prepares SPR Part2 Work Program
Is Approved
YES
NO
PRB reviews portfolio for funding
Is approved?
YES
NO
Is SPR Approved?
YES
NO
TxDOT Letting Management updates FMIS
RTI w/PMC negotiates and executes project
RTI administers project oversight w/ PMC advisement
Eliminate Statement?
YES
NO
END
A
Results are reviewed and next steps determined
Seek other funding opportunities
21

MDT Research Peer Exchange

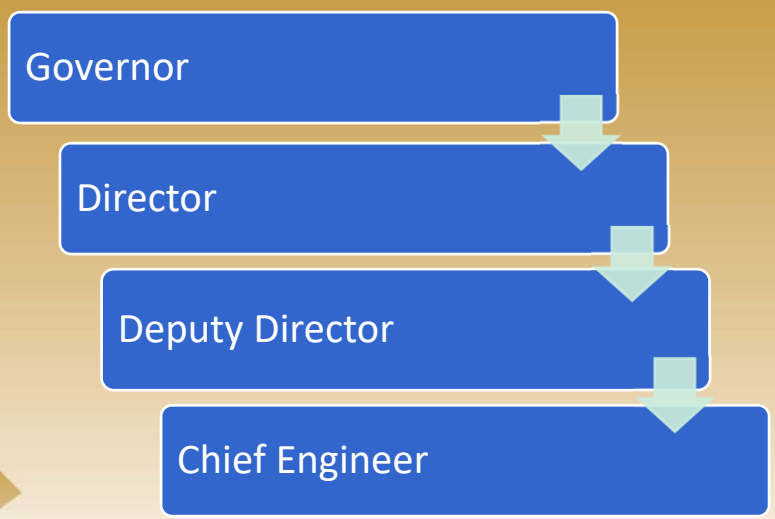
Implementation of Research Results
Research Performance Measures
The Value of Research

Sue Sillick
Montana Department of Transportation
September 12, 2017

RESEARCH PROGRAMS

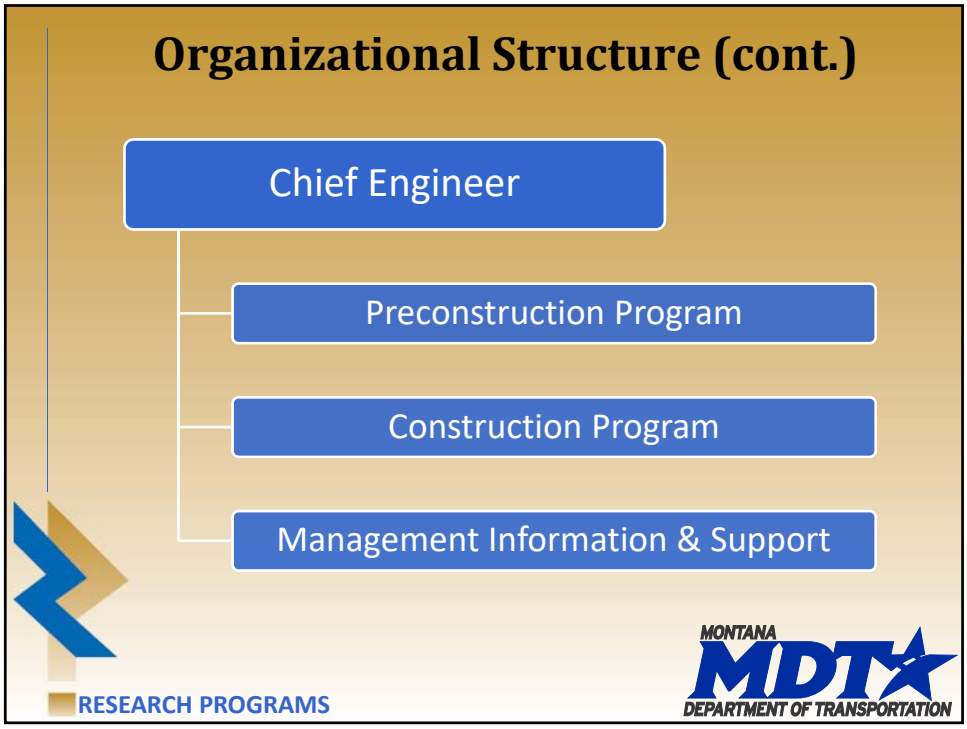
MONTANA MDT DEPARTMENT OF TRANSPORTATION

Organizational Structure



RESEARCH PROGRAMS

MONTANA MDT DEPARTMENT OF TRANSPORTATION


Organizational Structure (cont.)
Chief Engineer
Preconstruction Program
Construction Program
Management Information & Support
RESEARCH PROGRAMS
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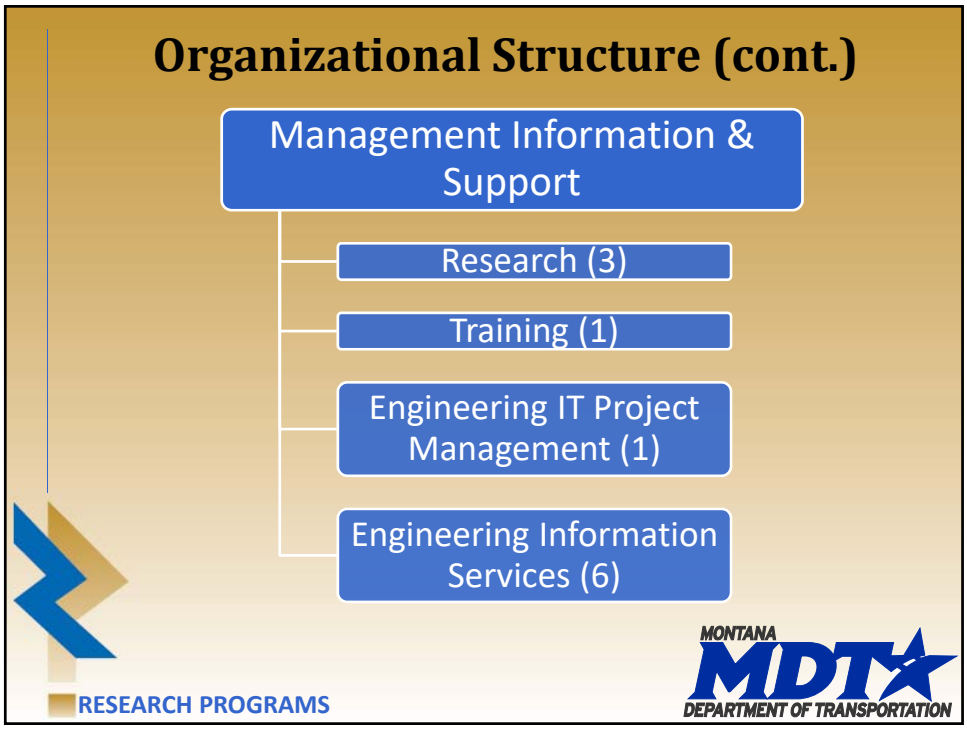
Organizational Structure (cont.)
Management Information & Support
Research (3)
Training (1)
Engineering IT Project Management (1)
Engineering Information Services (6)
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Research Staff

Research Programs Manager
Sue Sillick

Experimental Project Manager
Craig Abernathy

Librarian
Bobbi DeMontigny

RESEARCH PROGRAMS

MONTANA MDT DEPARTMENT OF TRANSPORTATION

Funding

- SPR
  - 2017 Federal Funding $2 M
  - Planning – Project by Project
- Earmark Funding
  - FHWA and other USDOT Administrations
  - Amount Varies on an Annual Basis
- Pooled-Fund Studies
  - TPF-5(309); $1.2 M, MDT $80,000

RESEARCH PROGRAMS

MONTANA MDT DEPARTMENT OF TRANSPORTATION

Guiding Principles

- Target MDT Needs
  - Department-Wide, incl., Multi/Inter-Modal
  - Champions & Sponsors Required
- Direction Set by MDT's Executive Management
- Strong Focus on Customer
- Focus on Applied, Implementable Research, Deployment, and Technology Transfer
- Define "Research" and "Implementation" Broadly

RESEARCH PROGRAMS

MONTANA MDT DEPARTMENT OF TRANSPORTATION

Guiding Principles (cont.)

- Involve Stakeholders (Internal and External) to Buy-In and Facilitate Implementation
- Provide Necessary Resources
- Communication, Communication, Communication
- Continuous Process and Program Improvement

RESEARCH PROGRAMS

MONTANA MDT DEPARTMENT OF TRANSPORTATION

Research Review Committee

- Director, Deputy Director, Division Administrators, District Rep, FHWA, WTI, Research Manager (12 members)
- Determines MDT's High Priority Research Needs and which Topics Forward to Technical Panels

RESEARCH PROGRAMS

MONTANA MDT DEPARTMENT OF TRANSPORTATION

Research Review Committee (cont.)

- Approves Research Projects (SOW and Proposal/Funding)
- Reviews Project Progress and Implementation Recommendations
- Makes Implementation Recommendations
- Ensures Implementation

RESEARCH PROGRAMS

MONTANA MDT DEPARTMENT OF TRANSPORTATION

Technical Panels

- Oversees projects from Inception through Implementation
- Determines Need for Research
- Determines Products Necessary for Implementation
- Identifies Barriers to Implementation
- Develops Scope

RESEARCH PROGRAMS

MONTANA MDT DEPARTMENT OF TRANSPORTATION

Technical Panels (cont.)

- Determines Appropriate Venue for Research
- Reviews Proposals
- Attends Project Kick-Off Meeting
- Reviews Project Progress
- Ensures Projects Stay on Scope
- Makes Implementation Recommendations
- Implements Research Results, as applicable

RESEARCH PROGRAMS

MONTANA MDT DEPARTMENT OF TRANSPORTATION

Implementation

- Definition

  Implementation means the widespread adoption of a new technique or product as a standard operating procedure or as an accepted alternative. Implementation activities can occur throughout the research process. **Implementation is a focus on MDT's Research Programs, making MDT Research relevant to MDT staff.**

RESEARCH PROGRAMS

MONTANA MDT DEPARTMENT OF TRANSPORTATION

Implementation (cont.)

- Consider Implementation from the Beginning and Throughout Each Project
  - Stage 2: Research Topic Statement
  - Champion
  - Sponsor
  - Technical Panel
  - Research Project Statement
  - Scope of Work

RESEARCH PROGRAMS

MONTANA MDT DEPARTMENT OF TRANSPORTATION

Implementation (cont.)

- Consider Implementation from the Beginning and Throughout Each Project (cont.)
  - Proposal
  - Project Deliverables
    - Final Report
    - Project summary Report
    - Implementation Report
  - Consultant Recommendations
  - Technical Panel Recommendations
  - RRC Recommendations

RESEARCH PROGRAMS

MONTANA MDT DEPARTMENT OF TRANSPORTATION

Implementation (cont.)

