

# Research, Engineering, and Development Advisory Committee (REDAC)

Wednesday, October 5, 2022

## Meeting Minutes

Federal Aviation Administration (FAA) Headquarters  
Conference Rooms 5AB and McCracken-Huerta Collaboration Ctr.  
800 Independence Ave, SW  
Washington, DC 20591

<b>Purpose</b>	Strategic Guidance – Findings and Recommendations on FY 2025 R&D Portfolio
<b>Facilitators</b>	<ul style="list-style-type: none"><li>• Dr. John Hansman, <i>Research, Engineering, and Development Advisory Committee (REDAC) Chairperson, Massachusetts Institute of Technology (MIT)</i></li><li>• Ms. Shelley Yak, <i>FAA William J. Hughes Technical Center (WJHTC) Director and REDAC Executive Designated Federal Official</i></li></ul>
<b>Note Taker</b>	Ms. Beth Arnz

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**Presentation:** Welcome Address and Opening Remarks | **Presenters:** Dr. John Hansman, *REDAC Chairperson, MIT*, and Ms. Shelley Yak, *WJHTC Director and REDAC Executive Designated Federal Official, FAA*

Dr. John Hansman opened the meeting with schedule and administrative notes, including that there would be allotted time following the Environmental and Energy Subcommittee Report for public comments. Ms. Shelley Yak announced the public meeting notice in the *Federal Register* as required and provided an introduction and updates. Ms. Yak remarked that she enjoyed attending the Research, Engineering, and Development Advisory Committee (REDAC) Subcommittee meetings and benefited from the discussions. Ms. Yak informed the REDAC that the updated National Aviation Research Plan (NARP) for FY 2022 through FY 2026 has been publicly released; she encouraged the REDAC members to review this document. Ms. Yak reiterated the five goal areas described in the NARP: to improve airport operations, air traffic, and air space management capabilities; to accelerate use of new technologies for aerospace vehicles, airports, and spaceports; to capitalize on the use of NAS, airport, and spaceport infrastructure; to improve human performance within the system; and to improve integrated modeling capabilities and system-wide analysis. Ms. Yak concluded her opening remarks by mentioning that she is pleased with the go-forward plan for the FAA's research portfolio.

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**Presentation:** NASA Overview | **Presenter:** Robert Pearce, *Associate Administrator, Aeronautics Research Mission Directorate, NASA*

Mr. Robert Pearce led a presentation to provide REDAC with an update from the NASA Aeronautics Research Mission Directorate (ARMD). Mr. Pearce communicated the ARMD vision that aligns the portfolio into four major areas: Ultra-Efficient Transport, High-Speed Commercial Flight, Future Airspace, and Advanced Air Mobility (AAM). These areas represent the NASA priorities for sustainability, greater mobility, and economic growth.

Mr. Pearce stated that the goal for Ultra-efficient Transport is net zero emissions by mid-century. NASA Aeronautics, through the Sustainable Flight National Partnership (SFNP), is working to improve thermal efficiency by reducing the size of the core. This work is well underway (although the schedule was negatively impacted by a lower budget appropriation in FY 2021) and is a priority for NASA Aeronautics Mission Research Directorate

(ARMD). Additionally, Mr. Pearce spoke to the development timeline for a sustainable flight demonstrator (built to test an ultra-efficient aerodynamic design and other new technologies to prove their predicted benefits in flight), with technology readiness scheduled for the FY 2025 - FY 2028 timeframe.

In the High-Speed Commercial Flight space, Mr. Pearce mentioned that NASA ARMD is focusing on hypersonic applications, for which industry and Congress have demonstrated interest. There is a major emphasis on supersonic technologies and efforts to reduce noise and sonic rumble. To accomplish over-land supersonic flight, Mr. Pearce stated that standards and rule changes will need to be implemented. Next steps will involve community fly overs to examine response to noise levels.

Mr. Pearce then began discussion of Advanced Air Mobility (AAM). The organization has aligned its AAM portfolio to focus on four core areas: Airspace, Automation, Safety, and Noise. NASA ARMD's role in addressing AAM challenges is to bring the national aviation community together to share insights, deliver long-term technical solutions, architectures, and recommended requirements for industry and regulatory organizations. Dr. Hansman asked how the new AAM Concept of Operations (ConOps) would influence NASA ARMD's plans. Mr. Pearce responded that while the FAA looks at near-term WISK ConOps, NASA ARMD looks at longer-term ConOps. NASA aims to construct an architecture to enable high levels of automation but one that is relevant to near-term operations.

