MARYAM ALLAHYAR, PhD
Director, Office of Research, Development & Technology

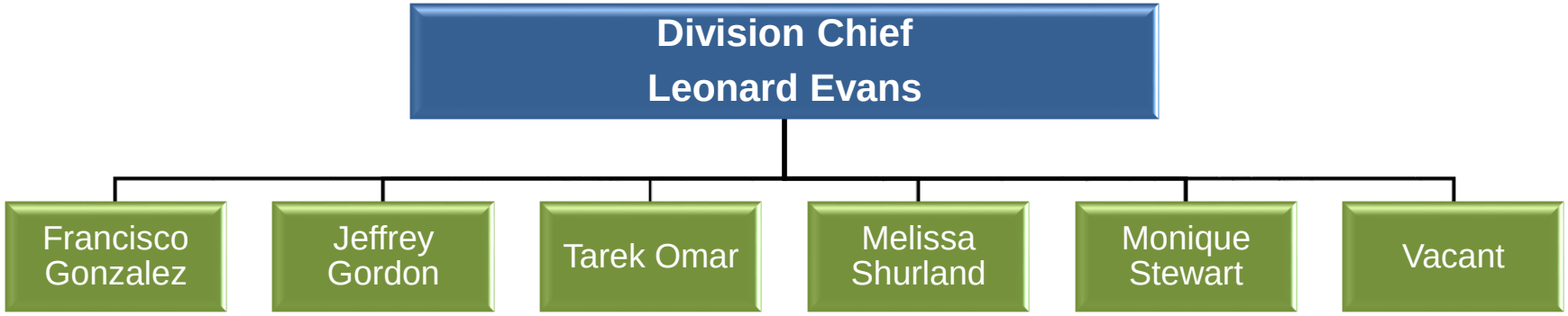
FRA Rolling Stock Research Program

Transportation Research Board
Committee for Review of the Federal Railroad Administration's R&D Program
Washington, DC ● May 14-15, 2019

U.S. Department of Transportation
Federal Railroad Administration

Rolling Stock Division Organizational Chart

(Effective date 06/01/2019)



Rolling Stock

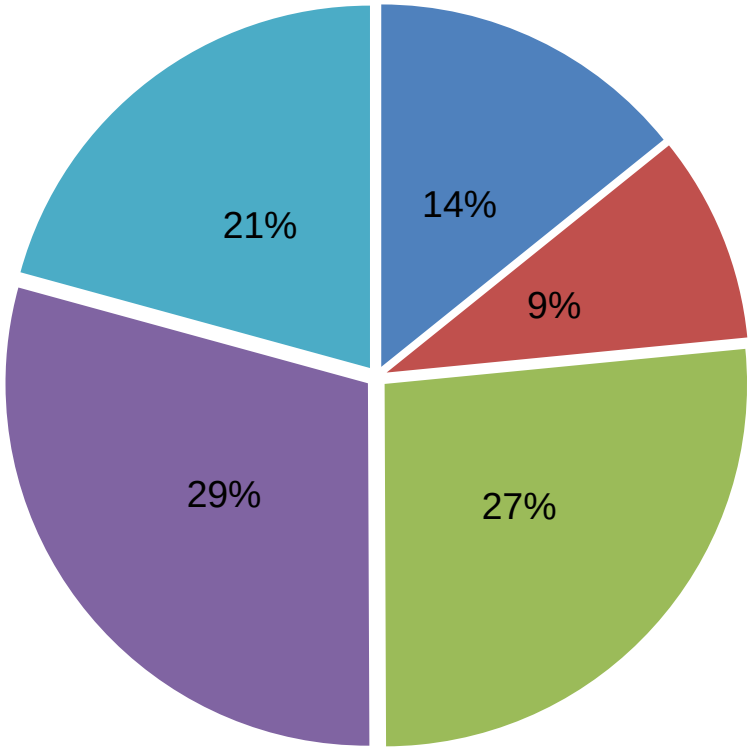
Focus: Examines the structural integrity of trains to increase the safety of passengers and reduce releases of hazardous materials. Targets the causes of derailment due to rolling stock component failures and poor train handling.