- Implementing the Results from Others
  - Passive
  - Distribute Reports
    - State DOTs
    - TRB E-Newsletter
    - Others – RSS Feeds
  - Ask
    - Add to the MDT library?
    - Do you plan to implement any of the results?
  - Is there a more systematic method?
  - Is there a more active method, given limited staff time?

RESEARCH PROGRAMS

MONTANA MDT DEPARTMENT OF TRANSPORTATION

Implementation (cont.)

- Keys to Success
  - Management Involvement and Support
  - Involve the Right People
  - Excited Champions/Implementers
  - Communication, Coordination, & Collaboration
  - Consider Implementation from the Beginning and Throughout Each Project

RESEARCH PROGRAMS

MONTANA MDT DEPARTMENT OF TRANSPORTATION

Implementation (cont.)

- Keys to Success (cont.)
  - ID implementation Barriers; Reduce or Eliminate Barriers
  - Develop Products Necessary for Implementation
  - Provide the Tools and Funding to Accomplish Implementation

RESEARCH PROGRAMS

MONTANA MDT DEPARTMENT OF TRANSPORTATION

Implementation (cont.)

- Next Steps
  - Identify Implementation Categories (Process); Develop Definitions
    - Implementation recommended/pending (full/partial?)
    - Plan to implement (full/partial?)
    - Implementation in progress
    - Implemented (fully/partially?)
    - Not implemented
    - Not implementable
    - Additional research needed

RESEARCH PROGRAMS

MONTANA MDT DEPARTMENT OF TRANSPORTATION

Implementation (cont.)

- Next Steps (cont.)
  - Identify Implementation Categories (Products); Develop Definitions
    - Knowledge Gained
    - New/Revised/Validated Policies, Processes, Procedures, Practices, or Methods
    - New/Revised/Validated Plans, Standards, or Specifications
    - New/Revised/Validated Legislation or Rules

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Implementation (cont.)

- Next Steps (cont.)
  - Identify Implementation Categories (Products); Develop Definitions
    - New/Revised/Validated/Improved manual, handbook, guidelines, or training
    - New/Improved Tool or Equipment
    - Demonstration
    - Operational Change

RESEARCH PROGRAMS

MONTANA MDT DEPARTMENT OF TRANSPORTATION

Implementation (cont.)

- Next Steps (cont.)
  - Formalize Process
  - Track Implementation
  - Develop/Revise Forms/Templates
    - Implementation Plan
    - Implementation Progress/Status Report
    - Implementation Report
  - Update Manual

RESEARCH PROGRAMS

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Performance Measures

Is it a performance measure if it is just tracked and not compared to a benchmark?

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MONTANA DEPARTMENT OF TRANSPORTATION

Performance Measures (cont.)

- Tracked, not Benchmarked
- Qualitative and Quantitative
- Input/Resources
  - Expenditures by Subject Area and Type of Project
  - Cost Sharing/Partnering – Leveraging Funds
  - Overhead Costs

RESEARCH PROGRAMS

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Performance Measures (cont.)

- Output
  - Number of Topic Statements and Disposition
  - Number of Projects and Project Status
  - On Time, Budget, and Scope
  - Number of Publications and Other Products Resulting from Project
  - Implementation
- Outcome
  - Customer Satisfaction
  - $ saved

RESEARCH PROGRAMS

MONTANA MDT DEPARTMENT OF TRANSPORTATION

Performance Measures (cont.)

- Outcome (cont.)
  - Improved Cost Effectiveness
  - Improved Environmental Stewardship
  - Improved Quality
  - Improved Safety
  - Improved Cost-Effectiveness
  - Improved Economic Vitality

RESEARCH PROGRAMS

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Value of Research Projects
Quantitative
B/C
ROI
Qualitative
Improved Cost Effectiveness
Improved Environmental Stewardship
Improved Quality
Improved Safety
Improved Cost-Effectiveness
Improved Economic Vitality
RESEARCH PROGRAMS
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Value of Research Program
Project Roll Up
Research Services
Qualitative
Annual Report
Improved Cost Effectiveness
Improved Environmental Stewardship
Improved Quality
Improved Safety
Improved Cost-Effectiveness
Improved Economic Vitality
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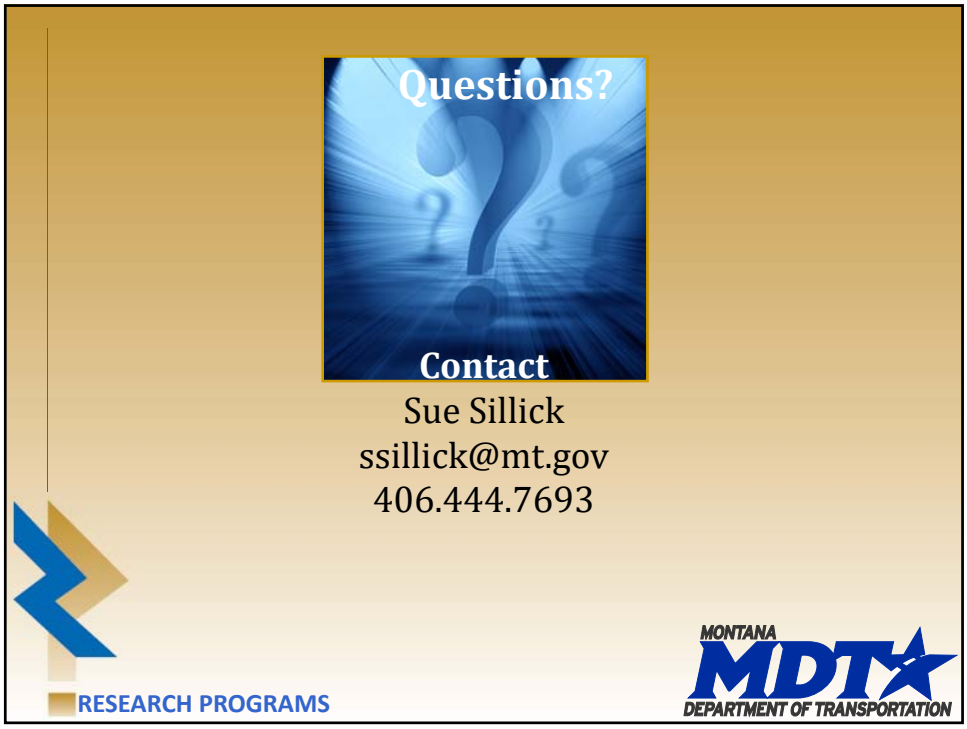
Questions?
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406.444.7693
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Peer Exchange Discussion Questions and Answers
Implementation, Performance Measures, and Value of Research Questions

Implementation

Funding

1) How is implementation funded, if separate from the original research project? When David Pamplin (for Jack Jernigan) of Turner Fairbanks Highway Research Center (TFHRC) FHWA came to visit the NJDOT Research Office on May 16, 2017, I was surprised to hear Mr. Pamplin say that implementation exclusive research projects cannot use SPR funds.
    a) Sue called David Pamplin about this. He said anything after developing an implementation plan that is not new, cannot use SPR funding. Anything that comes after the development of the implementation plan can also not use SPR funds (because it's no longer research). For example, the development of a pilot project is eligible, but the mass deployment of the product is not. This is new and different from how they have been doing it for years.
        i) FHWA–MT Div – This from Mary Huie. Implementation is eligible as long as it is part of the overall project.
        ii) MN– Is there a fact sheet available on this? They are working on this.
            (1) MT – David Pamplin says they are updating guidance for research for the RAC website and this will be included.
        iii) MT – Maybe what she is thinking of as implementation is really development. She may have to change her way of thinking on what to consider development versus implementation.
        iv) TX-KP – When states are looking at adopting technology from other states or NCHRP, does that mean they would not qualify for SPR funding? If your state is adapting others' technology, then it would qualify – group consensus.
        v) NJ – What is the lesson learned by using SPR funds to create an innovative full-scale bridge superstructure system, components and materials tester laboratory without being able to use SPR funding to verify that it functions properly with test samples? Instead of being embarrassed by this experience, we need to seek further guidance to avoid this lack of implementation opportunity situation in the future.
        vi) Everyone at the peer exchange said they fund these types of things using SPR. NJ thinks this will discourage folks from submitting problem statements if future research projects create innovative untested/unverified laboratory equipment or products that are unaffordable to utilize.
2) Does the budget for a research project usually include implementation?
    a) MT – They do include implementation products in the research project budget. The researchers need to work with the research staff so that they know this is possible. When they need products to be developed, they make sure the research team has folks on their team that can develop them.
    b) OH – To the extent that they can identify and define it, what the deliverables would be. With the district projects, at six months into a project the district folks look at what's being developed to see if it would be feasible. If not, they end the project. If the research is implementable, then there is a phase two of the project.
    c) TX-KP – They don't include as part of the research project, since they don't know if the results of the project would be valuable. If they did that, they tie up funds.
    d) MN - They fund implementation separately from the original project.
    e) VT – In VA (where she used to work), not considered a completed research project until it's implemented. Every state does it differently. Now in VT, she is trying to include implementation in the research project.

   f) MT – She wants to track their research projects to see if they implement them. Need to define what implementation is (a workshop for some states is implementation but tech transfer is considered implementation in others).
3) Should funding for tracking use and benefits of research implementation be a shared funding mechanism between RC (Research Center) and FA (Functional Area)?
   a) VT – Wants to know of examples where the Research office gets the Functional Area to pay for imp.
   b) MT – Doesn't know if they can get the FAs to fund it.
   c) OH – Happy to get the time of the folks in the FAs. Never talked about getting funding from them.
   d) TX-KP – There have been opportunities where a division may choose to go off and do some research on their own. They lose the connection with them; the Research office doesn't know about it. Sometimes if the Research office can't fund it, sometimes the FA does it on their own.
   e) ARA – Should the research customer be part of the tracking and implementation (and paying for it)? TRB-JB – Depends on what you are doing. May get the traffic guys to pay for the traffic control to test something, but they won't pay for the project itself. If you can get the FA to help out, that helps the research project get done in the first place. MT – They get FA support all the time.
4) Is there a research implementation pay item associated with projects selected for implementing research results? Is funding for this pay item shared?
   a) MT – They have a research project set up and don't do anything else. They do have a research project set up for FA staff time to work on research projects. Every invoice she pays for a federal funding project includes a charge for indirect costs, as required by state law.
   b) VT to UT – Do you pay people to be on TAPs? No. MT – they have a project set up for FA staff to put their time to (see a) above).
   c) UT – Their FA charges to their own overhead, not to the research project.

