Federal Aviation Administration

FY 2015
Research and Development (R&D) Portfolio Development Process

Guidance Reference Document

November 16, 2012

Federal Aviation Administration
NextGen Office
William J. Hughes Technical Center
Research and Development Management Division
ANG-E4

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INTRODUCTION

This document outlines how a viable Research, Engineering and Development (R,E&D) portfolio is developed each fiscal year within the research and development (R&D) portfolio development process. If you are a first time user, refer to Section 3.1 – Roles and Responsibilities, as well as the appendices, for additional information. Everyone should review the Schedules section for important events and deadlines in the FY 2015 R&D Portfolio Development Process and for important changes for the FY 2015 Portfolio.

Each year, the R&D Executive Board (REB) conducts a lessons learned session to review the R&D budget portfolio formulation process and determine if any updates, clarifications, or improvements are necessary.

Participants are encouraged to attend the lessons learned session this summer and suggest process improvements or to contact the document owner at any time during the process.

An electronic copy of the Guidance Document is available online at the ANG-E4 Knowledge Services Network (KSN) site: https://ksn2.faa.gov/narp/Home/REB/default.aspx

REVISION SUMMARY

Document Title:	FY 2015 Research and Development Portfolio Development Process – Guidance Reference Document	
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GD_RefGuideFY15B10.doc	Baseline B10 FY 2015 R&D Portfolio Development Process Guidance Reference Document	11/16/2012

The following changes have been made to the FY 2015 Guidance Reference Document:

- Addition of supplement containing the FY 2015 R,E&D Budget Narrative Development Process Guidance
- Update of Portfolio Development Process Schedule Chart

SCHEDULES

FY 2015 Portfolio Development Process Schedule

June 25, 2012	REB conducts FY 2014 lessons learned session
July-September 2012	ANG-E4 provides FY 2015 process training as required
September 26, 2012	R,E&D Advisory Committee (REDAC) meeting (Guidance for FY 2015)
September 10, 2012	REB reviews proposed updates to process
October 11, 2012	REB reviews draft Guidance Document
November-December, 2012	REB Support Team (RST) provides Program Planning Team (PPT) training as requested
November	PPTs begin developing portfolios
November 16, 2012	REB receives Guidance Document and reviews PPT processes
February 11, 2013	REB reviews PPT Portfolio (Group 1)
February 18, 2013	REB reviews PPT Portfolio (Group 2)
March	PPTs complete REDAC Subcommittee reviews of Portfolios
April 15, 2013	REB reviews PPTs updated Portfolios
April	REDAC meets (FY 2015 Portfolio Review)
May 6, 2013	REB finalizes FY 2015 Portfolio
May 13, 2013	REB back-up meeting date
May	Financial Manager collects draft budget narratives
May 24, 2013	REB completes Associate and Assistant Administrator reviews
June 7, 2013	REB presents R,E&D Portfolio to Joint Resources Council (JRC)
June	FAA submits budget to Office of Secretary of Transportation (OST)
June 10, 2013	REB conducts FY 2015 lessons learned session
July	OST provides budget feedback to FAA
August	FAA submits budget to Office of Management and Budget (OMB)
November	OMB provides budget feedback to FAA
January	Finance and Management Office (AFN) collects final updates for FAA budget
February 5, 2913	The President's Budget for FY 2015 is submitted to Congress

The process flowchart (Figure A-1) in Appendix A provides these dates and additional information on the portfolio development process.

* REB Meeting Date (Meeting Location to be Determined (TBD))

REB Schedule

The REB schedule for the FY 2015 process is provided below. In addition to the dates listed below, the REB members attend PPT meetings. The PPT meetings are scheduled individually by each PPT.

June 25, 2012 .....REB conducts FY 2014 lessons learned session

September 26, 2012 .....REDAC provides guidance for FY 2015 Portfolio

September 10, 2012*, 1-4 pm .....REB reviews proposed updates to process

October 11, 2012*, 1-4 pm.....REB reviews draft Guidance Document

November 12, 2012*, 1-4 pm .....REB receives Guidance Document and reviews PPT processes

February 11, 2013*, 1-4 pm .....REB reviews PPT Portfolios (Group 1)

February 18, 2013*, 1-4 pm .....REB reviews PPT Portfolios (Group 2)

February 24 – March 25, 2013....REDAC Subcommittees review Portfolio

April 15, 2013*, 1-4 pm .....REB reviews PPTs updated Portfolios

April 18, 2013.....REDAC reviews Portfolio

May 6, 2013*, 1-4 pm.....REB finalizes Portfolio

May 13, 2013*, 1-4 pm.....REB back-up meeting date

May 24, 2013 .....REB completes Associate and Assistant Administrator reviews

June 7, 2013 .....JRC reviews Portfolio

June 10, 2013*, 1-4 pm.....REB conducts FY 2015 lessons learned session

* REB Meeting Date (Meeting Location TBD)

PPT Schedule

The PPT process usually begins on or around the distribution of the Guidance Document, which occurs in mid-November. Some of the key dates for the PPT process and interfaces with the REB are provided below.

June 25, 2012*.....REB conducts FY 2014 lessons learned session

November 4, 2012 .....RST provides training to PPTs, as requested

November 16, 2012*, 1-4 pm*.....RST distributes Guidance Document to REB and reviews PPT processes

February 11, 2013* .....REB reviews PPT Portfolio briefings (Group 1)

February 18, 2013* .....REB reviews PPT Portfolio briefings (Group 2)

March 29, 2013.....PPTs complete REDAC Subcommittee reviews

April 15, 2013.....PPTs submit updated Portfolios for REB review

May 6, 2013*.....REB Finalizes PPT Portfolios

* REB Meeting Date (Meeting Location TBD)

REDAC Schedule

August 14-15, 2012.....Subcommittee on Airports (Review R&D programs)

August 7-8, 2012.....Subcommittee on Environment and Energy (Review R&D programs)

August 2-3, 2012.....Subcommittee on NAS Operations (Review R&D programs)

July 17-18, 2012 .....Subcommittee on Human Factors (Review R&D programs)

August 28-30, 2012.....Subcommittee on Aircraft Safety (Review R&D programs)

September 26, 2012 .....REDAC provides guidance for FY 2015 R&D portfolio

February 26-28, 2013.....Subcommittee on Human Factors (Review PPT portfolio)

March 26-27, 2013.....Subcommittee on Environment and Energy (Review PPT portfolio)

March 19-20, 2013.....Subcommittee on Airports (Review PPT portfolio)

March 12-14, 2013.....Subcommittee on Aircraft Safety (Review PPT portfolio)

March 5-7, 2013.....Subcommittee on NAS Operations (Review PPT portfolio)

April 24, 2013.....REDAC provides recommendations to FY 2015 R&D portfolio

Finance Schedule

The Financial Manager prepares and submits the R,E&D budget as shown in the following schedule.

February 11 & 18, 2013 .....REB meets to review proposed Portfolio briefings

May 11, 2013 .....Financial Manager collects draft budget narratives

June 6, 2013 .....REB briefs JRC

June 13, 2013 .....FAA submits budget to OST

July 26, 2013 .....OST provides budget feedback to FAA

August 23, 2013.....FAA submits budget to OST for submission to OMB

November 29, 2013 .....OMB provides budget feedback to FAA

January 10, 2014 .....Final updates due for FAA budget

February 5, 2014.....The President's Budget is submitted to Congress

Step ID	Task Name	Start	Finish
I	**Guidance Phase**	**Thu 5/10/12**	**Wed 5/8/13**
1	REB Approves REB Process Changes	Wed 9/12/12	Wed 9/12/12
2	Gather Strategic Planning Information	Thu 5/10/12	Wed 9/12/12
3	Prepare, Review, and Distribute Portfolio Guidance Document	Thu 5/10/12	Wed 11/7/12
4	Provide Team Training	Mon 7/9/12	Wed 5/8/13
II	**Program Area Portfolio Preparation Phase**	**Mon 10/8/12**	**Wed 4/10/13**
5	PPTs Update Decision Making Processes	Mon 10/8/12	Tue 11/6/12
6	REB Reviews PPTs Decision Making Process	Wed 11/7/12	Wed 11/7/12
7	PPTs Generate Portfolios	Thu 11/8/12	Tue 2/5/13
8	REB Reviews PPTs Portfolio (First REB Meeting)	Wed 2/6/13	Wed 2/6/13
8	REB Reviews PPTs Portfolio (Second REB Meeting)	Wed 2/13/13	Wed 2/13/13
9	REDAC Subcommittee Reviews Portfolio and Makes Recommendations	Mon 2/4/13	Thu 3/28/13
10	PPTs Update Portfolios	Fri 3/29/13	Tue 4/9/13
11	REB Reviews PPT Portfolio	Wed 4/10/13	Wed 4/10/13
III	**FAA Portfolio Review Phase**	**Wed 4/17/13**	**Wed 6/5/13**
12	R,E&D Advisory Committee Reviews R&D Portfolio	Wed 4/17/13	Wed 4/17/13
13	REB Prepares R,E&D Portfolio & Related Briefings	Thu 4/18/13	Wed 5/8/13
14	ATO Executive Council and FAA Associates and Assistant Administrators Review R,E&D Portfolio	Thu 5/9/13	Thu 5/23/13
15	JRC Approves R,E&D Investment Portfolio	Wed 6/5/13	Wed 6/5/13
IV	**Budget Preparation Phase**	**Mon 2/25/13**	**Mon 9/22/14**
16	Prepare Budget Narratives	Mon 2/25/13	Fri 4/26/13
17	Prepare OST Budget Submission	Mon 4/29/13	Fri 5/24/13
18	Prepare OMB Budget Submission	Mon 7/29/13	Fri 9/13/13
19	Prepare Congressional Budget Submission	Mon 11/25/13	Mon 2/3/14
20	Appeal of House and Senate	Wed 7/2/14	Mon 9/22/14
21	Congress Appropriates Funding	Mon 10/7/13	Thu 2/27/14
V	**Program Planning & Execution Phase**	**Wed 8/6/14**	**Fri 9/25/15**
22	Performers Prepare Detailed Spend Plans	Wed 8/6/14	Fri 9/26/14
23	Performers Execute in Accordance with Plans	Mon 9/29/14	Fri 9/25/15
VI	**Program Evaluation Phase**	**Mon 6/10/13**	**Mon 6/10/13**
24	REB Lessons Learned and Process Updates	Mon 6/10/13	Mon 6/10/13

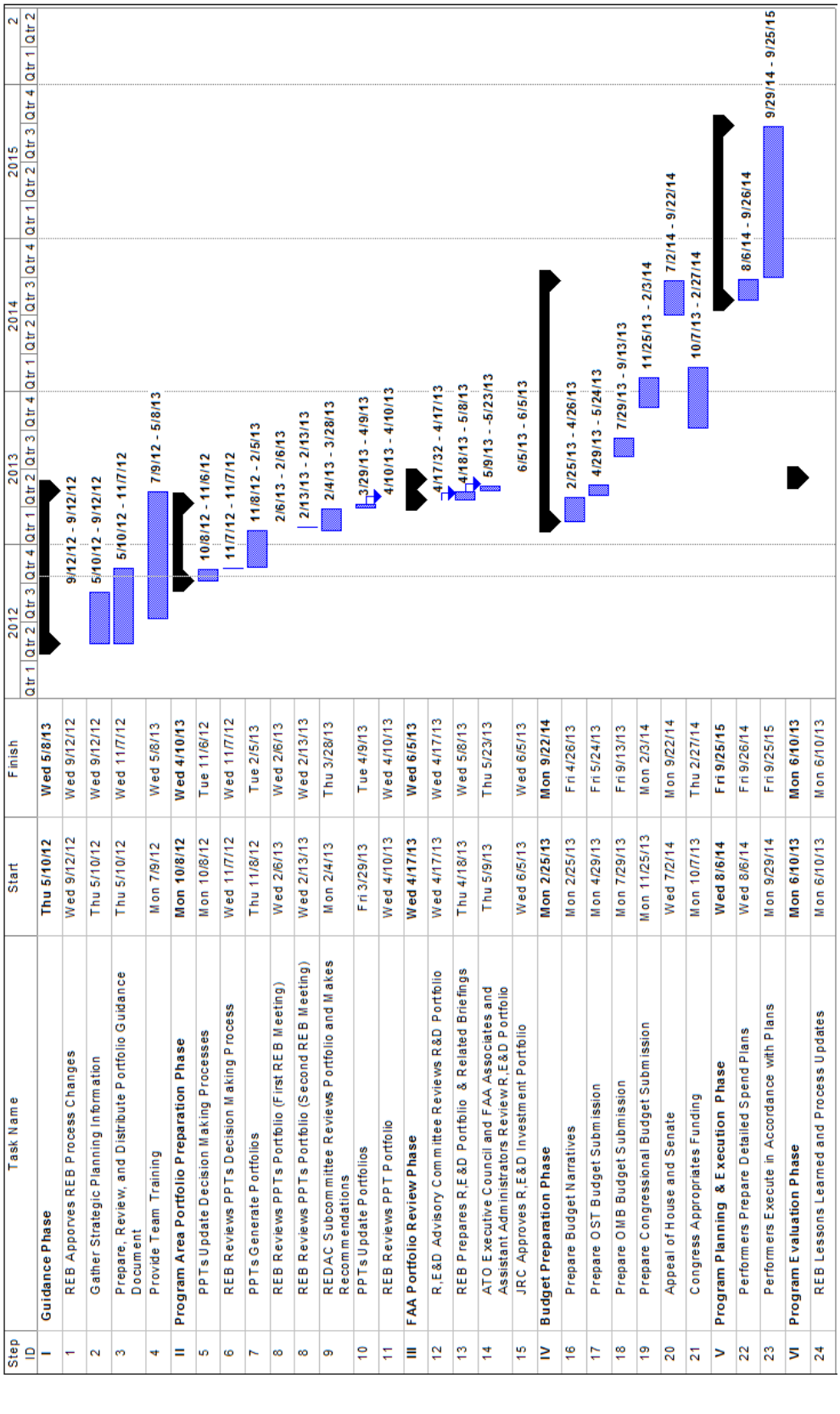

Figure 1 – FY 2015 Portfolio Development Process Schedule Chart

PROCESS OVERVIEW

The R&D portfolio development process schedule, as provided in Figure 1, includes strategic planning, budget formulation, program execution, and program evaluation. The process improves the planning, programming, and budgeting of the R&D program; increases the return on taxpayer investment; enhances productivity; and ensures the relevance, quality, and performance of the R&D program. Appendix A provides additional information on the portfolio development process steps.

Strategic planning for the R&D portfolio is provided by the National Aviation Research Plan (NARP), which links FAA's R&D activities to the broader strategic planning of the FAA Destination 2025, the FAA's NextGen Implementation Plan (NGIP), and the Joint Planning and Development Office (JPDO) Plans. The R&D portfolio must address the current challenges of operating the safest, most efficient air transportation system in the world while building a foundation for the future.

Formulation of the R&D portfolio is coordinated by the REB. The R&D portfolio includes programs in four appropriation accounts: Research, Engineering and Development (R,E&D); Facilities and Equipment (F&E); Grants-In-Aid for Airports (AIP); and Operations (Ops). The REB coordinates the various iterations of the portfolio with FAA upper-level management including the NextGen Office and Joint Resources Council (JRC). This ensures coordination at all levels for a well-balanced portfolio. Appendix B provides additional information on REB responsibilities.

Program Planning Teams (PPTs), composed of program managers (performers) and sponsors, execute the portfolio to ensure R&D results meet sponsor needs. Appendix C provides PPT guidance. Program managers possess scientific, engineering, and technical expertise and understand performance and financial management. They use program funding allocated in the formulation process and approved by Congress to conduct R&D and produce results that meet sponsor requirements. Performance guidance is provided in the supplemental attachment FY 2015 R,E&D Budget Narrative Development Process Guidance. This can be found following the appendices. The Guidance and further details on the budget narrative collaboration process can be found on the ANG-E4 KSN at https://ksn2.faa.gov/narp/Home/BN/default.aspx.

Evaluations determine whether the results produced by the portfolio meet the strategic plan, and whether the strategic plan is leading the R&D portfolio in the appropriate direction. The internal evaluation includes using databases to track the status of the R&D accomplishments and allows program managers to report progress and highlight issues, including funding and priority issues. NextGen programs undergo internal evaluation using NextGen Service Level Agreements that specify planned funding with scheduled milestones and measure annual progress against the plan. The REDAC and its subcommittees conduct external reviews of the R&D portfolio twice a year. These evaluations provide feedback for strategic planning and help ensure the relevance, quality, and performance of the R&D portfolio.

1.0 Purpose

The purpose of the FAA R&D portfolio development process is to produce an R&D portfolio that has a high level of relevance, quality, and performance.

1.1 Guidance Reference Document

The purpose of this document is (1) to provide guidance to participants on the FAA R&D portfolio development process and to document the process; (2) to minimize the time required to understand and use the process and maximize the time available to manage programs and produce results; and (3) to explain how the portfolio development process connects to the strategic planning, budget formulation, program execution, and evaluation of R&D.

1.2 R&D Portfolio

Each element of the FAA R&D portfolio has a clear purpose that supports the FAA mission to provide the safest, most efficient aerospace system in the world.

- The FAA is the sole certification authority for the United States aviation community. Through its R,E&D programs, the FAA develops standards to regulate the industry and ultimately reduces the aviation accident fatality rate. R,E&D programs include aviation research on fire extinguishing and prevention technologies; aircraft maintenance and structural technologies; the relationship between human factors and aviation accidents; air traffic control; weather forecasting; and environment and energy.

- The FAA has the sole responsibility for the National Airspace System (NAS). The FAA's F&E R&D programs target shortfalls (mission needs) in the operational capabilities that the FAA needs to perform its mission. The F&E programs provide the necessary equipment and facilities for the FAA to fulfill its mission for a safe, secure, and efficient NAS. The FAA's F&E R&D programs provide development and acquisition for products and services that enable the FAA to enhance the safety of the NAS and satisfy current and future operational needs of the U.S. civil aerospace system for national and international operations.

- The FAA is the sole licensing and permitting authority for the United States commercial space transportation community. The FAA's Ops R&D programs provide the engineering and information necessary for the FAA to develop tools, guidance, and regulations for reducing the safety risks of commercial space launch and reentry operations, including those involving human space flight. The Ops R&D programs support licensing and permitting activities for the regulation of the safety of the commercial space transportation industry.

- The FAA's AIP R&D programs focus on improvements in safety, operations, and construction of airports (including the development of innovative concrete and other materials in the construction of airport facilities to minimize installation costs and time out of service, and maximize lifecycle durability) to reduce capacity constraints of secondary and reliever airports located within major metropolitan areas. The FAA's AIP R&D programs encourage innovative technology, concepts, and approaches that will promote safety, capacity, and efficiency improvements in the construction of airports and in the air transportation system.

The R&D portfolio does not duplicate any other Federal, state, local, or private effort. If the R&D portfolio did not exist, no other public or private organization could take its place.

The R&D portfolio engages both internal and external stakeholders to provide input and assessment of the portfolio on a regular basis. The R&D portfolio also leverages its external partners for people, skills, and resources. For example, the Air Transportation Centers of Excellence partners from academia and industry provide matching resources for aviation-related R&D.

For more information, see Title 49 U.S. Code, section 47101 (a) (11); the FAA Destination 2025*;* and the *Federal Aviation Administration FY 2013 President's Budget Submission*.

2.0 Strategic Planning

One of the goals of the FY 2015 R&D Portfolio Development Process is to continue to provide an Agency-wide process for R&D to develop an integrated, well-planned, budgeted, and executed program. Integrated planning helps ensure that R&D resources are customer-focused and target the highest priority activities.

The NARP links FAA's R&D activities to the broader strategic planning of the FAA Destination 2025, the National Airspace System Enterprise Architecture (NASEA), FAA's NGIP, the JPDO Plans, and the National Plan for Aeronautics Research and Development and Related Infrastructure. The R&D portfolio must address the current challenges of operating the safest, most efficient air transportation system in the world while building a foundation for the future.

2.1 National Aviation Research Plan

Title 49 U.S. Code, section 44501c requires the Administrator of the Federal Aviation Administration to submit the NARP to Congress annually with the President's budget. The NARP is an integrated, performance-based plan for the FAA R&D portfolio that supports both the day-to-day operation of the current system and the future vision of NextGen. The NARP reports the R&D strategy and explains how the R&D portfolio supports the near-term goals mid-term targets of Destination 2025, the mid-term goals of the NGIP, and the long-term goals of the JPDO. The NARP is updated annually and available online at www.faa.gov/go/narp.

2.2 Destination 2025

Title 5 U.S. Code Chapter 3, section 306 requires the head of each agency to submit a strategic plan for program activities to the OMB and Congress. Destination 2025 serves as the agency's strategic plan and captures the FAA vision of the ideal future – a transformation of the Nation's aviation system in which air traffic will move safely, swiftly, efficiently, and seamlessly around the globe. The vehicle for providing opportunities during this transformation is the Next Generation Air Transportation System (NextGen). Destination 2025 also has a near-term focus since it contains metrics for 2018 that provide a waypoint to measure progress towards achieving the goals. The plan is available online at http://www.faa.gov/about/plans_reports/media/Destination2025.pdf.

2.3 National Airspace System Enterprise Architecture

The NASEA provides the framework for a transition plan to the future system by comparing the current state of the system to the desired state; and it identifies how operations, investments, policies, processes, organizational structures, information, and systems must change to achieve the future system. The NASEA shows how NextGen operational improvements (OIs) will support the transition to the future system. More information on the NASEA is available online at: https://nasea.faa.gov/.

2.4 NextGen Implementation Plan

The NGIP provides a tangible execution plan for the FAA's portion of the work needed to realize NextGen and focuses on accelerated early deployment and demonstrations, improved systems integration, and successful implementation. The FAA NextGen R&D program supports the planning, processes, and schedule of the NGIP. The NGIP is available online at http://www.faa.gov/nextgen/implementation/plan/

2.5 Joint Planning and Development Office Plans

Public Law 108-176, Title VII, section 709, *Vision 100 – Century of Aviation Reauthorization Act* of December 12, 2003, [Title 49 U.S. Code, section 40101] established the Joint Planning and Development Office (JPDO) to provide government wide planning and coordination for NextGen R&D. The JPDO works with the Departments of Defense, Transportation, Homeland Security, and Commerce, the FAA, the National Aeronautics and Space Administration (NASA), and the Office of Science and Technology Policy to plan federal aviation R&D and focus it on the long-term. The FAA Modernization and Reform Act of 2012 reaffirms this role. For more information, visit http://www.jpdo.gov/.

2.6 National Plan for Aeronautics Research and Development and Related Infrastructure

Executive Order 13419, National Aeronautics Research and Development signed by The President of the United States on December 20, 2006, established the nation's first policy to guide Federal aeronautics R&D through 2020. The Executive Order states "Continued progress in aeronautics, the science of flight, is essential to America's economic success and the protection of America's security interests at home and around the globe" and called for a plan for national aeronautics R&D and for related infrastructure.

The National Plan for Aeronautics Research and Development and Related Infrastructure dated December 21, 2007 and the Technical Appendix dated December 2008 establish aeronautics R&D challenges, priorities, and time-phased objectives, as well as the path forward for developing an aeronautics research, development, test, and evaluation infrastructure plan. A biennial update to the National Plan was released in February 2010, and the National Aeronautics Research, Development, Testing, and Evaluation Infrastructure Plan was released in January 2011. The National Plan defines the highest priority aeronautics R&D goals and objectives for the nation. These goals and objectives are intended to provide high-level guidance for foundational, advanced aircraft system, and air transportation system R&D through 2020. The FAA's R&D portfolio aligns with the National Plan. For more information and copies of the Plans, visit http://www.whitehouse.gov/administration/eop/ostp/nstc/aero.

3.0 Formulation

The FAA R&D programs are funded by annual Congressional appropriations, primarily through the FAA R,E&D budget. Appendix D provides information on the budget target allocation methodology used for the R,E&D funding. In addition, R&D is funded through F&E, AIP, and Ops appropriations.

3.1 Roles and Responsibilities

The FAA REB, with assistance from the PPTs, coordinates the development of the Agency's annual R&D investment portfolio, which includes efforts funded by all four appropriations: R,E&D, F&E, AIP, and Ops. The REB Support Team (RST) documents and supports the process, and the Financial Manager coordinates and prepares the R,E&D budget submission.

3.1.1 R&D Executive Board

The primary responsibility of the REB is to coordinate the annual R&D investment portfolio across all four appropriations. In particular, the REB plans, presents, and defends the R,E&D portion of the R&D program, and determines program impacts from changes that occur during the formulation phase and Congressional phase of the budget process.

The REB provides an oversight approach to managing the R&D portfolio development process; PPTs take a detailed approach, and they work together to formulate the portfolio and present the budget. Details on the PPTs are provided in Section 3.2.1.

3.1.1.1 REB Membership

There are seven REB members who represent the FAA lines of business (associate administrators) and assistant administrators who sponsor or manage funds for R&D programs. The head of each member organization appoints a representative to the REB. The member organizations and designated representatives are shown in Table 1. Member contact information is provided in Appendix E.

3.1.1.2 REB Voting

Appendix B explains the REB voting procedures. As the last column of Table 1 below shows, only five of the total seven members may vote. One voting member introduces a motion and another voting member seconds. After discussion, members vote on the motion. A vote requires the presence of a quorum—three of the five voting members (or their designated representatives).

Table 1: REB Members

Member Organization	Org	Representative	Role
Assistant Administrator for NextGen	ANG	Wilson Felder, ANG-E	Voting
Associate Administrator for Aviation Safety	AVS	Rob Pappas, AVP-300	Voting
Associate Administrator for Airports	ARP	James White, AAS-2	Voting
Associate Administrator for Commercial Space Transportation	AST	Ken Davidian, AST-4	Voting
Assistant Administrator for Policy, International Affairs & Environment	APL	James Hileman, APL-3	Voting
Assistant Administrator for Finance and Management	AFN	Cathy March, ABU-300	Advisory
Assistant Administrator for Information Technology	AIO	Trung Nguyen, ARD-200	Advisory

Approval of a motion requires a favorable vote from a majority of the total voting membership. If only three voting members are present, all three must vote in favor to carry the motion.

