

Evaluating Implementation of NCHRP Products: Building on Successful Practices

FINAL REPORT

NCHRP Project 20-44(P) Evaluating Implementation of NCHRP Products

Prepared for:

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EXECUTIVE SUMMARY

Background and Objectives

The National Cooperative Highway Research Program (NCHRP) is the states' research program—funded by State Planning and Research funds and driven by their needs. Each year the American Association of State Highway and Transportation Officials (AASHTO) Standing Committee on Research selects 40 to 50 new projects that reflect the changing priorities and challenges of states as they plan, design, construct, operate, or maintain the nation's highway infrastructure. The program produces more than 60 products annually that are intended to help states improve the way they do business.

NCHRP surveys its project panelists and principal investigators on a four-year cycle to learn about project outcomes, successes, and challenges. The most recent survey, conducted in 2012 for projects completed between June 2004 and June 2009, revealed that NCHRP products are being used extensively. The results are being incorporated into state practices, support the development of AASHTO standards, and are being used as the basis for state-specific follow-up research.

However, NCHRP is committed to continuous process review and improvement. To identify ways to further facilitate the application of its products, NCHRP initiated this project with the following objectives:

- Identify the people, processes, and practices that have supported successful, effective, and efficient application of research results.
- Analyze the factors that promote—or prevent—NCHRP product implementation.
- Develop criteria to guide future activities that support implementation.
- Recommend process improvements by NCHRP and others to meet the criteria and overcome obstacles.

To meet these objectives, we gathered and analyzed information from three sources:

- Interviews with more than 60 NCHRP project panelists about implementation activities on specific projects.
- Interviews with representatives from the three national bodies that drive NCHRP—the Transportation Research Board (TRB), AASHTO, and the Federal Highway Administration (FHWA)—to learn how these organizations and their staffs work independently and in concert to help disseminate and implement NCHRP products.
- An online survey and follow-up interviews with state research directors to learn how states are making use of NCHRP products, and how they are systematically tracking or promoting the use of NCHRP.

Key Findings

Elements of Implementation Success

Implementation success is associated with planning ahead for implementation (what will change, who will make the change, what is needed to support the change); establishing organizational channels for carrying out the implementation; and providing strong leadership to see the process through. Specifically, the following key elements have contributed to successful application of NCHRP results.

Implementation Leadership

No one position or organization is responsible for implementing NCHRP research results. Implementation champions—individuals or groups who consider it their role to initiate and oversee the implementation and follow through with this commitment—are needed. As the owners and users of NCHRP research, state department of transportation (DOT) managers and practitioners take on especially strong roles in implementing research results—as participants on NCHRP project panels and AASHTO committees, and as leaders within their state organizations. Their efforts are supported, guided, and coordinated by individuals within TRB, AASHTO, and FHWA who are committed to seeing the research implemented.

Buy-In for Implementation

The interviewees for this project repeatedly mentioned the importance of getting support for implementation from the beginning of the project. Support needs to come from those who will lead the implementation efforts, those who will be affected by the research, and those who will provide the channels for presenting the findings. This means communicating the project goals and interim results to stakeholders in an understandable way, gaining and leveraging the support of AASHTO and FHWA for upcoming changes, and addressing stakeholder concerns before the project is complete. Even after the research has concluded, the application of findings must be promoted in a way that acknowledges potential reservations or challenges among the users. Implementation champions build confidence in the research products through webinars, pilot projects, workshops, and other information and demonstration initiatives.

Structural Support and Resources

Beyond having the necessary people to support implementation, the interviewees discussed a range of mechanisms and resources that have been used to share the research results with those who will apply them. The TRB, FHWA, and AASHTO committees, task forces, and working groups provide critical channels for disseminating the results to end users and offering technical support and guidance for effective application. State DOT technical teams and oversight committees also play key roles in facilitating implementation, initiating changes to policy and practice documents, and partnering with industry and universities to train staff on new approaches and techniques.

Research Products That Address a Real Need and are Ready to Use

Research results are not always “field-ready,” or easily understood and applied without additional assistance. Implementable deliverables go beyond final reports to include demonstration software, websites, policy guidance, and training manuals. The project investigator provides some of these products, but the TRB, FHWA, and AASHTO project panel members and implementation leaders also provide additional support and guidance to make these products possible.

Targeted Dissemination

The dissemination of NCHRP project results is a fundamental step toward successfully implementing research findings. However, communication efforts are most effective when they are targeted to those who can act on the new information. Dissemination activities should focus on getting the right information to the right people in the right format at the right time.

Barriers to Successful Implementation

Those elements that can help lead to success for some projects (strong leaders, formal structures, effective products) are typically lacking in cases where implementation is unsuccessful. In particular, interviewees for this project described the following challenges for effectively implementing NCHRP research results.

Insufficient Implementation Leadership

Effective implementation of NCHRP research results requires strong leadership by designated individuals at the national and state levels. The interviewees described two primary types of implementation challenges related to leadership: 1) limited time or influence of those in leadership roles (particularly because of the volunteer nature of serving on NCHRP project panels) and 2) lack of designated implementation champions with clearly defined roles.

Lack of Buy-In and Readiness

When support for the research is not achieved, there can be a backlash to implementation that prevents it from progressing. Ensuring that stakeholders are sufficiently informed and supportive of new or upcoming research results can be a challenge, especially if the channels for communicating with end users are not evident.

Interviewees also described the challenge of achieving “readiness” to apply research results. They spoke repeatedly about a range of institutional barriers to implementation within DOTs: resistance to change, distrust of the product, aversion to risk, fear of liability, agency priorities, concerns about public perception, and political issues.

Insufficient or Ineffective Dissemination

Although the interviewees frequently described the successful dissemination—and use—of research results, dissemination challenges were a recurring roadblock to implementation. Multiple interviewees said that it was difficult to extract information from the many NCHRP reports shared with them or to see how results were applicable within their states. They commented that some

research results needed to be better explained or translated for user audiences or that they needed assistance marketing the results within their department. Several also noted that it can be difficult to get the research results to the right people at the state and local levels. Simply raising awareness among potential users that the research products are available can be a significant challenge.

Lack of an Implementable Product

Several interviewees noted that the findings included in NCHRP research reports are not always sufficient for implementation. States may need to do a lot of their own work to expand on or customize the results for their use, which requires money and personnel that they may not have. In other cases, the findings may be sufficient, but the language used is too technical for end users to effectively digest or promote to their senior managers.

