WSDOT

RESEARCH PEER EXCHANGE 2014

FINAL REPORT

AUGUST 2017

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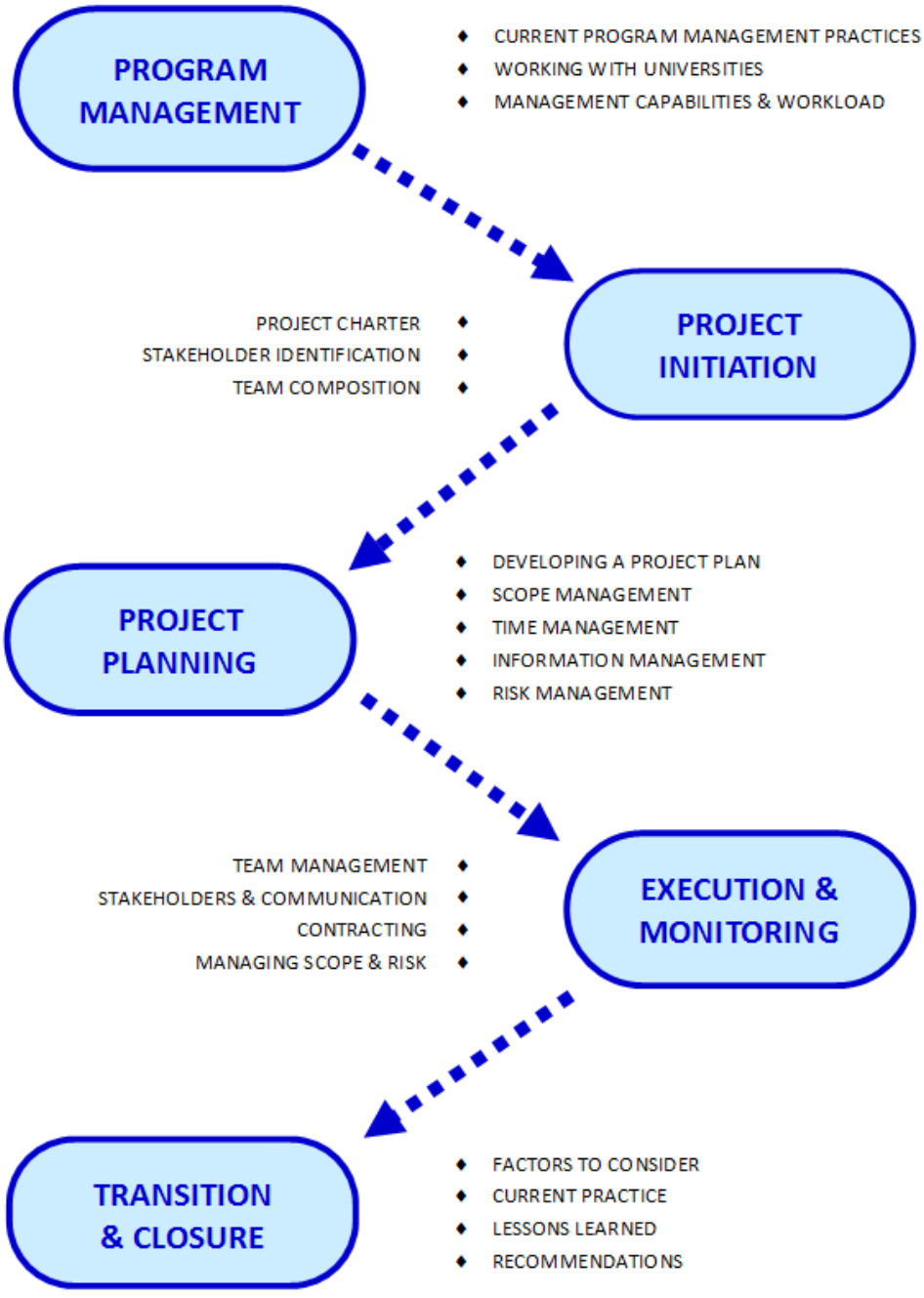
RESEARCH PROJECT DEVELOPMENT PROCESS



1. INTRODUCTION

The WSDOT Research Peer Exchange was held in Olympia, Washington on May 13 and 14, 2014 and addressed Research Program and Project Management as described in the following paragraphs:

Program Management

There are numerous funding programs, standing committees, partnership opportunities, and project panels that address transportation research and provide opportunity for state DOTs. State DOT Research Office responsibilities for these activities vary across the states. Program responsibilities were discussed such as: The programs that each participating agency manages, management expectations for each program, factors that determine responsibilities of Research Offices for national research programs, management techniques for these programs, workload estimation and workload requirements for these functions; and, criteria used to monitor program management performance?

Project Management

Discussion with other Research Directors finds there is significant difference in the number of projects managed by research project managers. Types of research projects managed by state DOTs vary and project management requirements are not equal. Some projects are conducted in-house while others are contracted, some are literature-based research and others require field work. Transportation Pooled Fund projects vary based on the department's role and the views of the Technical Oversight Committee. These variations result in different management responsibilities and workload. Aspects of project management were discussed including: Research project management expectations; guidance and training for project managers (i.e., *Project Management Body of Knowledge);* workload estimation and balancing; key competencies; lessons learned in project management and criteria used to monitor project management performance?

The peer exchange provided a forum to share practices, and discuss challenges and ways to address them.

Participants in the Peer Exchange

1. Skip (Harold) Paul, P.E, Director, Louisiana Transportation Research Center
2. Steve Pepin, Manager of Research, Office of Transportation Planning, Massachusetts Department of Transportation
3. Ken Chambers, Research Chief, Nevada Department of Transportation
4. Sue Sillick, Research Programs Manager, Montana Department of Transportation
5. Linda Taylor, P.E., Director Research Services & Library, Minnesota Department of Transportation
6. Cameron Kergaye, PhD, PE, PMP, Director of Research, Utah Department of Transportation
7. Anne Marie Sarrels, Branch Chief of Contracts and Resources in the Office of Management Services, California Department of Transportation
8. Michael Townley, Research Project Administration Manager, Research Administration Section, Bureau of Field Services, Michigan DOT
9. Megan Hall, Local Programs/Research and T2 Engineer, Federal Highway Administration, Olympia, WA

10. Balasingam Muhunthan, Professor and Chair, Washington State Transportation Center Director, WSU, Department of Civil and Environmental Engineering, Washington State University
11. Mark Hallenbeck, Director, Washington State Transportation Center, University of Washington
12. Yinhai Wang, Director, PacTrans and STAR Lab, Civil and Environmental Engineering Department University of Washington
13. Maya Bayya, Acting Assistant Director, Civil and Environmental Engineering Department, University of Washington
14. Dr. Waseem Dekelbab, Senior Program Officer, Transportation Research Board, Washington, DC
15. Dr. James Bryant, Senior Program Officer, Maintenance and Preservation Engineer, Transportation Research Board
16. Debra Elston, Director, Office of Corporate Research, Technology and Innovation Management, Federal Highway Administration, McLean, VA
17. Nancy Boyd, Director, Engineering Policy & Innovation Division, WSDOT

WSDOT Office of Research & Library Services

18. Leni Oman, Director
19. Rhonda Brooks, Research Manager
20. Kathy Lindquist, Research Manager
21. Kim Willoughby, Research Manager
22. Tim Carlile, Business Manager

WSDOT Capital Program Development & Management

23. Pat Morin, Program Manager, Systems Analysis
24. Patty Allison, Asset Management Specialist

2. PROGRAM MANAGEMENT

2.1. Research Programs

Transportation Research gained strength in state DOTs with the passage of Federal Highway Act of 1921 which authorized research funding for states. . The National Cooperative Highway Research was established in 1962 as a means to pool State Planning and Research funding to work on research of priority interest to state DOTs. The Transportation Pooled Fund program was started as an informal program in the 1980's to provide a means for state DOTs to pool funding for research, development and technical transfer activities of interest to more than one state DOT and/or FHWA. These programs all derived from SPR funding and most state DOT research programs have participated in these programs.