REB voting members vote to approve the following items:

- Meeting Minutes
- Proposed Changes to the Guidance Reference Document
- The Annual R&D Portfolio Development Process Guidance Reference Document
- The Annual R,E&D Budget Portfolio
- Other motions by voting members

REB meeting attendees seated at the table will be identified by name placards. REB members are the only attendees who may vote and voting REB members will be identified by name placards in red ink. Non-voting REB members will be identified by name placards in green ink. REB name placards will include the organization that the REB member represents. Non-voting attendees (RST members and PPT leads) seated at the table will be identified by name placards in black ink. Name placards will include the title of the attendee.

3.1.1.3 REB Interfaces

The REB provides high-level guidance to develop the R&D portfolio. REB members communicate and interact with numerous organizations to gather information to develop the R&D portfolio.

- Associate or Assistant Administrator, Chief Operating Officer, or Senior Vice President
- PPTs
- Research and Development Management Division (ANG-E4)
- Financial Manager (ABP-330)
- F&E Budget Planners
- JPDO
- National Plan for Aeronautics R&D and Related Infrastructure Interagency Working Groups

- REDAC
- REDAC Subcommittees
- Line of Business (LOB) Review Boards
- JRC

3.1.1.4 REB Responsibilities

The REB members participate in strategic planning, formulation, and evaluation activities.

Strategic Planning:
- Attend REDAC and REDAC Subcommittee meetings
- Monitor strategic planning of Destination 2025
- Monitor the NextGen planning of the NextGen Office and JPDO
- Review five-year corporate R&D funding targets

Formulation:
- Support R,E&D budget activities
- Set budget guidelines and convey budget targets
- Approve annual R&D Portfolio Development Process Guidance Reference Document
- Select PPT leads
- Oversee PPT process and review proposed R&D portfolio
- Participate in REDAC subcommittee review of PPT portfolios
- Review updates to PPT portfolios resulting from REDAC subcommittee review
- Prepare and brief R,E&D budget portfolio, JRC briefing, and LOB review board briefings
- Brief Associate or Assistant Administrators on the R&D portfolio
- Participate in budget adjustment planning when necessary
- Support requests for impact statements or information, as requested

Evaluation:
- Participate in annual lessons learned session for the process update
- Review PPT decision-making process updates

3.1.1.5 REB Outputs

The REB approves the following products during the R&D portfolio development process.

- Budget target allocations to PPTs
- PPT Proposed R&D budget portfolios (Steps 8 and 11)
- R,E&D budget portfolio briefings for LOBs and JRC presentations (Step 14)
- Lessons learned proposed process changes (Step 25)
- Annual updated R&D Portfolio Development Process Guidance Reference Document (Step 3)

The detailed process steps in Appendix A, Section A-1, have more information on these outputs.

3.1.2 Program Planning Teams

The seven PPTs prepare specific research program area portfolios as shown in Table 2. PPT members include the sponsors and performers, i.e., program and project managers. PPT members collect information, define programs, justify and prioritize program requirements, estimate funding, and interface with other teams to build and present an R&D budget for the FAA. The PPTs assess their program budget requirements and prepare budget and process documentation. The PPTs and the REB work together to formulate the portfolio and present the budget. The PPTs take a detailed approach to the portfolio development process, and the REB provides oversight.

3.1.2.1 PPT Leads

The PPT leads are listed in Table 2 by research program area and REB sponsor organization. Each PPT lead is responsible for forming a team of sponsors and performers appropriate for the program area. The R&D programs assigned to each PPT are listed in Appendix C, Section C-1. Contact information for PPT leads and REB sponsors is in Appendix E.

Table 2: PPT Leads

Program Area	REB Sponsor	PPT Lead	Telephone Number
Airports	ARP	James White, AAS-100	(202) 267-7605
Aviation Safety	AVS	Rob Pappas, AVP-300	(202) 267-7095
Commercial Space Transportation	AST	Ken Davidian, AST-4	(202) 267-7214
Environment and Energy	APL	James Hileman, APL-3	(202) 493-4273
Mission Support	ANG	Cathy Bigelow, ANG-E4	(202) 267-9076
NAS Operations	ANG	John Marksteiner (A), ANG-C4	(202) 267-9086
Weather	ANG	Steve Abelman, ANG-C6	(202) 385-7234

3.1.2.2 Sponsor and Performer Roles

An FAA sponsor organization defines and owns or shares the R&D requirement. Generally, the sponsor has identified and demonstrated a need for the research, and the sponsor will use the results of the research. The sponsor's role in the budget formulation process includes the following:

- Prepare requirements
- Determine if R&D requirements are consistent with NARP Chapter 2 milestones
- Prepare justification for any NARP milestone changes for REB approval

- Approve program budget narratives

A performer organization manages the work that fulfills the R&D requirement. Performers include program managers and program offices. Generally, the performer undertakes the R&D effort and provides research results. The performer's role in the budget formulation process includes the following:

- Prepare cost, schedule, and technical plan for requirements
- Prepare program budget narratives
- Prepare impact statement for NARP milestone changes for REB approval

When sponsors and performers are in the same organization, that organization performs both roles.

3.1.2.3 PPT Interfaces

PPT members interface with sponsors and performers to understand requirements and provide detailed information about R&D programs.

The PPTs also interface with the REB to formulate and review their R&D portfolios. The PPTs may interface with ANG-E4 for information on the NARP and REDAC recommendations; the Financial Manager for budget targets and past budget submission information; and the RST for training on the process. The PPT leads are encouraged to investigate opportunities for collaboration with other programs having overlapping goals or objectives.

The PPTs also interface with the REDAC to obtain subcommittee recommendations and with the Designated Federal Official (DFO) for the appropriate subcommittees for their program areas. The DFOs determine the level of detail required for the subcommittee to make sound budget portfolio recommendations to the full REDAC. Appendix E provides contact information on resources available to the PPTs.

3.1.2.4 PPT Lead Responsibilities

The PPT lead has the overall responsibility for completing the proposed R&D portfolio for the PPT program area.

- PPT lead responsibilities to the REB
  - Present the PPT Decision Making Process as needed
  - Present a five-year PPT portfolio that meets target funding levels
  - Present justification for any NARP Chapter 2 milestone changes

- PPT lead responsibilities to the PPT
  - Send PPT meeting announcements to all PPT members
  - Address internal PPT issues
  - Ensure that the PPT develops a portfolio of requirements for the target year and considers input from all PPT members.
  - Review and adjust funding for all changes to NARP Chapter 2 milestones
  - Ensure five-year planning for PPT portfolios is based on the budget targets provided

The PPT presents the proposed R&D portfolio to the REB using the PPT Briefing Format in Appendix C, Section C-3.

3.1.2.5 PPT Responsibilities

Each PPT communicates regularly with an assigned REB member(s) for process guidance and feedback during development of the R&D portfolio. The PPT responsibilities include the following:

- Gather Information
  - Current R&D Portfolio Development Process Guidance Reference Document
  - NARP, Destination 2025, NGIP, and JPDO Plans
  - National Plan for Aeronautics R&D and Related Infrastructure
  - Other documents, as needed

- Review PPT Guidance
  - Process Flowchart (Appendix A, Figure A-1)
  - Detailed Steps 5-11 and 25 (Appendix A)
  - Points of Contact List (Appendix E)
  - Target Allocations for PPT (Appendix D)
  - PPT Guidance (Appendix C)
    - Budget Line Items (BLIs) for PPT
    - Decision Making Process Guidance
    - Briefing Formats
    - REDAC Guidance

- Meet with assigned REB member
  - Review Decision Making Process from previous year and update as needed
  - Review Decision Making Process briefing (see Appendix C)
  - Update PPT membership (see Appendices C and E)
  - Identify process training requirements (contact the RST)
  - Develop meeting schedule and work plan
  - Review any special REB member guidance

- Meet with appropriate REDAC Subcommittee and DFO
  - Determine subcommittee meeting schedule
  - Identify information requirements
  - Determine briefing format
  - Attend subcommittee meetings
  - Prepare feedback related to subcommittee recommendations

- Generate Decision Making Process
  - Review last year's Decision Making Process and update as needed (Step 5)
  - Prepare Decision Making Process briefing as needed (see Appendix C)
  - Present Decision Making Process briefing to REB as needed (Step 6)
  - Request REB approval of Decision Making Process (Step 6)

- Generate R&D Portfolio
  - Ensure annual portfolio meets allocated budget target
  - Prepare PPT portfolio and briefing (Step 7; see Appendix C for format)

- Present portfolio briefing to the REB (Step 8)
- Present portfolio briefing to the REDAC subcommittee (Step 9)
- Update portfolio briefing to address subcommittee recommendations (Step 10)
- Present updated portfolio briefing to the REB (Step 11)
- Request REB approval of portfolio (Step 11)

- Participate in Lessons Learned
  - Attend lessons learned meeting (Step 25)
    - Evaluate the success of the process
    - Identify strengths and weaknesses
    - Recommend process improvements
  - Attend PPT Lessons Learned (Step 5)
    - Evaluate Decision Making Process
    - Propose changes to Decision Making Process
    - Incorporate changes into Decision Making Process

3.1.2.6 PPT Outputs

The PPT produces the items listed below during the R&D portfolio development process. Appendix A, Section A-1has more information on these outputs.

- PPT proposed budget portfolio (Step 7)
- Decision Making Process presentation for the REB, as needed (Step 6)
- REB approved Decision Making Process (Step 6)
- REB approved PPT portfolio (Step 8)
- Updated PPT portfolio, if needed (Step 10)
- REB approved updated PPT portfolio, if needed (Step 11)
- Lessons learned issues and proposed REB process changes (Step 25)

3.1.3 R&D Executive Board Support Team

The RST provides administrative support to REB meetings, maintains the R&D portfolio development process, and maintains and archives REB documentation. The RST also supports the PPTs, sponsors, and program and project managers by providing process training and briefing and document templates.

The RST membership consists of a team lead from the Research and Development Management Division (ANG-E4), the R,E&D financial manager (ABP-330), and contractor support staff. Additional personnel from each of these contributing organizations may be called upon for assistance. The RST members are listed in Table 3.

Table 3: RST Members and Contact Information

Name	RST Responsibility	Org	Telephone	Email
Pam Crenshaw	Team Lead	ANG-E4	(202) 267-8144	pam.crenshaw@faa.gov
Mike Gallivan	Financial Manager	ABP-330	(202) 493-5598	mike.gallivan@faa.gov
Aisha Staples	Staff	JMA/ANG-E4	(202) 465-8245	aisha.ctr.staples@faa.gov

3.1.3.1 RST Interfaces

The RST provides the process guidance reference document and briefing templates to all participants in the R&D portfolio process. The RST schedules the briefings required by the process and the pre-briefings within ANG and AFN. The RST interfaces with the following organizations and people:

- REB
- PPTs
- Sponsors and Performers, Program and Project Managers
- Research and Development Management Division (ANG-E4)
- NARP Manager (ANG-E4)
- REDAC Support Lead (ANG-E4)
- Advanced Concepts and Technology Development Division (ANG-C6)
- Assistant Administrator for Office of NextGen (ANG-1)
- Assistant Administrator for Finance and Management (AFN-1)
- Deputy Assistant Administrator, Financial Services (ABA-1)
- Director of Budget and Programs (ABP-1)
- Capital Budget Division (ABP-300)
- F&E Requirements & NAS Baseline Management Branch (ABP-320)
- R,E&D Program Management Branch (ABP-330)
- JPDO Staff
- JRC Secretariat
- Budget Planners

3.1.3.2 RST Responsibilities

The RST provides administrative support to the REB meetings and maintains process related documents.

- Monitor and identify updates to agency and JPDO strategic planning documents
- Update, prepare, and distribute process guidance document
- Prepare and provide process training
- Coordinate, schedule, and staff REB meetings
- Collect and distribute REB meeting documents
- Prepare and distribute REB meeting agenda and minutes
- Maintain archive of REB documents and provide copies when requested
- Implement REB decisions
- Prepare REB briefings for JRC
- Provide R&D budget and financial data support

- Host annual lessons learned session

3.1.3.3 RST Outputs

The RST outputs from the R&D portfolio development process are listed below. More information is provided in the detailed process steps in Appendix A.

- Annual R&D Portfolio Development Process Guidance Reference Document (Step 3)
- Team training on process (Step 4)
- Presentation for final version of R,E&D budget portfolio (Step 14)
- Draft LOB, and JRC briefings (Step 14)
- Documentation of REB lessons learned session and proposed process changes (Steps 25 and 1)

3.1.4 Financial Management Division

The R,E&D Financial Manager (ABP-330) works for the Assistant Administrator for Finance and Management (AFN-1), supports the NextGen Office, and is a permanent member of the RST. The R,E&D Financial Manager is Mike Gallivan (ABP-330) at 202-493-5598 or mike.gallivan@faa.gov.

3.1.4.1 Finance Interfaces

As the REB interfaces with the FAA budget office, the R,E&D Financial Manager coordinates the R,E&D budget presentations with ABP counterparts who present the F&E budget and maintains the R&D portfolio financial data. Finance interfaces with the following:

- REB
- Sponsors and Performers, Program and Project Managers
- Research and Development Management Division (ANG-E4)
- Advanced Concepts and Technology Development Division (ANG-C4)
- Assistant Administrator of the Office of NextGen (ANG-1)
- Assistant Administrator for Finance and Management (AFN-1)
- Deputy Assistant Administrator, Financial Services (ABA-1)
- Director of Budget and Programs (ABP-1)
- Capital Budget Division (ABP-300)
- Requirements & NAS Baseline Management Branch (ABP-320)
- R,E&D Program Management Branch (ABP-330)
- JRC
- OST
- OMB

3.1.4.2 Finance Responsibilities

The R,E&D Financial Manager prepares the R,E&D budget for JRC approval, and then for submission to OST, OMB, and Congress. The budget includes all R,E&D program budget narratives. The Financial Manager also prepares responses to passbacks from OST and OMB and mark-ups from Congress. Responsibilities include:

- Provide budget data and analysis for REDAC and JRC presentations
- Coordinate R,E&D budget submission with Financial Services and Budget (ABA, ABU)

- Prepare R,E&D budget submission for OST and OMB
- Respond to passbacks from OST and OMB
- Update R,E&D budget submission for the President's budget
- Respond to requests for information from Congress

3.1.4.3 Finance Outputs

The R,E&D Financial Manager's process products are listed below. See Appendix A for more information on the detailed process steps.

- Budget narratives (Step 17)
- OST budget submission (Step 18)
- OMB budget submission (Step 19)
- President's budget submission to Congress (Step 20)
- Responses to requests for additional information from Congress (Step 21)
- Financial plans (Step 23)

3.1.5 Capital Investment Team Process

In addition to relating capital investments to agency strategic goals, FAA management has a disciplined process for managing F&E funding for major system acquisitions. The FAA has established a detailed process for evaluating, approving, and managing projects. When management considers a project for funding, they must have a business case that estimates both project costs and benefits. A Capital Investment Team composed of representatives of all the major lines of business reviews the business case. If the team supports the project, it recommends that the Assistant Administrator for Finance & Management approve it before presenting the project to the JRC. Once the JRC approves a project, a baseline cost estimate is established, and the FAA commits to fully fund the baseline so the projected benefits are not lost because the project cannot be implemented consistent with its planned schedule. For more information on the F&E planning process, contact Chris Witt at (202) 267-7646 or chris.witt@faa.gov.

3.2 Review

The proposed R&D portfolio undergoes a series of external and internal reviews (Figure 2). The REDAC and its subcommittees conduct the external reviews. The JRC is the FAA's senior investment review board. The JRC is assisted by subordinate review boards that examine the portion of the R&D portfolio that applies to the particular board's line of business or service area.

3.2.1 Research, Engineering, and Development Advisory Committee

The REDAC review includes a detailed evaluation of the proposed R&D portfolio. The review is a two-step process. First, each of the five standing subcommittees on Aircraft Safety, Airports, Human Factors, Environment and Energy, and NAS Operations conducts a detailed review of the R&D portfolio in its respective area of expertise. Usually this occurs between February and March. Second, the full committee integrates recommendations from the subcommittees and provides a high-level evaluation of the R&D portfolio usually between March and April. For more information about the advisory committee and the requirements for this review, see section 5.3 or contact Gloria Dunderman at (202) 267-8937 or gloria.dunderman@faa.gov.

3.2.2 Joint Resources Council

The JRC makes corporate-level resource decisions including the following:

- Authorizes funding for new investment programs
- Approves investment resources
- Makes investment decisions
- Monitors investment program performance
- Oversees various subordinate boards for investment decision-making process
- Approves F&E and R,E&D annual budget submissions

Members of the JRC represent all agency LOBs, which include the service organizations that operate or maintain the products as well as the functional disciplines of budget, safety, and legal counsel. Prior to the JRC review, each LOB will review the R,E&D portfolio. For more information on the JRC, see the JRC Guidance at https://employees.faa.gov/org/staffoffices/afn/acq_business/investment_process/jrc_es/.

3.3 Submission

The Budget and Accounting Act of 1921 requires the President to coordinate the budget requests for all government agencies and to send a comprehensive budget to the Congress. Congress created the Bureau of the Budget, now OMB, to help the President do these tasks. Figure 2 below shows the flow of information and requirements from the source (PPTs) to the President's Budget. The Act also requires the President to include certain information in the budget. For more information see OMB Circular No. A-11, Section 15, Basic Budget Laws at http://www.whitehouse.gov/omb/circulars/a11/current_year/a11_toc.html and Title 31 U.S. Code, Chapter 11 at http://uscode.house.gov/download/pls/31C11.txt.

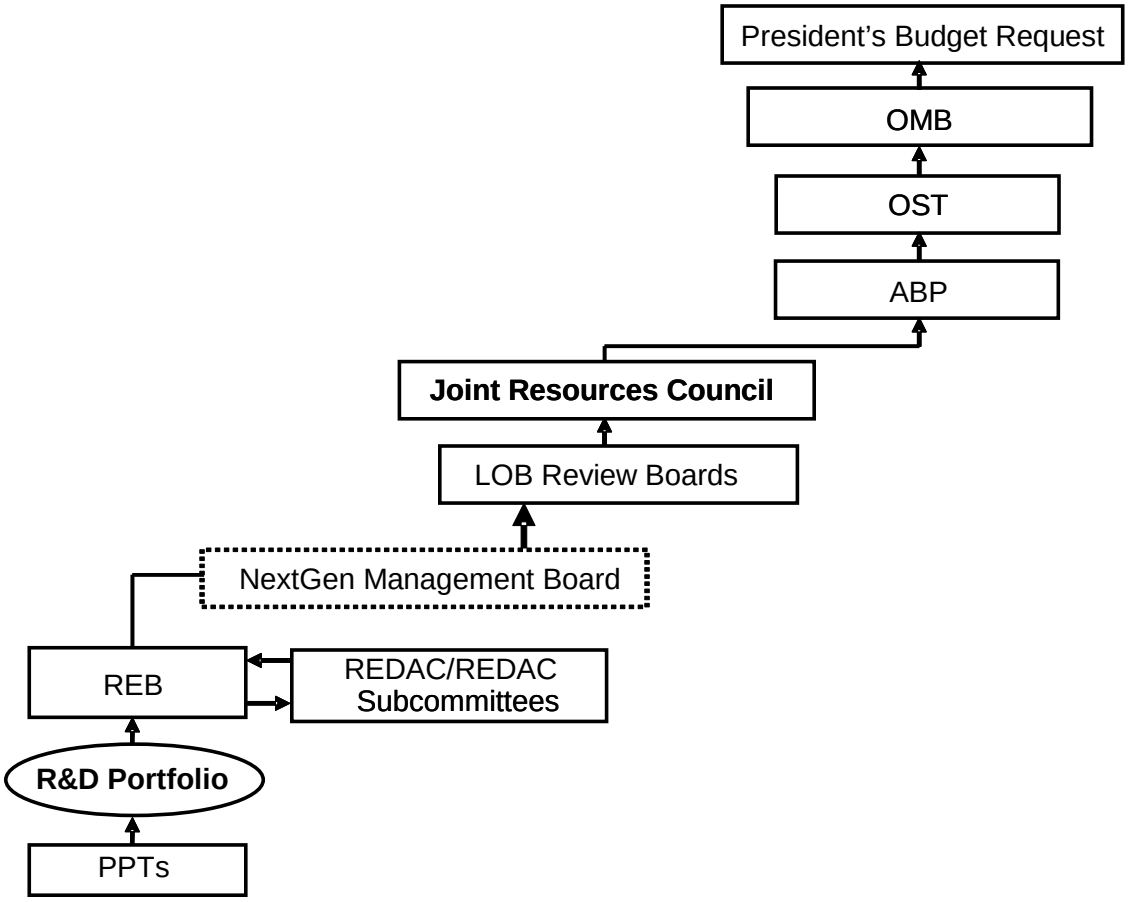

Figure 2 – Relationship of R&D Portfolio to Budget Submission Process

3.3.1 Office of the Secretary of Transportation

Title 31 U.S. Code section 1108 (b) (1) requires the Secretary of Transportation to prepare and submit to the President each appropriation request for the Department of Transportation (DOT). The request must be submitted in the form prescribed by the President and by the date established by the President.

To meet this requirement, DOT provides instructions to each modal administration for preparing its budget with a schedule for submitting the proposed budget to OST for review. The DOT guidance is published in early May, and the OST submission date is usually in early to mid-June. As a result of its review, DOT provides a passback to the modal administrators in late July. For more information, see Department of Transportation Performance Budget: Instructions for OST Submission, under separate cover, or contact Mike Gallivan at (202) 493-5598 and mike.gallivan@faa.gov.

3.3.2 Office of Management and Budget

Title 31 U.S. Code, section 1112 (c), (1) requires OMB to help establish, maintain, and publish standard terms and classifications for fiscal, budget, and program information of the Government, including information on fiscal policy, receipts, expenditures, programs, projects,

activities, and functions; and section 112 (d) requires agencies to use these standards when providing fiscal, budget, and program information to Congress.

To meet this requirement, the OMB Director issues a letter in April to the Secretary of Transportation providing policy guidance for the upcoming budget request. In July, OMB issues Circular A-11, which provides detailed instructions for submitting budget data and materials to all Federal agencies. The budget submission from DOT to OMB is usually due on or around September 10. OMB reviews the budget submission and sends a passback to DOT on or around November 30. In December the Secretary of Transportation may appeal to OMB to reverse or modify the changes in the passback. See OMB Circular No. A-11, section 10 at http://www.whitehouse.gov/omb/circulars/a11/current_year/a11_toc.html.

3.3.3. The President's Budget

As required by Title 31 U.S. Code, section 1105 (a), "On or after the first Monday in January but not later than the first Monday in February of each year, the President shall submit a budget of the United States Government for the following fiscal year." The fiscal year begins on October 1 of each year and ends on September 30 of the following year. The President's Budget for Fiscal Year 2013 is available online at http://www.whitehouse.gov/omb/budget/.

To meet this requirement, DOT prepares and submits its budget justification materials to OMB for final review. OMB prepares the final budget, and the President transmits the budget to the Congress. Once the budget is transmitted, the formulation phase ends, and the congressional phase begins. The appropriations subcommittees that review the DOT budget are the Transportation, Housing and Urban Development, and Related Agencies Subcommittee in the House of Representatives; and the Subcommittee on Transportation, Housing and Urban Development, and Related Agencies in the Senate. Information on the House subcommittee is available at http://appropriations.house.gov/Issues/Issue/?IssueID=34798 and on the Senate subcommittee at http://appropriations.senate.gov/sc-transportation.cfm.

4.0 Introducing a New Research Area

If any individual or organization would like to introduce a new research area[1], there are several possible paths to follow.

4.1 Definitions of Research and Development

First, it should be verified that the proposed research area fits the definition of research or development. From OMB Circular A-11, the following definition should be met:

> R&D activities comprise creative work undertaken on a systematic basis to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications.
>
> Basic research is defined as systematic study directed toward fuller knowledge or understanding of the fundamental aspects of phenomena and of observable facts without specific applications towards processes or products in mind. Basic research, however, may include activities with broad applications in mind.[2]
>
> Applied research is defined as systematic study to gain knowledge or understanding necessary to determine the means by which a recognized and specific need may be met.
>
> Development is defined as systematic application of knowledge or understanding, directed toward the production of useful materials, devices, and systems or methods, including design, development, and improvement of prototypes and new processes to meet specific requirements.

Per FAA order 2500.B, R,E&D funding may be used for:

> R,E&D Accounts fund research and development programs that improve the National Airspace System (NAS) by improving its safety, security, productivity, capacity, and environmental compatibility to meet expected NAS demands of the future. RED activities are conducted prior to full-scale development/acquisition activities, which transfers to F&E upon completion.

4.2 Proposed Research Area Falling within Existing PPT

If the proposed new research area falls within a technical area covered by an existing PPT, the individual or organization should contact the pertinent REB member and PPT lead to discuss including the new area in that PPT portfolio.

If there is agreement to include in an existing PPT portfolio and the topic area fits within an existing budget line item, the requestor should work with the appropriate budget line item manager to add the appropriate language to that narrative. In this option the funding target for

[1] Note that only R,E&D funded research areas can be added through the REB process. No F&E, AIP, or OPS funding changes or increases can be made by the REB.

[2] Note that FAA does not do basic research. FAA research must address a recognized and specific need, i.e., applied research, which means there should be a sponsor who will be using the research output that will support the addition of the new research area.

that PPT is not increased, thus the original programs in the PPT would be getting less funding to accommodate the introduction of the new research area.