Core Research Priorities

- Automated Inspection Technologies and Techniques
- Improved Materials and Component Designs for Rolling Stock Components
- Energy and Environmental Sustainability
- Occupant Protection Enhancements
- Improving the Safety of Hazardous Materials Transportation
- Risk Analysis of structural performance of liquefied natural gas (LNG) tank cars as fuel tenders and LNG commodity transport vessels

Goals: Safety, Infrastructure, Innovation and Accountability

Investments in Research, Development & Technology (RD&T)



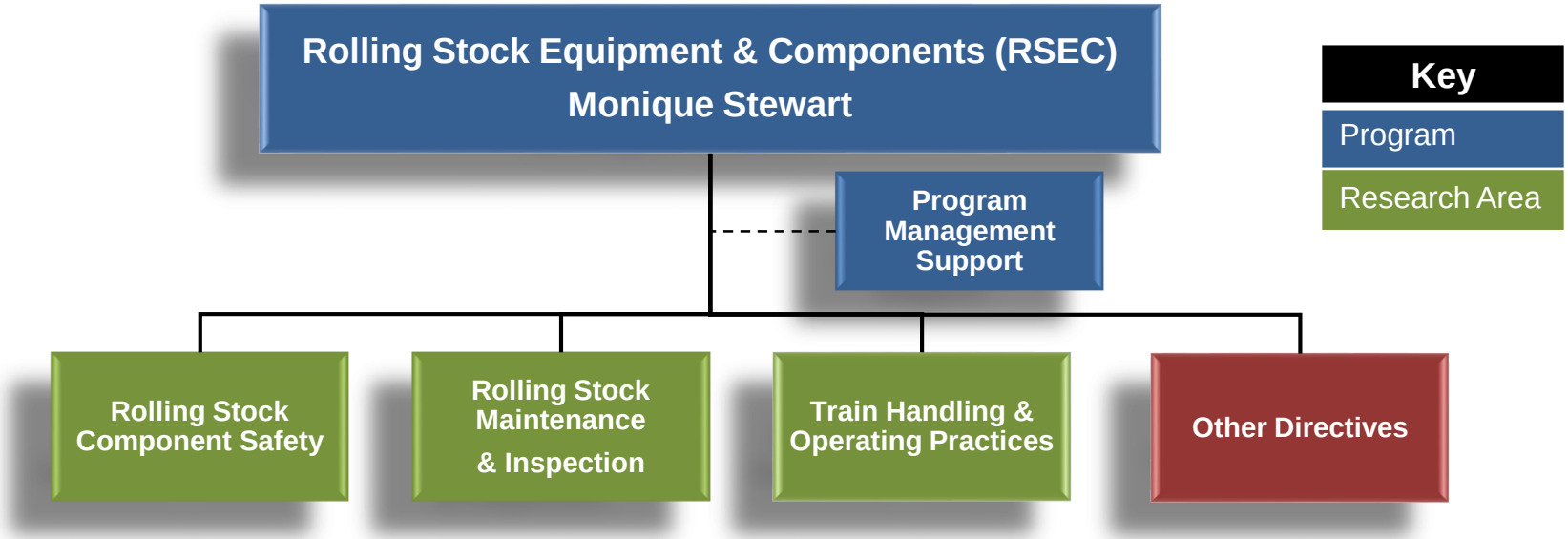
RD&T Program Name	FY19 Pres. Budget ($000)
Rolling Stock	$10,322*

