United States Department of Transportation
Annual Modal Research Plans
Fiscal Year 2017

Federal Motor Carrier Safety Administration
August 31, 2016
Steven K. Smith

FY 2017 FMCSA Research and Technology Program Funding Details (in thousands of dollars)

FMCSA Research and Technology Program	FY 2017 Pres. Budget	FY 2017 Basic	FY 2017 Applied	FY 2017 Development	FY 2017 Technology
Produce safe drivers	3,720	0	3,022	0	698
Improve safety of commercial vehicles	3,420	0	2,037	0	1,383
Produce safe carriers	1,240	0	581	484	175
Advanced safety through info-based initiatives	1,340	0	0	0	1,340
Enable and motivate internal excellence	960	0	960	0	0
Totals	**10,680**	0	6,600	484	3,596

Instructions for RD&T Funding Details: List all RD&T Programs for FY 2017 along with funding, as headings describe. Funding request amounts must be the same as reported in the FY 2017 RD&T portion of the President's Budget, include all funding request reflected in RD&T Exhibit-1, including anticipated Administrative expenses, and excluding Facilities. Report funding by Type of Research for all FY 2017 RD&T Programs. Reference OMB Circular No. A-11 for definitions of Basic Research, Applied Research and Development; report Technology funding request in the last column of the Funding Details table above, as appropriate.

FY 2017 FMCSA Research and Technology Program
Budget Request by DOT Goal(s)

RD&T Program Name	FY 2017 Pres. Budget ($000)	Safety	State of Good Repair	Economic Competitiveness	Quality of Life in Communities	Environmental Sustainability
FMCSA Research and Technology Program	$**10,680**	$**10,680**				
Totals	$**10,680**	$**10,680**				

Instructions for FY 2017 Program Budget Request by DOT Goal(s): Provide Program Name and FY 2017 RD&T Presidents Budget request by DOT Goal(s), as listed.

FMCSA Research and Technology Program

($10,680)
($000)

Program Description: FMCSA's Research and Technology Program provides scientific safety research on driver behavior, carrier operations, and technology applications. These contributions have proven critical in supporting Agency safety rulemakings, identifying enforcement priorities, and facilitating technology transfer to the marketplace. Program activities range from developing enhanced enforcement technologies, demonstrating the efficacy of truck drivers getting proper rest, evaluating the safety implications of automated and semi-automated vehicles, and understanding how commercial motor vehicles can safely use alternative fuels. These projects provide the underpinnings for the Agency's rulemaking and enforcement priorities. For example, recent research findings demonstrated the safety benefits of carriers' use of electronic logging devices to keep track of driver work hours.

Instructions for FY 2017 Program Descriptions: Provide description of <u>at least</u> a paragraph for each FY 2017 RD&T Program.

Program Objectives: FMCSA's Research and Technology Program contributes to: 1) the development of expertise, ideas, and tools to advance the state-of-the-art in commercial motor vehicle safety on the Nation's highways and 2) the development and evaluation of future Agency regulations, programs, and methodologies. FMCSA's Research and Technology Program has established the following strategic objectives:

- **Produce Safer Drivers:** This objective focuses on developing a better understanding of commercial driver behavior as it relates to safety, and understanding and addressing issues related to drivers' fitness for duty. Fitness-for-duty issues include alertness, health, training, and qualification. Initiatives under this objective also focus on the enforcement of commercial credentials and driving rules and State practices for handling information about commercial drivers.
- **Improve Safety of Commercial Motor Vehicles (CMV):** The principal goal of this strategic objective is to improve truck and motorcoach safety through vehicle-based research and the deployment of CMV safety technologies. Initiatives under this objective focus on: (1) testing, evaluating, and deploying advanced intelligent vehicle safety technologies and other onboard safety technologies and (2) developing new data and information to improve occupant protection and overall vehicle safety.
- **Produce Safer Carriers:** The principal goals of this strategic objective are to support: (1) the Agency's enforcement of carrier-related Federal Motor Carrier Safety Regulations and (2) efforts to improve carrier safety, by applying principles of safety management science from other industries, compiling best management practices, and communicating these best practices to motor carrier managers. Initiatives under this objective focus on improving carrier compliance investigations, enabling better performance practices for carriers and shippers, continuing the development and deployment of the Commercial Vehicle Information Systems and Networks (CVISN) Grant Program, and supporting carrier enforcement.
- **Advance Safety through Information-Based Initiatives:** The strategies and activities under this objective focus on conducting research that helps to support Agency rulemaking and enforcement activities. This can be done in several ways: 1) evaluating existing research to highlight areas for additional investigation; 2) investigating the overall business, economic, and technical trends in the CMV industry to understand and respond to their impact on safety; and 3) exploring the feasibility and utility of using multiple measures as a basis for calculating crash statistics and setting safety goals.

