

**U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
SUBCOMMITTEE ON RESEARCH AND TECHNOLOGY**

HEARING CHARTER

U.S. Surface Transportation: Technology Driving the Future

Friday, June 12, 2015
9:00 a.m. – 11:00 a.m.
2318 Rayburn House Office Building

Purpose

On Friday, June 12, 2015, the Research & Technology Subcommittee will hold a hearing to review surface transportation research, development, and technology (RD&T) programs and activities within the U.S. Department of Transportation (DOT), and the relationship between the Department and non-federal entities that also conduct transportation research. Spending at the DOT for RD&T is approximately \$1 billion annually. The hearing will also provide the Subcommittee with the opportunity to examine how research and development conducted today can lead to the revolutionary technological applications of tomorrow. Witnesses represent a variety of stakeholders from the federal government, academia, and industry.

Witness List

- **Honorable Gregory D. Winfree**, Assistant Secretary for Research and Technology, United States Department of Transportation
- **Dr. Michael Meyer**, Chair, Research and Technology Coordinating Committee (FHWA), National Academies' Transportation Research Board
- **Dr. Brian Smith**, Director, Center for Transportation Studies, University of Virginia
- **Mr. Jeffrey J. Owens**, Chief Technology Officer and Executive Vice President, Delphi Automotive

Background

The U.S. Department of Transportation annually supports over \$1 billion in RD&T activities in multi-modal surface transportation (rail, transit, motor carrier and highway). Such RD&T is conducted by a host of agencies within the DOT, including the Federal Highway Administration (FHWA), the Federal Transit Administration (FTA), the National Highway Traffic Safety Administration (NHTSA), the Federal Railroad Administration (FRA), and the Federal Motor Carrier Safety Administration (FMCSA).

According to the Congressional Research Service, funding for DOT R&D is “generally included in appropriations line items that also include non-R&D activities; therefore, it is not possible to identify precisely how much of the funding provided in appropriations laws will be allocated to R&D specifically unless funding is provided at the precise level of the request. In general, R&D funding levels are known only after DOT agencies allocate their appropriations to specific activities and report those figures.”¹

¹ <http://www.crs.gov/pdfloader/R43944>

However, the Federal Highway Administration (FHWA) and the Federal Aviation Administration (FAA) “account for more than three-fourths of the department’s R&D funding.”²

Provided by DOT, Figure 1 at the end of this document lists the Department’s fiscal year 2016 budget request for *all* surface transportation RD&T, which total over \$1.44 billion. The chart categorizes RD&T into “basic research (without specific application); applied research (for a specific need); and developmental research (design, development and improvements of prototypes and processes)” and technology as “demonstration projects and other related activities associated with research and development activities.”

U.S. Department of Transportation Research, Development and Technology Activities

Office of the Assistant Secretary for Research and Technology (OST-R)

DOT research and development activities have traditionally been coordinated through the Research and Innovative Technology Administration (RITA). As part of the Omnibus Appropriations bill signed into law last year (PL 113-76 on January 17, 2014), DOT elevated all activities previously performed by RITA into a new Office of the Assistant Secretary for Research and Technology (OST-R), located within the DOT’s Office of the Secretary.

While the name of the program changed, the mission remains the same. OST-R is responsible for reviewing and advocating for the Department’s research, development, and technology portfolio. The FY 2016 budget requests \$14.6 million for activities to be administered by the office in support of its mission to “coordinate, collaborate, and maximize the effectiveness of the Department’s research, development, and technology portfolio as well as enhancing the data collection and statistical analysis programs to support data-driven decision-making across the Department.”³ OST-R oversees the following programs, which are funded out of other Administration accounts:

OST-R RD&T Funding	FY 2015 Enacted	FY 2016 Request
Intelligent Transportation Systems (FHWA) ⁴	\$100.0	\$158.0
University Transportation Centers (FHWA) ⁵	\$72.5	\$82.0
Bureau of Transportation Statistics (FHWA) ⁶	\$26.0	\$29.0
Positioning, Navigation and Timing ⁷	\$1.6	\$1.6
Research, Development and Technology Coordination ⁸	\$1.3	\$0.5
Transportation Safety Institute*	-	-
Volpe National Transportation Systems Center*	-	-