The number of research programs and activities available to the transportation sector has continued to grow and provide opportunity for state DOTs to extend their research efforts. Program opportunities vary and include one or more of the following actions for state DOTs: submitting problem statements; receiving funding; partnerships for collaborative research; participation in project panels and research committees, and research products that may meet agency needs. A list of research programs active at the time of the peer exchange are listed in Appendix 1. Participants discussed the research activities their Research Program were involved with and what that involvement constituted. Involvement is summarized below and more information is provided in Appendix A.

ALL State DOT Research Programs in the Peer Exchange are active in the following:

1. State Planning and Research Part 2
2. Participating in Transportation Pooled Fund Projects
3. Transportation Research Board (TRB) State Visits
4. Participating in National Cooperative Highway Research Programs (NCHRP)
5. CRP Synthesis Program
6. Transit Cooperative Research Program (TCRP)

Distribute information to Subject Matter Experts

7. Other Cooperative Research Programs: all distribute information to subject matter experts and provide coaching on the programs if requested.
8. Infravation
9. Accelerated Innovation Deployment Demonstration Program
10. Broad Agency Announcements
11. Highways for Life
12. Innovations for Bridge

SOME State DOT Research Programs in the Peer Exchange are active in the following:

1. Managing a Quick Response Research program for their agency
2. Leading Transportation Pooled Fund Projects
3. NCHRP Quick Response Research Programs
4. International Scan Program
5. Domestic Scan Program
6. Strategic Highway Research Program Implementation Projects (at the time, two states had not participated).
7. State Transportation Innovation Council
8. Technology Implementation Group (TIG). Now AASHTO Innovation Initiative (AII)
9. Exploratory Advanced Research Program

10. University Transportation Centers
11. Local Technical Assistance Programs
12. Everyday Counts

NONE of the State DOT Research Programs are active in the following:

1. TRB Cooperative Research Legal Research
2. All other programs not mentioned on the list

2.2. Current Program Management Practices

Program management responsibilities and practices varied across participating organizations. Some of the variations included:

- Frequency of solicitations: biennial, annual, quarterly, and/or as needed.
- Research and innovation programs and activities managed by the research office
- Contracting practices: use of master agreements, on call agreements, ability to contract out of state, and organizations responsible solicitation and contract development.
- Budgets: funding sources, use of funding for staff, organization responsible for budget management, and ability to accept funding from other organizations.
- Oversight committees: standing or ad hoc committees, frequency of meetings, level of participants, actions (problem statement review, project advisory committee membership, implementation plans, …)
- Involvement with LTAP and training: Several agencies manage LTAP for their state. Louisiana also manages training activities funded by STP and state dollars.
- Conferences: Some agencies provided funding to support conferences. Others help develop conferences. Some conferences are funded through registration/cost recovery.

Discussion

- There is no single place to find information on all the research resources that are available. *Funding Sources for Transportation Research: Competitive Programs* captures several programs but is not comprehensive for all transportation research funding sources and is difficult to maintain through voluntary participation.
- Solicitations for national research programs and activities occurs throughout the year. Some activities have a scheduled lifecycle and can be incorporated into the research management lifecycle. Others are have irregular schedules and are more difficult to plan for.
- Most agency managers and customers are not aware with the complexity research management.
- National research funding program managers broadcast announcements about program opportunities to a wide audience. It is difficult to know who is best to respond and most activities have not clarified responsibilities. A structure does not exist as to the schedules, timing, priority, and how best to respond. It often becomes a workload issue to manage all these programs in addition to ongoing research project workload.
- The diversity of programs has been called a “firehose” of acronyms by some of our customers can often be overwhelming. Research Managers try to focus customers on the research need and to guide the submittal to the appropriate program.
- The use of the information pushed out to subject matter experts varies significantly based on

understanding of the research opportunities, workload and time to participate, and organizational support for innovation. As a result, some research programs are not leveraged for the value they can add to the agency.

- Funding is unpredictable in many areas. Multiyear funding commitments have the potential to address needs and expedite advancements in practice.
- Some states are having difficulty getting executive and staff participation in research activities. For other states, participation remains strong.
- We are all running very similar projects and all doing it very differently
- We agree that there is more opportunity to collaborate in pursuit of common interests with regional variations.

Suggestions for follow up included:

- Surveying State DOT Research Offices for their roles in research program management and the functional activities they conduct, and workload management practices.
- Developing a summary of research program evolution over the last 20 years and the value they have added.
- Discuss the value and opportunities for a transportation research resource portal.
- Federal participants will discuss options to coordinate programs. However, research activities ae often "collateral duty" and so employees often do not have much time to participate.

Additional research management questions were posed but not answered at the peer exchange:

- When generating project ideas, how are you making sure that you are addressing the most critical issues facing the department?
- How are funds distributed to long term/ basic research and policy research?

Participant Actions and Recommendations include:

- Focus on what you're good at, don't try to do it all
- Promote research staff awareness of the diversity of programs so they can help customers take advantage of those that are appropriate
- Leverage high opportunity distribution opportunities and gather input on where to place program emphasis.
- A common theme in the discussion was the importance of building and forming relationships. We do not have the opportunities we used to meet people and form and develop research partnerships and support successful implementation.
- Succinct communication is critical. Work to improve the "ask" in national program announcements.

2.3. Working with Universities

Peer exchange participants discussed the partnership between academia and agencies in transportation research. Participating DOTs have different types of partnerships with universities.

- The Louisiana Transportation Research Center (LTRC) was created through legislation and merges the resources of Louisiana Department of Transportation and Development and state universities.
- Other states have established partnerships with universities through formal agreements. For example, the Washington State Transportation Research Center (TRAC) creates a partnership between WSDOT, the University of Washington and Washington State University.
- Several states are involved with one or more University Transportation Centers, often sitting on University Transportation Center or Civil Engineering Department boards.
- Other participating states do not have formal partnerships with their universities.
- The Transportation Research Board often has difficulty contracting with universities because the universities will not assign them intellectual property rights.

University representatives discussed the importance of early engagement in developing research partnerships, problem statements, and projects. Some challenges that universities and research programs face include:

- Faculty turnover can result in temporary loss of capacity to do research or loss of competitiveness. State's and universities have used different strategies to help new faculty such as including new faculty on research teams with more experienced faculty or including new faculty in agency meetings to help them learn about agency interests and gain exposure.
- University staff do not have much chance to compete at national level do to the timing of solicitations and lack of engagement in development of research needs. Awareness of research needs and goals can be considered in the selection of faculty and development of research focus areas.
- Understanding the research need and context is important for project success. Providing contact information for technical experts is helpful. Often, that is the problem statement author(s) but it may also be a local technical expert.
- Internship programs are an important bridge between agencies and universities. They help agencies address near term needs at reasonable cost and help students gain experience and build contacts.
- It is good for universities to involve faculty as panel members so they understand panel and project dynamics. University involvement and leadership in TRB, SHRP II; NSF, etc. is highly valued in university practices.
- LADOTD has a mission to support higher education. Activities include students working at DOTD; providing $5000 for capstone projects, continuous interaction with faculty, university representatives serve as voting members on agency research committees, and faculty can submit proposals and attend meetings. In this way academics understand the real problems that need to be solved and how they can participate. This is good learning experience for professors.
- For some states, about 30 to 40% of co-op students stay and work for the department. It is a beneficial program.

