Research, Engineering, and Development Advisory Committee (REDAC)
National Airspace System (NAS) Operations Subcommittee | MINUTES

Session: *Winter/Spring 2024*
Dates: *March 19 – 20, 2024* (2 days)
Location: *Hybrid Meeting (In-Person & Zoom)*
FAA Building 10A, Orville Wright Building, Washington, D.C.
Conference Room 7B
Purpose: *Review of FY24-26 Proposed Portfolio; Provide Guidance and Recommendations; Informational Briefings or Updates*
Facilitator: *Phil Yeung, Designated Federal Officer (DFO)*
Chairperson: *Jim Kuchar*
Note Takers: *Emily Stelzer*
Upcoming Meetings: *September 4 – 5, 2024 (Summer/Fall 2024)*
March 11 – 12, 2025 (Winter/Spring 2025)

Day 1 – March 19, 2024

Welcome / Review of Actions

Presenters: *Jim Kuchar / Phil Yeung*
Summary: Phil Yeung (Designated Federal Officer) provided a review of the agenda, including agenda items that were included in response to Subcommittee requests at the Fall 2023 NAS Operations Subcommittee Meeting. He also reviewed documents that were provided to the Subcommittee, as well as outstanding actions.

Phil Yeung also announced that, due to a new position within the Office of NextGen, Kristina Carr will be acting as the Designated Federal Official for the Subcommittee.

Presentation: 1. Director Remarks
Presenter: *Eric Neiderman (on behalf of Shelley Yak)*
Summary: Eric Neiderman provided a budget update, sharing that a full budget was signed on March 8, 2024. He also shared that the FAA is under a temporary authorization, which expires May 10, 2024. Mr. Neiderman reported a $20M budget increase for RE&D funding.

Mr. Neiderman provided an overview of the evolution of NAS operations, with operations becoming more diverse through the 2040 timeframe. He highlighted the opportunity for the Subcommittee to consider how these changes will inform the research needs in the future.

He then shared the obligations and charge of the NAS Operations Subcommittee as a Federal Advisory Committee, which including recommendations to the FAA Administrator "concerning the needs, objectives, plans, approaches, content and accomplishments of the aviation research program." Mr. Neiderman shared the FAA's intent to expand the Full REDAC committee to 14-16 members. Ethical and legal reviews are being conducted in response to this need.

The Subcommittee asked for a status update on the FAA's research drivers for the next decade, as represented through the Strategic Outlook for Aviation Research (SOAR) framework presented the Fall 2023 meeting. Mr. Neiderman shared that this framework and goals would be briefed on the Hill in April, and then would be used to inform research needs over a 15-year timeframe. Mr. Kuchar requested that the SOAR charts, when complete, be shared with the Subcommittee.

Presentation: 2. Budget Briefing
Presenter: *Tennille Blackwell*

Summary: Tennille Blackwell provided an update on the RE&D budget, which has $280M total for FY2024. The Subcommittee discussed whether Small Business Innovative Research funding is included through RE&D funding.

Ms. Blackwell reported that the FY2024 budget merged the Weather Program and Weather Technology in the Cockpit under a single line item. Mr. Steiner noted that the combined funding of those line items was reduced. Three new budget line items were added in the FY2024 budget: Women in Aviation and Pilot Shortage Study, Aviation Accessibility Research, and Aircraft Radio Altimeter Development, Testing, and Certification.

The FY2025 RE&D budget request totals $250M.

Presentation: 3. Enterprise Concept Development
Presenter: *Steve Bradford*

Summary: Steve Bradford provided an overview of the Enterprise Concept Development portfolio. The portfolio includes the development of a framework for Responsible Artificial Intelligence (RAI), which will include establishing an industry consortium. Mr. Bradford also described a focus on Smart Airports, which explores applying advanced operations typically found at large airports to small, towered airports in a lightweight, low-cost way.