Budget in Millions of Dollars

* *Fee for Service*

² <http://www.crs.gov/pdfloader/R43944>

³ <http://www.dot.gov/sites/dot.gov/files/docs/FY2016-BudgetEstimate-OST.pdf>

⁴ <http://www.dot.gov/sites/dot.gov/files/docs/FY2016-BudgetEstimate-FHWA.pdf>

⁵ <http://www.dot.gov/sites/dot.gov/files/docs/FY2016-BudgetEstimate-FHWA.pdf>

⁶ <http://www.dot.gov/sites/dot.gov/files/docs/FY2016-BudgetEstimate-FHWA.pdf>

⁷ <http://www.dot.gov/sites/dot.gov/files/docs/FY2016-BudgetEstimate-OST.pdf>

⁸ <http://www.dot.gov/sites/dot.gov/files/docs/FY2016-BudgetEstimate-OST.pdf>

*Federal Highway Administration (FHWA)*⁹

The FHWA Research Technology & Education (RT&E) Program “conducts and coordinates research and development to generate innovative solutions to highway and transport challenges. It also undertakes significant technology deployment to accelerate the use of more effective decision-making information and cutting-edge practices and tools that allows our country to make the best investments in the Nation’s largest utility: our transportation system.”¹⁰

The FY 2016 budget requests \$496 million for FHWA’s RT&E program, which includes the following major research areas:¹¹

Program Activity	FY 2015 Enacted	FY 2016 Request
Highway Research and Development	\$115.0	\$130.0
Technology and Innovation Deployment	\$62.5	\$70.0
Training & Education	\$24.0	\$27.0
Intelligent Transportation Systems ⁺	\$100.0	\$158.0
University Transportation Centers ⁺	\$72.5	\$82.0
Bureau of Transportation Statistics ⁺	\$26.0	\$29.0

Budget in Millions of Dollars

⁺ As noted above, these programs are administered by OST-R

Within the Intelligent Transportation Systems’ Joint Program Office, the DOT has established an automation research program whose goal is to “enable safe, efficient, and equitable integration of automation into the transportation system.”¹² The hearing will provide an opportunity for discussion of this technology from the perspective of the federal government as well as industry, represented by the witness from Delphi Automotive, a leader in automotive vehicle technology.

*Federal Transit Administration (FTA)*¹³

The FTA Transit Research and Training Program activities support the overarching goal of strengthening public transportation in the United States. Specifically, the program “funds applied research on innovative technology and practices in the public transportation sector, provides technical assistance to the transit industry, and supports public transportation workforce development efforts.”¹⁴ The FY 2016 budget requests \$60 million for the Transit Research and Training account for the following programs:¹⁵

⁹ \$51.3billion requested for FY 2016; <http://www.dot.gov/sites/dot.gov/files/docs/FY2016-BudgetEstimate-FHWA.pdf>

¹⁰ <http://www.dot.gov/sites/dot.gov/files/docs/FY2016-BudgetEstimate-FHWA.pdf>

¹¹ <http://www.dot.gov/sites/dot.gov/files/docs/FY2016-BudgetEstimate-FHWA.pdf>

¹² <http://www.its.dot.gov/factsheets/pdf/AutomationUSDOT.pdf>

¹³ \$18.4 billion requested for FY 2016; <http://www.dot.gov/sites/dot.gov/files/docs/FY2016-BudgetEstimate-FTA.pdf>

¹⁴ <http://www.dot.gov/sites/dot.gov/files/docs/FY2016-BudgetEstimate-FTA.pdf>

¹⁵ <http://www.dot.gov/sites/dot.gov/files/docs/FY2016-BudgetEstimate-FTA.pdf>

Program Activity	FY 2015 Enacted	FY 2016 Request
Research, Development, Demonstration and Deployment	\$30.0	\$26.0
Transit Cooperative Research Program	\$3.0	\$7.0
Technical Assistance and Training	\$4.0	\$7.0
Human Resources and Training	\$0.5	\$20.0

Budget in Millions of Dollars

National Highway Traffic Safety Administration (NHTSA)¹⁶

The NHTSA Vehicle Safety Research and Analysis programs support DOT safety goals “through conducting motor vehicle safety research and development on advanced vehicle safety technology, ways of improving vehicle crashworthiness and crash avoidance, and vehicle-based options for decreasing distracted driving and alcohol involvement in crashes. Requested funding will support vehicle safety research into the reliability and security of complex safety-critical electronic control systems; studying the cybersecurity of vehicles; and assessing new and emerging technologies that can help drivers avoid crashes.”¹⁷

The FY 2016 budget requests \$39.7 million for NHTSA’s Vehicle Safety Research and Analysis programs, which includes the following research areas:¹⁸

Program Activity	FY 2015 Enacted	FY 2016 Request
Safety Systems	\$7.4	\$8.2
Biomechanics	\$9.9	\$11.0
Heavy Vehicles	\$1.9	\$2.0
Crash Avoidance	\$7.4	\$10.4
Alternative Fuels Vehicle Safety	\$1.4	\$3.0
Vehicle Electronics and Emerging Technology	\$0	\$4.1
Vehicle Research and Test Center	\$0.5	\$1.0

