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

FEDERAL AVIATION ADMINISTRATION

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Introduction

The Federal Aviation Administration (FAA) is pleased to provide this annual research plan describing its major research program priorities, funding, activities, and departmental collaboration.

Research and development (R&D) programs in the FAA support various operational mission areas across several lines of business and are funded through different appropriations. FAA's complete R&D portfolio is represented in its annual National Aviation Research Plan (NARP) pursuant to 49 United States Code 44501(c), and submitted to Congress with FAA's annual budget request. This plan, in addition to FAA's forthcoming five year strategic research plan consistent with the FAST Act, build upon FAA's FY2015 and FY2016 strategic goals to promote safety, efficiency, environmental responsibility, and global leadership. A significant tenet of FAA's R&D programs is to systematically expand and apply learned knowledge to produce useful materials, devices, systems, or methods that improve aviation safety, thereby achieving the lowest possible accident rate.

Occurring in one of the U.S. Government's largest enclosed fire test facilities, FAA's Fire Research and Safety program conducts research to prevent accidents caused by in-flight fires, and improve survivability during post-crash fires. Security and Hazardous Materials Safety organizational goals encompass cargo, passenger in-flight, materials, high energy power sources, and modelling research, and enable FAA to issue regulations, standards, and guidance material that ensure the highest level of safety in commercial aviation.

Through its Airport Improvement Program (AIP), FAA engages in progressive R&D to improve durability, economy, and environmental sustainability and extend the life of airfield pavements. Infrastructure capital improvements designed and implemented by airport operators under this program maintain and enhance both safety and efficiency, and reduce the environmental impacts on adjacent communities. For example, airport technology research addresses pavement structure, sustainable materials and mixture design and specification, while environment and energy research investigates the complex interdependencies that exist among aircraft noise, fuel burn and emissions. Collectively, AIP programs leverage research to evaluate airport compliance policy and technological options that mitigate aviation's environmental and energy use impacts.

FAA 's Human Factors laboratories encompass fatigue research across multiple aviation domains. Personnel serve on a variety fatigue-related interagency working groups, including DOT's Human Factors Coordinating Committee. Fatigue research supports policy development in response to NTSB recommendations and FAA Flight Standards organizations, and various CFR and Notice updates. Additionally, FAA genomics teams

evaluate biomarkers associated with the cognitive impairment of sleep deprivation in safety critical roles, and identify impairment in post-mortem civil aviation accident victims.

FY 2017 RD&T Program Funding Details

RD&T Program Name	FY 2017 Pres. Budget ($000)	FY 2017 Basic	FY 2017 Applied	FY 2017 Development	FY 2017 Technology
Fire Research and Safety	7,925		7,925		
Advanced Materials/ Structural Safety	4,113		4,113		
Aeromedical Research	9,538		9,538		
ATC/Tech Ops Human Factors	6,165		6,165		
Aircraft Catastrophic Failure Prevention	1,528		1,528		
Aircraft Icing /Digital System Safety	5,102		5,102		
Commercial Space Transportation	2,953		2,953		
Continued Airworthiness	10,269		10,269		
Flight deck/Maint. System Integration Human Factors	8,513		8,513		
NextGen Alternative Fuels for GA	5,792		5,792		
Propulsion and Fuel Systems	2,574		2,574		
System Safety Management	7,000		7,000		
Unmanned Aircraft Systems	8,422		8,422		
Weather Program	17,976		17,976		
NextGen Wake Turbulence	8,609		8,609		
NextGen Air Ground Integration Human Factors	8,575		8,575		
NextGen Weather Technology in the Cockpit	4,059		4,059		
NextGen Information Security	1,000		1,000		
Environment and Energy	15,013		15,013		
NextGen Environmental Research Aircraft Technologies	26,174		26,174		

RD&T Program Name	FY 2017 Pres. Budget ($000)	FY 2017 Basic	FY 2017 Applied	FY 2017 Development	FY 2017 Technology
System Planning and Resource Management	2,788		2,788		
WJHTC Laboratory Facility	3,412		3,412		
Advanced Technology Development & Prototyping	24,800			24,800	
NextGen Separation Management Portfolio	25,800			25,800	
NextGen Improved Surface Portfolio	2,000			2,000	
NextGen On-Demand NAS Information	8,500			8,500	
NextGen Improved Multiple Runway Operations	6,500			6,500	
NextGen NAS Infrastructure	17,660			17,660	
NextGen Laboratory Support	12,000			12,000	
Center for Advanced Aviation System Development	60,000			60,000	
Airport Technology Research Program	31,375		31,375		
Airport Cooperative Research Program	15,000		15,000		
Total	**371,135**		**213,875**	**157,260**	

FY 2017 RD&T 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
Fire Research and Safety	7,925	7,925				
Advanced Materials Structural Safety	4,113	4,113				
Aeromedical Research	9,538	9,538				
ATC/Tech Ops Human Factors	6,165	6,165				
Aircraft Catastrophic Failure Prevention	1,528	1,528				
Aircraft Icing/Digital System Safety	5,102	5,102				
Commercial Space Transportation	2,953	2,953				
Continued Airworthiness	10,269	10,269				
Flight deck/Maint System Integration Human Factors	8,513	8,513				
NextGen Alternative Fuels for GA	5,792					5,792
Propulsion and Fuel Systems	2,574	2,574				
System Safety Management	7,000	7,000				
Unmanned Aircraft Systems	8,422	8,422				
Weather Program	17,976	17,976				
NextGen – Wake Turbulence	8,609			8,609		
NextGen Air Ground Integration Human Factors	8,575			8,575		

RD&T Program Name	FY 2017 Pres. Budget ($000)	Safety	State of Good Repair	Economic Competitiveness	Quality of Life in Communities	Environmental Sustainability
NextGen – Weather Technology in the Cockpit	4,059			4,059		
NextGen Information Security	1,000			1,000		
Environment and Energy	15,013					15,013
NextGen Environmental Research Aircraft Technologies	26,174					26,174
System Planning and Resource Management	2,788	1702		369		716
WJHTC Laboratory Facility	3,412	2,803		609		
Advanced Technology Development & Prototyping	24,800			24,800		
NextGen Separation Management Portfolio	25,800			25,800		
NextGen Improved Surface Portfolio	2,000			2,000		
NextGen On-Demand NAS Information Portfolio	8,500			8,500		
NextGen Improved Multiple Operations Portfolio	6,500			6,500		
NextGen NAS Infrastructure Portfolio	17,660			17,660		

RD&T Program Name	FY 2017 Pres. Budget ($000)	Safety	State of Good Repair	Economic Competitiveness	Quality of Life in Communities	Environmental Sustainability
NextGen Laboratory Support Portfolio	12,000			12,000		
Center for Advanced Aviation System Development	60,000	15,600		41,400		3,000
Airport Technology Research Program	31,375	16,371		13,409		1,595
Airport Cooperative Research Program	15,000	5,000		5,000		5,000
Total	**371,135**	**133,554**		**180,290**		**57,290**

Fire Research and Safety

FY2017 Funding: $7,925,000

Program Description:

The Fire Research and Safety Program develops technologies, procedures, test methods, and fire performance criteria that can prevent accidents caused by hidden cabin or cargo compartment in-flight fires and fuel tank explosions and improve survivability during a post-crash fire.

Program Objectives:

Fire research addresses fundamental issues of (a) combustion toxicity; the impact of flame retardant chemicals, (b) health hazards of cabin materials; the impact of materials flammability on the initiation of in-flight fires, and (c) post-crash survivability.

Anticipated Program Activities:

(1) Develop a new test apparatus and methodology for accurately measuring the heat release rate of honeycomb, thermoplastic, and other large surface-area cabin interior materials.

(2) Determine mode of flame spread of structural composites in hidden areas and enclosed spaces.

(3) Determine the efficacy of current emergency smoke ventilation procedures and certification criteria.

Expected Program Outcomes:

The outcome and benefit derived from this program will be the introduction of enabling technologies to prevent accidents caused by fire in freighter aircraft and hidden in-flight fires in passenger-carrying airplanes. New technologies of interest to the aircraft manufacturers and operators will be enabled in a fire-safe manner or prohibited if warranted.

FY 2017 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the Aircraft Safety Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA). As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

Advanced Materials/Structural Safety

FY2017 Funding: $4,113,000

Program Description:

The Advanced Materials/Structural Safety Program investigates a broad spectrum of issues related to the use of composite and advanced materials in aircraft structures. These include fatigue and damage tolerance issues from in-flight hail and ground vehicle collisions, environmental and aging effects, and bonded joints and repairs. The program also develops safety awareness training for advanced composite materials and manufacturing processes.

Program Objectives:

The Program conducts research to develop or validate dynamic test methods, procedures, and means of analysis to meet crashworthiness regulations. It helps ensure that new aircraft structures demonstrate levels of safety equivalent to existing aircraft structures when subjected to survivable crash conditions.

Anticipated Program Activities:

(1) Evaluate new material forms (e.g., discontinuous fiber composites) that have found application in primary aircraft structures.

(2) Address specific Aviation Rulemaking Advisory Committee inputs and certification needs for certification of composite aircraft.

Expected Program Outcomes:

The Advanced Materials and Structural Safety program will improve aviation safety through improved understanding of aerospace vehicle design, structure, and subsystems to reduce the potential for accidents and incidents and support the development of standards and policy and methodologies and tools for certification.

FY 2017 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

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Aeromedical Research

FY2017 Funding: $9,538,000

Program Description:

The Aeromedical Research program develops new and innovative ways to support FAA regulatory and advisory missions to improve the safety of humans in civilian aerospace operations. Research personnel at the Civil Aerospace Medical Institute (CAMI) supporting this program discover methods and recommend strategies to enhance the safety, security, health, and optimum performance of the most important aspect of the National Airspace System (NAS), the human operator and the public, which she/he serves.

Program Objectives:

The Aerospace Medical Research program is formulated to keep abreast of emerging human safety risk issues such as those brought by the aging pilot population and changes in their health condition, advances in pharmacology, therapeutic tools, and surgical procedures. Improved aircraft materials, equipment, cabin configurations, life support systems, and evacuation assistive devices all may affect survival from an aircraft accident. The program has also been designed to address the complexity of software, technology, and systems integration practices as these continue to evolve.

Anticipated Program Activities:

(1) Conduct Meta-Analysis of Data on the Effects of Radiation Exposure on Aerospace Crew Members

(2) Develop a forensic toxicology laboratory methodology to perform analysis of benzodiazepines in postmortem fluids and tissues.

(3) Conduct study to assess potential safety effects of deviations from required minimum oxygen concentration levels required in Technical Standard Order 89a for Class E oxygen masks

(4) Analyze medical certification and accident data to derive methods or tools to enhance aircrew health, education programs, and medical certification decision-making processes

Expected Program Outcomes:

The Aeromedical research program is expected to improve aviation safety through improved understanding of factors that influence human physiology and performance in

aerospace environments and guidance and tools that enhance human safety, protection, and survival during civil aerospace operations.

FY 2017 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the Aircraft Safety Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA). As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

Air Traffic Control/Technical Operations Human Factors

FY2017 Funding: $6,165,000

Program Description:

The Air Traffic Control/Technical Operations Human Factors Program emphasizes the concept of Human-System Integration (HSI) and safety aspects of the functions performed by Air Traffic Controllers and Technical Operations Personnel. The HSI concept addresses the interactions between workstation design, training and facility assignment, and human error and human performance.

Program Objectives:

The Air Traffic Control/Technical Operations (ATC/TO) Human Factors program provides ATO technical sponsors with timely and appropriate R&D products and consultation services that focus on improving the safety and efficiency of complex ATC systems, by measuring and enhancing individual and team performance of air traffic controllers and technical operations specialists. Five focus areas are: development and update of human factors standards; human factors efforts to optimize the controller and technical operations workforces; human factors efforts to reduce error and improve safety; human factors efforts to support integration of technology into the NAS; and development of recommendations and methods for enhancing human performance.

Anticipated Program Activities:

(1) Complete research on factors that contribute to training success, and transition research results into potential strategies that could increase the field training success rate of air traffic controllers (new hires and certified professional controllers-in-training) and maintainers.

(2) Complete the study of the effectiveness of FAA leadership training in the ATO, and make recommendations for improvement.

(3) Assess the utility of the MITRE Vectoring Tool and make recommendations about whether the tool can be used to make facility placement decisions for new air traffic controllers.

(4) Validate the Terminal Radar Approach Control training standards and determine the reliability of the evaluation criteria.

Expected Program Outcomes:

The Human Factors research program is expected to improve aviation safety through improved knowledge of the human-system interface and a reduction in accidents and incidents through enhanced aerospace vehicle, air traffic, and technical operations that adapt to, compensate for, and augment the performance of the human.

FY 2017 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the Human factors Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA). As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

Aircraft Catastrophic Failure Prevention Research

FY2017 Funding: $1,528,000

Program Description:

The Aircraft Catastrophic Failure Prevention Research Program develops technologies and methods to assess risk and prevent occurrence of potentially catastrophic defects, failures, and malfunctions in aircraft, aircraft components, and aircraft systems. The program uses historical accident data and National Transportation Safety Board (NTSB) recommendations to examine and investigate turbine-engine uncontainment events and other engine-related impact events.

Program Objectives:

The goal of this research program is to have a public tool with standardized generic models, user guides, training, software quality control process, and validated public material models. This will reduce workload and allow for the timely processing of applications.

Anticipated Program Activities:

(1) Update and revise the new impact and failure models available in LS-DYNA through the LS-DYNA Aerospace Users Group.

(2) Evaluate the new MAT213 composite modeling and properties available in LS-DYNA to assess the improvement in predictive modeling. This work will be coordinated with the NASA advanced composites program.

(3) Address the Australian Transportation Safety Board recommendation on the Airbus A-380 uncontained engine failure by incorporating any lessons learned from this accident into revision of the FAA Large Engine Uncontained Engine Debris analysis Report.

Expected Program Outcomes:

The Aircraft Catastrophic Failure Prevention Research Program is expected to improve aviation safety through improved understanding of aerospace vehicle design, structure, and subsystems to reduce the potential for accidents and incidents and support the development of standards and policy and methodologies and tools for certification.

FY 2017 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the Aircraft Safety Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA). As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

Aircraft Icing/Digital System Safety/Aircraft Cyber

FY2017 Funding: $5,102,000

Program Description:

The Aircraft Icing/Digital System Safety/Aircraft Cyber Program develops and tests technologies that detect frozen contamination, predict anti-icing fluid failure, and ensure safe operations in atmospheric icing conditions. The program also develops new guidelines for testing, evaluating, and approving digital flight controls, avionics, and other systems during the certification of aircraft and engines and studies the airworthiness requirements of airborne cyber security.

Program Objectives:

The Aircraft Icing program develops and tests technologies that detect frozen contamination, predict anti-icing fluid failure, and ensure safe flight operations in atmospheric icing conditions. A major goal of the program is to reduce aviation's vulnerability to all in-flight icing hazards.

The goal of the Digital Systems Safety program is to approve and maintain aircraft safety by taking a proactive approach to the ever changing technological marketplace and conduct research in the areas of advanced digitally-intensive systems and assess how they can safely be deployed in the onboard airborne systems of systems environment

The increased connectivity of aircraft systems - particularly to external networks and systems without sufficient security controls - could introduce information security vulnerabilities, which, if exploited, could impact safe aircraft operations and continued airworthiness. The Aircraft Systems Information Security / Protection (ASISP) cyber initiative aims to explore where ASISP-related threats and risks can compromise fail-safe mechanisms in the architecture, design, and operation of aircraft systems

Anticipated Program Activities:

(1) Conduct aerodynamic test of swept wing with ice shapes in ONERA F1 wind tunnel.

