

**Research, Engineering and Development Advisory Committee (REDAC)
NAS Operations Subcommittee | MINUTES**

Date: August 11-13, 2015
Location: Washington, DC (Conference Room varies by date)
Purpose: Review Program Accomplishments; Provide Guidance / Recommendations for Development of the FY18 Portfolio
Chairman: Steve Bussolari
DFO: Maureen Molz
Next Meeting: March 8-10, 2016, Washington DC

DAY 1 - August 11 (JMA Conference Room)

Presentation: Budget Briefing
Presenter: Mike Gallivan

Summary of Briefing – The budget briefing covered requests, appropriation and enacted programs for the research, engineering & development (R,E&D), and facilities & engineering (F&E) research budgets. The FAA FY15 R,E&D budget appropriation was enacted at the \$156.750M requested on 12/16/14. The funding is directed at safety, improving efficiency, reducing environmental impacts, and mission support. The FY16 budget has not been enacted and the FAA will likely start FY16 under a continuing resolution. The House and Senate language demonstrates continued focus on Unmanned Aircraft Systems (UAS) research; NextGen-alternative fuels for general aviation; and research for aircraft technologies, fuels and metrics. The FY17 budget will be presented to congress 2/1/16.

Presentation: 1A10D NextGen – New Air Traffic Management Requirements
Presenter: Francisco Bermudez

Summary of Briefing – This briefing provided an overview of the status and plans for new Air Traffic Management (ATM) requirements for NextGen. The program, which is performed under the facilities and equipment (F&E) account budget, identifies new opportunities to improve the efficiency and effectiveness of air traffic management operations. Among the key activities planned for FY15 and FY16 are defining high level requirements for the Multi-function Phased Array Radar (MPAR) alternative and conducting proof of concept of Airborne Collision Avoidance System for Unmanned Aircraft (ACAS Xu) in support of RTCA SC-228. FY17 products will include harmonization of protocols and standards for enterprise information management; future collision avoidance requirements to support new classes of NAS users; and development of aviation requirements for weather.

Presentation: 1A01C Operational Concept Development & Infrastructure
Presenter: Maureen Keegan

Summary of Briefing – This briefing provided an overview of the accomplishments and planned activities of this program for developing, maturing, and validating near/mid-term

emerging integrated operational concepts to improve the capacity and efficiency of the NAS. This concept increases capacity by leveraging improvements in automation, airspace structure, and display/facility configuration. The program supported UAS concept maturation, operational integration analysis, National Special Activity Airspace Project (NSAAP) maturation, enterprise information display and delivery, assessment of the Terminal Sequencing and Spacing (TSS) tool, and support to RTCA committees. Plans for FY17 include continued operational integration analysis, PBN optimization, interval management and trajectory-based operations.

Presentation: Portfolio Review

Presenter: *John Marksteiner*

Summary of Briefing –This briefing provided an overview of the accomplishments and plans for the Concept Development and Validation (CD&V) portfolio. The Operational Concept - Validation Modeling (OCVM) funding line was discontinued in FY14 and any future funding will be included in the specific portfolios being supported. FY16 funds primarily support the Performance Based Navigation (PBN) Portfolio, with FY17 supporting maturation of concepts within the Separation Management, PBN, and Improved Surface Operations Portfolio. FY14 accomplishments include UAS functional analysis and operational requirements report, Concept of Operations for Datalink of Complex PBN Clearances, Space Vehicle Operations (SVO) ConOps, and Vertical Conformance Verification (VCV) operational shortfall assessment. FY15/16/17 deliverables include continued maturation of the UAS Class A & B, Optimized Route Capability (ORC), and 4D trajectory-based operations (4D TBO) concepts. The briefing began with a description of the impetus for dissolution of the Advanced Operations Concepts Division and integration into the Technology Development & Prototyping Division.

Presentation: NextGen Weather Processor (NWP)

Presenter: *Steven Viveiros (for Fred Anderson)*

Summary of Briefing –This briefing provided an outline of the NextGen weather program and details on the NextGen Weather Processor (NWP) system. The NWP system architecture, the change process, research priorities, and ANG weather alignment were presented. The two key roadmap work package 1 initiatives for NextGen weather are Common Support Services–Weather (CSS-Wx), being performed by Harris and NWP, being performed by Raytheon. NWP provides improved coverage and improved Wx displays. Future plans include development of a common NWP test platform based on the test reference system.