Instructions for FY 2017 Program Objectives: Provide descriptions of <u>at least</u> a paragraph for each FY 2017 RD&T Program.

Anticipated Program Activities: In FY 2017, FMCSA's Research and Technology Program will continue to support FMCSA's safety mission by:

- **Producing safer drivers.** The Agency will pursue research to gain a better understanding of the causes and impacts of driver health and wellness issues and unsafe driving behaviors. Using recently published recommendations from the National Academy of Sciences as a basis, FMCSA will tailor comprehensive research projects to better understand the causes and impacts of driver fatigue and the best methods for fatigue prevention. Research findings will equip the Agency to develop effective tools for the promotion of driver wellness and safety and the prevention of unsafe behaviors. Several related FY17 research and technology projects (planned) include:

  1. A study on the effectiveness of new education programs regarding sleep apnea.
  2. An assessment of companies that have successfully implemented programs for improving health and fitness.
  3. A longitudinal study of commercial drivers to assess long-term health impacts.

- **Improving safety of commercial motor vehicles (CMVs).** Through a variety of planned research and technology projects, the Agency will continue to investigate CMV safety technologies aimed at improving CMV safety performance. Several related FY17 research and technology projects (planned) include:

  1. An independent assessment and inventory of fleet management systems that link to truck parking availability.
  2. An investigation of the effectiveness of CMV side guards in reducing pedestrian fatalities.
  3. A study to recommend measures that truck drivers can take to safeguard their personal safety and security when parked.
  4. An examination of the impact of CMV automation on safety regulations.

- **Producing safer carriers.** In FY17, the Agency will seek to improve carrier safety performance and enforcement by researching automated inspection technologies and safety/financial returns associated with fleet implementation of onboard safety systems, such as electronic logging devices. Several related FY17 research and technology projects (planned) include:

  1. A study on the effectiveness of weigh station pre-clearance/e-screening systems.
  2. A business case study on the early adoption of electronic logging devices.
  3. Ongoing field tests to determine the effectiveness of wireless truck/bus inspections.
  4. A pilot test of dynamic onboard brake assessment technology.

- **Advancing safety through information-based initiatives.** FMCSA will continue to conduct research to inform and support Agency rulemakings and policy decisions, with an end goal of improving CMV driver and carrier safety on the highways. Several related FY17 research projects include:

  1. An inventory of variations in State hours-of-service rules.
  2. A study to determine the validity of violations contained in the out-of-service criteria and their impact on carriers' Safety Measurement System (SMS) scores.
  3. A study to determine the safety effects of allowing certain CMVs to proceed without stopping or slowing down at certain railroad grade crossings.

Instructions for FY 2017 Anticipated Program Activities: Provide descriptions of at least a paragraph for each FY 2017 RD&T Program.

Expected Program Outcomes: Expected program outcomes for each of the identified strategic objectives are included below.

- **Produce Safer Drivers:** By completing targeted research, FMCSA will gain a better understanding of the causes and impacts of driver health and wellness issues and unsafe driving behaviors. New research on commercial motor vehicle driver fatigue will provide the Agency with more detailed information regarding the causes of fatigue and the best methods for fatigue prevention. Research findings will: 1) equip the Agency to develop effective tools for the promotion of driver wellness and the prevention of unsafe behaviors and 2) help to shape future research efforts under this objective.

