

RESEARCH IMPLEMENTATION WHITE PAPER AASHTO COMMITTEE ON MAINTENANCE

(Latest Update: May 16, 2018)

Purpose:

The purpose of this research implementation white paper is to assist AASHTO Committee on Maintenance members and its partners with implementing maintenance related research results proposed by the Committee on Maintenance and/or proposed by and performed by its partners.

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Implementation Efforts During Ongoing Research:

Implementation of research should be considered and facilitated throughout the life of a maintenance research project, beginning with the initial proposal and continuing after research is complete. As a research project progresses, the research team and/or sponsor of the research should update the initial implementation concept based upon early research findings, recommendations, and continuous input from those who will present the findings and lead the implementation efforts. FYI on the following suggested implementation efforts:

- Require research project investigators to develop a Research Implementation Plan as part of the research project. Example actions from a simple research implementation plan are presented in the “Example Actions to Facilitate Implementation” section at the end of this document.
- A more formal Research Implementation Plan reviewed and approved by the State DOT or other implementation partners could discuss / address example items as follows: detailed goals, budget, completion date, implementation leaders, department, unit, personnel, identify whether the expected research results need to be field tested, determine how the expected results will be used, findings, benefits, target audience, influence agents, barriers, mitigation, tracking measures, identified resources, and proposed activities for implementation etc.
- Identify research implementation leaders through peer-to-peer communication and work with appropriate partners willing to evaluate and lead efforts within their own departments, regionally, and among local transportation agencies to implement results.
- Identify target audiences based on management level and area of interest, seek feedback on the research implementation plan and make changes as needed to address potential barriers, make plans to address them, and tailor implementation-ready products and encouragement accordingly.

- Acceptance of the research results is key to implementation by owners, especially if considered, adopted, and supported by the Committee on Maintenance and other applicable AASHTO Technical Committees.
- Project investigators typically provide some type of initial implementation products but the research team and/or sponsor of the research may also have to provide additional support and guidance to make the research implementation products possible.
- The research team and/or sponsor of the research should be willing to assist with disseminating research results, value, and other steps for successful implementation. They should also be willing to indicate a clear plan for the transfer of research deliverables (i.e. equipment, training materials, reports, manuals, webinars, etc.).
- One key barrier to implementing research is proprietary / non-open solutions. Research recommendations should be non-proprietary and support open system/source concepts if possible. Research results should focus on being “field ready”, or easily understood and implemented without the need for additional development.
- Ongoing research projects should be added to the Transportation Research Board’s (TRB) Research in Progress (RiP) database to let others know about active research projects. <https://rip.trb.org/>

Research Implementation Partners:

The research team and/or sponsor of the research should reach out to partners who have a vested interest with the respective research results/process/technology. Partners could include but are not limited to: State DOT / Research Development & Technology Program Managers (whether individually or through pooled-fund studies); Local Highway Agencies; Local and Tribal Technology Transfer (T2) Centers; Federal Highway Administration (FHWA) (Center for Accelerating Innovation, Turner Fairbanks Highway Research Center, National Highway Institute, Resource Center, and Division Offices); Industry Organizations; Universities; AASHTO Technical Committees; TRB; National Cooperative Highway Research Program (NCHRP); and the American Society of Civil Engineers (ASCE) etc.

In addition, the following stakeholders may also be used to provide critical channels for disseminating research results to end users and who in turn could offer technical support and guidance for effective application and training on new approaches and techniques: Technical Working Groups; State DOT technical teams; State DOT Maintenance Engineers; oversight committees; user liaison groups; industry representatives; university researchers; and research implementation task forces.

Types of NCHRP/TRB Publications & Activities:

Once an NCHRP research project is complete, it will generally be published as an NCHRP document. Work with NCHRP 20-44 “Moving Research into Practice” panel members to explore alternative research implementation funding assistance applications and commit to follow through and track results. <http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=588>

Only work performed under NCHRP can be published as an NCHRP document. Such publication is made after a thorough review and approval process in accordance with the National Academies’ guidelines.