RESEARCH AREA OVERVIEW

OFFICE OF RESEARCH DEVELOPMENT & TECHNOLOGY

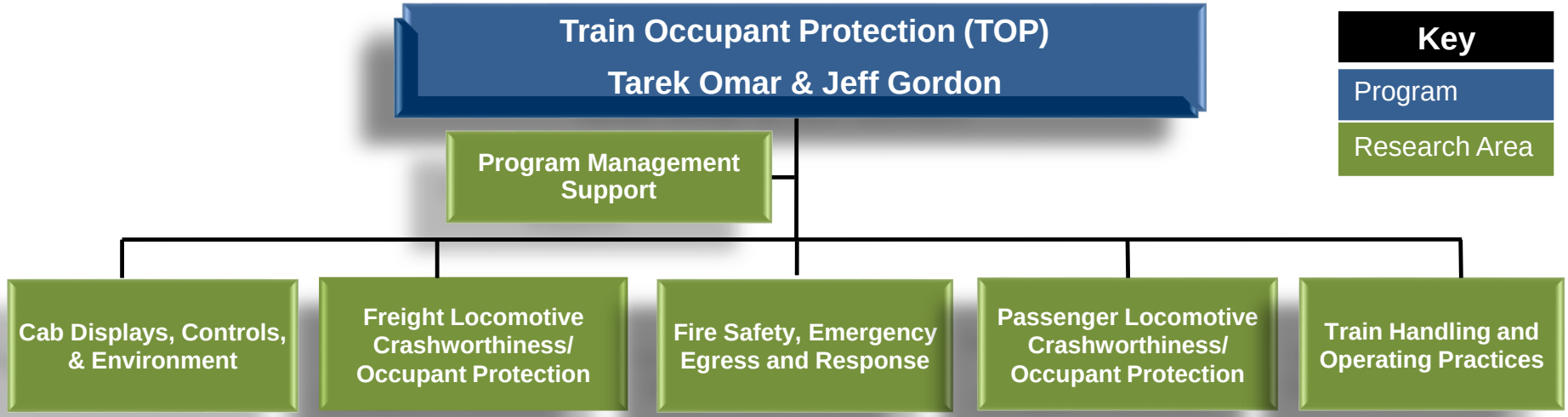
FRA OFFICE OF RAILROAD POLICY & DEVELOPMENT

RSEC Organizational Chart (Research Area Level)



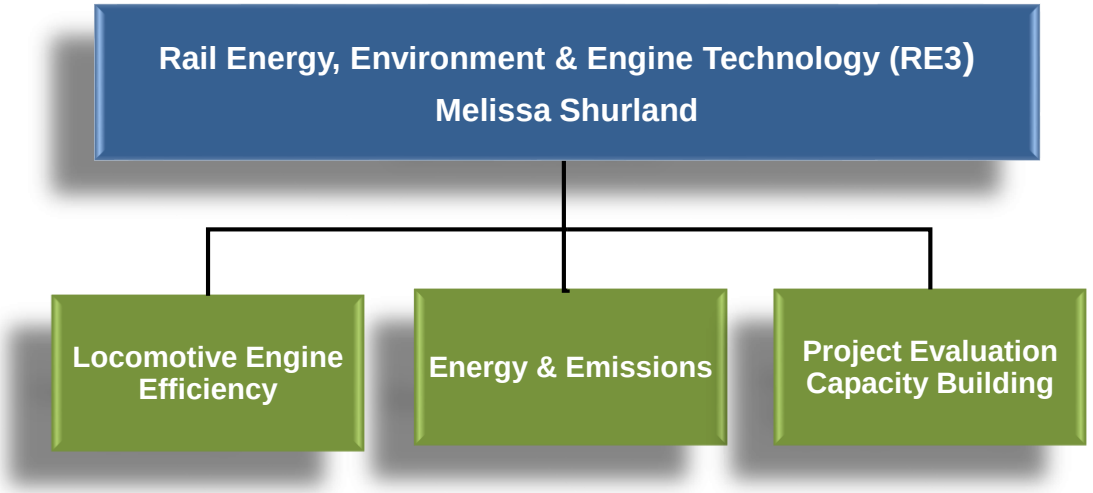
Research Area	Definition
Rolling Stock Component Safety	Evaluate the root causes of freight and passenger rail component defects and inefficiencies, in addition to identifying and evaluating optimal design specifications.
Rolling Stock Maintenance & Inspection	Evaluate and demonstrate the effectiveness and efficiency of automated inspection and maintenance procedures and equipment. Demonstrate the ability to monitor, control and power integrated advanced components remotely to detect defects real-time, improve switching capabilities and improve overall rail operational safety.
Train Handling & Operating Practices	Identify and implement optimal train handling practices to decrease accidents caused during train operations, improve equipment and component designs, promote fuel efficiency, and improve ride quality.