- **Improve Safety of CMVs:** Through a variety of planned research and technology projects, the Agency will gain a better understanding of the safety impacts associated with the adoption/use of cutting-edge CMV safety technologies (e.g., side guards designed to prevent pedestrian fatalities). FMCSA will also learn more about existing fleet management systems that link to truck parking applications (e.g., FMCSA's SmartPark truck parking alert system). Through Small Business Innovation Research projects, the Agency will also see continued progress in the development, testing, and potential commercialization of CMV safety technologies, such as a driver fatigue and distraction monitoring and warning system.

- **Produce Safer Carriers:** Research and technology projects conducted in FY17 will provide the Agency with improved automated inspection tools (e.g., wireless roadside inspection) and a better understanding of the effectiveness of existing automated inspection tools (e.g., weigh station pre-clearance/e-screening systems). Furthermore, the Agency will gain knowledge and insights regarding the safety and potential regulatory impacts of automated CMVs. Finally, research conducted under this objective will help motor carriers make informed decisions regarding the adoption of electronic logging devices ahead of the Federally mandated deadline.

- **Advance Safety through Information-Based Initiatives:** Findings from FY17 research and technology projects will inform and support FMCSA rulemaking and policy initiatives. In FY17, FMCSA will gain an improved understanding of: 1) hours-of-service regulations for intrastate drivers (by State); 2) the safety effects of allowing certain CMVs to cross railroad grade crossings without stopping,; and 3) the validity of the existing out-of-service criteria and the relation of out-of-service violations to carriers' Safety Measurement System scores. Other research projects to support FMCSA rulemakings will be conducted as needed.

Instructions for FY 2017 Expected Program Outcomes: Provide descriptions of at least a paragraph for each FY 2017 RD&T Program.

FY 2017 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
FMCSA Research and Technology Program	**National Highway Traffic Safety Administration (NHTSA), Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), Intelligent Transportation Systems (ITS) Joint Program Office (JPO), Maritime Administration (MARAD)** In FY 2017, FMCSA will continue to collaborate with other modes in an effort to identify common research needs and streamline existing and planned research efforts. Automated vehicle research is a common theme across the Department, and FMCSA is committed to working with the other modes to share information on existing efforts and to identify research gaps that need to be filled. In FY 2017, FMCSA will work closely with NHTSA, FHWA, the ITS JPO, and MARAD to develop targeted research related to automated and connected commercial motor vehicles (CMVs), with particular emphasis on the safety and regulatory impacts of these emerging technologies. Specific initiatives include a joint project with MARAD to investigate the feasibility and safety benefits of low-speed automated truck queues at ports and warehouses; an analysis, conducted in collaboration with the ITS JPO, of the existing Federal Motor Carrier Safety Regulation (FMCSR) framework to identify potential impacts and compatibility challenges presented by CMV automation; and development of a research roadmap to better understand current and emerging automation technologies and to further study the impacted FMCSRs. FMCSA will also collaborate with NHTSA on cybersecurity best practices for heavy vehicle aftermarket devices. Also with the ITS JPO, FMCSA will support the demonstration and evaluation of the Smart City winner to test, evaluate, and demonstrate the benefits of connected city concepts. Regarding interoperability, FMCSA will support the ITS JPO in its efforts to incorporate all modal stakeholder needs while developing and evolving the integrated National ITS Architecture and software tools to support large scale, interoperable deployment of ITS, connected vehicle, and connected automation technology. Additionally, FMCSA will provide subject matter experts to review training materials