Next, Mr. Pearce spoke about NASA ARMD's vision for future airspace, which includes further refining the vision, partnering with, and supporting the FAA. Dr. Hansman inquired as to what extent NASA ARMD is looking at environmental factors to drive greater efficiency out of airspace. He mentioned the criteria for reduction of separation standards and inquired about any underlying research to support this reduction. Mr. Pearce replied that NASA ARMD is currently performing sustainable operational demos, to take existing research and to perform trajectory management for each segment of flight. Then, the next step would be to look at this research in an integrated manner. Mr. Pearce further explained that expanding scientific understanding of contrail management is a priority for NASA ARMD, since contrails are a huge driver of greenhouse gas emissions leading to negative climate impacts. He pointed to an example of managing contrail production so that limitations can be set during periods where they would have a highly adverse effect on climate.

On the topic of climate impacts, Dr. Hansman stated that there is a push by the worldwide aviation industry to use climate impact reduction as a marketing message. Therefore, there is a need and an opportunity to increase flexibility for high-altitude, Enroute airspace. Future vision is to adjust altitudes to manage contrails more effectively. Dr. Hansman stated that contrail management is a big opportunity requiring underlying work where NASA ARMD can provide assistance. Mr. Pearce agreed and stated that contrail management is a near-term priority for NASA ARMD.

Mr. Pearce concluded his report by stating that NASA ARMD appreciates the partnership with the FAA and that they are well-positioned to support an innovative future for aviation.

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**Presentation:** FAA Environment and Energy Overview | **Presenter:** Dr. Jim Hileman, Chief Scientific and Technical Advisor for Environment and Energy, FAA

Dr. Jim Hileman spoke on behalf of the Office of Environment and Energy (AEE). His office works to understand the impacts of aviation noise and emissions to inform policy and solutions development. Research initiatives include the Aviation Sustainability Center (ASCENT), the Continuous Lower Energy, Emissions, and Noise (CLEEN) Program, Commercial Aviation Alternative Fuels Initiative (CAAFI), and the Department of Transportation's VOLPE Center. Dr. Hileman first highlighted his office's Noise Research and Development efforts. In 2021, the FAA put out a Federal Register Notice on the FAA's Noise Research Program, which provides a comprehensive overview of FAA's Research and Development (R&D) efforts on noise. The aim is to improve noise modeling and to measure the impacts of aviation noise on sleep and health. In terms of Aircraft Emissions R&D, the agency is

working to understand emissions, reduce emissions at the source, and focus on mitigation efforts. Dr. Hileman noted that the impacts of commercial space vehicles on emissions is an emerging area.

Dr. Hileman then spoke to additional highlights of ongoing R&D efforts. The office is overseeing rapid growth and expansion; in a 24-month period, the office obligated \$470M in R&D programs. The FAA's R&D supports both domestic policy and International Civil Aviation Organization (ICAO) policies. Additionally, the Inflation Reduction Act (signed in August 2022) provided a new Sustainable Aviation Fuel (SAF) and Tech Grant Program and a SAF Blenders Tax Credit.

One of AEE's key initiatives is support of the Aviation Climate Action Plan. This document lays out the plan to achieve the Administration's goal for aviation - net-zero greenhouse gas emissions from the U.S. aviation sector by 2050. Dr. Hileman explained that 80% of aviation greenhouse gas emissions are attributable to Enroute operations. From an aircraft and engine technology development standpoint, the FAA is working in a public-private partnership with industry (via the CLEEN Program) to accelerate maturation of certifiable aircraft and engine technologies. CLEEN Phase IV will be setup earlier than anticipated and is a 50/50 cost share with industry. Jet fuel, while a critical component for safety, creates CO<sub>2</sub> emissions. Electricity makes sense for Advanced Air Mobility (AAM), but it will not alleviate negative climate impacts. Dr. Hileman presented data to demonstrate that climate impact mitigation efforts must be focused on flights over 1,000 nautical miles (nm) – which represents 20% of operations yet 65% of total global fuel burn.