Project milestones management is important to research funding programs. Universities often work with grant programs that have less focus on project schedules. Faculty may not see contract language and requirements. Strategies used by participants included kick off meetings and/or project initiation letters that provide the Principal Investigator with information on project management expectations. Some states conduct evaluations of each project that include timeliness of deliverables. Some states consider past project management in selecting Principal Investigators for new projects.

2.4. Research Management Capabilities and Workload Management

The diversity of research programs, topics, and projects as well as the number of customers and partners results in very busy workload for state DOT research offices. State DOT Research Directors must manage their agency program to meet FHWA funding requirements to maintain a Research Program Manual that reflects current practice, prepare a SPR Part 2 Work Program, conduct periodic peer exchanges, enter projects into the Research in Progress database, and enter research reports into the Transportation Research Information Database. Other expectations include supportive activities for NCHRP, TRB, AASHTO, and University Transportation Centers. Expectations have also increased for outreach, implementation, and performance management.

Research Program resources have not increased with these expectations. As a result, Research Directors often ask each other about competencies required to manage research and workload management practices.

Research Management Capabilities

Research Office employees need to understand that the state DOT Research Program role is to serve the other divisions. They need to good listeners and communicators.

The role of the Research Director and Research Project Manager have evolved with changing expectations. Today research offices need the following skills:

- Leadership
- Program development and management
- Analysts
- Marketing and outreach
- Business managers (Budget
- Contract specialists
- Project management
- Stakeholder and meeting management and facilitation
- Writing and editorial skills
- Knowledge managers
- Library professionals

In addition to the skills, research office positions benefit from people with energy, curiosity, imagination, ability to synthesize multiple inputs and articulate difficult concepts, and who doesn't fear technology and new ideas.

Administrative support has diminished in most agencies and Research Project Managers often have to

schedule meetings and prepare materials. This can be very time consuming with the number of people involved in projects.

Participants discussed current classifications:

- Washington has behavioral and technical competencies for the classifications of research managers but they are part of the planning classification series and not a good fit for the work research managers do.
- Louisiana's Research Project Managers are all engineers. They can develop a career path to become a supervisory expert or technical expert.
- Minnesota is developing a position description (PD) for implementation engineers. Their typical planner or a civil engineer is not kind of work research managers do.
- FHWA's Office of Corporate Research, Technology and Innovation Management are primarily business majors and work well dealing with people. Position descriptions are for program analysts, program manager, marketing and communication, contract specialists, knowledge managers, leadership and library professionals.
- Nevada recognizes the value of behavioral competencies over technical degrees. They arrange for training or mentors to help gain the skills needed for the position.

Research Directors often don't have the opportunity to develop positions for the needed competencies. Instead, they use the skills of the employees they have and work to close the gaps in skills. Research Directors use departmental training to develop staff such as supervision, people management, conflict resolutions, communication, technical report writing, and statistical techniques. Senior research managers mentor these folks since they have been through the system.

Workload Management

A core question is "how many research projects can one person manage?" Context varies based on the funding program (is it internally managed or is a partner managing the project?) and the scope of the project. Project management and the level of effort required is similar for small and large projects though the length of the project will vary. Despite the interest in project management workload, limited data is available to assess research management workload.

In California, a Governor's Executive Order directed state agencies to identify and address efficiencies in all operations. As part of their response, Caltrans established a team to look at the research program work practices and potential efficiencies. A team was formed to address the following objectives:

- Identify Division of Research, Innovation, and System Innovation (DRISI) workload
- Develop and implement charging practices guidelines
- Develop labor reports
- Develop work load standards
- Prepare for the Department of Finance's Zero-Based Budgeting Review

They began by compiling a list of workload activities and establishing key identifiers. DRISI activities were organized into three activities: Program Services, Project Activities, and Administrative Functions and subtasks were identified for each. This information provided the foundation for charging practices.