	and offer course instruction for Professional Capacity Building (PCB) classes and webinars developed by the ITS JPO. Safety as it relates to drivers, passengers, and pedestrians and bicyclists remains a priority for the Agency. In FY 2017, FMCSA will continue to collaborate with NHTSA and FHWA on research related to pedestrian and bicyclist safety, focusing on ways to reduce pedestrian and bicyclist fatalities resulting from large truck and bus crashes. FMCSA and FHWA have both identified human factors research as focus areas for FY 2017; FMCSA will work with FHWA to align and synergize efforts, where possible. On the topic of crash avoidance, FMCSA will collaborate with NHTSA on heavy vehicle crashworthiness research, as well as rulemaking considerations and research for heavy vehicles (e.g., the Electronic Stability Control rulemaking for trucks). FMCSA will continue to collaborate with NHTSA and FHWA on speeding-related issues (the three agencies have an intermodal speed team that meets periodically to share project information and occasionally to collaborate on joint projects). Separately, FMCSA will support FRA "Train Control and Communications" research efforts, specifically concerning ITS development as it relates to CMVs. Finally, FMCSA will support FHWA on a variety of other research efforts in the following areas: • Emerging technology. • Connected/automated vehicles. • Enterprise data (e.g., integrating connected vehicle data into transportation management systems). • Accelerating deployment. **Benefitting from Research:** FMCSA often cites research conducted by other modes, in support of rulemakings, recommended changes to standards, justifications for new research, etc. FMCSA will continue to benefit from research conducted by the FRA (e.g., hours of service of transportation operators and obstructive sleep apnea), NHTSA (e.g, highway safety and automated vehicle research), the ITS JPO (e.g., connected and automated vehicle

	research) and FHWA (e.g., human factors and automated vehicle research).

Instructions for FY 2017 OA Collaboration Partners (Internal DOT): List all Collaboration Partners between your OA and other DOT OAs.

How program meets statutory requirements: FMCSA's Research and Technology Program meets the requirements outlined in 49 U.S.C. § 31108, which requires the Secretary of Transportation to establish and carry out a motor carrier and motor coach research and technology program. In FY 2017, FMCSA's Research and Technology Program will continue to fund numerous research and technology projects mandated in the Fixing America's Surface Transportation Act, 2015 (FAST Act).

Describe how public and stakeholder input have been utilized in the development of this research program.

FMCSA has internal and external mechanisms to help assess the utility of the Research and Technology Program:

- Research and technology projects are reviewed by FMCSA's Research Executive Board, comprised of members from across the Agency; and
- Each product has a customer or benefactor who provides input and evaluation.

FMCSA collaborates closely with product end-users including other USDOT modes such as the Federal Highway Administration (FHWA) and the National Highway Traffic Safety Administration (NHTSA). FMCSA also works closely with external customers to ensure that the Agency's research and technology portfolio addresses current needs in the transportation safety environment. These include the National Transportation Safety Board, the Office of Management and Budget, U.S. Department of Energy, the Government Accountability Office, State enforcement agencies, the Transportation Research Board (TRB), the National Academy of Sciences (NAS), and the Committee on National Statistics. In FY15, FMCSA commissioned NAS and CNSTAT to conduct a panel study on methodological approaches to understanding driver fatigue. The NAS/CNSTAT panel experts reviewed the existing literature/research and developed a set of 13 recommendations for improved commercial driver fatigue research (published in March 2016). FMCSA is working to incorporate these recommendations into its research plans over the next several years. FMCSA provides regular briefings, webinars, and public forums for industry representatives, safety advocates, congressional staff, and the transportation research community. Additionally, in FY 2017, FMCSA plans to establish a Research Analysis Committee at TRB to: a) assist FMCSA in refining its research methodologies; b) assist in identifying and utilizing current research in the transportation and related communities; and c) promote the familiarity and availability of FMCSA research activities throughout the stakeholder community.

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FMCSA Research and Technology Program
(DOT Goal(s))

Program Description: FMCSA's Research and Technology Program provides scientific safety research on driver behavior, carrier operations, and technology applications. These contributions have proven critical in supporting Agency safety rulemakings, identifying enforcement priorities, and facilitating technology transfer to the marketplace. Program activities range from developing enhanced enforcement technologies, demonstrating the efficacy of truck drivers getting proper rest, evaluating the safety implications of automated and semi-automated vehicles, and understanding how commercial motor vehicles can safely use alternative fuels. Taxpayer support is necessary as these projects provide the underpinnings for the Agency's rulemaking and enforcement priorities. For example, recent research findings demonstrated the safety benefits of carriers' use of electronic logging devices to keep track of driver work hours.