Dr. Hileman then discussed alternative aircraft energy sources. Many alternative fuels require hydrogen, yet electricity needs for its production are great. He also explained the single and multiple fuel options for aircraft energy sources, the former which leverages today's airport infrastructure, and the latter which does not add CO<sub>2</sub> to the environment. Dr. Hileman then highlighted the SAF Grand Challenge, a multi-agency roadmap to reduce the cost of SAF, enhance its sustainability, and expand its supply and end use. The SAF Grand Challenge Roadmap was released in September 2022, and the FAA was featured prominently throughout.

In terms of international climate leadership initiatives, the FAA is working with its partners to develop tools and conduct analysis of a wide range of economic and environmental impacts that could result from changes to aviation noise, emissions, and energy policy. These efforts are intended to support decision-making. Dr. Hileman explained that the FAA led the effort to create a Long-Term Aspiration Goal (LTAG) for CO<sub>2</sub> emissions for International Civil Aviation Organization (ICAO) Committee on Aviation Environmental Protection (CAEP). In March 2022, the final report of the LTAG task group was released and unanimously approved. Dr. Hileman stressed that this work will be foundational in terms of getting to net zero greenhouse gas emissions by 2050.

Addressing the scope of non-CO<sub>2</sub> impacts of aviation on climate, Dr. Hileman spoke about Aviation-Induced Contrails (AIC)/cloudiness. The concern is the cirrus clouds resulting from contrails (at certain temperatures, pressures and humidity levels). Solution options that the FAA has examined are to modify current jet fuel specifications, SAF, new engines and combustor technology, and to change flight path or altitude. FAA efforts in this area have focused on decision support tools.

Dr. Hileman ended his report with a look at recent successes and real-world impacts contributable to the FAA. These successes include informing decision-making to support U.S. leadership on international aviation climate issues, supporting the development of SAF, accelerating technological innovation, and advancing our understanding of noise, emissions, and their impacts.

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**Presentation:** Subcommittee Report – Environment and Energy | **Presenter:** Mr. Ian Redhead, *Deputy Director, Operations and Maintenance/COO, Kansas City International Airport*

Mr. Ian Redhead briefed the REDAC on the Environment and Energy Subcommittee meetings held in September, 2022. Mr. Redhead stated that the program has benefited from budget increases, which are enabling new initiatives.

Mr. Redhead started his presentation by discussing Office of Environment and Energy R&D Program successes (both locally and internationally) to address climate change, including Sustainable Aviation Fuels (SAF), public/private partnerships, and global impacts as a leader at the International Civil Aviation Organization/Committee on Aviation Environmental Protection (ICAO/CAEP). Mr. Redhead did note that aviation noise remains a threat to the growth of U.S. aviation.

Prior to presenting the Subcommittee's Findings and Recommendations, Mr. Redhead discussed the timely awarding of grants which is negatively impacting projects, an area of concern that had been identified previously but which remains unresolved. Dr. Hansman recommended that this area be formally documented as a Finding and Recommendation by the Subcommittee.

Mr. Redhead presented the Subcommittee's first finding related to SAFs. The Subcommittee recommended that the FAA maintain a leadership role in SAF development to ensure that carbon neutral growth and emissions reduction goals can be realized, and to capitalize upon this emerging industry to benefit rural America and the U.S. aviation industry. Additionally, the Subcommittee recommended that the FAA use its increased funding to accelerate SAF research.

Mr. Redhead presented the second finding by stating that the execution of the Environment and Energy research portfolio has been accomplished by working collaboratively with private industry, major universities, other federal departments, and some foreign governments. He added that the benefits of partnership have been proven, resulting in data-driven policies and technological advances in aviation which enable the U.S. to maintain its leadership role at ICAO/CAEP and on the global aviation stage. He stated that the Subcommittee continues to endorse public-private partnerships like the Continuous Lower Energy, Emissions and Noise (CLEEN), Commercial Aviation Alternative Fuels Initiative (CAAFLI), and Aviation Sustainability Center of Excellence (ASCENT) programs and suggested continuing the allocation of robust funding in these areas to address federal mandates.

The Subcommittee's third finding acknowledged that maintaining the U.S. global leadership position at ICAO/CAEP is essential and advantageous to the U.S. aviation industry. The Subcommittee recommended continuing, strong support of all research programs allowing the FAA and the U.S. to maintain its current leadership position at ICAO/CAEP to influence policy and rulemaking.