NCHRP/TRB Publications

- NCHRP Implementation Support Program: AASHTO’s Special Committee on Research and Innovation annually allocates NCHRP funds to support efforts to implement NCHRP results. These funds are available to NCHRP project panels, State DOTs and AASHTO

committees who need resources to support implementation of NCHRP products.

<http://www.trb.org/NCHRP/NCHRPImplementationSupportProgram.aspx>

- Implementation and services related to NCHRP projects include: demonstration or pilot projects in a host agency; workshops or peer exchanges; training; flyers, brochures, or videos for specific target audiences; and briefing materials for senior management.
- **NCHRP Synthesis Program:** This synthesis series reports on current knowledge and practice, in a compact format, without the detailed directions usually found in handbooks or manuals. Each synthesis in the series provides a compendium of the best knowledge available on those measures found to be the most successful in resolving specific problems. <http://www.trb.org/SynthesisPrograms/SynthesesNCHRP.aspx>
- **Transportation Research International Documentation (TRID):** When research products, reports and other documents are complete, they are entered in TRID (the TRIS and ITRD database) for wider distribution. This is the international transportation research database maintained by TRB. <https://trid.trb.org/>
- **National Academies of Sciences, Engineering, and Medicine (NASEM) TRB Weekly E-Newsletter:** Many research implementation practitioners find that the NASEM TRB weekly E-Newsletter is a great way to learn about NCHRP studies and some FHWA and State DOT research results. <http://www.trb.org/Publications/PubsTRBENewsletter.aspx>
- **TRB Annual Meeting Papers:** TRB received more than 6,000 papers for the 2018 Annual Meeting. Approximately 20% of papers were published in the Transportation Research Record and approximately 60% were accepted for presentation at the TRB Annual Meeting. Paper submission is open from June 1 through August 1. Information on the requirements for submitting papers to TRB for presentation at the Annual Meeting is found on their website. <http://onlinepubs.trb.org/onlinepubs/AM/InfoForAuthors.pdf>
- **Transportation Research Record:** TRR is published throughout the year, and consists of a collection of papers on specific transportation modes and subject areas. <http://www.trb.org/Publications/PubsTRRJournal.aspx>
- **“Evaluating Implementation of NCHRP Products: Building on Successful Practices”** Final Report (NCHRP Project 20-44(P)) is useful for assisting with implementation efforts, especially Section 1 “Elements of Implementation Success”. (See pages 8 -14) http://onlinepubs.trb.org/onlinepubs/nchrp/docs/Evaluating_Implementation_of_NCHRP.pdf
- **Research Results Digest:** RRD is used to promote early awareness of project results to encourage implementation. RRDs also summarize specific findings that emphasize how research may be used. The contents are typically organized in terms of the problem, the solution, the findings, and the applications. RRDs generally run 4–32 printed pages. <http://www.trb.org/Publications/PubsNCHRPResearchResultsDigestsAll.aspx>
- **Web-only Documents:** Web-only documents are fully searchable PDFs of contractor-prepared research reports or supporting appendix materials. Web-only documents are typically linked to other research project related products, as well as to the relevant project write-ups. All reports should be 508 compliant, web searchable, and web accessible. <http://www.trb.org/Publications/PubsNCHRPWebOnlyDocuments.aspx>
- **Impacts on Practice:** NCHRP uses Impacts on Practice to showcase the value of NCHRP research in a series of successful brief case studies which highlight how transportation agencies have put critical NCHRP research results to use nationwide. <http://www.trb.org/NCHRP/NCHRPImpactsonPractice.aspx>
- **Paths to Practice:** TRB’s NCHRP Paths to Practice explores how the TRB webinar program helps advance NCHRP research. This program is the go-to resource for

transportation professionals who want to stay informed about the latest research results and get ideas on how to implement them without leaving their desks. NCHRP produces approximately 30 webinars per year. <http://www.trb.org/Main/Blurbs/177019.aspx>

