Research and Technology Coordinating Committee Letter Report: March 2014

DETAILS

0 pages | 8.5 x 11 | PAPERBACK

ISBN 978-0-309-43419-5 | DOI 10.17226/22538

AUTHORS

Research and Technology Coordinating Committee

TRB TRANSPORTATION RESEARCH BOARD
OF THE NATIONAL ACADEMIES

March 24, 2014

Mr. Victor M. Mendez
Administrator
Federal Highway Administration
U.S. Department of Transportation
1200 New Jersey Avenue, SE
HOA-1, Room 887-314
Washington, DC 20590-9898

Dear Administrator Mendez:

On January 28 and 29, 2014, the Research and Technology Coordinating Committee (RTCC) met with the Federal Highway Administration's (FHWA's) Research, Development, and Technology (RD&T) staff at the Beckman Center in Irvine, California. The roster of the committee, which indicates the members in attendance, is included in Attachment 1. RTCC's charge is to monitor and review FHWA's research and technology activities and advise FHWA on (*a*) the setting of a research agenda and coordination of highway research with states, universities, and other partners; (*b*) strategies for accelerating the deployment and adoption of innovation; and (*c*) areas in which research may be needed. At this meeting, FHWA staff sought guidance on how well they are managing and implementing the RD&T elements of the current surface authorization bill, the Moving Ahead for Progress in the 21st Century Act (MAP-21). Although MAP-21 reduced total RD&T funding, the absence of earmarks and narrowly designated areas of research in the act has given FHWA considerably more flexibility in allocating funds across RD&T areas and in funding specific initiatives than the administration had under previous authorizations. The meeting focused on the processes that FHWA has put in place to set RD&T priorities given this new flexibility.

The committee developed the content of this letter report in closed-session deliberations and subsequent correspondence. The letter report was then subject to the National Research Council's peer-review process. The first section of the letter report summarizes the committee's findings and recommendations. The second section addresses the background of FHWA's discretionary funding and recent experience with this committee. The third section summarizes the presentations made at the meeting, and the fourth provides the committee's findings and recommendations.

The assessment and recommendations of this report represent the committee's best collective judgment on the basis of the information provided and discussed at the meeting. I would like to thank the FHWA staff for their productive presentations and the subsequent discussions during our meeting, both of which informed the development of this report

SUMMARY

The passage of MAP-21 in 2012 gave FHWA, for the first time in many years, (*a*) almost complete discretion in setting priorities for its RD&T funding and (*b*) a dedicated source of funds for implementation. The meeting gave FHWA staff an opportunity to present for review the processes that they have set in place for choosing both research areas to fund and research products and deployment strategies for delivering innovations to the field. The committee's findings and recommendations (in bold) are as follows:

1. FHWA has taken strong first steps toward managing discretionary funding. For example, the administration has significantly increased funds for strategic initiatives and has also focused much more on delivering innovative programs than it did under SAFETEA-LU.

THE NATIONAL ACADEMIES
Advisers to the Nation on Science, Engineering, and Medicine

500 Fifth Street, NW
Washington, DC 20001

Phone: (202) 334-2934
Fax: (202) 334-2003
www.TRB.org

2. State departments of transportation (DOTs) are primary customers of the products of FHWA's RD&T programs. Staff in FHWA field offices are very familiar with the issues the state DOTs are facing. These staff could be better utilized to communicate the states' priorities to FHWA and to explain the FHWA RD&T program and priorities to the states. **FHWA should continue to improve its utilization of field office staff, both to improve RD&T implementation and to strengthen two-way communication with the states.**

3. The FHWA RD&T program staff made effective presentations on RD&T activities in structures, pavements, safety, and operations. In presentations to stakeholder groups about research development and discussion, **RD&T staff should also be addressing FHWA's activities and priorities in planning, policy, and the environment and highlighting the recent increases in funding for these areas.**

4. FHWA has an applied research program, and the administration is putting in place processes for more effective translation of research into implementable products. However, FHWA appears to be expecting that the success rate from of its RD&T program that may exceed that of private industry. This implies that FHWA may be putting too much emphasis on making incremental gains and may be missing opportunities for larger-scale gains through more fundamental and higher-risk research. **FHWA should evaluate whether it is placing too much emphasis on developing products for near-term application and possibly missing opportunities for larger gains over the long term.**

5. FHWA staff provided good examples of successes in program management as well as the potential benefits of the RD&T the administration is investing in. FHWA would benefit from **developing clear, concise, and compelling descriptions of its program management and the value of the RD&T program.**