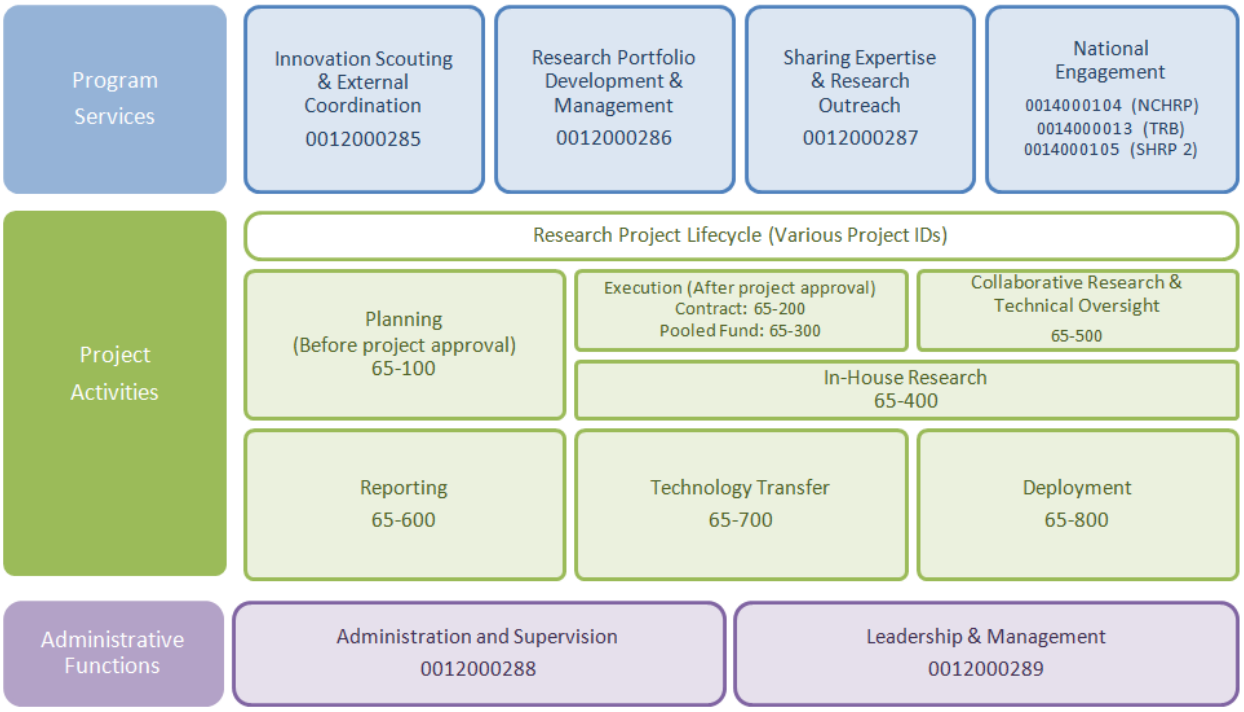


Figure 1. DRISI Charging Practices Model

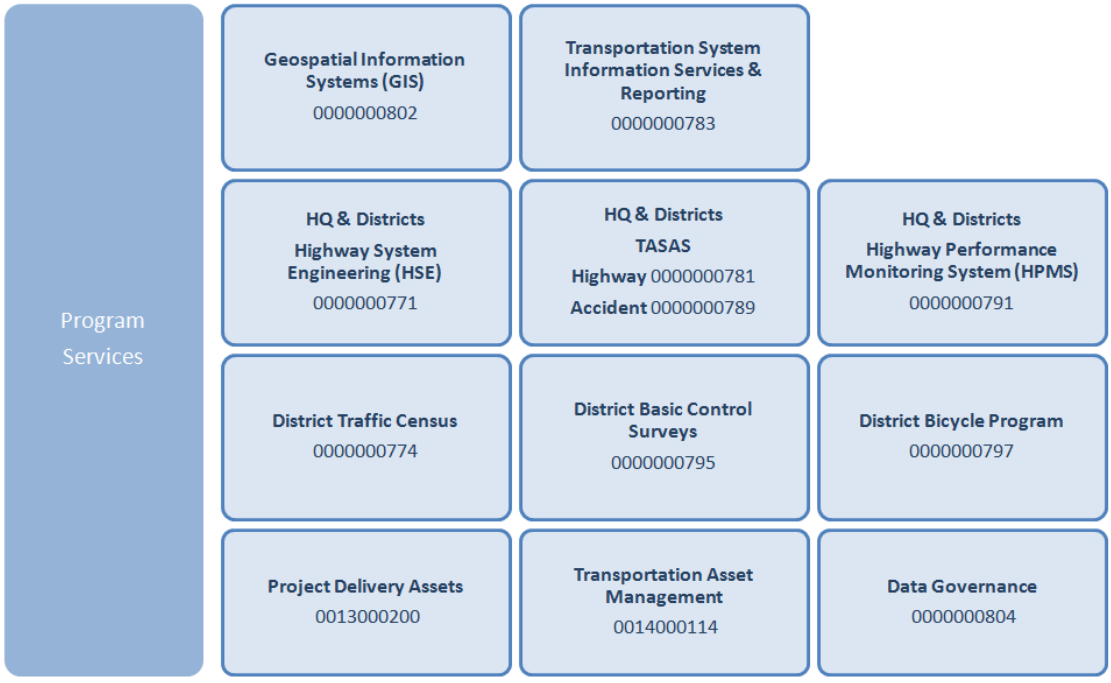


Figure 2. Continuation of DRISI Charging Practices Model

A charging practices policy and activity sheets were prepared and training on the new charging practices was provided for all DRISI staff. Once the new charging practices were in place, the team developed labor reports. This included practices to identify and correct mischarges, checking for reasonableness (are we capturing activity at the right level?), and conducting an annual time charging analysis. An

analysis of multiple years of time charging information provided the foundation for the development of workload standards.

Based on the analysis of time charging, the team is developing workload standard assumptions and methodologies. Workload estimates have been developed such as:

- Research contracted to external organizations: 500 average hours to complete.
- Transportation Pooled Fund studies 250 hours for projects Caltrans participates in but does not lead
- Research conducted by Caltrans staff: 515 average hours to complete

Effort is underway to come up with an average baseline. The team anticipates that standards may be distinguished between small, average, and large projects. They have reviewed 100 activities and are focusing on the activities it takes to conduct a project. These activities do fit into a typical project lifecycle and the five phases of project management.

The team was also preparing for a zero-based budgeting review by the California Department of Finance by providing the following material:

- Zero-Based Budget Templates
- Charging Practices Guidelines
- Labor Reports
- Workload Standards Assumptions and Methodologies
- Functional Organizational Charts
- DRISI outputs (e.g. Division Overview, Annual Reports, SP&R Annual Work Program, Implemented Research Products)

The team prepared a policy statement and guidelines for charge codes for timesheets to support consistent application. A year later they had data to show labor reports. The team analyzed data from year to year to determine an average workload standard for an average research project and derived the following:

- 500 hours for research contracted out
- 250 hours for TPF projects lead by others
- 515 hours for TPF projects led by Caltrans

Both the methodology and results were of interest to the peer review team.

- Leadership would like innovations to be delivered faster. Developing the baseline to establish how long it takes to develop projects will help identify streamlining opportunities.
- Triple constraints impact workflow: scope, time and money
- Participants discussed the length of time it takes to develop a Cooperative Research Program and efforts that are underway by the AASHTO Standing Committee on Research to shorten the timeframe for NCHRP.
- A broader study of workload might help align research program capacity with expectations and optimize capacity for innovation.

The peer review team further discussed research project management expectations and practices as described in the next section.

3. PROJECT MANAGEMENT

Discussion with other Research Directors finds there is significant difference in the number of projects managed by research project managers. Factors affecting this include things such as the types of research programs and projects, administrative responsibilities such as contracting and budget management, and, contracting practices and responsibilities. In addition, some projects are conducted in-house while others are contracted, some are literature-based research and others require field work. Transportation Pooled Fund projects vary based on the department's role and the views of the Technical Oversight Committee.

These variations result in different management responsibilities and workload. Aspects of project management were discussed including:

- Research project management expectations;
- Guidance and training for project managers such as the , Project Management Institute's (PMI) *Project Management Body of Knowledge* (PMBOK)
- *W*orkload estimation and balancing;
- Key competencies;
- Lessons learned in project management
- Criteria used to monitor project management performance

The Peer Exchange Team reviewed the Program Management Institute's Program Management Body of Knowledge (PMBOK) practices and discussed opportunities to strengthen project management practices. Patty Allison, WSDOT provided an overview of the agency's project management online guide that is based on PMBOK and Cameron Kergaye, UDOT, provided an overview of the Project Management Body of Knowledge (PMBOK). Highlights of the Cameron's presentation are provided below.

3.1. PMBOK and Research Projects

What is a Project?

Both Projects and Operations are: performed by people; constrained by limited resources; and, planned, executed and controlled. A project is a temporary endeavor undertaken to produce a unique product, service or result. Projects are characteristically: temporary, unique, and require progressive elaboration. This differs from operational activities that are ongoing and repetitive. Project Management is the application of knowledge, skill tools and techniques to project activities in order to meet project requirements.

Why Project Management?

Project management helps managers organize the approach to the project, generate a credible schedule, track progress and maintain key control points for the project, identify where to focus your efforts, and detect problems early.

Project Management for Research

When Cameron began managing the UDOT Research Program, he observed that Research Project Managers were managing projects but were not using the PMBOK approach adopted by other business

units of the agency. Working with the Research Project Managers, he scaled and adapted the PMBOK approach for application to research projects. Cameron's recommendation is to keep it simple, pilot the process, determine necessary tools, and size up tasks and resources. The UDOT Project Management Checklist can be found in Appendix B

Peer Exchange participants were interested in the PMBOK process but were wary of the workload it might add. Research Programs do many of the PMBOK steps but use different terms and document fewer elements. For example, several participants noted that they establish project panels that have stakeholder representation and work with this group to shape the project scope of work and monitor performance.

The value of modifying current practices to add more rigor in documentation was not clear. Most participants found the discussion useful in reflecting on their practices and opportunities for improvement such as a midterm review of the scope, plan and progress of a project. Concern was expressed about the current workload for many Research Offices. The loss of administrative staff in several programs has increased the effort needed by Research Project Managers to prepare copies, letters, and other administrative functions.

Project management applications are used at the enterprise level by several state DOTs and versions of PMI's Project Management Body of Knowledge (PMBOK) process have been adopted. Some of the nuances are shared here together with tips on how to apply some of the PM principles and BMPs appropriately for research projects with the objective of managing the research projects better.

Most peer exchange participants expressed concern about the level of effort required to implement a PMBOK approach to project management. Research projects tend to be relatively small compared with capital projects. PMBOK processes are very scalable and some of the many generic elements can be tailored to customize each project's needs to develop a project plan.

3.2. Project Initiation

Project Charter

Project Charters help teams develop a shared understanding of the project objectives. The charter should include information on the implementation so that the product supports use of the research results. This may include the intended audience, the resources used (manuals, databases, models, etc. The charter should also help establish a baseline if before and after comparisons will be needed for performance monitoring. Flow charts showing the conceptualization of the project are often helpful. It is critically important that the project team and stakeholders endorse the project charter.

Stakeholder Identification and Team Composition

Project success and implementation relies on at least one project champion that has time to engage in the project. Peer exchange participants agree that project should not proceed without this. The project champion may or may not be the problem statement author.