General

5) MT - I'm curious as to what implementation means to each state in attendance. We've spent some time in the Ahead Of The Curve (Jason) effort talking about technology transfer, implementation, dissemination, deployment, demonstration, innovation, pilots, and other terms that hint at "taking research off the written page." As you are aware, implementation doesn't happen well unless it is woven throughout the project development and execution life cycle. A suggestion: make use of the 20-44 NCHRP program, especially when states are actively engaged in the panels and have some dedicated leaderships. To borrow a phrase, early money is like yeast.
   a) MT and OH feel they now need to change their definitions of implementation. They look at it differently now.
   b) ARA – He's pleased that the original researcher doesn't have to do the implementation (this a change, not sure whose rule is changed). This change helps because implementing is different than the original research and the researcher isn't necessarily the best person to conduct the implementation (create/carry out a pilot, develop training, etc.)
   c) CTC – Is verifying current practices considered implementation? MT – Yes. OH – Yes. TRB-JB – Some folks using widespread adoption (or systematic use) as part of the definition UT – They are looking for the successful implementation of the research and hope to get widespread use of it (that's the gravy). TRB-WD – You can accept things but unless you use it, it's not implemented. UT – IF they have a manual that no one reads or uses it, is it still implemented? TRB-WD – No.
   d) Sounds like everyone needs to relook at their definition of implementation. Sue is going to do this.
   e) MN – They don't follow up to see if a project was implemented. Partially due to staff time. He feels they need to look at their definition too. How do they even ask a FA if they have implemented it when not sure what the definition is?

6) Alternate definitions of implementation.
   a) Everyone needs to look at this, especially related to what they heard from David Pamplin (FHWA).
7) Is it OK to emphasize tech transfer (project champions, fact sheets, posters, other dissemination) and not worry about Implementation?
   a) NJ – Tech transfer is an important step. She hopes tech transfer is part of implementation. She is anxious to make people aware that research has even happened. Then it can be implemented. UT – Tech transfer is an important step in the implementation plan. TRB-JB – Start with some of the implementation projects and how they can be implemented. Build on that success, once they are implemented.
8) Are there other resources available for newly appointed implementation specialists?
   a) There is a sub-page on implementation and performance measures on the Research Program and Project Management website. The performance measures sub-group of RAC has a sub-group on implementation. Hafiz will add Stefanie to this group.
   b) TRB-WD – The Senior Program Officer is responsible for implementation for the NCHRP projects they oversee. You should begin as early as possible to have an implementation person involved in the research project.
9) When categorizing implementation, do we begin with what the researchers recommend or with what the agency recommends?
   a) MT – Researchers make the implementation recommendations in the final report. The TAP discusses and decides if it can be done. If they say it can't be done, then is it a negative mark? They will only go forward with what will work for them and track those implementation activities. They record what the researcher recommends and what MT will decide to move forward with.
   b) OH – They expect the researcher to make implementation recommendations, but Ohio DOT is the agency who will be using it. They will implement what they learned from it and they own it.
   c) FHWA-MT – They measure how many of the recommendations they end up implementing. (When a value engineering study is done.)
   d) TRB-WD – The DOT should let the researcher know what barriers they face and work with researcher to address them.
10) How does the group feel about the transportation research/innovation community adopting the Technology Readiness Level (TRL) scale as a standard practice? (This is on FHWA's Exploratory Advanced Research website.)
   a) OH – We should understand this but not necessarily use it. It may be too detailed for the projects they work on.
   b) TRB-WD – Taking from big industry doesn't apply to what we do. TRL has 9 levels. Scale it based on your project.
   c) VT - Not all applied research begins with basic research.
   d) MT - #7 under develop performance measurement. "Prototype demonstrated in operational environment."

Planning

11) Should we bring in outside organizations to be a part of IRCs (Implementation Review Committees) or PRCs (Project Review Committees)? If so, to what degree?
   a) MT – They involve any stakeholder from the beginning because they want their buy in. They want resource agencies there at the beginning, again, to create buy-in.
12) How to make the implementation coordination seamless with the research project.
   a) NJ – Implementation from the beginning starting with the RFP deliverables to an implementation product in the final report package.
   b) OH – They have the project manager who wrote the idea at the beginning be involved all the way along because they know the project and are invested in it.

c) MT – They explicitly say "This is not our project. You need to review all products to make sure you are getting what you need. If you don't and you don't get what you need, then that's on you."
d) UT – They rely on their champions to be the implementers. Then they are concerned with implementation. Within the TAC, they choose folks who are invested so that if the champion leaves, then there are others to whom the project is important. So it doesn't get lost.
    i) TRB-WD - They have an implementation team so that if the champion leaves, the project will still move forward because it's important to them.
    ii) Sometimes projects get dropped because priorities change.

13) When is it appropriate for implementation to be a full-scale additional project rather than part of the original project scope?
    a) UT – Depends on what implementation means.
    b) OH – If they have a contract with someone they can't easily contract with, then they will do it as a separate project.
    c) MT – Put in what you know up front. As it develops, change the contract. At the end, if need more, then it becomes a separate project.
    d) TX – They do it as a separate project because then no scope creep. A good demarcation line.
    e) MN – Same as TX.
    f) NJ – They will do a separate implementation project. But sometimes comes back as a really large project and more costly.
    g) OH - That's a reason to keep with the original contract. If a new project and researcher, then need to have good communication between the original researcher and the new one.
    h) Different ways work for different agencies.
    i) CTC – They put in a project (not sure which one), the possibility of implementation (with funding included) but if it doesn't happen, that's okay.
    j) TX-KP – Have to take into consideration the agency's readiness for implementing a project.
    k) OH – Can also consider doing a revision to an old research project. Create a new project to see if it's feasible to implement the original research. A feasibility study because need new information to determine if it's doable to implement.
    l) TX-KP – Find another champion (if someone has retired) to come on board and get involved with the implementation.
    m) ARA – Or a defined succession plan (if the champion leaves).

14) For implementation, what strategies can be used to engage the research customer after the project is complete? Do we lose focus on the project after we file a project closeout/completion memo?
    a) OH – They lose focus. Once it's closed it's closed and it's hard to regather everyone back together.
    b) TRB-JB – Making sure actively communicating with the customers after it's closed, on the project and the topics they address.
    c) MT – Implementation products are developed as a part of the research project contract or a separate contract, if necessary. It ois then in the hands of operational staff. Would like to follow implementation until it is complete or it is clear there will be no more implementation. They also thank the panel members in their internal e-newsletter, put it in their catalog, and do some additional info sharing.
    d) TRB-JB – What are you engaging them for? For implementation. Now that research is complete, have to reengage them for the implementation part of the project. Engage some of the same folks and new ones, who would be interested in the imp.
    e) NJ – How do they share their implementation examples with the rest of the agency?
    f) UT – It might be good to have a performance measure to measure the customer's engagement and if/how they are implementing the research. They then have to come back and reengage. MT – How would they report it? UT – By having it part of the cycle. If they show they don't implement it, why spend money in the future for a project for them.

g) TRB-JB – Could come back to Research as "What research are you doing that's implementable?" UT – The champions would probably be reporting on it (and they were involved from the beginning). If they aren't implementing, then it says something about them. (Given that it's an implementable, decent product.)
    i) TRB-WD – The research team is responsible for the project. If it doesn't work, is that the TAP's fault that it wasn't implemented? It's the research team's fault that they didn't develop an implementable product or results?
    ii) TRB-WD – What if the researcher team develops a poorly written report. MT – If they aren't happy with any deliverables or deliverables are late, they hold an invoice until they are happy with it.

15) How is leadership engaged for implementation efforts?
    a) MT – They have their high-level leadership before a project is begun commit to implementation, as appropriate.
        i) UT – Does that include funding for widespread deployment? MT – If it makes sense for mass deployment, she thinks they would support it. (Didn't say if with funding or with moral support.)
        ii) TRB-WD – You will need general support for your program more than specific support for mass deployment.
    b) OH – Some mass deployments involve politics and support from multiple areas that need top level support. They need to hear from leadership that it is important, that the research was implemented and that this is the way the agency is going to do. It's no longer just a research project.
    c) TRB-WD – Do you give an update to the agency even before a project is finished? Report on in-progress projects? MT – The TAC has to keep their areas informed of what's going on with their project. TRB-WD – He feels it's important for the Research folks to provide updates too. OH – They do updates on some projects, rarely when it's a special project. MT – They did report when Research paid for updates to their Enterprise system because it affected the entire agency.
    d) MT – Their process document contains examples of what is not considered research, in order to clarify things with staff.

16) How does a newly appointed Implementation Coordinator/Specialist develop champions at all levels of their agency? Is the following resource (or other resources from the recent past) incorporated into this peer exchange? CALTRANS: Implementing Research Results: Highlighting State and National Practices, March 8, 2011
    a) UT – Constant dialog.
    b) MT – Helps if they come from within the agency. Show the field folks that you can be of value to them and then the word will spread.
    c) MN – Some of the innovative research is from the districts.
    d) CTC – This question about setting up the coordinator for success. Is this position better for an engineer with a specific interest vs. a generalist? It's done both ways. Not sure if either is better.
        i) TRB-WD – He believes the project manager (TL) is the best person. The implementation coordinator can assist on other issues (overall implementation issues) but the TL is best for specific projects.
            (1) TRB-JB – At state DOT, implementation coordinator probably a combination of project and program.
            (2) UT-PC – As the implementation coordinator, most of his job is engaging people. He's always talking to others in the department

17) Is the researcher the appropriate person to develop the implementation plan?
    a) MT – No. She envisions the Research person doing it. The panel discusses it and the Research person writes the implementation plan.
    b) OH – Done in-house, project manager (Research person).

c) UT-PC – When do you create the plans? OH – Ask them to think about what they need, the products they need to implement the project.
d) VT – They have the researchers write the plan at the beginning to get it into the university's heads that they need to think about implementation and that their results should be implementable.

18) How often is a marketing/communications person involved with the implementation plan?
a) MT – She doesn't envision a big role for them.
b) UT – Implied that the implementation plan would have tech transfer activities built in.
c) MN – Informal. The marketing person teams up with the project coordinator. The project coordinator takes the marketing person along when go on job site. They interview the technical liaison. Also, the project coordinator brings it up to the technical advisory panel to think about it before the end of the project.
d) OH – They discuss it in The Loop videos, what Research is doing.

19) What are potential drawbacks to using something like the Illinois DOT Implementation Worksheet at every TAC meeting?
a) NJ – Is this too formal or too much of a burden? She sees value but also the project managers being inundated with additional forms.
b) UT – Their implementation engineer brought this up to him. Their project managers feel like it's too much for them to do. They need to get their buy in to get them to use it.
c) TRB-WD – Have the research team do it. The TAP does the initial one and then the researcher updates it (at the TAP meetings).
d) UT – They are excited to use it too, but haven't yet.
e) TRB-JB – Give it to a champion so they can see what they will need to think about it.
f) CTC – Need to update it to make it valuable. If it's too big for someone to use, adapt it to your agency.
g) MN – They track these things in their database.

20) What are the best practices for determining the resources required for implementation?
a) TRB-WD – Previous experience and previous projects. They know how much time/money it takes to host a peer exchange or a workshop.
b) OH – What are your different options in your agency? Understanding those.
c) TRB-JB – Depends on what you are implementing. Each will require something different.
d) NJ – What processes are required for implementation at your agency? This question makes her wonder if implementation should be a separate project (TX and OH), instead of included at the beginning.
e) MN – What are the key things we need from staff for implementation? What do we need in skills for an implementation engineer? What to put in a project description for an implementation engineer? He has nothing to go by.