Budget in Millions of Dollars

The FY 2016 NHTSA budget also requests \$152 million for Highway Safety Research and Development, which includes “research activities to reduce highway fatalities, prevent injuries, and significantly reduce the economic toll of motor vehicle crashes by data collection and analysis, research into highway safety issues, and the development of effective countermeasures.”¹⁹

¹⁶ \$908 million requested for FY 2016; <http://www.dot.gov/sites/dot.gov/files/docs/FY2016-BudgetEstimate-NHTSA.pdf>

¹⁷ <http://www.dot.gov/sites/dot.gov/files/docs/FY2016-BudgetEstimate-NHTSA.pdf>

¹⁸ <http://www.transportation.gov/sites/dot.gov/files/docs/FY2016-BudgetEstimate-NHTSA.pdf>

¹⁹ <http://www.dot.gov/sites/dot.gov/files/docs/FY2016-BudgetEstimate-NHTSA.pdf>

*Federal Railroad Administration (FRA)*²⁰

The FRA Railroad Research and Development (R&D) Program focuses on improving railroad safety. The mission of the program is “to ensure the safe, efficient and reliable movement of people and goods by rail through basic and applied research, and development of innovations and solutions.”²¹

The FY 2016 budget requests \$39.3 million for FRA’s Railroad R&D Program, which includes the following research areas:²²

Program Activity	FY 2015 Enacted	FY 2016 Request
Track Program	\$11.3	\$11.4
Rolling Stock Program	\$10.3	\$10.3
Train Control and Communication	\$8.1	\$8.1
Human Factors Program	\$5.5	\$5.5
Railroad Systems Issues	\$3.9	\$3.9

Budget in Millions of Dollars

*Federal Motor Carrier Safety Administration (FMCSA)*²³

The FMCSA Research and Technology (R&T) Program “provides scientific safety research on driver behavior, carrier operations, and technology applications....Program activities range from developing enhanced enforcement technology through wireless roadside inspections, demonstrating the efficacy of truck drivers getting proper rest, and understanding how commercial motor vehicles can safely use alternative fuels.”²⁴

The FY 2016 budget requests \$9.7 million for FMCSA’s R&T Program, which includes the following research areas:²⁵

Program Activity	FY 2015 Enacted	FY 2016 Request
Produce Safe Drivers	\$2.5	\$4.8
Improve Safety of Commercial Vehicles	\$2.7	\$2.8
Produce Safer Carriers	\$1.2	\$2.0
Advanced Safety through Info-Based Initiatives	\$2.8	\$0.5

Budget in Millions of Dollars

²⁰ \$5.0 billion requested for FY 2016; <http://www.dot.gov/sites/dot.gov/files/docs/FY2016-BudgetEstimate-FRA.pdf>

²¹ <http://www.dot.gov/sites/dot.gov/files/docs/FY2016-BudgetEstimate-FRA.pdf>

²² <http://www.dot.gov/sites/dot.gov/files/docs/FY2016-BudgetEstimate-FRA.pdf>

²³ \$668.5 million requested for FY 2016; <http://www.dot.gov/sites/dot.gov/files/docs/FY2016-BudgetEstimate-FMCSA.pdf>

²⁴ <http://www.dot.gov/sites/dot.gov/files/docs/FY2016-BudgetEstimate-FMCSA.pdf>

²⁵ <http://www.dot.gov/sites/dot.gov/files/docs/FY2016-BudgetEstimate-FMCSA.pdf>

Reports

The following reports provide background and context for research, development and technology issues relevant to the hearing.

Legislative

The Science Committee mandated the requirement for the DOT to develop strategic RD&T plans in the 2005 Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU, P.L. 109-59), as well as in the 2012 Moving Ahead for Progress in the 21st Century Act (MAP-21, P.L. 112-141).