(2) Identify the assurance issues related to the applications running on virtual machines in airborne systems.

Expected Program Outcomes:

This program is expected to improve aviation safety through improved understanding of aerospace vehicle design, structure, and subsystems to reduce the potential for accidents

and incidents and support the development of standards and policy and methodologies and tools for certification.

FY 2017 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the Aircraft Safety Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act.(FACA). As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

Commercial Space Transportation Safety
FY2017 Funding: $2,953,000

Program Description:

The primary mission of the Commercial Space Transportation Office (AST) is to ensure the safety of the public, property, and national security and foreign policy interests of the U.S. during commercial launch and reentry operations. This program conducts research on emerging space concepts, technologies, and operating techniques in order to keep safety at the forefront of these activities.

Program Objectives:

The R&D Program is intended to enable advances in critical areas spanning four thematic areas that address safe and efficient integration of increased commercial space launch and re-entry activity into the NAS, advanced safety assessment methods, advanced vehicle safety technologies and methodologies, and human spaceflight and physiological safety factors.

Anticipated Program Activities:

(1) Review available data and analyses to identify priority areas of concern for repetitive use considerations of high utilization reusable spaceflight vehicles (Supports advanced vehicle safety technologies and methodologies).

(2) Assessment of screening and training requirements for pilots with repeated exposures to sustained high acceleration, as well as conduct aerobatic flights and National Aerospace Training and Research Center testing (Supports human spaceflight and physiological safety factors).

Expected Program Outcomes:

This program is expected to improve aviation safety through:

(1) Safe and efficient integration of increased commercial space launch and re-entry activity into the NAS.

(2) Improved vehicle safety and risk management, including knowledge of all safety-critical components and systems of the space vehicles and their operations, to better identify potential hazards and apply and verify hazard controls.

(3) Guidance and tools that enhance human safety, protection, and survival during space operations.

FY 2017 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the NAS Operations Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA). As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

Continued Airworthiness

FY2017 Funding: $10,269,000

Program Description:

The Continued Airworthiness Program promotes the development of technologies, procedures, technical data, and performance models to prevent accidents and mitigate accident severity, related to civil aircraft failures as a function of their continued operation and usage. The program focuses on longer-term maintenance of the structural integrity of fixed-wing aircraft and rotorcraft, continued safety of aircraft engines, development of inspection technologies and the safety of electrical wiring interconnect and mechanical systems.

Program Objectives:

Continued Airworthiness research will focus on emerging technologies such as damage tolerance and durability issues of new aluminum-lithium alloys, metal additive manufacturing (AM), new and emerging alloys. These will be studied for inclusion in Metallic Materials Properties Development and Standardization (MMPDS), and risk management methods to support the Aircraft Certification Services Monitor Safety/Analyze Data (MSAD) initiative, which is a data-driven, risk-based continued operational safety decision-making process.

Anticipated Program Activities:

(1) Develop test methods and provide data to assess bird strike avoidance and damage to rotorcraft.

(2) Provide technical data for use by the FAA for approving angle of attack systems installation on general aviation airplanes.

Expected Program Outcomes:

The Continued Airworthiness Program is expected to improve aviation safety through improved understanding of aerospace vehicle design, structure, and subsystems to reduce the potential for accidents and incidents and support the development of standards and policy and methodologies and tools for certification.

FY 2017 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the Aircraft Safety Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA). As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

Flight deck/Maintenance/System Integration Human Factors

FY2017 Funding: $8,513,000

Program Description:

The Flight deck/Maintenance/System Integration Human Factors program provides the research foundation for FAA guidelines, handbooks, orders, Advisory Circulars (AC's), technical standards orders and regulations that help ensure the safety and efficiency of aircraft operations. It also develops human performance information that the agency provides to the aviation industry for use in designing and operating aircraft, and training pilots and maintenance personnel.

Program Objectives:

Research results enable the FAA and industry to improve task performance and training for aircrew, inspectors, and maintenance technicians, improve training for UAS control station and crew, develop and apply error management strategies to flight and maintenance operations, and ensure certification of new aircraft and design or modification of equipment considers human factors.

Anticipated Program Activities:

Provide recommendations for Automatic Dependent Surveillance Broadcast/Cockpit Display of Traffic Information minimum operational performance standards and related FAA guidance.

Expected Program Outcomes:

This program is expected to improve aviation safety through improved knowledge of the human-system interface and a reduction in accidents and incidents through enhanced aerospace vehicle, air traffic, and technical operations that adapt to, compensate for, and augment the performance of the human.

FY 2017 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the Aircraft Safety Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA). As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

NextGen – Alternate Fuels for General Aviation

FY2017 Funding: $5,792,000

Program Description:

The NextGen – Alternative Fuels for General Aviation addresses the use of alternative and renewable fuels for GA to lessen aviation environmental impacts on air and water quality. The program develops data and methodologies to support certification of alternative aviation fuels for GA aircraft.

Program Objectives:

This research program provides critical knowledge (through screening and testing) to assure the continued operational safety of aircraft using a new unleaded fuel. Successful transition to an unleaded fuel will improve the environment by eliminating airborne lead from aviation sources and help sustain a vibrant segment of the nation's economy.

Anticipated Program Activities:

(1) Establish Phase two engine and aircraft test resources.

(2) Perform initial engine and aircraft testing.

Expected Program Outcomes:

The NextGen Alternative Fuels for General Aviation Program is expected to reduce environmental impact of aviation operation through the establishment of data and methodologies to support certification of alternative fuels for General Aviation aircraft.

FY 2017 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the Aircraft Safety Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA). As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

Propulsion and Fuel Systems

FY2017 Funding: $2,574,000

Program Description:

The Propulsion and Fuel Systems Program develops technologies, procedures, test methods, and criteria to enhance the airworthiness, reliability, and performance of civil turbine and piston engines, propellers, fuels, and fuel management systems.

Program Objectives:

The Propulsion and Fuel Systems Program conducts research on advanced damage-tolerance and risk assessment methods that provide the FAA's Office of Aviation Safety with the basis for new or revised engine certification and continued airworthiness standards. This research also supports preparation of Advisory Circulars (ACs) that provide industry with technical information on acceptable means of compliance with regulations. Benefits will accrue in the form of a reduced risk of engine failures and fewer accidents, which in turn will lead to fewer injuries and fatalities.

Anticipated Program Activities:

(1) Develop and release a DARWIN® analysis mode to support a proposed AC that addresses damage tolerance of blade attachment slots.

(2) Develop and implement an improved fleet risk analysis capability into the DARWIN® design code that is able to address inspection-related corrective actions to assess continued airworthiness associated with AC 39-8.

Expected Program Outcomes:

The Propulsion and Fuel Systems program is expected to enhance aviation safety through improved understanding of aerospace vehicle design, structure, and subsystems to reduce the potential for accidents and incidents and support the development of standards and policy and methodologies and tools for certification.

FY 2017 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the Aircraft Safety Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA). As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

System Safety Management/Terminal Area Safety

FY2017 Funding: $7,000,000

Program Description:

The System Safety Management/Terminal Area Safety Program develops risk management methods, prototype tools, technical information, and Safety Management System Procedures and Practices. In addition, the program develops an infrastructure that enables the free sharing of de-identified, aggregate safety information derived from government and industry sources in a protected manner. It also conducts research to leverage new technologies and procedures that enhance pilot, aircraft, and operational safety in terminal and enroute domains.

Program Objectives:

The System Safety Management program is designed to improve safety through developing safety data collection methods, advanced safety data and risk analysis techniques, and prototypes of risk-based decision-making capabilities to identify and analyze emerging safety issues in a cooperative nature with the aviation stakeholders. The program provides an ability to analyze trends across the aviation community that is much more effective than monitoring individual certificated entities, e.g., air operators and air traffic facilities.

The Terminal Area Safety program improves the safety of operations near or at an airport. It provides solutions to reduce fatal accidents in the terminal area through (a) improving flight crew response during upset and recovery with an effective indicator, (b) enabling safe helicopter approaches when using advanced vision systems, and (c) exploring consistent operational standards for a stable approach to reduce runway excursions.

Anticipated Program Activities:

(1) Develop concept of operations and a model to establish safety oversight profiles for Air Traffic Organization facilities, systems, procedures, and safety standards.

(2) Develop an integrated domain safety risk evaluation model of NAS critical systems to support the assessment and approval of NAS critical system changes and controls for high-risk hazards.

(3) Develop criteria for determining when a missed approach should be performed.

Expected Program Outcomes:

The System Safety Management/Terminal Area Safety program is expected to improve aviation safety through improved system-wide access and sharing of aviation safety data and analysis tools within the aviation community, providing safety resources that are integrated with operations of aviation industry stakeholders.

FY 2017 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

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Unmanned Aircraft Systems Research

FY2017 Funding: $8,422,000

Program Description:

The Unmanned Aircraft Systems (UAS) Research Program supports FAA efforts in implementing the Next Generation Air Transportation System (NextGen) by studying safety implications of new aircraft operational concepts and technology to the National Airspace System (NAS) and supporting the development of new and modified regulatory standards. The program's research activities focus on new technology assessments, methodology development, data collection and generation, laboratory and field validation, and technology transfer.

Program Objectives:

The portfolio of work will be focused on sense (detect) and avoid, control and communications, system safety criteria, modeling and simulation requirements, and research that will support the safe, efficient, and timely integration of UAS in the NAS within the 14 Code of Federal Regulations (CFR) regulatory framework. Additionally, funding will provide for engineering, technical, and management support of overall research activities.

Anticipated Program Activities:

(1) Develop prototype antenna and brass board electronics, lab-test and flight test antenna final designs for Airborne Collision Avoidance System antennas along with hardware/software for test data collection.

(2) Document the most optimal sensor fusion strategy and the sensitivity of each data fusion performance parameter in transitioning from sense and avoid Function one (remain well clear) to Function two (avoid collisions).

(3) Collect and analyze UAS Safety Data from Congressionally mandated test sites.

Expected Program Outcomes:

The Unmanned Aircraft Systems Research program is expected to improve aviation safety through improved understanding of aerospace vehicle design, structure, and subsystems to reduce the potential for accidents and incidents and support the development of standards and policy and methodologies and tools for certification.

FY 2017 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the Aircraft Safety Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA). As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

Weather Program

FY2017 Funding: $17,976,000

Program Description:

The Weather program conducts applied research focused on improving weather information required for integration into decision-support tools to reduce the impact of adverse weather on the NAS. The improved weather information increases safety by supporting better operational planning and decision-making by ATM, dispatchers, and pilots.

Program Objectives:

This program mitigates weather related NAS safety and/or traffic flow efficiency issues with a line of sight to operational exploitations. The applied research also supports the evolution of legacy weather capabilities that meet the weather information needs of today's NAS users into the capabilities that are being developed and deployed as NextGen decision-support weather tools. This work is frequently conducted in collaboration with the FAA's designated weather provider, the National Weather Service (NWS).

Anticipated Program Activities:

(1) Complete an initial evaluation of a national scale gridded forecast of CONUS ceiling and visibility conditions.

(2) Complete evaluation report on use of a common platform for Volcanic Ash Advisory Centers to promote common situational awareness of volcanic ash products.

(3) Conduct scientific meteorological assessments of advanced turbulence, convective, oceanic, & in-flight icing products.

(4) Implement into operational multi-radar multi-sensor (MRMS) system, dual polarization algorithms for distinguishing false radar returns; implement real-time data from radar sites in the Caribbean into MRMS.

(5) Conduct assessment of advanced convective weather forecast features (probabilistic/multi-modal forecasts).

(6) Improve and enhance modeling and simulation techniques to validate performance requirements for both direct and indirect weather dependencies.

(7) Derive significant meteorological information from grids in collaboration with the National Weather Service.

(8) Conduct assessment of Part 33, Appendix D (utilized 1950s data) ice crystal envelopes for engine icing using combined database from flight campaigns to determine if an Appendix D revision, resulting in certification and testing to a different total ice water content.

Expected Program Outcomes:

The Weather program is expected to improve aviation safety through

(1) Establishment of requirements and standards for enabling the availability and improving the quality and quantity of meteorological information to safely implement NextGen operational improvements and

(2) Improved accuracy and accessibility of observed and forecast weather to reduce the number of accidents and incidents attributed to hazardous weather.

FY 2017 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the NAS Operations Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA). As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

NextGen – Wake Turbulence

FY2017 Funding: $8,609,000

Program Description:

The NextGen – Wake Turbulence Program conducts research to increase airport runway capacity safely by reducing aircraft wake separation minima under certain conditions and addressing wake turbulence constraints in today's terminal and enroute airspace and in the future NextGen airspace designs.

Program Objectives:

Air Traffic Control contributes to flight delays and aircraft operating costs. By developing safe reductions to the existing air traffic control wake mitigation separations, this program will contribute to increased National Airspace System (NAS) capacity, enabling more flights with less cost and delay.

Anticipated Program Activities:

(1) Provide Boeing 737-Max series aircraft wake separations to ICAO and incorporate into ATC Orders and associated decision support automation.

(2) Develop a prototype controller decision support tool information display for use in dynamically reducing the required wake separations between aircraft in instrument approaches to a single runway.

(3) Complete development of the wake mitigation procedures to be applied to en route and transition airspace trajectory based operations.

(4) In collaboration with the FAA's Flight Standards Service, accomplish large scale flight data recorder screenings of an aircraft series for potential medium- to low-level wake encounter events, for use in establishing the statistical base for future assessments of ATC procedure changes.

(5) Complete revision of en-route aircraft wake turbulence generation fast time model, using data collected from en-route wake measurements.

Expected Program Outcomes:

The NextGen – Wake Turbulence research program is expected to improve efficiency through improved aircraft separation processes associated with current generalized and static air navigation service provider wake turbulence mitigation separation standards

FY 2017 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the NAS Operations Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA). As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

NextGen – Air Ground Integration Human Factors

FY2017 Funding: $8,575,000

Program Description:

The NextGen – Air Ground Integration Human Factors Program addresses flight deck and ATC integration for NextGen operational capabilities. It focuses on human factors issues that primarily affect the pilot side of the air-ground integration challenge. It conducts research to ensure pilots receive the right information at the right time for decision-making and collaboration with ATC to operate in the NAS efficiently.

Program Objectives:

The NextGen - Air Ground Integration Human Factors addresses flight deck and air traffic service provider integration for each operational improvement or NextGen application considered, with a focus on those issues that primarily affect the pilot side of the air-ground integration challenge. Through use of simulation, and demonstration, the program assesses interoperability of tools, develops design guidance, determines training requirements, and verifies procedures to support certification, flight standards, and the FAA's Air Traffic Organization's service units for ensuring safe, efficient, and effective human system integration in transition of NextGen capabilities.

Anticipated Program Activities:

Create a report presenting human factors considerations for the evaluation and integration of electronic flight bag/portable electronic device/tablet technologies with NextGen applications/operations.

Expected Program Outcomes:

This program is expected to improve human-system integration and an increase in ATC efficiency through enhanced controllers-pilots coordination in cooperatively managing traffic loads as cockpit technology and air traffic workstations are more closely connected.