Process

21) Our experience is that implementation works best when it is "needs-driven", in terms of an implementation project proposed by a practitioner who is solving a problem, using results from one or more sources of completed research. Implementation is less successful when it is driven by a programmatic desire to "push out" the results of single completed research projects. What are the typical ways or processes being used by other DOTs or should be used for a successful implementation programs? Should implementation be a "need driven" process or be "institutionalized" at a program level by DOTs? There has to be some discussion about it!
a) UT-PC – Plowable pavement markers – One of their regions wants to use a specific solution on all their roads. Other regions want to see what happens. Central Maintenance doesn't want to use it at all. It's up to the region to use their budget to do it and make it a standard. If they do this and it fails, then it's on that region. Central maintenance wants to wait 3-5 years to see how it fares. He feels stuck. Do they support it or not? Research will monitor the performance over time.

Doesn't happen as quickly as the field folks want, which is a drawback for folks going through Research. They want to do it on their own because it's faster.

b) MN – They spend so much time reviewing completed projects each year. They can't tell the offices or districts to implement research results. How do you get them to implement?
   i) UT-PC – His job is to be the marketing and the salesman. He peddles successes to show them how they can help them (by showing how when others implemented that it worked for them and they should do it too.) Starts need based at an individual level and moves to institutionalized.
   ii) OH – If the customer doesn't bite, then they let it go. She doesn't consider it a failure if a project isn't implemented. There is a range of performance in the research results. Let it go.
   iii) TRB-WD – Communicate with top management that not every project will be implemented or successful.
   iv) MT – Should be a higher percent of implementable results with applied research.
   v) ARA – Institutionalize a process of how it should go so that it's the philosophy that the Research program doesn't let research sit on the shelf (but realize that some will).
   vi) TRB-WD – Funding is needed for implementation (shows institutionalized support).
   vii) CTC – Towards Zero Deaths. This goal will never be reached, but the DOTs embrace it anyway. And have seen drops in deaths because of their dedication.

22) In terms of timeline of implementing research results, there is a "big question" of an "appropriate timeframe" for implementation or measuring the success of implementation of research results. It takes some time (years), from the conclusion of a research project, to evaluate whether research results have been implemented and whether that implementation was successful. It is very difficult, if not beyond the ability, for the institution to follow up on every research project due to changes in personnel that occur over the "life of a project": from the research initiation to implementation. In other words, there is a time-frame involved from the need statement to the implementation of results, including time to initiate the original research project, conduct the research, initiate the implementation, complete the implementation project, and follow-up on the implementation. How to find a conducive "time frame" to a performance measure regarding the implementation of research results? Is there is a simple process or an outline to help navigate this process?
   a) MN– Is three years good enough, five years good enough?
   b) NJ – What is the research life cycle, appropriate steps, durations and outcomes?
   c) TRB-WD – If you have established a system go back after 3 or 5 years, then survey your customers at these time frames. It won't be a problem if there are staff changes. You have the survey in place.
   d) TRB-JB – How are you defining success for implementation? That will determine the timeframe at which you look at it.
   e) NJ – Part of the success of the surveying is to see if people even know about those projects that happened three years ago. That's a measure of success (that they know about them) and if they don't know about them, now they will.
      i) TRB-WD – He looks to see which topic areas know about the old projects (and use the results) so that help going forward on where to put future resources.
      ii) NJ – Do you try to bring everyone up to the same level of implementation? TRB-WD – No, one size doesn't fit all.
      iii) TX – They don't go back and survey folks. It's a great way to see if your research has propagated to other districts.
   f) UT – IL goes back and interviews stakeholders and champions six months after implementation has begun. The timeframe will vary depending on the project.

23) Others approach to determining implementation projects i.e. process.
   a) See Implementation of Research Results handout.

24) Where does one start when designated as their Research Unit's Implementation Specialist?

a) NJ – Her goal is to have an implementation specialist to track implementation of projects. Will this solve all her problems?
    i) TRB-WD – It will be a beginning of a problem. You need the right person in the role.
    ii) OH – Use the upcoming symposium to get an idea of what projects she should implement. Which projects are people interested in or talking about?
    iii) TRB-WD – Maybe don't do any research for a year and just focus on implementing completed projects.
    iv) Do what UT does and constantly reach out to people. Take old research and talk to the districts and offices to see what they did with the research (especially if they were involved on the project (the person or the office)).

25) What are best practices for implementing the research of others (states, NCHRP, etc.)?
    a) MT – She sends it out and asks them to let them know if they will implement.
    b) TRB-WD – Send out NCHRP reports and let them know funds are available thru NCHRP 20-44 for implementation. ($2M available. And can partner with STIC.) Sue will add this to her emails.
        i) UT - 20-44 only available for implementation of NCHRP results? Waseem – Yes. If UT wants to try some NCHRP results, then the contract is with NCHRP and the contractor, even though the contractor is doing the work for UT. Money not transferred to the state. NCHRP holds the contract.
    c) UT – Struggling to identify research and experimental innovations that others are doing. Need to identify the revenue source of how going to implementation it. Or marketing the ideas.
    d) MT – Do staff even read what she sends them?
    e) TRB-WD – They love when states send staff to be panel members because then results get out into the agency.
    f) UT-PC – They have basic eight subject leads. They ask them to put together their needs, problems they face. Then he has that information and when he hears something in his discussions with others, he knows what's needed. Also uses it when talking with the universities about projects.
    g) TRB-JB – Because of information overload, sending out a report link, not necessarily easy for the recipient to ferret out how it might be useful to them.
    h) TRB-WD – Would like to have one implementation team for every project and one implementation team for the entire program. You need a team at two levels. Have the implementation coordinator
    i) MT – Maybe looking at this the wrong way. Now – They do a literature search when they have a need and can point out what's already been done. Then it is needs based. Instead of pushing it out to them.
    j) OH – Don't expect anything to come back from it. But might spark them at some later point.
    k) MT – She gets more response when she asks them if it should be added to the library.
    l) When a junior engineer wants to research something, Dale Peabody gives the library 40 hours to create a report on it. Problem solving money (this came from the Maine peer exchange.)
    m) TRB-WD – Sometimes emails announcing something is boring. He puts a picture from the report and gets more hits on his link. He markets it. He likes the one-page summaries on reports because they are easy for people to digest. The way you communicate matters. Don't be so heavy on the technical details.
    n) MN – They also do 2-page technical summaries on every research project. Have a consultant do it – focuses on the writing, in a simple language. They interview the principal investigators and technical liaisons and then write the technical summary. The MN DOT internal marketing people have different focus and that's why they don't write these summaries.
        i) TRB-WD – We are engineers and they need help with the writing. Also, don't have full-time staff to devote to it.
        ii) TRB-WD – Does anyone do in-house webinars on projects? MT – Yes for some traffic safety projects. Helps to get the info out beyond the folks immediately involved.

iii) OH – They do webinars on research projects for most of them. She is trying to make them focused on implementation and the practical side of the research, not on the technical aspects. (Worked with CTC to get GoToMeeting set up at OH DOT.)
iv) MT – She got GoToMeeting in their agency.

Tracking

26) What are the most effective methods to record implementation data?
   a) VT – for those who have an electronic system, do you like them? MN – Yes, they've used their Automated Research Tracking System (ARTS) database for a long time and it has evolved. MN DOT is trying to bring in research from the other areas of the agency into ARTS. (Maintenance, Traffic, etc.) Research is happy about that. ARTS is homegrown because no commercial product could do what they need. There are different levels of access to the database from read-only to full administrative privileges. They have added a benefits and implementation tabs to track those activities. They thought about buying commercially available software but realized it probably wouldn't work. He has demoed it for many states. He's happy to share information about it. He has a manual he can also share. Only drawback – They have had a contract with the same contractor for programming the entire life of the database. Concerned if that goes away, what would they do? They are thinking about bringing someone on in-house that would learn how to program it.
   b) MT – She did a survey about who tracks and has a database? MN stood out because theirs is Oracle-based. She worked with MN DOT's contractor to find out what it would cost them to have their own database. She worked with her own IT folks to do a business process analysis document. But in the meantime, MT is getting a Program Project Management System database and Sue has met with them to tell them what she needs. MT has implemented a construction scheduling system. It does not provide financial tracking or contract management. These would have to be provided separately. Sue is waiting to see if the same company will get the Program Project Management System contract also.
   c) TX-KP – They are looking at a performance measures system for the entire agency and could potentially tap into that.
   d) OH – They designed one in 2010 in dotnet. They worked with their IT folks, who told the consultants not to document anything. Then the consultants contract didn't get renewed so basically couldn't use it to its fullest. After four years, the IT folks gave them someone to help them. They can extract data to Excel. It's a project management system. Seven people use it. They are not functioning fully with this system.
   e) MT-MD – This question is important. MT involved in a lot of innovative stuff, especially in engineering. He's concerned the information is not being captured and used. He's looking forward to hearing what we come up with.
   f) UT – They have an Access database. They are updating it to track in it. They use the enterprise-wide Socrata. Take data from there, put it in the Access database and play with it. It's only for project management right now. Implementation tracking is not in it yet. Seven people use it. They struggle with what's going on outside and putting it in their system.
      i) CTC – Does innovation extend beyond Research? Would those things be in their database? UT- They have folks that do experimental features and would love to have that information in the database. They only put in things that they pay for. He wants to get all things in there, whether Research paid for it or not.
      ii) NJ – NJ DOT Research had an ongoing contract for an Access research tracking system. Same university tried to convert it to a cloud system. Now we are contracting out to a University and consultant to create a cloud customized system that will eventually tie into NJ DOT's eBuilder Project Management system, which will be connected with our Federal financial system (FMIS), which is now eFMIS. Otherwise, to have eBuilder customized for

Research that would take place at least three years from now. My acting Manager is interested in how much ARTS system cost, SOW, etc.

g) How much does ARTS cost?
   i) MN – Last five years. They renew the contract every year be adding or improving the database. About $80k/year – maintenance, assistance, training and programming.
h) MT – Nice thing about using a system another state has is that there is the potential for joint upgrades.
i) MN – Iowa is also working with their contractor but he's not sure where they are at with creating a database.