Presentation: A11.I Weather PPT Portfolio Review / AWRP

Presenter: *Steve Abelman*

Summary of Briefing –This briefing presented AVS weather activities, accomplishments, overview of research transition teams, and an update on the status of modeling and simulation efforts. The program applies research to minimize the impact of weather on the NAS. The research conducted within this portfolio includes developing Terminal Area Icing Weather Information for NextGen, mitigating Ice Crystal Weather Threat to Aircraft Turbine Engines, safely lowering Visibility for CAT 1 Approaches and RVR Conversion, and developing Safety-

Driven Weather Requirements for Wake Mitigation. The briefing provided details on hazardous weather mitigation, evolving capabilities, linkages to NextGen implementation plans, weather modeling and sensing, and ensuring effective research. RTT Research Transition Teams (RTTs) have been very effective in integrating closely coupled topics among the agencies and accelerating R&D to achieve near-term results while accelerating and informing far-term objectives. An FAA-NWS RTT was initiated earlier this year tasked with developing a high quality, rapidly-updated analysis with reliable deterministic and ensemble-based probabilistic forecast guidance.

Presentation: **A12.e NextGen – Weather Technology in the Cockpit (WTIC)**

Presenter: *Gary Pokodner*

Summary of Briefing –The briefing described the purpose of the research projects within this portfolio as developing, verifying, and validating requirements for incorporation into Minimum Weather Service (MinWxSvc) standards. Focus areas include: Minimum cockpit meteorological (MET) information, Minimum MET information performance standards, Minimum information rendering standards, Enhanced weather training, and Minimum cockpit technology capabilities. WTIC focuses on identifying causal factors for weather-related GA safety risks/hazards. In FY15 the program delivered the WTIC Wind Study to RTCA SC206. Plans include producing trade space for Boeing and A320 models, leading SG7 of RTCA SC-206, and investigating potential sources of truth wind data for High Resolution Rapid Refresh (HRRR) accuracy comparison.

DAY 2 - August 12 (NASA HQ)

Presentation: **UAS Concept Maturation, Validation, and Requirements Development**

Presenter: *Sherri Magyarits*

Summary of Briefing –This briefing provided a comprehensive history of the FAA concept development and maturation program conducted to integrate Unmanned Aircraft Systems (UAS) into the NAS. Beginning in 2011, the FAA utilized a systematic process, in collaboration with cross-organizational lines of business, to identify research needs and strategic plans for moving forward. The preliminary UAS ConOps was delivered in 2012 and continued to be refined and matured with a focus on the mid-term (~2020) and integrated (~2025) states. The objective of the ConOps was to initiate the engineering process of identifying requirements, establishing a framework for FAA program alignment, and identifying interrelationships between NextGen systems as well as documenting expectations for UAS operators. The ConOps was the cornerstone for enabling the FAA to address UAS considerations such as shortfalls and challenges, certification and operational approval processes, NAS evolution, normal operations, contingency operations, and impacts and interactions with other NAS operational concepts. It does not address UAS weighing less than 55 pounds and operated within visual line of sight of the flight crew. Key assumptions include that UAS will be expected to meet performance/equipage requirements for the airspace in which they are operating, ATC will remain responsible for separation services, and that there will be equitable access to airspace for all NAS users. A key challenge was to define instrument flight rules (modified IFR) with respect to UAS and which will require new regulations and procedures. The program

developed 11 operational scenarios to address a broad range of users and types of UAS. The mid-term and mature state versions of these scenarios were vetted with ATC subject matter experts. The ConOps, operational scenarios and requirements were decomposed and service area responsibility allocation tables developed. These tables identify FAA requirements and UAS operator expectations. A major accomplishment was the instantiation of the UAS Steering Group to provide executive level guidance across multiple FAA lines of business. Current work is focused on identifying operational and technical gaps associated with integrating UAS into Class A and B airspace and developing notification requirements for the modified IFR concept. Next steps include engaging the UAS stakeholder community on vision and expectations of operating in the NAS and addressing low altitude UAS operations.