Instructions for FY 2018 Program Descriptions: Provide description of <u>at least</u> a paragraph for each FY 2018 RD&T Program.

Program Objectives: FMCSA's Research and Technology Program contributes to: 1) the development of expertise, ideas, and tools to advance the state-of-the-art in commercial motor vehicle safety on the Nation's highways and 2) the development and evaluation of future Agency regulations, programs, and methodologies. FMCSA's Research and Technology Program has established the following strategic objectives:

- **Produce Safer Drivers:** This objective focuses on developing a better understanding of commercial driver behavior as it relates to safety and understanding and addressing issues related to drivers' fitness for duty. Fitness-for-duty issues include alertness, health, training, and qualification. Initiatives under this objective also focus on the enforcement of commercial credentials and driving rules and State practices for handling information about commercial drivers.
- **Improve Safety of Commercial Motor Vehicles (CMVs):** The principal goal of this strategic objective is to improve truck and motorcoach safety through vehicle-based research and the deployment of CMV safety technologies. Initiatives under this objective focus on: (1) testing, evaluating, and deploying advanced intelligent vehicle safety technologies and other onboard safety technologies and (2) developing new data and information to improve occupant protection and overall vehicle safety.
- **Produce Safer Carriers:** The principal goals of this strategic objective are to support: (1) the Agency's enforcement of carrier-related Federal Motor Carrier Safety Regulations and (2) efforts to improve carrier safety, by applying principles of safety management science from other industries, compiling best management practices, and communicating these best practices to motor carrier managers. Initiatives under this objective focus on improving carrier compliance investigations, enabling better performance practices for carriers and shippers, continuing the development and deployment of the Commercial Vehicle Information Systems and Networks (CVISN) Grant Program, and supporting carrier enforcement.
- **Advance Safety through Information-Based Initiatives:** The strategies and activities under this objective focus on conducting research that helps to support Agency rulemaking and enforcement activities. This can be done in several ways: 1) evaluating existing research to highlight areas for additional investigation; 2) investigating the overall business, economic, and technical trends in the CMV industry to understand and respond to their impact on safety; and 3) exploring the feasibility and utility of using multiple measures as a basis for calculating crash statistics and setting safety goals.

Instructions for FY 2018 Program Objectives: Provide descriptions of <u>at least</u> a paragraph for each FY 2018 RD&T Program.

Anticipated Program Activities: FMCSA will continue to pursue research as it relates to the four identified strategic objectives (produce safer drivers; improve safety of commercial motor vehicles; produce safer carriers; advance safety through information-based initiatives). In FY18, FMCSA's Research and Technology Program will continue to support FMCSA's safety mission by conducting research and technology projects designed to: 1) improve understanding of the causes and safety impacts of commercial driver fatigue, 2) develop and implement commercial motor vehicle safety technologies to improve drivers' safety performance, 3) support Agency rulemaking and policy decisions, 4) develop roadside technologies to streamline inspection processes and target high-risk carriers, and 5) carry out any congressionally mandated research and technology projects.

Instructions for FY 2018 Anticipated Program Activities: Provide descriptions of at least a paragraph for each FY 2018 RD&T Program.

Expected Program Outcomes: Expected program outcomes for each of the identified strategic objectives are included below.