- Ready Results: Briefs on select NCHRP reports that summarize the research and provide practical next steps for implementation are found here. <http://www.trb.org/Main/Blurbs.aspx?fields=PublicationType|NCHRPReadyResults>
- Research Topic Highlights: Shares research summaries within specific topic areas. <http://www.trb.org/Main/Blurbs.aspx?fields=PublicationType%7CNCHRPResearchTopicHighlights>

NCHRP/TRB Activities

- TRB also has an extensive webinar program in which various committees help to disseminate research results through its webinars. <https://webinar.mytrb.org/Webinars>

Types of AASHTO Publications & Activities:

AASHTO Publications

- AASHTO Documents: The research team and/or sponsor of the research may also choose to advance the document to an AASHTO publication as standards, methods, specifications, guidebooks, and/or manuals. Early planning is encouraged to incorporate NCHRP project findings into AASHTO documents. As such, research results can be formally adopted through the AASHTO process but cannot be posted concurrently on TRBs website. In addition to publishing research results as an AASHTO document, there is value in coordinating with the AASHTO Special Committee on Research and Innovation (R&I).
 - The research team and/or sponsor of the research can also present the project at an annual Committee on Maintenance meeting and request a vote to move forward with publication as an AASHTO document. They can then work with the committee Research Coordinator, TWG leadership and AASHTO staff to begin the process. If the research document is published as an AASHTO document, the TWG will be the “owner” of the document and will be responsible for future updates. <https://maintenance.transportation.org/>
 - AASHTO specifications and guidelines could be developed for testing and documenting material quality and performance based on research results. Subcommittees could also be developed to prepare recommended standards for products and applications to be published as AASHTO specifications and guidelines.
- AASHTO Innovative Initiative: AASHTO’s Innovative Initiative provides another opportunity to assist with research project implementation efforts. Quite a few states contribute funds to this program and the resources are used to help market implementable research, technologies, and innovations that benefit State DOTs. <http://aii.transportation.org/Pages/default.aspx>
 - The AASHTO Innovative Initiative is also working on developing a flow path diagram that will help research practitioners think through how they might pursue development and implementation of new technologies/products. It’s envisioned that the flow path document will help people assess the Technology Readiness Level of their product and what might be the most appropriate programs to support development, marketing, and implementation needs.

AASHTO Activities

- AASHTO's Special Committee on Research and Innovation and TRB staff are looking at ways to improve implementation of NCHRP-funded research. TRB staff are in the process of developing a guidance regarding implementation planning – including developing a research implementation plan template – for NCHRP panels. The Implementation Coordinator for the program is Sid Mohan (smohan@nas.edu, (202) 334-1249).
 - Resources for Research Managers / Implementers on the AASHTO Special Committee on Research and Innovation website includes: Calendars, Communicating Results and Value, Legislation and Regulations, Meetings, Reporting / Technology Transfer, Research Program and Project Management, and State DOT Research. <https://research.transportation.org/resources-for-research-managers/>
 - The AASHTO Special Committee on Research and Innovation also has another website hosting popular Q&As which may be useful: Where can I find...? How can I use SPR funds? How can I use the RAC Listserv? How does NCHRP work? What are the other research programs at TRB? <https://research.transportation.org/faq/>
- AASHTO Technical Service Programs are also helpful in assisting with research implementation efforts.
 - Snow and Ice Pooled Fund Cooperative Program (SICOP) - Winter Maintenance: <https://sicop.transportation.org>
 - Equipment Management: <https://www.emtsp.org>
 - Transportation System Preservation (TSP2): <https://www.tsp2.org>
 - Additional TSP's: <https://www.transportation.org/technical-service-programs/>

Types of FHWA Publications & Activities:

FHWA Publications

- Center for Accelerating Innovation: Through the Center for Accelerating Innovation, FHWA makes resources available such as Newsletters (Every Day Counts News, Innovator), and Multimedia (Videos, Publications, Presentations, On-Demand Webinars). <https://www.fhwa.dot.gov/innovation/resources/>
- FHWA Research Library: The FHWA Research Library is an integral part of FHWA's research, development, and technology transfer activities and offers to ease workloads, reduce costs, and expand research capabilities. <https://www.fhwa.dot.gov/research/library/>
- USDOT National Transportation Library: USDOT National Transportation Library, Repository & Open Science Access Portal (ROSA P): The idea behind ROSA P is to comply with the USDOT Plan to Increase Public Access to the Results of Federally-Funded Scientific Research results. For ROSA P's website on how to "Submit Content" see: <https://rosap.ntl.bts.gov/submitContent>
- FHWA Research List of Periodicals: FHWA's Research List of Periodicals lists nine periodicals which can help get the word out on research results. (Public Roads Magazine, Focus, Transportation Operations Research and Development Update, Nondestructive Evaluation Center Newsletter, Research & Technology Transporter, Long Term Pavement Performance Newsletter, FHWA Research & Technology Now, Long-Term Bridge Performance Newsletter, and the Analysis, Modeling, and Simulation Biannual Update) <https://www.fhwa.dot.gov/research/publications/periodicals.cfm>

FHWA Activities

- FHWA's Center for Accelerating Innovation also assists with developing and implementing resources related to several program areas such as: Other Programs (Every Day Counts, State Transportation Innovation Councils Incentive, Accelerated Innovation Deployment Demonstrations, and Increased Federal-share for Project-level Innovation) and Other Programs (Partner Program, Highways for Life).
<https://www.fhwa.dot.gov/innovation/> & <https://www.fhwa.dot.gov/innovation/resources/>
- Every Day Counts (EDC): This is a window of opportunity every two years for states to get their solutions and products included in future rounds.
<https://www.fhwa.dot.gov/innovation/everydaycounts/>
<https://www.fhwa.dot.gov/innovation/everydaycounts/contacts.cfm>
- State Transportation Innovation Councils (STIC): Through the Center for Accelerating Innovation, resources are made available to STIC's to encourage implementation of innovative practices. <https://www.fhwa.dot.gov/innovation/stic/guidance.cfm>
- Accelerated Innovation Deployment (AID): The AID Demo program provides funding as an incentive for eligible entities to accelerate the implementation and adoption of innovation in highway transportation. <https://www.fhwa.dot.gov/innovation/grants/>
- SHRP2 Solutions – Implementation Assistance Program: A range of opportunities is available to raise awareness of SHRP2 Solutions and to encourage early adoption of these products. <https://www.fhwa.dot.gov/goshrp2/ImplementationAssistance>
- State Planning and Research Part II (SPR2) Work Program: Implementation of research may also be possible through the SPR2 Work Program. The SPR program was set up by FHWA to help State DOTs implement promising research results emanating from federal, regional, or state research and technology transfer activities. SPR2 funds may be used to finance demonstration projects to advance product implementation.
<https://www.fhwa.dot.gov/research/about/fast/qanda.cfm>

Types of State DOT Publications & Activities:

State DOT Publications

- Research project results can also be disseminated through State DOT internal newsletters and video communications to share innovations and ideas that save time, money, and/or provide a safer environment for its employees. A mix of items highlighted on over 50 State DOT websites include: websites, publications, subscribe, subscriptions, RSS feed, newsletter, blog, listserv, STIC Program, catalog, active research, completed research, and archives. <https://research.transportation.org/state-dot-research/>

State DOT Activities

- Google has a State DOT Search Engine which can also be used to search for research implementation activities/ideas at the State DOT level.
<https://cse.google.com/cse/publicurl?cx=006511338351663161139:cnk1qdck0dc>
- State DOT Peer reviews can be used to gauge technical presentations and publications at NHI Courses with the use of critique sheets to provide feedback and applicability of guidelines and suggestions for improvement.
- State DOT Research Close Out Surveys can also be utilized to gather data for completeness of research project information and assist with moving ahead with research results.
- State DOTs could also open their research program to local agencies, districts, and maintenance personnel for solicitation of research proposals. Once funded and results are obtained, project sponsors are excited to implement the results because they are the

ones who recommended the project. These projects are typically process improvement ideas resulting in implementation as the research is taking place.