If, however, the proposed research fits within an existing PPT but does not fit within an existing BLI, the requestor would have to prepare a request for a new BLI (see Section 4.3 Below).

It would also be possible to submit an above target request to have additional funding allocated to the PPT to accommodate the new research area. See Section 4.3 below for process for an above target request.

When that PPT portfolio is reviewed, the REB would need to approve the addition of the new research area and the above target request, if that option is requested.

4.3 Proposed Research Area Requiring New BLI

If the proposed research area does not fit within an existing PPT or an existing BLI, then the requestor must initiate a new BLI. The entails creating a new budget narrative with an above target funding request for the R,E&D appropriation. Once the requestor has the approval of their own organization for this action, the next step is for REB approval, both of the new research area and making an above target request. Use the template provided for the PPT R&D portfolio presentation in Appendix C, Section C.3. It is suggested that you work with the RST Team to prepare this presentation.

The REB has two options for adding a new research area. The REB could approve the new area but not approve an above target request. In that case, the funding for the new area would have to be taken from the existing programs and the REB would have to decide what would be reduced to fund the new area. In this situation, a new FY 2015 budget narrative must be prepared to be included in the FY 2015 FAA budget submission. It is suggested that you work with the RST Team to prepare the budget narrative.

The REB could approve both the new area and the above target request. In this situation, the new FY 2015 budget narrative must be prepared with a justification for an above target funding increase. It is suggested that you work with the RST Financial POC to prepare the documentation needed for the above target request to accompany the new budget narrative.

Any action requesting above target funding would then need to be approved by the FAA Budget Office, OST and finally OMB to be included in the FY 2015 Budget Submission. The FY 2015 budget submission will be delivered to Congress in February 2013. And finally, it would have to be approved by Congress sometime in FY 2017 before work in the new research can start.

5.0 Execution

By September 30, Congress completes action on appropriation bills for the upcoming fiscal year or provides a continuing resolution (a stop-gap appropriations law). The OMB apportions funds made available in the annual appropriations process and other available funds within 30 days after approval of a spending bill. Throughout the fiscal year, which begins on October 1 and ends on September 30, agencies incur obligations and make outlays to carry out the funded programs, projects, and activities. Agencies hire people, enter into contracts, grant agreements, etc., to carry out their programs, projects, and activities. See OMB Circular A-11, section 10 at http://www.whitehouse.gov/omb/circulars/a11/current_year/a11_toc.html.

5.1 Sponsor and Performer Roles

Sponsors and performers interact in Program Planning Teams. Sponsors and performers should review the definitions below to understand the expectations, roles, and responsibilities for each. See Section 3.1.2.3 for additional information on sponsor and performer roles during the formulation process. When the sponsor and performer are in the same organization, that organization performs both roles. Sponsor and performer procedures are modeled after the guidelines in the Project Management Institute's (PMI) Project Management Body of Knowledge (PMBOK). Additional information about the items listed in this section is available at www.pmi.org.

A **Sponsor** is an organization that identifies and owns, or shares, the R&D requirement. Generally, the sponsor has demonstrated a need for the research, and the sponsor will use the results of the research. Sponsor roles include the following:

- Identifies need or requirement
- Aligns need to Destination 2025 performance target, if applicable
- Prioritizes needs or requirements
- Verifies the need with external customers, if applicable
- Communicates sponsor expectations to the performer
- Identifies criteria for success of the project
- Reviews project scope, risks, issues, assumptions, and constraints
- Obtains required funding for the project
- Attends project meetings, as needed
- Provides final acceptance of the project
- Provides lessons learned information
- Implements R&D results, if applicable

A **Performer** is an FAA organization responsible for managing the work performed to meet the R&D requirement. Performers include program and project managers and program offices. Generally, the performer undertakes the R&D effort and provides the research results. Performer roles include the following:

- Reviews requirements documentation
- Defines research to meet sponsor's need
- Conducts analysis to evaluate feasible alternatives
- Identifies project scope, risks, issues, assumptions, and constraints
- Identifies key team members and identifies roles and responsibilities
- Develops cost, schedule, and resource requirements

- Develops project plan
- Establishes project deliverables
- Identifies required changes and implements approved changes
- Supports sponsor in obtaining required funding
- Measures project performance and communicates project status
- Ensures project deliverables meet requirements
- Obtains final project acceptance from sponsor
- Communicates and documents lessons learned
- Archives project records and final project reports
- Provides final project reports
- Measures sponsor satisfaction

5.2 Program Management

This section provides a reference list to help performers increase program effectiveness to meet performance goals. Program managers should review this checklist regularly. The goal is to deliver R&D program quality and performance in accordance with the OMB guidance.

5.2.1 Contracts, Grants, and Cooperative Agreements

Using fair and open competition, program offices award contracts, grants, and cooperative agreements. Agency management gives program offices oversight adequate to ensure appropriate use of funds and to support annual reporting requirements.

1. Contract, Grant, and Cooperative Agreement Award
    a. Documents annual earmarks (non-competitive) and reports earmarks as percent of total program budget
    b. Uses competitive process for all awards other than earmarks
    c. Imposes reasonable qualification standards
    d. Provides independent merit review and ranking of proposals
    e. Provides reasonable amount of outreach to encourage new participants
    f. Announces possibility of renewal in original competition
    g. Holds awardees to a high standard of performance

2. Contract, Grant, and Cooperative Agreement Management
    a. Identifies awardees reporting requirements
    b. Documents awardees' use of funds in eligible activity categories
    c. Conducts site visits to awardees on a regular basis
    d. Audits awardees performance
    e. Documents awardees expenditures to verify that funds are used for their designated purpose

3. Contract, Grant, and Cooperative Agreement Performance Data
    a. Collects and compiles performance information on a regular basis, and reports performance information as required for agency reports on an annual basis

References for additional information are provided below.

- Contracts: Acquisition and Contracting, AAP-1, at (202) 267-8513, https://employees.faa.gov/org/linebusiness/ato/acquisition_business/apc/.
- Cooperative Research and Development Agreements (CRDA): John Hensyl, Technology Transfer Program Manager, ANG-E73, at (609) 485-7140, http://www.faa.gov/about/office_org/headquarters_offices/ato/tc/initiatives/ttp/.
- Grants: Lisa Ferrante, Acquisition and Grants Branch Manager, AAQ-600 at (609) 485-5837, https://employees.faa.gov/org/linebusiness/ato/acquisition_business/apc/.

5.2.2 Financial Management

Program offices ensure that funds are administered efficiently and obligated as planned and scheduled; use procedures that measure and achieve cost effectiveness in program execution; and apply recommended financial management practices. For more information on financial management, see the Budgets, Accounting, and Finance website at: https://employees.faa.gov/tools_resources/budget_finance/.

1. Obligations
    a. Develop program plan identifying cost, schedule, and milestones
    b. Establish obligation schedule corresponding to resources in program plan
    c. Ensure partners establish obligation schedules corresponding to program plan
    d. Obligate annual budget consistent with program plan schedule
    e. Limit amount of un-obligated funds (percent) remaining at year end
    f. Report actual expenditures compared to intended use
    g. Act timely and appropriately to correct funds not spent as intended

2. Procedures
    a. Identify clear goals of efficiency improvements for information technology (IT) investments
    b. Empower front line managers and employees
    c. Seek to reduce costs
    d. Identify and avoid redundancies
    e. Demonstrate effort to improve efficiency

3. Systems
    a. Prepare procurement requests in PRISM (an FAA accounting system)
    b. Review financial transactions and account balances in DELPHI (an FAA accounting system)
    c. Consult FAA financial practices, procedures, and data management
    d. Prepare an annual spend plan
    e. Review and document performance on spend plan monthly

6.0 Budget Adjustment

At different points during the R&D portfolio development process, there may be a need to assess the impact of funding changes prior to submitting a budget to Congress. These requests would usually come to the REB from the Budget Office and would generally represent hypothetical situations. In such cases, the REB will be convened to develop a proposal for the given budget revision scenario or scenarios. A series of REB meetings would be held to discuss multiple alternative budget adjustments to respond to requests from the Budget Office. Each REB member would review the proposed budget scenarios with their LOB for concurrence. Once there is agreement among the REB members, the proposal would be forwarded to the Budget Office.

This process may be performed at various stages in the budget process. Conducting this process will allow the REB to plan for some alternative scenarios and to have documented, consensus-based options to address such budget adjustments should they occur.

Potential budget revision alternatives that could occur include, but are not limited to, budget cuts, funding increases, and unfunded earmarks.

7.0 Evaluation

The FAA uses a combination of internal and external evaluations to review R&D program results and internal processes. Internal evaluations include several performance tracking systems used by various offices and Lessons Learned sessions. The REDAC and its subcommittees conduct the external evaluation of the R&D portfolio. The Commercial Space Transportation Advisory Committee (COMSTAC) evaluates the Commercial Space Transportation activities, including R&D activities.

7.1 Lessons Learned Sessions

After the annual R&D portfolio is approved by the JRC, the REB meets to review the lessons learned from the current year's portfolio development process. The purpose of the lessons learned session is to identify areas of success and opportunities for improvement for the next portfolio development process. Meeting attendees are encouraged to engage in open discussion to identify issues, which are recorded and addressed. The RST presents the accomplishments from the process, opportunities for improvement, suggestions received from participants, and goals for the next process. After review and approval by the REB, changes are made in the portfolio development process.

7.2 Research, Engineering, and Development Advisory Committee

Public Law 100-591, dated November 3, 1988, established the REDAC to provide advice and recommendations to the FAA Administrator on needs, objectives, plans, approaches, content, and accomplishments of the aviation research program; and, also, to assist in assuring that all Agency research is coordinated with similar research efforts outside the FAA. *Public Law 101-508* dated November 5, 1990, expanded REDAC duties to review the research and training carried out by the regional centers of air transportation excellence. *Public Law 104-264*, dated October 6, 1996, added an annual review of the allocations made to the major categories of R&D to provide advice and recommendations to the Administrator on whether the allocations are appropriate to meet the needs and objectives of the aviation research program. See Section 44508 of Title 49 of the US Code. For information on committee reports, contact Gloria Dunderman at (202) 267-8937 or gloria.dunderman@faa.gov, or see the FAA website at www.faa.gov/go/redac.

7.2.1 REDAC Responsibilities

The REDAC meets twice a year, in the fall and in the spring. During the fall meeting, the committee provides guidance to the FAA on how the agency should invest its R&D funding in the coming portfolio development process for the FY+2 R&D portfolio. During the spring meeting, the committee reviews and provides recommendations on the proposed FY+2 R&D portfolio. The FAA tracks the implementation of these recommendations.

There are five standing subcommittees that support the REDAC by conducting reviews in the summer and winter for the following research areas: Aircraft Safety; NAS Operations; Environment and Energy; Airports; and Human Factors. During the summer, the subcommittees work with the sponsors and performers to conduct detailed program reviews and provide guidance for development of the R&D portfolio. During the winter, the subcommittees conduct detailed reviews of the proposed R&D portfolios.

7.2.2 REDAC Outputs

The REDAC and the subcommittees provide guidance and recommendations for the R&D portfolio development. Information on these items is provided in the detailed process steps in Appendix A.

- REDAC guidance for annual R&D investments (Step 2)
- Subcommittee recommendations on PPT R&D budget portfolios (Step 9)
- REDAC recommendations on R&D budget portfolio (Step 13)

7.2.3 REDAC Schedule

The scheduled REDAC meetings for the FY 2015 R&D portfolio development process are listed on page 4. Additional information on the REDAC recommendations and FAA responses is provided in Appendix C, Section C.4.

7.3 Commercial Space Transportation Advisory Committee

Established in 1984, the COMSTAC provides information, advice, and recommendations to the Administrator on matters relating to the U.S. commercial space transportation industry including FAA R&D activities. The COMSTAC provides annual recommendations for commercial space transportation R&D projects and periodically reviews the FAA R&D reports and activities. For more information about the COMSTAC meetings, members, or reports, contact Susan Lender at (202) 267-8029 or susan.lenderer@faa.gov or visit the website http://www.faa.gov/about/office_org/headquarters_offices/ast/industry/advisory_committee/.

7.4 Office of Management and Budget Evaluation Criteria

The FAA uses OMB evaluation criteria to conduct the PART review of the R&D portfolio. The OMB evaluation criteria focus on the relevance, quality, and performance of the FAA R&D portfolio. For more information, see the OMB PART Guidance No. 2007-02, January 29, 2007 at http://www.whitehouse.gov/sites/default/files/omb/part/#2008.

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Appendix A

Portfolio Development Process

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A. Portfolio Development Process Phases and Steps

There are 7 phases and 28 steps in the FY 2015 Research & Development (R&D) Portfolio Development Process. The high-level activities in each of the seven phases are illustrated in the Portfolio Development Process Flowchart in Figure A-1.

The R&D Portfolio Development Process phases are:

Guidance
Program Area Portfolio Preparation
FAA Portfolio Review
Budget Submission
Budget Adjustment
Program Planning and Execution
Program Evaluation

A detailed description of each of the 28 steps in the process shown in Figure A-1 follows.

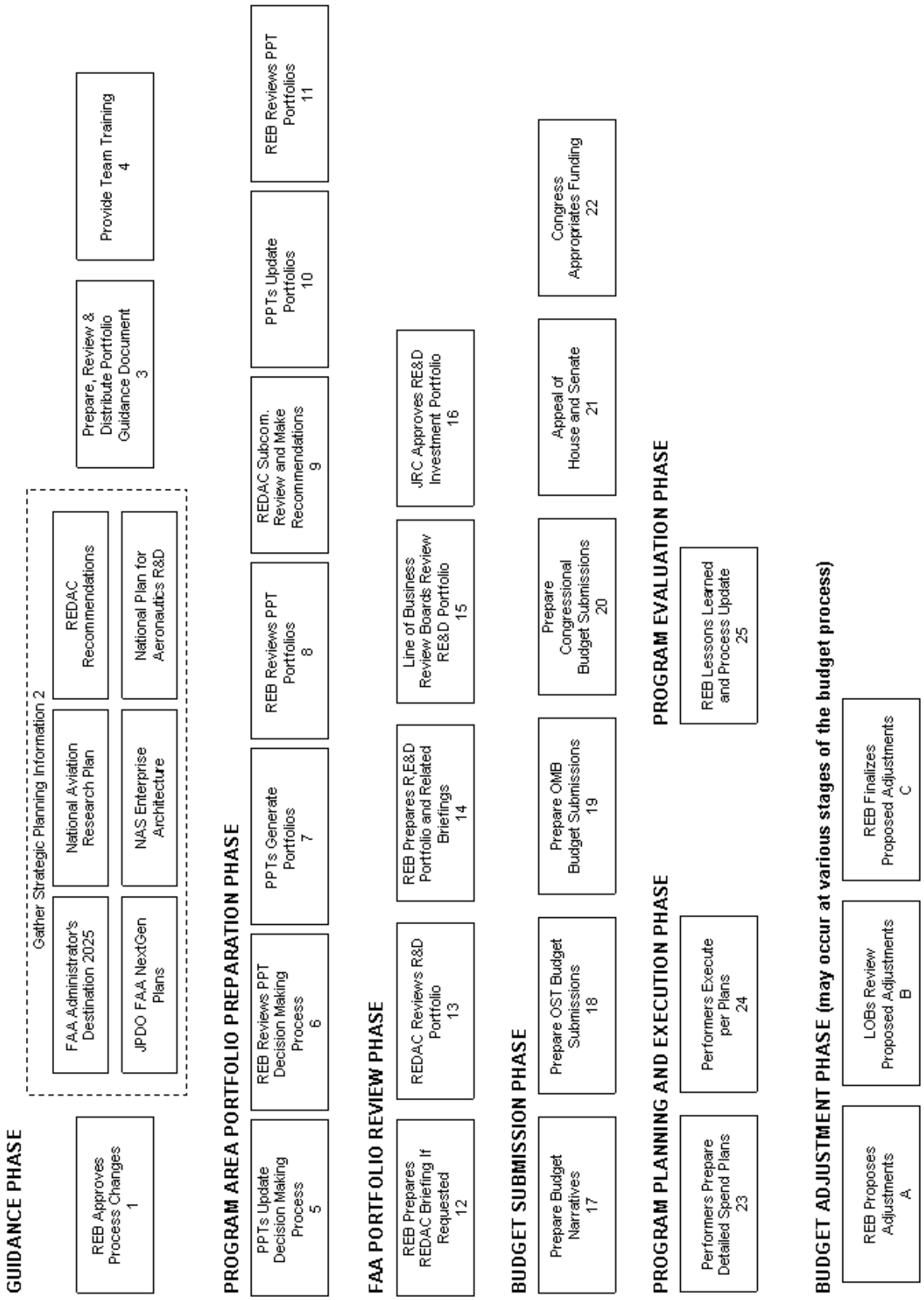

Figure A-1: FY 2015 R&D Portfolio Development Process Flowchart

Guidance

Step 1. REB Approves Process Changes

Input:	Proposed Changes from the Research and Development Executive Board (REB) Lessons Learned Meeting and Input from the REB
Output/Product:	Proposed Changes for FY 2015 R&D Portfolio Development Process Guidance Reference Document
Customer(s):	REB
Performer(s):	REB and REB Support Team (RST)
Description:	Based on the feedback and reviews from the REB lessons learned meeting, the RST compiles proposed changes to update the Portfolio Development Process Guidance Reference Document for the upcoming year. Working with appropriate stakeholders, the RST Lead dispositions lessons learned issues and proposed process changes and reviews with the REB. The REB votes on each change to the process.

Step 2. Gather Strategic Planning Information

Input:	FAA Flight Plan, Destination 2025, National Aviation Research Plan (NARP), R&D Advisory Committee (REDAC) Guidance, Joint Planning and Development Office (JPDO) NextGen Plans, National Airspace System (NAS) Enterprise Architecture (EA), FAA's NextGen Implementation Plan (NGIP), and National Plan for Aeronautic Research and Development and Related Infrastructure
Output/Product:	FAA R&D Strategic Information
Customer(s):	REB, Program Planning Teams (PPTs)
Performer(s):	RST
Description:	The RST reviews information collected from the referenced resources and notifies the REB. This information, along with input from the previous year's lessons learned session, is used in Step 3 to create the annual R&D Portfolio Development Process Guidance Reference Document.

Step 3. Prepare, Review, and Distribute Portfolio Guidance Document

Input:	REB Approved Process Changes and Strategic Planning Information
Output/Product:	FY 2015 R&D Portfolio Development Process Guidance Reference Document
Customer(s):	All Process Participants; PPTs in particular
Performer(s):	RST
Description:	The RST updates, prepares, and distributes the R&D Portfolio Development Process Guidance Reference Document. The document provides top-level guidance, R&D budget target allocations, portfolio development criteria, and instructions for the Process. Using output from Step 1 from the annual lessons learned meeting, the RST reviews and incorporates updates.

Step 4. Provide Team Training

Input:	FY 2015 R&D Portfolio Development Process Guidance Reference Document
Output/Product:	Training Presentations and Materials for 2015 Process
Customer(s):	All Process Participants (as requested)
Performer(s):	RST
Description:	The RST provides training based on the R&D Portfolio Development Process Guidance Reference Document for the REB and PPT members, as requested by the REB, RST, or the PPTs. This training is generally done after the publication of the Guidance Document in November of each year. Training for writing budget narratives is done as needed.

Program Area Portfolio Preparation

Step 5. PPTs Conduct Lessons Learned Session and Update Decision Making Process

Input:	FY 2015 R&D Portfolio Development Process Guidance Reference Document
Output/Product:	Portfolio Development Decision Making Process Presentation for the REB
Customer(s):	REB
Performer(s):	PPTs
Description:	PTTs conduct a lessons learned session and subsequently update their PPT portfolio based upon lessons learned feedback (Step 25). The PPTs follow the guidance in Appendix C for preparing the presentation on their decision making process (see Section C-2).

Step 6. REB Reviews PPT Decision Making Process

Input:	Individual PPT presentations
Output/Product:	Approved Decision Making Process for the PPTs
Customer(s):	REB
Performer(s):	PPTs
Description:	The PPTs follow the briefing guidelines for PPT Decision Making Process and other process guidance from the R&D Portfolio Development Process Guidance Reference Document and present the decision making process used in the formulation of their R&D portfolio to the REB. The REB reviews the Decision Making Process and approves or disapproves. The PPTs must have approval from the REB for their Decision Making Process. In the event that a PPT's process is not approved, the PPTs must reconsider decision making process to meet needs of the REB. If the PPT's decision making process has not changed from previous year, then the PPT does not have to make a presentation to the REB, and approval of the REB is assumed based on prior approval. The previous decision making process presentation will be uploaded to the KSN for reference, noting that it is identical to the prior REB-approved process.*

Step 7. PPTs Generate Portfolios

Input:	FY 2015 R&D Portfolio Development Process Guidance Reference Document and Sponsor Requirements
Output/Product:	PPT Proposed Budget Portfolios for FY 2015
Customer(s):	REB, FAA Financial Services (ABP-330)
Performer(s):	PPTs
Description:	The PPTs generate budget portfolios for their program areas using target allocations provided by the REB (with input from ABP-330), instructions in the R&D Portfolio Development Process Guidance Reference Document, and sponsor-defined requirements.

Step 8. REB Reviews PPT Portfolios

Input:	PPT Proposed Budget Portfolios for FY 2015
Output/Product:	Proposed FY 2015 R&D Budget Portfolio
Customer(s):	REDAC Subcommittee (through the PPTs)
Performer(s):	REB
Description:	The REB reviews and approves proposed PPT budget portfolios and identifies gaps, overlaps, and opportunities for cooperation among PPTs.

* The PPT can receive this automatic approval for only two consecutive years. If in the third year, the decision making process remains unchanged, the PPT will still need to make a presentation for REB approval.

Step 9. REDAC Subcommittee Reviews Portfolio and Makes Recommendations

Input:	PPTs Proposed Budget Portfolios for FY 2015
Output/Product:	Recommendations for FAA's Proposed FY 2015 R&D Budget Portfolio
Customer(s):	PPTs
Performer(s):	PPTs and REDAC Subcommittees
Description:	In the second quarter of the fiscal year, generally mid-February, the PPTs brief their proposed budget portfolios to the REDAC Subcommittees. PPT leads must work with the Designated Federal Official (DFO) of each REDAC Subcommittee to ensure that the level of information required by the subcommittee to make informed decisions is provided. After reviewing the PPT budget portfolios, the Subcommittees provide feedback, advice, and recommendations to the PPTs.

Step 10. PPTs Update Portfolios

Input:	Proposed FY 2015 Budget Portfolio and REDAC Recommendations
Output/Product:	Revised PPT Proposed Budget Portfolios for FY 2015
Customer(s):	REB
Performer(s):	PPTs
Description:	The PPTs update their initial FY 2015 Budget Portfolio, as necessary, to reflect REDAC recommendations and any other external input.

Step 11. REB Reviews PPT Portfolios

Input:	PPT Proposed Budget Portfolios for FY 2015
Output/Product:	Proposed FY 2015 R&D Budget Portfolio
Customer(s):	REB
Performer(s):	PPTs
Description:	If a PPT makes changes in Step 10, then the REB reviews and approves the modified FY 2015 portfolio.

FAA Portfolio Review

Step 12. REB Prepares R,E&D Advisory Committee Briefing, if Requested

Input:	Proposed FY 2015 R&D Budget Portfolio
Output/Product:	Proposed FY 2015 R&D Budget Portfolio REDAC Briefing
Customer(s):	REDAC
Performer(s):	REB and RST
Description:	The REB and the RST assist the REB Chair/REDAC DFO in preparing a briefing of the R&D Budget Portfolio to present to the REDAC, if requested. The REB Chair presents the briefing to the REDAC.

Step 13. R,E&D Advisory Committee Reviews R&D Portfolio

Input:	Proposed FY 2015 R&D Budget Portfolio and other REDAC Briefings
Output/Product:	REDAC Recommendations on the Proposed FY 2015 R&D Budget Portfolio
Customer(s):	REB
Performer(s):	REDAC
Description	The REDAC reviews the proposed FY 2015 R&D Budget Portfolio and other presentations, as requested by FAA upper level management. During the REDAC meeting, Subcommittees present their findings and recommendations for each R&D program area. The REDAC makes recommendations for improving the R&D Budget Portfolio in a letter to the FAA Administrator. The REB incorporates the feedback from the REDAC review into the briefing to the Joint Resources Council (JRC), as appropriate.

Step 14. REB Prepares R,E&D Portfolio and Related Briefings

Input:	REDAC Recommendations and Proposed FY 2015 R&D Budget Portfolio
Output/Product:	Proposed Final FY 2015 Research, Engineering, and Development (R,E&D) Budget Portfolio and Briefing
Customer(s):	REB, Associate and Assistant Administrators, and the JRC
Performer(s):	REB and RST
Description:	The REB and the RST prepare a final draft of the R,E&D Budget Portfolio and related briefings. An R,E&D Budget Portfolio briefing is presented to the Associate and Assistant Administrators, , and the JRC.

Step 15. FAA Associate and Assistant Administrators Review R,E&D Portfolio

Input:	Proposed Final FY 2015 R,E&D Budget Portfolio
Output/Product:	Approval from Associate and Assistant Administrators
Customer(s):	REB and JRC
Performer(s):	Associate and Assistant Administrators who sponsor R,E&D research
Description:	The FAA Line of Business (LOB) review boards coordinate and review investment activity within a line of business. Each board reviews and approves the proposed final R,E&D Budget Portfolio, which is reported back to the REB, and incorporated into the briefing to the JRC.

Step 16. JRC Approves R,E&D Investment Portfolio

Input:	Proposed Final FY 2015 R,E&D Budget Portfolio
Output/Product:	Approved FY 2015 R,E&D Budget Portfolio
Customer(s):	REB
Performer(s):	JRC
Description:	The REB presents the proposed final FY 2015 R,E&D Budget Portfolio to the JRC for review and consideration. The JRC may approve the proposed Budget Portfolio or make modifications and adjust target levels. If the JRC requires changes to the Budget Portfolio, the REB makes the changes and briefs the JRC again with a revised Budget Portfolio.

