

# State DOT Research Implementation Strategies: Best Practices

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NCHRP Project 20-44(21)  
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## Overview

NCHRP initiated Project 20-44(21): “Synthesis of State Peer Exchanges and RPPM” to identify practices, opportunities, and challenges related to implementation of research conducted by state departments of transportation (DOTs). Best practices highlighted in this guide are drawn from three core data collection and synthesis tasks conducted for this project:

- A [synthesis of State Planning and Research peer exchanges](#) focused on those where the host state DOT addressed implementation as a theme for discussion.
- A [synthesis of the AASHTO Research Program and Project Management \(RPPM\) database](#) focused on documentation, processes, and reports tagged by submitter DOTs as related to implementation.
- A survey of research directors focused on state DOT experiences and perspectives related to research implementation practices, plans, and barriers.

Drawing from these sources, this guide serves not only to compile best practices but to present opportunities and next steps for agencies looking to put these findings to work. When additional details or expanded examples are available in the synthesis reports or survey responses, they are cited and linked in this guide. Users interested in more details are encouraged to refer back to these reports, which in turn include citations back to the source peer exchange reports and RPPM entries.

## Strategies, Barriers, and Opportunities

Strategies are organized around seven functional areas that evolved from the synthesis reports and served as the basis for the survey:

- **Program Management**
- **Roles and Staffing**
- **Project Management and Process**
- **Funding and Contracting**
- **Tracking**
- **Technology Transfer and Marketing**
- **Demonstrations, Pilots, and Other Implementation Activities**

Discussion of each functional area closes with highlighted best practices for implementation (encompassing stand-alone implementation activities as well as implementation tasks included within a research project). These are grouped into three categories with increasing expectation of cost and level of effort:

1. **Low-Cost, High-Impact Tactics**—These are tactics to support research implementation that will be helpful for state DOT research programs that have particularly small or limited budgets and staff time.
2. **Transferable Tools**—These are tactics for enacting successful strategies that can be adopted readily by any state DOT research program.
3. **Advanced Recommendations**—These are tactics that have been proven successful for mature or advanced programs. While typically more involved than Transferable Tools—often requiring the development of new processes rather than easy-to-borrow ideas—they will be helpful for those state DOT research programs looking to advance research implementation to the next level.

In addition, this guide calls out **Priority Strategies**, approaches that surfaced as the most important and most widely deployed by state DOTs.

## Best Practices by Area

**PROGRAM MANAGEMENT** strategies involve ways a research program is organized to support implementation, and ways it interacts with others within or beyond the agency to support implementation.

- *Seek buy-in from agency leaders.*

While this is a popular strategy among agencies, it was noted that it can be difficult to secure the attention and support of leadership for individual research projects or the program as a whole. It is important to seek leadership buy-in early in the process—before a project is put under the direction of a technical panel.

- *Use successful implementation efforts to demonstrate the value of the research program (including benefit-cost and return-on-investment calculations) and build staff and management support.*

Over 80% of survey respondents already use this strategy or are working toward it. It was also described as the most challenging in the Program Management area. One agency stated: “Everyone is interested in quantifying the benefits of research, but ... quantification is hard.” [Aligning research with innovation](#) (peer exchange synthesis, p. 11) can build the case for research implementation.

- *Develop a comprehensive set of strategies to advance implementation within the transportation agency.*

A question raised by agencies was, both philosophically and practically, whose job is implementation? The research program can encourage or promote implementation, but ultimately it falls in the hands of technical areas of the DOT, industry, or others.

- *Formalize and document the implementation process (roles, steps, options).*

It was noted that even when the implementation process is well defined, sometimes “by the time it comes around to implementation, the project has lost its momentum.” These [formalized processes](#) (peer exchange synthesis, p. 12) are the same strategies detailed within the other six areas below in this guide (Roles and Staffing, Project Management and Process, etc.).

- *Identify barriers to implementation and opportunities to address them.*

It is important to begin the discussion of possible barriers early in project development and continue examining them throughout a project’s life cycle. It was noted in the [peer exchange synthesis](#) (p. 13) that not every project will or should be implemented. Moreover, documenting and understanding failed implementation is also valuable.