Types of Miscellaneous Publications & Activities:

Miscellaneous Publications

- American Society of Civil Engineers (ASCE) Publications: ASCE hosts national and regional conferences and publishes peer-reviewed journals. You can also pursue getting research results posted to the ASCE Library. Possible resources may include Manuals of Practice, Standards, and Technical Reports. Communication with ASCE must be done early on during the research phase to facilitate meeting their requirements for publication. <https://ascelibrary.org/>
- Long-Term Pooled-Fund Studies: Some topic areas have long-term pooled-fund studies (i.e., Aurora, Clear Roads for road weather and winter maintenance, respectively) which are good to work with to help identify agencies most likely to embrace new research results. <http://www.pooledfund.org/>
- Communication Briefing Materials: The research team and/or sponsor of the research can develop a range of communication briefing materials to promote research findings and educate end users through: flyers, reference sheets, brochures, computer programs and tools, websites, national policy guidance, specification language, training materials and manuals, magazine articles, or videos for appropriate audiences and for senior management.
 - As related to computer programs and tools, these should be developed as open-source software, ie. non-proprietary, as this would allow the end-user to inspect, modify, and/or enhance the software as desired without restriction.

Miscellaneous Activities

- Implementation activities could include making presentations, posters, or exhibits on research results at relevant Regional and State DOT meetings and conferences, workshops, webinars, training classes, focus groups, or peer exchanges.
- The research team and/or sponsor of the research could identify State DOTs, manufacturers, consultants, and contractors that are willing to facilitate implementation or pilot the research results.
- Finally, research results may also be showcased or demonstrated to provide hands on experience and knowledge.

Types of Social Media Activities:

Social Media Activities

- It's recognized that there is a gap between research and subsequent implementation of research recommendations. Merely reading a research report rarely leads to implementation of recommendations. Active, effective dissemination of recommendations to end users is essential for optimizing implementation. Focus group discussions and surveys/interviews of the target audiences may provide valuable input to refine social media use in getting the word out.
- It's one thing to publish a report or document, and it's another to ensure that people see that it's out there, let alone read it. In this day of "information overload", it's easy for good results to get lost in the noise. Implementation practitioners do a good job talking about partnering with others, presenting at conferences, etc., but must also explore other ways such as social media to get the word out.

- Using Social Media to Enhance Your Research Activities: See link for information on this topic: Introduction; What can the social web provide; Engaging with one's peers using Twitter; Enhancing impact and maximizing dissemination; Enhancing awareness of one's research activities; Developing one's professional network; Understanding and Addressing barriers; and Conclusions. http://opus.bath.ac.uk/35624/2/sra_2013.pdf

Example Actions to Facilitate Implementation:

- Publication of the project report on a TRB website
- Publication as an AASHTO guide document
- Presentation at an annual meeting of the appropriate AASHTO Committee, TRB Committee, and/or TSP2 regional partnership
- Presentation during an advertised webinar through TRB, AASHTO Committees, and/or with professional organizations to share the results of the project report with owners

Conclusion:

Putting research results, findings, or suggestions into practice requires an extensive, coordinated effort by national, state and local leaders. To foster wider use of research findings, the research team and/or sponsor must identify implementation champions, assign clear responsibilities, and track implementation efforts. Implementation of successful research results is more than just publishing a report. You need champions and resources to help move it into production. The AASHTO Committee on Maintenance and its partners are a great group of people who are willing to learn and explore using new processes and procedures to improve safety and efficiency of highway and bridge maintenance. **It is people, who have helped deploy research implementation items in the past and it is people who will continue to do so in the future.**