FY 2017 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the Human Factors Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA). As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

NextGen – Weather Technology in the Cockpit

FY2017 Funding: $4,059,000

Program Description:

The NextGen – Weather Technology in the Cockpit does research to develop, verify, and validate recommended requirements for incorporation into MinWxSvc standards. The MinWxSvc is defined as Meteorological Information (MET,) minimum performance standards (e.g., accuracy) of the MET information, minimum information rendering standards, and enhanced training on cockpit MET information and technology.

Program Objectives:

To develop the MinWxSvc recommendations, WTIC research is performing gap analyses to identify operational shortfalls impacting efficiency attributable to adverse weather conditions and associated gaps of MET information in the cockpit. The MinWxSvc standards will resolve the identified MET information gaps to mitigate the efficiency-related operational shortfalls.

Anticipated Program Activities:

(1) Quantify NAS benefits from up linking/crosslink of enhanced meteorological information to the cockpit.

(2) Perform simulations and/or demonstration of providing initial minimum weather service enhanced wind information (accuracy, timeliness, etc.) recommendations to the Flight Management System and Air Traffic Control Systems to verify realization of predicted benefits of associated NextGen application program(s).

Expected Program Outcomes:

This program is expected to improve efficiency through:

(1) Establishment of requirements and standards for enabling availability and improving the quality and quantity of meteorological information to reduce impacts of adverse weather on rerouting, NAS capacity, and NextGen operational procedures and

(2) Improved accuracy and accessibility of observed and forecast weather information to improve NAS efficiency (e.g., reduced delays and cancellations, increased capacity in high traffic areas).

FY 2017 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the NAS Operations Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA). As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

NextGen – Information Security
FY2017 Funding: $1,000,000

Program Description:

The NextGen – Information Security program supports the FAA Cyber-Security Strategic Plan goals and objectives to protect and defend the FAA networks and systems deter and mitigate risks of cyber-attacks.

Program Objectives:

The purpose of this program is to conduct research to help prevent disruptive cyber incidents that affect the Air Traffic Control (ATC) mission and improve resiliency in the event an incident does occur. While the current measures in place for the information security for the National Airspace System (NAS) are robust, the rapidly evolving capabilities of our potential adversaries and sharply decreasing costs of exploits will continue to necessitate some prudent exploration of advanced detection and defense capabilities for the NAS systems.

Anticipated Program Activities:

(1) Develop program plan and research initiatives to support the FAA Cybersecurity Strategic Plan.

(2) Formulate research activities to support national aviation system priority needs set forth by the FAA Cybersecurity Steering Committee.

Expected Program Outcomes:

The program is expected to improve efficiency through improved cyber resiliency for the NAS system of systems in the case of determined adversaries with persistent attacks that try to undermine the NAS.

FY 2017 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This is a new start initiative which will be fully shaped – if funded – in 2017. No public input has been specifically sought in defining the program at this point. However, the program directly supports the Executive Order (EO) 13636 Improving Critical Infrastructure Cybersecurity and the Presidential Policy Directive (PPD)-21 Critical Infrastructure Security and Resilience, which defines Transportation Systems Sector as one of the 16 critical infrastructure sectors and aviation as an essential sub-sector.

Environment and Energy

FY2017 Funding: $15,013,000

Program Description:

The Environment and Energy Program characterizes aircraft noise and emissions as well as their consequential impacts on the environment. It then provides guidance on mitigating such impacts and provides fundamental knowledge, development, and validates methodologies, models, metrics, and tools. It analyzes and balances the inter-relationships between noise and emissions and considers local to global impacts as well as determine economic consequences. The program also reduces scientific uncertainties related to aviation environmental issues to support decision-making.

Program Objectives:

The Environment and Energy program is studying the impacts of aviation, specifically from jet engines, on the environment while providing analysis to support the development of solutions to mitigate those impacts. At the core of the program is the development and use of an integrated aviation environmental tool suite. This tool suite is built upon a sound scientific understanding - which is also being developed as a part of this program - of aviation noise and emissions; as well as their environmental, health, and welfare impacts. The program is using these models and knowledge to inform decision-making on policies and technology development relating to aviation's energy use and environmental impacts.

Anticipated Program Activities:

(1) Refine methods for estimation of aircraft contribution to climate change and implement them in analytical tools.
(2) Advance the understanding of noise impacts on social welfare and health.

Expected Program Outcomes:

The E&E program will contribute to reduce environmental impacts of aviation through:

(1) Reduced significant community noise impacts in absolute terms.
(2) Reduced impact of aviation emissions on air quality and global climate and
(3) Improved energy efficiency and assured availability of sustainable alternative jet fuels.

FY 2017 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
Policy, Planning & Environment Technical Center	Volpe National Transportation Systems Center

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the Environment and Energy subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA). As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

NextGen – Environmental Research Aircraft Technologies, Fuels and Metrics

FY2017 Funding: $26,174,000

Program Description:

The NextGen – Environmental Research Aircraft Technologies, Fuels and Metrics Program develops solutions to mitigate aviation environmental impacts in absolute terms and increase fuel efficiency. It matures aircraft technologies through the Continuous Lower Energy, Emissions and Noise (CLEEN) Program to reduce noise and emissions at the source level. It assesses, demonstrates, and supports qualification of alternative aviation fuels that reduce emissions that impact air quality and climate change. Availability of alternative aviation fuels also increases energy security. The program also supports research to determine the appropriate goals and metrics to manage NextGen aviation environmental impacts needed to support EMS.

Program Objectives:

The program is developing solutions to reduce the impacts associated with aviation noise and exhaust emissions, and increasing energy efficiency and availability. In collaboration with industry, the program will accelerate the maturation of engine and airframe technologies to reduce aviation noise, fuel use, and emissions that impact air quality and climate change. It will also provide test data, analyses, and methodologies to overcome barriers to the adoption of alternative jet fuels that could serve as drop-in replacements for today's petroleum-derived turbine engine fuels. This will lead to faster deployment of these fuels and the faster realization of the accompanying environmental improvements and economic development that will come with this new industry. The NextGen – Environmental Research – Aircraft Technologies, Fuels, and Metrics program is providing the FAA with funding to accelerate the maturation of aircraft and engine technologies and develop alternative jet fuels.

Anticipated Program Activities:

(1) Demonstrate Continuous Lower Energy, Emissions and Noise Advanced Turbine Components.

(2) Demonstrate technologies that can reduce energy use, emissions, and noise in year three of the second phase of the Continuous Lower Energy, Emissions and Noise Program.

Expected Program Outcomes:

The NextGen – Environmental Research – Aircraft Technologies, Fuels, and Metrics program will contribute to reduce environmental impacts of aviation through:

(1) Reduced significant community noise impacts in absolute terms.
(2) Reduced impact of aviation emissions on air quality and global climate and
(3) Improved energy efficiency and assured availability of sustainable alternative jet fuels.

FY 2017 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
Policy, Planning & Environment Technical Center	Volpe National Transportation Systems Center

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the Environment and Energy Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA). As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

System Planning and Resource Management

FY2017 Funding: $2,788,000

Program Description:

This program provides cross-cutting research and development portfolio planning, development, management and coordination. It produces the National Aviation Research Plan (NARP), an annual strategic plan for FAA Research and Development (R&D). The program also administers the congressionally mandated (P.L. 100-591 Section 6 Advisory Committee) Research, Engineering and Development Advisory Committee (REDAC) and provides single point of coordination, advocacy and outreach for the FAA research program.

Program Objectives:

The program maintains liaison with all organizational elements and stakeholders participating in the agency's R&D program and ensures cohesion and alignment of the FAA R&D portfolio with national and departmental strategic priorities. It ensures that alignment is expressed and is traceable in all internal planning, coordination and management deliverables.

Anticipated Program Activities:

On an annual recurring basis the program performs the following core activities:

(1) Prepare the FY 2019 R,E&D budget submission.

(2) Manage FAA's R,E&D portfolio to meet efficiency goals.

(3) Process REDAC recommendations on planned R&D investments for FY 2019.

(4) Deliver the 2017 NARP to Congress with the President's FY 2018 budget request.

Research Collaboration

(5) Conduct the 2016 International Conference on research in air transportation.

(6) Conduct planning for the 2017 International ATM R&D Seminar.

Expected Program Outcomes:

Timely and effective planning, formulation, coordination and management of FAA's R&D portfolio leading to a more effective research program that will benefit the public by making aviation safer and smarter and enhancing the U.S. global leadership in aviation.

FY 2017 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
R&D Coordination	**OST-R**

How Program meets statutory requirements:

This program produces the National Aviation Research Plan (NARP), which is a report of the Federal Aviation Administration to the United States Congress pursuant to Section 44501(c) of Title 49 of the United States Code. It also produces and submits to the Office of the Secretary of Transportation the Annual Modal Research Plan (AMRP) as required by the Fixing America's Surface Transportation (FAST) Act - P. L. 114-94 (Sec. 6501(a)(1)).

Finally, this program administers the FAA Research Engineering and Development Advisory Committee (REDAC) process in accordance with statutory requirements set forth in the Aviation Safety Research Act of 1988 (P.L. 100-591) and P.L. 101-the Federal Aviation Administration Research, Engineering and Development Authorization Act of 1990 (P.L. 101-508)

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

This program is largely about coordination, facilitation, management and reporting of FAA R&D program activity. Continuous liaison with internal and external stakeholders is in fact the essence of the program and the means of obtaining input.

William J. Hughes Technical Center Laboratory Facility

FY2017 Funding: $3,412,000

Program Description:

This program sustains research facilities located at the William J. Hughes Technical Center Laboratory (WJHTC) to support Research and Development (R&D) program goals. These programs require specialized facilities to emulate and evaluate field conditions. The R&D programs require flexible, high-fidelity laboratories to perform full mission, ground-to-air and Human-In-The-Loop (HITL) simulations. The R&D laboratories are comprised of the simulation facilities, the flight program's airborne laboratories, and the Human Factors (HF) laboratory.

Program Objectives:

The program provides an integrated laboratory platform for the purpose of demonstrating operational procedures, defining human and system performance requirements, full-mission demonstrations integrating NextGen air and ground capabilities for pilot separation responsibility and controller efficiencies, and analysis, evaluation, and validation of R&D milestones. The funding provides for project support, engineering support, aircraft fuel costs, pilot certification and training, equipment and software hardware licenses for support tools.

Anticipated Program Activities:

The work under this program is largely aimed at sustainment and upgrade activity to maintain readiness to support R&D performing program customers as specified below:

Simulation Facilities

(1) Provide simulated test environments for ongoing research such as for UAS in the NAS, and commercial space vehicle research.

(2) Achieve a fully integrated weather and traffic simulation capability on the simulators' window visual systems and on the avionics weather displays – is manifested as turbulence in the simulator motion bases. Traffic will be displayed on all visual systems including Traffic Alert and Collision Avoidance System and traffic information service avionics and depicted on air traffic situation displays.

Flight Program's Airborne Laboratories

(3) Provide the appropriate flying laboratory to meet the needs of our flight test customer. The flight program will be provided appropriately with trained flight crew, maintained aircraft, and fueled aircraft; at the location required for testing for the period of time requested, in addition to any modifications to the test aircraft required by the program.

Concepts and Systems Integration – HF

(4) Provide the necessary resources, including equipment and personnel, to maintain the HF Laboratory in a state of readiness to conduct HF simulations.

(5) Enhance the HITL air traffic control simulation platform to include project specific prototypes and data collection capabilities.

Expected Program Outcomes:

Successful program execution will result in a capable and ready integrated laboratory platform to support R&D project performance in demonstrating operational procedures, defining human and system performance requirements, full-mission demonstrations integrating NextGen air and ground capabilities for pilot separation responsibility and controller efficiencies, and analysis, evaluation, and validation of R&D milestones.

FY 2017 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program provides cross-cutting laboratory support services to diverse research projects. Stakeholder engagement and input occurs at the project level at the point of planning and requirements development for particular projects.

Advanced Technology Development and Prototyping

FY2017 Funding: $24,800,000

Program Description:

The Advanced Technology Development and Prototyping portfolio includes diverse research projects to develop and validate technology and systems that support air traffic services. These initiatives support the requirements associated with the evolving air traffic system architecture and improvements in airport safety and capacity. These programs are described in the National Aviation Research Plan (NARP) and are summarized below:

The ***Runway Incursion Reduction Program (RIRP)*** conducts research, development, and operational evaluation of technologies to increase runway safety. Consistent with standing National Transportation Safety Board recommendations, research emphasis will remain on technologies that provide direct safety indications and alerts to pilots at large airports, as well as, those that can be applied cost effectively at small to medium airports.

The ***Operations Concept Validation and Infrastructure*** program develops and validates NAS level operational concepts that are key to the FAA modernization programs and NextGen. Developing operational concepts is the first step in developing an Enterprise Architecture. The program conducts the overall analysis and planning for NAS evolution by determining the required annual updates to the NAS Enterprise Architecture products: Operational Improvements, Operational Sustainment, and Operational Requirements.

The ***Major Airspace Redesign*** program funds physical changes in facilities necessary to accommodate airspace redesign. Implementation of an airspace redesign frequently results in changes to the number and span of control of operational positions or sectors, including changes to sector, area or facility boundaries.

Program Objectives:

Runway Incursions (RI) are a leading safety concern of the FAA and the ***Runway Incursion Reduction Program*** helps to identify solutions that can aid in preventing them. The program will pursue a strategy of "right site, right size" to identify candidate technologies that are best suited to a variety of airports in order to address the specific types of RI causal factors encountered at that site (e.g. converging runways, ground vehicle operations, taxiway/runway hotspots, wildlife, etc.).

Concept development and validation is necessary to investigate specific concept elements, and to drive out operational and technical requirements and implications for human factors, training and procedures. The ***Operations Concept Validation and Infrastructure Evolution*** program assesses the interaction of changing roles and responsibilities of NAS service providers and pilots, airspace changes, procedural changes and new mechanized systems for distributing weather, traffic and other flight related information.

The ***Major Airspace Redesign*** program is the FAA initiative that ensures all airspace related efficiency benefits facilitated by the Major Airspace Program, facility changes, and automation improvements are achieved. Major Airspace Redesign serves as one of the FAA's primary efforts to modernize the Nation's airspace. The purpose of this national initiative is to review, redesign and restructure airspace.

Anticipated Program Activities:

Following is a selected set of anticipated activities for the projects described above:

(1) Runway Incursion Reduction Program

(a) Complete annual technical and operational evaluation report of existing Runway Incursion Reduction Program prototype systems

(b) Complete annual report documenting results of human-in-the-loop testing human factors, safety logic, aircraft performance, or any uncertainty or deficiency pertaining to surface based runway incursion indications

(c) Complete annual report on testing of safety logic enhancements to runway incursion detection and prevention products

(2) Operations Concept Validation and Infrastructure Evolution

(a) Develop annual updates to the NAS Enterprise Level Operational Requirements based on prior year research and development

(b) Develop annual updates to the NAS Enterprise Architecture for NAS level operational improvements and operational sustainment activities based on prior year research and acquisition decisions

(c) Conduct concept engineering activities and develop concept engineering/requirements validation artifacts, such as shortfall analyses, concept of operations, requirements, technical assessments, and evaluation documents

(3) Major Airspace Redesign

(a) Conduct engineering analysis as needed for Caribbean airspace redesign implementation.