Recommendations

The interviewees recommended a number of improvements for implementing NCHRP research, and additional themes emerged through the analysis of the task findings. Although many practices that support application of NCHRP results are already in place, there are opportunities for expanding or formalizing these effective practices to benefit even more projects. Key recommendations follow.

Clarify and Formalize Roles and Responsibilities

Many of those interviewed for this project thought that it was up to the states to implement NCHRP research results. They described NCHRP as being the states' research program, indicating that states should take responsibility for applying the results. Yet, interviewees repeatedly said that they thought NCHRP should be more focused on implementation, do more to share research findings and support implementation by the states, provide more implementation resources, and be a leader in coordinating efforts among national and state agencies.

In addition, there is a need to formalize the selection of implementation champions and their leadership responsibilities to ensure that more (if not all) projects get attention. This means clarifying the roles of TRB staff, FHWA staff, project panelists, and the investigator.

Embed Implementation in the Research Process

Although NCHRP requires an implementation plan for research projects, many interviewees saw a need for NCHRP to embrace a culture of implementation. In other words, NCHRP should more formally embed implementation in the entire research process—from project and panel selection to the handling of interim results, to the distribution and marketing of findings.

Enhance and Formalize Implementation Mechanisms

Implementation related to projects in well-defined technical areas, such as bridge design and highway materials, is relatively straightforward. Well-established channels (the AASHTO committees) exist for sharing research results, established guidance documents that the research feeds into, and established

processes for inviting feedback while the research is still underway. NCHRP should look for opportunities to replicate or modify these implementation mechanisms in other topic areas. In other words, NCHRP can play a key role in connecting NCHRP panel members with the national or regional committees, working groups, or other topically oriented entities in each research area. These groups can ensure the buy-in that is needed, help promote the research findings, and help refine the research products for optimal assimilation by end users.

Multiple interviewees also mentioned the need for improved coordination and collaboration with FHWA and AASHTO on implementation. Their involvement and support lend credibility to the findings, which support implementation, and they often have relationships with end users that can be used to promote research results.

Boost Communication Processes and Products

Interviewees described a critical role for NCHRP in disseminating research results and talked repeatedly about the need for NCHRP to enhance and expand the communication approaches used. They wanted NCHRP to be much more aggressive about sharing findings through ongoing, targeted communication products.

Expand Implementation Resources

The interviewees expressed the need for additional NCHRP resources to support effective implementation by the states. Even if the states are responsible for incorporating the findings into their practices, they are not always able to get the buy-in and resources they need to follow through. NCHRP already funds on a limited basis implementation projects that develop tools and guidance, demonstration projects with lead states, webinars to explain results, and other forms of technical assistance. However, there doesn't appear to be a formal mechanism for evaluating the need for, and providing funding for, additional implementation resources on a project-by-project basis.

Supplementary Documents

In addition to synthesizing and documenting the task findings in this final report, NCHRP requested two companion deliverables, which are included at the end of this report:

4-Page Folio: Implementing NCHRP Research

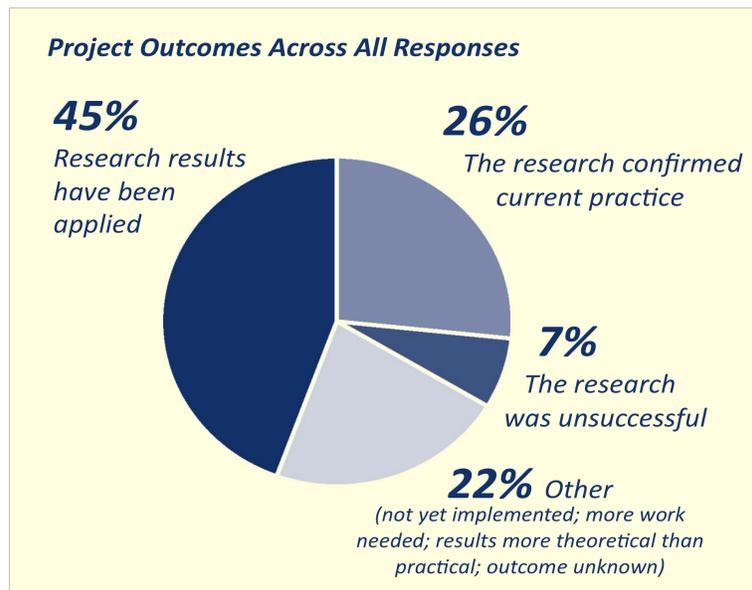
This four-page summary of the project findings presents the key elements of successful NCHRP project implementation, the roles of state and national leaders in implementing results, and the implementation activities that should be incorporated into each step of the project life cycle.

10 Implementation Case Studies: *Paths to Practice*

CTC & Associates developed 10 two-page case studies of selected NCHRP products highlighting a range of effective approaches to implementation discussed with the interviewees for this project.

INTRODUCTION

The National Cooperative Highway Research Program (NCHRP) surveys its project panelists and principal investigators on a four-year cycle to learn about project outcomes, successes, and challenges. The most recent survey, conducted in 2012 for projects completed between June 2004 and June 2009, revealed that NCHRP products are being used extensively. The results are being incorporated into state practices, support the development of the American Association of State Highway and Transportation Officials (AASHTO) standards, and are being used as the basis for state-specific follow-up research.



Project Panelist Survey Outcomes

However, there is room for improvement. To identify ways to further facilitate the application of its products, NCHRP initiated this project with the following objectives:

- Identify the people, processes, and practices that have supported successful, effective, and efficient application of research results.
- Analyze the factors that promote—or prevent—NCHRP product implementation.
- Develop criteria to guide future activities that support implementation.
- Recommend process improvements by NCHRP and others to meet the criteria and overcome obstacles.

To meet these objectives, NCHRP requested three tasks to gather information about implementation successes, barriers, and opportunities:

Task 1. Interviews with NCHRP project panelists to learn details about and characterize NCHRP projects that were implementable and implemented (and just as importantly, to gain similar insights about those that weren't).

Task 2. Interviews with the three national bodies that drive NCHRP—the Transportation Research Board (TRB), AASHTO, and the Federal Highway Administration (FHWA)—to learn how these organizations and their staffs work independently and in concert to help disseminate and implement NCHRP products.

Task 3. An online survey and follow-up interviews with state research directors to learn how states are making use of NCHRP products, and how they are systematically tracking or promoting the use of NCHRP.