Budget Submission

Step 17. Prepare Budget Narratives

Input:	JRC Approved R,E&D Budget Portfolio
Output/Product:	R,E&D Budget Narratives
Customer(s):	Office of the Secretary of Transportation (OST)
Performer(s):	ABP-330, Sponsors, Program and Project Managers, and ANG-E4
Description:	ABP-330 sends out a request to the program and project managers (or their financial representatives) to prepare budget narratives in accordance with the JRC approved budget portfolio. ABP-330 provides current and out-year financial information to R,E&D sponsors and program and project managers to help them prepare budget narratives. Program and project managers prepare budget narratives and send them to the sponsors for review. If the sponsors agree with the budget narratives, the sponsors forward them to ABP-330. All changes must be coordinated with sponsors and performers prior to submission to ABP-330. Further details on the process to develop the budget narratives are provided in the Supplemental Attachment – RE&D Budget Narrative Process Guidance following Appendix E. Sponsor reviews should address only the what (i.e., the requirements) and not how the requirements are met. Only requirements that are supported by a sponsor are included in the budget narrative. Performers cannot sponsor requirements, in other words, research cannot be self-sponsored.

Step 18. Prepare OST Budget Submission

Input:	R,E&D Budget Narratives
Output/Product:	FAA R,E&D Budget Submission to OST
Customer(s):	OST
Performer(s):	ABP-330
Description:	ABP-330 edits and submits the R,E&D budget narratives to ABP. ABP compiles budget information for all FAA appropriations, R,E&D, F&E, AIP, and Ops, to prepare the overall FAA budget request to OST. ABP-330 provides copies of the final budget narratives that were submitted to OST to R,E&D program managers and sponsors. OST reviews the budget and provides feedback (also known as passback) to the FAA.

Step 19. Prepare OMB Budget Submission*

Input:	FAA R,E&D Budget Submission to OST and OST Passback Information
Output/Product:	FAA R,E&D Budget Submission to Office of Management and Budget (OMB)
Customer(s):	OMB
Performer(s):	ABP-330, R,E&D Program Managers, and Sponsors
Description:	The R,E&D program managers use the OST passback information to revise and update their budget narratives, as needed, and send to sponsors for review. All changes are coordinated with sponsors and performers before submitting to ABP-330. ABP-330 collects the updates from the sponsors and reviews, edits, and updates financial information for the budget narratives. ABP-330 submits the R,E&D budget narratives to ABP-330 for inclusion in the overall FAA budget request to OMB. ABP-330 sends copies of final budget narratives that are submitted to OMB to R,E&D program managers and sponsors. The OMB reviews and provides feedback (also known as the passback) to the FAA.

Step 20. Prepare Congressional Budget Submission *

Input:	FAA R,E&D Budget Submission to OMB and OMB Passback Information
Output/Product:	FAA R,E&D Budget Submission to Congress
Customer(s):	Congress
Performer(s):	ABP , R,E&D Program Managers, and Sponsors
Description:	The R,E&D program managers use the OMB passback information to revise and update their budget narratives and coordinate any changes with sponsors. After sponsors review, ABP-330 collects, reviews, and edits the budget narratives as needed. ABP-330 then submits the R,E&D budget narrative to ABP for inclusion in the overall FAA budget request to Congress. APB-330 sends the final budget narratives to OST, who submits to Congress.

Step 21. Appeal of House and Senate

Input:	FAA R,E&D Budget Submission to Congress
Output/Product:	Appeal (FAA Response) to the House or Senate Reports
Customer(s):	Congress (Conference Committee)
Performer(s):	ABP
Description:	The House and Senate independently review the budget. Each organization provides a report on its version of the budget that is reviewed by the FAA. The FAA may comment or appeal portions of either report. An appeal would be prepared by the Budget Office for submittal to OST, and if approved by OST, OST submits to OMB, and OMB to either the House or Senate or either's conference committee. Once this is done, the House and Senate meet together to review and finalize the Budget.

* There is often deliberation and requests for additional information between Steps 19, 20 and 21.

Step 22. Congress Appropriates Funding

Input:	FAA R,E&D Budget Submission to Congress
Output/Product:	FAA R,E&D Budget Appropriation
Customer(s):	FAA, Department of Transportation (DOT)
Performer(s):	Congress
Description:	Congress reviews the FAA's budget submission, gives direction, and appropriates funds (which may include earmarks) to the DOT, who then provides the funds to the FAA.

Program Planning and Execution

Step 23. Performers Prepare Detailed Spend Plans

Input:	Appropriated Budget
Output/Product:	Financial Plans
Customer(s):	ABP
Performer(s):	Performers (Program and Project Managers)
Description:	After receiving the budget appropriation, ABP provides an allowance to each line of business which distributes funding to the R&D program offices. Based on the appropriated funding level, each program and project manager prepares financial plans.

Step 24. Performers Execute in Accordance with Plans

Input:	Procurement Plans
Output/Product:	Committing Document(s)
Customer(s):	ABP and Performers (Program and Project Managers)
Performer(s):	Contracting Officers
Description:	The R&D performers prepare and process committing documents based on their procurement plans. These committing documents, called Procurement Requests (PRs), are forwarded to the contract office or grants office for competitive award. Once the contract or grant is awarded, the funds are obligated. As the contractor or grantee is paid, the funds are expended.

Program Evaluation

Step 25. REB Lessons Learned and Process Update

Input:	FY 2015 R&D Portfolio Development Process Guidance Reference Document
Output/Product:	Lessons Learned Issues and Proposed Process Changes
Customer(s):	REB, PPTs, and RST
Performer(s):	All Process Participants
Description:	The REB sponsors a lessons learned meeting in early summer each year. The REB, PPT members, and the RST evaluate the success of the R&D budget formulation process, discuss its strengths and weaknesses from the previous year, and make recommendations to improve the process. The REB identifies issues and proposed process changes to the R&D Portfolio Development Process Guidance Reference Document for the upcoming year.

Budget Adjustment[†]

Step A. REB Adjustments to Funding of R,E&D Portfolio

Input:	Request from FAA Budget Office with proposed delta in funding for R,E&D
Output:	Proposed revisions to R,E&D portfolio, with impact statements
Customer(s):	FAA Budget Office
Performer(s):	REB with RST support
Description:	Budget Office requests that the program offices propose adjustments to the funding for the R,E&D portfolio. The request may be for the current year or future years and the request could be come at various points in the budget process. The proposed adjustment will usually be to develop alternative budget profiles for potential changes. The REB will be convened to discuss adjustments; multiple meetings may be necessary to reach consensus.

Step B. LOBs Review Proposed Adjustments

Input:	Proposed revisions to R,E&D portfolio, with impact statements
Output:	Approved revisions to R,E&D portfolio
Customer(s):	FAA Budget Office
Performer(s):	REB with RST support
Description:	Each REB members with R,E&D funded R&D reviews the proposed scenario(s) with their Associate or Assistant Administrator. The REB will then meet as needed to address any comments and feedback from the LOBs, until there is agreement on the proposed scenario(s).

[†] Budget adjustment requests can occur at multiple times during the portfolio development cycle.

Step C. REB Finalizes Proposed Adjustments

Input:	Proposed revisions to R,E&D portfolio, with impact statements
Output:	Approved revisions to R,E&D portfolio
Customer(s):	FAA Budget Office
Performer(s):	REB with RST support
Description:	The REB will then meet to finalize the proposed scenario(s) to address any comments and feedback from the LOBs. The proposal will be provided to the Budget Office.

Appendix B

Research and Development Executive Board Voting Procedures

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B. R&D Executive Board

B.1 R&D Executive Board History

The Research and Development (R&D) Executive Board (REB) has over ten years of history. In 1994 there was a reorganization under the direction of Dr. George Donohue (Head of the Research and Acquisitions Organization, ARA), and the Aviation Research Office, AAR-200, was created with Dr. Clyde Miller as manager. The responsibility for the R,E&D planning and budget formulation transferred from Rob Tucker, APM-300, to Clyde Miller, AAR-200. After going through several budget cycles, the R,E&D Steering Group requested that Dr. Miller re-engineer the formulation process. The AAR-200 organization worked with a cross-agency team during the summer of 1996 to formulate a new process. On December 4, 1997, Dr. Clyde Miller presented the new process to the JRC, and they approved it. The new process included the Group of Seven (G7), which became the REB. The G7 included representatives from Research and Acquisitions (ARA); Air Traffic Services (ATS); Regulation and Certification (AVR); Airports (ARP); Policy, Planning and International Aviation (API); Region and Center Operations (AAD); and Civil Aviation Security (ACS).

Today, the REB includes representatives from three Associate Administrators – Aviation Safety (AVS); Airports (ARP), and Commercial Space Transportation (AST) – and four Assistant Administrators – NextGen (ANG), Policy, International Affairs & Environment (APL), Information Services (AIO), and Finance and Management (AFN).

Through 1995, all FAA R&D activities were funded with the R,E&D budget. That same year, the Commercial Space Transportation (AST) office moved from DOT to become part of FAA with an R&D program authorized in the Operations budget. In 1998, the G7 was renamed the REB to avoid confusion with the Economic Group of Seven. In 1999, AST joined the REB process. Also in 1999, Congress moved all Communication, Navigation, and Surveillance (CNS), Air Traffic Management (ATM), and Airports R&D programs from the R,E&D budget to the F&E budget, and these programs then used the F&E budget process. Congress continued to require these programs be considered R&D even though they were F&E funded. In 2003, ARP decided to move the Airports R&D program from the F&E budget to the AIP budget (now Grants-In-Aid for Airports). After requesting this change for several years, it became part of The President's Budget Request in 2003. In 2006, Congress approved half of the Airports R&D program in the AIP budget, but left half in F&E. In 2007, Congress approved the entire Airports R&D program in the AIP budget, and ARP continued in the REB process. Today, the REB creates an R&D portfolio funded by four appropriation accounts: R,E&D; F&E; AIP; and Operations. Although all F&E programs must participate in the Capital Investment Team (CIT) process, the REB reviews the F&E R&D programs, as well as the AIP and AST R&D programs.

B.2 R&D Executive Board Voting Procedures

To make decisions or take action within REB proceedings (e.g., approve meeting minutes, Guidance Document updates, components of the annual R&D portfolio, the annual R&D budget portfolio, etc.), members should adhere to the formal voting process outlined below.

To hold a vote, a quorum must be present. A quorum is defined as the minimum number of total REB voting members that must be present to conduct business. For the REB, a quorum is the majority of the voting membership (three of the five voting members).

Motion Proposal

To propose the REB consider a certain idea, a voting member requests recognition from the Chair or RST Lead and then says:

- "I move that the REB… (Insert proposed motion)"

To be voted on, a motion must be seconded by another REB voting member, who will say:
- "I second that motion."

The Chair or RST Lead will then restate the motion being considered and ask the REB if they are ready to vote, by saying:

- "It is moved and seconded that… (Repeat motion)."

Motion Discussion

The Chair or RST Lead will then ask:

- "Is there any discussion?"

If any member wants to discuss the motion, two minutes will be allotted for each person to speak. Both the Chair and the RST Lead have the right to curtail discussion to:

- Ensure all members have a chance to convey their opinions; and
- Proceed to a vote.

Vote

The Chair or RST Lead will ask:

- "Are we ready for a vote?"

If there is no further discussion, the motion is put to a vote. The Chair and the RST Lead ask those in favor of the motion to vote by saying:
- "All those in favor of the motion, raise your hand and say 'Aye'."

The Chair or RST Lead then asks those opposed to the motion to vote by saying:
- "All those opposed to the motion, raise your hand and say 'No'."

After recording how each voting member voted, the Chair or RST Lead tallies the votes; a majority vote carries the motion. A majority means a majority of the total number of voting members, not just a majority of those present. The Chair or RST Lead announces whether the motion carried or lost, what the effect of the vote's outcome will be, and what the next order of business is, by saying: "The motion carried (or lost), and … (statement on the impact of the vote).

Appendix C

Program Planning Team Guidance

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C. Program Planning Team Guidance

C.1 R&D Budget Line Items in Each Program Planning Team

The information provided in the following two tables reflects the budget structure and PPT alignment for FY 2015. Table C-1 lists the R&D programs by Appropriation; Table C-2 lists R&D programs by assigned PPT. A Point of Contact List for each program in this table is in Appendix e, Section e-1.

Table C-1: R&D Budget Line Items by Appropriation

FY 2015 BLI #	Program Name	Assigned PPT
Research, Engineering and Development (R,E&D)		
A11.a	Fire Research and Safety	Aircraft Safety
A11.b	Propulsion and Fuel Systems	Aircraft Safety
A11.c	Advanced Material/Structural Safety	Aircraft Safety
A11.d	Aircraft Icing/Digital System Safety	Aircraft Safety
A11.e	Continued Airworthiness	Aircraft Safety
A11.f	Aircraft Catastrophic Failure Prevention Research	Aircraft Safety
A11.g	Flightdeck/Maintenance/System Integration Human Factors	Aircraft Safety
A11.h	System Safety Management	Aircraft Safety
A11.i	Air Traffic Control/Technical Operations Human Factors	NAS Ops
A11.j	Aeromedical Research	Aircraft Safety
A11.k	Weather Program	Weather
A11.l	Unmanned Aircraft Systems Research	Aircraft Safety
A11.m	NextGen - Alternative Fuels for General Aviation	Aircraft Safety
A.11.n	NextGen – Advanced Systems and Software Validation	Aircraft Safety
A12.a	JPDO	NAS Ops
A12.b.	NextGen - Wake Turbulence	NAS Ops
A12.c	NextGen - Air Ground Integration Human Factors	Aircraft Safety
A12.d	NextGen - Weather Technology in the Cockpit	Weather
A13.a	Environment and Energy	Environment & Energy
A13.b	NextGen - Environmental Research - Aircraft Technologies, Fuels, and Metrics	Environment & Energy
A14.a	System Planning and Resource Management	Mission Support
A14.b	William J. Hughes Technical Center Laboratory Facility	Mission Support
Facilities and Equipment (F&E)		
1A01A	Advanced Technology Development & Prototyping (ATDP) – Runway Incursion Reduction	NAS Ops (optional)
1A01B	ATDP – System Capacity, Planning and Improvement	NAS Ops (optional)
1A01C	ATDP – Operations Concept Validation	NAS Ops

FY 2015 BLI #	Program Name	Assigned PPT
1A01D	ATDP - NAS Weather Requirements	Weather
1A08A	NextGen - ATC/Tech Ops HF (Controller Efficiency/Air Ground Integration)	NAS Ops
1A08B	NextGen - New Air Traffic Management Requirements	NAS Ops
1A08C	NextGen - Operations Concept Validation - Validation Modeling	NAS Ops
1A08D	NextGen - Environment and Energy - Environmental Management Systems and Noise and Emissions Reduction	Environment & Energy
1A08E	NextGen - Wake Turbulence - Re-categorization	NAS Ops
1A08F	NextGen - Operational Assessments	Environment & Energy, Aircraft Safety, NAS Ops
1A08G	NextGen - System Safety Management Transformation	Aircraft Safety
1A08H	NextGen - Staffed NextGen Towers	NAS Ops
4A09	Center for Advanced Aviation System Development (CAASD)	NAS Ops (optional)
Grants-In-Aid for Airports (GIAA)		
GIAA	Airports Technology Research - Capacity	Airports
GIAA	Airports Technology Research - Environment	Airports
GIAA	Airports Technology Research - Safety	Airports
GIAA	Airport Cooperative Research Program (ACRP) - Capacity	*ACRP Board of Gov.
GIAA	ACRP - Environment	*ACRP Board of Gov.
GIAA	ACRP - Safety	*ACRP Board of Gov.
Operations (Ops)		
AST	Commercial Space Transportation Safety	Commercial Space

* Not a PPT

Table C-2: R&D Budget Line Items by Program Planning Team

Appropriation	FY 2015 BLI #	Program Name
Airports		
GIAA	GIAA	Airports Technology Research – Capacity
GIAA	GIAA	Airports Technology Research - Environment
GIAA	GIAA	Airports Technology Research – Safety
GIAA	GIAA	Airport Cooperative Research Program – Capacity (ACRP Board of Governors)
GIAA	GIAA	Airport Cooperative Research Program – Environment (ACRP Board of Governors)
GIAA	GIAA	Airport Cooperative Research Program – Safety (ACRP Board of Governors)
Aircraft Safety		
R,E&D	A11.a	Fire Research and Safety

Appropriation	FY 2015 BLI #	Program Name
R,E&D	A11.b	Propulsion and Fuel Systems
R,E&D	A11.c	Advanced Material/Structural Safety
R,E&D	A11.d	Aircraft Icing/Digital System Safety
R,E&D	A11.e	Continued Airworthiness
R,E&D	A11.f	Aircraft Catastrophic Failure Prevention Research
R,E&D	A11.g	Flightdeck/Maintenance/System Integration Human Factors
R,E&D	A11.h	System Safety Management
R,E&D	A11.j	Aeromedical Research
R,E&D	A11.l	Unmanned Aircraft Systems Research
R,E&D	A11.m	NextGen – Alternative Fuels for General Aviation
R,E&D	A11.n	NextGen – Advanced Systems and Software Validation
R,E&D	A12.c	NextGen – Air Ground Integration Human Factors
F&E	1A08G	NextGen – System Safety Management Transformation
F&E	1A08F	NextGen – Operational Assessments – Safety
Commercial Space Transportation		
Ops	AST	Commercial Space Transportation
Environment & Energy		
R,E&D	A13.a	Environment and Energy
R,E&D	A13.b	NextGen – Environmental Research – Aircraft Technologies, Fuels, and Metrics
F&E	1A08D	NextGen – Environment & Energy – Environmental Management Systems and Noise and Emissions Reduction
F&E	1A08F	NextGen – Operational Assessments – Environment and Energy
Mission Support		
R,E&D	A14.a	System Planning and Resource Management
R,E&D	A14.b	William J. Hughes Technical Center Laboratory Facility
National Airspace System Operations		
R,E&D	A11.i	Air Traffic Control/Technical Operations Human Factors
R,E&D	A12.a	Joint Planning and Development Office (JPDO)
R,E&D	A12.b	NextGen – Wake Turbulence
F&E	1A01A	ATDP – Runway Incursion Reduction
F&E	1A01B	ATDP – System Capacity, Planning and Improvement
F&E	1A01C	ATDP – Operations Concept Validation
F&E	1A08A	NextGen – ATC/Tech Ops HF (Controller Efficiency and Air Ground Integration)
F&E	1A08B	NextGen – New Air Traffic Management Requirements
F&E	1A08C	NextGen – Ops Concept Validation – Validation Modeling
F&E	1A08E	NextGen – Wake Turbulence – Re-categorization
F&E	1A08F	NextGen – Operational Assessments – Capacity

Appropriation	FY 2015 BLI #	Program Name
F&E	1A08H	NextGen – Staffed NextGen Towers
F&E	4A09	Center for Advanced Aviation System Development (CAASD)
Weather		
R,E&D	A11.k	Weather Program
R,E&D	A12.d	NextGen – Weather Technology in the Cockpit
F&E	1A01D	ATDP – NAS Weather Requirements

C.2 Guidance for Program Planning Team Decision Making Process

The PPTs are asked to consider the following categories when developing briefings for the REB on their decision making process for base programs. When developing these briefings, describe the process at a high level using these criteria as a guideline, and only were applicable. If a certain category is not applicable to your PPT, do not feel obligated to include it in the briefing. It is up to the individual PPT to provide a briefing that best describes your portfolio development process.

The briefings will be kept on file and updated annually to reflect changes in the PPT process.

1) **PPT Composition and Structure**
   Include the names and organizations of your sponsors and performers. Identify which sponsors and performers participate in the portfolio development process and provide a brief description of the roles and responsibilities of the sponsors and performers including who makes decisions and final approvals.

2) **Meeting Management**
   Does your organization hold regular meetings to discuss their R&D goals? If so, please describe how these meetings are planned, who typically participates, and if documentation is kept.

3) **Data Management**
   What type of information do you need and/or collect from you PPT members in order to make well informed decisions to develop your research portfolio? How do you collect this data and what is done with the data once it is collected?

4) **Portfolio Development Process**
   Describe how your PPT identifies and prioritizes requirements. Do you consider recommendations from the REDAC and/or the REDAC Subcommittees?

5) **PPT Portfolio Accountability and Performance**
   Include the methods used by the PPT to account for your portfolio's performance and expenditures. Is there a method used to judge the efficiency and success of a project? How is it determined if a project should be terminated?

6) **Portfolio Relationship Management**
   Describe if and how your PPT regularly coordinates or interfaces with any outside organizations while developing your research portfolio. This can include, but is not limited to, the Joint Planning Development Office (JPDO), other government agencies, professional organizations, academia, or private industry.

C.3 Program Planning Team Briefing Format for Proposed R&D Portfolios

C.3.1 Guidance for Program Planning Team Briefing Preparation

The overview below and outline in Table C-5 summarize the required content of the briefing and indicate the level of detail for the presentation.

The RST works closely with PPT leads to help them develop briefings. For an electronic copy of the PPT Briefing Template, contact the RST Lead.

The RST will provide the PPT leads with list indicating which PPT will be responsible for reporting on each NARP milestone in Chapter 3-5. This list will be provided to the PPT leads at least 1 month prior to the date of the REB meeting when the REB reviews the PPT portfolios.

C.3.2 Overview for PPT Briefing Preparation

Use the descriptions and the sample slides in this section as a guide to present major themes. Focus on important issues and, keep project justifications brief.

Throughout the briefing, PPTs should group individual programs (i.e., BLIs) logically. PPTs may make minor variations to the briefing template in this section to accommodate unique characteristics of individual portfolios. Program summaries or supplemental information may be included in handouts for reference, but are to be not briefed.

C.3.3 PPT Briefing Content Summary

C.3.3.1 PPT Portfolio Overview Slide

Describe the top-level goals of the PPT Portfolio.

C.3.3.2 PPT Financial Summary Slides

On one slide, provide the enacted (FY 2013), request (FY 2014), and target (FY 2015) financial summary information for both base programs and NextGen programs. Group the BLI number information; list the funding by appropriation with each base program and NextGen program (R,E&D, F&E, etc.). For each year listed, separate the in-house and contract funds. Use Table C-3 on the financial summary slide to present the budget information.

On another slide, provide a five-year projection of contract spending for FY 2015 through FY 2019. These figures will be provided by the RST Financial Manager and are to be considered only a target amount. Contact mike.gallivan@faa.gov, (202) 493-5598 for these projected dollar amounts. The projected budget levels should be labeled “For Planning Purposes Only,” and will only include contract dollars. Table C-4 below shows the format for the PPT 5-Year Financial Plan slide.

Table C-3: PPT Financial Summary

Program	FY 13 Enacted		FY 14 Request		FY 15 Target	
	In-House	Contracts	In-House	Contracts	In House	Contracts
Base Program (Funding Appropriation)						
Item (BLI #/Title)						
Item (BLI #/Title)						
Base Total						
NextGen Programs (Funding Appropriation)						
Item (BLI #/Title)						
Item (BLI #/Title)						
NextGen Subtotal						
PPT Total						

Table C-4: PPT 5-Year Financial Plan

Program	Out-Year Contract Dollars				
	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019
Base Program					
Item (BLI #/Title)					
Item (BLI #/Title)					
Base Total					
NextGen Programs					
Item (BLI #/Title)					
Item (BLI #/Title)					
NextGen Subtotal					
PPT Total					

C.3.3.3 NARP Milestone Summary Slide

Verify that your FY 2015 portfolios support the 2013 NARP milestones in Chapter 3-5. PPTs changing or deleting any NARP milestones should provide the sponsor justification for the change, as well as any impact(s) from the performer.

The RST will provide the PPT leads with a list indicating which PPT will be responsible for reporting on each NARP milestone. This list will be provided to the PPT leads at least 1 month prior to the date of the REB meeting when the REB reviews the PPT portfolios.

C.3.3.4 PPT REDAC Recommendations Slide

List the REDAC and the subcommittee's recommendations for your FY 2015 portfolio, as well as your response to the recommendations.

If a REDAC recommendation led to a change in the portfolio, describe the change. If a REDAC recommendation is rejected, describe the rationale for rejection.

C.3.3.5 Base and NextGen Program Description Slides (Quad Chart)

Provide a quad chart with supporting data for each base and NextGen program BLI presented in the briefing. In the title of the slide include the program name, BLI number, whether it is a base or NextGen program, and the funding type (appropriation). Provide four areas of information on each quad chart: (1) the Destination 2025 Goals supported and the Need for each proposed requirement; (2) the Research Goal(s) included in the program's FY 2015 budget narrative; (3) the planned FY 2015 accomplishments for each BLI, and (4) out-year funding requirements or projected out-year funding from Financial Summary Slide (Table C-4).

An example of the quad chart layout and descriptions is provided at the end of this section in Figure C-1. General information for each of the quad chart sections is provided in the following sections.

C.3.3.5.1 Quad Chart Section 1: Destination 2025 Goals/Need (Upper Left)

PPTs should be specific in relating their request of both base and NextGen programs to the FAA Destination 2025 in the Destination 2025 Goals section. PPTs should also briefly state the justification for the program's objectives in the Need section. Place this information in the upper left-hand corner of the quad chart.

C.3.3.5.2 Quad Chart Section 2: Research Goals (Upper Right)

PPTs should list a selection of key Research Goals from each program's FY 2015 budget narrative. Place this information in the upper right-hand corner of the quad chart.

C.3.3.5.3 Quad Chart Section 3: FY 14 Accomplishments (Lower Left)

PPTs should briefly describe the planned FY 2015 accomplishments. Describe how these accomplishments support the Research Goals. Place this information in the lower left-hand corner of the quad chart.