BACKGROUND

For many years FHWA had little, if any, flexibility in allocating RD&T resources to administration and customer priorities. The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), the surface transportation authorization bill passed in 2006, gave FHWA little or no discretion in selecting areas for research, and Congress did not set aside funds for technology transfer. In fact, Congress earmarked and designated significantly more funds for specific research programs than it authorized FHWA to spend. In SAFETEA-LU, Congress described $234.8 million in designated and earmarked research programs but authorized only $196.4 million in spending. The result was several mandated but unfunded and underfunded RD&T program areas, including policy, safety, and operations, among others. The subsequent technical corrections to the bill eased the overdesignation and overearmarking by reallocating funds for the second Strategic Highway Research Program (SHRP 2) to Title 1, thereby increasing the federal RD&T funds available for other authorized programs. The temporary extensions of SAFETEA-LU gave the U.S. DOT the flexibility to discontinue funding for earmarks deemed "sufficiently funded" to achieve their original purpose, but that funding was still to be used within the same major research program area. FHWA determined that all earmarks were sufficiently funded in 2011 and 2012, meaning that the administration experienced additional marginal gains in discretion during this period.

In contrast, the increase in flexible funding under MAP-21 was dramatic, as shown in Figure 1. FHWA's discretion in setting priorities for RD&T increased from roughly $43 million in FY 2012 to $150 million in FY 2013.

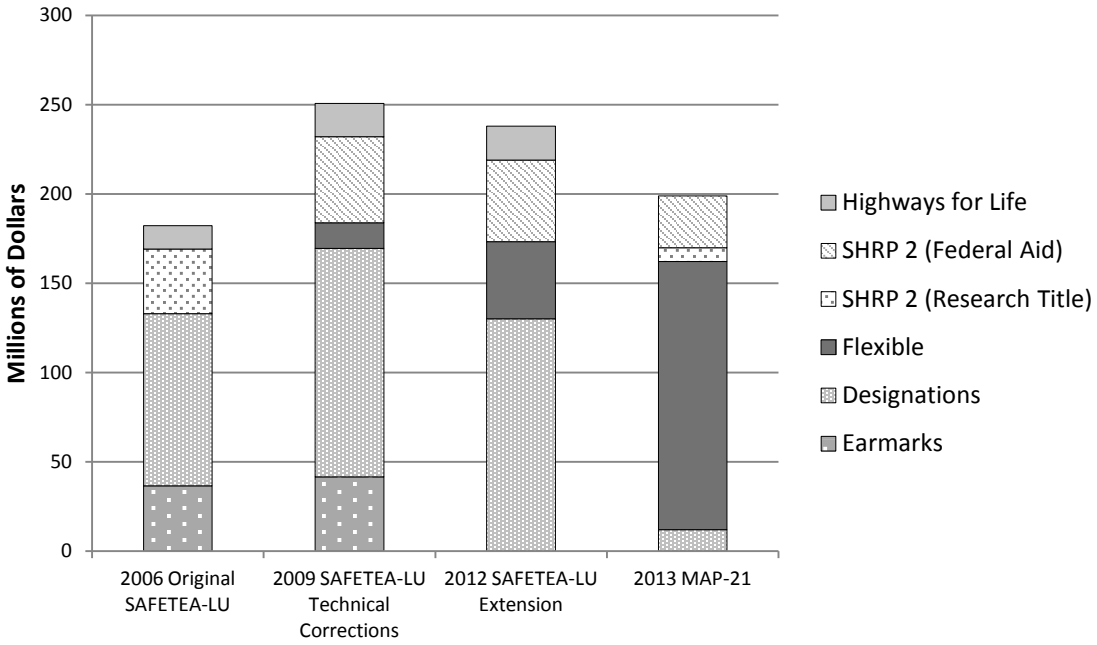


FIGURE 1 Increase in flexible funding under MAP-21.

SUMMARY OF MEETING PRESENTATIONS

Overview

Michael Trentacoste, Associate Administrator for FHWA RD&T, began the meeting with an overview of the process improvements and changes in focus areas of FHWA's RD&T program since the previous committee meeting. FHWA's RD&T program has been focusing on implementation of the administration's technology research, much of which is occurring through the Every Day Counts initiative and through early implementation of products from SHRP 2, as described below. Staff are working to better communicate the value of the RD&T program; their efforts will be facilitated by the measurement and evaluation program FHWA is putting in place as a result of both MAP-21 requirements and previous committee recommendations. Trentacoste also highlighted the increased coordination with international research organizations, particularly the Forum of European National Highway Research Laboratories (FEHRL) and other European agencies.