Mr. Bradford reported that the final version of the Extensible Traffic Management (xTM) Concept of Operations is now complete. This portfolio also completed a use case for RAI, as well as an AI Operational Capability document. In FY25, the effort will complete a functional analysis and concept of operations for Smart Airports, as well as an update to the concept of operations associated with the FAA's future vision.

Presentation: 4. New Air Traffic Management Requirements
Presenter: *Steve Bradford*

Summary: Steve Bradford presented an overview of the New ATM Requirements portfolio, which includes the research and development of procedures, tools, and systems in support of operational improvements. Accomplishments included development of an integrated framework for Air/Ground System Wide Information Management (SWIM), research on the ability of the NAS to support the integration of UAS through current day technologies (e.g., third party weather services), international harmonization of flight and flow information, and an update to the certification framework for Machine Learning/AI in the NAS.

Future work in this portfolio will include analysis on Hyper Connected ATM Systems, a final analysis for the requirements for potential use of AI in support of controller functions, and the development of a future services-based architecture

for ATM systems that leverage modern software architectures. Mr. Bradford also shared that future work will examine qualification of third-party weather providers in support of urban air mobility.

Monica Alcabin asked Mr. Bradford to clarify the benefits of Flight and Flow Information for a Collaborative Environment (FF-ICE). Mr. Bradford shared that Flight Information Exchange Model (FIXM), which is already being used through collaborative decision making, allows for trajectory information sharing. He also noted that improvements related to FF-ICE will allow for a harmonized, digital approach to supporting the collaborative decision making (CDM) process pre-flight, as well as information about constraints that impact the flight plan.

Presentation: 5. Informational Briefing: New ATM Project – AI Certification Framework
Presenter: *Kanvasi "TJ" Tejasen*
Summary: TJ Tejasen presented an informational briefing on the AI Certification Framework project, which is being carried out under the New Air Traffic Management Requirements portfolio. Ms. Tejasen indicated that the work is being done in alignment with executive guidance (e.g., White House Blueprint for AI Bill of Rights, National AI R&D Strategic Plan, NIST Risk AI Management Framework, and the Executive Order on "Safe, Secure, and Trustworthy Development and Use of AI"). The framework is intended to be used to ensure that software provided by external vendors complies with FAA requirements.

Ms. Tejasen described that current industry standards are more suited for traditional software development and do not yet sufficiently consider AI. This work would help to inform future standard needs, as well as describe how AI should be considered within the AMS lifecycle and acquisition processes. Ms. Tejasen then reviewed the assumptions and methodology of the framework. Ms. Tejasen noted that they are reviewing the framework in the context of candidate projects within the Office of NextGen and NASA.

The Subcommittee engaged in a series of questions and discussion regarding the reach and scope of the certification framework, including the relationship between this effort and the work underway with AVS to establish an AI Roadmap. With respect to the latter topic, Ms. Tejasen explained that the efforts are related and are being coordinated, though AVS's effort is focused on aircraft and avionics uses of AI, while this work is specifically related to ATM applications. When asked about the relationship to this work to other government agency activities, Ms. Tejasen explained that the work has included NIST, Department of Defense, and commercial sector feedback and learnings. Jim Kuchar recommended considering additional risk factors, including financial risk.

Presentation: 6. Informational Update: Innovate28
Presenter: *Mitchell Bernstein*
Summary: Mitchell Bernstein provided an informational update on the Innovate28 initiative, which is focused on integrating initial advanced air mobility operations in the NAS as soon as vehicles are certified. Mr. Bernstein provided an overview of the FAA's cross-agency integrated team, as well as ongoing engagement with stakeholders in the federal government, local / state / and tribal governments, and industry. He shared an overview of key Innovate28 activities.

Recent accomplishments included the signing of an FAA / Air Force AFWERX Prime Memorandum of Understanding, as well as the kickoff of an autonomy working group. Mr. Bernstein also shared progress in establishing wake separation standards, vertiport standards, and airspace integration considerations.