Presentation: **UAS Strategic Plans and Near Term Opportunities**

Presenters: *Maureen Keegan, Rob Pappas, Vishal Gupta*

Summary of Briefing – This briefing described inputs and artifacts of the UAS concept maturation effort, the operations evolution strategy, and the L2 program plan. The UAS Concept Maturation Plan outlines the activities required to address existing FAA shortfalls associated with the provision of air traffic services to UAS airspace users in the mid-term and beyond (2020-2025+) and the process and products for the maturation effort. Examples of twelve high priority concept maturation activities and their associated shortfalls and requirements were presented. The FAA has initiated external stakeholder engagement to solicit feedback and needs for civil UAS stakeholders, particularly through the Pathfinder Industry Initiative. Representative UAS users were selected from industry to participate in the innovative program. They represent the three key focus areas: UAS in Visual Line of Sight over people; rural UAS Extended Visual Line of Sight, and rural UAS Beyond Visual Line of Sight. The UAS Steering Group (USG) was established in 2013 and consists of executive level guidance which includes the Air Traffic Organization, NextGen, and the Safety Group. The USGs' mission is to provide direction and guidance for maturation and validation of UAS operational concepts across FAA lines of business. Examples of the UAS Concept Maturation were provided which included; Drivers & Process, Research Gap Analysis and Modified IFR Concept Development among others. An overview of the FAA's UAS Center of Excellence (COE) Alliance for System Safety of UAS through Research Excellence (ASSURE) program was provided, which included the core members, affiliated members and corporate partners. Mississippi State University leads the ASSURE team, which is comprised of twenty-one research universities, including international partners, and more than a hundred leading industry/government partners, including Disney (ABC), Amazon Prime Air, and Fedex, the team provides annual reports on their advanced UAS research to congress and the NARP. A list of eleven UAS COE technical focus areas were provided.

Presentation: **NASA - NY TBO: Integrated Demand Management (IDM)**

Presenters: *Nancy Smith, Paul Lee*

Summary of Briefing –This briefing described research being conducted by the Airspace Operations Laboratory at Ames Research Center. The objective is to develop a 'toolkit' of TBO procedures and methods to improve efficiency and robustness of NY operations under all

conditions. The current focus is on improving convective weather operations. The IDM concept integrates several key NextGEN trajectory based Operations (TBO) elements including Collaborative Trajectory Options Program (CTOP), Time-Based Flow Management (TBFM), and Required Time of Arrival (RTA). The team will conduct a human in the loop simulation in August 2015.

Presentation: NASA – Unmanned Aerial System Traffic Management (UTM)

Presenter: Parimal Koparedekar

Summary of Briefing –The UTM briefing outlined a NASA concept focused on enabling safe UAS operations in low altitude airspace. The concept encompasses airspace management and geofencing, weather and severe wind integration, predicting and managing congestion, terrain and man-made objects, maintaining safe separation (via Airspace reservation, V2V, & V2UTM), and permitting only authenticated operations. The concept will evolve through 4 builds. Build 1 is focused on reservation of airspace volume, Build 2 beyond line of sight operations, and Build 3 tracking and internet connectivity. The final build, scheduled for March 2019, focuses on UAS in high density urban environments.

Presentation: TBO, Separation Management, and Data Communications

Presenter: Steve Bradford

Summary of Briefing – This briefing provided the FAA’s “Master Plan” Development Process. The FAA NextGen planning/implementation time frames were discussed. The objectives and benefits of the NSIP: NAS Enterprise Architecture Integration was discussed. The main objective of the NSIP was stated to integrate portfolios, Increments and their relationships with the NAS EA, creating a consistent view for all stakeholders on NextGen plans and implementation. It was explained the NSIP concept was tied to the NAS EA Services Roadmaps.

Presentation: 4DT Demonstration Project

Presenter: Natee Wongsangpaiboon

Summary of Briefing –This briefing presented the objectives of the 4D TBO project as demonstrating advanced TBO services enabled by the introduction of ATN-B2 technologies. The project leverages industry participation in a demonstration of the feasibility and benefit of dynamic RNP, advanced interval management (A-IM), and ATC Winds (uplinked wind data). Stakeholders include RTCA, CDM Future Concepts Team, as well as airline operators, aircraft and avionics manufacturers. This project is in the demonstration planning stage and will begin the demonstration phase in FY16, culminating in an initial benefits assessment in FY17.

Presentation: Optimized Route Capability

Presenter: Phillip Bassett

Summary of Briefing –The briefing provided an overview of a traffic management tool under development that leverages *intelligent offloading* to optimize arrival fix allocations. The FAA is maturing this concept in collaboration with NASA, who is responsible for developing the

algorithm. The tool will evaluate aircraft up to 600 miles from an airport and provide a list of strategic reroutes to efficiently offload aircraft from overloaded fixes. When reroutes are accepted, coordination is streamlined through electronic distribution to all relevant facilities.