Background

Jack Jernigan, Team Director for the RD&T Program Development and Partnership Team, provided an overview of the recent history of the RD&T program, including descriptions of the changes in funding flexibility. As shown in Figure 1 above, the increases in flexibility since the original SAFETEA-LU bill are substantial and welcome. Even though the total amount of RD&T funds that MAP-21 provides to FHWA is reduced as compared with SAFETEA-LU, MAP-21 gives FHWA much more discretion in setting priorities.

University Transportation Centers

In response to the committee's request for a status report on the University Transportation Centers (UTC) program under MAP-21, Debra Elston, Director of Program Management for FHWA RD&T, described the changes that have occurred in the program over the past 25 years. The UTC program began in 1987 as a $10 million program with 10 regional centers; the latest authorization of funds for the program in MAP-21 provides $70 million annually for 35 centers. As a result of a reorganization required by FY 2014 appropriations, the UTC program is currently managed by the Office of the Assistant Secretary for Research and Technology. The program is funded through FHWA by the Highway Trust Fund. Notably,

all centers are now chosen through a competitive grant selection process that is transparent and reported to Congress. FHWA's RD&T agenda provides a platform for programmatic coordination with the UTCs that encourages both basic and advanced research in university settings.

Research Deployment Initiatives

The Center for Accelerating Innovation at FHWA works to accelerate adoption of innovative technologies in all aspects of highway transportation. Hari Kalla, who leads the center, discussed the efforts FHWA has undertaken to deploy the results of research. Highways for Life, a program authorized under SAFETEA-LU, has provided incentives for demonstrating innovative technologies and practices, distributing $75 million in demonstration grants to 78 projects throughout the country. The Every Day Counts initiative, in its second iteration and gearing up for a third, has also been central to this effort, with every state transportation administration applying at least one of the innovations. Kalla depicted the partnerships required between state DOTs, FHWA, and other stakeholders in chart shown in Figure 2.

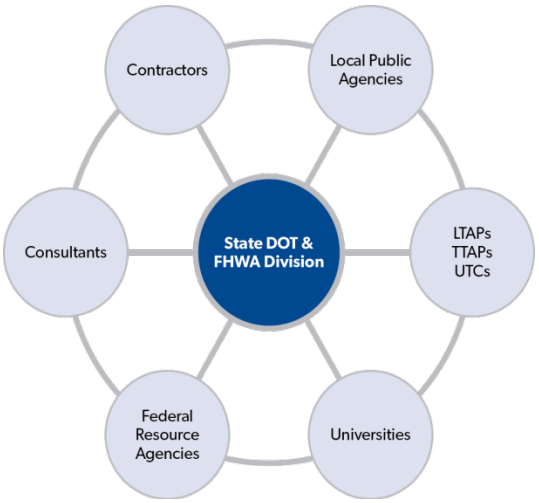


FIGURE 2 Partnerships between state DOTs, FHWA, and other stakeholders (LTAP = local technical assistance program; TTAP = Tribal Technical Assistance Program).

RD&T Agenda Setting

FHWA's RD&T website (https://www.fhwa.dot.gov/research/tfhrc/offices/) serves as a supplement to the stakeholder outreach done by program and RD&T staff. The website describes each office's objectives and strategies along with activities that illustrate how the RD&T agenda is stimulating new practices and policies. John Moulden, the National Partnership Program Manager for FHWA's RD&T program, explained to the committee that the site is organized around FHWA's strategic RD&T objectives and presents the major national-level RD&T challenges facing the United States; he also discussed how FHWA is addressing each of those challenges. The site is intended to facilitate communication with all stakeholders and allows anyone to see the current activities and objectives of FHWA's research program.

Research Program Evaluation

FHWA staff and the RTCC have been in discussion over several meetings about research program benchmarking and research program evaluation. At a previous meeting, FHWA staff had discussed options for program evaluation that the RTCC perceived as premature given the cost and complexity of carrying out a comprehensive program evaluation. At this meeting, staff proposed a sensible first step toward program evaluation: each of the offices managing research will select two projects for evaluation – one prospective and one retrospective. FHWA's RD&T staff will then assist the offices in developing project research evaluation plans for each project. The offices managing the research will subsequently evaluate the projects. The RTCC believes this is an appropriate first step to take and looks forward to the results. The members also volunteered to assist FHWA in reviewing the project evaluation plans.