Jim Kuchar asked whether this initiative would leverage current infrastructure and procedures. Mr. Bernstein confirmed that this initiative will focus on near-term considerations, but other projects are examining the longer-term concept.

Presentation: 7. Informational Briefing: Status of ADS-B Vertical Rate (VR) Turbulence Project
Presenter: *Larry Cornman / NCAR*
Summary: Larry Cornman provided an overview of research sponsored by the FAA's Weather Technology in the Cockpit program, to use ground-based ADS-B to augment existing turbulence observations. Mr. Cornman described some of the algorithmic challenges faced in conducting the research, as well as the successful application of the algorithm to four case study days. Mr. Cornman also described work sponsored by Aireon to examine the use of space-based Automatic Dependent Surveillance Broadcast (ADS-B) for broad global coverage. Follow-on activities include demonstration to inform operational deployment and standards development.

Mr. Kuchar asked about alternative data sources for use. Mr. Cornman indicated that the prevalence of ADS-B data from all equipped aircraft makes it a superior solution to alternative data sources.

Presentation: 8. Runway Incursion Reduction Program (RIRP)
Presenter: *Rob Higginbotham / Ingrid Rinker*
Summary: Rob Higginbotham gave an overview of the current activities being conducted under the Runway Incursion Reduction Program, designed to provide situation awareness on the airport surface to those who can take corrective action. Rob indicated that the goal is to provide a low-cost alternative to Runway Status Lights, and he described an effort to install six directional strings of runway entrance lights at San Antonio airport. Operational test and evaluation will begin in August 2024 and will be a focus of research in FY2025.

Presentation: 9. Informational Briefing: AVS Research Strategy
Presenter: *Bruce DeCleene*
Summary: Bruce DeCleene provided an overview of the AVS Research Strategy, which has been developed to establish top-down research goals, guide investments within the FAA and externally, inform future appropriations, and inform the research activities of others. Mr. DeCleene described a framework for describing certification readiness, and ten strategic research thrusts. Mr. DeCleene has asked the Subcommittee to review the strategy document, providing recommendations and feedback in the Fall 2024. The official request and document will be provided by Shelley Yak.

Presentation: Findings and Recommendations Discussion
Presenter: *Jim Kuchar / Subcommittee*
Summary: The Subcommittee reviewed the day's presentations and identified candidate areas of focus for findings and recommendations. Discussions were then adjourned until the following day.

Day 2 – March 20, 2024

Presentation: 10. Informational Briefing: AAM Vision
Presenter: *Dave Oord, Cash Castillo / Wisk*
Summary: Cash Castillo and Dave Oord provided an information briefing, summarizing Wisk, a concept for operations, and enabling elements for AAM. Wisk's concept of operations is aligned to the FAA's UAM ConOps, as well as the Agency's Info-Centric NAS Concept of Operations. Mr. Oord and Mr. Castillo described Wisk's strategic phases for passenger carrying AAM evolution, as well as key enablers for each of those phases.

Mr. Castillo and Mr. Oord also shared an overview of a proposed Operations Center, designed to provide remote supervision and situation awareness of the operation. Mr. Kuchar asked about the expertise and staffing levels associated with supervision. Mr. Castillo shared that human factors considerations are being addressed and that staffing will be aligned to operational demand and complexity. He also shared that a layered safety approach is being used to ensure operational resiliency.

Bruce Holmes questioned whether the Wisk concept takes into account the spectrum limitations associated with radars. Mr. Castillo noted that any use of technologies would align to the requirements of the bands being used.

Presentation: 11. Weather Program
Presenter: *Tammy Flowe / Gary Pokodner*
Summary: Tammy Flowe provided an update on the Weather Program portfolio. At the beginning of her presentation, she indicated that the weather program was reduced in funding, which the Subcommittee noted during the budget briefing the day before. FY2024 accomplishments including enhancing offshore precipitation (OPC) enhancements and in-flight icing models to meet operational needs. Graphical Turbulence Guidance (GTG) Nowcast models are being transitioned to NWS in response to NTSB recommendations. Ms. Flowe also provided updates on advanced weather radar techniques, visibility, terminal area icing, high ice water content, UAS weather, weather observations, quality assessment, space weather, volcanic ash detection, and wind detection. Ms. Flowe noted that the volcanic ash and wind detection research were reduced in scope in FY2024 due to the budgetary reduction noted at the beginning of the briefing. Ms. Flowe also shared anticipated and emerging research for the Weather Program in FY2025 and FY2026.