This final report documents the results of these tasks, synthesizes the findings, and provides recommendations for improving implementation of NCHRP projects going forward. The report also includes the following supplementary documents requested by NCHRP:

- **4-Page Folio: Implementing NCHRP Research**
This four-page summary of the project findings presents the key elements of successful NCHRP project implementation, the roles of state and national leaders in implementing results, and the implementation activities that should be incorporated into each step of the project life cycle.
- **10 Implementation Case Studies: *Paths to Practice***
These two-page case studies of selected NCHRP products highlight a range of effective approaches to implementation discussed with the interviewees for this project.

SYNTHESIS OF FINDINGS AND RECOMMENDATIONS

The following sections present the findings from an analysis of all interview and survey responses across the three primary project tasks. These findings are organized to address the key objectives of the project: elements of implementation success, barriers to implementation, and recommendations for improving implementation in the future. For a detailed description of the interview and survey methodology, as well as the results by task, refer to the appendices of this report (available as a separate document).

Section 1. Elements of Implementation Success

This section describes the key people, products, and structures that have supported successful implementation of NCHRP research in the past. Not surprisingly, implementation success is related to planning for implementation (what will change, who will make the change, what is needed to support the change); establishing organizational channels for carrying out the implementation; and providing strong leadership to see the process through. Below is an overview of these key elements, organized into the following subsections:

- Implementation Leadership
- Buy-In for Implementation
- Structural Support and Resources
- Ready-to-Use Products

Implementation Leadership

No one position or organization is responsible for implementing NCHRP research results. Instead, implementation champions are needed—individuals or groups who consider it their role to initiate and oversee the implementation and follow through with this commitment. According to the interviewees, implementation champions may be project panel members, TRB or FHWA staff, investigators, or leaders from AASHTO or TRB committees.

As the owners and users of NCHRP research, state department of transportation (DOT) managers and practitioners take on especially strong roles in implementing research results—as participants on NCHRP project panels and AASHTO committees, and as leaders within their state organizations. Their efforts are supported, guided, and coordinated by individuals within TRB, AASHTO, and FHWA who are committed to seeing the research implemented.

Below are a few examples provided by interviewees of implementation leadership roles from past NCHRP projects:

- **TRB Staff:**
 - Formed a task force to support the development and publication of a new manual.

- Communicated project status, expected results, and implementation goals within TRB, with AASHTO, and with FHWA.
- **NCHRP Panel Members:**
 - Communicated the project findings to staff in their own DOTs, oversaw customization of final products, and shared their successes with other states.
 - Distributed the final product via e-mail to all state DOTs and federal agency administrators.
 - Shared the project findings at AASHTO and TRB committee meetings.
- **AASHTO Committee Members:**
 - Participated on project panels to provide input and prepare for updates to national specifications.
 - Coordinated with TRB task groups to develop materials to support implementation.
- **FHWA Staff:**
 - Led a marketing effort to distribute new guides that resulted from NCHRP research.
 - Hosted webinars to share research results.
- **Principal Investigators:**
 - Presented the research findings at TRB and AASHTO meetings.
 - Drafted language for updating national specifications.

In some cases, the interviewees emphasized the critical role of a single individual in leading and promoting implementation of the results. In other cases, they viewed implementation as a collaborative effort among multiple individuals and groups.

Buy-In for Implementation

The interviewees for this project repeatedly mentioned the importance of getting support for implementation from the beginning of the project. The purpose is to ensure support for bringing the results into practice among those who will lead the implementation efforts, those who will be affected by the research, and those who will provide the channels for distributing the findings. Successful implementation efforts typically involve the following key steps to ensure that this needed buy-in occurs.

Involve the Right People—From the Beginning

The individual who will serve as the implementation champion should be involved in the research project itself, informing the research need, approving how the project is being conducted, and reviewing how the research product is being developed. As mentioned above, project panel members frequently take the lead on implementation, perhaps partly because they feel an obligation to see the projects through to completion, but also because their project involvement has fostered their own buy-in and support for using the results. Several of the AASHTO Research Advisory Committee members interviewed described their state DOTs' efforts to get staff on as many project panels as possible. They know that their involvement in the projects improves awareness of the research results within their agencies. It prompts

them to share the research activities in progress and promote the findings enthusiastically within the DOTs. Ultimately, their involvement from the beginning of the project supports implementation at the end. Conversely, an implementation champion assigned later in the research process will not always be as effective as one involved early on.

The interviewees also described the importance of involving potential end users well before the project concludes. This means communicating the research need and value with DOT managers, sharing expectations and opportunities with subject area experts within DOTs, and inviting feedback from industry representatives about potential changes to practice. The goals are to address concerns, build support, and avoid roadblocks that can disrupt or halt implementation.

Finally, interviewees talked about preparing organizational implementation channels to ensure that research results are distributed and used. Examples of such channels include TRB committees, AASHTO committees, industry organizations, and FHWA expert task groups. These groups provide an important conduit of information to end users, and their support is often needed before implementation can proceed. Many national guidance documents and specifications produced by AASHTO and FHWA, for example, are informed by NCHRP research. However, changes to these documents won't take place without organizational support for the change. Recognizing the roles that these groups play in implementation and effectively involving them early on in the research will help ensure broad implementation of the results.

Communicate Often

Effective involvement of all stakeholders is not possible without good communication. Interviewees described a range of communication approaches employed throughout the research process to effectively raise awareness and encourage support for the research. Examples include providing interim project updates at committee meetings, meeting with technical groups about potential implementation needs, and hosting webinars to explain and promote research results. These communications need to happen frequently, starting from the very beginning of the project, and with all relevant stakeholders.

The interviewees also described how communication approaches were tied to implementation goals. For example, frequently reaching out to technical committees and stakeholders who may be impacted by possible implementation helps to build relationships that make end users more receptive to the findings. Sharing interim research reports, when changes to the final products are still possible, fosters trust and helps avoid unexpected roadblocks. Assisting with the development of specifications that result from the research can help ensure the new guidance will be understood and accepted as a national standard. Producing webinars or research summaries puts usable information in the hands of practitioners.

Address Concerns

Several interviewees described successfully overcoming resistance to implementation by addressing stakeholder concerns during the research process. In some cases, educating stakeholders about the research and giving them a chance to raise questions and concerns is enough to get their buy-in. In other cases, it may be necessary to make course corrections to the research if there is no clear path forward to

implementation. Addressing concerns requires seeking feedback from stakeholders in the first place. It's an extra step that requires a commitment of time and resources, but several interviewees for this project touted the benefits for implementation. The alternative can be that the research is questioned—or worse, attacked—based on its content or applicability to practice, and then doesn't have a chance to get used.