C.3.3.5.4 Quad Chart Section 4: Out-Year Funding Requirements (Lower Right)

PPTs should provide a chart of out-year funding showing contract dollar requirements. Include information for five years, FY 2015 thru FY 2019. Place this information in the lower right-hand corner of the quad chart.

Figure C-1: Example of a Quad Chart

A11.e. – Continued Airworthiness
Base Program – R,E&D

Destination 2025 Goals

- Next Level of Safety
  - The Continued Airworthiness program contributes to the FAA's strategic goal of increasing aviation safety by reducing the number of accidents associated with failure of aircraft structure, engines, and systems

Need

- The 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.

Research Goals

- By FY 2015, develop technical data on rotorcraft that provide guidance for certification of Health and Usage Monitoring Systems (HUMS) for usage credits.
- By FY 2015, develop a predictive methodology for damage tolerance risk assessment and risk management for continued operational safety of small airplanes.
- By FY 2015, assess performance of an advanced inspection system for identifying environmental damage of composite structures, such as by chemical, UV, and water ingress.

FY 2014 Accomplishments

- Complete assessment of performance of traditional and advanced inspection systems necessary for evaluating the strength of bonded aircraft structures, including technologies to find hidden joint damage
- Prototype flight displays, adapted to NextGen operational and performance needs, including flight trajectory related information
- Continue research to develop technical data to evaluate and assess commercial aircraft health monitoring systems for certification and continued airworthiness requirements

Out-Year Funding Requirements

(Contract dollars)

	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019
Funding Target ($000)					

Table C-5 provided below outlines the suggested amount of time that should be spent on each component of the PPT Portfolio briefing.

Table C-5: PPT Briefing Outline and Suggested Time Allocation

Topic	Suggested Time Allocation for Briefing
1) PPT Program Overview	10%
2) PPT Financial Summary (budget year and 5-year)	
3) NARP Milestone Summary	40%
4) PPT REDAC Recommendations	
5) Base Program	50%
a) Quad Chart (Based on BLI #)	
b)	
6) NextGen Programs	
a) Quad Chart (For Item, BLI #, and Title)	
b)	

C.4 Research, Engineering, and Development Advisory Committee Designated Federal Official Interfaces

The meeting schedule for the REDAC is provided below.

REDAC Meeting Schedule

February 26-28, 2013.....Subcommittee on Human Factors (Review PPT portfolio)

March 5-7, 2013.....Subcommittee on NAS Operations (Review PPT portfolio)

March 12-14, 2013.....Subcommittee on Aircraft Safety (Review PPT portfolio)

March 19-20, 2013.....Subcommittee on Airports (Review PPT portfolio)

March 26-27 .....Environment and Energy (Review PPT portfolio)

April 24, 2013.....REDAC provides recommendations on FY 2015 R&D portfolio

The Designated Federal Officials (DFOs) interface with the PPTs for their respective REDAC Subcommittees. The DFOs determine the level of detail and input required for Subcommittees to make sound budget Portfolio recommendations to the full REDAC. A summary of the REDAC Subcommittee DFO contact information and their associated PPT interface(s) is provided below.

Table C-6: DFO Information

REDAC Subcommittee	DFO	Phone No.	Email	PPT Interface				
				Aircraft Safety	Weather	NAS Ops	Airports	Environment & Energy
NAS Ops	Eric Neiderman (ANG-E)	(202) 267-6389	eric.neiderman @faa.gov	•	•	•		
Aircraft Safety	John Wiley (ANG-E)	(609) 485-6011	john.wiley @faa.gov	•	•			
Airports	James White (ARP)	(202) 267-7605	james.white @faa.gov				•	
Human Factors	Michelle Yeh (ANG-C)	(202) 267-8758	michelle.yeh @faa.gov	•	•	•		
Environment and Energy	James Hileman (APL)	(202) 493-4293	james.hileman @faa.gov					•

The Mission Support PPT is not reviewed by the REDAC or any subcommittee. The Commercial Space Transportation PPT is reviewed by the Commercial Space Transportation Advisory Committee (COMSTAC).

The REDAC point-of-contact is Gloria Dunderman (202-267-8937, gloria.dunderman@faa.gov).

C.5 Research, Engineering, and Development Advisory Committee Guidance on FY 2015 R&D Portfolio

R. John Hansman
T. Wilson Professor of Aeronautics and Astronautics
Director, International Center of Air Transportation

Massachusetts Institute of Technology
77 Massachusetts Avenue, Building 33-303
Cambridge, Massachusetts 02139–4307

Aeronautics and Astronautics
Engineering Systems Division

Phone 617–253-2271
Fax 617–253-4196
Email rjhans@mit.edu

October 3, 2012

The Honorable Michael P. Huerta
Acting Administrator
Federal Aviation Administration
800 Independence Avenue, SW
Washington, DC 20591

Dear Administrator Huerta: Michael

Thank you for taking the time to meet with the Research, Engineering and Development Advisory Committee (REDAC) at our recent meeting. The committee enjoyed the discussion and benefited from your insights. In response to one of your suggestions the REDAC will take the action to cross coordinate with the NextGen Advisory Committee (NAC).

The REDAC is encouraged that the agency is making progress in several areas noted in prior REDAC reviews. In particular the committee noted the progress in developing capability in software and digital systems both in AVS and in the recent appointment of a Chief Scientist for Software in the NextGen organization.

The REDAC noted that the FAA is uniquely positioned to take advantage of the national initiative in "big data" While recognizing the current capabilities in ASIAS and NAS monitoring there appear to be significant opportunities to improve the safety, efficiency and environmental performance of the NAS by applying the current and emerging data mining technologies to the vast set of operational data the agency routinely collects (e.g. ETMS, ASDE-X, PDARS, ASAP, FOQA, ...).

The REDAC recommends that the agency develop an aggressive "big data" strategy for both monitoring and operational control of the NAS. One particular area identified by several of REDAC subcommittees is the potential use of "big data" to characterize the human element in operational performance both at the individual flight level and the overall system level.

The REDAC also encourages the FAA to clearly articulate and quantify the range of user benefits and costs of proposed operational concepts and systems. Capturing this range should help to focus and balance needed investments in Research and Development, as well as for eventual implementation. This is especially important if significant costs must be borne by entities such as airports or flight operators before benefits can be realized.

I am enclosing the summary findings and recommendations from the fall 2012 meetings of the standing REDAC Subcommittees (Aircraft Safety, NAS Operations, Environment and Energy, Airports, and Human Factors).

Finally, we would like to reiterate our offer to address specific areas of concern in a focused study if there are issues that you feel the REDAC could provide independent and effective advice.

Sincerely,

R. John Hansman
Chair, FAA Research, Engineering and Development Advisory Committee

Enclosure

General Observation – Big Data

The REDAC noted that the FAA is uniquely positioned to take advantage of the national initiative in "big data." While recognizing the current capabilities in ASIAS and NAS monitoring there appear to be significant opportunities to improve the safety, efficiency and environmental performance of the NAS by applying the current and emerging data mining technologies to the vast set of operational data the agency routinely collects (e.g. ETMS, ASDE-X, PDARS, ASAP, FOQA, …).

The REDAC recommends that the agency develop an aggressive "big data" strategy for both monitoring and operational control of the NAS. One particular area identified by several of REDAC subcommittees is the potential use of "big data" to characterize the human element in operational performance both at the individual flight level and the overall system level.

NAS Operations Subcommittee

(1) Finding: The important work in Operations and Concept Validation Program briefed by John Marksteiner was very near term and had no five-year or longer plan or roadmap of needed activities. While understandable in light of the budget situation within the FAA, this work, in particular, which the subcommittee has championed every meeting, needs to have a longer-term outlook and the capability to develop it.

Recommendation: FAA should enable and support a longer-term (e.g., five year) activity in developing a coordinated and understandable plan or roadmap for these activities, particularly those supported by the facilities and equipment (F&E) budget line, which would be informed by assessing and monetizing shortfall areas (see related finding and recommendation) to define needed research areas.

(2) Finding: Given the breadth of advances associated with the implementation of the NextGen Concept of Operations (ConOps), it is very important to address integration requirements. This applies at both the level of workstation software for the operational staff with different roles and responsibilities and at a broader systems level, where collaboration and coordination need to be carefully addressed in terms of direct and computer-mediated human-human communication, coordination and collaboration and human-automation interactions.

Specific examples of the need for workstation integration include the need for integrated workstations for Air Traffic Control (ATC) Tower, Terminal Radar Approach Control (TRACON) and Air Route Traffic Control Center (ARTCC) controllers, supervisors and traffic managers. At the system level, the issue is one broader systems thinking during the design and evaluation of ConOps, procedures and technologies in order to ensure effective integration. Of particular concern is the need to design to support coordination of the many actors within this distributed work system, including controllers, traffic managers, pilots, dispatchers and ATC coordinators, ramp controllers, airport operators, and Airline Operations Centers (AOCs). It appears that some of this required crosscutting human factors research for NextGen was eliminated after the Human Factors Subcommittee review, as was noted in the succeeding NAS Operations Subcommittee review.

Recommendation: More intense cross-cutting human factors research and development efforts are necessary to ensure that the linkages among different ConOps that have been developed are carefully defined and addressed in order to ensure effective integration. In particular, we reiterate our recommendation that all nodes of collaboration, including AOCs, as

appropriate, are explicitly identified as components in all areas of NextGen research and implementation where the flight deck, air traffic control and AOCs already collaborate today or will in NextGen, and should be adequately funded.

(3) Finding: The Subcommittee was pleased by Dr. Karlin Toner's Joint Planning and Development Office (JPDO) presentation for its overall thought leadership, depth and maturity. We were impressed by the completeness of JPDO's recent engagements of the stakeholder communities, and the explicit acknowledgement of the complexities of the issues and willingness to face the difficulties each presents. In particular, the JPDO briefing describing the flow of NextGen capabilities as a function of needed work was considered excellent by the subcommittee, particularly the understanding that, to reach a 2025 Nation Airspace System (NAS) with changed roles and responsibilities (a long-standing concern of the Subcommittee), work beyond the research currently ongoing is required.

Recommendation: The research requirements to move beyond the NextGen Operations Level 3 to the Level 4 implementation capabilities have been initially identified by JPDO. A gap analysis of on-going research against that required to reach these capabilities should be developed as soon as possible and briefed to the NAS Operations Subcommittee.

(4) Finding: A significant portion of the FAA's research agenda involves the definition and validation of operational concepts that build upon NextGen equipage. The NAS Operations Subcommittee was not briefed on any activities that address issues related to transition and mixed equipage or multiple levels of service based on differing levels of aircraft capability. The NAS consists of, and will continue to consist of, a wide range of aircraft capabilities (e.g., equipage, training, performance envelopes) and missions. Regional jets, for example, are unlikely to be delivered with, or retrofit, certain NextGen functionality due to cost-effectiveness considerations.

Recommendation: FAA research activities (e.g., ConOps development, validation, etc.) involving NextGen equipage need to explore the following:

- Critical mass thresholds for delivery of benefits to equipped users
- Potential automation mitigations to enable controllers to handle mixed capabilities
- Trade space of performance requirements, benefits, costs, aircraft equipage levels, and ground capabilities with respect to overall system performance gains, system benefits, and net benefits to equipped operators
- Performance and equipage levels in different timeframes and operational environments (e.g., 2018 timeframe versus the 2025 timeframe and later)
- Methods to ensure that aircraft with NextGen equipage gain differential benefits over non-equipped aircraft

(5) Finding: The FAA presented a plan to complete a Trajectory-Based Operation (TBO) concept of operations by November 2012. While there are several activities in place to develop standards and implement TBO capabilities, the direct benefits for operators equipping with a TBO capability have not been quantified, nor have the mechanisms for delivery of benefit been validated. Current work has not allayed operator concerns that equipped aircraft will not achieve differential benefits.

Recommendation: The FAA research supporting the validation of a TBO concept of operations should include the following activities:

- Differentiation of mid-term (2018) and post-mid-term (2025+) operations and benefits

- Integrate operations associated traffic flow management and collaborative decision-making with those involving digital communications to the aircraft regarding reroutes (both pre-flight and during flight)
- Address mixed capability operations (see previous recommendation)
- Quantify the marginal benefits of differing performance requirements and capabilities from both a system perspective and the perspective of investing operators

Finding: The Weather Technology in the Cockpit research program is addressing a wide range of issues related to the delivery of commercial weather products to pilots while in flight. The subcommittee could not determine, based on the information presented, the magnitude of the problems being addressed or the likely impact that could be achieved with respect to addressing the FAA's strategic goals for general aviation (GA) safety, such as captured in Destination 2025.

Action: The NAS Operations Subcommittee requests that FAA provide an update on the suite of research activities that are addressing major contributors to GA safety problems. In addition, the Subcommittee requests that FAA provide additional rationale that captures major problems to be addressed in the FY 2015 research portfolio for the Weather Technology in the Cockpit program.

Finding: Current capabilities to collect and store data related to NAS operations are expanding at a rapid pace, today there is the potential of collecting, and correlating, literally terabytes of data. Federal use of "big data", however, must be sensitive to concerns related to privacy, labor agreements, non-punitive safety culture initiatives, and several other factors. The FAA has initiated use of big data in initiatives such as the Aviation Safety Information Analysis and Sharing (ASIAS) capability; ATM initiatives may similarly benefit from leveraging a combination of public and private organizations that can provide the FAA intelligent and predictive ATM data analytics to improve planning, awareness and ultimately operational decisions.

Action: The NAS Operations Subcommittee believes this is an emerging area that can provide great benefit to the FAA. We request that FAA share with the Subcommittee an update on the FAA's strategy to utilize big data initiatives to inform research and decision-making.

Subcommittee on Aircraft Safety

Finding: The subcommittee found the Digital System Safety briefing to be thorough and reflected the FAA's acknowledgement of previous concerns of adequate focus and staffing in this area. Further, the subcommittee feels recent organizational changes will bolster the FAA's ability to maintain momentum in this area. Unquestionably, the digital system safety focus must remain agile to match the changing nature of the threat environment and maintain complementary coordination with other digital systems that comprise the aviation system. The subcommittee encourages FAA to review how common-place, commercial-off-the-shelf technology can be integrated into general aviation cockpits, where price sensitivity may otherwise prevent safety gains which could be recognized from using technology that is now available in many consumer products.

(1) Finding: The routine integration of Unmanned Aircraft Systems (UAS) into non segregated civil airspace is clearly a complex challenge, requiring significant research and analysis. The FAA's R,E&D budget alone is not likely to be able to fund the necessary research to address this challenge in a timely fashion without close collaboration with other Federal agencies sponsoring similar research. The subcommittee is encouraged by FAA and JPDO efforts to align research among the FAA, DoD, and NASA. The subcommittee is similarly encouraged by

efforts internal to the FAA to effectively organize the agency to address the integration challenge. The subcommittee applauds the creation of the new UAS Integration Office, AFS-80, and efforts within the Office of Advanced Concepts & Technology Development, ANG-C, to ensure FAA research and analysis efforts are planned in a coordinated fashion. The subcommittee could not help but note the similarities between the UAS integration challenge and the integration challenge created by commercial space which has an Associate Administrator and a separate line of business devoted to addressing. While the subcommittee notes considerable FAA organizational improvements with the creation of AFS-80 and changes in ANG-C alignments, the subcommittee is concerned that the matrix nature of the organizational structure without clear lines of authority may not be the most effective.

Recommendation: The FAA Administrator should review whether the FAA is appropriately organized to address the UAS integration challenge and whether sufficient FAA R,E&D resources are being devoted to the challenge.

Finding: At our August 2012 meeting, as part of our UAS integration "deep dive," the subcommittee received a very comprehensive and well-presented briefing on the FAA research efforts, which in the absence of additional context, seems appropriate. Based upon our recommendations in the Fall of 2010, the subcommittee had been assured that a NAS Integration Roadmap would be available in March 2011. It was not. In August 2011, we were told that the roadmap was again not quite ready. At our meeting in March 2012, we were once again told that the Airspace Integration Roadmap is still not ready and is under review by the UAS Aviation Rulemaking Committee (ARC) that may recommend changes. The subcommittee again requested information for the August 2012 meeting on "the FAA's UAS Airspace Integration Roadmap and Concept of Operations and how this material is being used to inform R&D planning." Again this information was not available because comments from the UAS ARC are being incorporated. The subcommittee recognizes that the FAA is working with the JPDO, the DoD, and NASA, to not only develop and coordinate this material but to develop a Comprehensive UAS Integration Plan based upon Congressional direction. The subcommittee also recognizes that coordination of such material among Federal agencies takes time. The subcommittee feels we are unable to make any recommendations regarding the appropriateness of the existing FAA research plans without appropriate context to include an integration roadmap, operational requirements, concept of operations, and some idea of the research being conducted by DoD, NASA, and others.

At our August 2012 "deep dive," it was explained that for UAS integration there are three competing objectives associated with each of the following: safety, efficiency, and timeliness. The subcommittee agrees. The subcommittee recognizes the political pressure from the UAS stakeholder community to accelerate efforts ensuring more *timely* integration, while at the same time legacy airspace users are unlikely to be willing to accept a less *efficient* National Airspace System (NAS) to enable UAS integration. The subcommittee believes that the FAA needs to continue to avoid the temptation to compromise safety in an effort to satisfy aggressive integration timeline objectives from the UAS community.

Action: At our March 2013 meeting, the subcommittee requests a briefing on the UAS Airspace Integration Roadmap, the FAA UAS Concept of Operations, and the UAS Comprehensive Integration Plan. The subcommittee also requests that the FAA map planned FY 2013-FY 2015 research efforts to this guidance material.

(2) Finding: The subcommittee received a thorough briefing on the Aviation Safety Information Analysis and Sharing (ASIAS) and finds this program continues to be an exemplary model of

how R&D is successfully transitioned into operational use. The FAA in association with the transport community has developed a collaborative process to collect and share data in order to identify potential safety risks. The FAA must continue to build on this success to expand the ASIAS program to other applicable communities such as general aviation (GA) and Rotorcraft.

The subcommittee sees a gap between the Aviation Safety Action Program (ASAP)/Flight Operational Quality Assurance (FOQA) data collected and how it connects to the human element in each situation. The subcommittee understands the challenge with closing this gap but feels that it is a logical next step and that there is great potential value to enhance safety and assist with the development and implementation of future regulation by connecting the human element to ASAP/FOQA data collected as part of this program.

Recommendation: FAA should consider conducting research into connecting the human element with the operational events recorded by ASAP/FOQA data.

(3) Finding: The Subcommittee again expresses the importance of human factors research in all aspects of aviation safety and is pleased to see the coordination both within the FAA and with outside organizations to help establish and set priorities for the focus areas of this activity. It will be important that the human factors research requirements be completed in a timely manner to meet both current and future regulatory needs as well as the needs of the NextGen. In particular there are many research activities ongoing across the aviation community to provide interventions intended to reduce the loss of control category of accidents. The research covers a broad spectrum of interventions to include upset recovery training, enhanced simulator fidelity, and new display systems such as Angle of Attack (AOA) or Synthetic Vision. The FAA will need to make sure the outputs of their human factors research do not stretch out but are completed in time to effectively support the objectives of these interventions. Additionally, there currently is considerable regulatory activity around fatigue management and Fatigue Risk Management Systems (FRMS). With an implementation date of January 2014, the SAS is concerned that the FAA Flight Standards Service (AFS) might have research needs closer in than FY 2015 to support regulatory development and approval efforts.

Recommendation: The Subcommittee recommends that AFS revisit their research needs to support the implementation of FAR 117 as well as approval and development of FRMS. The high level of industry interest and activity in this issue will likely necessitate funding for research and support in FY 2014 as well as FY 2015.

Finding: The Subcommittee finds the work being done in the area of metallic structures to be valuable and relevant to safety community. The collaborative efforts on the materials handbook and crack growth computer codes show good results with wide applicability both within the FAA and across industry and have focused on newer materials and repair processes. The work provides a good foundation for the life and crack growth risk assessments of small aircraft by the small aircraft directorate staff.

(4) Finding: The Subcommittee is pleased to see the GA envelope protection work being successfully completed with proof of concept flight testing of the FAA developed approach. The stall departure and envelope awareness and protection work for transport aircraft appear to be off to a slow start with contract awards for FY 2012 yet to be completed. The list of proposed FY 2015 research topics appears to cover some important areas in flight controls but the Subcommittee wonders why the AF447 lessons are not being worked urgently today. The FY 2015 proposed tire failure research effort seems so basic the Subcommittee suggests a

close collaborative approach with tire and airplane manufacturers would be a good means to make rapid progress.

Recommendation: If lessons from the AF447 incident regarding flight controls design and certification warrant new research, the Subcommittee recommends the research be prioritized and accelerated for near-term completion.

Finding: The Subcommittee appreciates the briefing on the FAA's overall plan for R&D addressing rotorcraft safety in response to its March 2012 Finding. The subcommittee has two observations concerning Health and Usage Monitoring System (HUMS) usage credits and the advanced control research.

The HUMS-related research being performed in the Continued Airworthiness of Rotorcraft Systems area is well along and should be continued. Currently 7 years into a 10-year program, the research should support certification of a HUMS for usage credit in response to its users. Subcommittee recognizes the importance of the program and encourages the FAA to meeting the completion date of 2017. Subcommittee requests a progress report at the March 2013 meeting. However, given HUMS equipage requirements for certain airspaces, the SAS suggests that the HUMS research include potential benefits of using this equipment in order to move the collaboration with the European Aviation Safety Agency (EASA) in the direction of a HUMS certification for usage credits.

The Subcommittee also notes that the advanced control systems research is behind schedule. The Subcommittee suggests that the program catch-up by using R&D from the fixed wing effort (e.g., Fly-By-Wire/Fly-By-Light) to the extent possible.

Action: The HUMS-related R&D is of high priority; leverages work from other areas, and should continue. Subcommittee asks to be updated at the March 2013 meeting.

Finding: The Subcommittee finds that Aircraft Icing continues to be focused on important safety areas; especially critical are completion of super-cooled large droplet means of compliance and High Ice Water Content (HIWC) characterization and threat mitigation. Overall, Aircraft Icing is a strong effort and is producing good results. The Subcommittee is concerned with the HIWC schedule slippage due to the complexity of getting flight data. The FAA has recognized the importance of maintaining in-house icing expertise and has taken appropriate measures to build engineering strength by nurturing and developing technical area co-leads at the Technical Center as well as by leveraging skills from key partnerships.

Finding: The Subcommittee continues to see excellent work being conducted by this team. The work is relevant to both current and future needs of the composites community. The composite airframe crash worthiness work is late to need for the first transport airplane certification but is still very much needed to provide the design and certification guidance to the FAA and industry. The Composite Materials Handbook this team continually updates is very valuable to the composite design community and its continued support by the team is appreciated by the SAS.

Finding: The Subcommittee continues to support the important work this research team has performed in delivering ever improving Nondestructive Evaluation (NDE) techniques to industry applied to high energy critical components. The subcommittee suggests the team poll their industry partners to help identify the next level of safety improvements possible with further inspection technique development.

Finding: The Center for General Aviation Research (CGAR) and the Joint Advanced Materials and Structures (JAMS) Centers of Excellence continue to be examples of how cost sharing arrangements, complemented by competent FAA management and leadership, can be an effective way to conduct relevant research, produce valuable products, provide a source of talent for FAA recruitment and advance the knowledge of FAA staff.

Finding: The Subcommittee again notes that the Fire Research and Safety Program continue to be relevant, well managed, and directly responsive to current and emerging requirements. The international reputation and credibility achieved by the team is noted and is especially important in light of the recent congressional language limiting the ability of FAA to impose fire safety regulations that are no more stringent than the International Civil Aviation Organization (ICAO) standards. The Subcommittee also notes, without passing judgment, the comparatively high level of out-year funding for this program activity relative to other safety areas which are repeatedly shown as leading contributors to fatal accidents.

Finding: The Subcommittee finds that the Maintenance & Inspection (M&I) area is taking an appropriate life-cycle view by balancing performance of the actual research tasks with development of training and guidance materials based on the results of the research. The Original Equipment Manufacturers (OEM) is involved on relevant committees and incorporates results into their maintenance manuals. Focus of emerging need areas for FY 2015 and beyond is based on continuation of the trends in materials (particularly composites) being deployed by the industry.

Finding: The Subcommittee finds that the Electrical Systems area is producing results in response to FAA sponsor's requirements. The Subcommittee would find it helpful to better comment on the focus of emerging need areas if all of the areas considered and the rationale for their inclusion, or non-inclusion, in future prioritization were presented.

Finding: The Subcommittee continues to support the excellent work of the Civil Aerospace Medical Institute (CAMI). They are a unique, internationally-recognized, national asset. The Subcommittee is encouraged by the support provided by the Aerospace Medical Equipment Needs (AMEN) program for modernization and refurbishment of CAMI's facilities so that they may continue their valuable work. Continued, consistent funding of CAMI remains essential.

As some of the CAMI stalwarts retire, the FAA should actively recruit the next generation of researchers.

Finding: The Subcommittee found the briefing on the Aircraft Catastrophic Failure Prevention Program thorough and reflected positive activity in an area considered to be of high value. The Subcommittee was encouraged to see an upcoming transition of focus from metals to composite material in the coming years. The Subcommittee noted the continued refinement of tools created by this activity is considered to be of high importance.

Finding: The Subcommittee finds that the approach and focus of the Weather Technology in the Cockpit (WTIC) research activities align well with the expanded weather information expected to become available to the cockpit via NextGen technologies. We were also pleased to see that since the last review, WTIC has taken positive steps that show a close coordination with other projects as appropriate, in particular the NextGen - Air Ground Integrations Human Factors Budget Line Item. The WTIC project appears to be adequately funded to support its planned activities; however, it may face a challenge getting these funds obligated and/or costed

in a timely manner. The FAA may want to take steps as appropriate to ensure these funds are protected from any end-of-year realignments the agency has to make to meet cost performance metrics.