(b) Implement infrastructure changes resulting from airspace redesign

Expected Program Outcomes:

The **Runway Incursion Reduction Program** is expected to improve aviation safety by ensuring no fatal accidents on certificated airports as a result of airport design, runway incursions or excursions, or wildlife strikes. The program will continue its mission to develop safety technologies that can then be applied at not just large airports, but also small-to-medium sized airports with commercial service throughout the NAS that have seen a recent uptick in the rate of runway incursions.

Both the **Operations Concept Validation and Major Airspace Redesign** programs are expected to improve efficiency by developing feasible procedures, operational methods, and technologically-advanced systems that can decrease workload and increase efficiency of the NAS. The Operational Concept Validation program will perform the early concept research for advanced operational concepts to ensure they are well understood and are based on valid assumptions. The airspace redesign projects are projected to deliver benefits through the reduction of restrictions, shorter flight distances, more fuel efficient routes, and reduced delays.

FY 2017 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
ATDP	**None**

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the NAS Operations Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act (FACA). As appropriate, particular findings and

recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

NextGen Separation Management Portfolio

FY2017 Funding $25,800,000

Program Description:

The Separation Management portfolio conducts pre-implementation activities to reduce risk, and implementation activities supporting the safe and efficient separation of aircraft and other vehicles in the National Airspace System (NAS). Risk reduction activities may include validation of concepts or technologies; demonstration and integration of operational capabilities; and an understanding of the role of the human through cognitive engineering experiments. Separation Management evaluates and matures concepts and capabilities that focus on the enhancement of separation assurance through the use of both ground based automation and aircraft technology enhancements. Pre-implementation research conducted under this portfolio includes:

a. Oceanic Tactical Trajectory Management

The Oceanic Tactical Trajectory Management (OTTM) program addresses current performance gaps in the areas of capacity, productivity, efficiency, safety, and environmental impacts in the oceanic environment. Oceanic Trajectory Management in Four Dimensions (OTM-4D) is the OTTM mid-term concept. The key objective of this concept is to use trajectory-based operations to improve fuel efficiency, system predictability, and performance by enabling airlines and other operators to flight plan and fly closer to their optimal (or preferred) 4D trajectories while in oceanic airspace.

b. Wake Turbulence - Re-Categorization

The RECAT project develops wake separation standards that provide increased airspace and airport throughput capacity without aircraft equipage costs or runway expansions. This project has been part of a joint EUROCONTROL and FAA program that had reviewed the then required wake mitigation aircraft separations used in both the USA's and Europe's air traffic control processes and determined the those standards could be safely modified to increase the operational throughput capacity of airports and airspace that will have heavy operational demand in the NextGen era.

c. UAS Concept Validation and Requirements Development

The UAS Concept Validation and Requirements Development Program conduct the overall analysis and planning for the development, integration, and subsequent implementation of emerging UAS enabling technologies. [Note: A Separate FY2017 RDT Project Description for this initiative is included in the AMRP].

Program Objectives:

Oceanic Tactical Trajectory Management

OTTM will conduct research and development to provide enhanced User Trajectory Planning through coordination capabilities. Trajectory coordination enables interactive flight plan collaboration between airspace users and the FAA in which the airspace user informs the FAA of his intended 4D oceanic trajectory and receives feedback prior to the flights entry into oceanic airspace about the likelihood of achieving that trajectory based on other oceanic flights intended trajectories.

Wake Re-Categorization

The program will complete Phase II standards which will provide the runway throughput optimal wake separation standards/procedures for Core airports that have different fleet mixes than the airports that implemented and received benefit from the RECAT Phase I wake separation standards.

UAS Concept Validation and Requirements Development

See separate FY2017 RDT Project Description.

Anticipated Program Activities:

Following is a selected set of anticipated activities for the projects described above:

(1) Oceanic Tactical Trajectory Management

(a) Complete benefits analysis and validation and report results

(b) Develop Functional Analysis for Controller 4D Trajectory Insight

(c) Conduct modeling and simulation and report results for: Traffic Congestion Depiction and Flight Specific Likelihood Feedback, Pre-Oceanic Coordination Planner, and Re-Profile Alert

(d) Complete tech transfer and associated documentation

(2) Wake Re-Categorization

(a) Complete concept feasibility description of dynamic wake separation standards

(b) Complete initial deployment of the RECAT Phase II wake separation standards to three metropolitan area airports – for evaluation of the standards use and modification (if required) for ease of application by controllers

(c) Develop detail descriptions of ATC dynamic wake separation standards alternatives and how they would be applied in the NAS

(d) Deliver briefings to and conduct data gathering with the aviation community concerning alternative ATC dynamic wake separation processes and procedures

(3) UAS Concept Validation and Requirements Development

(a) See separate FY2017 RDT Project Description.

Expected Program Outcomes:

The projects described above are expected to improve efficiency through:

(1) Improved methods and/or capabilities that enable safe reduction in separation standards, increase in airspace capacity, and/or efficient management of aircraft trajectories. **(OTTM)** and

(2) Improved aircraft separation processes associated with current generalized and static air navigation service provider wake turbulence mitigation separation standards. **(Wake RECAT)**

FY 2017 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the NAS Operations Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA) As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

NextGen Improved Surface Portfolio

FY2017 Funding: $2,000,000

Program Description:

The Improved Surface portfolio conducts pre-implementation activities to reduce risk and implementation activities supporting the TFDM System. The work will focus on the development of efficient traffic flow management and collaborative decision making on the surface by providing a key ground infrastructure program for NextGen mid-term operations. Pre-implementation research conducted under this portfolio includes:

Surface Tactical Flow

The Surface Tactical Flow (STF) Program develops trajectory-based surface operations in support of NextGen. It leverages the development efforts of the NASA Surface Management System (SMS) and provides guidelines for the development of a collaborative Surface Traffic Management (STM) system.

Program Objectives:

The Surface Tactical Flow program will conduct research activities to develop and mature Surface Trajectory-Based Operations (STBO) capabilities to leverage and extend mid-term STBO capabilities of information sharing, planning and scheduling, and taxi route management.

Anticipated Program Activities:

(1) Conduct initial integration testing of departure scheduling with coordination of traffic management initiatives to provide inputs to the Airspace Technology Demonstration – 2 (ATD-2)

(2) Analyze Flight Strip event data from lesser equipped airports for integrating departure traffic into metroplex departure schedules

Expected Program Outcomes:

The Surface Tactical Flow program is expected to improve efficiency through improved methods, technologies and capabilities that enable increased surface traffic movement efficiency.

FY 2017 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the NAS Operations Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA) As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

NextGen On-Demand NAS Information Portfolio

FY2017 Funding: $8,500,000

Program Description:

The On Demand NAS Information (ODNI) portfolio conducts pre-implementation activities to reduce risk supporting the exchange of information between FAA and other National Air Space (NAS) users. The portfolio provides flight planners, Air Navigation Service Providers (ANSP) staff, and flight crews with consistent, complete, and easily processed information on changes of conditions in the NAS affecting safety, security, and efficiency. The ODNI portfolio examines concepts and matures capabilities through validation activities, demonstrations conducted with stakeholders, and human systems engineering to mitigate adverse impacts and to exchange information efficiently and securely between FAA and NAS users. Pre-implementation research conducted under this portfolio includes

Advanced Methods

Advanced Methods is a pre-implementation engineering analysis and requirements program that addresses shortfall areas identified by ATO programs and provides possible solutions to future ATM system work packages. Specifically Advanced Methods is focusing on addressing shortfall areas identified in the Traffic Flow Management (TFM) Shortfall Analysis which was coordinated with industry partners.

Program Objectives:

The Advanced Methods program will support improvements to increase airport capacity and sector throughput, and reduce sector delays by providing the NAS users and Air Traffic Management with a common understanding of the NAS constraints. The program will develop and test prototype improvements and provide operational concepts and requirements for implementation by automation programs and operational organizations.

Anticipated Program Activities:

Following are anticipated activities for the Advanced Methods project. Conduct concept engineering activities to develop the following products for individual capabilities under Constraint Prediction, Monitoring and Alerting, Operational Response Development, and TFM System Performance Analysis Capability:

(1) Updated Capability Functional Analysis,

(2) Updated Capability Requirements and

(3) Rough order of magnitude cost estimates

Expected Program Outcomes:

The Advanced Methods project is expected to improve efficiency through feasible procedures, operational methods, and technologically-advanced systems that can decrease workload and increase efficiency of the NAS.

FY 2017 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the NAS Operations Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA) As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations

NextGen Improved Multiple Runway Operations Portfolio

FY2017 Funding: $6,500,000

Program Description:

The Improved Multiple Runway Operations (IMRO) portfolio conducts pre-implementation activities to reduce risk in support of multiple runway operations. The IMRO Portfolio improves runway access through the use of improved technology, updated standards, safety analysis, and modifications to air traffic monitoring tools and operating procedures that will enable more arrival and departure operations. Improving runway access equates to reduced delays that occur now when demand exceeds the capability of the airport's runways. Pre-implementation research conducted under this portfolio includes:

Closely Spaced Parallel Runway Operations

Closely Spaced Parallel Operations (CSPO) is the simultaneous approach of aircraft pairs into airports with single and multiple parallel runways that are closely spaced (runways that are less than 4,300 feet apart). The CSPO program will accelerate activities to provide increased arrival operations to airports with closely spaced parallel runways in IMC. CSPO will develop the performance requirements that enable the implementation of innovative procedures, tools and/or controller/pilot aids that increase capacity at airports utilizing multiple independent and dependent operations.

Program Objectives:

Closely Spaced Parallel Operations

Closely Spaced Parallel Operations project is focused on finding safe ways to recover capacity lost by the current aircraft-to-aircraft separation procedures required for simultaneous operations to closely spaced parallel runways during limited visual conditions. The goal of CSPO analysis is to maintain the same arrival and departure rates regardless of weather conditions.

Anticipated Program Activities:

Following are anticipated activities for the Closely Spaced Parallel Operations project

(1) Perform analysis of data collected in Paired Approach (PA) to CAT I minima human in the loop (HITL) simulations and provide technical report

(2) Complete Simultaneous Approaches using High Update Rate surveillance technical report and supply a status memo

(3) Perform analysis of course divergence on departure to support future CSPO departures HITL simulations and provide technical report

(4) Complete Demonstration Execution Plan

(5) Perform safety assessment for flight demonstration

(6) Complete prototype demonstration cockpit avionics and ground ATC tools (as needed)

Expected Program Outcomes:

The Closely Spaced Parallel Operations project is expected to improve efficiency through safe reduction in separation standards for approaches to closely spaced parallel runways to enable increased airport capacity**.**

FY 2017 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the NAS Operations Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA) As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

NextGen – NAS Infrastructure Portfolio

FY2017 Funding: $17,660,000

Program Description:

The NAS Infrastructure portfolio conducts pre-implementation activities to reduce risk for aviation weather-related and cross-cutting engineering issues. This portfolio provides the research, development, and analysis of portfolio capabilities such as validation activities, human system engineering, and demonstrations. Work with this portfolio addresses aviation weather-related issues by supporting the improvement of (1) air traffic management (ATM) decision-making during adverse weather conditions, (2) weather forecasting in the transformed NAS, and (3) existing weather infrastructure. Surface/Tower/Terminal Systems Engineering, NextGen Navigation Engineering, New ATM Requirements, NextGen DME, and Information Management conduct analysis to develop solutions that can apply across the NAS domain. Pre-implementation research conducted under this portfolio includes:

a. New Air Traffic Management Requirements

The New Air Traffic Management (ATM) Requirements Program identifies new opportunities to improve the efficiency and effectiveness of ATM and expanding capacity by developing decision support tools that improve the strategic management of operations in the NAS. [Note: A Separate FY2017 RDT Project Description for this initiative is included in the AMRP]

b. Weather Observation Improvements

The NextGen Weather Observation Improvements Program manages the evolution of the existing aviation weather observation sensor networks to one that provides the optimal quantity and quality of ground, air, and space-based sensors.

Program Objectives:

NAS Weather Observation Improvements

The NAS Weather Observation Improvements Program uses data to explore potential NextGen-enabled concepts and to mitigate the high priority shortfalls. In the near term, this program is addressing current limitations of the sensor network for the Terminal environment.

New ATM Requirements

The service analysis and operational demonstration activities within New Air Traffic Management (ATM) Requirements Program support the development of operational improvements that will increase the number of arrivals and departures at major airports. [See separate FY2017 RDT Project Description].

Anticipated Program Activities:

Following are anticipated activities for the NAS Weather Observation Improvements project: [See separate FY2017 RDT Project Description for New ATM Requirements anticipated activity]

(1) Produce a concept maturity technology plan for terminal wind operational improvements that identifies improved spatial sampling in the terminal area, improved information availability, and sensor modernization and consolidation opportunities

(2) Complete update of weather observations shortfall analysis; ascertain stakeholder buy-in and prioritization, and document terminal winds operational improvement in NAS Infrastructure portfolio

(3) Deliver assessment of market technologies and maturing research and development programs for adverse wind mitigating applications

(4) Complete required AMS system engineering artifacts for terminal-area adverse winds useful segment

Expected Program Outcomes:

The Weather Observation Improvements project is expected to improve efficiency through:

(1) The establishment of requirements and standards for enabling availability and improving the quality and quantity of meteorological information to reduce impacts of adverse weather on rerouting, NAS capacity, and NextGen operational procedures and

(2) Improved accuracy and accessibility of observed and forecast weather information to improve NAS efficiency (e.g., reduced delays and cancellations, increased capacity in high traffic areas.

FY 2017 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the NAS Operations Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA) As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

NextGen Laboratory Support Portfolio

FY2017 Funding: $12,000,000

Program Description:

The NextGen – Laboratory Support Portfolio focuses on evaluating future concepts and technologies to support technical transfer to the implementing organizations, promoting industry involvement, and identifying implementation challenges and research areas. This work supports the infrastructure needed to complete those demonstrations and studies, measures performance impacts of NextGen capabilities, reports progress in the performance of implemented capabilities at specific locations, as well as updates the NSIP.

The NextGen Laboratories [NextGen Integration Evaluation Capability (NIEC) and Florida Test Bed (FTB)] enable research activities that support pre-implementation and risk reduction activities by providing a platform to conduct validation, modeling, and demonstrations.

Program Objectives:

The laboratory support portfolio is intended to provide a robust platform where early-stage NextGen concepts can be integrated, demonstrated, and evaluated. These laboratories provide the FAA and industry an agile environment for the rapid integration of new and emerging technologies. It also promotes contributions and R&D investment from industry and leverages industry's capabilities, resulting in cost avoidance to the FAA and accelerated NextGen development.

Anticipated Program Activities:

Following are anticipated activities supported by the Laboratory Support Portfolio projects: [A separate RDT Project Description for the Florida Test Bed is included in the AMRP]

NextGen Integration and Evaluation Capability (NIEC Laboratory):

Perform upgrades to support NextGen demonstration and simulation activities

Enhance the air ground data communication capabilities between the Air Traffic Controller positions and the cockpit simulator

Florida Test Bed (Lab FTB):

Refer to separate project description for additional detail.

Expected Program Outcomes:

The projects described above are expected to improve efficiency by enabling concept engineering and evaluation activities that reduces the risk of successful implementation of ATM concepts and capabilities that improve NAS operational efficiency.

FY 2017 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is in and of itself a pathway to obtaining stakeholder input. Specifically, the NIEC laboratory is used to expose stakeholders in the ATM operational user community to emerging NextGen concepts and capabilities in order to gain their assessment of the potential operational effectiveness and/or suitability of the concept for use in further maturation and development. The Florida Test Bed is used to engage industry stakeholders in the prototyping and demonstration of emerging concepts and thereby promote mutual (FAA and industry) understanding of concept maturity, technology readiness and areas needing further development.