Technical Advisory Committees (TAC) help ensure that the research project product is of value to the agency and serve as a resource for the research team. Composition of the TAC is important and diverse perspectives help strengthen outcomes. It is helpful to include representatives from the functional groups that will be affected by the research product or have essential inputs to the research project. A

mix of people in support of a concept and those who are critical should be considered as well.

Most TACs are involved in a project from "cradle to grave". They are involved in the selection of the PI, running the project and all project outcomes.

The NCHRP uses the practices of the National Academies to guide panel development. They have established a matrix that helps identify required or necessary areas of experience of people to serve on the panel and also promote diversity of perspectives by seeking representatives from different sectors, geographic areas, cultures, race, and gender. The Academy must approve the membership and TRB processes must be followed.

The manner in which a Technical Advisory Committee (TAC) is organized differs somewhat from state to state.

- A TAC may address one project or multiple projects on a topic (e.g., pavement projects).
- Size of the TAC varies. Some states limit the number represented to 7 while others have up to 8-12 members.
- Some states include external partners such as Metropolitan Planning Organizations, other state agencies, other state DOTs, active or retired academia, or industry representatives on TACs. Others are limited to agency participants. Some may allow non-voting participation from external partners.
- TAC members may include people from different levels of the hierarchy. Make up should be based on the research scope and support needed.
- Engaging senior managers can be difficult due to time commitments but, when possible, engage them on research that of strategic value where they can help set direction for new or long range initiatives.

TACs own the problem statement. Some states do an orientation for the TAC team that informs them of their role and responsibility. This helps the TAC or decide if they need to select someone else. If TAC members can't attend orientation, the Research Manager will brief them. Other states use existing agency/project or specialty office meetings and get on the agendas to discuss research needs. Connecting new TAC members with "seasoned staff" can help with onboarding staff.

The Technical Monitor selection should be based on aligning skills and background with the needs of the project and familiarity with geographic area if applicable. For example, if a project addresses Structures, the Bridge Engineer is asked to participate. The Research Project Manager should serve as an equal member on the project team. Often they are hesitant to do so but their knowledge or research project practices and implementable products are important to the success of the project.

Technical advisory committee participation can help recruitment and succession planning for future research ideas as well as other positions. Massachusetts encourages TAC members to bring other employees in order to develop their capability to serve on future TACs.

Staffing reductions and retirement of experienced TAC members are impacting participation in TACs. To address this, one state encourages TAC team members to bring someone else from their business area to help broaden the base of people available for TACs.

Research committee work should be integrated into the workflow of the department. This may lighten the additional workload and engage existing committees in the identification of research needs.

3.3. Project Planning

PMBOK and developing a project plan

Planning establishes the project objectives and course of action required to attain those objectives. The key benefit of this is to delineate a strategy and .scope of work. The project management plan includes scope, time, cost, quality, communications, human resources, risks, procurements, and stakeholder engagement. The project plan is an opportunity to clarify expectations and develop a shared vision with PIs and other project staff.

The key is to keep it comprehensive enough to endorse and follow yet simple enough to track and update. This could be as simple as a flow chart of the project plan. Some participants had attempted to use customized project applications but found the effort to be greater than the value. Participants recognized that a simple project plan with a schedule prepared using a spreadsheet may be adequate for smaller projects.

The Project Plan should include the following elements:

- Project development steps
- Project definition: What are the technical questions that focus the work? This step clarifies the problem statement and proposal. The "is/is not" discussion can help clarify the project scope and set boundaries.
- Deliverables
- Budget
- Project schedule and milestones
- Metrics: identify what must be tracked and reported, this may include establishing a baseline.
- Constraints and Risks: Identify constraints and risks to the project and actions to manage them.
- Implementation requirements: who will use the product? How will it be disseminated?

Participants discussed variables in the project plan. If the plan is developed before the Principal Investigator (PI) is identified, the plan may include the method to procure the PI. A project plan for a grant is likely to be different than a contracted project (e.g., the funding institution would not track interim deliverables). In Minnesota, if the scope hasn't been developed in 6 months, they will take it back to the board to drop the project and fund something else that is a higher priority.

Planning scope management

Scope management includes all, and only, the work required, to complete the project successfully. Managing the research project scope is primarily concerned with defining and controlling what is and is not included in the project. Most states require literature reviews as part of the problem statement. It is important to check the literature for recent publications on the subject prior to actions such as solicitation for Principal Investigators and scope discussions.

In the RFP allow adequate flexibility for creativity on the approach but try and nail down the scope by clearly identifying goals and objectives.

Scope management—be sure to consider the following items:

- Risk assessment: weather, will sometime affect the scope, schedule, and budget. One state included risk assessment in the scoring of the project.

- Constraint matrix
- Scope changes/contract modifications: how they will be handled
- Literature searches
- Phasing projects
- Cost estimating

It is important to think about implementation of the research results in the earliest stages of the research process and identify success factors that are feasible to measure. This should be done early in the project in order to narrow the metrics that will be managed.

In SHRP II Renewal they learned some lessons. Send out clarifying questions to identify issues and create a risk management plan or an amplified work plan and to keep projects on time.

Time management

Develop a baseline schedule so as to enable monitoring and tracking and to recognize any hold-ups that we may need to address. This is also a great tool for lessons learned and being able to plan more accurately for the next project with more reliable timelines.

Information Management and Project Files

Information management supports communication, project tracking, and dissemination of results. Some examples of practices include:

- Utah assigns project ID codes to each project.
- All of Montana's project records are in electronic form and stored on a shared server.
- Emails: Some states save them and other do not keep any emails.
- Michigan deposits their project file into Project Wise. All employees can access this and all approvals are done online. Files are organized by the project manager and contract number. The project file incudes all stages for the projects: RFP, contract, correspondence, etc. They plan to provide access to universities and consultants in the future.
- In Minnesota, the research database contains all project records including invoices, amendments, meeting minutes, emails, correspondence. Reports and files can be generated as needed. All staff have access and project managers are responsible for keeping it current and accurate. The database also includes marketing information and is accessible to communication staff. It is organized by program year and can be sorted by many attributes.
- NCHRP manages by project folders that are set up but the research manager. They retain all information as they are audited by FHWA.

Paper versus digital

- Some organizations use digital signatures, others do not. It is important to make sure you have all the proper documents in the file for future audits.
- Some organizations require that hard copies of records be maintain even if they are digitized.
- Data access can be secured by managing read/write privileges based on need. The PM or ECM system should be able monitor and report edits and access.

Tips for management:

- A steward for the information must be identified.

- Project information management starts with the problem statement and that is retained for future reference.
- Information needs should be included in the project initiation and planning. Include the kind of information is needed to document before and after performance.
- Do not collect everything. Only keep the critical information.
- Periodically go through files to make sure everything is there.
- Managing projects after someone leaves can be challenging. A referencing system is would help keep maintain access.
- Having a file-naming convention is also recommended to promote findability.
- Electronic content management (ECM) systems (ProjectWise, SharePoint, etc.) help to ease access, search, etc.
- Challenges: miscoding, transferring management from one person to another. Plan for this.

Plan Risk Management

The objective is to maintain the scope, schedule and cost using the simplest easy to use tools. Think about the possible risks. Involve the TM's, PI's and other stakeholders as early as possible when identifying possible risks and opportunities.

Some states do a risk assessment at the beginning of their projects, Michigan considers risk when scoring projects, and others monitor the scope schedule and budget to observe changes. Research is a discovery process so it is not unusual to need to modify the scope or schedule. Risk factors include things such as weather, project schedules, PI illness, and sabbaticals.

Consider including risk identification and mitigation in RFPs and score accordingly. In this way during the planning process, you can consider risk management strategies.