The 2005 plan established a five-year pathway for DOT research activities and mandated that the Transportation Research Board (TRB) independently review the plan and identify strengths and weaknesses. Similarly, the 2012 legislation required an updated strategic plan and another independent review by TRB of the current FY 2013 to 2018 plan titled, “*Research, Development, and Technology Strategic Plan*.”²⁶

Transportation Research Board

Special Report 317: *The Essential Federal Role in Highway Research and Innovation*²⁷

Earlier this year TRB issued Special Report 317 via the Research and Technology Coordinating Committee (RTCC). RTCC serves as an independent advisor on national and federal highway research, and Special Report 317 “aims to inform the impending reauthorization of MAP-21 by providing background and context for decisions about future federal funding of highway RD&T.”²⁸ According to the report, reductions in resources for FHWA – human and financial – would “hamper the agency’s ability to continue to fulfill its essential roles and responsibilities....If substantial reductions do occur, the pace of innovation on the nation’s highways will likely slow to a crawl at a time when public expectations for improved safety and greater reliability, as well as reduced revenues for maintenance and upkeep, are placing growing demands on the national highway system.”²⁹

Special Report 313: *Framing Surface Transportation Research for the Nation’s Future*³⁰

Last year, TRB issued Special Report 313 in response to requests from state departments of transportation and the National Cooperative Highway Research Program to consider “whether and how the lessons learned from transportation research in other countries, and from research in domestic nontransportation sectors, might be used to improve surface transportation research in the United States.”³¹ The request came about as a result of concerns related to a constrained budget environment and a desire to maximize the efficiency and effective use of scarce public funds.

The report describes the U.S. surface transportation research enterprise as decentralized, with research programs initiated from the bottom up reflecting the priorities of its diverse participants, activities, and funding sources. Consequently, “much of the research aims at specific problems identified

²⁶ https://www.rita.dot.gov/rdt/sites/rita.dot.gov/rdt/files/rdt_strategic_plan_2013.pdf

²⁷ <http://onlinepubs.trb.org/onlinepubs/sr/sr317.pdf>

²⁸ <http://onlinepubs.trb.org/onlinepubs/sr/sr317.pdf>

²⁹ <http://onlinepubs.trb.org/onlinepubs/sr/sr317.pdf>

³⁰ http://www.nap.edu/openbook.php?record_id=18611

³¹ http://www.nap.edu/openbook.php?record_id=18611

by sponsors and is relatively short term and applied in nature.”³² While there have been important transportation improvements, there have been missed opportunities too because of the imbalance between bottom-up and top-down approaches. The US system “tends to focus on solving narrowly defined problems at the expense of basic and advanced research that could form the basis for exploring broader crosscutting issues and developing innovative solutions to long-term challenges.”³³

The report suggests establishing a new and more cohesive national framework to strengthen US surface transportation research led by the “Standing Committee on Research of the American Association of State Highway and Transportation Officials and comprised of representatives from the public, private, academic, and nonprofit sectors.”³⁴ The report also recommends federal action in support of the transition to this new framework. Recognizing that while DOT has much of the responsibility for US transportation systems, other agencies, such as the Department of Energy and Department of Defense, also contribute to transportation research within their respective missions. Notably, the report suggests that to “make better use of federal resources, the White House Office of Science and Technology Policy should create a task force to explore potential synergies and gains from greater coordination among pertinent agencies.”³⁵

³² http://www.nap.edu/openbook.php?record_id=18611

³³ http://www.nap.edu/openbook.php?record_id=18611

³⁴ http://www.nap.edu/openbook.php?record_id=18611

³⁵ http://www.nap.edu/openbook.php?record_id=18611

Figure 1

U.S. Department of Transportation Office of the Assistant Secretary for Research and Technology				
FY 16 President's Budget Request (\$000)				
Research, Development and Technology (RD&T) Funding by Office/Operating Administration and Funding Source				
	TOTAL	Airport and Airway TF	Transportation TF ¹	General Fund (GF)
USDOT Total R&D Budget by Funding Source	\$ 1,444,294	\$ 420,236	\$ 957,119	\$ 66,939
Federal Aviation Administration	\$ 420,236	\$ 420,236		
Research, Engineering and Development		\$ 166,000		
Improve Aviation Safety		\$ 96,623		
Improve Efficiency/Economic Competitiveness		\$ 24,671		
Reduce Environmental Impact		\$ 38,884		
Mission Support		\$ 5,822		
Facilities and Equipment		\$ 198,050		
Airport Improvement Program (T)		\$ 46,000		
Operations		\$ 10,186		
Federal Highway Administration	\$ 701,247		\$ 701,247	
Highway Safety Research and Development			\$ 130,000	
Technology and Innovative Deployment Program (T)			\$ 70,000	
Future Strategic Highway Research Program Implementation (T)			\$ 25,000	
Training and Education (T)			\$ 27,000	
Intelligent Transportation Systems			\$ 158,000	
ITS Multi-Modal Research			\$ 133,540	
Technology Transfer and Evaluation (T)			\$ 18,460	
ITS Program Support			\$ 6,000	
University Transportation Research (T)			\$ 82,000	
State Planning and Research (SP&R)			\$ 189,839 ²	
Administrative Expenses			\$ 19,408	
Federal Motor Carrier Safety Administration	\$ 13,373		\$ 13,373	
Produce Safe Drivers			\$ 4,848	
Improve Safety of Commercial Vehicles			\$ 2,835	
Produce Safer Carriers (T)			\$ 1,955	
Advanced Safety Through Info-Based Initiatives (T)			\$ 500	
Enable and Motivate Internal Excellence			\$ 550	
Administrative Expenses (R&D)			\$ 2,685	
Federal Railroad Administration	\$ 68,278		\$ 25,000	\$ 43,278
Railroad Research and Development				\$ 39,250
Track Program				\$ 11,429
Rolling Stock Program				\$ 10,322
Train Control and Communication				\$ 8,086
Human Factors Program				\$ 5,542
Railroad Systems Issues Program				\$ 3,871
Rail Service Improvement Program (R&D)			\$ 25,000	
Salaries & Expenses (R&D)				\$ 4,028
Federal Transit Administration	\$ 62,193		\$ 62,193	
National Research Program			\$ 26,000 ³	
Technical Assistance and Standards Development (T)			\$ 7,000 ³	
Human Resources and Training (T)			\$ 20,000	
Transit Cooperative Research Program (T)			\$ 7,000	
Low to No Emissions Program (T)			\$ -	
Administrative Expenses			\$ 2,193	