RD&T Projects
($5.0M or greater)
Fiscal Year 2017

FY 2017 RD&T Project Funding Details

RD&T Project Name	FY 2017 Pres. Budget ($000)	FY 2017 Basic	FY 2017 Applied	FY 2017 Development	FY 2017 Technology
UAS Concept Validation and Requirements Development	9,000			9,000	
New ATM Requirements	8,000			8,000	
Florida Test Bed	7,300			7,300	
Totals	24,300			24,300	

FY 2017 RD&T Project Budget Request by DOT Goal

RD&T Project Name	FY 2017 Pres. Budget ($000)	Safety	State of Good Repair	Economic Competitiveness	Quality of Life in Communities	Environmental Sustainability
UAS Concept Validation and Requirements Development	9,000			9,000		
New ATM Requirements	8,000			8,000		
Florida Test Bed	7,300			7,300		
Totals	**24,500**			**24,500**		

UAS Concept Validation and Requirements Development

FY2017 Funding: $9,000,000

(Start and End Dates: IAW Concept Maturation and Investment Schedule)

Project Description:

The UAS Concept Validation and Requirements Development Program is part of the NextGen Separation Management Portfolio, The program conducts the overall analysis and planning for the development, integration, and subsequent implementation of emerging UAS enabling technologies. The program executes concept development, engineering analysis, and evaluation in support of mission analysis and investment analysis activities. This program also conducts shortfall analyses as part of service analysis and ensures the linkage of proposed solutions back to validated operational needs

Project Objectives:

UAS operations have increased dramatically in both the public and civil sectors. This proliferation consequently introduces greater operational risk and exposure to the users of the National Airspace System (NAS). As such, air traffic products, policies, and procedures must be reviewed and refined, or newly developed through supporting concept maturation work to permit safe UAS operations, alongside manned aircraft operations.

Anticipated Project Activities:

Following are anticipated activities for the UAS Concept Validation and requirements Development project:

(1) Program Management activities that include:

a. Conduct Investment Analysis and Business Case development
b. Finalize Spectrum Management Alternative Analysis
c. Finalize command and control (C2) ground Infrastructure Alternative Analysis

(2) UAS C2 Solution Space Analysis activities:

a. Continued analysis of the UAS C2 solution space
b. Conduct Systems Engineering Trade Studies to determine most cost effective method for providing industry access to the UAS Command and Control allocated spectrum in the C and L band
c. Identify FAA spectrum needs

(3) UAS Concept Maturation activities to include:

a. Review and refine the UAS NAS Impact Analysis results based on revised projected service demands, results from FY 2016 Human-in-the-Loop (HITL) trials simulations, etc.

b. Conduct HITL trials and simulations based on the UAS Concept Maturation Plan, identifying new operational requirements and potential concept maturation needs

c. Develop preliminary Computer Human Interface (CHI) requirements documents

Expected Project Outcomes:

Mature concepts, capabilities and business cases for investments to facilitate the safe and timely integration of UAS into the NAS.

FY 2017 Collaboration Partners (Internal DOT)

Project Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How will Project be evaluated?

This program is subjected to review and oversight as part of the NextGen portfolio management process. The resulting investment business case products are reviewed by the system engineering and investment planning and analysis organizations in the FAA.

New ATM Requirements

FY2017 Funding: $8,000,000

Start and End Dates: IAW Concept Maturation and Investment Schedule

Project Description:

The New Air Traffic Management (ATM) Requirements Program identifies new opportunities to improve the efficiency and effectiveness of ATM and expanding capacity by developing decision support tools that improve the strategic management of operations in the NAS.

Project Objectives:

The service analysis and operational demonstration activities within New Air Traffic Management (ATM) Requirements Program support the development of operational improvements that will increase the number of arrivals and departures at major airports.

Anticipated Project Activities:

Following are anticipated activities for the New ATM Requirements project

(1) Finalize Multifunctional Phased Array Radar performance requirements

(2) Develop detailed Multifunctional Phased Array Radar advanced technology demonstrator test and evaluation plan

(3) Assess Flight Information Exchange Model compliance with the International Civil Aviation Organization Reference model

(4) Develop transition plan for Flight Information Exchange Model

(5) Conduct quality assurance /quality control validation for Weather Information Exchange Model

(6) Review the Airborne Collision Avoidance System Xu System Requirements and Specification V1.0 document to inform RTCA SC-147 and SC-228 with standards development activities

(7) Incorporate optimization and tuning updates with stakeholder feedback into the Airborne Collision Avoidance System Xu Run 3 logic

Expected Project Outcomes:

Mature concepts, capabilities and business cases for investments in new ATM decision support tools, capabilities and operational improvements to enhance NAS operational efficiency.

FY 2017 Collaboration Partners (Internal DOT)

Project Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How will Project be evaluated?

This program is subjected to review and oversight as part of the NextGen portfolio management process. The resulting investment business case products are reviewed by the system engineering and investment planning and analysis organizations in the FAA.

Florida Test Bed

FY2017 Funding: $7,300,000

Start and End Dates: N/A

Project Description:

The Florida Test Bed is a facility located at the Embry Riddle Aeronautical University in Daytona Beach, Florida. It supports the integration of new and emerging technologies into the National Airspace System (NAS) through demonstrations and evaluations. These activities cultivate government, academia, and industry partnerships through collaboration.

Project Objectives:

One of the main purposes of the Florida Test Bed is to provide an open-access location for industry, users, and vendors to demonstrate new capabilities and harness NAS architecture solutions. The Florida Test Bed will also support integrated demonstrations and large-scale modeling and simulation.

Anticipated Project Activities:

Following are anticipated activities for the Florida Test Bed. It should be noted that while the activities listed below are largely to sustain, maintain and implement upgrades to the laboratory's capability, additional substantive R&D activities result from FTB utilization by individual demonstration projects.

(1) Perform upgrades to support NextGen demonstration activities

(2) Add airport surface automation system to the tower environment

(3) Add security and business rules on Noise Exposure Map infrastructure and to DOD/Defense Research Engineering Network (DREN) for increasing the fidelity of the messaging systems

(4) Add automated capability to provide adaptation data and system build updates for keeping the FTB systems synchronized with live flight data

(5) Finalize Multifunctional Phased Array Radar performance requirements

Expected Project Outcomes:

Mature concepts, capabilities and business cases for investments in new ATM decision support tools, capabilities and operational improvements to enhance NAS operational efficiency.

FY 2017 Collaboration Partners (Internal DOT)

Project Name	Name of Collaboration Partner(s) (Internal DOT)
Florida Test Bed	**None**

How will Project be evaluated?

This program is subjected to review and oversight as part of the NextGen portfolio management process. The resulting test, demonstration and investment business case products are reviewed by the system engineering and investment planning and analysis organizations in the FAA.

Airport Technology Research

FY2017 Funding: $31,375,000

Program Description:

The Airport Technology Research Program (ATRP) executes a broad range of research projects that support FAA safety, capacity and environmental objectives. Safety initiatives include research aimed at (a) improving airport lighting and marking, (b) reducing wildlife hazards near airport runways, (c) improving airport fire and rescue capability, and (d) reducing the likelihood and severity of surfacing accidents. Under its capacity objective, ATRP research is aimed at providing better airport planning, designs, and improved runway pavement design, construction, and maintenance. The ATRP Environment Program establishes up-to-date exposure-response relationships for community annoyance and sleep disturbance in the U.S. by collecting extensive data, which covers a wide variety of airport types and geographic locations.

Program Objectives:

The Airport Technology Research Program supports increased safety and capacity while reducing the environmental impact of airport operations by exploring, evaluating and testing new technologies and design standards for potential adoption and implementation via the Airport Improvement Program. Research project outputs inform the development and issuance of Advisory Circulars which are the primary method of conveying airport improvement design guidance and standards for airport operators.

Anticipated Program Activities:

(1) Establish pavement roughness index for airports.

(2) Complete data collection for the Aircraft Noise and Annoyance study.

(3) Complete updates to the dose-response curves for U.S. airports using data collected from the Aircraft Noise and Annoyance study.

(4) Enhance and optimize mixture design, testing, and specifications that support pavement performance for mixtures using both virgin and recycled/reclaimed materials and industrial byproducts.

(5) Explore the use of new and innovative materials and practices that minimize environmental impacts, including the use of nanoparticles for these improvements

Expected Program Outcomes:

(1) No fatal accidents on certificated airports as a result of airport design, runway incursions or excursions, or wildlife strikes.

(2) Availability of existing airport facilities protected and used as efficiently as possible, while making strategic investments in new facilities consistent with evolving aviation needs.

(3) Established requirements, policies, procedures, and resources to allow airports in the United States to become environmentally-friendly neighbors.

(4) Access to analytical tools and guidance to that support optimization of pavement structural design to achieve desired performance targets.

(5) Ability to select and design mixtures to achieve required performance characteristics and longer life.

FY 2017 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the Airports Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA). As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

Airport Cooperative Research
$15,000,000

Program Description:

The Airport Cooperative Research Program (ACRP) is an industry-driven, applied research program that develops near-term, practical solutions to problems faced by airport operators. ACRP is managed by the Transportation Research Board (TRB) of the National Academies of Sciences, Engineering, and Medicine and is sponsored by the Federal Aviation Administration (FAA). The research is conducted by contractors who are selected on the basis of competitive proposals.

Program Objectives:

The Airport Cooperative Research Program (ACRP) carries out applied research on problems that are shared by airport operating agencies and are not being adequately addressed by existing federal research programs. The ACRP undertakes research and other technical activities in a variety of airport subject areas including design, construction, maintenance, operations, safety, security, policy, planning, human resources, and administration.

Anticipated Program Activities:

The ACRP Oversight Committee announced their FY 2016 projects in August 2015. The selected research projects will examine different research areas that target near-term solutions to problems facing airport operators and industry stakeholders. The projects will report on the state of the practice in critical areas within the industry. The selected research areas include

(a) Integrating climate resiliency into airport management systems,
(b) Cost benefit analysis of storm water infrastructure improvements,
(c) Airport emergency operations and
(d) Preparing for the connected airport and the Internet of Things

Expected Program Outcomes:

The ACRP advances state of the knowledge and practice across a broad range of topics of import to the airport operator community and other industry stakeholders. Specific outcomes will be dependent on the particular research proposals awarded in a given year.

FY 2017 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
ACRP	**Transportation Research Board**

How Program meets statutory requirements:

The Airport Cooperative Research Program (ACRP) was authorized in December 2003 as part of the Vision 100-Century of Aviation Reauthorization Act (Public Law 108–176)

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

Research problem statements for ACRP are solicited periodically but may be submitted to TRB by anyone at any time. It is the responsibility of the AOC to formulate the research program by identifying the highest priority projects and defining funding levels and expected products.

United States Department of Transportation
Annual Modal Research Plans
Fiscal Year 2018 Outlook

Fire Research and Safety

SAFETY

Program Description:

The Fire Research and Safety Program will continue to develop technologies, procedures, test methods, and fire performance criteria that can prevent accidents caused by hidden cabin or cargo compartment in-flight fires and fuel tank explosions and improve survivability during a post-crash fire.

Program Objectives:

Fire research will continue to address fundamental issues of (a) combustion toxicity; the impact of flame retardant chemicals, (b) health hazards of cabin materials; the impact of materials flammability on the initiation of in-flight fires, and (c) post-crash survivability.

Anticipated Program Activities:

(1) Evaluate detector technology that discriminates between aircraft fire and non-fire smoke/odor sources.

(2) Make available a searchable database of fire test results and material flammability for public, government and industry use.

(3) Examine state-of-the-art technology for protection of compressed hydrogen in aircraft fuel cell applications.

Expected Program Outcomes:

The outcome and benefit derived from this program will be the introduction of enabling technologies to prevent accidents caused by fire in freighter aircraft and hidden in-flight fires in passenger-carrying airplanes. New technologies of interest to the aircraft manufacturers and operators will be enabled in a fire-safe manner or prohibited if warranted.

FY 2018 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the Aircraft Safety Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA). As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

Advanced Materials/Structural Safety
SAFETY

Program Description:

The Advanced Materials/Structural Safety Program will continue to investigate a broad spectrum of issues related to the use of composite and advanced materials in aircraft structures. These include fatigue and damage tolerance issues from in-flight hail and ground vehicle collisions, environmental and aging effects, and bonded joints and repairs. The program will also continue to develop safety awareness training for advanced composite materials and manufacturing processes.

Program Objectives:

The Program will continue to conduct research to develop or validate dynamic test methods, procedures, and means of analysis to meet crashworthiness regulations. It will continue to help ensure that new aircraft structures demonstrate levels of safety equivalent to existing aircraft structures when subjected to survivable crash conditions.

Anticipated Program Activities:

(1) Develop assessment of typical range of ditching and other water landing scenarios to provide recommendations on certification requirements.

(2) Evaluate composites quality control Advisory Circular 21-26 for necessary updates and provide background data.

Expected Program Outcomes:

The Advanced Materials and Structural Safety program will improve aviation safety through improved understanding of aerospace vehicle design, structure, and subsystems to reduce the potential for accidents and incidents and support the development of standards and policy and methodologies and tools for certification.

FY 2018 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the Aircraft Safety Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA). As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

Aeromedical Research

SAFETY

Program Description:

The Aeromedical Research program develops new and innovative ways to support FAA regulatory and advisory missions to improve the safety of humans in civilian aerospace operations. Research personnel at the Civil Aerospace Medical Institute (CAMI) supporting this program discover methods and recommend strategies to enhance the safety, security, health, and optimum performance of the most important aspect of the National Airspace System (NAS), the human operator and the public, which she/he serves.

Program Objectives:

The Aerospace Medical Research Program will continue to keep abreast of emerging human safety risk issues such as those brought by the aging pilot population and changes in their health condition, advances in pharmacology, therapeutic tools, and surgical procedures. Improved aircraft materials, equipment, cabin configurations, life support systems, and evacuation assistive devices all may affect survival from an aircraft accident. The program has also been designed to address the complexity of software, technology, and systems integration practices as these continue to evolve.

Anticipated Program Activities:

(1) Explore the association of selected medical certification pathology codes with deceased pilot medical certificate status data.

(2) Evaluate the potential increased risks of air travel cabin altitude exposure for individuals compromised with pulmonary disease.

(3) Conduct photometric evaluations to investigate the efficacy of photo luminescent escape path signs and markers.

(4) Identify persuasive technology applications for development of aircraft evacuation.

(5) Summarize assessment of the influence of exit location and method of operation on evacuation capability, including consideration of fuselage size and exit disposal.

Expected Program Outcomes:

The Aeromedical research program is expected to improve aviation safety through improved understanding of factors that influence human physiology and performance in aerospace environments and guidance and tools that enhance human safety, protection, and survival during civil aerospace operations.

FY 2018 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the Aircraft Safety Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA). As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

Air Traffic Control/Technical Operations Human Factors
SAFETY

Program Description:

The Air Traffic Control/Technical Operations Human Factors Program will continue to emphasize the concept of Human-System Integration (HSI) and safety aspects of the functions performed by Air Traffic Controllers and Technical Operations Personnel. The HSI concept will continue to address the interactions between workstation design, training and facility assignment, and human error and human performance.