Be cognizant of PIs and TMs who may tend to be risk takers and RMs who may lean towards being risk averse. Nevertheless, it must be recognized that research is a process of discovery and not a standard practice and therefore risk is an inherent part of the project.

Consider a constraint matrix. It may be possible to mitigate major risks by breaking down projects into phases and deliverables. For smaller projects, milestone management may be adequate.

3.4. Project Execution & Monitoring

Project execution consists performing activities to complete the work defined in the project management plan. It also involves coordinating people and resources and managing stakeholder expectations. During project execution, results may require planning updates, which may include changes to expected durations, changes in resource productivity and availability, and unanticipated risks.

Monitoring consists tracking and review of progress and performance of the project; identifying areas in which changes to the plan may be required. It also involves:

- Controlling changes and recommending corrective or preventive action in anticipation of possible problems
- Monitoring the ongoing project activities against the project management plan

Issues

States identified some of the issues and risks they faced during research project execution when dealing with PIs and faculty. These include life events such as illness, sabbaticals, transfers, retirements, etc. Other issues encountered that states need to be aware of include underperforming faculty members, chronically late tasks, weather, vandalism, equipment damage and replacement responsibility and costs, data [un]availability, data loss, etc.

On the manpower side for DOTs a shrinking workforce, participation challenges due to ambient workload, difficulties in getting professionals with the right mix of technical and soft skills.

Stakeholder and Communication Management

Participants shared some insights and advice on how to get buy in for the research projects. For time management and to ensure good participation by stakeholders, hold meetings only if you have three or more "meaty" items on the agenda. Establish a Technical Advisory Committee for each project. Include affected organizations and others with key knowledge. This may include other agency academics, and contractors, etc.

- Involve the panel along the way so they own the project.
- Research Project Managers should help in decision-making, conflict resolution and elevate issues to upper management when necessary. They also bring knowledge about actions that support implementable projects.
- Get buy-in from industry, legislators, users, etc. as appropriate as successful implementation depends largely upon them.
- Manage projects out of your expertise area to develop a broader understanding.
- Diverse expertise helps identify implementation challenges.
- Include activities that support field application or other implementation into the contract even on a small scale to ensure that the recommendations are feasible.
- Where necessary also include user training for the new method, process or equipment. The training could through a community college or industry vendors, etc.

Contracting methods that states adopt

Contracting rules and practices vary by state and organization.

Contract types

States use the following types of contracts to outsource research work:

- **Interlocal agreements**, less strict than a consultant provider agreement. Not the level of scrutiny. Exempt from advertisement. (Nevada)
- **Indefinite Delivery of Services (IDS) contracts** – indefinite delivery of services with universities and do projects with them that lasts for 4 years and they have done it for 8 years. (Michigan)
- Interdepartmental service/Interagency agreements (California. Louisiana, Minnesota, Montana, Washington).
    - One state uses these even for out-of-state agencies.
- **Request for Proposals (RFP)** with consultants that describe how the research team will approach the research need.
    - In Louisiana, professional service contracts can take 2 to 3 months to execute.

- Request for Qualifications – to identify the preferred Principal Investigator/Research Team. The scope of work is negotiated with the selected PI.
- **Master agreements** with universities. Work is initiated with an approved task order. (Minnesota, Louisiana and Washington)
  - In Minnesota, the universities and state agencies can bid on a master agreement every five years.
  - In Louisiana, all external work goes through the universities and they and they can reissue the work to a third party.
- Cooperative funding agreement for work with federal agencies this is a lump sum with deliverables. One state wants to use this type more with the universities. (Montana)
- **Boilerplate agreement/contract** for any governmental agency
- Sole source contracts, especially when intellectual property rights are involved. Requirements to advertise intent vary by organization and amount of funding.
- **Cost reimbursable** –The National Academies can cut a $100,000 Sole cost reimbursable agreement if the contractor requires no changes to the boilerplate. If changes are required, they move on to the next candidate.
- **MOUs MOAs**
- **Broad Agency Announcements** – FHWA uses these to negotiate the proposal and increase the partnership level of the people doing the work.
- **Memorandums of Understanding/Memorandums of Agreement (MOU/MOA)**

Overhead rates were discussed. The university overhead rate seems high to many agencies. Federal guidance says the responsible agency can negotiate a new rate. Many but not all states have been able to negotiate a lower rate.

University researchers are sometimes seem unclear about the difference between a contract and a grant. Most of their work is funded through grants that provide broad discretion in use and application. Contracts provide more defined expectations. Usually the faculty researcher does not see the contract language, especially the requirements in a Master Agreement. It is helpful to provide a copy or summary of expectations to the researcher during the project initiation.

Managing scope and risk during project execution

Project selection cycles varied across the organizations involved in the peer exchange from quarterly decisions to biennial decisions and included variations based on the activity (e.g., quick response research is typically as needed). Research funding organizations typically develop expenditure/aging plans for projects. Most research is on multi-year projects and, because of the nature of research, coming up with an accurate estimates of expenditures is more an art than science. This can lead to changes in project plans. States shared the various ways in which they control, manage and mitigate risk:

- Have a reporting system. It does not have to be anything sophisticated—even a spreadsheet will do. There are also several mobile apps now available.
  - Minnesota's research management database sends out a notice that they haven't completed all the tasks. The PM and RM then check in with the PI. They then discuss issues

during monthly meetings with universities and develop interventions. If that fails, then issues elevate to the governing board and either get on-track or the contract is terminated.

- Have a contingency fund. Michigan has a contingency fund. It was used for another large project and they are currently building it back up. When it is available, it helps support project modifications.
- Consider "is" "is not" discussion when scope changes are proposed during project execution.
  - Significant changes in scope, schedule or budget requires a modification of the agreement. For any modification of scope, schedule or budget, always ensure that the original intent of the project is preserved.
  - Funding for PIs to attend specific research-related conferences can be approved if set up as line items in the agreements
  - Identify optional tasks that can be added if approved
- Have regular meetings with the research team and a track progress with the help of a management reporting system
  - Conduct a mid-term review or evaluation.
  - Washington meets with the PIs quarterly and then monthly in the last quarter of the biennium to keep projects and budgets on track.
  - WA also uses aging plans to track expenditures and help monitor progress.
  - Report on progress and address issues that may arise
  - Compare deliverables against interim milestone expectations or phases of project where a project has been broken up to reduce risk or decide on direction.
  - When deliverables are not being met discuss these directly with the PIs and if intervention is needed involve the dean of the university if required.
  - Include a 360-degree assessment of the PI team, technical staff and other involved with the project. If needed, take corrective action as soon as possible. In this way, any changes in scope or consideration of new ideas can be captured promptly.
- Have a backup plan for project personnel so someone else is familiar with the project(s) and ready to step in if a key state staffer leaves or is moved.
- Payments to contractors should be made on the basis of deliverables not time and materials.
  - Hold invoices if PI is not performing. Escalate performance issues as needed.
  - Nevada has language in the contract that requires reimbursement to state in case of poor performance.
- Some organizations have a lot of latitude in project management. In Washington, Research Managers have discretionary approval authority up to $35,000 or when additional funding. Those decisions move to the Research Director.

Incentives

Some states use a model of incentives or disincentives to keep projects and PIs on track:

- The NCHRP Synthesis Program provides a $5000 incentive for timely delivery. It has proven to be a good way to get the project delivered on time as it is very popular with panels and contractors.
- In SHRP II they determined that if the project was implementable they would reward the PIs with the incentive amount.
- Some states retain 10 or 15% of the budget until they get a final product.