FINDINGS AND RECOMMENDATIONS

Improved Management of FHWA's RD&T Program

The committee commends FHWA for its recognition of the importance of an effective management structure and strategy in exercising its new discretion over RD&T resources; the committee also commends the tremendous steps that FHWA has taken to be responsible with this discretion. Management of the RD&T program has improved substantially in the past few years. The priority-setting process for discretionary spending developed by the administration since the passage of MAP-21 is good, although it may take time before an assessment can demonstrate the viability and productivity of the selection process. Some of the actions taken so far include setting up an administration-wide team of top executives to set priorities. A guaranteed stream of base funding has been provided to the various program areas, and additional funding is available on a competitive basis. The administration's decision to increase the funding share for strategic initiatives selected by this RD&T management team by nearly fivefold while providing smaller shares to the program offices indicates that it is making hard choices about priorities. As described to the committee, FHWA also has established and implemented an overall framework for performance management and program evaluation. This framework is based in part on previous RTCC recommendations, and the committee appreciates FHWA's follow-up on those recommendations.

State DOTs

The division offices and administrators are an important but underutilized resource for FHWA. The state DOTs are the primary customers of FHWA's RD&T programs. The administration's division offices could be doing more to work with the states on implementing innovative products and methods and on publicizing the positive effects of this implementation. The field staff often do not fully understand the role of the federal RD&T staff and have competing responsibilities; conversely, the federal staff in Washington headquarters may not understand or appreciate the challenges facing each of the individual states as well as the field staff do. The committee is pleased to see that the administration is aware of this communication gap. The administration has implemented an "RD&T 101" plan to inform and engage field staff about the RD&T program. **FHWA should continue to improve its utilization of field office staff, both to improve RD&T implementation and to strengthen two-way communication with the states.**

Increased Focus on Planning, Policy, and the Environment

Although the FHWA RD&T program is ostensibly focused on all aspects of surface transportation, in practice, the research program as described focuses most heavily on the hard side of the field, such as pavements, geometric design, bridges, and construction. The soft side—planning, policy, and the environment—was not well represented among FHWA's descriptions of its research programs and spending. The relative lack of inclusion of these fields makes FHWA appear as though it is overlooking the needs of a significant part of the work of surface transportation professionals. In addition, the lack of emphasis may make FHWA appear to be less than fully responsive to the USDOT's overarching national priorities. This is clearly not actually the case, as demonstrated by the threefold increase in policy spending (from 1.5 percent of total research program funds under SAFETEA-LU to 4.8 percent under MAP-21).

The committee understands that the research FHWA conducts and the publication of its successes are heavily oriented toward hard-side topics because evaluation of such projects is reasonably straightforward. However, to demonstrate how FHWA RD&T is serving all areas in which highway professionals are engaged, **FHWA should also be presenting its activities and priorities in planning, policy, and the environment and highlighting the recent increases in funding for these areas.** Research on these topics is admittedly more complicated and less tangible, but FHWA can highlight the increased funding as an acknowledgment of the importance of these fields.

Expected Success Rates

Not all research, even in a program focused on applied research, can reasonably be expected to result in a new product or technique that can be implemented in the field. In a widely cited and respected pair of analyses, Edwin Mansfield found that approximately 90 percent of industrial research projects failed to

result in a commercial product.[1, 2] He also found that the lag time between the conclusion of the research and commercial introduction of successful research projects was, on average, 6 to 7 years. While Mansfield's figures are dated, they remain the most comprehensive empirical data on the success rates of industrial innovation projects. These findings indicate that research very often produces results that are not commercial successes and that, even when the research is successful, the process of introducing the innovation to the public is a slow one.

Considering these industry norms, FHWA should first ensure that its research portfolio has a balance of risk and uncertainty that is appropriate for a government RD&T program. This balance should meet the criterion that the research is technically promising but unlikely to be supported by private industry because of risk and the uncertainty of technical success. Second, FHWA should also ensure that its deployment portfolio is similarly well-balanced, and third, FHWA should be careful not to confuse deployment rate with an actual adoption rate. As an example, an FHWA developed crash barrier may be adopted for one or a few exits by 40 of the 50 states. This might be presented as a deployment rate of 80%; yet, obviously, a negligible percentage of exits are protected by the new technology. Both the research and deployment portfolios should contain projects that show promise for technical and deployment success, although they may also exhibit, on average, a risk level too high for private firms.