<b>Low-Cost, High-Impact Tactics</b>	With limited resources, try to borrow successful practices of other states.
<b>Priority Strategy</b>	Seeking buy-in from agency leaders was the most used strategy in this area (55% of survey respondents).

**ROLES AND STAFFING** strategies involve the ways a research program establishes and defines the roles and responsibilities of research staff, others at the DOT, and the consultants/investigators involved in implementation work.

- *Involve other business and technical areas within the agency that may be affected by implementation activities, such as information technology.*

Many agencies are engaging internal stakeholders early and keeping them plugged in throughout the research process. [Staff responsible for implementation](#) (peer exchange synthesis, p. 19) should be involved as early as possible and provide “the driving force behind the research.”

- *Include external stakeholders, such as by gathering industry feedback on new specifications and products, and secure early buy-in.*

Early and ongoing participation of external stakeholders (other state agencies, federal agencies, and industry) is encouraged to identify roadblocks that could impede implementation, gain support for the project, and identify other needs while the project is underway and after it concludes.

- Involve senior management and decision-makers in implementation.*

One agency described leadership buy-in as “a must.” Another described engaging decision-makers by requiring that highly placed agency staff members agree to support implementation of project results in their business areas. [TRB guidance](#) (RPPM synthesis, p. 12) notes that strong support from senior management can foster innovation and eliminate potential barriers to new products and processes.
- Define the roles and responsibilities of research staff, project panels, project champions, and functional area staff who will be implementing the research.*

Consider selecting project champions that are highly regarded and have a degree of authority. Encourage cross-functional engagement by appointing panel members from a wide range of program areas. Note that champions do more than serve on project panels; they are the driving force who must take the lead on future implementation.
- Keep the project panel together after the project has ended to track and facilitate implementation activities.*

Prepare for post-project implementation by ensuring that project panels include staff who will be responsible for implementing project results, and use a form to help panel chairs and research project managers track implementation after a project concludes. Keep research staff engaged with the project panel to facilitate continued progress.
- Designate a research staff member as a dedicated implementation coordinator or implementation manager.*

This Roles and Staffing strategy is the least likely to be applied among survey respondents. Limited staffing levels and resources are prompting some respondents to find other ways to advance implementation. [Georgia DOT’s technical/implementation managers](#) (RPPM synthesis, p. 10) are selected from the membership of the Research Technical Advisory Groups overseeing research projects to track and report on implementation during a project and after it concludes.

<b>Low-Cost, High-Impact Tactics</b>	Task the project manager overseeing the research project with tracking implementation of research results. These individuals tend to have knowledge and insight gained over the project’s life cycle that can facilitate implementation.
<b>Advanced Recommendations</b>	Establish a committee of subject matter experts from inside and outside the agency, including internal stakeholders impacted by the research, that oversees and ensures implementation of a research project’s findings.
<b>Priority Strategy</b>	Involving other business areas is the strategy in this area that is the most likely to be applied by respondents. More than two-thirds are already doing it and another 23% are working toward it.

**PROJECT MANAGEMENT AND PROCESS** strategies involve steps established at all phases of research to support implementation.

- Address implementation throughout all phases of the research process (scoping, kickoff, and through completion); set clear goals for putting research into practice.*

Several agencies [integrate implementation across the research process](#) (peer exchange synthesis, p. 20). One agency notes: “It’s understood from the beginning and by the technical committee and researchers.” Implementation goal-setting is another commonly used strategy in the area of project management.
- Implement relevant research results from other agencies, including research discussed at the TRB Annual Meeting and other conferences.*

While implementing research found at national conferences like the TRB Annual Meeting can be challenging, setting up channels to report noteworthy findings is not difficult and can be an important first step. States' [reporting documents](#) are available (peer exchange synthesis, p. 27).