NCHRP has focused considerable effort on this aspect of implementation, playing a strong communication and coordination role to ensure that there is buy-in among stakeholders. NCHRP staff is assigned to individual AASHTO committees, subcommittees, and technical groups, and works closely with them on an ongoing basis. One illustrative example is the interaction between TRB's Waseem Dekelbab and the Subcommittee on Bridges and Structures (SCOBS). About 30 related NCHRP projects are underway at any one time and Dekelbab reports to SCOBS on the progress of each, providing interim results and asking for feedback for the principal investigators. Dekelbab attends as many of the 20 technical committees as he can during the annual and midyear SCOBS meetings.

TRB staff attends AASHTO committee meetings to hear research problems, recommend AASHTO committee members to serve on relevant NCHRP panels, and coordinate between TRB committees and the corresponding AASHTO committees. As both subject area experts and program leaders, TRB staff members are well-positioned to establish links with individuals and organizations that will make implementation possible and effective.

Structural Support and Resources

Beyond having the necessary people to support implementation, the interviewees discussed a range of mechanisms and resources that have been used to share research results with those who will apply them. Below is a brief overview of these implementation channels that have made real-world application of the research findings possible.

National Outreach

Most interviewees considered “getting the word out” an implementation activity in itself, even though additional steps are required beyond dissemination for the results to be incorporated into practice. Often interviewees assumed that if managers and practitioners had access to the results (new information, guidance, or tools), they would use these results to apply what was useful to them in their own agencies.

Research results and products are disseminated via topical automated mailing lists and websites; transportation libraries; National Highway Institute (NHI) training courses; presentations at TRB and AASHTO committee meetings or national conferences; and information sharing events, such as TRB or FHWA workshops and webinars. FHWA expert task groups and resource centers also help distribute research findings and encourage incorporation into practice. All of these formal and enduring structures support ongoing dissemination of research results among both government and industry stakeholders.

For some projects, implementation leaders have created subcommittees to develop educational materials that will support implementation at the state or local levels and working groups to connect end users with

new guidance and tools. Development of the *Highway Safety Manual* (NCHRP 17-27), for example, involved multiple projects and numerous stakeholders. The project panel formed a user liaison subcommittee to work with researchers and practitioners who would be adopting and using the manual. The subcommittee identified potential users of the manual and identified venues for improving understanding of the new research.

State Outreach

As members of NCHRP project panels, state DOT staff helps establish distribution channels and mechanisms for sharing NCHRP results at the state level. Several interviewees described working with their senior management, field staff, and FHWA to customize and apply NCHRP findings for their own needs. This commitment to implementing NCHRP research at the state level is critical; the state's investment in NCHRP research is not realized until the research is implemented.

Several state DOTs have dedicated positions for implementation through their research programs. Iowa DOT has an implementation engineer, Minnesota DOT has a research and implementation program development engineer, and Pennsylvania DOT has 1.5 to 2 full-time employees working on implementation. Though none described activities solely focused on NCHRP implementation, there is a growing awareness and emphasis on the role that these employees can play in supporting NCHRP project implementation within their agencies. Additional DOT research managers described the established outreach and distribution channels they have in place for sharing NCHRP research reports to the applicable staff so they are aware of the information.

Funded Implementation Projects

NCHRP formally supports outreach and dissemination activities by providing some funding specifically for implementation. Sometimes this funding is built into the research project budget as a required component of the work. In other cases, NCHRP provides funding for separate projects to support implementation of the findings from research that has already been completed. This implementation funding supports a range of outreach and technical assistance activities that vary based on the information that needs to be shared and the intended audience. Below are just a few examples of NCHRP-funded implementation activities.

Lead States Initiative for Implementing the *Highway Safety Manual*. Through NCHRP Project 17-50, NCHRP helped to expedite implementation of the HSM around the country. The project funded pilot implementation projects using a lead state model, development of the *Highway Safety Manual User Guide* based on the experiences of the lead states, peer exchanges with support states, and webinars to further support the sharing of best practices.

Highway Capacity Manual Applications Guide (Project 03-64). The guide developed in this research encourages implementation of the *Highway Capacity Manual* by showing how to appropriately apply its methodologies to real-world problems and indicating when other methods may be more appropriate.

Training for Human Factors Guidelines (NCHRP Report 600). This implementation effort involved the development of training modules by the contractor. The activity used a lead states model, with six states leading outreach efforts. To fund this implementation, TRB took advantage of residual contract funds from the original research project.

Project 1-40 Research, Implementation of MEPDG (Project 1-37). This series of projects included a three-day workshop with two people from each state DOT on how MEPDG was developed and how to use it. Implementation funds also supported an independent review of the MEPDG guide, and another contract was used to repair the bugs in the MEPDG software.

E-learning Website for Mobile LiDAR Guide (NCHRP Report 748, Project 15-44). This website was developed with input from the project panel. NCHRP implementation funds were used to develop the site and host it for five years. The site will include a class and serve as a repository for information. In addition, the class content from the site will be shared with NHI for possible use.

Implementing Transportation Data Program Self-Assessment (NCHRP Project 08-92). This project, currently in progress, is designed to review and revise a methodology developed through previous NCHRP research, produce a guidebook for implementation of the methodology, and develop case studies for applying the revised methodology.

NCHRP U.S. Domestic Scan Program (NCHRP Project 20-68A). To accelerate implementation of leading practices, this program sponsors up to five scans per year on targeted topics to put state and federal DOT practitioners in touch with innovative peers around the country. Through traveling scans or peer exchange meetings, participants learn firsthand how a new technology or practice works in the real world and develop close professional relationships that remain readily available to them after the scan. A recent parallel effort funded under this project has focused on providing support and facilitation for post-scan information dissemination and implementation activities.

Webinars. About 10 of the webinars completed each year through TRB focus on recent NCHRP products. These webinars are requested by NCHRP staff or TRB committee chairs, and funding for them is often built into NCHRP project costs. Workshops and seminars have also been included in project funding for selected NCHRP projects.

Ready-to-Use Products

Multiple interviewees described the need for supplemental research products that can be shared through the distribution channels described above, beyond the final report required of all NCHRP projects. Research results may not be “field-ready,” or easily understood and applied without additional assistance. In several cases, the interviewees pointed to an implementable product that made the difference in their agencies’ willingness and ability to implement the findings.