Therefore, FHWA should not feel pressure for every one of its research innovations to be a quick success. The committee is pleased that FHWA has continued to fund the Exploratory Advanced Research Program now that it has shifted from being a line-item in FHWA's authorization to being a program that FHWA can fund at its discretion. The RTCC is aware that FHWA's portfolio includes this small program that is not intended to produce products that can be implemented immediately. As reported to the committee, however, FHWA's expected deployment rate in its applied research programs seems to be noticeably higher than the common industry average of 10 percent; this observation may be an indication that the administration is choosing to focus its research only on projects that it expects to have commercial success. If the administration puts too much emphasis on ensuring that all of its projects are eventually deployable, it will take too few risks in its research, narrow its research agenda unnecessarily, and miss opportunities for the occasional blockbuster result that can result from fundamental, higher-risk research. **FHWA should evaluate whether it is placing too much emphasis on developing products for near-term application and possibly missing opportunities for larger gains.**

Communication of RD&T Value

FHWA's communication of its RD&T agenda, priorities, and activities is effective and improved in comparison with previous years. However, FHWA staff would benefit from having a short and clear presentation that describes the management and evaluation improvements they have instituted and the value of their research to both surface transportation and the country. The presentations and descriptions for the committee were strong but also rather detailed. Congress, state DOTs, and other stakeholders will require shorter and more pointed versions of this type of communication.

FHWA should develop clear, concise, and compelling descriptions of its program management and the value of the RD&T program for review by Congress and other stakeholders. Although the staff are very good at providing plenty of details about the overall success of their program, they should also have shortened descriptions of their work. An elevator pitch type of presentation is most likely to be effective with Congress, and a single-page fact sheet could be a useful leave-behind for congressional staff members. Although there is no substitute for face-to-face interactions with stakeholders to both explain FHWA's program and seek input on priorities, the administration's new website for communicating with stakeholders offers opportunities for developing and conveying brief and compelling descriptions of FHWA's initiatives and inviting commentary on these and other priorities from stakeholders. FHWA should be able to articulate the value of its research program briefly but effectively.

[1] Mansfield, E. Academic Research and Industrial Innovation. *Research Policy*, Vol. 20, 1991, pp. 1–12. http://www.mba.intercol.edu/Entrepreneurship/UT%20Computer%20Science%20Course/Academic_Research_and_Industrial_Innovation.pdf.

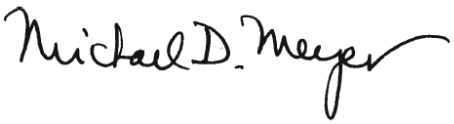
[2] Mansfield, E. Academic Research and Industrial Innovation: An Update of Empirical Findings. *Research Policy*, Vol. 26, 1998, pp. 773–776. ftp://ftp.ige.unicamp.br/pub/CT001%20SocCiencia/Agosto%2030/mansfield%20research%20policy%201998-1.pdf.

CONCLUSION

The committee very much appreciated the opportunity to meet with FHWA staff and acknowledges FHWA's efforts to manage its newfound discretionary abilities. Overall, the committee would like to recognize the tremendous progress that FHWA's RD&T program has made in recent years.

On behalf of RTCC, I offer my thanks to Michael Trentacoste and his staff for their time and efforts. I hope you find this letter report to be useful as the RD&T programs and discretionary funding management process move forward.

Sincerely,



Michael Meyer, Chair

Attachment 1: Participants

Attachment 1

PARTICIPANTS

Research and Technology Coordinating Committee

Michael Meyer, Modern Transport Solutions, LLC, Atlanta, Georgia, *Chair*
Kevin Chesnik, Applied Research Associates, Madison, Wisconsin
Karen Dixon, Texas A&M Transportation Institute, College Station
Patricia Gillette, Colorado Motor Carriers Association, Denver
Timothy Henkel, Minnesota Department of Transportation, Saint Paul
Wayne Kittelson, Kittelson & Associates, Portland, Oregon
Michael Morris,* North Central Texas Council of Governments, Arlington
Ronaldo Nicholson, District Department of Transportation, Washington, D.C.
Harold Paul, Louisiana Transportation Research Center, Baton Rouge
David Roessner, SRI International, Washington, D.C.
Robert Sack,* New York State Department of Transportation, Albany
Kumares Sinha, Purdue University, West Lafayette, Indiana
Stephanie Wiggins, Los Angeles County Metropolitan Transportation Authority (Metro), California
James Winford, Jr., Prairie Contractors, Inc., Opelousas, Louisiana

FHWA Staff

Michael Trentacoste
Debra Elston
Jack Jernigan
Hari Kalla*
John Moulden

TRB Staff

Robert Skinner
Steve Godwin
Katherine Kortum
Timothy Devlin

The names of those who attended the meeting are shown in bold.
*Attended via conference call.