- *Detail implementation in the program's research manual and process documents.*

There are many examples of state DOT program manuals with details on implementation—defining it, stating its importance, and explaining how it can be fostered ([RPPM synthesis](#), p. 14; [peer exchange synthesis](#), p. 21).

- *Develop and revise an implementation plan for each research project; consider using an implementation planning worksheet or template as a guide.*

Some agencies have sophisticated planning documents that are updated through the life of the research project (survey free responses by North Carolina, p. 2, and Montana, p. 3). These keep stakeholders focused on implementation through the life of the project, even as outcomes develop over time.

- *Prioritize projects for implementation.*

It can be “challenging to prioritize implementable projects because it is not always clear how beneficial they will be.” Virginia uses a prioritization form with a scoring rubric ([RPPM synthesis](#), p. 16).

- *Develop “tactical tools” to accelerate implementation (policies, contracts and agreements, reference guides, and evaluation procedures).*

Some agencies referred to the implementation plan (see above) as their “tactical tool.” According to the survey, employment of tactical tools is the least commonly used strategy in this area.

<b>Transferable Tools</b>	Many states' research manuals and related materials do a comprehensive job of documenting implementation processes; these can be drawn upon as examples. Multiple agencies have staff who attend the TRB Annual Meeting report back (in one case, to DOT executives) on technology with promising potential for implementation.
<b>Advanced Recommendations</b>	Montana DOT has a comprehensive implementation planning and documentation form updated through the life cycle of a project that helps inform and update a strategic approach to implementing project results. North Carolina DOT likewise has an implementation plan for the kickoff, intermediate, and closeout meetings.
<b>Priority Strategy</b>	Integration of implementation across the research process is already done by a large majority of survey respondents (65%), and 26% are working toward this.

**FUNDING AND CONTRACTING** strategies involve formal channels for providing funds for implementation and establishing contract language to facilitate implementation.

- *Allocate dedicated funding for implementation activities (funded as discrete projects or included as tasks in the original research project contract).*

Examples of state implementation budgets vary significantly from \$100,000 to \$10 million ([peer exchange synthesis](#), p. 29). Funds should be accompanied by leadership/institutional support and clear goals.

Write necessary implementation products into research contracts when possible. As further discussed in the [RPPM synthesis](#) (p. 18) and the survey free responses (p. 6), interpretations vary on rules governing what may be covered through federal State Planning and Research, Part II funds; therefore, it is important to carefully define and scope implementation components of a research project.

- *Seek alternative funding sources for implementation activities.*

Suggested channels include state DOT technical areas, NCHRP, federal State Transportation Innovation Council funding, and national pooled funds.

<b>Low-Cost, High-Impact Tactics</b>	Dedicating funding to implementation may be unrealistic. Aim instead to “integrate implementation into everything.” Write implementation products into research contracts when possible.
<b>Transferable Tools</b>	Successful alternative funding sources include state DOT technical areas (for example, construction) to implement findings; the NCHRP implementation support program (Project 20-44); federal State Transportation Innovation Council funding; and the Transportation Pooled Fund program.

**TRACKING** strategies involve established methods to track what research is being implemented and how successful those implementation efforts have been.

- *Report periodically on implementation progress (staff communications, dashboards, conferences).*  
This is the most commonly used tracking strategy. The responsibility for final reporting of implementation data can be shared among the DOT research office, the functional area/champion, and the researcher. Several examples are detailed in the [RPPM synthesis](#) (p. 19).
- *Report periodically on implementation progress at the program level.*  
As detailed in the survey free responses (p. 6) and the [RPPM synthesis](#) (p. 21), one agency conducts a large-scale evaluation every five years on the extent and impact of the implementation of recommendations that resulted from agency research studies; this involves interviews, surveys, documentation, and refinement of ways to measure impact. Another is reviewing every research project completed over the past five years in order to document the implementation—or nonimplementation—of each, to classify the types of implementation, and to assign a value to each implementation where applicable.
- *Track implementation for all completed research projects using a database or other tool.*  
Limited staff time was called out as an obstacle to enacting this strategy. One survey respondent stated that it can be difficult to acquire the necessary feedback from customers due to competing objectives and changes in positions and roles over time. Caution was offered not to try to capture too much information. This strategy was called out as challenging by 26% of survey respondents.
- *Conduct surveys or interviews of project stakeholders to assess implementation status.*  
Stakeholder surveys revealed staff movement and limited interest in completed projects are barriers to implementation of research results (survey free responses, p. 7).