The Subcommittee observed WTIC has implemented a large portfolio of research activities via contracts to address the identified FY 2012- FY 2014 focal areas. While it could be a potential challenge to effectively comprehend and manage all these activities, the Subcommittee was impressed and reassured by the grasp of knowledge the presenter seem to have across the breath of these activities.

Finding: The Subcommittee is pleased to see the level of effort and investment being made to find a suitable alternative for leaded piston engine fuel. It is well recognized how important, yet challenging, this area of research is. Further, we recognize research may be needed beyond the Destination 2025 goal of transitioning "most" of the piston fleet to an alternative fuel by 2018.

Finding: The Subcommittee received a concise briefing on the progress made toward infusing damage tolerance into design lifting practices, including the current and planned guidance material releases, as well as updates to the Design Assessment of Reliability With INspection (DARWIN) code for desirable new capabilities. Spinoff of other government involvement and support was also highlighted. The Subcommittee finds that this area is a good example of making progress on research requirements in partnership with industry, producing useful information for both Original Equipment Manufacturers (OEMs) and regulators, and then planning to sunset the work when those results are achieved. The direction of future work toward lifting of composite engine structures in response to applicant designs is encouraged. The Subcommittee suggests that direct FAA interaction with the community to further examine current needs and future trends (considering service difficulty reports, Commercial Aircraft Safety Team (CAST) recommendations, and future engine designs) will enhance the Technical Community Representative Group's (TCRG) identification of future research to enhance turbine engine safety.

Subcommittee on Environment and Energy

(1) Finding: The Office of Environment and Energy announced at the meeting that it would be establishing a new Center of Excellence (CoE) that will include both environmental and energy projects. The existing PARTNER Center of Excellence will continue to exist to enable ongoing projects to be completed, but will then be shut down.

Recommendation: The subcommittee strongly supports the establishment of the new Center of Excellence and urges that the following principles be included in the CoE mandate:

- The FAA must play a leadership role in ensuring that the CoE projects are aligned with FAA research goals. In order to accomplish this objective, the FAA should be encouraged to make an annual presentation to the CoE detailing these FAA goals.
- A process to enable stakeholders to have a meaningful input into CoE research activities must be established.
- A small percentage of CoE projects should be devoted to "entrepreneurial" activities that might appear to be "out-of-the-box" but which might lead to environmental breakthroughs, if successful.

(2) Finding: A continuing theme of the subcommittee is the absolute need for the FAA to engage in cooperative research with various other government departments. These

cooperative efforts would be important in any budget scenario, but are particularly important in the current fiscal environment. The subcommittee also commends the continuing internal cooperation within the FAA to ensure that environmental considerations are taken into account in all Agency decision-making activities.

Recommendation: The subcommittee is encouraged by the continuing cooperation among government agencies and among the various lines of business within the FAA and strongly recommends that these efforts continue. In order to continue to assess these efforts, it is recommended that NASA and the Department of Defense continue to brief the subcommittee on their environmentally related programs and that this type of briefing be expanded to include other governmental departments and agencies (Department of Agriculture, Environmental Protection Agency, etc.).

(3) Finding: Continued Operational and Tools Research is necessary to support the implementation of NextGen initiatives and the development of environmental standards through the International Civil Aviation Organization (ICAO) process.

Recommendation: The Agency should continue to develop and refine environmental tools that will enable the assessment of the environmental consequences of NextGen implementation as well as assist in the establishment of environmental standards at ICAO. This effort is particularly important now, when several tools are on the verge of being fully operational.

(4) Finding: United States leadership in the international community continues to be an important environmental priority, especially as the ICAO debates the setting of a worldwide aircraft CO_2 emissions standard. At the same time, the subcommittee is concerned that the demands on the Office of Environment and Energy in the ICAO context are burdensome, with the United States playing a disproportionate role in the international research effort. A possible result of such an overemphasis on the ICAO research requirements may limit needed research projects in the domestic NextGen context.

Recommendation: The subcommittee strongly recommends that support for ICAO activities continue. However, the Agency should exercise discipline over the ICAO work projects by requesting a clear problem statement for each request that has been appropriately vetted and encourage other countries to play a greater role in the environmental research area.

(5) Finding: The Noise Roadmap designed to update the Agency's position on the effects of aircraft noise is moving forward with the development of a community survey to track public concerns. The validity of the results of any survey such as the one underway in the area of aircraft noise depends on the robustness of the questions asked. The subcommittee is concerned that all aspects of the noise issue may not be addressed in the current survey planning process.

Recommendation: The FAA should consider empanelling an expert review board to assess the survey questions before the survey is actually conducted to ensure that all aspects of aircraft noise issues are considered.

Subcommittee on Airports

(1) Finding: Regarding Research Project Description (RPD) 155, Heated Airfield Pavements, the Subcommittee felt that additional information was needed regarding the business case justification for heated pavement installations, which would include defining the conditions under

which these pavements can be used beneficially. Because the concept of use, benefits and life-cycle costs associated with heated pavements are not fully understood, the Subcommittee also felt that the project schedule should incorporate explicit decision points together with "go/no go" criteria to manage the risks associated with the research project.

Recommendation: The Subcommittee recommends that the FAA complete its review and assessment of existing heated pavement installations (e.g., Oslo, Helsinki, Stockholm) and the prototype heated pavement sections at Binghamton Airport. The assessment of existing heated pavements should include a review of what drove the business case for the heated pavement installation and what proven benefits these existing systems can provide. The Subcommittee also suggests that the project schedule include explicit decision points together with "go/no go" criteria to its project schedule so research funds can be conserved in the event this research does not prove fruitful.

(2) Finding: Regarding RPD147, Aircraft Braking Friction, the Subcommittee believes that the research plan is very challenging and has significant risks that may impact its successful completion. To help manage the risks associated with the project, the subcommittee believes that the project schedule should incorporate explicit decision points together with "go/no go" criteria to manage the risks associated with the research project.

Recommendation: The Subcommittee recommends that the FAA add decision points together with "go/no go" criteria to its project schedule its project schedule so research funds can be conserved in the event this research does not prove fruitful.

(3) Finding: Regarding RPD145, 40-Year Pavement Life, the Subcommittee found that additional information was needed regarding the definition of what a 40-year pavement is as well as what would constitute a successful project outcome. To help manage the risks associated with the project, the subcommittee believes that the project schedule should incorporate explicit decision points together with "go/no go" criteria to manage the risks associated with the research project.

Recommendation: The Subcommittee recommends that the FAA provides the Subcommittee with a working definition of 40-year life and a list of expected pavement maintenance activities associated with 40-year pavement life-cycle at or before the next Subcommittee meeting. The Subcommittee also recommends that the FAA continues to solicit advice from the FAA Pavement Working Group, which meets twice a year, on this project. Finally, as with RPDs 155 and 147, the Subcommittee recommends that the FAA add decision points together with "go/no go" criteria to its project schedule so research funds can be conserved in the event this research does not prove fruitful.

Subcommittee on Human Factors

(1) Finding: The subcommittee was briefed on the FY 2015 research plans for the Air Traffic Control (ATC)/ Technical Operations Human Factors Program and the NextGen Human Factors ATC/Technical Operations Program. The subcommittee was encouraged by the research plans themselves, and by the degree that the plans were generated in consultation with the sponsoring organizations within the FAA. Thus consultation serves both to call out to relevant organizations where human factors research is warranted, and to smooth the path for transition of the research into implementation. Further, the subcommittee was delighted by recent efforts to broaden the scope of the research methods and thus the impact that human factors research can have, through novel studies such as the use of Air Traffic Safety Action Program (AT-SAP)

to identify operational issues. Such demonstrations highlight where human factors researchers can work closely with the operational community in examining concerns such as air traffic procedure design, in addition to the more-established role of human factors in system acquisition.

Recommendation: Continue as presented to the subcommittee with the FY 2015 research plans for "Air Traffic Control/Technical Operations Human Factors Program" and "NextGen Human Factors ATC/Technical Operations." In support of this research, continue with the close collaborations with the research sponsors, and continue with efforts to expand the application of human factors research into supporting the operational organizations within ATO, such as assisting with air traffic procedure design.

(2) Finding: The only significant gap noted by the subcommittee in the FY 2015 research plans for "Air Traffic Control/ Technical Operations Human Factors Program" and "NextGen Human Factors ATC/Tech Ops" is the lack of sponsorship of research into the human factors of the operation of Unmanned Aerial Systems (UAS) within current and NextGen air traffic operations. Human factors concerns in common air traffic operations, such as the resolution of a conflict between the UAS and a manned aircraft, can span the air traffic controller, the operator of the UAS, and the pilots of other aircraft. The subcommittee understands that a reasonable body of research is planned into the technical and operational concerns with UAS, which is not balanced by the highly-likely human factors concerns that will commensurately arise.

Recommendation: The Human Factors Research Division (ANG-C1) should coordinate with the ATO offices responsible for incorporating UAS into air traffic operations to develop research plans that examine the likely human factors concerns with the handling of UAS within current and NextGen air traffic operations, and should work to define and sponsor human factors research that is balanced with, and scheduled to provide research results timely relative to planned research into UAS vehicle systems and operation. Such research should also be closely co-ordinated with the flight deck human factors UAS research being sponsored by AVS through the UAS and Human Factors TCRGs, and with the UAS concept of operation development.

(3) Finding: The subcommittee was briefed by the Air Traffic Control/ Technical Operations Human Factors Program within the FAA Human Factors Division (ANG-C1) about a strategic plan for air traffic human factors research that is under development. This plan is intended to specify long-range objectives and areas of emphasis that build upon traditional research areas and, most notably, outline new initiatives. This program intends to work closely with appropriate organizations throughout the FAA, including potential sponsors within the ATO and elsewhere within the FAA, to demonstrate where human factors research can apply new methods to address new and emerging problems.

Three specific new initiatives were presented to the subcommittee and the subcommittee recognized the value of each of them. The first is to expand human factors research contributions to (and work more collaboratively with) ATO operations. Of note, such research can address human factors concerns in the safety evaluation of current and proposed air traffic procedures (with RNAV arrival and departure procedures as a potential first area), conduct analyses of operational problem areas (for example, a recent analysis was conducted problems within 'hand-offs'), and provide longitudinal studies to monitor operations of interest following their implementation and/or modification. While these initial steps have focused on safety evaluation, the subcommittee believes this expansion can also be fruitful if it also extends to more direct collaboration with the ATO operations community. The subcommittee finds this

initiative to be a valuable application of human factors research, particularly with the increased complexity of new air traffic operations and the need to identify human factors concerns throughout their design and implementation.

The second initiative addresses automation, and intends to support the air traffic operations organizations by providing an actionable philosophy to guide the development of automation at a high-level, as well as specific criteria in its design as can be applied by the software and program management community. Automation is a critical element in many of the plans for NextGen and modernization. There are core human factors related to automation, and these need to be clearly understood to support a core strategy. This is an important problem and the subcommittee is delighted to see the Program tackling the need to tie together prior research results and identify a coherent automation strategy for air traffic. The subcommittee also discussed with the program where more specificity will need to be provided in the Program's strategic plan as it moves forward.

The final initiative addressees change management, with a unique and vital focus on preparing the workforce for the introduction of significant changes to their systems and to their tasks. The workforce of interest includes not only the controllers, but also the other personnel in the facility whose tasks and functions may change significantly. The subcommittee finds this initiative to be critical not only in implementing change, but also in understanding the allowable rate of change within the work force.

Recommendation: The Air Traffic Control/Technical Operations Human Factors Program within ANG-C1 should continue with the strategic plan development as presented to the subcommittee. The three new initiatives as presented should be further scoped and detailed. These initiatives should also explicitly identify where these initiatives touch on cross-cutting human factors concerns and thus can learn from, and coordinate with, other human factors research (completed in the pat and on-going) within the FAA, NASA, and other stakeholders in the aviation community. A specific area noted by the subcommittee is with parallel examinations of automation between the proposed flightdeck research requirements and the 'automation' new initiative identified here for air traffic research; a briefing should be provided to the subcommittee at the next meeting as to how and where cross-cutting research in automation exists and will be coordinated.

(4) Finding: The subcommittee received a briefing by the chair of the Technical Community Research Group (TCRG) for Human Factors on the FY 2015 Requirements Reviews on Flightdeck / Maintenance/ Systems Integration Human Factors and on NextGen Flight Deck Human Factors. Overall, we find the FY 2015 requirements as presented to us to represent key areas of importance to the aviation community at large and to NextGen. Each of the requirements as presented describes has obvious safety implications that are either already emerging in the community or very likely to emerge in the near future; failure to address these concerns could delay critical NextGen developments and/or limit the ability to implement key safety improvements in many elements of the current system, including general aviation and rotorcraft.

Recommendation: The Office of Aviation Safety (AVS) should continue with planning the FY 2015 research requirements as presented to the subcommittee, recognizing that they represent key areas of importance to the aviation community at large and to NextGen as captured through a systematic requirements generation process.

(5) Finding: The subcommittee recognizes that this annual review cycle is part of a systematic process looking out several years to enable informed certification and operational approval, based upon research results of appropriate depth and breadth that are available as they are required. Thus, we appreciate the benefits of this cycle with its substantial look-ahead; we also recognize the flip-side of this approach, which is the potential for some important issues to be 'missed' by the process, either by the TCRG or the subsequent AVS selection process, or because of issues that emerge on a faster-time scale than the multi-year cycle represented here. The Human Factors subcommittee thus views its role as also helping to monitor for any issues that have been missed or that may be emerging; from this perspective, the subcommittee identified the following three issues:

Issue 1: Within the funding profile presented from present day to FY 2015 and beyond, and within the proposed research requirements for FY 2015, the subcommittee was encouraged to see the emphasis on new systems such as Class 1 and Class 2 Electronic Flight Bags (EFB). These systems represent a larger class of concerns arising with new ways to certify (and provide operational approval for the use of) emerging technologies involving personal/consumer electronics in the cockpit, mixed levels of criticality, and management of information stemming from multiple sources and presented across multiple displays. Given the rapid rate of change in the enabling technologies, these concerns may not be isolated to EFB systems. Thus it will be necessary to monitor for where these concerns may also arise in other systems and the degree that research examining EFB systems can -- and cannot -- provide the required insight.

Issue 2: Likewise, given on-going plans within the aviation community for fatigue risk management systems (FRMS), the subcommittee was encouraged to see the requirement "Fatigue Mitigation in Flight Operations." The proposed timeline for this requirement is scaled to the latest deadlines required of operators for the implementation of FRMS. Where operators may choose to implement FRMS earlier, the proposed database for tracking carriers' application of FRMS may also need to be moved earlier.

Issue 3: Similarly, the subcommittee was encouraged to see the requirement "NextGen: DataComm Human Factors R&D." Many related concerns are already emerging in the community, even with current day systems, which this research requirement may both learn from and provide some insights into. These concerns include questions about digital Notices to Airmen (NOTAMs) and proper methods for amending Pre-Departure Clearances (PDCs) such that all relevant parties remain synchronized.

Recommendation: In addition, we recognize that Aviation Safety (AVS) has a process to reconsider research planning, selection and execution in light of emerging issues. Specific considerations that the subcommittee recommends considering at this time are:

- Concerns arising with human factors research sufficient to guide certification (and operational approval for the use of) emerging technologies involving personal/consumer electronics in the cockpit, mixed levels of criticality, and management of information stemming from multiple sources and presented across multiple displays, particularly where these concerns may extend beyond the planned research focused more specifically towards EFB systems.
- Where operators may chose to implement FRMS earlier, the proposed database for tracking carriers' application of FRMS may also need to be moved earlier.
- Related to on-going research within "NextGen: DataComm Human Factors R&D," concerns are already emerging in the community, including questions about digital NOTAMs and proper methods for amending Pre-Departure Clearances (PDCs) such that all relevant parties remain synchronized.

(6) Finding: Of particular note, with the FY 2015 Flightdeck/Maintenance/Systems Integration Human Factors proposed Core Human Factor TCRG research requirements, the proposed Requirement "NextGen: Human Factors Considerations of Complex Systems" is a forward-looking initiative that can provide a broad look at an important phenomenon spanning almost all NextGen systems and operations. The subcommittee agrees that systems are rapidly becoming much more complex in day-to-day operations for human operators, and both Flight Deck and Air Traffic Control will encounter these issues in the near future. The subcommittee finds the proposed FY2015 research requirement in complexity to be a good start into this area, and further believes that broader perspectives on complexity will be required in future years, including examining not only of specific types of flightdeck systems but also complexity of operations and of integrated air-ground systems.

Recommendation: The Human Factors Subcommittee recognizes the value of the proposed FY 2015 research requirement in complexity and recommends that its planning continue in close consultation with its AVS sponsor. In addition, this effort should be considered a starting point for planning in future years to recognize the operational and technical factors creating system complexity, and to motivate novel, inter-disciplinary research approaches to what is fundamentally a cross-cutting concern.

Appendix D

Target Allocation Methodology

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D. Target Allocation Methodology

The FAA R,E&D Program Management Division (ABP) supports the Air Traffic NextGen and Planning Organization and is a permanent member of the RST. ABP responsibilities include supporting the budget formulation process by providing funding data, such as target funding allocations, to the PPTs for developing their annual R,E&D budget portfolio.

Each January, the OMB produces a report titled Total for Balance Available Limitations and Outlays Policy using the OMB's MAX database. This report is used to generate the initial and final total target allocations for the R,E&D budget portfolio.

Each fiscal year's report provides the final target allocation for 2 years out and the initial target allocation for 3 years out. For example, the FY 2012 report provided the final allocation for FY 2014 and the initial allocation for FY 2015; and the FY 2013 report will provide the final allocation for FY 2015 and the initial allocation for FY 2016.

The R,E&D budget portfolio is reviewed and discussed at the REB Lessons Learned meeting. In this meeting, REB members, PPTs, and the R,E&D Financial Manager review R,E&D budget strategies.

During the meeting, participants offer feedback, flag issues, and make suggestions to enhance and improve the process. The approved recommendations are incorporated in the upcoming budget portfolio build. Changes to the process are incorporated in the formal procedures of the R&D Portfolio Development Guidance Reference Document published in November each year.

D.1 Initial Total Target Allocations

Using its MAX database, OMB produces reports each January with numbers for the initial total target allocations. The FY 2012 OMB MAX Report provides the initial target allocations for FY 2015. The initial targets are coordinated with the Executive Director of William J. Hughes Technical Center (ANG) prior to dissemination.

D.2 Final Target Allocations

The OMB MAX Report also generates the final target. The FY 2013 OMB MAX Report provides the final target allocations for FY 2015.

NOTE: The initial and final target allocations will vary for any given fiscal year. Also, as OMB updates their assumptions policy guidance, out-year targets may change.

D.3 Funding priorities

Direct in-house costs will be funded first and indirect costs second. The remaining funds are available to fund grants, contracts, and other funding vehicles. The grants and contracts amount for the applicable BLIs is provided to the PPTs, each of which reviews its respective programs and allocates the funds to specific budget line items

D.4 In-House Estimates

To develop in-house estimates, ABP uses a formula that accounts for expected pay increases (including within-grade salary increases), anticipated additional positions, and inflation. These increases are added to the in-house amounts in the President's request using the OMB

estimate for inflation. Expectations on the amount Congress may approve are not used to determine inflation.

When the official in-house budget is built and the actual approved pay raise and current inflation factors are included, the resulting figures may change and could exceed the in-house target. If this is the case, funding must come from the grants and contracts allocation—a zero-sum process.

D.5 Indirect Estimates

In May of 2000 the REB made a decision to split the R,E&D funding into two components, 1) direct funding and 2) indirect funding. Direct funding is funding that directly supports a specific budget line item (BLI). Indirect funding is funding that supports the overall R,E&D appropriation and crosses lines of business.

Direct funding finances tasks and personnel that can be tracked to specific activities and goals that are presented in a specific budget narrative. The indirect component was created so that, when preparing budget narratives, the people planning the expenditures would know that they could plan for the entire amount of the contract dollars that was allocated to the specific BLI and not have to anticipate an unknown “tax” to be determined later. This would also support more accurate planning. Since FY 2000 indirect funding has averaged 3.49% of the total R,E&D appropriation.

Indirect funding is mainly used to fund the Personnel Compensation and Benefits (PC&B) for personnel that provide overall support for the R,E&D appropriation and processes. This includes the Director and front office staff that are not supporting a specific BLI but are conducting activities that support all BLIs. Currently there are 18 indirect positions, which is a reduction from a high of 31 indirect positions. In the past, indirect funding has supported the personnel at the two NASA Field Offices at the NASA Langley Research Center in Virginia and at the NASA Ames Research Center in California. While indirect funding is mainly used to fund positions, it also funds pop-up activities, unfunded congressional earmarks, tools for the front office such as the performance tracking database, the newsletter, and various reports. Indirect funds also pay for contractor support for the R,E&D Executive Board, the R,E&D Advisory Committee, the NARP activities. While these activities are funded by the System Planning and Resource Management BLI, additional funds are needed.

The amount of the indirect funds from each budget line item is determined by calculating what percentage each budget line item is of total of all R,E&D direct funding. (The direct R,E&D funding is the total R,E&D contract dollars minus the amount of indirect funding needed.) For example if the Fire budget line item is 5% of the total R,E&D direct budget then 5% of the indirect expenses are allocated to the Fire BLI. Obligations of indirect funds are allocated based on the same percentage.

D.6 Grants/Contracts Estimates

The funding for grants and contracts is calculated by subtracting the estimated in-house total and the estimated indirect total from the appropriation total which is based on OMB MAX reports (see D.3 Funding Priorities).

D.7 Target Dissemination

Initial targets for the FY 2015 Portfolio Development Process will be developed in the fall of 2012 using the January 2012 MAX Report. The final targets will be disseminated when the OMB MAX system closes for the year in late January 2013. The final targets will be coordinated with the Director of ANG-E prior to dissemination.

The FY 2015 target allocations for the PPTs are provided in Table D-1. These target allocations are to be used by the PPTs to create their R&D budget portfolios and are for planning purposes only. They are subject to change based on direction from OMB. For questions contact Mike Gallivan at mike.gallivan@faa.gov.