Program Objectives:

The Air Traffic Control/Technical Operations (ATC/TO) Human Factors program will continue to provide ATO technical sponsors with timely and appropriate R&D products and consultation services that focus on improving the safety and efficiency of complex ATC systems, by measuring and enhancing individual and team performance of air traffic controllers and technical operations specialists. The program will continue to focus on development and update of human factors standards; human factors efforts to optimize the controller and technical operations workforces; human factors efforts to reduce error and improve safety; human factors efforts to support integration of technology into the NAS; and development of recommendations and methods for enhancing human performance.

Anticipated Program Activities:

Deliver human factors training information to support the Air Traffic Organization's top five NAS hazards.

Expected Program Outcomes:

The Human Factors research program is expected to improve aviation safety through improved knowledge of the human-system interface and a reduction in accidents and incidents through enhanced aerospace vehicle, air traffic, and technical operations that adapt to, compensate for, and augment the performance of the human.

FY 2018 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the Human Factors Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA). As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

Aircraft Catastrophic Failure Prevention Research
SAFETY

Program Description:

The Aircraft Catastrophic Failure Prevention Research Program will continue to develop technologies and methods to assess risk and prevent occurrence of potentially catastrophic defects, failures, and malfunctions in aircraft, aircraft components, and aircraft systems. The program will continue to use historical accident data and National Transportation Safety Board (NTSB) recommendations to examine and investigate turbine-engine uncontainment events and other engine-related impact events.

Program Objectives:

The goal of this research program is to have a public tool with standardized generic models, user guides, training, software quality control process, and validated public material models. This will reduce workload and allow for the timely processing of applications.

Anticipated Program Activities:

(1) Develop new tests needed for composite impact and failure.

(2) Complete verification study for uniaxial composite impact.

Expected Program Outcomes:

The Aircraft Catastrophic Failure Prevention Research Program is expected to improve aviation safety through improved understanding of aerospace vehicle design, structure, and subsystems to reduce the potential for accidents and incidents and support the development of standards and policy and methodologies and tools for certification.

FY 2018 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the Aircraft Safety Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA). As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

Aircraft Icing/Digital System Safety/Aircraft Cyber
SAFETY

Program Description:

The Aircraft Icing/Digital System Safety/Aircraft Cyber Program will continue to develop and test technologies that detect frozen contamination, predict anti-icing fluid failure, and ensure safe operations in atmospheric icing conditions. The program will also continue to develop new guidelines for testing, evaluating, and approving digital flight controls, avionics, and other systems during the certification of aircraft and engines and studies the airworthiness requirements of airborne cyber security.

Program Objectives:

The Aircraft Icing program will continue to develop and test technologies that detect frozen contamination, predict anti-icing fluid failure, and ensure safe flight operations in atmospheric icing conditions. Reducing aviation's vulnerability to all in-flight icing hazards will remain a major program goal.

The goal of the Digital Systems Safety program remains to approve and maintain aircraft safety by taking a proactive approach to the ever changing technological marketplace and conduct research in the areas of advanced digitally-intensive systems and assess how they can safely be deployed in the onboard airborne systems of systems environment

The Aircraft Systems Information Security / Protection (ASISP) cyber initiative will remained focused on exploring where ASISP-related threats and risks can compromise fail-safe mechanisms in the architecture, design, and operation of aircraft systems

Anticipated Program Activities:

(1) Create a validation database of ice shapes and their aerodynamic effects on swept wings for computational fluid dynamics.

(2) Identify airborne electronic hardware development error types that remain undetected by verification techniques.

(3) Investigate different techniques to calculate worst-case execution time and explore the feasibility of deterministic behavior for multi-core processors implementations with dynamic allocation of code blocks to individual cores during run time.

Expected Program Outcomes:

This program is expected to improve aviation safety through improved understanding of aerospace vehicle design, structure, and subsystems to reduce the potential for accidents and incidents and support the development of standards and policy and methodologies and tools for certification.

FY 2018 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the Aircraft Safety Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA). As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

Commercial Space Transportation Safety
SAFETY

Program Description:

The primary mission of the Commercial Space Transportation Office (AST) is to ensure the safety of the public, property, and national security and foreign policy interests of the U.S. during commercial launch and reentry operations. This program will continue to conduct research on emerging space concepts, technologies, and operating techniques in order to keep safety at the forefront of these activities.

Program Objectives:

This program will continue to enable advances in critical areas spanning four thematic areas that address safe and efficient integration of increased commercial space launch and re-entry activity into the NAS, advanced safety assessment methods, advanced vehicle safety technologies and methodologies, and human spaceflight and physiological safety factors.

Anticipated Program Activities:

(1) Report results of thermal ablation testing and analysis of ultra-high temperature composites for thermal protection systems in liquid rocket engine plume.

(2) Gather high-fidelity measurements of rocket source noise and noise in communities near spaceports, and conduct initial validation of models for long-range sound propagation through complex atmospheric conditions (Supports safe and efficient integration of increased commercial space launch and re-entry activity into the NAS.)

(3) Identify and assess algorithm improvements for launch collision avoidance, with initial formulation of improved trajectory and uncertainty input data requirements (Supports safe and efficient integration of increased commercial space launch and re-entry activity into the NAS.)

(4) Identify candidate approaches to characterize dynamic population clusters in public safety analysis methods and evaluate potential mitigation measures (Supports advanced safety assessment methods.)

(5) Identify draft recommended practices for crew human factors for suborbital winged commercial spaceflight vehicles (Supports human spaceflight and physiological safety factors.)

Expected Program Outcomes:

This program is expected to improve aviation safety through:

(1) Safe and efficient integration of increased commercial space launch and re-entry activity into the NAS.

(2) Improved vehicle safety and risk management, including knowledge of all safety-critical components and systems of the space vehicles and their operations, to better identify potential hazards and apply and verify hazard controls.

(3) Guidance and tools that enhance human safety, protection, and survival during space operations.

FY 2018 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the Aircraft Safety Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA). As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

Continued Airworthiness
SAFETY

Program Description:

The Continued Airworthiness Program will continue to promote the development of technologies, procedures, technical data, and performance models to prevent accidents and mitigate accident severity, related to civil aircraft failures as a function of their continued operation and usage. The program will continue to focus on longer-term maintenance of the structural integrity of fixed-wing aircraft and rotorcraft, continued safety of aircraft engines, development of inspection technologies and the safety of electrical wiring interconnect and mechanical systems.

Program Objectives:

Continued Airworthiness research will continue to focus on emerging technologies such as damage tolerance and durability issues of new aluminum-lithium alloys, metal additive manufacturing (AM), new and emerging alloys. These will be studied for inclusion in Metallic Materials Properties Development and Standardization (MMPDS), and risk management methods to support the Aircraft Certification Services Monitor Safety/Analyze Data (MSAD) initiative, which is a data-driven, risk-based continued operational safety decision-making process.

Anticipated Program Activities:

(1) Develop technical data to assess damage tolerance of aluminum-lithium primary structure and follow on effort to material characterization.

(2) Develop technical data to evaluate non-flammable electrolyte lithium batteries and battery systems for aerospace applications.

(3) Develop property standards for emerging process intensive materials.

Expected Program Outcomes:

The Continued Airworthiness Program is expected to improve aviation safety through improved understanding of aerospace vehicle design, structure, and subsystems to reduce the potential for accidents and incidents and support the development of standards and policy and methodologies and tools for certification.

FY 2018 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the Aircraft Safety Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA). As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

Flight deck/Maintenance/System Integration Human Factors

SAFETY

Program Description:

The Flight deck/Maintenance/System Integration Human Factors program provides the research foundation for FAA guidelines, handbooks, orders, Advisory Circulars (AC's), technical standards orders and regulations that help ensure the safety and efficiency of aircraft operations. It also develops human performance information that the agency provides to the aviation industry for use in designing and operating aircraft, and training pilots and maintenance personnel.

Program Objectives:

Research results will continue to enable the FAA and industry to improve task performance and training for aircrew, inspectors, and maintenance technicians, improve training for UAS control station and crew, develop and apply error management strategies to flight and maintenance operations, and ensure certification of new aircraft and design or modification of equipment considers human factors.

Anticipated Program Activities:

Define methods for evaluating both Traditional and Advanced Qualification Program training programs to support updates to guidance for crew resource management.

Expected Program Outcomes:

This program is expected to improve aviation safety through improved knowledge of the human-system interface and a reduction in accidents and incidents through enhanced aerospace vehicle, air traffic, and technical operations that adapt to, compensate for, and augment the performance of the human.

FY 2018 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the Aircraft Safety Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA). As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

NextGen – Alternative Fuels for General Aviation
SAFETY

Program Description:

The NextGen – Alternative Fuels for General Aviation addresses the use of alternative and renewable fuels for GA to lessen aviation environmental impacts on air and water quality. The program will continue to develop data and methodologies to support certification of alternative aviation fuels for GA aircraft.

Program Objectives:

This research program will continue to provide critical knowledge (through screening and testing) to assure the continued operational safety of aircraft using a new unleaded fuel. Successful transition to an unleaded fuel will improve the environment by eliminating airborne lead from aviation sources and help sustain a vibrant segment of the nation's economy.

Anticipated Program Activities:

Perform engine and aircraft testing to address remaining areas of concern.

Expected Program Outcomes:

The NextGen Alternative Fuels for General Aviation Program is expected to reduce environmental impact of aviation operation through the establishment of data and methodologies to support certification of alternative fuels for General Aviation aircraft.

FY 2018 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the Aircraft Safety Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA). As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

Propulsion and Fuel Systems
SAFETY

Program Description:

The Propulsion and Fuel Systems Program will continue to develop technologies, procedures, test methods, and criteria to enhance the airworthiness, reliability, and performance of civil turbine and piston engines, propellers, fuels, and fuel management systems.

Program Objectives:

The Propulsion and Fuel Systems Program will continue to conduct research on advanced damage-tolerance and risk assessment methods that provide the FAA's Office of Aviation Safety with the basis for new or revised engine certification and continued airworthiness standards. This research will also continue to support preparation of Advisory Circulars (ACs) that provide industry with technical information on acceptable means of compliance with regulations. Benefits will accrue in the form of a reduced risk of engine failures and fewer accidents, which in turn will lead to fewer injuries and fatalities.

Anticipated Program Activities:

Develop advanced stress intensity factor solutions for new geometries, extending the applicability of DARWIN® to new classes of life-limited engine components.

Expected Program Outcomes:

The Propulsion and Fuel Systems program is expected to enhance aviation safety through improved understanding of aerospace vehicle design, structure, and subsystems to reduce the potential for accidents and incidents and support the development of standards and policy and methodologies and tools for certification.

FY 2018 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the Aircraft Safety Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA). As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

System Safety Management
SAFETY

Program Description:

The System Safety Management/Terminal Area Safety Program will continue to develop risk management methods, prototype tools, technical information, and Safety Management System Procedures and Practices. In addition, the program will continue to develop an infrastructure that enables the free sharing of de-identified, aggregate safety information derived from government and industry sources in a protected manner. It also will maintain conducting research to leverage new technologies and procedures that enhance pilot, aircraft, and operational safety in terminal and enroute domains.

Program Objectives:

The System Safety Management Program will continue to improve safety through developing safety data collection methods, advanced safety data and risk analysis techniques, and prototypes of risk-based decision-making capabilities to identify and analyze emerging safety issues in a cooperative nature with the aviation stakeholders. The program will continue to provide an ability to analyze trends across the aviation community that is much more effective than monitoring individual certificated entities, e.g., air operators and air traffic facilities.

The Terminal Area Safety Program will continue to improve the safety of operations near or at an airport. It provides solutions to reduce fatal accidents in the terminal area through (a) improving flight crew response during upset and recovery with an effective indicator, (b) enabling safe helicopter approaches when using advanced vision systems, and (c) exploring consistent operational standards for a stable approach to reduce runway excursions.

Anticipated Program Activities:

(1) Develop methodology to identify and optimize Air Traffic Safety Oversight Service oversight activities, surveillance targets, and data collection parameters based on risk trends and air traffic safety oversight service resources.

(2) Develop an integrated domain safety risk evaluation model of air traffic procedures to support the assessment and approval of air traffic procedure changes related to separation minima.

(3) Develop state-of-art analytical capabilities for Aviation Safety Information Analysis and Sharing System to analyze rotorcraft data.

(4) Determine the criteria for adoption of Helicopter Advanced Vision Systems for Point-in-Space Instrument Approach procedures.

Expected Program Outcomes:

The System Safety Management/Terminal Area Safety program is expected to improve aviation safety through improved system-wide access and sharing of aviation safety data and analysis tools within the aviation community, providing safety resources that are integrated with operations of aviation industry stakeholders.

FY 2018 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the Aircraft Safety Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA). As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

Unmanned Aircraft Systems Research
SAFETY

Program Description:

The Unmanned Aircraft Systems (UAS) Research Program will continue to support FAA efforts in implementing the Next Generation Air Transportation System (NextGen) by studying safety implications of new aircraft operational concepts and technology to the National Airspace System (NAS) and supporting the development of new and modified regulatory standards. The program's research activities will keep focusing on new technology assessments, methodology development, data collection and generation, laboratory and field validation, and technology transfer.

Program Objectives:

The portfolio of work will continue to focus on sense (detect) and avoid, control and communications, system safety criteria, modeling and simulation requirements, and research that will support the safe, efficient, and timely integration of UAS in the NAS within the 14 Code of Federal Regulations (CFR) regulatory framework. Additionally, funding will provide for engineering, technical, and management support of overall research activities.

Anticipated Program Activities:

(1) Define ground control station human interface requirements, UAS pilot training requirements, and ground observer requirements.

(2) Complete manufacturer and operator maintenance data collection and analysis and develop maintenance technician Part 147 practical test standards and UAS repair station operational criteria.

Expected Program Outcomes:

The Unmanned Aircraft Systems Research program is expected to improve aviation safety through improved understanding of aerospace vehicle design, structure, and subsystems to reduce the potential for accidents and incidents and support the development of standards and policy and methodologies and tools for certification.

FY 2018 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the Aircraft Safety Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA). As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

Weather Program
SAFETY

Program Description:

The Weather program will continue to conduct applied research focused on improving weather information required for integration into decision-support tools to reduce the impact of adverse weather on the NAS. The improved weather information will continue to increase safety by supporting better operational planning and decision-making by ATM, dispatchers, and pilots.

Program Objectives:

This program will continue to mitigate weather related NAS safety and/or traffic flow efficiency issues with a line of sight to operational exploitations. The applied research also continue to support the evolution of legacy weather capabilities that meet the weather information needs of today's NAS users into the capabilities that are being developed and deployed as NextGen decision-support weather tools. This work is frequently conducted in collaboration with the FAA's designated weather provider, the National Weather Service (NWS).

Anticipated Program Activities:

Transition Continental United States in-flight icing forecast and analysis capability that includes liquid water content, drop-size distribution, and temperature, for implementation (as part of the NAS Infrastructure Portfolio section of the *NextGen Implementation Plan*)

Expected Program Outcomes:

The Weather program is expected to improve aviation safety through

(1) Establishment of requirements and standards for enabling the availability and improving the quality and quantity of meteorological information to safely implement NextGen operational improvements and

(2) Improved accuracy and accessibility of observed and forecast weather to reduce the number of accidents and incidents attributed to hazardous weather.