<b>Low-Cost, High-Impact Tactics</b>	Contract with a university partner to conduct tracking activities as part of its program support.
<b>Transferable Tools</b>	Successful tracking strategies include scheduling exit surveys near completion of a research project to learn about implementation potential and timing; discussion and calculation of benefit-cost potential of implementation; and creation of a research program and project management system.
<b>Priority Strategy</b>	Implementation tracking is of high interest to research programs. All four of the strategies above are now used by a significant number of survey respondents (as high as 61%), and many other respondents are either working toward each of these strategies or are interested in trying them.

**TECHNOLOGY TRANSFER AND MARKETING** strategies address how transfer of technology intersects implementation, and how marketing successful research promotes implementation.

- *Present research results directly to relevant DOT staff and local agencies; use webinars, videos, research briefs/summaries, conference presentations, conference posters, newsletters, email notifications, and/or annual reports.*

While agencies are using a [range of communication products and outreach efforts](#) to disseminate research findings (peer exchange synthesis, p. 33), some “would like and need to do more” and are interested in taking greater control over the process. This was the most widely used strategy in the entire survey.

- *Communicate research results and showcase implementation successes to communicate the value of implementation.*

Moving from an ad hoc approach to an organized and strategic effort is recommended, and annual poster sessions and showcases to highlight research program results are seen as effective ways to communicate the value of implementation.

<b>Low-Cost, High-Impact Tactics</b>	Require researchers to prepare a webinar, conference poster, and/or two-page brief as a final deliverable.
<b>Transferable Tools</b>	Assign research program staff to contribute to a periodic agency e-newsletter, or develop email notifications that highlight opportunities for implementation.
<b>Advanced Recommendations</b>	Learn more in the <a href="#">peer exchange synthesis</a> (pp. 34-35) about New Jersey DOT’s annual research showcase to recognize innovative research projects, and Utah DOT’s annual research conference that couples researchers’ presentations with participant workshops.
<b>Priority Strategy</b>	Presentation of research results was the most frequently used strategy among every strategy in the survey, with three-quarters of respondents already engaging in this effort and 16% working toward it.

**DEMONSTRATIONS, PILOTS, AND OTHER IMPLEMENTATION ACTIVITIES** highlight the ways a research program can enhance an agency’s knowledge base with an incremental approach to implementation and by learning from other agencies.

- *If appropriate, begin deployment with a demonstration project or pilot project.*

Agencies noted that application of this strategy is project-dependent, and the research office may not have control over the pilot effort. Where possible, engage with external partners, and consider launching a pilot when buy-in is lacking for an immediate broader implementation. [Avoid the typical barriers](#) (RPPM synthesis, p. 23) described in a 2014 NCHRP report that can limit the success of a demonstration project.

- *Learn from other agencies’ successful and unsuccessful implementation efforts.*

Case studies in the [peer exchange synthesis](#) (p. 40) describe the factors contributing to successful DOT implementation efforts. Applying other agency successes can be challenging if the implementing agency has not provided sufficient guidance to allow for transfer of their experience. Limited resources and the lack of broader agency interest may also preclude implementation of other agencies’ research.

<b>Low-Cost, High-Impact Tactics</b>	Include a demonstration or pilot in the research project contract. Use the pilot’s success to encourage broader implementation.
<b>Transferable Tools</b>	Seek partnerships with academic and industry stakeholders to develop demonstration projects after projects conclude. Request supplemental information (internal documents, recommendations) from contacts at state DOTs successfully implementing research results in their agencies.
<b>Priority Strategy</b>	Use of demonstration projects or pilot projects was among the most used strategies in the survey. Several examples are detailed in the survey free responses (pp. 8-9).