TOP Organizational Chart (Research Area Level)



Area Name	Objective
Cab Displays, Controls, & Environment	Improve cab/locomotive visibility at night, provide extra alerting for track workers and attempting trespassers, provide extra visibility/alerting when approaching grade crossings, unify an optimized cab display across all railroad providers, increase freight and passenger rail safety, and reduce operating and maintenance costs for locomotives.
Freight Locomotive Crashworthiness/Occupant Protection	Improve safety of train crews and other occupants in freight locomotives.
Fire Safety, Emergency Egress and Response	To develop training materials for fire prevention and emergency egress from locomotives.
Passenger Locomotive Crashworthiness/ Occupant Protection	Improve safety of occupants in passenger locomotives.
Train Handling and Operating Practices	Identify and implement optimal train handling practices to decrease accidents caused during train operations, improve equipment and component designs, promote fuel efficiency, and improve ride quality.

Rail E3 Organizational Chart (Research Area Level)



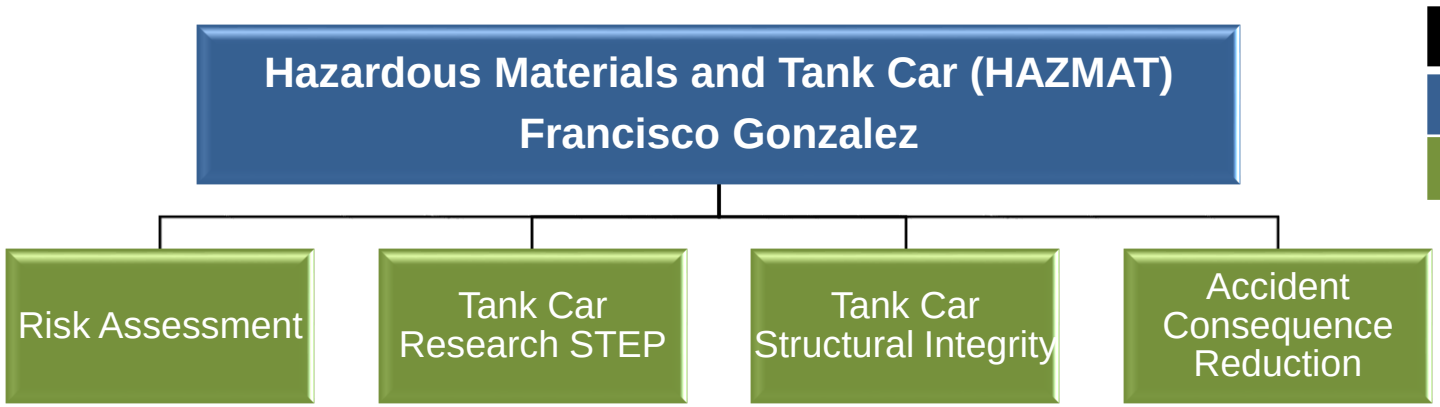
Key

Program

Research Area

Research Area	Definition
Locomotive Engine Efficiency	To support the research, development and demonstration of advanced technologies that will improve the efficiency of locomotive engines, and rail transportation
Energy & Emissions	To support the research, development and demonstration of advanced technologies that will reduce energy consumption and associated emissions of locomotives while maintaining or improving the efficiency of rail transportation

HAZMAT Organizational Chart (Research Area Level)



Research Area	Definition
Risk Assessment	Projects that evaluate the potential risks that affect the overall transportation of hazardous materials.
Tank Car Research – STEP	Projects that address improving the safe transportation of energy products.
Tank Car Structural Integrity	Projects that will aid the improvement of crashworthiness of tank cars and containers transporting hazmat.
Accident Consequence Reduction	Projects to minimize the consequences of a tank car/package involved in a train accident by reducing the risk of release.

HIGH PRIORITY PROJECTS

OFFICE OF RESEARCH DEVELOPMENT & TECHNOLOGY

FRA OFFICE OF RAILROAD POLICY & DEVELOPMENT

Rolling Stock Component Safety: Air Brake System Behavior – Very Long Trains (VLT)

Goals: Focus on the development & improvement of equipment. Investigate and study significant issues pertaining to safe operation.

Outcomes:

- Improved train makeup.
- Improved motive power assignment.
- Reduced incidents/derailments.
- Improved operational safety.
- Reduced risk exposure to public.

Strategic Goals: Safety, Innovation, and Accountability

Safe Transportation of Energy Products (STEP)

Goals: Assess the operational safety risks associated with hazardous material unit trains. Focus on train operation of hazardous materials that presents any unique or additional risks.