Implementable deliverables have included demonstration software, websites, policy guidance, and training manuals. In some cases, the project investigator provides these additional products, but often the panel members and staff from FHWA, TRB, and AASHTO get involved in creating products that support implementation.

AASHTO Publications

The implementable product most frequently described as effective by the interviewees is a manual or guidance document produced through an AASHTO committee. NCHRP research projects feed into more than 100 different AASHTO publications overseen by AASHTO committees, such as the following:

- *Highway Safety Manual*
- *LRFD Bridge Design Specifications*
- *A Policy on Geometric Design of Highways and Streets*
- *Strategic Performance Measures*

The effectiveness of these products stems not only from their recognition as national standards but also from the formal processes that are in place to produce or update them. The interviewees described well-established mechanisms for coordinating with AASHTO committees on research needs and results related to guidance documents. Below is just one example of this implementation process, as described by an interviewee for this project:

“The research was presented at the annual meeting for the AASHTO bridges subcommittee on culverts before the report was finalized. Any changes resulting from the research were discussed so that once the research was finished, the proposed changes could be taken back to the committee to get their buy-in. Once the subcommittee approved the changes, they were taken to the AASHTO bridges committee for a review and vote by all of the chief bridge engineers from the 50 states. Their approval means the changes get incorporated into the AASHTO guidance.”

As with other forms of results dissemination, the existence of a guidance document does not necessarily mean that people are using it or that the results have been applied. However, the interviewees repeatedly said they considered a project implemented if the findings had been incorporated into an AASHTO publication. Because so many DOTs use these documents, interviewees typically expected that states would incorporate any new information into their practices whenever practical to do so.

FHWA Publications and Programs

NCHRP projects often serve as foundational resources for FHWA guidance documents and programs as well, such as:

- Accident Modification Factors
- Safety Countermeasures
- Roundabouts

- *Manual on Uniform Traffic Control Devices (MUTCD)*
- Context Sensitive Solutions
- Every Day Counts initiatives
- *Mechanistic-Empirical Pavement Design Guide*
- Highways for LIFE
- Application of NCHRP IDEA (Innovations Deserving Exploratory Analysis) Program results

Implementation of NCHRP research is typically planned in advance for projects where FHWA has submitted a proposal or contributed funding. In these cases, the research topic may be part of an FHWA research roadmap or strategic plan.

Section 2. Barriers to Successful Implementation

Those elements that can help lead to success for some projects (strong leaders, formal structures, effective products) are typically lacking in cases where implementation is not successful. Below is an overview of the specific challenges that interviewees shared related to implementing NCHRP, organized into the following subsections:

- Insufficient Implementation Leadership
- Lack of Buy-In and Readiness
- Inconsistent Implementation Processes
- Lack of an Implementable Product

Insufficient Implementation Leadership

The interviewees described two primary types of implementation challenges related to leadership: 1) limited time or influence of those in leadership roles and 2) lack of designated implementation champions with clearly defined roles.

Limited Time or Influence

Not surprisingly, successful implementation can be limited by the reach of those taking on a leadership role. For example, implementation may happen in one state agency because of the leadership provided by a single panel member from that state. For implementation to happen in multiple states, it is often necessary for multiple individuals or groups to take on leadership roles. Research results often need to be customized for end users based on the unique environment of each state or agency. This means that leadership is needed to promote the findings at both the national level and the state or local levels.

As noted by a few of the interviewees, serving on an NCHRP project panel is a volunteer activity. It can be difficult for panel members or others charged with leading implementation to prioritize implementation efforts among their formal job duties. This can lead to delays in implementation and lost

enthusiasm for incorporating the results into practice. The interviewees also raised a number of concerns related to the makeup of project panels. For example, when there is not adequate representation from both the technical/research side of a problem and the practical/end user side, the final research product may not be well-suited for implementation. Also, not all panel members may be willing or able to take on a leadership role in promoting the research results.

No Clear Champion

As much as an implementation leader can drive successful implementation, the lack of a designated leader makes effective implementation very difficult. It was common for interviewees to cite the need for a champion when describing why results were not implemented as hoped or why implementation activities stalled. For example, one interviewee said that some findings have been “kicking around between committees” and nobody will take charge of them. Another said that implementation got off to a great start, but the ball was dropped after the project champion retired.

This lack of designated champions with defined implementation roles appears related to ambiguity surrounding implementation responsibilities at an organizational level. Some interviewees thought NCHRP should lead implementation efforts, while others thought it was up to AASHTO or the states. Even at the state level it is not always clear who should take the lead on implementing results. It could be the staff that serves on NCHRP project panels or national committees, DOT research office staff, leaders in local agencies, or others.

Lack of Buy-In and Readiness

Successful implementation relies on both the willingness and readiness of organizations and individuals to embrace and apply new ideas and practices. As described earlier in Elements of Implementation Success, the interviewees provided examples of proactive efforts to ensure buy-in or willingness among stakeholders. When buy-in is not achieved, however, there can be a backlash to implementation that prevents it from progressing. Ensuring that stakeholders are sufficiently informed and supportive of new or upcoming research results can be a challenge, especially if the channels for communicating with end users are not evident. For example, research that feeds into an AASHTO guidance document benefits from the AASHTO committee structure and publication development process when it comes to sharing information with the intended audience. However, it may be harder to achieve buy-in for subject areas that are more focused on policy or that are breaking into brand new territory in terms of national guidance.

A more significant challenge for implementation described by many of the interviewees is the readiness of organizations and individuals to apply research results. They spoke repeatedly about a range of institutional barriers to implementation within DOTs: resistance to change, distrust of the product, aversion to risk, fear of liability, agency priorities, concerns about public perception, and political issues.

Related to implementation readiness is the cost of using research results, both in terms of purchasing power and staff resources. Many interviewees said that they lacked the time to digest and apply new

research findings or lacked the funding to purchase software or equipment called for in implementation. They also described the challenge of keeping staff versed on the latest science and technologies when they have been out of school for years.

Although the interviewees shared many examples of effective implementation practices aimed at anticipating and avoiding challenges related to *buy-in*, efforts to anticipate *readiness* challenges were notably lacking.

Insufficient or Ineffective Dissemination

Dissemination of research results was described frequently as a successful implementation practice by the interviewees. Despite the successes mentioned, however, the interviewees repeatedly cited dissemination challenges as a recurring roadblock to implementation. Multiple interviewees said that it was difficult to extract information from the many NCHRP reports shared with them or to see how results were applicable within their states. They commented that some research results needed to be better explained or translated for user audiences or that they needed assistance marketing the results within their department.