FY 2018 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the NAS Operations Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA). As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

NextGen – Wake Turbulence
ECONOMIC COMPETITIVENESS

Program Description:

The NextGen – Wake Turbulence Program will continue to conduct research to increase airport runway capacity safely by reducing aircraft wake separation minima under certain conditions and addressing wake turbulence constraints in today's terminal and enroute airspace and in the future NextGen airspace designs.

Program Objectives:

The program will continue to develop safe reductions to the existing air traffic control wake mitigation separations and thereby contribute to increased National Airspace System (NAS) capacity, enabling more flights with less cost and delay.

Anticipated Program Activities:

Perform analysis in support of Safety Risk Management Documentation for Wake Turbulence Mitigation for Single Runway procedure.

Expected Program Outcomes:

The NextGen – Wake Turbulence research program is expected to improve efficiency through improved aircraft separation processes associated with current generalized and static air navigation service provider wake turbulence mitigation separation standards.

FY 2018 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the NAS Operations Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA). As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

NextGen – Air Ground Integration Human Factors
ECONOMIC COMPETITIVENESS

Program Description:

The NextGen – Air Ground Integration Human Factors Program will continue to address flight deck and ATC integration for NextGen operational capabilities and focus on human factors issues that primarily affect the pilot side of the air-ground integration challenge. It will continue to conduct research to ensure pilots receive the right information at the right time for decision-making and collaboration with ATC to operate in the NAS efficiently.

Program Objectives:

The NextGen - Air Ground Integration Human Factors will continue to address flight deck and air traffic service provider integration for each operational improvement or NextGen application considered, with a focus on those issues that primarily affect the pilot side of the air-ground integration challenge. Through use of simulation, and demonstration, the program will continue to assess interoperability of tools, develops design guidance, determines training requirements, and verifies procedures to support certification, flight standards, and the FAA's Air Traffic Organization's service units for ensuring safe, efficient, and effective human system integration in transition of NextGen capabilities.

Anticipated Program Activities:

Create a report with human factors recommendations and considerations for the design and evaluation of Electronic Chart Software related to NextGen capabilities.

Expected Program Outcomes:

This program is expected to improve human-system integration and an increase in ATC efficiency through enhanced controllers-pilots coordination in cooperatively managing traffic loads as cockpit technology and air traffic workstations are more closely connected.

FY 2018 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the Human Factors Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA). As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

NextGen – Information Security

ECONOMIC COMPETITIVENESS

Program Description:

The NextGen – Information Security program supports the FAA Cyber-Security Strategic Plan goals and objectives to protect and defend the FAA networks and systems deter and mitigate risks of cyber-attacks.

Program Objectives:

Upon successful initiation in FY2017, the program will continue to conduct research to help prevent disruptive cyber incidents that affect the Air Traffic Control (ATC) mission and improve resiliency in the event an incident does occur. While the current measures in place for the information security for the National Airspace System (NAS) are robust, the rapidly evolving capabilities of our potential adversaries and sharply decreasing costs of exploits will continue to necessitate some prudent exploration of advanced detection and defense capabilities for the NAS systems.

Anticipated Program Activities:

This is a new start initiative in FY2017. Activities and milestones for 2018 and beyond will be defined in the program plan for research initiatives to be developed in 2017.

Expected Program Outcomes:

The program is expected to improve efficiency through improved cyber resiliency for the NAS system of systems in the case of determined adversaries with persistent attacks that try to undermine the NAS.

FY 2018 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

The program is expected to improve efficiency through improved cyber resiliency for the NAS system of systems in the case of determined adversaries with persistent attacks that try to undermine the NAS.

NextGen – Weather Technology in the Cockpit

ECONOMIC COMPETITIVENESS

Program Description:

The NextGen – Weather Technology in the Cockpit will continue to do research to develop, verify, and validate recommended requirements for incorporation into MinWxSvc standards. The MinWxSvc is defined as Meteorological Information (MET), minimum performance standards (e.g., accuracy) of the MET information, minimum information rendering standards, and enhanced training on cockpit MET information and technology.

Program Objectives:

To develop the MinWxSvc recommendations, WTIC research will continue to perform gap analyses to identify operational shortfalls impacting efficiency attributable to adverse weather conditions and associated gaps of MET information in the cockpit. The MinWxSvc standards will resolve the identified MET information gaps to mitigate the efficiency-related operational shortfalls.

Anticipated Program Activities:

Propose standards for improving weather information to the flight deck in oceanic and non-controlled airspace.

Expected Program Outcomes:

The program is expected to improve efficiency through:

(1) Establishment of requirements and standards for enabling availability and improving the quality and quantity of meteorological information to reduce impacts of adverse weather on rerouting, NAS capacity, and NextGen operational procedures and

(2) Improved accuracy and accessibility of observed and forecast weather information to improve NAS efficiency (e.g., reduced delays and cancellations, increased capacity in high traffic areas).

FY 2018 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the NAS Operations Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA). As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

Environment and Energy
ENVIRONMENTAL SUSTAINABILITY

Program Description:

The Environment and Energy Program characterizes aircraft noise and emissions as well as their consequential impacts on the environment. It provides guidance on mitigating such impacts and provides fundamental knowledge, development, and validates methodologies, models, metrics, and tools. It analyzes and balances the inter-relationships between noise and emissions and considers local to global impacts as well as determine economic consequences. The program will continue to reduce scientific uncertainties related to aviation environmental issues to support decision-making.

Program Objectives:

The Environment and Energy program will continue studying the impacts of aviation, specifically from jet engines, on the environment while providing analysis to support the development of solutions to mitigate those impacts. At the core of the program is the development and use of an integrated aviation environmental tool suite. This tool suite is built upon a sound scientific understanding - which is also being developed as a part of this program - of aviation noise and emissions; as well as their environmental, health, and welfare impacts. The program will continue to use these models and knowledge to inform decision-making on policies and technology development relating to aviation's energy use and environmental impacts.

Anticipated Program Activities:

(1) Develop air quality model to capture global impacts of aviation emissions.
(2) Advance noise propagation methodology for implementation in analytical tools.
(3) Release improved version of Aviation Environmental Design tool.

Expected Program Outcomes:

The E&E program will contribute to reduce environmental impacts of aviation through:

(1) Reduced significant community noise impacts in absolute terms.
(2) Reduced impact of aviation emissions on air quality and global climate and
(3) Improved energy efficiency and assured availability of sustainable alternative jet fuels.

FY 2018 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
Policy, Planning & Environment Technical Center	Volpe National Transportation Systems Center

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the Environmental and Energy Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA). As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

NextGen Environmental Research
Aircraft Technologies, Fuels and Metrics
ENVIRONMENTAL SUSTAINABILITY

Program Description:

The NextGen – Environmental Research Aircraft Technologies, Fuels and Metrics Program develops solutions to mitigate aviation environmental impacts in absolute terms and increase fuel efficiency. It matures aircraft technologies through the Continuous Lower Energy, Emissions and Noise (CLEEN) Program to reduce noise and emissions at the source level. It assesses, demonstrates, and supports qualification of alternative aviation fuels that reduce emissions that impact air quality and climate change. Availability of alternative aviation fuels also increases energy security. The program also supports research to determine the appropriate goals and metrics to manage NextGen aviation environmental impacts needed to support EMS.

Program Objectives:

The program is continuing to develop solutions to reduce the impacts associated with aviation noise and exhaust emissions, and increasing energy efficiency and availability. In collaboration with industry, the program will continue to accelerate the maturation of engine and airframe technologies to reduce aviation noise, fuel use, and emissions that impact air quality and climate change. It will also provide test data, analyses, and methodologies to overcome barriers to the adoption of alternative jet fuels that could serve as drop-in replacements for today's petroleum-derived turbine engine fuels. This will lead to faster deployment of these fuels and the faster realization of the accompanying environmental improvements and economic development that will come with this new industry. The NextGen – Environmental Research – Aircraft Technologies, Fuels, and Metrics program will continue to provide the FAA with funding to accelerate the maturation of aircraft and engine technologies and develop alternative jet fuels.

Anticipated Program Activities:

(1) Advance approval methodology for alternative jet fuels.

(2) Demonstrate technologies that can reduce energy use, emissions, and noise in year four of the second phase of the Continuous Lower Energy, Emissions and Noise Program.

Expected Program Outcomes:

The NextGen – Environmental Research – Aircraft Technologies, Fuels, and Metrics program will contribute to reduce environmental impacts of aviation through:

(1) Reduced significant community noise impacts in absolute terms.
(2) Reduced impact of aviation emissions on air quality and global climate and
(3) Improved energy efficiency and assured availability of sustainable alternative jet fuels.

FY 2018 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
Policy, Planning & Environment Technical Center	Volpe National Transportation Systems Center

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the Environment and Energy Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA). As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

System Planning and Resource Management

Economic Competitiveness

Program Description:

This program provides cross-cutting research and development portfolio planning, development, management and coordination. It produces the National Aviation Research Plan (NARP), an annual strategic plan for FAA Research and Development (R&D). The program also administers the congressionally mandated (P.L. 100-591 Section 6 Advisory Committee) Research, Engineering and Development Advisory Committee (REDAC) and provides single point of coordination, advocacy and outreach for the FAA research program.

Program Objectives:

The program maintains liaison with all organizational elements and stakeholders participating in the agency's R&D program and ensures cohesion and alignment of the FAA R&D portfolio with national and departmental strategic priorities. It ensures that alignment is expressed and is traceable in all internal planning, coordination and management deliverables.

Anticipated Program Activities:

(1) Prepare the FY 2020 R,E&D budget submission.

(2) Manage FAA's R,E&D portfolio to meet efficiency goals.

(3) Process REDAC recommendations on planned R&D investments for FY 2020.

(4) Deliver the 2018 NARP to Congress with the President's FY 2019 budget request.

Research Collaboration

(5) Conduct the 2017 International Conference on research in air transportation.

(6) Conduct planning for the 2018 International ATM R&D Seminar.

Expected Program Outcomes:

Timely and effective planning, formulation, coordination and management of FAA's R&D portfolio leading to a more effective research program that will benefit the public by making aviation safer and smarter and enhancing the U.S. global leadership in aviation.

FY 2018 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
R&D Planning	**OST-R**

How Program meets statutory requirements:

This program produces the National Aviation Research Plan (NARP), which is a report of the Federal Aviation Administration to the United States Congress pursuant to Section 44501(c) of Title 49 of the United States Code. It also produces and submits to the Office of the Secretary of Transportation the Annual Modal Research Plan (AMRP) as required by the Fixing America's Surface Transportation (FAST) Act - P. L. 114-94 (Sec. 6501(a)(1)).

Finally, this program administers the FAA Research Engineering and Development Advisory Committee (REDAC) process in accordance with statutory requirements set forth in the Aviation Safety Research Act of 1988 (P.L. 100-591) and P.L. 101-the Federal Aviation Administration Research, Engineering and Development Authorization Act of 1990 (P.L. 101-508)

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

This program is largely about coordination, facilitation, management and reporting of FAA R&D program activity. Continuous liaison with internal and external stakeholders is in fact the essence of the program and the means of obtaining input.

Advanced Technology Development and Prototype (F&E Portfolio)
Safety, Economic Competiveness

Program Description:

The Advanced Technology Development and Prototyping portfolio includes diverse research projects to develop and validate technology and systems that support air traffic services. These initiatives support the requirements associated with the evolving air traffic system architecture and improvements in airport safety and capacity. These programs are described in the National Aviation Research Plan (NARP) and are summarized below:

The ***Runway Incursion Reduction Program (RIRP)*** conducts research, development, and operational evaluation of technologies to increase runway safety. Consistent with standing National Transportation Safety Board recommendations, research emphasis will remain on technologies that provide direct safety indications and alerts to pilots at large airports, as well as, those that can be applied cost effectively at small to medium airports.

The ***Operations Concept Validation and Infrastructure*** program develops and validates NAS level operational concepts that are key to the FAA modernization programs and NextGen. Developing operational concepts is the first step in developing an Enterprise Architecture. The program conducts the overall analysis and planning for NAS evolution by determining the required annual updates to the NAS Enterprise Architecture products: Operational Improvements, Operational Sustainment, and Operational Requirements.

The ***Major Airspace Redesign*** program funds physical changes in facilities necessary to accommodate airspace redesign. Implementation of an airspace redesign frequently results in changes to the number and span of control of operational positions or sectors, including changes to sector, area or facility boundaries.

Program Objectives:

The ***Runway Incursion Reduction Program*** will continue to pursue a strategy of "right site, right size" to identify candidate technologies that are best suited to a variety of airports in order to address the specific types of RI causal factors encountered at that site (e.g. converging runways, ground vehicle operations, taxiway/runway hotspots, wildlife, etc.).

The ***Operations Concept Validation and Infrastructure Evolution*** program will continue to assess the interaction of changing roles and responsibilities of NAS service providers and pilots, airspace changes, procedural changes and new mechanized systems for distributing weather, traffic and other flight related information.

The ***Major Airspace Redesign*** program will continue to ensures all airspace related efficiency benefits facilitated by the Major Airspace Program, facility changes, and automation improvements are achieved. The program will continue to pursue review, redesign and restructure airspace.

Anticipated Program Activities:

It is anticipated that the program will continue the activities identified in the FY2017 work plan for each of the projects described above.

Expected Program Outcomes:

The Runway Incursion Reduction Program is expected to improve aviation safety by ensuring no fatal accidents on certificated airports as a result of airport design, runway incursions or excursions, or wildlife strikes. The program will continue its mission to develop safety technologies that can then be applied at not just large airports, but also small-to-medium sized airports with commercial service throughout the NAS that have seen a recent uptick in the rate of runway incursions.

Both the Operations Concept Validation and Major Airspace Redesign programs are expected to improve efficiency by developing feasible procedures, operational methods, and technologically-advanced systems that can decrease workload and increase efficiency of the NAS. The Operational Concept Validation program will perform the early concept research for advanced operational concepts to ensure they are well understood and are based on valid assumptions. The airspace redesign projects are projected to deliver benefits through the reduction of restrictions, shorter flight distances, more fuel efficient routes, and reduced delays.

FY 2018 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
ATDP	**None**

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the NAS Operations Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act (FACA). As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

NextGen - Separation Management Portfolio
Economic Competitiveness

Program Description:

The Separation Management portfolio conducts pre-implementation activities to reduce risk, and implementation activities supporting the safe and efficient separation of aircraft and other vehicles in the National Airspace System (NAS). Risk reduction activities may include validation of concepts or technologies; demonstration and integration of operational capabilities; and an understanding of the role of the human through cognitive engineering experiments. Separation Management evaluates and matures concepts and capabilities that focus on the enhancement of separation assurance through the use of both ground based automation and aircraft technology enhancements. Pre-implementation research conducted under this portfolio includes:

a. Oceanic Tactical Trajectory Management

The Oceanic Tactical Trajectory Management (OTTM) program addresses current performance gaps in the areas of capacity, productivity, efficiency, safety, and environmental impacts in the oceanic environment. Oceanic Trajectory Management in Four Dimensions (OTM-4D) is the OTTM mid-term concept. The key objective of this concept is to use trajectory-based operations to improve fuel efficiency, system predictability, and performance by enabling airlines and other operators to flight plan and fly closer to their optimal (or preferred) 4D trajectories while in oceanic airspace.

b. Wake Turbulence - Re-Categorization

The RECAT project develops wake separation standards that provide increased airspace and airport throughput capacity without aircraft equipage costs or runway expansions. This project has been part of a joint EUROCONTROL and FAA program that had reviewed the then required wake mitigation aircraft separations used in both the USA's and Europe's air traffic control processes and determined the those standards could be safely modified to increase the operational throughput capacity of airports and airspace that will have heavy operational demand in the NextGen era.

c. UAS Concept Validation and Requirements Development

The UAS Concept Validation and Requirements Development Program conduct the overall analysis and planning for the development, integration, and subsequent implementation of emerging UAS enabling technologies. [Note: A Separate FY2017 RDT Project Plan for this initiative is included in the AMRP)

Program Objectives:

Oceanic Tactical Trajectory Management

OTTM will continue to conduct research and development to provide enhanced User Trajectory Planning through coordination capabilities. Trajectory coordination enables interactive flight plan collaboration between airspace users and the FAA in which the airspace user informs the FAA of his intended 4D oceanic trajectory and receives feedback prior to the flights entry into oceanic airspace about the likelihood of achieving that trajectory based on other oceanic flights intended trajectories.