Outcomes:

- Understand the risk related to the transportation of different hazardous materials in different train configurations.
- This technology will positively impact rail reliability and safety.

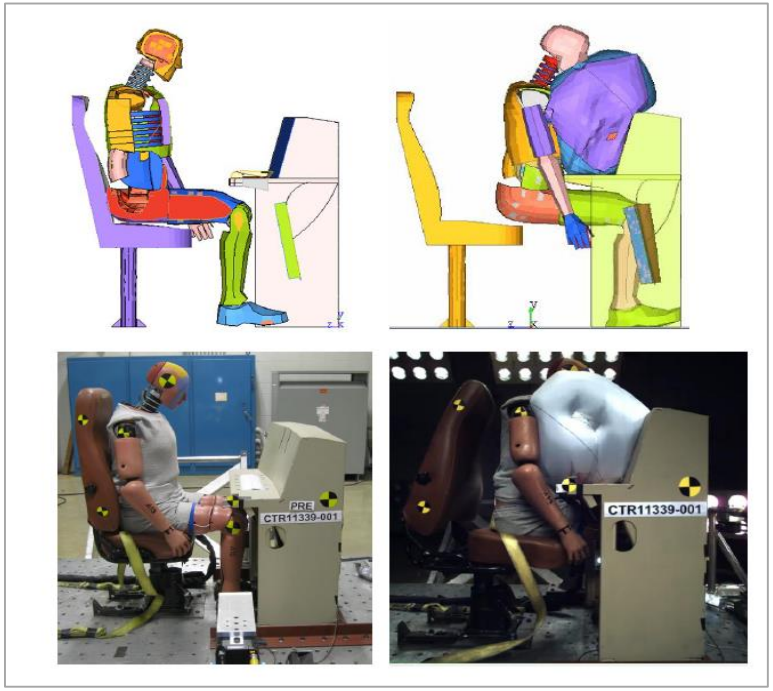
Strategic Goals: Safety, Innovation, Infrastructure, and Accountability

Locomotive Crashworthiness and Occupant Protection

Goals: Develop improved strategies and designs for rail rolling stock to reduce injuries and fatalities resulting from rail accidents (collisions and derailments).

Outcomes:

- Conceptualize, analyze, design and demonstrate the effectiveness of engineering improvements to rail vehicle crashworthiness.
- Reduce fatalities and injuries to train crews, passengers and the public.
- Develop improved abdominal instrumentation of test dummies for more accurate table impact tests.
- Use research results to inform industry standards development, particularly American Public Transportation Association (APTA) Safety Standards.



Strategic Goals: Safety, Innovation, and Accountability

Liquefied Natural Gas (LNG) Research

Goals:

- Investigate innovative safety technologies that will improve the transportation and use of natural gas, both liquefied (LNG) and compressed (CNG), in the rail sector.
- Provide the FRA Office of Railroad Safety scientific backing for standards and requirements.

Outcomes:

- Construction of a LNG fuel tender built to Association of American Railroads (AAR) M-1004 specifications for dynamic crash testing.
- Fire testing of a Type IV International Standardization Organization (ISO) tank.
- Development of risk criteria for qualification of safety assessment by the FRA Office of Railroad Safety.

Strategic Goals: Safety, Innovation, and Accountability

Tank Car Research

Goals:

- Conduct dynamic crash test on three to four DOT 113, DOT 117 and DOT 105 full-scale tank cars.
- Validate computer models in order to develop standard procedures to evaluate the performance of different or new tank car designs to determine equal level of safety.

Outcomes:

- Develop test methodology.
- Develop a test plan.
- Prepare and test tank cars.
- Analyze and provide the data for model validation.

Strategic Goals: Safety, Innovation, and Accountability

Rolling Stock and PHMSA Economic Impact of Regulatory Reform

- The Pipeline and Hazardous Materials Safety Administration (PHMSA) is responsible for all HazMat regulations, to include those that pertain to the movement of HazMat via the rail network.
- The FRA HazMat program provides results that impact regulatory reform, and its research addresses the improvements of PHMSA HazMat regulations.
- Rolling Stock research that leads to the development of new tank car designs or that improves the safe transportation of HazMat material has large economic benefits.

CONTACT US

Federal Railroad Administration
1200 New Jersey Avenue, SE
Washington, DC 20590

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