27) What are some challenges and lessons learned in pursuing implementation tracking efforts?
   a) UT- Implementation of the Implementation tracking efforts can be had to get buy in because more paperwork for folks. Build the business case and presenting it show the long-term value. Do that before you hit them with a form. Sell it as "this is a good thing." Selling it is super important.
   b) TX-KP – Initial pilot for implementation deployment is straightforward. The additional deployment gets lost. They don't get feedback from other districts that also may have implemented it. They would like to record that, but can't if they don't know it happened. Want to record the benefits that the entire state is getting from the implementation of research results.
   c) ARA – The "one more thing" issue. If ask too much, then can sometimes get poor quality information, which can be worse than no info. Be cautious of this.
28) What are best practices for tracking implementation?
   a) FHWA-MT Div – Early and often.
   b) MT – And having some system that works for you.
29) Do you track implementation within each project, or complete a process to look at all projects at once (e.g., annually)?
   a) UT – Both. They are recognizing that it's hard to do every five years. It's like pulling teeth. Annual checkups might be better to see where you stand and what support is needed.
   b) OH – This her question. The five-year retrospective they did was hard. To go back and get folks to remember the project and what they did with it. They track a research contract in their system but in terms of gathering information that's up to the research project manager.
30) How can implementation tracking be conducted to benefit the entire department, not just Research?
   a) UT – Communicating it will benefit the entire department. Be the source of answers for folks in the department. Go to Research to see if research has been done on their need.
   b) CTC – Hafiz talked about different levels of access. Not everyone will want to see everything. Some will want a dashboard view.
   c) MT-MD – They hold a construction conference every two years. Those folks will not look at a research system. Research folks attend the conference and let them know what's going on to sell them on Research services. Mike advises that if you have these at your agency, get on their agenda. Let folks know what you do. The construction folks love the experimental features because it makes sense to them. The other research may not be what they want to hear so tell them things about your program that will help them.

Reporting

31) Who is ultimately responsible for "final reporting" of implementation data? RC (Research Center), FA (Functional Area), GC (General Contractor), University or other?
   a) UT – Everyone is somewhat responsible for the various phases of imp. The PI needs to record their part but can't be held responsible for implementation at the department. Define the roles up front so everyone knows what's expected of them.
   b) MT – Looking to the future, she would be recording if the implementation recommendations have been completed.
   c) NJ – The Research Bureau is responsible, but they have universities gather information from all parties involved.

d) OH – If they have a contract for an implementation project, then gathering information is part of the contract.
e) MT – You could have an annual contract for someone to gather that data from all projects.
f) UT – If you can have the performance measure and the champion work together on it – provide updates, maybe a case study. They don't differentiate between research and experimental features. They co-mingle. Have the two communicate and put in your database.

32) Does one person own implementation and reporting, or is it distributed?
a) No response as this was covered above.

Staff

33) Can we nationally decide on a standard name for this position? Specialist, coordinator, etc.
a) MN – They call it an implementation engineer. It will be different for each state depending on the rules at their agency (union stuff). They have coordinators who track but don't provide technical assistance.
b) CTC – Could also be a manager.

Success

34) What are best practices for sharing successful implementation efforts?
a) See RAC Survey Results document on best practices.

35) Which research project deliverables, traditional or non-traditional, have helped with the successful implementation of research results?
a) MT – they try and put as many important products they know about up front in the contract or id them later and do a separate contract, if necessary.
b) VT – Do you feel your 2-page summaries are helpful to get the information out to folks?
i) OH – Used to do a final report and an executive summary document (7-8 pages) but written in the same language. Now they have the PI do a 2-pager, with pictures and written in plain language. Helped in that they share that with the executive leadership. They haven't measured if that has impacted implementation, but they know that staff read it so that they might consider implementation of the research.
ii) MT – The PI drafts a research project sum report. They took the design from TX – Intro, What We Found, What We Did, etc. The researcher does it and they put it into their In-Design template.
iii) TX – They do the same thing. Some projects have a video that must be part of the final product.
iv) CTC – CTC does these 2-page summaries for MN, MI and NCHRP. We interview the TL or Research Manager and talk to the PI. There has been discussion about submitting something as a starting point. It needs to be the agency's message and not the PI's message. There are a lot of ways to go that depends on goals and staff availability. Two pages should be enough. Four pages is doable, but it can be too long for folks especially, as you move up the ladder.
c) NJ – How many have implementation reports as a requirement of the contract? Can you share?
i) MT – Yes, the researchers and panel meet to discuss the researcher's implementation recommendations and determine MDT's response. This all gets put into an implementation report from the consultant. Research staff put this information into their implementation report template. All implementation reports have to be approved by the high-level Sponsor, who is ultimately responsible for implementation. She will send Stefanie their template.
ii) OH – Don't require this from the PI. Require their recommendations but OH documents what they decide to do.
iii) UT – No
iv) MN – No. They do the tech summaries that CTC creates.
v) TX – No
vi) VT - No

36) Is implementation success more likely when implementation support (training, etc.) is provided by the researcher as one of the research contract tasks?
   a) OH – Yes, by putting in the contract you have already defined and thought about what you need at the end.
   b) ARA – yes
   c) MT – Yes
   d) NJ – Training sometimes discourages implementation, especially when the product is not user friendly.
   e) TRB-WD – Not necessary.
   f) TRB-JB – SHRP II. They included that the PI would draft a 2-page plan. Training plan could be included. Need to put in the contract so that it's spelled out for the PI.
   g) TX – What OH said, put in the contract.
37) A question for state agencies: How extensible do you find implementation stories from other agencies? That is, when reading or hearing about how another state put research to practice, does it commonly present opportunities about how you can do the same, or too often does it seem like a mismatch because of differences in state regulations, political climate, or technical approaches to a given problem? When such research does seem to have implementation value, is the next step more commonly (a) We can use those research results, or (b) We would first need to do research similar in our own state?
   a) CTC – Does anyone ever take a research report and use it?
   b) OH – They help her think more creatively. She shares with others in the agency to start the conversation.
   c) MT – If directly applicable then can be implemented. If needs to be adjusted, then they will do that. It depends.
   d) MN - Depends on the type of project. If from the south, e.g., then need to test in your own climate.
   e) VT – Start the conversation, share the information, and get people thinking along those lines.
   f) MT – There is some feedback when you share with others. Folks will tell you if it is good information.
   g) UT- Can also be piecemeal. May take some of what they read and use it but not necessarily all of it.
   h) CTC - Reach out to the PI or the Research office when want more info? Research office because that's their contacts.

Performance Measures

38) Is it a performance measure if it is just tracked and not compared to a benchmark?
   a) VT – Yes because something is better than nothing.
   b) UT – Performance measures for a time that's worth tracking until a benchmark can be established.
   c) MT – not all performance measures will lend themselves to a benchmark. You can use the performance measures to see trends.
   d) TRB-JB – Use performance measures as performance indicators once you start tracking for several years. You can see trends.
   e) CTC – If it just measures something then it's a measure. But an indicator shows what's happening.
   f) TX-KP – If you have a trend then you know what's going on.
   g) FHWA-MT Div – Performance indicators are not a mandate, but performance measures are. What is required is a work in progress. Taking years to get anything going because people are afraid of what's going to be required. He thinks we should just start so that we can see what's

happening. But because the mandates will be tied to funding, it makes people squeamish to start tracking at all.

h) MN – He feels pressure that he must show that certain measures must be met. He doesn't want to have performance measure on all his projects, such as all of them should be implemented, because that is impossible. They do have a performance measure that all projects should be done on time and on budget. All projects decided on in the fall must be under contract by a certain date to keep projects moving forward – to keep them timely. For implementation, they have a target of they have X amount of money that they will use on implementation projects. They didn't have a comparison at the end of the year that they had 40 projects, and all were implemented.
    i) TRB-JB – Depends on what story you trying to tell. Don't track what you don't want to highlight.

i) TRB-JB – Do you track your level of satisfaction of the research project with the sponsoring agency?
    i) MT – They have an exit survey that goes to the project panel and the consultant at the end of the project.
    ii) Kevin – They do a general survey but not project-specific.
    iii) MN – Do exit interview for each project. They do a paper evaluation. They track in ARTS. They do a survey of their customers (internal and external) every 3-4 years.
    iv) MT – Includes satisfaction with researcher and the Research staff. She sends to the researcher so they can see the results. They have had discussions with Consultant Design to use their system for evaluating researchers. Then can see how the researchers are doing across projects.
    v) OH – No project-based exit surveys but have done a program customer satisfaction survey.
    vi) TX – They do a program customer satisfaction survey.
    vii) UT – They do a program customer satisfaction survey along with the 5-year review. They need to decide if they going to do it at the project level.
    viii) VT – She will do one for her upcoming symposium and will add a few questions on the research program in general.

39) Does it meet the performance criteria for the requesting group OR is it research performance measures?
    a) UT – Are you (Research) measured on something you really can't do? Such as implementing a project? They can record how many were implemented but not have it as part of the question of "Was the research successful?" Communicate with the champion to see if they used the research. Did they get something out of it? Then put in their (Research) suite of things they track.
    b) MN – Agrees with that. It would be worthwhile to go back to TLs to see if they used the research.
    c) TRB-JB – On the basic level, were there products from the programs that were implementable? If they didn't, find out what their barriers to implementation were. This may give Research indicators on what they may do to help remove those barriers. The leadership may have to take action to remove those barriers.

40) How can we insure performance measures of research be transferrable to performance measures of research implementation? – Struggled with how to word this. I'm trying not to speak of contractual performance measures (on time, deliverables, etc.) but the measured performance of the research result in implementation?
    a) VT – Does this get into a quantitative value?
    b) CTC – Or at least showing an impact of the research? A change in practice vs. a quantitative value that comes from it.
    c) MN – They ask the PI if the research would be implementable and how? Will it be quantifiable? If so, they give the PI money to then provide those quantitative results. Do this at the beginning of the project. Stole this from TX.
    d) TRB-JB – What is a non-contractual performance measure for research? TRB-WD – Is the project implementable? Did it meet its objectives?

i) TX – How do you measure that?
ii) VT – Like that the questions are yes/no.
iii) TRB-WD – They send a survey to panel with these types of questions. If anyone answers no, then they won't publish the report until everyone answers yes.
iv) TRB-JB – They struggled with this with SHRP-II projects. What is "implemented"? Two states using it, five states? They needed to define that goal. Once they had a goal, they could measure the performance. If not meeting the goals, what stopped your agency from doing it?
v) TRB-WD – Need to collect data for years before you can really know your performance measures and have them be viable.

41) How do we allow for performance measurement of the research result in environments different than the research environment?
   a) No response.
42) How do we enhance IT systems to maximize tracking implementation, benefits/impacts and/or performance measures? What is the most effective way to record/use implementation data?
   a) VT – If you have a database, is there a way to enhance it to track implementation or performance measures?
      i) MT – Depends on each state's internal environment.
      ii) MN – The survey they will do on the implementation of their projects (to TLs and cc: to the administration). Send them the project they have done in their area: what has been done with them, updates on using the research, barriers to implementation, and suggestions for how they can be implemented.
43) In general, performance measures take a lot of time and resources to collect, evaluate and report the data. Therefore, a lot of thought and planning should be given to the need and usefulness of that performance measure, and the practicality or priority of the performance measure compared to other priorities. What are the typical performance measures that DOTs could use in measuring the success of their implementation program given the constraints mentioned in above two bullets?
   a) VT – Loves surveys. Surveys and performance measures are tricky because if they don't get a survey response, then what does that mean? How to interpret the silence?
      i) MT – When they send an exit survey, they must remind them. Some folks will not respond. Once she gets more than 50% of the panel responding, then she will look at the results and put them together.
   b) TRB-JB – This question gets to "Do you have an implementation program?" and measuring the success of the program.
   c) MT - They don't have an implementation program.
   d) MN – Looking for something at the program level that people have used – typical performance measures they have used.
      i) UT – Use benefit/cost to tell the story that things are being implemented and are cost effective. They do this on a rolling five-year basis and this will help them evaluate their program overall.
44) Thinking about the performance measures issue, how much time/effort is appropriate for collecting and reporting information on the research program? Is this a once a year collection effort? Do the results move the needle?
   a) ARA – Those of you who have collected multiple years of data, are you better informed, has it changed what you do?
      i) UT – Depends on the measure and are you looking to make changes based on what you are measuring. If something no longer needs to be managed, then don't continue to collect the data.
      ii) TX – They use the performance measures as control data. See the trends and make changes based on that. They track timing of deliverables and have seen the time to delivery has shortened. Because both the researchers and project managers know what is going on.

iii) OH – They track in their annual report, the number of applications they get for their programs. The little bit of the data on one program (which they didn't find that useful) allowed her to make a decision on whether to continue.