Several also noted that it can be difficult to get the research results to the right people at the state and local levels. As one interviewee shared:

“I’m only in charge of one part of the state; the districts are on their own. Implementation in my area was up to me, and I haven’t tried to expand it into other areas of the state. While one could find something like this on the web, that’s not generally how it works; district personnel are going to ask their central office staff, all of whom are too busy to develop new standards and practices to implement. A lot of projects, whether funded by NCHRP or not, don’t get rolled out statewide. There’s just one guy in the research office dealing with 60 projects; he doesn’t have time to promote them.”

Research results that feed into existing national guidance documents or specifications are typically implemented through formal processes within TRB or AASHTO committees. The processes used for other types of research results, however, are often developed on a case-by-case basis by those most interested in seeing the results applied. Therefore, projects with no clearly defined implementation champion or process may not receive the attention needed to ensure application of the findings.

Lack of an Implementable Product

Several interviewees noted that the findings included in NCHRP research reports are not always sufficient for implementation. States may need to do a lot of their own work to expand on or customize the results for their use, which requires money and personnel that they may not have. In other cases, the findings may be sufficient, but the language used is too technical for end users to effectively digest or promote to their senior managers. There are also times when more research is needed, either at the national or state level, to provide a complete understanding of a problem or guidance on the solution. Any of these challenges can cause implementation to pause or even halt.

Section 3. Recommendations

This section outlines recommendations for improving NCHRP research implementation. Many of these recommendations were suggested directly by the interviewees, but others arose through an analysis of findings. As described earlier in Elements of Implementation Success, there are already many practices in place that support application of NCHRP results. The recommendations below include opportunities for expanding or formalizing these effective practices to benefit even more projects. The recommendations are organized by the themes that emerged during analysis, focusing on those opportunities that repeatedly arose during conversations with interviewees:

- Clarify and Formalize Roles and Responsibilities
- Embed Implementation in the Research Process
- Enhance and Formalize Implementation Mechanisms
- Boost Communication Processes and Products
- Expand Implementation Resources

Clarify and Formalize Roles and Responsibilities

The Role of NCHRP

Many of those interviewed for this project thought that it was up to the states to implement NCHRP research results. They described NCHRP as being the states' research program, indicating that states should take responsibility for applying the results. They also pointed out the need for customizing research findings to fit the unique needs and environments at the state and local levels, noting that this is best accomplished by the states. Yet, interviewees repeatedly said that they thought NCHRP should be more focused on implementation, should do much more to share research findings, should do more to support implementation by the states, should provide more implementation resources, and should be a leader in coordinating efforts among national and state agencies. This disconnect suggests a significant need for NCHRP to clarify the program's role in implementation and how that role will affect allocation of resources, both in terms of staff and project funds.

Champion Selection and Responsibilities

There does not appear to be a formal process for selecting implementation champions and defining their responsibilities in leading implementation efforts. In some cases, panel members assume it is their responsibility to do as much as they can to share results, especially within their own agencies or at TRB or AASHTO meetings. In other cases, TRB or FHWA staff takes the lead in disseminating research results or developing products that support implementation by the states. There is enough enthusiasm and respect for the NCHRP research process and what comes out of it that many individuals and organizations do already step up to lead implementation efforts. However, implementation is too important to be left to the enthusiasm of the staff and volunteers involved. There is a need to formalize the selection of

implementation champions and their leadership responsibilities to ensure that more (if not all) projects get attention. This means clarifying the roles of TRB staff, FHWA staff, project panelists, and the investigator.

These leadership roles will likely vary by project, depending on subject area addressed, the expected end users, and the breadth of expected implementation. Given the size and impact of most NCHRP projects, multiple individuals need to be involved in leading these efforts. However, there should be a few clearly selected champions who know it is their role to lead implementation and know what this leadership involves. For example, all involved should know who is shepherding the implementation, who is coordinating with the TRB and AASHTO committees, who is working at the state and local levels, and who is reaching out to industry or other stakeholders. Agencies should also have a process in place for replacing an implementation champion when an individual retires or accepts a new position.

The interviewees shared varying opinions about the roles of investigators in implementation. Some described how investigators had played important roles in developing products that supported implementation (such as manuals, software, or specification language) or in promoting research findings at conferences and committee meetings. Others expressed concern about involving investigators, citing potential conflicts of interest. NCHRP should clarify the desired role of investigators; how project panelists should engage the investigators (formally or informally) to assist with implementation, if desired; and the expected limits of their involvement.

Embed Implementation in the Research Process

Although NCHRP requires an implementation plan for research projects, many interviewees saw a need for NCHRP to embrace a culture of implementation. In other words, NCHRP should more formally embed implementation in the entire research process, from project and panel selection to the handling of interim results, to the distribution of findings. Below is an overview of opportunities for improvement in this area identified by the interviewees.

Fund Projects That are in Demand

Interviewees saw an opportunity to improve implementation simply by ensuring that the projects selected for funding address a pressing need. Agencies should be eager to receive the research results and be clear about how the findings will be used. It may be worth evaluating the balloting process to ensure that practical, high-priority projects are being selected.

Plan for Implementation

Another opportunity to ensure that the project has an objective that supports implementation arises once a project is selected. Several interviewees noted that the quality of the work plan influences the likelihood of applying the results. The investigator and panel members should anticipate how the results will be used and what potential roadblocks will prevent implementation. End user readiness to apply results (such as having the ability to buy software coming out of the project or having the necessary technical

understanding to lead implementation) should also be considered when selecting research approaches. Once again, this planning is officially expected within the research development process, but it is not always taking place to the extent that is needed.

Refine Selection of NCHRP Project Panelists

Many of the interviewees commented on the importance of carefully selecting project panelists as a way to lay the groundwork for effective implementation. Knowledgeable, motivated panelists are integral to the successful conduct of research but also important for their role in leading implementation efforts.

The interviewees complimented NCHRP on including AASHTO technical committee representatives and for involving those who developed the problem statements. However, interviewees suggested more deliberately including industry representatives and consultants, those with strong connections to end users, and those who can understand and help translate technical findings for practical use. The overarching theme, as described by the interviewees, is to bring together those who identified the problem or will use the results and those who will carry out and guide the research. This will lead to stronger research projects and will help build acceptance of the findings, both of which will improve implementation. As one interviewee noted, “The key to implementation success is the practicality of the recommendations. Some research requires a lot of data analysis that jurisdictions don’t have the time or access to do. NCHRP panels have to have research folks on them to make the data relevant.”