Figure 1 (contd.)

U.S. Department of Transportation			
<u>Office of the Assistant Secretary for Research and Technology</u>			
FY 16 President's Budget Request (\$000)			
Research, Development and Technology (RD&T) Funding by Office/Operating Administration and Funding Source			
Maritime Administration	<u>\$ -</u>		
National Highway Traffic Safety Administration	<u>\$ 141,510</u>	<u>\$ 141,510</u>	
Research and Analysis		<u>\$ 74,784</u>	
Crashworthiness		\$ 19,188	
Crash Avoidance		\$ 10,088 ⁴	
Data Programs (T)		\$ 45,508	
Alternative Fuels Vehicle Safety		\$ 3,000	
Vehicle Electronics and Emerging Technology		\$ 2,000	
Vehicle Test Center - Ohio		\$ 2,500	
Highway Safety Research		\$ 6,142	
Administrative Expenses		\$ 53,084	
Pipeline and Hazardous Materials Safety Administration	<u>\$ 22,012</u>	<u>\$ 13,796</u>	<u>\$ 8,216</u>
Pipeline Safety		\$ 12,433 ⁵	
Hazardous Materials Safety			\$ 7,670
Administrative Expenses		\$ 1,363	\$ 546
Saint Lawrence Seaway Development Corporation	<u>\$ -</u>		
Office of the Secretary	<u>\$ 15,445</u>	<u>\$ 15,445</u>	
Transportation Planning, Research and Development		\$ 10,019	
Assistant Secretary for Research and Technology		<u>\$ 5,426</u>	
Alternative Fuels R&D		\$ 499	
R&D Planning and Management		\$ 509	
Administrative Expenses		\$ 2,808	
Positioning, Navigation and Timing		\$ 1,610	
Bureau of Transportation Statistics		\$ 29,000 ⁶	
University Transportation Centers		\$ 82,000 ⁶	
Intelligent Transportation Systems		\$ 158,000 ⁶	
DOT SUBTOTALS	<u>\$ 1,444,294</u>		
Research and Development	<u>\$ 1,000,142</u>		
Technology Investment (T)	<u>\$ 398,701</u>		
Facilities (F)	<u>\$ 45,451</u>		

Definitions

R&D: This budget activity includes: basic research (without specific application); applied research (for a specific need); and developmental research (design, development and improvements of prototypes and processes.

Technology: Demonstration projects and other related activities associated with research and development activities.

Facilities: Acquisition, design and construction and repairs of all physical facilities for use in research and development activities.

¹ The FY16 President's Budget proposes to rename the "Highway Trust Fund" to the "Transportation Trust Fund" as part of the Administration's GROW AMERICA Act proposal.

² Estimated. 23 USC 505(b) requires State DOTs to expend no less than 25% of their annual SP&R funding on RT&E activities.

³ Through FY15, Transit Research and Training was funded through the General Fund. The President's FY16 Budget Request moved this program to the Transportation TF.

⁴ Through FY15, Research and Analysis-Vehicle Safety was funded through the General Fund. The President's FY16 Budget Request moved this program to the Transportation TF.

⁵ Pipeline Safety R&D funded through the Pipeline Safety Fund (PSF).

⁶ Resources are shown as non-adds because the funding resides in the FHWA Research, Technology and Education budget line.