Gary Pokodner then provided an update on projects associated with Weather Technology in the Cockpit (WTIC). Mr. Pokodner noted that the research in this area is now beginning to transition in focus from the NextGen program to NAS 2040. Accomplishments included maturation of the Cockpit Cognitive Assistance concept, research on pilot confidence in weather observations with uncertainty, research examining the accuracy of pilots' weather mental models, and maturation

of a preflight briefing tool. Mr. Pokodner highlighted the need for research examining localized weather observations related to wind, particularly as they relate to energy use and electric-powered flight. The Subcommittee discussed how government, industry, and academia might address that need. Mr. Pokodner concluded his briefing highlighting the anticipating and emerging research areas for the Weather Technology in the Cockpit projects in FY2025 and FY26.

Presentation: 12. NextGen – Wake Turbulence
Presenter: *Jillian Cheng*

Summary: Jillian Cheng provided an update on the Wake Turbulence portfolio. FY2024 accomplishments included the development of wake generation and response assessments for new aircraft types, progress in the development of wake encounter metrics, collection of wake data at select airports and within the enroute airspace.

Ms. Cheng shared that FY2025 objectives will extend research being conducting in FY2024, including wake encounter risk assessments for new entrants, concept alternatives for the controller display of wake encounter hazard locations, and evolving wake operational needs. FY2026 emerging focus areas include application of wake generation and encounter data, acquiring additional wake generation data, as well as completing the development of the Wake Hazard Avoidance (WHA) concept and algorithms.

Mr. Kuchar asked whether automation changes that will be necessary to address the WHA concept are being discussed. Ms. Cheng shared that WHA will require En Route Automation Modernization (ERAM) modifications, which is being worked with ATO.

Mr. Steiner asked whether the wake generated by buildings or structures is being considered for separation to new entrants. Ms. Cheng shared that this program does not focus on structure wake formation and separation.

Presentation: 13. Operations Concept Validation & Infrastructure Evolution (ATDP)
Presenter: *Guillermo Sotelo*
Summary: Bob Humbertson provided an update on behalf of Guillermo Sotelo on the Operations Concept Validation and Infrastructure Evolution portfolio. Mr. Humbertson shared that FY2024 accomplishments included the delivery of a market analysis a roadmap for higher airspace, and an AAM integration plan developed for the ATO. The Subcommittee expressed interest in a more detailed review of these topics in an upcoming meeting. Mr. Humbertson also provided a brief overview of research plans and focus areas for FY2025-26.

Presentation: 14. Enterprise Human Factors
Presenter: *Tara Gibson*

Summary: Tara Gibson presented an update on the Enterprise Human Factors portfolio, which is focused on guidance early in the acquisition process to inform NAS domains, systems, and programs. Ms. Gibson shared FY2024 accomplishments, including a human factors assessment of large ATC displays, recommendations for traffic management unit (TMU) regional coordination practices, and methods for enhancing acquisition management to include human readiness levels. Eddie Austrian further explained that human readiness levels for

a given system should be aligned to the technical readiness level of that same system.

Ms. Gibson shared that FY2025 research will include new focus on the development of a Training Manager Training Model and NAS Mental Models. Research on human readiness levels within the acquisition process will also undergo validation and adapt guidance in alignment with the use of these readiness levels. FY2026 focal areas will include human factors research examining an increasingly rich information ecosystem, in alignment with the NAS 2040 vision.