DAY 3 - August 13 (JMA Conference Room)

Presentation: 1A01A Runway Incursion Reduction Program (RIRP)

Presenter: *Matt Royston*

Summary of Briefing –This presentation consisted of a portfolio update on the Runway Incursion Reduction Program (RIRP). Several projects were discussed including Low Cost Ground Surveillance (LCGS), Enhanced Final Approach Runway Occupancy Signal (eFAROS), Runway Safety Assessment (RSA) and Small Airport Surveillance System (SASS). Although, eFAROS conducted a successful Flight Check at BOS, there are concerns with the program. The Runway Safety Group no longer supports the program, and the team is awaiting final decision from ATO senior management on the project. In FY15 the program conducted a runway safety assessment, developed a Runway Incursion Shortfall Analysis (RIPSA), and conducted data collection for the Small Airport Surveillance System (SASS). Plans for FY16 include developing a performance report regarding the SASS system against truth data.

Presentation: Commercial Space Transportation (AST)

Presenter: *Mike Romanowski*

Summary of Briefing –This briefing identified the Air Space Transportation as one of the four FAA lines of business. The fundamental differences between aviation and space were identified. Specifically, that aviation is the safest mode of transportation while space is inherently risky.

AST responsibilities, products and services were discussed. These responsibilities included licensing, experimental permits and research among others. The drivers of real commercial space market growth were identified. AST is pursuing an enhanced R&D portfolio to impact high priority areas and requires funding. The FAA initiated new Commercial Space Transportation Safety RE&D BLI in the FY2016 Presidents Budget Request. Thirteen research projects were suggested to support the BLI milestone development.

Presentation: Mixed Equipage Estimates in NAS Performance

Presenter: *Joe Post*

Summary of Briefing –This briefing provided information on the NextGen Organization and the Program Management Office (PMO) responsibilities. The FAA modeling division leverages two MITRE products (avionics equipage database and avionicsCoster) in developing its forecasts. The System Wide Analysis Capability (SWAC) was presented along with a listing of operational improvements modeled in the tool. SWAC provides a fast time equipage aware NAS model for all Air Traffic domains. The presentation included a SWAC test matrix and output metrics.

Presentation: A12.a NextGen – Wake Turbulence; 1A05D NextGen – Wake Turbulence – Re-categorization

Presenter: *Jeff Tittsworth*

Summary of Briefing – This briefing gave an overview of current wake turbulence R&D projects. Since 2002 the focus has been on operational impacts, particularly capacity enhancements by providing cost effective airport throughput capacity benefits without requiring new runways or additional aircraft equipage requirements. Ongoing projects include wake re-categorization (RECAT), wake turbulence mitigation for arrivals (WTMA), and wake turbulence mitigation for departures (WTMD). The research will include development of wake related ATC decision support tools, development of WAKE mitigation separations for new aircraft designs, development of a statistical wake encounter frequency/severity risk assessment capability and the development of models, databases and data wake sources.

Presentation: 1A11 NextGen – ATC/Tech Ops Human Factors

Presenter: *Jerome Lard*

Summary of Briefing –This briefing presented both expected shortfalls and expected benefits realized by the ATC Technical Operation Human Factors (HF) Research Program. Overall budget and plans, ongoing activities and accomplishments were presented. Among the projects are HF guidance for early acquisition stages, human error analyses, strategic job analyses and guidance materials for the use of automation. This work is funded through the separation management and performance based navigation portfolios. Support to NextGen operational increments was identified as an emerging FY18 focal area.

Presentation: A11.i Air Traffic Control/Technical Operations Human Factors

Presenter: *Rachel Seely and Dan Herschler*

Summary of Briefing –This briefing presented Air Traffic Control/Technical Operations Human Factors Research products and accomplishments. The key focal areas of the past year included, developing methods for measuring and improving controller training and training program efficiency at N90, identifying job competencies and performance metrics, implementing a human error taxonomy to support air traffic and technical operations HF incident analyses, conducting human-in-the-loop simulations, and updating HF requirements and process standards to support ATO acquisition programs. Proposed focal areas include strategic job analyses, alignment of organizational culture with the maintenance operations concept, and developing an integrated approach to ATC system interface design and testing.