45) As we have continued to address accountability, performance measures that do not require substantial costs to collect are key. My favorite measures right now: students/professionals trained, number of researchers engaged, on-time/on-budget, slack (downtime, how do you align your work with your busy period), outstanding projects, backlog, and research customers served.
   a) VT – This question is giving her ideas for potential measures. Can we identify measures like the above that aren't super difficult? Do you need a performance measure effort to make a change (like getting more deliverables on time)? They changed their deliverable time, but not because of a performance measures program. Do you need performance measures to make changes?
   b) ARA – Cost to collect performance measures? How much is the right time/money to spend on performance measures? 10% of your time? Less or more? Not a problem to solve here, but interesting to think about.
      i) VT – Stewardship agreements? In the RAC survey document on performance measures. Sue had a document on Performance Compliance Measures – CO DOT's document that shows what is in their stewardship agreement related to Research.
      ii) MT – They have a stewardship agreement, but Research is not in it. Each DOT should have a stewardship agreement. Only two DOTs (CO and NM) indicated in the survey they include Research in their stewardship agreement.
   c) ARA – Does anyone have any have favorite performance measures they are using? He likes TX's.
   d) MT – She likes the overhead costs to keep them at a certain level. It shows what it takes in Research for the whole program vs. spending on other things.
   e) ARA – Does OH report on the Research time codes that the panel members use to charge their time (but Research doesn't actually pay for the time)?
   f) MT – They have a project set up to charge for Research staff time. The only charges that go to the project are the researchers doing the work. The panel members have their own project they charge their time to. It hits their SPR money not the state money.
   g) VT – She is making changes next year so time tracked specifically.

46) Are the performance measures at a program or project level and how are they defined?
   a) OH – Both. CO ones were program based, because they were part of stewardship agreement.
   b) TRB-WD – Start at project level and can always move to program level.
   c) Both!

47) Do you measure time to contract?
   a) MT – No. They can contract in a day. If with a public entry, they can do it themselves as they have the template. RFPs quick too.
   b) OH – They did measure when asked. Their interest is making sure the proposals are clear and they are getting what they want. Projects won't start until August and she's okay with that. Measuring this is not important to her. They ask if the projects are time sensitive. Changed the contracts to say that the start date is when they get a project initiation letter, which may come later.
   c) TX – They do a notice to proceed letter to initiate the project start. They try to have contracts done by the start of the next fiscal year. Doesn't find value in measuring time to contract.
   d) MT – Letter to proceed with RFPs. With universities, the date it's signed.
   e) TRB-WD – This an important issue. The sponsor wants them to execute contracts ASAP. Not always in their control because the contract office covers the entire Academies.
   f) OH - They do their own contracts and use electronic signatures.
   g) TX – A lot of it is the university side holding things up.
   h) MT – They have a research-purchasing RFP and contract template. They fill it out and send to Purchasing to complete it.

i) TRB-WD – They try to improve the process by having a task order with the big consultants so don't have to do a new contract each time.

48) Do you measure efficiency, such as # projects per person?
   a) MT –If they have a researcher who is late, then won't give them a new contract until they catch up. For Research performance measures – Doesn't apply, because not enough staff – only 1 plus staff managing research projects.
   b) TRB-WD – Some areas have more projects one year than others due to popularity of the topic in transportation. Leadership looks at how many projects everyone works on, but it doesn't happen too often. If an SPO leaves, then another one fills in as "acting." A new SPO won't get a lot of new projects.

49) How do you measure agency engagement?
   a) MT – They have noted in their annual report the number of people who participated on the project panels.
   b) VT – Surveys relate to agency engagement. Satisfaction stories get to non-quantitative measures.
   c) MT – Asked to grade the project in their exit survey that gets to non-quantitative aspects.
   d) VT – How to get at how many new people involved in research projects?
   e) MT – If successful in one area (areas doing research) then others hear about it and new areas may become new research customers.
   f) TRB-WD – He will tell someone he needs help from that they don't have to be involved in the early stages but keeps them involved and updated. Then allows them to be involved later, at their convenience.
   g) TX – What is the measure? The # of projects someone is on?
   h) TRB-WD – Rotates folks off a panel if someone is not engaged and not responding. They follow up with someone to get their reason for not being involved.
   i) TRB-WD - Do you check diversity of your panels in terms of gender, age, and race? Do you include young people because others will retire, and the knowledge will be gone?
      i) OH – Yes, they try to involve younger staff when can.
      ii) MT – Yes, on involving the younger staff. Also balance the panel so that it's not just higher ups and the others are afraid to speak at the panel meetings.

50) Are performance measures related to contract measurement (tasks completed on time and on budget, receipt of timely quarterly technical progress reports, etc.) sufficient?
   a) VT – Are the contract measurements a decent start for performance measures?
      i) TRB-WD – Try to be reasonable on lateness of deliverable and finishing a contract. Quality of project is more important. The contract time is an estimate and be reasonable on why it might go over.
   b) UT –They have projects that last many years. In Research they aren't as strict on ensuring projects are done at a specific time. This makes people frustrated on the implementation side because they are waiting for the results in order to implement them.
      i) OH – Completely separate.
      ii) VT- Completely separate.
      iii) MN – Research projects, they monitor how they are doing timewise. They don't automatically give time extensions and review those carefully (it does cost them money to process those amendments). They will deny amendments that can't get finished within a SFY. They don't get the money for that year. Some PIs will say they can give the 75% of the project. The TAP is consulted and if they agree, then that's okay. Sometimes a specialty office will contribute funds to finish the project.
      iv) MT – They stress timeliness and getting reasonable goal dates. They require task reports but don't pay invoices based on task reports. They will hold an invoice until the deliverable is turned in.
      v) VT – They do deliverable-based invoices, but the quality of the task isn't always there. They need to deliver a progress report (10-20 pages) of what they did that quarter to get paid.

vi) TX/MT – They have project progress meetings. Timing depends on the project.

c) NJ - We are now tracking individual PI hours on all active projects. A few were over-scheduled and therefore their contracts had to be modified to scale back their hours.

51) How do you measure benefits differently from value of research?
   a) OH – UT's benefit cost formula had other stuff on the cost side besides just cost. She is interested in that. Performance measures and value of research seem so connected and she wanted to see if folks had something else in mind.
   b) MT – Performance measures feed into value of research but is that the only thing that feeds into it.
52) What performance measures do other state DOT's track?
   a) This is in the handout from the survey respondents.
53) Again, for state agencies: How widely varied are the performance measures that are most useful for different customers? It seems unlikely that internal practitioners, DOT management/executives, state lawmakers, and the traveling public/taxpayers would all measure success along the same metrics. Is it a worthwhile goal to develop measures that are meaningful to the most groups, or do they become too nonspecific and watered-down? What improvements can be made to the processes for developing, vetting, and revising performance metrics?
   a) CTC – Measures for a broader range of customers, both inside and outside (lawmakers, public, etc.).
      i) VT – Things you should consider to make these items applicable to multiple types of people. Goes back to, is it worth the effort to have a systematic effort for performance measures? There are academic rubrics, but do we want to follow them. If someone comes up with a systematic set of performance measures, do we follow them?
         (1) Get in touch with James after 11/15 to see if we can share the paper Emily referenced. It's on sustainability. It's an example of going through this effort.
54) Is there a publicly-accessible performance measures dashboard (from a state DOT or perhaps other kind of agency) that you consider to be the current "gold standard"?
   a) CTC - VDOT has a public facing dashboard of performance measures (Research not included.) He feels like the things we see in annual reports would be easy to be put into this kind of graphical representation. Folks more likely to view this than open a PDF of an annual report.
   b) VT – Washington State is known for their performance measures dashboard (but we didn't find it so maybe they don't do it anymore.)
   c) OH – Likes the idea. ODOT has a critical success factors with 20 factors, but it doesn't have to do with Research.
   d) UT – What research-oriented measures would be worth putting on a dashboard?
      i) OH – Likes Brian's suggestions of looking at annual report and using those statistics for a dashboard, updated monthly.
      ii) VT – WS has a Performance Measures library page that links to performance measures for all other states.
      iii) MN- Have an annual At-A-Glance that has some dashboard type information on the last page.
   e) TRB-JB – The question is what story do you want to tell with a dashboard? Information for management won't necessarily be the same as for what to tell the public. Is the story to create credibility with upper management so you will have their support or is it to help you manage your projects?
55) Do state DOTs have separate performance measures reports?
   a) MT – Do you get a separate performance measures report (benefit cost analysis) from the PI? A MDT technical expert puts together the assumptions (cost savings, time saved, etc.) and then it gets sent to the researcher who comes up with the benefit cost and puts it in a report. Sue will send a link to their performance measures report. Not all projects warrant this. Their chief engineer wants more of these. He wants them written into the research contract.
      i) OH – The benefit cost analysis is part of their final report. They ask for it in all their final reports.
56) Do state DOTs add performance measures reporting to their research contracts?

a) No response.

57) How do state DOTs determine the data they will need from each research project for performance reporting?
   a) ARA – Could task your project champion to think about this.
   b) CTC – Or include in the project bid to have the investigator suggest how to measure performance. Clear Roads pooled fund study does this because they figure the researchers are the experts at it.

58) Has FHWA or anyone else considered standardizing an implementation process, with standard performance measures, for the implementation aspect of each DOT's Research Unit?
   a) This would be difficult.
   b) FHWA-MT Div. – Freight has performance measures coming for their sector. These will be nationwide for all states. He thinks something will be coming for Research too.
   c) VT – She got the idea that FHWA is hands off when it comes to providing mandates to the Research offices.

59) Do you share performance measures with your agency leadership? With the public?
   a) MT – In their annual report, where they put qualitative things, it's out there for everyone to see.
   b) OH – Same.
   c) MT – Do not share internal performance measures.
   d) MT – What purpose would it serve putting out to public?
   e) CTC – Differences between public and trying to communicate it. Unless on landing page, no one will see it.