Table D-1: FY 2015 Initial Target Allocations for Budget Formulation

R,E&D Core and Other R&D	FY 2015			FY 2016	FY 2017	FY 2018	FY 2019
R,E&D Core	In-House	Contracts	Total	Total	Total	Total	Total
Aircraft Safety	$23,130,580	$43,873,094	$67,003,673	$44,843,207	$46,163,816	$47,834,919	$49,154,900
NAS Operations (NAS Ops)	$5,821,050	$4,219,961	$10,041,011	$4,313,272	$4,440,295	$4,601,031	$4,727,995
Environment & Energy (E&E)	$2,067,259	$12,715,657	$14,782,916	$12,996,823	$13,379,572	$13,863,905	$14,246,473
Weather	$664,087	$15,115,505	$15,779,592	$15,449,736	$15,904,723	$16,480,464	$16,935,235
Mission Support	$3,310,259	$3,119,480	$6,429,738	$3,188,455	$3,282,352	$3,401,172	$3,495,023
Direct Travel	$1,677,235		$1,677,235				
R,E&D In-House (FY 16-19)				$36,779,552,	$36,888,508	$36,997,329	$37,106,008
Subtotal R,E&D	$36,670,470	$79,043,695	$115,714,165	$117,571,044	$120,059,266	$123,178,820	$125,665,633
Subtotal R,E&D Indirect PC&B	$355746	$2,089,054	$2,444,800	$2,514,546	$2,554,441	$2,595,034	$2,636,338
Subtotal R,E&D Indirect Travel	$30,536		$30,536				
Subtotal R,E&D Core	$37,056,752	$81,132,750	$118,189,501	$120,085,590	$122,613,707	$125,773,854	$128,301,971

BLI #	R,E&D NextGen Programs							
A11.m	NextGen - Alternative Fuels for General Aviation	$295,034	$5,262,493	$5,557,527	$5,352,224	$5,474,167	$5,627,089	$5,749,016
A12.b	NextGen - Wake Turbulence	$361,050	$8,965,870	$9,326,920	$9,118,741	$9,326,492	$9,587,021	$9,794,742
A12.c	NextGen - Air Ground Integration Human Factors	$351,900	$14,933,639	$15,285,539	$15,188,274	$15,534,316	$15,968,271	$16,314,270
A11.n	NextGen - Advanced System and Software Validation	$-	$1,021,145	$1,021,145	$1,038,556	$1,062,218	$1,091,891	$1,115,551
A12.d	NextGen - Weather Technology In The Cockpit	$644,927	$3,630,664	$4,275,591	$3,692,571	$3,776,701	$3,882,204	$3,966,323
A13.b	NextGen - Environment and Energy - Aircraft Technologies, Fuels and Metrics	$479,426	$19,023,218	$19,502,644	$19,347,584	$19,788,390	$20,341,184	$20,781,935
A12.a	Joint Planning and Development Office	$2,251,961	$9,654,018	$11,905,980	$9,818,632	$10,042,339	$10,322,879	$10,546,558
NextGen Direct Travel		$493,687		$493,687				
R,E&D In-House (FY 16-19)					$4,908,879	$4,925,801	$4,942,781	$4,959,820
NextGen Indirect PC&B		$207,145	$1,216,542	$1,423,68	$1,448,949	$1,455,870	$1,462,825	$1,469,813
NextGen Indirect Travel		$17,778		$17,778				
Subtotal: R,E&D NextGen		$5,102,909	$63,707,590	$68,810,499	$69,914,410	$71,386,293	$73,226,146	$74,698,029

Table D-1: FY 2015 Initial Target Allocations for Budget Formulation (continued)

BLI #	F&E NextGen	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019
1A08A	NextGen- ATC/TechOps Human Factors - Controller Efficiency/Air Ground Integration	$5,369,000	$5,919,900	$6,000,000	$6,536,000	TBD
1A08D	NextGen - Environment & Energy Noise/Emission Reduction & Validation Modeling	$8,947,000	$9,866,400	$10,000,000	$10,894,000	TBD
1A08B	NextGen - New Air Traffic Management Requirements	$19,684,000	$21,706,100	$29,000,000	$33,287,000	TBD
1A08C	NextGen - Operations Concept - Validation Modeling	$4,474,000	$4,933,200	$5,000,000	$5,967,000	TBD
1A08F	NextGen - System Safety Management Transformation	$7,158,000	$7,893,100	$8,000,000	$9,653,000	TBD
1A08G	NextGen - Wake Turbulence Re-Categorization	$1,342,000	$1,480,000	$3,000,000	$3,425,000	TBD
1A08H	NextGen - Staffed NextGen Towers	$5,368,000	$5,919,800	$6,000,000	$6,851,000	TBD
1A08E	NextGen - Operational Assessments	$7,158,000	$7,893,100	$8,000,000	$8,715,000	TBD
NextGen F&E (R&D) Total		$59,500,000	$65,611,600	$75,000,000	$85,328,000	TBD

	FY 2015	FY 2016	FY2017	FY 2018	FY 2019
F&E – Advanced Technology Development and Prototyping (ATD&P)	$25,800,000	$25,900,000	$25,900,000	$26,000,000	$26,000,000
F&E – Center for Advanced Aviation System Development (CAASD)	$19,275,000	$19,275,000	$19,275,000	$19,275,000	$19,275,000

Airports	$44,300,000	$44,300,000	$44,300,000	$44,300,000	$44,300,000
Commercial Space	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000

R,E&D Core and NextGen	$87,000,000	$190,000,000	$194,000,000	$199,000,000	$203,000,000
Other R&D	$45,300,000	$45,300,000	$45,300,000	$45,300,000	$45,300,000
F&E NextGen	$59,500,000	$65,611,600	$75,000,000	$85,328,000	TBD
F&E Other	$45,075,000	$45,175,000	$45,175,000	$45,275,000	$45,275,000
Total R&D Portfolio	$336,875,000	$346,086,600	$359,475,000	$374,903,000	TBD

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Appendix E

Reference Information

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E. Reference Information

E.1 Points of Contact

The current contact information provided in this section is available at the REB KSN site: https://ksn2.faa.gov/narp/Home/REB/default.aspx

Table E-1: R&D Portfolio Development Process Contacts

Name	Position	Org.	Phone No.	Email
R&D Executive Board (REB) Members				
Wilson Felder	ANG, Chair	ANG-E	202-267-3468	wilson.felder@faa.gov
Rob Pappas	Rep., Aviation Safety	AVP-300	202-267-7095	rob.pappas@faa.gov
James White	Rep., Airports	AAS-2	202-267-7605	james.white@faa.gov
Ken Davidian	Rep., Commercial Space Transportation	AST-4	202-267-7214	ken davidian@faa.gov
James Hileman	Rep., Environment & Energy	AEE-1	202-493-4293	james.hileman@faa.gov
Cathy March	Rep., Financial Services (non-voting)	ABA-300	202-267-3790	cathy.march@faa.gov
Trung Nguyen	Rep., Information Technology (non-voting)	ARD-200	202 385-8398	trung.n.nguyen@faa.gov
Program Planning Team (PPT) Leads				
James White	Lead, Airports	AAS-2	202-267-7605	james.white@faa.gov
Rob Pappas	Lead, Aircraft Safety	AVP-300	202-267-7095	rob.pappas@faa.gov
Ken Davidian	Lead, Commercial Space Transportation	AST-4	202-267-7214	ken.davidian@faa.gov
Jim Hileman	Lead, Environment & Energy	AEE-3	202-493-4293	james.hileman@faa.gov
Cathy Bigelow	Lead, Mission Support	ANG-E4	202-267-9076	cathy.bigelow@faa.gov
John Marksteiner	Lead, National Airspace System Operations	ANG-C5	202-267-9086	john.marksteiner@faa.gov
Steve Abelman	Lead, Weather	ANG-C61	202-385-7234	steve.abelman@faa.gov
R,E&D Advisory Committee (REDAC) Points of Contact (POCs)				
Gloria Dunderman	Lead, REDAC Meeting Coordinator	ANG-E4	202-267-8937	gloria.dunderman@faa.gov
Denise Davis	REDAC Support Team	ANG-E4	202-267-9426	denise.davis@faa.gov
Wilson Felder	DFO, REDAC	ANG-E	202-267-9250	wilson.felder@faa.gov
John Wiley	DFO, Aircraft Safety	ANG-E2	609-485-6011	john.wiley@faa.gov
James White	DFO, Airports	AAS-2	202-267-7605	james.white@faa.gov
Jim Hileman	DFO, Environment and Energy	AEE-3	202-493-4293	james.hileman@faa.gov
Michelle Yeh	DFO, Human Factors	ANG-C1	202-493-7167	michelle.yeh@faa.gov
Eric Neiderman	DFO, NAS Operations	ANG-E25	609-485-6389	eric.neiderman@faa.gov
R&D Executive Board Support Team (RST)				
Pam Crenshaw	Lead, REB Support Team	ANG-E4	202-267-8144	pam.crenshaw@faa.gov
Mike Gallivan	Lead, Finance	ABP-330	202-493-5598	mike.gallivan@faa.gov
Aisha Staples	Member, REB Support Team	JMA/ANG -E4	202-267-3373	aisha.ctr.staples@faa.gov

Name	Position	Org.	Phone No.	Email
Other Important Contacts				
Brandy Ingargiola	Joint Resource Council, Meeting Coordinator	AAP-200	202-385-8188	brandy.ingargiola@faa.gov
Brandy Ingargiola	ATO Executive Council Meeting Coordinator	AAP-200	202-385-8188	brandy.ingargiola@faa.gov
John Hensyl	Cooperative Research and Development Agreements	ANG-E73	609-485-7140	john.hensyl@faa.gov
Lisa Ferrante	Grants – Manager, Acquisitions and Grants	AAQ-600	609-485-5837	lisa.ferrante@faa.gov
Susan Lender	Commercial Space Transportation Advisory Committee	AST-005	202-267-8029	susan.lender@faa.gov
Chris Witt	Air Traffic Organization, Capital Planning Process	ABP-320	202-267-7646	chris.witt@faa.gov

The points of contact for each budget line item are provided in Table E-2. This information is listed as a reference for questions concerning the BLI or the R&D process.

Table E-2: Program Contact List by Appropriation and Budget Line Item

Appro-priation	BLI #	Program	POC Name	POC Phone	POC E-mail
R,E&D	A11.a	Fire Research and Safety	Gus Sarkos	609-485-5620	constantine.sarkos@faa.gov
R,E&D	A11.b	Propulsion and Fuel Systems	Joe Wilson	609-485-5579	joseph.wilson@faa.gov
R,E&D	A11.c	Advanced Materials/Structural Safety	Curt Davies	609-485-8758	curtis.davies@faa.gov
R,E&D	A11.d	Aircraft Icing/Digital System Safety	Jim Riley Chuck Kilgore	609-485-4144, 609-485-6235	james.t.riley@faa.gov charles.kilgore@faa.gov
R,E&D	A11.e	Continued Airworthiness	Xiaogong Lee	609-485-6967	xiaogong.lee@faa.gov
R,E&D	A11.f	Aircraft Catastrophic Failure Prevention Research	Bill Emmerling	609-485-4009	william.emmerling@faa.gov
R,E&D	A11.g	Flightdeck/Maintenance /System Integration Human Factors	Tom McCloy	202-267-7167	tom.mccloy@faa.gov
R,E&D	A11.h	System Safety Management	Hossein Eghbali	609-485-5982	hossein.eghbali@faa.gov
R,E&D	A11.i	Air Traffic Control/Technical Operations Human Factors	Dino Piccione	202-493-5305	dino.piccione@faa.gov
R,E&D	A11.j	Aeromedical Research	Estrella Forster, PhD	405-954-6131	estrella.forster@faa.gov
R,E&D	A11.k	Weather Program	Warren Fellner	202-385-7253	warren.fellner@faa.gov
R,E&D	A11.l	Unmanned Aircraft Systems Research	Sabrina Saunders-Hodge	202-267-9993	sabrina.saunders-hodge@faa.gov
R,E&D	A11.m	NextGen – Alternative Fuels for General Aviation	Dave Atwood	609-485-4986	dave.atwood@faa.gov
R,E&D	A11.n	NextGen – Advanced Systems and Software Validation	TBD	TBD	TBD
R,E&D	A12.a	Joint Planning and Development Office (JPDO)	Dawn Zimmer Victoria Frazier	202-624-3243 202-220-3303	dawn.zimmerman@faa.gov victoria.frazier@faa.gov
R,E&D	A12.b	NextGen - Wake Turbulence	Tom Proeschel Jeff Tittsworth Paul Strande	757-864-5242 202-493-5601 202-267-5687	thomas.ctr.proeschel@faa.gov jeffrey.tittsworth@faa.gov paul.strande@faa.gov

Appro-priation	BLI #	Program	POC Name	POC Phone	POC E-mail
R,E&D	A12.c	NextGen - Air Ground Integration Human Factors	Tom McCloy	202-267-7167	tom.mccloy@faa.gov
R,E&D	A12.e	NextGen - Weather Technology in the Cockpit	Gary Pokodner	202-385-7236	gary.pokodner@faa.gov
R,E&D	A13.a	Environment and Energy	James Hileman Mohan L. Gupta	202-493-4293; 202-267-3496	james.hileman@faa.gov mohan.l.gupta@faa.gov
R,E&D	A13.b	NextGen Environmental Research – Aircraft Technologies, Fuels, and Metrics	James Hileman Mohan L. Gupta	202-493-4293; 202-267-3496	james.hileman@faa.gov mohan.l.gupta@faa.gov
R,E&D	A14.a	System Planning and Resource Management	Cathy Bigelow	202-267-9076	cathy.bigelow@faa.gov
R,E&D	A14.b	William J. Hughes Technical Center Laboratory Facility	Deborah DiStefano	609-485-4546	deborah.distefano@faa.gov
F&E	1A01 A	Advanced Technology Development & Prototyping (ATDP) – Runway Incursion Reduction	John Maffei	202-493-4649	john.maffei@faa.gov
F&E	1A01 B	ATDP – System Capacity, Planning and Improvement	David Chin	202-385-7295	david.chin@faa.gov
F&E	1A01 C	ATDP – Operations Concept Validation	John Marksteiner Cynthia Morris	202-267-9086 202-493-5994	john.marksteiner@faa.gov cynthia.morris@faa.gov
F&E	1A01 D	ATDP – NAS Weather Requirements	Steve Abelman	202-385-7234	steve.abelman@faa.gov
F&E	1A01 E	Airspace Management Program	Rodger Dean	202-267-9275	rodger.a.dean@faa.gov
F&E	1A08 A	NextGen – ATC/Technical Operations Human Factors (Controller Efficiency/ Air-Ground Integration)	Dino Piccione	202-493-5305	dino.piccione@faa.gov
F&E	1A08 B	NextGen – New Air Traffic Management Requirements	Diana Liang	202-385-6725	diana.liang@faa.gov
F&E	1A08 C	NextGen – Operations Concept Validation – Validation Modeling	John Marksteiner Cynthia Morris	202-267-9086 202-493-5994	john.marksteiner@faa.gov cynthia.morris@faa.gov

Appro-priation	BLI #	Program	POC Name	POC Phone	POC E-mail
F&E	1A08 D	NextGen – Environment & Energy – Environmental Management Systems and Noise and Emissions Reduction	James Hileman Mohan L. Gupta	202-493-4293 202-267-3496	james.hileman@faa.gov mohan.l.gupta@faa.gov
F&E	1A08 E	NextGen – Wake Turbulence – Re-categorization	Tom Proeschel Jeff Tittsworth Paul Strande	757-864-5242 202-493-5601 202-267-5687	thomas.ctr.proeschel@faa.gov jeffrey.tittsworth@faa.gov paul.strande@faa.gov
F&E	1A08F	NextGen – Operational Assessments	James Hileman Mohan L. Gupta	202-493-4293 202-267-3496	james.hileman@faa.gov mohan.l.gupta@faa.gov
F&E	1A08 G	NextGen – System Safety Management Transformation	Sherry Borener	202-493-5630	sherry.borener@faa.gov
F&E	1A08 H	NextGen – Staffed NextGen Towers (SNT)	John Marksteiner Cynthia Morris	202-267-9086 202-493-5994	john.marksteiner@faa.gov cynthia.morris@faa.gov
F&E	4A09	Center for Advanced Aviation System Development (CAASD)	June Green, Linda Szyhowski	202-385-6488 202-385-7124	june.green@faa.gov linda.m.szyhowski@faa.gov
AIP	ARP	Airports Technology Research - Capacity	Satish Agrawal	609-485-6686	satish.agrawal@faa.gov
AIP	ARP	Airports Technology Research - Environment	Satish Agrawal	609-485-6686	satish.agrawal@faa.gov
AIP	ARP	Airports Technology Research - Safety	Satish Agrawal	609-485-6686	satish.agrawal@faa.gov
AIP	ARP	Airport Cooperative Research Program - Capacity	James (Jim) White Paul Friedman	202-267-7605 202-267-3367	james.white@faa.gov paul.friedman@faa.gov
AIP	ARP	Airport Cooperative Research Program - Environment	James (Jim) White Paul Friedman	202-267-7605 202-267-3367	james.white@faa.gov paul.friedman@faa.gov
AIP	ARP	Airport Cooperative Research Program - Safety	James (Jim) White Paul Friedman	202-267-7605 202-267-3367	james.white@faa.gov paul.friedman@faa.gov
OPS	AST	Commercial Space Transportation Safety	Ken Davidian Glenn Rizner	202-267-7214 202-267-3194	ken.davidian@faa.gov glenn.h.rizner@faa.gov

E.2 Website and Resource References

Table E-3: Website and Resource References

General Topic and Website	Page No. in Guidance Document
FY 2015 Portfolio Development Process Guidance Document • https://ksn2.faa.gov/narp/Home/REB/Shared%20Documents/Forms/AllItems.aspx?RootFolder=%2fnarp%2fHome%2fREB%2fShared%20Documents%2fGuidance%20Document%2fFY%202015&FolderCTID=&View=%7b2BE91E1E%2d1C81%2d4CFA%2d8ECF%2d58E6148A3FA4%7d	**1**
Budget, Accounting, and Finance • https://employees.faa.gov/tools_resources/budget_finance/	**29**
Commercial Space Transportation Advisory Committee • http://www.faa.gov/about/office_org/headquarters_offices/ast/industry/advisory_committee/	**31**
Contracts – Acquisition and Contracting • https://employees.faa.gov/org/linebusiness/ato/acquisition_business/apc/	**29**
Cooperative Research and Development Agreement • http://faa.gov/go/techtran	**29**
Federal Aviation Administration Destination 2025 • http://www.faa.gov/about/plans_reports/	**10**
Federal Aviation Administration NextGen Implementation Plan • http://www.faa.gov/nextgen/implementation/plan	**10, 24**
Grants • https://employees.faa.gov/org/linebusiness/ato/acquisition_business/apc/	**29**
House Subcommittees • http://appropriations.house.gov/Subcommittees/Subcommittee/?IssueID=34798	**26**
Joint Planning and Development Office Plans • www.jpdo.gov	**11**
Joint Resources Council Guidance • https://employees.faa.gov/org/staffoffices/afn/acq_business/investment_process/jrc_es/	**22**
NAS Architecture • https://nasea.faa.gov/	**10**
National Aviation Research Plan • www.faa.gov/go/narp	**10**
National Plan for Aeronautics Research and Development and Related Infrastructure – December 21, 2007 • http://www.whitehouse.gov/administration/eop/ostp/nstc/aero	**11**
NextGen Concept of Operations • www.jpdo.gov	**12**
NextGen Enterprise Architecture • http://www.jpdo.gov/knowledge_center.asp	**10**
NextGen Integrated Plan • www.jpdo.gov	**12**

General Topic and Website	Page No. in Guidance Document
Office of Management and Budget – Circular A-11, Section 10 • http://www.whitehouse.gov/omb/circulars/a11/current_year/a11_toc.html	**26, 27**
Office of Management and Budget – Circular A-11, Section 15 • http://www.whitehouse.gov/omb/circulars/a11/current_year/a11_toc.html	**22**
Office of Management and Budget – Program Assessment Rating Tool Guidance No. 2007-02, January 29, 2007 • http://www.whitehouse.gov/omb/part/fy2007/2007_guidance_final.pdf	**32**
Project Management Institute – Project Management Professional Credential Handbook • www.pmi.org	**27**
R,E&D Advisory Committee (REDAC) • www.faa.gov/go/redac	**31**
REB KSN Site • https://ksn2.faa.gov/narp/Home/REB/default.aspx	**55**
FY 2013 President's Budget Submission • http://www.faa.gov/about/office_org/headquarters_offices/aba/budgets_brief/media/FY%202013%20President's%20Budget%20Submission.pdf.	**9, 24**

E.3 Acronyms

Table E-4: Acronyms

Acronym	Definition
AAD	Region and Center Operations
AAR-200	Aviation Research Office (currently known as ANG-E4)
AAS-2	Deputy Director, Airport Safety and Standards [ARP]
ABA	Office of Financial Services
ABU	Office of Budget [ABA]
ABU-300	Capital Budget Division [ABA]
ACRP	Airport Cooperative Research Program
ACS	Civil Aviation Security
AEE-3	Scientific and Technical Advisor, Chief Scientist [APL]
AFN	Office of Finance and Management [Assistant Administrator]
APL	Policy, International Affairs, and Environment [Assistant Administrator]
AIO	Information Services [Assistant Administrator]
AIP	Airport Improvement Program [Appropriation] (currently known as GIAA)
ANG	NextGen Office [Assistant Administrator]
API	Policy, Planning, and International Aviation (now known as APL)
APM-300	Currently known as ABP-300
ARA	Research and Acquisitions Office
ARD-200	Office of IT Enterprise Research & Development [AIO]
ARP	Airports [Line of Business]
ASDE-X	Airport Surface Detection Equipment – Model X
ASIAS	Aviation Safety Information Analysis and Sharing
AST	Commercial Space Transportation [Line of Business]
AST-4	Office of the AST Chief Engineering
ATC	Air Traffic Control
ATDP	Advanced Technology Development and Prototyping
ATM	Air Traffic Management
ATS	Air Traffic Services
AVR	Regulation and Certification (now known as AVS)
AVS	Aviation Safety [Line of Business]
AVP	Office of Accident Investigation and Prevention
AVP-300	Safety Management and Research Planning Division
BLI	Budget Line Item
CAASD	Center for Advanced Aviation System Development (MITRE)
CIT	Capital Investment Team
CNS	Communication, Navigation, and Surveillance
COMSTAC	Commercial Space Transportation Advisory Committee
ConOps	Concept of Operations
CRDA	Cooperative Research and Development Agreement
DFO	Designated Federal Official
DOT	Department of Transportation
F&E	Facilities and Equipment [Appropriation]
FAA	Federal Aviation Administration
FY	Fiscal Year
G7	Group of Seven (became the REB in 1998)

Acronym	Definition
GIAA	Grants-In-Aid for Airports (Formerly known as: AIP)
HUMS	Health and Usage Monitoring Systems
JPDO	Joint Planning and Development Office
JRC	Joint Resources Council
KSN	Knowledge Services Network
LOB	Line of Business
NARP	National Aviation Research Plan
NAS	National Airspace System
NAS Ops	National Airspace System Operations
NASEA	National Airspace System Enterprise Architecture
NASA	National Aeronautics and Space Administration
NextGen	Next Generation Air Transportation System
OI	Operational Improvement
OMB	Office of Management and Budget
Ops	Operations [Appropriation]
OST	Office of the Secretary of Transportation
PMI	Project Management Institute
PPT	Program Planning Team
PR	Procurement Request
PRISM	An FAA accounting system
R&D	Research and Development
REB	Research and Development Executive Board
REDAC	Research, Engineering, & Development Advisory Committee
RPD	Research Project Description (no longer used in RE&D)
RPD	Resource Planning Document (used in F&E)
RST	REB Support Team

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Federal Aviation Administration

FY 2015 R,E&D Budget Narrative Development Process Guidance

A How-To Guide for Developing and Approving FY 2015 R,E&D Budget Narratives

February 2013

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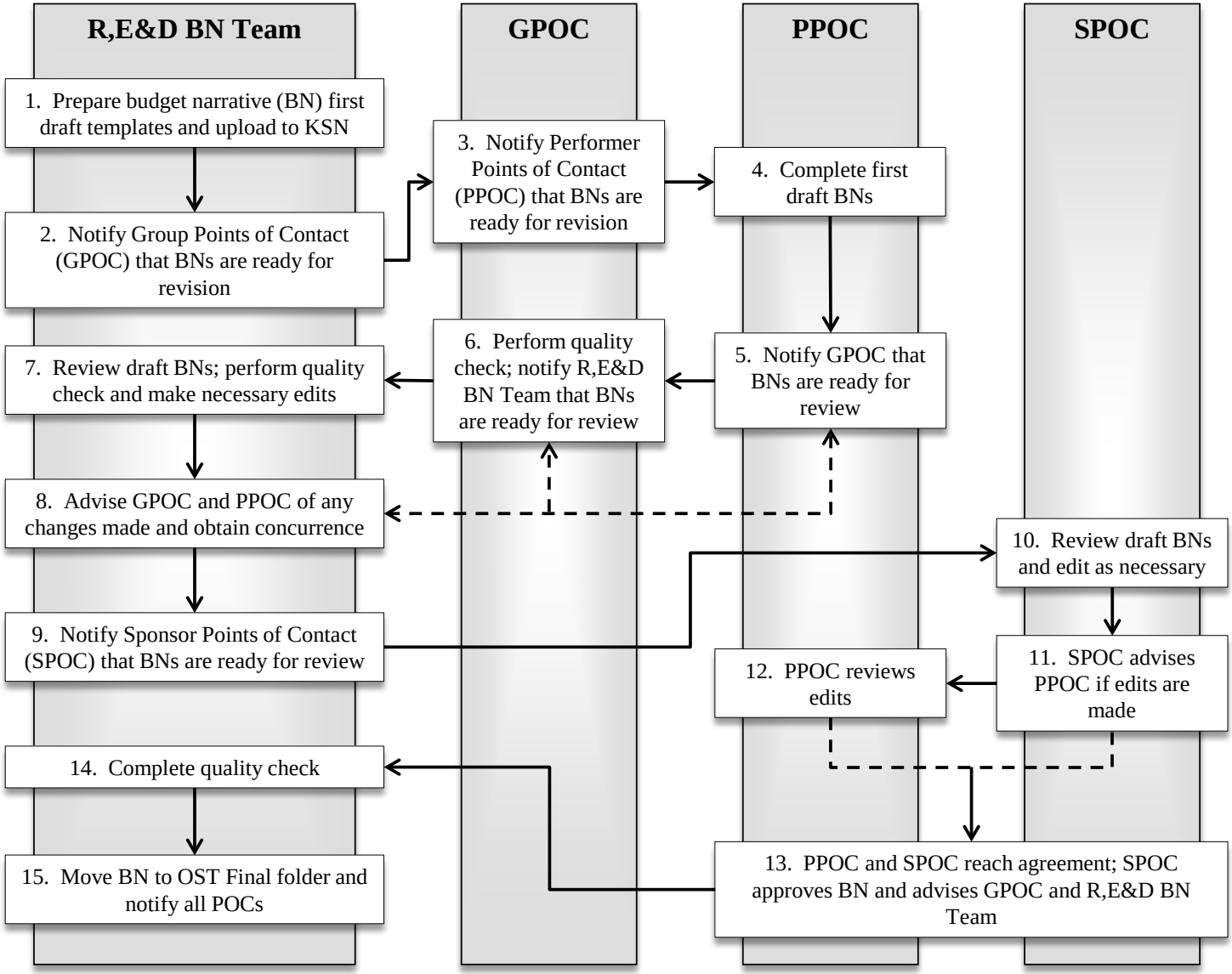
Strategic Goals from the *U.S. DOT Strategic Plan FY 2012 – FY 2016*....14

FY 2015 Budget Narrative Development Flowchart



FY 2015 Budget Narrative Development Schedule

Event	Start Date	End Date	# Weeks
ANG-E4 conducts training at WJHTC and HQ for PPOCs and GPOCs on completion of the Budget Narratives (BN)	02/18/2013	02/22/2013	1
R,E&D BN Team notifies GPOC that first draft BNs are available on KSN (Step 2)	02/22/2013		-
Performers prepare first draft BNs and GPOC performs quality check (Steps 3-6)	02/25/2013	03/15/2013	3
R,E&D BN Team performs quality check (Steps 7-8)	03/18/2013	03/22/2013	1
R,E&D BN Team notifies SPOC that first draft BNs are available for review (Step 9)	03/22/2013		-
Sponsors review first draft BNs (Step 10)	03/25/2013	04/12/2013	3
SPOC advises GPOC and PPOC of required edits; GPOC and PPOC reviews edits (Steps 11-12)	04/15/2013	04/26/2013	2
PPOC and SPOC reach agreement; SPOC approves first draft BNs and advises GPOC and R,E&D BN Team (Step 13)	04/26/2013		-
R,E&D BN Team performs final quality check and finalizes first draft BNs (Steps 14-15)	04/29/2013	05/10/2013	2
R,E&D BN Team delivers BNs to the FAA Office of Budget – Capital Budgets Division (ABU-300)	05/10/2013		-
ABU-300 reviews BNs	05/13/2013	05/24/2013	2
OST reviews and provides comments on BNs	05/27/2013	07/26/2013	TBD
PPOC reviews and addresses OST comments on BNs	07/29/2013	08/09/2013	TBD
SPOC reviews and coordinates with PPOC on updated BNs	08/12/2013	08/30/2013	TBD
ABU-300 reviews updated BNs	09/02/2013	09/13/2013	TBD
OMB reviews BNs	09/16/2013	11/22/2013	TBD
OMB Passback (estimated)	11/25/2013	11/29/2013	TBD
OMB comments addressed by PPOC, R,E&D BN Team, and SPOC, as needed.	12/2/2013	01/10/2014	TBD
Delivery of FY 2015 R,E&D Budget Narratives to Congress	02/03/2014	02/07/2014	TBD

FY 2015 Budget Narrative Development Process

This document provides guidance in developing the fiscal year (FY) 2015 R,E&D budget narratives using the R,E&D Budget Narrative Collaboration site on the Knowledge Services Network (KSN). This chapter provides an overview of the development process, as outlined in the sections below:

First Draft (Template)
Performer Draft
Sponsor Review
Final OST Draft

First Draft (Template)

Step 1 - The R,E&D Budget Narrative Management Team (R,E&D BN Team), comprised of the Office of Budget and Programs – R,E&D Program Management Branch (ABP-330) and the Research and Development Management Division (ANG-E4), uses the FY 2014 R,E&D budget narratives to develop templates (first drafts) of the FY 2015 budget narratives. The R,E&D BN Team uploads first draft narratives to the Performer Working Files folder on the R,E&D Budget Narrative Collaboration KSN site.