Recommendations

- The following recommendations was closed:
 - 4D Trajectory Based Operations
- New recommendations were identified on the following programs:
 - Runway Incursion Reduction
 - Unmanned Aircraft System (UAS) Integration in the NAS

Pending Actions

- For March 2016 NAS Ops meeting:
 - 1) Inspect the FAA process to move weather concepts from requirements to implementation. Determine if the required elements are in place and if there are disconnects. Consider logistic and level of participation of members on the Requirements Management Board. Provide recommendations to the subcommittee. (M.Weber, J. Kuchar)
 - ✓ 2) Send past 1A01A Runway Incursion Reduction Program briefings to M. Molz (M. Royston)
 - ✓ 3) Email Runway Incursion Reduction Program briefings to sub-committee (M. Molz)
 - 4) Add the following topics to the March agenda:
 - Runway Incursion Reduction Program - 1 hour minimum (M. Royston)
 - Commercial Space Transportation Briefing (M. Romanowski)
 - NASA Unmanned Aerial System Traffic Management (UTM) concept (NASA)
 - How does UTM fit into NAS, FAA considerations regarding the concept (Steve Bradford)

Completed 9/30/15

Completed 10/01/15

Completed Actions

- Deep dive on Trajectory Based Operations to include high-level research objectives and samples of current FAA and NASA research efforts (**August 13, 2015**)
- Deep dive on UAS to include technical elements and multiple areas of expertise (**August 12, 2015**)
- Engage with ANG-5 (Joe Post) to provide response on how mixed equipage was considered in estimates of NAS performance (**August 13, 2015**)
- Request briefing from Commercial Space Transportation (AST) on research areas relevant to the subcommittee (**August 13, 2015**)
- Recommend to 1A01A: Runway Incursion Reduction that they engage with REDAC / Safety Subcommittee (**August 13, 2015**)

Subcommittee Members in Attendance:

Steve Bussolari (Chairman)
Joseph Bertapelle
John Cavolowsky
Bruce Holmes
Emily Stelzer
James Kuchar
William Leber
Mark Weber
Andres Zellweger
Maureen Molz (FAA, DFO)

Others in Attendance: See attendance list

REDAC / NAS Operations Subcommittee Meeting Agenda

Date: August 11-13, 2015
Location: Washington, DC (Conference Room varies by date)
Purpose: Review Program Accomplishments; Provide Guidance / Recommendations for Development of the FY18 Portfolio

Tuesday, August 11 (*JMA Conference Room)

Welcome/Overview	Steve Bussolari Maureen Molz	0830-0900
Review of REDAC Recommendations, Responses and Open Actions	Steve Bussolari	0900-0930
Budget Briefing	Mike Gallivan	0930-1000
Break		1000-1015
1A10D NextGen – New Air Traffic Management Requirements	Francisco Bermudez	1015-1040
1A01C Operations Concept Validation	Maureen Keegan	1040-1110
1A11 NextGen – Ops Concept Validation Modeling	John Marksteiner	1110-1140
Lunch		1140-1300
NextGen Weather Processor	Fred Anderson	1300-1330
AWRP	Steve Abelman	1330-1400
Break		1400-1430
A12.e NextGen – Weather Technology in the Cockpit	Gary Pokodner	1430-1500
Sub-Committee Discussion	Subcommittee Members	1500-1700
Dinner – location TBD		1800

Wednesday, August 12 (NASA HQ w/AMES VTC)**

Review Findings and Recommendations / New Actions	Steve Bussolari	0800-0900
UAS Concept Maturation, Validation, and Requirements Development	Sherri Magyarits	0900-1030
Break		1030-1045
UAS Strategic Plans and Near Term Opportunities	Maureen Keegan Rob Pappas Vishal Gupta	1045-1200
Lunch		1200-1300
Trajectory Based Operations	NASA	1300-1430
TBO - Overview TBO/Sep Man	John Maffei	1430-1445
4TBO - Concept	Steve Bradford	1445-1515
Questions		1515-1530
Break		1530-1545
4D Demonstration	Natee Wongsangpaiboon	1545-1610
Optimized Route Capability	Phillip Bassett	1610-1635
Questions		1635-1645
Sub-Committee Discussion	Subcommittee Members	1645-1715

Thursday, August 13 (*JMA Conference Room)

Review Findings and Recommendations / New Actions	Steve Bussolari	0800-0900
1A01A Runway Incursion Reduction	Matt Royston	0900-0930
Commercial Space Transportation (AST)	Mike Romanowski	0930-1000
Break		1000-1015
Mixed Equipage Estimates in NAS Performance	Joe Post	1015-1045
A12.a NextGen – Wake Turbulence	Jeff Tittsworth	1045-1115
1A05D NextGen – Wake Turbulence – Re-categorization	Jeff Tittsworth	1115-1145
Lunch		1145-1245
1A11 NextGen – ATC/Tech Ops HF	Jerome Lard	1245-1315
A11.i Air Traffic Control/Technical Operations Human Factors	Rachel Seely, Dan Herschler	1315-1345
Break		1345-1400
Sub-Committee Discussion	Subcommittee Members	1400-1445
Discussion and wrap up	Subcommittee Members	1445-1545