UT – Email on RAC listserv from OK re: Annual Performance Report. Is that related to what we are discussing here?

   f) TX - APER = Annual Performance Evaluation Report. It's talking about the status of your program? It's related to SPR.
   g) MT – Ryan from IL put something related to that on RPPERFORMANCE MEASURE website. Lots of numbers. Sue's is not like this. Hers doesn't have as many numbers and talks about what was done for each project.
   h) OH – Research 101 class from National Highway Institute. It tells you the regulations, your requirements, etc.
      i) ARA - NHI owns it. The Above the Curve.
   i) Annual Accomplishment Report that goes with each Research Office's Annual Work Plan, which is sent to their FHWA Division Office. Everyone has different deadlines and their reports are different.

The Value of Research

60) In our experience and evaluation, the best way to ensure the value of research and garner support for research and implementation is to involve a wide range of practitioners in a transparent process to identify needs, fund projects and manage the projects. The practitioners who are involved in the process and its outcomes will be natural advocates for research that provides value to their areas of practice. How are other state DOTs involving their practitioners in a transparent process in the research projects? How are other DOTs ensuring the value of research and develop broad based support for research and implementation?
   a) MT – Their process is transparent because they put everything on their website.
   b) VT – Is a transparent process the same thing as value of research?
      i) MT – How do you determine the value of research? Repeat customers who tell others?
         (1) OH – It's in the eye of the beholder.
   c) UT – Involve many DOT folks from various areas to sit down with the universities to discuss the problem statements the researchers submit. Then the DOT folks vote on them. They get 60 problem statements over 6-8 functional areas. They discuss them all (in breakouts so each group

gets 10-15 statements to discuss). Their issue is communicating on the back end when it's done, updates on the problem statements discussed.

d) TX – They do the same thing with about 200 ideas.
    i) VT – Does the researcher present the problem statements? UT – Whomever submitted it (anyone can).
e) MT – The champions present the ideas to the Research Review Committee.
f) VT – How do you show the value of the projects selected to everyone else in the agency?
    i) UT – They would love to do the 2-page write up and hand them out to everyone in the related functional area.
g) MT – They have Stage 2: Topic Statements (like Problem Statements) that anyone can fill out and submit. They consider the public entity first to conduct the research (if they submitted one) if the Research Review Committee doesn't see any red flags. No guarantees, but they try.
    i) The librarian has already done a literature search when Stage 1: Research Project Idea form is submitted. If it comes in without a MT DOT Champion, then Sue tries to find one. If one can't be found, then it won't move forward. After the literature search is done, the champion decides if it will move to Stage 2.
    ii) Pooled funds – Will only commit money for three years at a time. The TL must submit a project update form annually.
h) MN – They get 60-80 need statements per year and fund about 24 projects.

61) What are the best practices for determining the value of research projects and which projects will be included?
    a) TX – Wouldn't you include all of them?
    b) CTC – Depends on the story you want to tell.
    c) MT – Show value for the big hitting projects that will show the value of your entire program.
    d) MN – They choose the big projects for which they have the data and show value.
    e) TX – Choose the high value ones for the messaging value.
    f) TRB-JB – The ones you want to show value via numbers, you pick the ones that have numbers. Other projects will lend themselves to demonstrating value qualitatively.
62) What are the best practices for determining the value of research programs? Is it just a roll-up of the projects whose individual value was determined or something else?
    a) MT – They would look at the services the Research Office provides, such as the Library. In their annual report they have been doing a quantitative value of all the projects together and the services they provide.
    b) TX – They just started the value of research thing. Their Administrative Director for the division must talk to the legislature or commissions sometimes. Most of the time you can pick one or two projects and show the benefit costs. They are trying to build a Gantt chart of the program and associate the value to the projects. This makes it like a roll up to the program.
    c) UT – With their 5-year report, they roll it all together. They would like to have it individualized and roll it up. They got a 42% response to their survey on the projects, which would be feedback on less than half of the projects.
    d) VT – By the time you try to show home runs, you are cherry picking. Sharing the story of the best projects isn't bad because sharing a model of success for projects. Gets back to the performance measures and showing the benefits of your entire program.
    e) MT – She doesn't look at value as just numbers. Qualitative is good too.

What's the difference between the Annual Report and the Annual Accomplish Report?

MT – If she does an Annual Report, it is linked to in the Annual Accomplish Report. The Annual Accomplish Report is minimal. Her Annual Report gives her more info and is her pref.

TX – Just does the FHWA report, APER.

OH – Do their work program and ??

63) Is the Value of Research incorporated into everyone's DOTs Asset Management Plan nationally?
    a) MT – No

b) OH – No
c) VT – No. New England just getting into asset management.
d) UT – Why are these things mentioned together?
e) NJ – They have an asset management plan for the department and Research isn't included, but it should be.
    i) OH – Would the projects be listed as assets? Would it be a feeder or an itemization? NJ – Between the performance measures and value of research, research programs could get benefit from an asset management plan approach. VT – Asset management is a total other entity and doesn't apply. NJ – She views it as a funding thing and prioritization of the funding. OH – She doesn't say Research listed as an asset, but it's an interesting thought. VT – Looks like NJ is trying to get leadership's attention and on their radar. NJ Based on the concepts from this project http://www.state.nj.us/transportation/refdata/research/reports/NJ-2009-005.pdf, establishing performance measures, tracking performance over time and then setting performance targets based on maximizing public benefit - helps inform research program budgeting priorities. ARA – There are some overlaps between asset management and research out there and this may grow.

64) Is your PI or agency staff responsible for documenting the value?
a) VT – Should the researcher be documenting value or the Research staff?
b) MN – They pay extra money for the PI to document the value. This is the first year they have done this. PIs asking for $3k-$5k to do that, about a week's worth of time. The PIs work with the department to get information and assumptions.
c) MT – Performance report and they are less than $1k each.
d) MT – Does Hafiz go back and verify the value they stated is true? They probably will, but haven't yet since it's the first year. The PIs didn't want to provide a memo within first 90 days on how they will calculate the value. PIs didn't like this. Also, PIs said that not all projects will have calculable value. MN allowed the TAP to override the PI providing the memo, if they don't feel it's applicable to the program.
e) UT – Value is project value vs. program value. Trying to figure out which type of value we are discussing. Value of research – need to determine what exactly are we talking about – value of the project, value to customers, value of program.
f) CTC – You don't know the extent of the implementation when you are calculating the benefits.
g) UT – Was there a learning curve for the MT researchers on how to calculate the benefits? MT – Yes. They worked through it together with the researchers. They link to an example in the contract, so they can see exactly what is expected of them. Two projects have these calculations so far. She sent these performance measures reports to a professor to review to make sure they were done correctly.

65) Are agency engineers willing to quantify the benefits?
a) MT – Yes, for the two projects they have done this on (performance measures report).
b) OH – When they did their 5-year retrospective in 2014, folks were nervous in answering this question. If they couldn't go back and get hard data, then they didn't want to answer. Now, they have those discussions during the project, so they know what they are measuring.
c) TX – Some folks nervous about how far down the rabbit hole you go with providing benefits. You must have your assumptions on what the benefits calculations will be based.

66) If you share the value of research with leadership is it per project, aggregated, periodic?
a) TX – They just started this and their leadership is aware they are trying. It's at a project level (and depends on which projects the leader wants to focus on).
b) MT – They've only done the two quantitative ones and do qualitative in the annual report. All projects they worked on this year have provided benefits. It would be on an annual basis and rolled up.
c) UT – They do it every five years and only from the projects for which people respond to their survey. The survey encourages respondents to call out the minimum benefits. The folks who

didn't get any benefits may not answer the survey. They also got a few zeros from respondents that they got no value.
   d) TRB-JB – Also, it may not have gotten implemented because of institutional benefits.
   e) CTC – Also could be confirming existing practice. What is the benefit on that?
   f) TX – If another state gets value out of it, even if your agency didn't, there is value in that as well.
   g) TRB-JB – If UT sees a zero, contact them and find out why a zero. Document it to see what not to do again, what barriers in their way.
      i) VT – What about the folks who didn't respond? Contact them? TRB-JB – Focus on the ones who did respond because they are responsive to your program. Then hit the others, if you have time.

67) How do others see/define the value of research i.e. is it cost/benefit plus quality? Method of verifying?
   a) TX's – They are gathering a lot of information up front and follow up in 3-5 years to see if they got out of it what they thought it would be.
      i) Where did the knowledge go? – In the one area where the research was done or throughout (to other districts)?
   b) CTC – UT had a long list of non-quantitative benefits that aren't in their benefits cost analysis.
   c) MT – Add to the performance measures report some of the qualitative benefits as well.

68) While savings from research are often expressed in hard dollars, the benefit-cost ratio remains a very common way of expressing the value of research. This can produce eye-popping numbers (for example, when the benefits include productivity saved from reduced congestion). Are decision makers and policy makers moved by these kinds of numbers, or are they viewed as too soft to have anything more than PR value?
   a) MT – In their performance measures report, they clearly spell out the assumptions and estimates. She made them as backed up as possible, so they will be believable.
   b) UT – They spell out user costs (define these specifically so readers can see where the numbers come from) and that they have a context for them. For traffic – they talk about hours saved of drivers sitting in traffic (and its related costs), the costs associated with idling, etc. The numbers seem unbelievable but when you say where they come from, it makes more sense.
   c) OH – Their executive leaders are sensitive to roadway closures. UT – It's political capital.
   d) TRB-JB – They clearly identified actual dollars saved at the agency AND user costs. Need both. Or can put it another way, such as reduced delays by 60%, instead of saved user costs of a really high number that's unbelievable.

69) Is value of research similar to impact of research? Should we be striving for a quantitative, $ of impact measure?
   a) VT's – She is not convinced that all benefits can be turned into dollars.
   b) UT – You can go down the rabbit hole if you try to do this.
   c) VT – Impact of research seems to be the current buzzword in VT.
      i) UT – Impact = the benefit part of the benefit cost. They put all benefits together and quantify as much as they can. And they put that number in the formula.
         (1) There is impact without quantifying it.
      ii) MT – Dollars or lives saved or something you can measure. If you can be quantitative, do that. If not, that's okay.
   d) CTC – UT's grading scale is qualitative but gives a quantitative feel to it. Shows where you are at on the qualitative benefit.
   e) UT – They like TX's definition of value. Value = benefit cost plus quality.

70) How do we incorporate anecdotal evidence of research in determining value of research when results aren't highly quantifiable?
   a) OH – Bullet points of "it saved x percentage of labor" and other descriptions.
   b) MT – Done the same thing.
   c) VT – Anecdotal stuff shows the picture in communicating value.