Presentation: 15. Air Traffic Control/Technical Operations Human Factors
Presenter: *Tara Gibson*
Summary: Tara Gibson provided an overview of the ATC Tech Ops portfolio, which informs ATC and Tech Ops policy, guidance, standards, training, procedures, and job aids. FY2024 accomplishments included technical reports and scientific proceedings, which provided a job analysis methodology and design guidance for alarms. Research is also underway to provide guidance for artificial intelligence / machine learning within ATC, as well as controller visual scanning.

Jim Kuchar noted that human factors guidance for AI should be related to the guidance and framework associated with the approval of AI systems discussed during the Subcommittee meeting during *Presentation 5: AI Certification Framework*.

Ms. Gibson provided a brief overview of research that will be concluding in FY2024. FY2025 research activities are anticipated to include ATC task and workload management, cognitive skills degradation, and controller response to stress. Ms. Gibson then shared emerging focal areas in FY26, including the use of augmented reality and virtual reality and other advanced technologies.

Presentation: Findings and Recommendations Discussion
Presenter: *Subcommittee*
Summary: The Subcommittee discussed findings and recommendations and identified documents and briefings to be included for the next meeting. That meeting will be held on September 4 and 5, 2024. Subcommittee members agreed to develop an observation regarding Agency activities associated with AI / ML, as well as consider findings related to weather and federated information systems and service suppliers. The Subcommittee also discussed the date for the Spring 2025 meeting, which was set for March 11-12, 2025.

The Subcommittee requested the following documents prior to the next meeting:

- xTM Concept of Operations (Steve Bradford)

The Subcommittee expects to receive a formal request through the Full REDAC meeting to review and provide comment on the AVS Safety Research Strategy.

The Subcommittee also discussed the following information topics for briefings in the Fall 2024 meeting:

- SOAR Framework including example application to one or more research areas (Eric Neiderman)
- AI Certification Framework update including example application to 1+ use cases (TJ Tejasen)

- AI Roadmap update (Trung Pham)
- UAS/AAM Integration Research Plan Update / Differences (Sabrina Saunders-Hodge)
- FAA ASSURE COE program update, particularly research related to large UAS (TBD FAA POC + ASSURE lead)
- Update on Office of Commercial Space Transportation R&E plan (AST TBD)

Presentation: Recap and Closing
Presenter: *Jim Kuchar / Phil Yeung*

Summary: Jim Kuchar and Phil Yeung thanked the Subcommittee and FAA participants for their time and efforts in planning for and conducting the meeting.

REDAC / NAS Operations Subcommittee Meeting Agenda

Purpose: Review the R&D portfolio developed based on the subcommittee's strategic guidance from the Fall Meeting. The FAA briefs the proposed R&D FY+2 years.

Day 1: Tuesday, March 19th

Conference Room:

Building 10A, Orville Wright Building, 800 Independence Ave SW, Washington, DC 20591

7th Floor, Conference Room **7B** (see Page 4 for room location)

Zoom/Dial-in: See Page 3 for phone and video conferencing details

8:45am	Welcome / Review of Actions	Jim Kuchar / Phil Yeung
8:55am	1. Director Remarks	Eric Neiderman
9:05am	2. Budget Briefing	Tennille Blackwell
9:30am	3. Enterprise Concept Development	Steve Bradford
10:00am	4. New Air Traffic Management Requirements	Steve Bradford
10:30am	Break	
10:45am	5. Informational Briefing: New ATM Project – AI Certification Framework	Kanvasi "TJ" Tejasen
11:45am	6. Informational Update: Innovate28	Mitchell Bernstein
12:15pm	Lunch	
1:15pm	7. Informational Briefing: Status of ADS-B Vertical Rate (VR) Turbulence Project	Larry Cornman / NCAR
2:15pm	8. Runway Incursion Reduction Program (RIRP)	Rob Higginbotham / Ingrid Rinker
2:45pm	Break	
3:00pm	9. Informational Briefing: AVS Research Strategy	Bruce DeCleene
4:00pm	Findings and Recommendations Discussion	Subcommittee