Step 2 - The R,E&D BN Team notifies the Group Point of Contact (GPOC) via email that the first drafts are ready for review. The GPOC is the single point of contact for your organization for interacting with the R,E&D BN Team in developing the budget narratives. If your organization does not have a GPOC, those functions can be done by the Performer Point of Contact (PPOC) for each budget narrative.

Performer Draft

Step 3 -The GPOC reviews the first draft narrative and notifies the PPOC, via email, that the narrative is available for revision. At this point, the first draft becomes the performer draft. The performer draft narrative is located in the appropriate subfolder of the Performer Working Files folder in KSN (e.g., the *A11.a Fire Research and Safety* subfolder is located in the *Aircraft Safety* folder), which is available in the *FY 2015 R,E&D Budget Narratives* Document Library.

Step 4 - The PPOC reviews, edits, and completes the performer draft narrative. Please see "FY 2015 R,E&D Budget Narrative Instructions" on page 6 for specific, line-by-line guidance on how to complete the budget narrative. During review, ensure that the "Track Changes" function in MS Word is turned on. Also, please ensure that your name and initials are reflected in your tracked changes. The process to do this varies depending on your version of Microsoft Word. Using "Track Changes" in MS Word is vital to the Budget Narrative Collaboration Process, as it provides complete transparency throughout each phase of the narrative development process. If a change to the narrative is not tracked during the review process, it will not be accepted as part of the final version.

The Sponsor organization will be approving each budget narrative. The Sponsor POC (SPOC), the individual representing the sponsoring organization for its research needs, will need to

approve all narratives. To expedite the sponsor's approval, the PPOCs should collaborate with their sponsor technical points of contact to identify and define the planned FY 2015 accomplishments in the budget narrative (and review the FY 2014 accomplishments). It would also be a good idea for the sponsor technical points of contact to coordinate with the SPOC before the sponsor review. To aid in the sponsor's review, approved sponsor requirements will be pre-loaded as major headings into the templates (first drafts) of each budget narrative.

Step 5 - The PPOC saves the revised narrative in the Performer Working Files folder on KSN and notifies the GPOC via email that the document is ready for review.

Step 6 - The GPOC checks the performer draft narrative to ensure compliance with the instructions set forth in "FY 2015 R,E&D Budget Narrative Instructions" and works with the PPOC to make edits as necessary. This may require several iterations with the PPOCs. The GPOC approves the most current version of the performer draft narrative, ensures it is in the Performer Working Files folder, and notifies the R,E&D BN Team via email when the performer draft narrative is ready for review.

Steps 7-9 – R,E&D BN Team performs a quality check on the performer draft narrative and notifies the GPOC and PPOC if any changes were made as a result of the check. This may require several iterations with the GPOCs and PPOCs. After addressing all issues, the R,E&D BN Team will get concurrence on any edits via email. The R,E&D BN Team uploads the performer draft narrative to the Sponsor Review Files folder in KSN and notifies the SPOC via email. At this point, the performer draft narrative goes into Sponsor Review.

Sponsor Review

Step 10 - With track changes on, the SPOC reviews the budget narrative and edits as necessary. Sponsor edits should be focused on requirements (i.e., what is to be done), and not how the tasks will be completed. The Performers are responsible for how the tasks will be completed. Sponsors should not make extensive word-smithing edits, although they may suggest changes to the PPOC to clarify and correct any errors or typographical mistakes.

Steps 11-13 - The SPOC advises the PPOC if any edits are made and the PPOC reviews to address the SPOC changes and/or comments. The SPOC and the PPOC reach agreement on how to address all updates. This may require several iterations with the PPOCs. If necessary, the R,E&D BN Team will adjudicate any issues that are not resolved. The SPOC approves the budget narrative and notifies the GPOC and the R,E&D BN Team via email that the updated and approved narrative is in the Sponsor Review Files folder.

Final OST Draft

Step 14 – The R,E&D BN Team performs a quality control check on the sponsor-approved draft narrative and creates a new version without comments or changes tracked. If any changes are made during this step, the R,E&D BN Team will inform the SPOC, GPOC, and PPOC of what changes were required.

Step 15 – The R,E&D BN Team will move the sponsor-approved and R,E&D BN Team-reviewed budget narrative to the OST Final folder on KSN. The R,E&D BN Team will notify all POCs via email.

The R,E&D BN Team will review all FY 2015 budget narratives before final delivery to OST, updating the budget data as available. If any changes are made during this review, the R,E&D BN Team will ensure files on the R,E&D Budget Narrative Collaboration KSN site are updated as needed and appropriate POCs are notified.

FY 2015 R,E&D Budget Narrative Instructions

General Guidelines

*****USE TRACK CHANGES AT ALL TIMES WHEN MAKING EDITS. CHANGES NOT TRACKED OR NOT ATTRIBUTABLE TO A SINGLE EDITOR (BY NAME) WILL NOT BE ACCEPTED INTO THE FINAL VERSION OF THE BUDGET NARRATIVE*****

- Use plain language. The narrative should be readily understandable to all audiences. http://www.plainlanguage.gov/
- Use active voice whenever possible
- Use pronouns
- Minimize use of acronyms
- Minimize use of technical language
- Be brief. If you can't articulate your point in a few words, you should rethink your message and how that message actually justifies the request.
- Use Tahoma 9 pt. font; no more than 6 pages of text in length.
- Include references and hyperlinks. When referencing a report, study, externally developed statistic, or other source of information, cite the source and where possible include a hyperlink to that source.

Narrative Template Instructions

What Is The Request And What Will We Get For The Funds

- Funding Table: The template includes a table with data columns for FY 2013 Enacted, FY 2014 Enacted, FY 2015 Request, and Difference from FY 2014 Enacted. Budget numbers will be pre-filled in by the R,E&D BN Team and do not require editing – only review. This data will likely change many times throughout the narrative development process and is the responsibility of the R,E&D BN Team. The FY 2015 Request amount that appears in the first draft template is contract dollars only, as opposed to total budget amounts that are shown for FY 2013 and FY 2014. Until FY 2015 is updated with the total amount requested, the Difference from FY 2014 will remain blank. The FY 2015 contract amount is the amount to which the budget narrative should be written.

- The first sentence after the funding table is template material and non-editable: "For FY 2015, $[FY 2015 Requested Amount] is requested for [Program Name]. Major accomplishments planned include:"

- Under each sponsor requirement major heading, list major accomplishments planned to be completed in FY 2015. Accomplishments are research efforts that show something completed or an output (single instance in time with a definitive end date). An output is defined as: a quantity of deliverables or a measurable level of activity that is consumable by customers or beneficiaries. Each accomplishment bullet should start with a verb, such as Complete or Deliver. Examples of outputs would include: number of procedures

developed, number of safety inspections conducted, number of hardware/software systems developed, tested, fielded, commissioned, number of aircraft operations performed, etc. No continuing work should be listed. These major accomplishments will appear in the Business Plan.

- Following the bulleted list of major planned accomplishments, provide a brief description (two to three paragraphs; do not use a bulleted list) to expound on the planned activities and accomplishments for FY 2015. This paragraph should be at more of a global level than the list of accomplishments in the previous section, with a summary of the outcomes expected from use of the planned funds.

What Is This Program

Describe the program in this section. The description should include all of the elements below in the order shown.

- Description of Activity – Provide a one or two paragraph general description of the work performed by the program, not specific to any particular budget year. Include the purpose of the program and who benefits from the results of the research.

- Program Collaboration - The intent of this paragraph is to describe how the partners working with you assist in implementing the research results. Partners are defined as entities that contribute resources to the effort. Contractors and grantees generally are not partners. COEs would be an exception.

- FY 2014 Accomplishments Planned – This paragraph should begin with "In FY 2014, major accomplishments planned include:". This list should be consistent with the list provided in the FY 2014 narrative (accomplishments organized by approved sponsor requirements as the main headings). To ensure this consistency, the R,E&D BN Team has taken all of the planned accomplishments from last year's narrative and placed them under the FY 2014 planned accomplishments section of this year's narrative and made them past tense. In addition, there should be no continuing work listed in this section.

- Description of Program Goals - Strategic goal(s) supported by this program – use goal categories as listed in the *U.S. DOT Strategic Plan FY 2012-2016*, see page 14.

Why Is This Particular Program Necessary

- Explain why this program is important in measurable terms wherever possible. Using the beneficiaries listed in the "Program Collaboration" section, state the benefits to those entities in measurable terms. This may include the key outcomes identified in the "Description of Activity" section, but should be more complete in terms of the number of outcomes presented and the timeframe for completing each outcome.

- Explain the intended measurable benefits to beneficiaries, public, or customers. This should include a discussion of measurable benefits over time and not just in the requested budget year.

How Do You Know The Program Works

- The first paragraph that discusses the REDAC is considered template material. The subcommittee associated with the respective budget narrative has been specifically mentioned in this paragraph. Performers and sponsors should review this paragraph for accuracy.

- For the remainder of this section, you should present specific information that describes the efficiency and effectiveness of the research program. If there are recent accomplishments, include references to in-house and independent studies on the efficiency and effectiveness of the program (not reports on the results). Summarize the conclusions drawn from assessments, evaluations, or other studies, citing the source of those analyses with a hyperlink. To demonstrate effectiveness, you might also cite any recent examples of implementation of research outputs that lead to benefits being realized. If there were any other assessments done by outside groups (such as the Government Accountability Office or the Inspector General) related to the efficiency and effectiveness of the program, include the findings here, with a reference and hyperlink to the report or study, if available.

Why Do We Want/Need To Fund The Program At The Requested Level

- Justify the request level by describing what would happen if the program were funded at different levels or explain why there are no options for changing the funding level. Be specific in describing the impact with the consequences of reduced funding. For example, if reducing the funding to X level delays the completion of a project by six months, what is the consequence to the mission or the negative effect on the benefits due to a six-month delay? Describe any cost decreases or increases and resultant changes in expected outputs and outcomes. Include any negative consequences due to delay in implementation of outputs. Stating that reducing the funding will lead to some delay (even long delays) in the effort without describing a negative consequence is equivalent to stating that there is no impact if your funding is reduced.

FY 2015 R,E&D Budget Narrative First Draft (Template) Example

Below is an example of a completed FY 2015 budget narrative first draft. Keep in mind that the first draft templates for each Budget Line Item's narrative will vary. For each individual narrative, comments will be shown and edits will be tracked to show how the drafts were developed by the R,E&D BN Team.

Detailed Justification for
A11.d Aircraft Icing/Digital System Safety

What Is The Request and What Will We Get For The Funds

FY 2015 – Aircraft Icing/Digital System Safety

Activity/Component	FY 2013 Enacted	FY 2014 Enacted	FY 2015 Request	Difference from FY 2014 Enacted
A11.d Aircraft Icing/Digital System Safety	$5,404,000	$6,644,000	$6,092,000	$

For FY 2015, $ is requested for Aircraft Icing/Digital System Safety. Major accomplishments planned include:

Aircraft Icing

- Research on Ice Crystal and Other Appendix C Exceedance Conditions in Support of Rulemaking
  - Complete second phase of fundamental research work on ice crystal physics studies to determine physical parameters of importance for ice accretion formation mechanisms that will support simulating these conditions inside engine compressors.
  - Complete processing and primary analysis of the ice crystal cloud data from field campaigns and provide ice crystal cloud parameters in a format that will allow for their evaluation as an updated engineering standard for convective weather ice crystal icing conditions.
- Safe Operations and Take-off in Aircraft Ground Icing Conditions
- Simulation Methods Development/Validation to Support Appendix C Icing Certification and Continued Operational Safety
- Rotorcraft Flight in Known Icing Compliance Criteria

The major activity planned for FY 2014 is the HIWC ice crystal field campaign out of Darwin, Australia. The data collected will be used in the development and evaluation of facility and analytical simulation tools and in the assessment and possible improvement of the proposed ice crystal regulatory atmospheric envelopes. The ground icing research results are incorporated into the annual winter notice needed by the airlines. The rotorcraft research is a new initiative which is expected to be completed by FY 2015, resulting in improved guidance to the industry on certification of rotorcraft for icing conditions.

Digital System Safety

- Onboard Network Security and Integrity
- Software Development Techniques and Tools
- Airborne Electronic Hardware Techniques and Tools
  - Identify safety issues and propose mitigation approaches when airborne electronic hardware techniques and tools are used in airborne systems.
  - Evaluate approaches to AEH COTS component design assurance.

Digital System Safety researchers will evaluate onboard network security and integrity, system considerations for complex digitally intensive systems, software development techniques and tools, and integrity, AEH design techniques and tools, and COTS reliability and continued operational safety.

What Is This Program

FAA establishes rules for the certification and operation of aircraft that encounter icing conditions as well as rules for the use of digital systems. The agency uses the research results to generate Advisory Circulars (ACs) and various other forms of technical information detailing acceptable means for meeting requirements, to guide government and industrial certification and airworthiness specialists and inspectors.

The Aircraft Icing/Digital System Safety Program develops and tests technologies that detect frozen contamination, predict anti-icing fluid failure, and ensure safe operations both during and after flight in atmospheric icing conditions. To improve digital system safety, researchers are proactive in ensuring the safe operation of emerging, highly complex software-based digital flight controls and avionics systems.

A major goal of the program is to reduce aviation's vulnerability to all in-flight icing hazards through the application of its research to improve certification criteria. Commercial airplanes are not yet certified to fly in icing conditions to an icing envelope that includes supercooled large droplet (SLD) and ice crystal icing conditions. The program's researchers have contributed to the development of technical data and advisory materials to correct this omission. A study by the Engine Harmonization Working Group indicates that over 100 in-service engine events, many resulting in power loss and at least six in multiple engine flameouts, occurred in HIWC environments from 1988 to 2003. A current collaborative research effort between the FAA, NASA, Transport Canada, Environment Canada, and the Australian Bureau of Meteorology is addressing this issue. This joint effort brings together the expertise and facilities needed to conduct the research and also facilitates harmonization of the resulting guidance and regulatory material. Other collaborative efforts include work with various committees and working groups within the Aerospace Industries Association. Partnering with industry provides as avenue for their inputs into potential FAA standards, guidelines, and means of compliance which expedites industry acceptance. In a similar vein, the FAA works with several committees within SAE International to take advantage of the members' technical expertise in developing standards and to expedite industry acceptance. For example, SAE G-12 Aircraft Ground Deicing Committee assists in updating holdover time guidelines and establishing standards for de/anti-icing methodologies, deicing fluids, and ground ice detection.

The program is also developing new guidelines for testing, evaluating, and approving digital flight controls, avionics, and other systems for the certification of aircraft and engines. Additionally, the program supports development of policy, guidance, technology, and training needs of the Aircraft Certification Service and Flight Standards Service that will assist and educate FAA and industry specialists in understanding digital system safety and assessing how it may be safely employed in systems such as fly-by-wire, augmented manual flight controls, navigation and communication equipment, and autopilots.

Working with the Radio Technical Commission for Aeronautics, RTCA, helps to ensure the effectiveness of the agency's rulemaking in digital systems and other aviation areas. FAA participates on the Certification Authorities Software Team, an international group of certification and regulatory authority representatives from North and South America, and Europe. The team seeks to promote harmonization of certification and regulatory positions on software and complex electronic hardware aspects of safety.

In FY 2014, major accomplishments include:

Aircraft Icing

- Research on Ice Crystal and Other Appendix C Exceedance Icing Conditions
  - Conducted full field campaign out of Darwin, Australia to collect atmospheric data necessary for high fidelity facility and analytical simulation of High Ice Water Content (HIWC) ice crystal conditions (Note: Funding under A11.d supplements funding provided under the A11.k Weather Program. Effective simulation, the primary goal of the activity listed here, is not possible without high quality atmospheric data, so the two efforts are intimately intertwined.)

- Simulation Methods Development/Validation to Support Appendix C Icing Certification and Continued Operational Safety
  - Completed development of 3D model for testing of ice accretion/aerodynamic effects of ice on 3-D lifting surfaces.
- Safe Operations and Take-off in Aircraft Ground Icing Conditions
  - Completed data and information package needed to update annual winter notice providing guidance for formulation of ground de-icing plans as required by airlines in CFR 121.629.
- Rotorcraft Flight in Known Icing Compliance Criteria
  - Identified candidate minimum required icing instrumentation requirements and flight and wind tunnel test points required for verification of ice protection systems on rotorcraft.

Digital System Safety

- Onboard Network Security and Integrity
  - Provided initial (Phase 1) input for the development of RTCA SC-216 Subgroup 3 Aircraft Systems Cyber Vulnerability-Prevention Recommended Practices.
  - Performed an additional phase of work in the development of the airborne network security simulator that integrates industry and government aeronautical simulators to assess and identify network security threats in an airborne network environment.
- Software Development Techniques and Tools
  - For Phase 2, determined assurance case applicability to digital systems by examining previously developed assurance cases in various regulated sectors for approaches, successes, failures, and providing a comparison to existing development assurance standards (e.g., RTCA/DO-178B and RTCA/DO-254).
  - For Phase 1, assessed, validated, and clarified DO-178C criteria for model-based development.
- Airborne Electronic Hardware Design Techniques and Tools
  - Identified safety issues and proposed mitigation approaches for when software development techniques and tools are used in airborne systems.
  - Investigated airborne electronic hardware (AEH) design assurance in the initial category of commercial off-the-shelf (COTS) electronic hardware.
  - Assessed alternative approaches to electronic hardware design assurance for complex custom micro-coded devices and identify candidate approaches for further study.
- System Considerations for Complex Digitally Intensive Systems
- COTS Reliability and Continued Operational Safety

Aircraft Icing/Digital System Safety supports the DOT strategic goal of Safety by reducing transportation related injuries and fatalities on commercial air carrier and general aviation. To reduce the number and severity of accidents, or potential accidents, associated with icing and failures to software-based digital flight controls and avionics systems, the program develops and assesses ways to ensure airframes and engines can safely operate in atmospheric icing conditions and while using digital systems.

Why Is This Particular Program Necessary

Aircraft Icing

Aircraft icing due to the freezing of supercooled water on aircraft surfaces is a continuing concern in all realms of aviation, due to the insidious nature of icing problems for takeoff, cruise, holding, and landing. Fatal accidents fall into two major categories: takeoff accidents due to failure to properly de-ice or anti-ice prior to takeoff, and accidents due to accretion of ice while in-flight. The latter class affects all phases of flight, but particularly holding

and approach and landing. Since 1980, takeoff icing accidents have claimed many hundreds of fatalities, while in-flight icing accidents have claimed at least 200 fatalities. Icing problems due to flight in ice crystals in HIWC environments were not fully recognized as posing a serious safety hazard until recent years. Although ice crystals bounce off aircraft surfaces, when ingested into engine cores and pitot tubes, the crystals have resulted in serious events. The FAA, working with industry, has identified 140 ice crystal turbine engine power loss events in reviewing 16 years of recent data (a power-loss event is a surge, stall, rollback, or flameout of one or more engines). There were also 11 total power loss events from flameout and 1 forced landing due to ice crystals. The FAA has also received recent feedback on pitot tube ice crystal events where the probe stopped working.

Digital System Safety

The goal of the Software and Digital Systems (SDS) research is to improve and maintain manned and unmanned aircraft safety and prepare for the FAA's Next Generation Air Transportation System by conducting research in the area of advanced, airborne digital systems (software-based and programmable logic-based), such as fly-by-wire flight controls, navigation and communication equipment, autopilots, and other aircraft and engine functions. Software and digital systems are concerns in aviation due to the large quantity of aircraft computer software code and AEH used to implement the software code. Also, the field of digital systems continues to change rapidly and is becoming increasingly more complex and pervasive within aircraft. More importantly, the effect of software and AEH upon the ultimate safety of the aircraft in which this equipment resides is yet to be fully determined. The SDS research focuses the research on areas that will help prevent normal equipment failures (faulty software code and AEH) and abnormal equipment failures through security vulnerabilities exposed by cyber security threats. This research supports the aircraft certification process that includes work to assure digital systems function properly and safely. The results of the research are technical data, reports, compliance methods, verification methods, and certification techniques that can be used to develop policy, guidance, and training materials, and to enforce aircraft continued airworthiness. The research assists both the FAA and industry in meeting their safety objectives. Although there have been no aircraft accidents directly attributable to the failure of software or AEH, it is prudent to take research and development actions that will prevent such accidents.

How Do You Know The Program Works

The Research, Engineering and Development Advisory Committee (REDAC) reviews and evaluates all programs in the FAA R&D program, including this line item, on an annual basis. Established by Congress in 1989, the REDAC reports to the FAA Administrator on R,E&D issues and provides a link between FAA's program and similar efforts in industry, academia, and government. The REDAC specifically looks at the FAA research programs in terms of the relevance and appropriateness of the program to the National Airspace System and works to ensure FAA's program goals and priorities properly link to national needs. The committee also examines the quality and performance of the Research and Development program (through its subcommittee, the Aircraft Safety Subcommittee) and provides FAA with advice on how to best allocate funds to ensure a high quality R,E&D program. Representing corporations, universities, associations, consumers, and other agencies, REDAC members hold two-year terms.

Ground icing research is used each year in the development of guidance is published annually in the FAA's ground deicing notice, which is needed by airlines to formulate their required ground icing plans for the coming winter. In-flight atmospheric research was used in the development of the envelopes included in the notice of proposed rulemaking which was published in June 2010 for supercooled large drop (freezing drizzle and freezing rain aloft in and out of clouds and at the surface) conditions. A final rule is anticipated in the first half of 2012. A GAO report entitled *Improved Planning Could Help FAA Address Challenges Related to Winter Weather Operations* was published in July 2010. This report covered all aspects of the FAA's policies and activity in the area of aircraft icing, and a portion was devoted to research. The report praised the FAA's research investment strategy with its icing research partners, NASA and NCAR in particular.

The SDS research has provided numerous inputs to the certification authorities in the development of policy, guidance, rules, and regulations. Object oriented technology research provided input to RTCA Special Committee-205/WG-71 for DO-178C development and object oriented technology in aviation handbook development, training input, and handbook tools. Research on COTS avionics and software provided inputs for FAA ACs and orders. Research on Data Network Evaluation Criteria and Ethernet-Based Aviation Databuses provided handbook tool and input to databus evaluation criteria that was used by industry. For Flight Critical Data Integrity Assurance for Ground-Based COTS Components, provided input to Rotorcraft Directorate level for knowledge and security-related items in LANs in aircraft research and RTCA SC-216. For Software Development Tools and Software Verification

Tools, research provided input to DO-178C. Research into Networked Local Area Networks in Aircraft Safety, Security, and Certification Issues, and Initial Acceptance Criteria provided input to RTCA SC-216.

Why Do We Want/Need To Fund The Program At The Requested Level

Any reduction in funding would restrict the full HIWC ice crystal field campaign in Darwin, Australia. This would likely take the form a shortened campaign or less support from our research partners, who are partially dependent on FAA for funding support for their participation. This could result in a substantially smaller ice crystal atmospheric database than is needed to develop high fidelity facility and analytical simulation tools.

A reduction could also adversely impact the testing to determine ground anti-icing allowance times and other guidance for ice pellet conditions, including ice pellets mixed with other forms of precipitation. Guidance is published annually in the FAA's ground deicing notice, which is needed by airlines to formulate their required ground icing plans for the coming winter. This is an area where there are issues that have led to strong expression of concern by some airlines, concerns that need to be resolved.

If funding for Digital Systems Safety were reduced, the ability of the FAA and industry to evaluate emerging, highly-complex, digital hardware and software for use in advanced flight controls and aircraft systems would be negatively impacted. Consequently, certification specialists would find it difficult to properly assess proposed aircraft and systems designs which employ this technology for flight-essential and flight-critical applications. Further, the FAA would not be able to determine if certification policy, criteria, or training would be needed to accommodate new technologies or methodologies. A further risk of not performing this research is the reduced ability to develop, validate, and improve certification methods and the inability to reduce time and cost to both FAA and industry in certifying aircraft employing advanced digital airborne systems.

Strategic Goals from the *U.S. DOT Strategic Plan FY 2012 – FY 2016*

SAFETY: Improve public health and safety by reducing transportation-related fatalities and injuries.

STATE OF GOOD REPAIR: Ensure the U.S. proactively maintains critical transportation infrastructure in a state of good repair.

ECONOMIC COMPETITIVENESS: Promote transportation policies and investments that bring lasting and equitable economic benefits to the Nation and its citizens.

LIVABLE COMMUNITIES: Foster livable communities through place-based policies and investments that increase transportation choices and access to transportation services.

ENVIRONMENTAL SUSTAINABILITY: Advance environmentally sustainable policies and investments that reduce carbon and other harmful emissions from transportation sources.