- **Produce Safer Drivers:** By completing targeted research, FMCSA will gain a better understanding of the causes and impacts of driver health and wellness issues and unsafe driving behaviors. Research findings will: 1) equip the Agency to develop effective tools for the promotion of driver wellness and the prevention of unsafe behaviors; and 2) help to shape future research efforts under this objective.
- **Improve Safety of Commercial Motor Vehicles (CMVs):** Through a variety of planned research and technology projects, the Agency will gain a better understanding of the safety impacts associated with the adoption/use of cutting edge CMV safety technologies. Through Small Business Innovation Research projects, the Agency will also see continued progress in the development, testing, and potential commercialization of CMV safety technologies.
- **Produce Safer Carriers:** Research and technology projects conducted in FY18 will provide the Agency with improved enforcement and inspection tools, a better understanding of the effectiveness of existing CMV safety technologies, and knowledge and insights regarding the safety impacts of newly developed CMV technologies. Research conducted under this objective will also help motor carriers make informed decisions regarding the adoption of various CMV safety technologies.
- **Advance Safety through Information-Based Initiatives:** Findings from FY18 research and technology projects will inform and support FMCSA rulemaking, policy, and enforcement initiatives. Areas of focus will be determined based on Agency needs.

Instructions for FY 2018 Expected Program Outcomes: Provide descriptions of at least a paragraph for each FY 2018 RD&T Program.

FY 2018 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
FMCSA Research and Technology Program	**National Highway Traffic Safety Administration (NHTSA), Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), Intelligent Transportation Systems (ITS) Joint Program Office (JPO) and the Maritime Administration (MARAD)** FMCSA's collaborative work with NHTSA, FHWA, FRA, the ITS JPO, and MARAD will continue from FY 2017 into FY 2018. In particular, FMCSA will continue to work with NHTSA, FHWA, the ITS JPO, and MARAD on research related to automated and connected vehicles and cybersecurity. FMCSA will collaborate with NHTSA on heavy vehicle crashworthiness research, as well as rulemaking considerations and research for heavy vehicles. The Agency will also continue to collaborate with NHTSA and FHWA on speeding-related issues. Separately, FMCSA will support FRA "Train Control and Communications" research efforts, specifically concerning ITS development as it relates to CMVs. Finally, FMCSA will continue to support FHWA on a variety of other research efforts in the following areas: • Emerging technology. • Connected/automated vehicles. • Enterprise data. • Accelerating deployment. Additional collaborative opportunities will be identified through collaborative discussions held during FY 2017. **Benefitting from Research:** FMCSA often cites research conducted by other modes, in support of rulemakings, recommended changes to standards, justifications for new research, etc. FMCSA will continue to benefit from research conducted by the FRA (e.g., hours of service of transportation operators and OSA), NHTSA (e.g, highway safety and automated vehicle research), the ITS JPO (e.g., connected and automated vehicle research), and FHWA (e.g., human factors and automated vehicle research).

Instructions for FY 2018 OA Collaboration Partners (Internal DOT): List all Collaboration Partners between your OA and other DOT OAs.

How program meets statutory requirements: FMCSA's Research and Technology Program meets the requirements outlined in 49 U.S.C. § 31108, which requires the Secretary of Transportation to establish and carry out a motor carrier and motor coach research and technology program. In FY18, FMCSA's Research and Technology Program will continue to fund numerous research and technology projects mandated in the Fixing America's Surface Transportation Act, 2015 (FAST Act).

Describe how public and stakeholder input have been, or will be, utilized in the development of this research program:

FMCSA has internal and external mechanisms to help assess the utility of the Research and Technology Program:

- Research and technology projects are reviewed by FMCSA's Research Executive Board, comprised of members from across the Agency, and
- Each product has a customer or benefactor who provides input and evaluation.

FMCSA collaborates closely with product end-users including other USDOT modes such as the Federal Highway Administration and the National Highway Traffic Safety Administration. FMCSA also works closely with external customers to ensure that the Agency's research and technology portfolio addresses current needs in the transportation safety environment. These include the National Transportation Safety Board, the Office of Management and Budget, U.S. Department of Energy, the Government Accountability Office, State enforcement agencies, the Transportation Research Board, the National Academy of Sciences, and the Committee on National Statistics. FMCSA provides regular briefings, webinars, and public forums for industry representatives, safety advocates, congressional staff, and the transportation research community. FMCSA will continue to utilize the Research Analysis Committee established at TRB to enhance the Agency's research program and maximize stakeholder input.