NCHRP might consider revisiting the process for selecting (or modifying) project panelists to ensure that each member of the panel has a clear role in leading and guiding the research as well as a clear role in leading or supporting implementation. Such process changes would also help ensure that additional practitioners or experts would be added to the panel if the scope of the research changes significantly midproject.

Speed the Delivery of Results

Several interviewees commented that the lengthy process for completing NCHRP research contributed to implementation challenges. With so much time passing between the problem statement submittal and final report publication, the findings may have lost relevance, and key champions for the research may have moved on. Several interviewees wanted to see the results distributed sooner, with interim updates on progress and findings made readily available. Some also commented that the formal process for updating AASHTO publications prevented users from accessing and applying results in a timely fashion. For example, one interviewee described how city officials in his state created their own design manual based unofficially on NCHRP research because AASHTO was taking so long to update the *Green Book*.

Produce Supplemental Products

Multiple interviewees expressed the need for additional products resulting from NCHRP research that will support implementation. This could be a specification, a test method, training, design guidance, or software—anything that could be picked up at a DOT level and put to use. Such tangible products are built into some NCHRP projects, especially those that feed into existing national guidance documents or

established work areas within DOTs. However, NCHRP has an opportunity to include supplemental products in more research projects and should consider what marketing materials, websites, guidance documents, reference sheets, or Excel tools will help states promote and use the findings within their agencies.

Track Implementation

It's hard to formalize implementation leadership roles and evaluate the effectiveness of implementation efforts without keeping track of implementation as it occurs. Many of the interviewees did not know the extent of implementation for the projects they were involved with or have a sense of the project implementation goals (beyond sharing the report). This, of course, relates to the ambiguity surrounding responsibility for implementation (NCHRP or the states). It is not possible or realistic for NCHRP to track all instances of implementation from research results, but there is an opportunity to establish broad goals with checkpoints to see progress toward those goals. One interviewee suggested involving FHWA resource centers in implementation tracking. Another suggested surveying the AASHTO committees that have submitted problem statements for information about adoption of the results. Another recommended asking states when they accept the report to explain how they will use the product in their own organization and what is needed for deployment.

Enhance and Formalize Implementation Mechanisms

As described by multiple interviewees, implementation related to projects in well-defined technical areas, such as bridge design and highway materials, is relatively straightforward. There are well-established channels (the AASHTO committees) for sharing research results, established guidance documents that the research feeds into, and established processes for inviting feedback while the research is still underway. NCHRP should look for opportunities to replicate or modify these implementation mechanisms in other areas of research. For each project, the panel should consider which stakeholders need to be involved (along with when and how), the existing policies or practices that will be affected by the research, and what channels (committees, national organizations, state organizations, etc.) can serve as the conduit for reaching end users with the new findings.

Multiple interviewees mentioned the need for improved coordination and collaboration with FHWA and AASHTO on implementation. Their involvement and support lend credibility to the findings, which supports implementation, and they often have relationships with end users that can be used to promote research results. In particular, interviewees mentioned the opportunity to coordinate more closely with FHWA resource centers on implementation.

Boost Communication Processes and Products

Overwhelmingly, the interviewees saw a critical role for NCHRP in disseminating research results and talked repeatedly about the need for NCHRP to enhance and expand the communication approaches used. They recognized the value of webinars for translating research results for practical use and wanted to see more of them. They also commented on the helpfulness of the existing communication products, such as

the *Impacts on Practice* series, which describes how states have applied specific research results. However, they wanted NCHRP to be much more aggressive about sharing findings through ongoing, targeted communication products.

Expand Dissemination Approaches

Below are some of the interviewees' suggestions for expanding the reach of NCHRP communication efforts:

- Make sure all resources are available electronically and integrated into online transportation library collections.
- Offer workshops to roll out results to states.
- Translate the results of the research into something practitioners can use.
- Promote relevant NCHRP research findings during TRB state visits.
- Build in a process for communicating with states (and fund it) that includes regional workshops and a PowerPoint that DOTs can use to communicate with other agencies.
- Identify lead states that implement first and then share results, leading to a second phase of trainings and webinars.
- Include presentations at the TRB annual meeting and other key meetings in any implementation strategy.
- Provide searchable electronic versions of research results.
- Create two-page summaries for every report. Send them to all DOTs and local agencies.
- Share project updates while the research is in progress, for example, via a two-page whitepaper that could be produced when a project is 75 percent complete.
- Create brief, hard-hitting communication products targeted at senior leadership. Make them a required part of projects.
- Provide a way to sign up for notifications when anything of significance happens for research in various areas of interest.
- Increase the use of AASHTO committee automated mailing lists to share information.

Use Targeted, Strategic Communications

Interviewees also shared ideas for making communication efforts more effective:

- Focus on getting the results to the right people, whether senior managers, DOT safety engineers, or city personnel.
- Be strategic when moving forward with outreach to optimize the investment. Don't spend money on a costly workshop in a location where it won't have the biggest impact.
- Plan upfront what you're trying to communicate before holding a webinar or producing a digest. Select the communication tool that will get the biggest bang for the buck.

- Make sure the research report uses plain English so that it can be easily understood by those who will use it. Translate the findings into summary form for senior decision makers.

Expand Implementation Resources

The interviewees also expressed the need for additional NCHRP resources to support effective implementation by the states. Even if the states are responsible for incorporating the findings into their practices, they are not always able to get the buy-in and resources they need to follow through. In some cases, they need training or other forms of technical assistance to be able to understand and apply the results. In other cases they cannot afford the AASHTO publications or tools that resulted from the research. Many interviewees said that resistance to change within DOTs is a significant obstacle to implementing study findings. Without demonstrations of the research being used by other states, it can be difficult to convince DOT managers of implementation feasibility and benefits.

NCHRP already funds some implementation projects that develop tools and guidance, demonstration projects with lead states, webinars to explain results, and other forms of technical assistance. However, there doesn't appear to be a formal mechanism for evaluating the need, and providing funding, for additional implementation resources on a project-by-project basis. Several interviewees pointed to models for implementation developed by the first and second Strategic Highway Research Programs, emphasizing the use of lead states, demonstration projects and partial financial assistance for state DOT implementation. In addition, the State Transportation Innovation Councils (<http://www.fhwa.dot.gov/publications/publicroads/13julaug/02.cfm>), a relatively new FHWA program that gives grants to states to implement innovations, may provide an implementation collaboration opportunity for NCHRP.