Contract performance and termination

States shared stories about contract performance and reasons for termination:

- All organizations have a termination clause in contracts. Some can issue immediate stop work orders and then begin negotiating to terminate. Others can terminate a contract within 30 days of a written notice.
- The culture at universities is based on incentives such as research funding, number of students, number of publications and patents. Time is not important, therefore communication is very important. It is important to let researchers know expectations. The priority is to get a good report and to work with them.
- Examples of situations that arise:
  - The project PI moved to another University and the research sponsor didn't know he had left. The graduate student working on the project was not in the agreement. The PI was the key personnel identified and the university would only work with the contract as written. They had to terminate the contract.
  - PIs sometimes have life events that arise (their own health or a family emergency). Organizations manage what to do on a case-by-case basis.
  - Sabbaticals have proven to be a challenge for some organizations. None of the organizations have contract language about what to do if the PI or key research team member goes on sabbatical.
  - When terminating an agreement, there can be some ambiguity in expenditures. PIs can charge for whatever they deem related to that task. Nevada can get a reimbursement for items they deem to be in abeyance.
- Organizations manage contract performance in a variety of ways:
  - Massachusetts uses interim deliverables to make sure they are on track. There are so many variables and knowing when to intercede or when to let go and get it done is part of the art of management.
  - Montana uses task reports and resolve issues earlier before they become problems. Then the only thing the final report does is provide the recommendations.
  - Minnesota has a "hit list" (a conformance checklist)—if it exceeds thresholds, it is taken to a higher level. Multiple extensions can be a problem. If completion goes beyond six months of project end date, the PI will not get a project in future.
  - Communicating and elevating issues as needed is key. Michigan has hard deadline that the draft report is due three months prior to contract end. This is not negotiable. They withhold new projects if PIs have not performed. If the past performance score is low, they need to show better performance in future projects. However, results take time to show.
  - FHWA will close a TPF project if the quarterly report is not received.
  - Louisiana instituted performance reports for project managers and research managers, such as expenditures/invoices paid on time. They use the data to manage their priorities and it has helped get things get done.

3.5. Transition, Closure & Lessons Learned

This stage of the project consists of concluding all activities, formally completing the project and/or contractual obligations. It verifies that the contracted activities have been completed and formally

establishes that the project or project phase complete. Project closure also provides an opportunity to consider the following:

- What was the value and benefit of projects that have been implemented?
- How do you evaluate what you did and is it worth implementing?
- Evaluating the performance of the PI's involved--would you want to work with them again?
- What needed to be tracked? Did this happen? Are there lessons learned?
- Should the project continue and how do you maintain continuity or hand off if needed?
- How could you have determined what was behind schedule? If there were challenges, is there a way they could have been planned for or avoided?

Research projects typically end with a research report and plans for implementation. Project closeout is usually initiated 30 days after project deliverables have been met, but may take longer in some cases.

Closure of the project requires several actions including:

- Ensure deliverables have been completed and received
- Ensure documentation is complete and update the project record
- Conduct final project review with the TAC and, as needed, others
- Ensure report conforms with research report guidelines
- Distribute final report (TRID, NTIS, Library)
- Update Research in Progress to indicate the project is complete
- Work with the TAC to organize presentations, as appropriate
- Complete handoff to the technical program responsible for implementation. The handoff provides a validation point that the product is in good shape.
- Conduct exit survey with the TAC and project team. Capture what was learned and share a summary of the responses.
- Pay final invoice, close contract.
- Closeout of work orders is critical to avoid tying up funds. Connect with finance staff to complete closure if needed
- Providing close out checklists can be helpful. The Office of Sponsored Research at Louisiana State University sends a bulletin to their PIs to remind them of all the things they need to do to get them to finish projects.

On a more holistic scale, a 20 Year "look-back" of all the research programs would show certain patterns that may be useful. Although there is no one place to go to find all information it would provide a good opportunity to learn from program activities about project trends to consider in charting the course for the future.

4. CONCLUSION

The major objectives of this Peer Exchange were learning from others especially in the area of project management and new and innovative procedures, workload management, position classifications, program, project, and contract management procedures, connections with research needs, problems, ideas and research solutions, and research in other areas. Other related topics included selecting and achieving excellent projects, corrective actions, CPD to research project management, recruitment, working with universities, attracting national programs, and working in the diversity of project management.

Participants actively engaged throughout the peer exchange and each organization summarized actions they intended to take following the discussion.

- Do a survey of the role of the Research Offices in state DOTs.
- Include FHWA on the Executive Committee and decision making to eliminate the need to get approval later.
- Include the Federal Highways Administration into TRB state visits and consider how the peer exchange can aid the partnership.
- FHWA Division's challenge is that research is just one of multiple hats for them. Put together a research 101 for the Divisions.
- Find ways to integrate young faculty into the program and designate them on committees.
- Stick with what you are good at and let the rest slide by.
- Hire an independent consultant to do a summary of research every three years.
- Pay for performance to incentivize it.
- Set aside $1 million for implementation of research outcomes.
- Share good research stories and how it has helped through forums such as TRB's *Research Pays Off.*

APPENDIX A

National Programs and the Level of Involvement by State DOT Research Programs

Leading Transportation Pooled Fund Projects (TPF's)	Caltrans and WSDOT
Participating in Transportation Pooled Fund Projects (TPF's)	All
NCHRP	All
NCHRP Quick Response	MassDOT; MT some to assist; MI, support, not involved. TRB, A lot of work for small amount of funds ($50K), but the work completed is worth significantly more.
International Scan	None driving the program. Some involved, but most not unless it's required. FHWA is most involved in topics.
Domestic Scan:	Some participants, MN submitted a couple of times, but not selected. Skip chaired a domestic panel for 6 years. Problem statements not clear in addressing objectives. MT submitted.
Legal Research	None
Synthesis	All
SHRP2	MT & NV not submitted. Facilitating by most, no direct involvement.
TCRP	2 lead and all rest push it out
Other CRP's	All - Push out and provide coaching if interest
Committee and Standing and Panel Members	Send it out and some send them in directly. Nominations—some come through research offices, but not all.
Nominations	Some come through research offices, but not all. TRB likes the nomination to come through Research to know they are approved.
TRB State Visits:	All are doing these. Can request a NCHRP representative to participate in the state visit.
Everyday Counts	Most at some level, but from different sides. Some with LTAPs are involved.
State Transportation Research Council (STIC)	MT just starting, no research positions are on it, but have peripheral engagement with their customers.
TIG	UT, LA, MT help, NV.
Infravation	All pushing information out and offering assistance-most.
Accelerated Innovation & Deployment (AID)	All pushing information out.
BAA	All pushing info out. Not coordinated by most.
Exploratory Advanced Research	Caltrans

UTC's	LA, WSDOT, UT, MNDOT, MT, MI
Remote Sensing	None
Connected Vehicles	None
LTAP	MN, MT, UT, LA
Conferences	MA, LA, UT
Funding Implementation of Research	MT, LA, UT, assist WA, Mass, MI. LADOTD: Reorganized & rewrote job descriptions to help put things into practice for accountability and responsibility, 50% of time. Technical assistance mostly – sometimes training & pay for performance. TRB: Implementation starts with the first project selection.
Highways for Life	Push out
Innovations for Bridge	Push out

APPENDIX B

UDOT Project Management Check-list (courtesy Cameron Kergaye)

Research Project Management Checklist

Project:____________________________________ **Project Number:**_____

Project Manager: __________________________________ Principal Investigator: ___________________________________

UDOT Champion (customer) _______________________ Sponsor (funder): _______________________________________

1. Project Context Phase

□ 1.1 **PM** Set up project files

1.1.1 Create project folder in Pending Projects subfolder of Project Management folder on Research Shared Drive

1.1.1.1 Name project folder with PIC Number and abbreviated project title

1.1.1.2 Create subfolders for Contract Documents, Implementation, Invoices, Meeting Notes, Miscellaneous Items, Report, TAC Members, and Problem Statement