71) How to gage value to customers so they use the research process?
   a) MT – At-A-Glance that MN uses or a different marketing tool.
   b) UT's question – They get a lot of research problem statements. They want to make sure that everyone who needs research knows how to do it. Show them they can rely on research that they can get what they are looking for.
   c) OH – UT trying to share the programmatic value of research and what folks can get from research. Do you have a newsletter that goes out to employees? UT – Yes. OH – They have folks excited to work with Research. They get them to toot Research's horn (in the newsletter).
   d) TX – How to keep the areas encouraged that get turned down? TX tries to make sure they do projects across the agency so that everyone stays in engaged.
   e) OH – If you do research with one group, you drain them and don't have the resources from them that you need for the projects.
   f) UT – Need to balance it and say where research is best applied. It may be heavy in one area one year because good projects, but then spread it out the next year.
   g) TX – Used to balance out the research funds across areas, no matter what, but they don't any more. They look at priorities for the agency and try to balance where they can.
   h) OH – They go to district and functional area meetings to talk about research. That gets folks involved across the agency. The districts or areas own the projects. Encourage them to tell their research story and be there to back them up on how the research process works.
72) High Value Research Submissions and Award Recipients
   a) Is it better to submit multiple nominations or just one?
      i) VT – She thinks it better to do one, so others don't cancel each other out.
      ii) MT – She does more than one.
      iii) CTC – It seems to be what's top of mind for what folks need help on. There seems to be no rhyme or reason for what gets picked.
      iv) UT – Have submitted more than one in the past. Lately, now one or two. What is your reason for submitting? – To get it out there or to win?
      v) MT – When she ranks them, she looks at the individual projects and doesn't care where they are from.
      vi) Different regions do the voting differently. Some only allow one project from a state to go through to the final four. Others don't do this.
      vii) OH – In the last couple of years, there have been other brochures featuring a topic. Discussions on allowing a project in a featured topic in both or just for the High Value Research compendium or a topic brochure.
      viii) UT – The criteria for voting on the High Value Research projects. How do others look at how they should judge which projects are high value?
         (a) MT – Looks at impact and how big of an impact. Not all of them include the benefits.
      ix) CTC – Do you look at the compendium with all the projects in it?
         (a) MT – She has gone thru it, in the past, and send it to her subject matter experts.
      x) CTC – They may be adding search terms next year so that it can be easier to find a project.
   b) What do other states do to leverage High Value Research project awards?
      MT – They send out to the higher ups in the agency. For a Safety project winner this year, the research already attending TRB meeting, so they will present.
      OH – Put in their newsletter, when they had one. Had the winning researcher present it at TRB – OH paid for them to attend.
      OH – They have an OH guide to TRB. They scan through all presentations and look for anything related to OH – ODOT, universities, from there. They send this to the senior leadership. It's good advertising for Ohio overall. TRB-JB – Send the book to him to see if they can do a query so the information can be easily found.

c) Is it possible to submit and not receive a High Value Research award or supplemental brochure mention?
   OH – Yes. They have the smallest region and OH has the highest number of submissions.
   MT – Yes.
   CTC – 32 projects chosen across all brochures and about 132 total projects submitted.

73) How do we measure value of research when results can be beneficial to those outside our organization? (i.e., other state DOTs, industry, national organizations)
   a) MT – They do some projects that are value to others that the DOT doesn't end up implementing. These are political projects that they must do. They are hard.
   b) OH – They do projects that they feel would be beneficial at the beginning, but figure out that it won't bring value, so they stop.
   c) UT – If you can quantify the value to the other agency, do it and still show it as value.
   d) TRB-JB – If the other can quantify the benefit, then use that calculation.

Multiple Topics/General

74) What should a small state (VT) without an Implementation Engineer and/or limited staff concentrate on?
   a) TRB-JB – What's the most interest in VT?
   b) MT – Find out what the most need is.
   c) UT – Have your project champions help you with this. Have them figure it out so the work doesn't fall on you.
   d) OH – Concentrate, you can't do everything. Pick something and focus on that. Find out from your folks how you can help them, start with those small successes and build your reputation.
   e) CTC – If you have a piece of something that you brought to the New England pooled fund or a project that you brought NCHRP to consider, do a piece of it.

75) DOT research programs are somewhat different in each state; it could be due to size and magnitude, organizational structure, leadership priorities, etc. etc. How to bring in consistency in research implementation, value of research, and performance measures in an environment where programs are different without being perceived as "cookie-cutter" or "too controlling" or "too much driving"? We would like an implementation programs that is "customer driven" not "institution driven". We don't want to be "heavy handed" or "over forceful" to our customers.
   a) MN – Value of research and benefit quantification of implementation. How can they do similar things, so they have consistency in what they are doing? His problem – They don't want to have an approach that is not applicable at DOTs across the board. They don't want to go to their customers telling them what they must implement. They want this to come from the customers.
   b) OH – As staff describe their issues to you, ask how Research can help them.
   c) MN – Going to take back serving the customers, figure out their barriers, and help them. He hopes there isn't some guidance from FHWA that all DOTs have to whatever, because it won't work as all DOTs are different.
   d) OH – Best practices are helpful.

76) Engaging new research customers. In a stable smaller DOT, we tend to go to the same people repeatedly. Is there a systematic way to bring in new ideas? Does it depend on the individual research manager to do so? Does it depend on the organizational structure?
   a) ARA – He hears this from smaller DOTs. How to expand their reach as a Research program?
   b) MT – She did a roadshow and went to every office to talk about research. Their solicitation goes out to every employee. They go to all the area conferences. They have an article in every DOT newsletter. Sue meets with all new managers. They push themselves in every way they can.
      (1) ARA – Do you document these processes so if she leaves, others can follow it?

c) UT – Likes the targeted information MT sends to DOT staff. If they see what others are doing, it might spark them to think about what they can do at their DOT.
d) VT – Having a Research presentation at new employee orientation.
e) OH – Thinned out staff made some functional areas abandon research because they didn't have the staff or time. That's when they went out to the districts to seek out research projects from them. It's ok if some areas can't do research. It's Research's job to support them not the FAs job to entertain Research.

77) How are implementation, performance measures, and value of research related, and how can they all benefit the department?
a) Already answered it.
b) VT – Would Implementation be one of the legs of a three-legged stool of the three?
c) UT – Performance measures could be a lot more than what is related to implementation.
d) OH – She will poke around with this.
e) ARA – CTC can do this.

78) Again, a tough one to sink into without becoming overwhelmed. I like what Minnesota just released (SRF completed the work) and I have always appreciated what Cam and others did/do in Utah. Capturing this information is critical and one home run a year is all that is really needed to justify the program. There is good research out there however that doesn't get moved because of barriers – specs, political battles, etc. Maybe a discussion on how to tie implementation and value of research together would make sense.
a) ARA – Liked what we talked about here and need to document our recommendations and highlights.

79) What skill sets do you believe are necessary for a transportation research program of the modern age?
a) UT – When Patrick got hired on, he was told to sell the Research program. One skill – communication. He believes in it and that it's very important. He will help people understand what Research does, what they can gain from working with them.
b) MT – Agrees about communications. More is better.
    i) UT – MT has several ways that folks can get the same information – website, library, sent to them, meetings, ne
c) VT –Two forms of communications: 1) talking about it to everyone possible and 2) technology transfer about the projects. It's probably easy to do one form and harder to do both.
d) OH – Sense of creativity. How do you link this person with that? How can you look in new places to get projects going and done?
    i) VT – Doing research outside of the Materials section.
    ii) MT – They went back and forth from Materials and Planning. When she came on she focused on the program being for the entire DOT.
e) UT – Be able to articulate a vision of what you want the Research program to be. Having a person or people say this is where we are, where want to go and how we are going to get there. Ambition, tenacity and vision are important.
f) CTC – Intellectual curiosity to have interest in your customers' problems that you want to help them solve it.
g) VT – Ownership. Make sure that your customers feel that the project is theirs vs. being Research's project.
h) ARA – What is the groups' take on technical writing and other services? Is that a role?
    i) UT – They have discussed the need for a technical writer, especially editing of various documents.
    ii) MT – They ask the researcher to provide quality docs – provide a technical editor or something else.
    iii) VT – Megan's Swanson (IL) presentation on hiring a technical editor. Can VT do some of that without hiring someone?

iv) MT – With the pooled fund they lead, they have started getting peer review. They are using peer review at the beginning of the project from proposal to final report. Makes it a better project if get the review from the beginning (so don't get comments at the end that say, "it would have been better if you would have done this"). She hired someone to do the peer review, from the university. She pays them $300 per deliverable, $1,500 for the entire process.
v) TRB-JB – Ability to respond and adapt but not react. When we react, we tend not to communicate what we want to communicate.
vi) ARA – What skill sets do you wish you had now?
    (1) MT – More people.
    (2) TRB-WD – IT support. Help with surveys and Google Analytics. Need to test your surveys before sending them. Need someone who can analyze the results.
        (a) TRB-JB – How do you design your surveys? Need access to that skill set -Don't have to have it within your staff. Make it so your surveys don't have built-in bias.
        (b) VT – The small scale that most of us do as individual states, the bias isn't as crucial.
    (3) MT – She was excited that her new librarian had a BA in communications and a MA in Library Science. Good combination for librarian/technology transfer person.
    (4) UT – They have a librarian but don't have a large or accessible library. They have no way of knowing what's in their library except for an old piece of technology that may be able to find stuff. Will be upgrading their library. Technology transfer. Ambition is important: Reaching out to folks and getting some response from them. Ability to adapt because their program is changing, and folks need to be good with that.
    (5) TRB-WD – Social media skills
        (a) MT – She has highlighted research projects on Facebook and they have videos. They must submit the Facebook post to the Communications team who review, approve and send it out.
        (b) UT – Same method as MT with Facebook posts.
        (c) OH – They post on ODOT Facebook and LTAP also posts on their Facebook page.
        (d) TRB-WD – TRB has their own communications person but NCHRP folks are encouraged to post (Facebook or LinkedIn) as individuals, as it provides a personal touch. They push things out to their committees. The communications staff also pushes things out for them.
        (e) VT – They only have one Communications person and they don't pay attention to Research. TRB-JB – Meet with them and let them know what you want to highlight to get them onboard.
            (i) OH – Lack of interest in Research could be a function of timing. The person in Communications could not be interested but then leave and the new person digs it.
            (ii) TRB-WD – Take initiative and do it by yourself if you can. Set up a Research Facebook page if you are allowed.
            (iii) MT – They need to use the DOT Facebook page. They also put articles in the DOT e-newsletter, which come out on payday. They also have a quarterly Research e-newsletter.
            (iv) Hafiz – Weekly electronic DOT newsletter and submit articles in there about Research projects.
            (v) TX – They have a communications team that puts stuff out. There is a TX DOT newsletter that comes out monthly but not weekly.
            (vi) OH – Monthly glossy magazine that has a Research project in it every issue. They don't use the word research.
            (vii) UT – Have their own research newsletter quarterly.

(viii) TRB-WD – Send a final report to TRB to get into their weekly newsletters. Also, use Research Pays Off. They will write the article for you, they just need the project details.

(ix) CTC – MN has their own Twitter account, as well as Facebook and YouTube channel.

(x) MN – They have a blog as well. The communications manager does most of the blogging. One of their Communications folks does the website. Sometimes articles that are in their newsletter get picked up by magazines.

(f) ARA – Think about where you want to be in 5-10 years. What skill sets will you need in the future to keep your program going.

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