Several interviewees also said NCHRP should commit time and money to communicating research results via the expanded dissemination approaches suggested above. This funding could be built into the research project or handled separately. Such an investment could ease the reliance on volunteers to share the results, which makes it possible to have higher implementation expectations.

SUPPLEMENTARY DOCUMENTS

4-Page Folio: Implementing NCHRP Research

The four-page folio that follows provides an overview of the key project findings in three areas: elements of successful NCHRP project implementation, the roles of state and national leaders in implementing results, and the implementation activities that should be incorporated into each step of the project life cycle.

10 Implementation Case Studies: *Paths to Practice*

CTC & Associates developed 10 two-page case studies of selected NCHRP products highlighting a range of effective implementation approaches as discussed with this project's interviewees. These case studies follow the four-page folio.

IMPLEMENTING NCHRP RESEARCH

Proven Practices, Avenues for Improvement

A 2012 SURVEY OF MORE THAN 500 NCHRP PROJECT PANEL MEMBERS AND INVESTIGATORS SHOWED THAT research results from this state-driven program are being used extensively to improve practice around the country. However, there is still room for improvement in how results are shared and applied. To better understand the structures and processes that have led to current successes and opportunities to further stimulate the implementation of results, NCHRP conducted in-depth interviews with a cross section of more than 60 project panel members; TRB, AASHTO, and FHWA leaders; and state DOT research directors. This folio presents the high-level findings from NCHRP 20-44(P), Evaluating Implementation of NCHRP Products. The final report is available online, along with 10 *Paths to Practice* case studies that highlight a range of successful approaches to putting NCHRP research to use.



Elements of Successful Implementation



Implementation leaders have clear roles

Effective implementation of NCHRP research results requires strong leadership by designated individuals at the national and state levels. The roles and responsibilities for these leaders need to be clear, and their efforts need to be tracked and supported.

See pages 2 and 3 for a description of the implementation leadership provided by TRB staff, AASHTO committee members, NCHRP project panelists, FHWA technical experts, and state DOT practitioners.



Research products are ready to use

Research results are not always “field ready,” or easily understood and applied, without additional assistance. Implementable deliverables go beyond final reports to include demonstration software, websites, policy guidance, and training manuals.

The project investigator provides some of these products, but the project panel members and implementation leaders from TRB, FHWA, and AASHTO must provide additional support and guidance to make these products possible.



Research users are consulted before, during, and after the project

The interviewees for this project repeatedly mentioned the importance of getting support for implementation from the beginning of the project. Support needs to come from those who will lead the implementation efforts, those who will be affected by the research, and those who will provide the channels for presenting the findings.

This means communicating the project goals and interim results to stakeholders in an understandable way, gaining and leveraging the support of AASHTO and FHWA for upcoming changes, and addressing stakeholder concerns before the project is complete.



Institutional structures support rapid dissemination and assimilation of results

It's not enough to produce a tool or specification. The research results need to be distributed broadly to those who can use them. The committees, task forces, and working groups of TRB, FHWA, and AASHTO provide critical channels for disseminating the results to end users and offering technical support and guidance for effective application.

State DOT technical teams and oversight committees also play key roles in facilitating implementation, initiating changes to policy and practice documents, and partnering with industry and universities to train staff on new approaches and techniques.

IMPLEMENTATION LEADERS PUT RESULTS INTO PRACTICE

NO SINGLE PERSON OR ORGANIZATION IS SOLELY responsible for implementing the results of an NCHRP research project. Instead, putting results into practice requires an extensive, coordinated effort by national and state leaders. Identifying these implementation champions, assigning them clear responsibilities, and tracking their implementation efforts as they unfold will encourage wider use of NCHRP research findings.

NCHRP Project Panelists



Since no national standards existed for using flowable fill, NCHRP panel members led efforts to customize their state specifications using NCHRP research results.

Every NCHRP project is guided by a panel of individuals nominated to serve because of their subject area expertise and their ability to provide effective project guidance. Volunteer panelists from state DOTs, universities, and industry provide crucial connections to the organizations and individuals who will benefit from the research. Because of their strong ties to end users, the project panelists are expected to take on prominent leadership roles in implementation, including:

- Help scope the research project to address a pressing need; the results are more likely to be used.
- Incorporate implementation planning in the project scope.

- Require an implementation plan from the project investigator.
- Invite stakeholder feedback on the project scope, research progress, and preliminary deliverables—and suggest changes as needed to address potential implementation roadblocks.
- Present project findings and implementation opportunities to peers around the country.
- Help customize the research products to encourage implementation.
- Lead implementation efforts within their own departments, regionally and among local transportation agencies.
- Participate in pilot implementation projects and share their experiences with other agencies.

State DOT Practitioners



Traffic engineers at the Missouri DOT are leading implementation of the J-turn intersection, an innovative median treatment highlighted in NCHRP Report 650.

NCHRP is the states' research program, funded by state DOTs and designed to respond to the significant transportation challenges identified by them. As the front line in designing, building, operating, and maintaining the transportation system, state DOTs are ultimately responsible for making changes to practice that are prompted by NCHRP research results. DOT managers and staff should lead implementation activities in a variety of ways:

- Participate in AASHTO committees that propose and prioritize research projects, focusing on those that states will be eager and ready to implement.
- Serve on NCHRP project panels, guiding both the research and implementation.

- Distribute and promote research results to practitioners at the state and local levels.
- Customize the findings and products from NCHRP projects for application within their own agencies and states. Develop guidance documents, conduct follow-up state research, and lead pilot implementation projects.
- Monitor the progress and outcomes of NCHRP projects across topic areas. Prepare to make state practice and policy changes based on the research findings.
- Initiate implementation projects through State Transportation Innovation Councils using competitive funding available through FHWA.

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 on most 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 state 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 to practice among state DOT practitioners 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 State Transportation Innovation Council Incentive Program.

AASHTO Committee Members



NCHRP research informs many AASHTO products, from guidance on snow and ice control materials to AASHTOWare Bridge Management software.

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 at their agencies, have the technical expertise to oversee the research, and often make the final recommendation 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 websites 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 related 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 assistance. 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 educate 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 steps that NCHRP implementation leaders have taken to apply research results.

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



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