Wake Re-Categorization

The program will continue to explore and advance the development of the RECAT Phase III dynamic wake separation standards.

UAS Concept Validation and Requirements Development

See separate FY2017 RDT Project Description.

Anticipated Program Activities:

(1) Continue the feasibility description of dynamic wake separation standards (RECAT Phase III) and the concept of how they would be applied by Air Navigation Service Providers (ANSPs)

(2) Continue to deliver briefings to and conduct data gathering with the aviation community concerning the need for and benefits of the RECAT Phase III dynamic wake separation standards.

Expected Program Outcomes:

The projects described above are expected to improve efficiency through:

Improved methods and/or capabilities that enable safe reduction in separation standards, increase in airspace capacity, and/or efficient management of aircraft trajectories. ***(OTTM)***

And,

Improved aircraft separation processes associated with current generalized and static air navigation service provider wake turbulence mitigation separation standards. ***(Wake RECAT)***

FY 2018 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the NAS Operations Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA) As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

NextGen Improved Surface Portfolio
Economic Competitiveness

Program Description:

The Improved Surface portfolio conducts pre-implementation activities to reduce risk and implementation activities supporting the TFDM System. The work will focus on the development of efficient traffic flow management and collaborative decision making on the surface by providing a key ground infrastructure program for NextGen mid-term operations. Pre-implementation research conducted under this portfolio includes:

Surface Tactical Flow

The Surface Tactical Flow (STF) Program develops trajectory-based surface operations in support of NextGen. It leverages the development efforts of the NASA Surface Management System (SMS) and provides guidelines for the development of a collaborative Surface Traffic Management (STM) system.

Program Objectives:

The Surface Tactical Flow program will conduct research activities to develop and mature Surface Trajectory-Based Operations (STBO) capabilities to leverage and extend mid-term STBO capabilities of information sharing, planning and scheduling, and taxi route management.

Anticipated Program Activities:

The project will continue evaluation of emerging concepts and perform risk reduction activities on technologies that will support future improvements for TFDM. Done in collaboration with NASA's ATD-2, these efforts will produce new improvements that will increase TFDM, Traffic Flow Management System (TFMS), and Time Based Flow Management (TBFM) connectivity and integration.

Expected Program Outcomes:

The Surface Tactical Flow program is expected to improve efficiency through improved methods, technologies and capabilities that enable increased surface traffic movement efficiency.

FY 2018 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the NAS Operations Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA) As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

NextGen On-Demand NAS Information Portfolio

Economic Competitiveness

Program Description:

The On Demand NAS Information (ODNI) portfolio conducts pre-implementation activities to reduce risk supporting the exchange of information between FAA and other National Air Space (NAS) users. The portfolio provides flight planners, Air Navigation Service Providers (ANSP) staff, and flight crews with consistent, complete, and easily processed information on changes of conditions in the NAS affecting safety, security, and efficiency. The ODNI portfolio examines concepts and matures capabilities through validation activities, demonstrations conducted with stakeholders, and human systems engineering to mitigate adverse impacts and to exchange information efficiently and securely between FAA and NAS users. Pre-implementation research conducted under this portfolio includes

Advanced Methods

Advanced Methods is a pre-implementation engineering analysis and requirements program that addresses shortfall areas identified by ATO programs and provides possible solutions to future ATM system work packages. Specifically Advanced Methods is focusing on addressing shortfall areas identified in the Traffic Flow Management (TFM) Shortfall Analysis which was coordinated with industry partners.

Program Objectives:

The Advanced Methods program will continue to support improvements to increase airport capacity and sector throughput, and reduce sector delays by providing the NAS users and Air Traffic Management with a common understanding of the NAS constraints. The program will continue to develop and test prototype improvements and provide operational concepts and requirements for implementation by automation programs and operational organizations.

Anticipated Program Activities:

The program will continue to conduct concept engineering activities to develop the following products for individual capabilities under Constraint Prediction, Monitoring and Alerting, Operational Response Development, and TFM System Performance Analysis Capability:

Expected Program Outcomes:

The Advanced Methods project is expected to improve efficiency through feasible procedures, operational methods, and technologically-advanced systems that can decrease workload and increase efficiency of the NAS.

FY 2018 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the NAS Operations Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA) As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations

NextGen Improved Multiple Runway Operations Portfolio
Economic Competitiveness

Program Description:

The Improved Multiple Runway Operations (IMRO) portfolio conducts pre-implementation activities to reduce risk in support of multiple runway operations. The IMRO Portfolio improves runway access through the use of improved technology, updated standards, safety analysis, and modifications to air traffic monitoring tools and operating procedures that will enable more arrival and departure operations. Improving runway access equates to reduced delays that occur now when demand exceeds the capability of the airport's runways. Pre-implementation research conducted under this portfolio includes:

Closely Spaced Parallel Runway Operations

Closely Spaced Parallel Operations (CSPO) is the simultaneous approach of aircraft pairs into airports with single and multiple parallel runways that are closely spaced (runways that are less than 4,300 feet apart). The CSPO program will accelerate activities to provide increased arrival operations to airports with closely spaced parallel runways in IMC. CSPO will develop the performance requirements that enable the implementation of innovative procedures, tools and/or controller/pilot aids that increase capacity at airports utilizing multiple independent and dependent operations.

Program Objectives:

Closely Spaced Parallel Operations

Closely Spaced Parallel Operations project is focused on finding safe ways to recover capacity lost by the current aircraft-to-aircraft separation procedures required for simultaneous operations to closely spaced parallel runways during limited visual conditions. The goal of CSPO analysis is to maintain the same arrival and departure rates regardless of weather conditions.

Anticipated Program Activities:

The program will continue to explore procedural changes and associated safety analyses to enable further capacity gains in a closely spaced parallel runway operational environment.

Expected Program Outcomes:

The Closely Spaced Parallel Operations project is expected to improve efficiency through safe reduction in separation standards for approaches to closely spaced parallel runways to enable increased airport capacity.

FY 2018 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the NAS Operations Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA) As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

NextGen – NAS Infrastructure Portfolio

Economic Competitiveness

Program Description:

The NAS Infrastructure portfolio conducts pre-implementation activities to reduce risk for aviation weather-related and cross-cutting engineering issues. This portfolio provides the research, development, and analysis of portfolio capabilities such as validation activities, human system engineering, and demonstrations. Work with this portfolio addresses aviation weather-related issues by supporting the improvement of (1) air traffic management (ATM) decision-making during adverse weather conditions, (2) weather forecasting in the transformed NAS, and (3) existing weather infrastructure. Surface/Tower/Terminal Systems Engineering, NextGen Navigation Engineering, New ATM Requirements, NextGen DME, and Information Management conduct analysis to develop solutions that can apply across the NAS domain. Pre-implementation research conducted under this portfolio includes:

a. New Air Traffic Management Requirements

The New Air Traffic Management (ATM) Requirements Program identifies new opportunities to improve the efficiency and effectiveness of ATM and expanding capacity by developing decision support tools that improve the strategic management of operations in the NAS. [Note: A Separate FY2017 RDT Project Description for this initiative is included in the AMRP]

b. Weather Observation Improvements

The NextGen Weather Observation Improvements Program manages the evolution of the existing aviation weather observation sensor networks to one that provides the optimal quantity and quality of ground, air, and space-based sensors.

Program Objectives:

NAS Weather Observation Improvements

The NAS Weather Observation Improvements Program uses data to explore potential NextGen-enabled concepts and to mitigate the high priority shortfalls. In the near term, this program will continue to address current limitations of the sensor network for the Terminal environment.

New ATM Requirements

The service analysis and operational demonstration activities within New Air Traffic Management (ATM) Requirements Program support the development of operational improvements that will increase the number of arrivals and departures at major airports. [See separate FY2017 RDT Project Description].

Anticipated Program Activities:

The program will continue to perform a broad range of concept engineering and exploratory development activity to support future investment and implementation of improved NAS weather observation capabilities.

Expected Program Outcomes:

The Weather Observation Improvements project is expected to improve efficiency through:

(1) The establishment of requirements and standards for enabling availability and improving the quality and quantity of meteorological information to reduce impacts of adverse weather on rerouting, NAS capacity, and NextGen operational procedures and

(2) Improved accuracy and accessibility of observed and forecast weather information to improve NAS efficiency (e.g., reduced delays and cancellations, increased capacity in high traffic areas.

FY 2018 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the NAS Operations Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA) As appropriate, particular findings and

recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

NextGen Laboratory Support Portfolio
Economic Competitiveness

Program Description:

The NextGen – Laboratory Support Portfolio focuses on evaluating future concepts and technologies to support technical transfer to the implementing organizations, promoting industry involvement, and identifying implementation challenges and research areas. This work supports the infrastructure needed to complete those demonstrations and studies, measures performance impacts of NextGen capabilities, reports progress in the performance of implemented capabilities at specific locations, as well as updates the NSIP.

The NextGen Laboratories [NextGen Integration Evaluation Capability (NIEC) and Florida Test Bed (FTB)] enable research activities that support pre-implementation and risk reduction activities by providing a platform to conduct validation, modeling, and demonstrations.

Program Objectives:

The laboratory support portfolio will continue to provide a robust platform where early-stage NextGen concepts can be integrated, demonstrated, and evaluated. These laboratories will continue to provide the FAA and industry an agile environment for the rapid integration of new and emerging technologies. They will continue to promote contributions and R&D investment from industry and leverages industry's capabilities, resulting in cost avoidance to the FAA and accelerated NextGen development.

Anticipated Program Activities:

It is anticipated that the program will pursue varied upgrades to maintain, sustain and enhance the capabilities of the NIEC and FTB as warranted by planned demonstrations and user activity.

Expected Program Outcomes:

The projects described above are expected to improve efficiency by enabling concept engineering and evaluation activities that reduces the risk of successful implementation of ATM concepts and capabilities that improve NAS operational efficiency.

FY 2018 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is in and of itself a pathway to obtaining stakeholder input. Specifically, the NIEC laboratory is used to expose stakeholders in the ATM operational user community to emerging NextGen concepts and capabilities in order to gain their assessment of the potential operational effectiveness and/or suitability of the concept for use in further maturation and development. The Florida Test Bed is used to engage industry stakeholders in the prototyping and demonstration of emerging concepts and thereby promote mutual (FAA and industry) understanding of concept maturity, technology readiness and areas needing further development.

Airport Technology Research Program

Safety, Economic Competiveness, Environmental Sustainability

Program Description:

The Airport Technology Research Program (ATRP) executes a broad range of research projects that support FAA safety, capacity and environmental objectives. Safety initiatives include research aimed at (a) improving airport lighting and marking, (b) reducing wildlife hazards near airport runways, (c) improving airport fire and rescue capability, and (e) reducing the likelihood and severity of surfacing accidents. Under its capacity objective, ATRP research is aimed at providing better airport planning, designs, and improved runway pavement design, construction, and maintenance. The ATRP Environment Program establishes up-to-date exposure-response relationships for community annoyance and sleep disturbance in the U.S. by collecting extensive data, which covers a wide variety of airport types and geographic locations.

Program Objectives:

The Airport Technology Research Program will continue to support increased safety and capacity while reducing the environmental impact of airport operations by exploring, evaluating and testing new technologies and design standards for potential adoption and implementation via the Airport Improvement Program. Research project outputs will continue to inform the development and issuance of Advisory Circulars which are the primary method of conveying airport improvement design guidance and standards for airport operators.

Anticipated Program Activities:

(1) Establishment of new method to calculate aircraft classification number and pavement classification number

(2) Enhance and optimize mixture design, testing, and specifications that support pavement performance for mixtures using both virgin and recycled/reclaimed materials and industrial byproducts

(3) Explore the use of new and innovative materials and practices that minimize environmental impacts, including the use of nanoparticles for these improvements

Expected Program Outcomes:

(1) No fatal accidents on certificated airports as a result of airport design, runway incursions or excursions, or wildlife strikes.

(2) Availability of existing airport facilities protected and used as efficiently as possible, while making strategic investments in new facilities consistent with evolving aviation needs.

(3) Established requirements, policies, procedures, and resources to allow airports in the United States to become environmentally-friendly neighbors.

(4) Enhance and optimize mixture design, testing, and specifications that support pavement performance for mixtures using both virgin and recycled/reclaimed materials and industrial byproducts.

(5) Explore the use of new and innovative materials and practices that minimize environmental impacts, including the use of nanoparticles for these improvements

FY 2018 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
	None

How Program meets statutory requirements:

This program is not driven by particular statutory requirements.

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

This program is reviewed twice yearly by the Airports Subcommittee of the Research Engineering and Development Advisory Committee (REDAC) – a chartered committee consisting of industry and academia that functions in accordance with the Federal Advisory Committee Act. (FACA). As appropriate, particular findings and recommendations are reported independently by the committee to the FAA Administrator and the agency responds formally to all such recommendations.

Airports Cooperative Research

Safety, Economic Sustainability, Environmental Sustainability

Program Description:

The Airport Cooperative Research Program (ACRP) is an industry-driven, applied research program that develops near-term, practical solutions to problems faced by airport operators. ACRP is managed by the Transportation Research Board (TRB) of the National Academies of Sciences, Engineering, and Medicine and is sponsored by the Federal Aviation Administration (FAA). The research is conducted by contractors who are selected on the basis of competitive proposals.

Program Objectives:

The Airport Cooperative Research Program (ACRP) carries out applied research on problems that are shared by airport operating agencies and are not being adequately addressed by existing federal research programs. The ACRP undertakes research and other technical activities in a variety of airport subject areas including design, construction, maintenance, operations, safety, security, policy, planning, human resources, and administration.

Anticipated Program Activities:

The ACRP Oversight Committee will announce their FY 2017 project topics during the course of 201-65. While the selected research projects remain to be determined, it is anticipated that they will continue examine different research areas that target near-term solutions to problems facing airport operators and industry stakeholders. The selected projects will continue to report on the state of the practice in critical areas within the industry.

Expected Program Outcomes:

The ACRP advances state of the knowledge and practice across a broad range of topics of import to the airport operator community and other industry stakeholders. Specific outcomes will be dependent on the particular research proposals awarded in a given year.

FY 2018 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
ACRP	**Transportation Research Board**

How Program meets statutory requirements:

The Airport Cooperative Research Program (ACRP) was authorized in December 2003 as part of the Vision 100-Century of Aviation Reauthorization Act (Public Law 108–176)

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

Research problem statements for ACRP are solicited periodically but may be submitted to TRB by anyone at any time. It is the responsibility of the AOC to formulate the research program by identifying the highest priority projects and defining funding levels and expected products.