Day 2: Wednesday, March 20th

Conference Room:

Building 10A, Orville Wright Building, 800 Independence Ave SW, Washington, DC 20591
7th Floor, Conference Room **7B** (see Page 4 for room location)
Zoom/Dial-in: See Page 3 for phone and video conferencing details

9:00am	10. Informational Briefing: AAM Vision	Dave Oord, Cash Castillo / Wisk
10:00am	11. Weather Program	Tammy Flowe / Gary Pokodner
11:00am	Break	
11:15am	12. NextGen – Wake Turbulence	Jillian Cheng
11:45am	13. Operations Concept Validation & Infrastructure Evolution (ATDP)	Guillermo Sotelo
12:15pm	Lunch	
1:15pm	14. Enterprise Human Factors	Tara Gibson
1:45pm	15. Air Traffic Control/Technical Operations Human Factors	Tara Gibson
2:15pm	Findings and Recommendations Discussion	Subcommittee
3:00pm	Recap and Closing	Jim Kuchar / Phil Yeung

Legend Key:

	Informational Briefing or Update

Day 1 Attendee List:

Adam O'Hara	SAIC
Andrea Stevenson-Hardin	ARA
Bill Kaliardos	FAA
Bob Humbertson	MBO Partners
Brandon Graham	FAA
Brian Powers	FAA
Bruce DeCleene	FAA
Bruce Holmes	Holmes Consulting LLC
Casey Hines	FAA
Chinita Roundtree-Coleman	FAA
Colleen Wanner	
Edie Whitehead	FAA
Emily Stelzer	MITRE
Eric Neiderman	FAA
Gary Pokodner	FAA
Hamza Abshir	FAA
Jim Kuchar	MIT Lincoln Laboratory
Joe Bertapelle	Joe Bertapelle LLC
Jon Schleifer	FAA
Jorge Fernandez	FAA
Kanvasi "TJ" Tejasen	FAA
Karl Kaufmann	FAA
Kristina Carr	FAA
Larry Cornman	NCAR
LaToya Smith	A3 Technology
Mark Hale	Diakon Solutions LLC
Mark Orr	FAA
Matthias Steiner	NCAR
Mitchell Bernstein	FAA
Monica Alcabin	Boeing
Monique Moore	FAA
Okoineme Giwa-Agbomeirele	FAA
Phil Yeung	FAA
Reshma Kumar	FAA
Rob Higginbotham	FAA
Steve Bradford	FAA
Tara Gibson	FAA
Tennille Blackwell	FAA
Wendy Humbertson	BAH

Day 2 Attendee List:

Adam O'Hara	SAIC
Andrea Stevenson-Hardin	ARA
Ben Willems	FAA
Bill Kaliardos	FAA
Bob Humbertson	MBO Partners
Brandon Graham	FAA
Brian Powers	FAA
Bruce DuCleene	FAA
Bruce Holmes	Holmes Consulting LLC
Cash Castillo	Wisk
Chinita Roundtree-Coleman	FAA
David Oord	Wisk
Deborah Shaibe	FAA
Eddie Austrian	Fort Hill Group
Emily Stelzer	MITRE
Eric Neiderman	FAA
Gary Pokodner	FAA
Hamza Abshir	FAA
Jillian Cheng	FAA
Jim Kuchar	MIT Lincoln Laboratory
Joe Bertapelle	Joe Bertapelle LLC
Karl Kaufmann	FAA
Kenneth Janak	FAA
Kristina Carr	FAA
LaToya Smith	A3 Technology
Mark Hale	Diakon Solutions LLC
Matthias Steiner	NCAR
Monica Alcabin	Boeing
Monique Moore	FAA
Okoineme Giwa-Agbomeirele	FAA
Phil Yeung	FAA
Reshma Kumar	FAA
Tammy Flowe	FAA
Tara Gibson	FAA
Tennille Blackwell	FAA
Wendy Humbertson	BAH
Zachary Dassault	FAA