1.1.2 Create files for hardcopy documents

□ 1.2 **PM** Gather and analyze documentation, identify gaps in knowledge

Research Problem Statement Literature search Findings of previous phases (when applicable) UTRAC-approved budget

□ 1.3 **PM** Identify Stakeholders (list on last page of checklist)

□ 1.4 **PM** Hold meeting with Sponsor and Division Head(s) to confirm project context

1.4.1 List Functional Groups (FGs) – affected and contributory (list on last page of checklist)

1.4.2 Create Technical Advisory Committee (TAC) of 4 to 7 – assign one or more FGs to each member so all FGs are represented:

_______________________ for FGs: _______________________, _______________________, _______________________

_______________________ for FGs: _______________________, _______________________, _______________________

_______________________ for FGs: _______________________, _______________________, _______________________

_______________________ for FGs: _______________________, _______________________, _______________________

_______________________ for FGs: _______________________, _______________________, _______________________

_______________________ for FGs: _______________________, _______________________, _______________________

_______________________ for FGs: _______________________, _______________________, _______________________

1.4.3 Create Constraint Matrix:

	Most	Moderate	Least
Scope			
Schedule			
Budget			

1.4.4 Ensure Sponsor, Division Head(s) and PM are on same page

1.4.5 Confirm with Division Head(s) the UDOT Champion and project outcome expectations

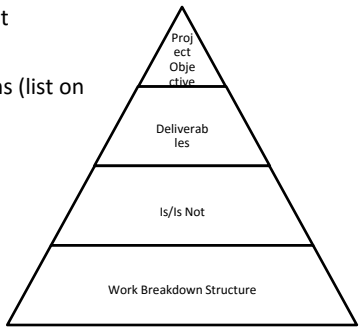
2. Planning Phase

Note: At least 1 and up to 3 TAC planning meetings are held before contract execution. The following process assumes 3 meetings – project definition, work breakdown review, and risk management plan. It may be possible on some projects to cover all the issues in 2 or even 1 meeting, using phone conversations and email to resolve remaining issues. Match Sponsor meetings accordingly.

□ 2.1 **PM** Extend invitations to TAC members, confirm availability, and set up TAC planning meeting(s)

Research Project Management Checklist

Project:_____ **Project Number:**_____



□ 2.2 **PM** Prior to executing contract, hold 1st TAC planning meeting to create a Project Definition Document

2.2.1 Write a Project Objective Statement (25 words or less)

2.2.2 Define Task Policies and Procedures for managing scope, schedule, budget, and communications (list on back of sheet)

2.2.3 Draft Initial Implementation Plan

2.2.4 Validate Constraint Matrix

2.2.5 Brainstorm the Project Deliverables and what each Is and Is Not

2.2.5.1 Project Deliverables (list minimum deliverables on last page of checklist)

2.2.5.2 Is/Is Not (for each deliverable)

□ 2.3 **PM** Validate scope and approach with Sponsor

□ 2.4 **PI** Create a Work Breakdown Structure and Preliminary Schedule for Attachment C

2.4.1 Chart resources and team member time commitments associated with the project plan

2.4.2 Reconcile plan with original project objectives, note any changes

□ 2.5 **PM** Hold 2nd TAC planning meeting to review and approval Work Breakdown Structure and Planned Project Schedule

2.5.1 Define project promotional activities (video, newsletter article, webinar, fact sheet, UDOT Annual Conference, etc.)

□ 2.6 **PM** Obtain Sponsor support for any changes to objectives and/or scope

□ 2.7 **PM** Hold 3rd TAC planning meeting to create Risk Management Plan

2.7.1 Brainstorm risks to scope, schedule, resources (common risks listed below)

2.7.2 Assess significance of listed risks

2.7.2.1 Use ***impact***, ***probability***, and ***lack of forewarning*** as criteria

2.7.2.2 Rate risks as high, medium, and low (plan to manage high risks, evaluate medium risks case-by-case)

2.7.3 Brainstorm preventive measures, forewarning indicators, and contingencies for high and appropriate medium risks

2.7.3.1 Add tasks to Work Breakdown Structure for any risk prevention activities

□ 2.8 **PM** Obtain confirmation and support from Sponsor for risk management plan

□ 2.9 **PM** Prepare contract documents

2.9.1 Complete contract cover sheet using template

2.9.2 Include Attachments A and B

2.9.3 Include Attachment C provided by PI

2.9.4 Include Sole Source Justification memo in project folder when needed for non-state agency contracts

2.9.5 Send contract documents to consultant's contract administrator for signature (hard copy or PDF)

□ 2.10 **PM** Execute Contract

2.10.1 Obtain signature of Research Director (Systems Planning & Programming Director if $100K or higher)

2.10.2 Submit to UDOT Contract Administrator

2.10.3 Scan contract and file in project Contract Documents subfolder; place hard copy in project file

□ 2.11 **PM** Complete project activation

2.11.1 Give PI Notice to Proceed, request PI provide completed Project Researchers Demographic Profile to UDOT Civil Rights

2.11.2 Add project information to TRB Research in Process (RiP) online database

2.11.3 Rename project folder (1.1.1) with contract number in place of PIC number and move (with subfolders) from Pending Projects folder to Active Projects folder

Research Project Management Checklist

Project:_____ **Project Number:**_____

3. Execution Phase

☐ 3.1 **PM** MITAR (Monitor, Investigate, Take Action, Report)

- 3.1.1 Ensure that PI is taking and distributing minutes of each TAC meeting per contract requirements
- 3.1.2 Review progress reports and coordinate with UDOT Champion for payment of invoices as they are received
- 3.1.3 Ensure that PI completes Interim Report(s) and evaluate the progress of the project
- 3.1.4 Start early implementation activities if defined in the Implementation Plan (2.2.3) or if initial results in the Interim Report indicate
- 3.1.5 Maintain updated project status information in the Master List as required
- 3.1.6 Update RiP as needed for multi-year projects

☐ 3.2 **PM** Use planning process defined in Planning Phase to make necessary changes to project during execution phase

☐ 3.3 **PM** Conduct Midterm Project Review(s)

- 3.3.1 Complete Project Review Checklist in consultation with Sponsor and TAC, as appropriate
- 3.3.2 Review and modify Implementation Plan with Sponsor and TAC
- 3.3.3 Meet with PI to discuss results of review and discuss strategies for improvement

4. Project Closeout Phase

☐ 4.1 **PM** Conduct Final Project Review

☐ 4.2 **PM** Ensure that Final Report is acceptable in accordance with Research Report Guidelines (following the Research Publishing Process)

☐ 4.3 **PM** Ensure that other deliverables outlined in the contract documents (2.2.4.1) have been completed as described

☐ 4.4 **PM** Complete handoff of Implementation Plan to UDOT Champion

☐ 4.5 **PM** Add project final report information to TRB/ITRD Transportation Research International Documentation (TRID) online database

☐ 4.6 **PM** Update RiP project listing to “complete”

☐ 4.7 **PM** Pay final invoice

Research Project Management Checklist

Project:_____ **Project Number:**_____

Stakeholders (1.3)

Functional Groups – FGs (1.4.1)

Group 1 – most affected by outcome

Group 2 – most able to contribute

Project Policies and Procedures (2.2.2)

- TAC meeting frequency
- Communication formats
- Due dates
- Invoice payments (frequency and triggers
- Mid-term evaluations
- Other:

Minimum Research Project Deliverables (2.2.4.1)

- Final report
- Interim reports (if required)
- Videos and public engagements
- Other:

Common Research Project Risks (2.7.1)

- Student leaves before project is done
- UDOT champion takes new position and no new champion can be found
- Output not implementable
- Final report quality is substandard