The fourth finding of the Environment and Energy Subcommittee acknowledged that while aviation noise continues to be an issue warranting ongoing research, many technological improvements have been made resulting in more fuel efficient and quieter aircraft. Mr. Redhead stated that the Subcommittee strongly supports prioritization of noise research to support informed decision-making, to enable introduction of new entrants to the NAS, and to enable NextGen deployment.

The fifth and final finding surrounded adequate subject matter staff to support increases in research activity, expansion of public private partnerships and planned future projects. The recommendation was that the FAA carefully examine the workload of current staff and to ensure adequate support for additional research priorities and portfolio projects.

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**Presentation:** Public Forum – C. Christensen/D. Yaplee | **Presenter:** Dr. C. Christiansen/Darlene Yaplee

The public provided two submissions for REDAC review. Studio City for Quiet Skies (cofounded by Kimberly Turner and Suellen Wagner), while electing not to address the Committee, proposed that implementation of Advanced Air Mobility (AAM) and Urban Air Mobility (UAM) not occur without first establishing a regulatory and environmental framework (based on research and due diligence) that explores an assessment of public benefit, safety, and potential/likely adverse impacts.

Dr. Cindy Christiansen, one of the co-founders of the Aviation Impacted Communities Alliance (AICA), addressed the Committee. AICA has recommended the following research proposals to the FAA: an updated noise exposure study and report based on the FAA's Neighborhood Environmental Survey (NES); a National Academies Division of Medicine Consensus Report on the effects of aviation noise and pollution on public health; and a National Academies Division of Medicine and Division of Engineering Consensus Report that recommends a system to measure aviation noise close to airports and, separately, aviation noise close to Performance Based Navigation procedures (PBN).

Darlene Yaplee, co-founder of AICA, made additional recommendations relative to negatively impacted communities and neighborhoods. She recommended that the Committee consider N-Above and T-Above research using the Neighborhood Environmental Study (NES) data, research to improve AEDT accuracy for locations "away from airport," and national airport complaint data research.

Mr. Chris Oswald asked Ms. Yaplee and Ms. Christiansen about recommendations relative to ambient noise levels in neighborhoods. Ms. Yaplee answered that ambient noise should be included in aviation noise research and noise policy review. Ms. Christiansen further recommended developing a metric that measures increase in noise and not actual noise. Dr. Hansman closed the session by stating that the public submissions would be reviewed in Subcommittee.

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**Presentation:** Subcommittee Report – NAS Operations | **Presenter:** Dr. Jim Kuchar, *MIT-LL*

Dr. James Kuchar began the NAS Operations Subcommittee briefing by providing an overview of the agenda and topics discussed during the August 2022 meetings. Dr. Kuchar described the Subcommittee's updates to the FAA's Research Landscape, and the Subcommittee's research program reviews. Dr. Kuchar indicated that the Subcommittee received several deep dive briefings on the Info-centric NAS and Data Exchange Ecosystem, an Enterprise Architecture overview, FAA Commercial Space Transportation (AST) Research Alliance, Weather R&D for Unmanned Aircraft Systems (UAS)/Unmanned Aircraft System Traffic Management system (UTM)/Advanced Air Mobility (AAM), Urban Air Mobility (UAM) concept overview, and UAS Integration Research coordination and a Center of Excellence (COE) Alliance for System Safety of UAS through Research Excellence (ASSURE) overview. He then outlined three Subcommittee Findings and Recommendations.

Dr. Kuchar presented the Subcommittee's first Finding related to Wake Re-categorization portfolios. Work to-date has mainly focused on conventional aircraft configurations and procedures. There is a need for wake research on new aircraft types, as wake may be an issue in high throughput operations. The Subcommittee recommended that the FAA begin planning to execute wake research focused on AAM operations with vertical takeoff and landing (VTOL) and short takeoff and landing (STOL) aircraft performing both conventional and non-conventional approach and departure procedures. Additionally, the Subcommittee recommended that the FAA provide regulation on longitudinal separation requirements as lateral separation between tracks on AAMs is tighter than what exists today. Dr. Hansman recommended that the FAA be more proactive in giving research requirements to NASA (he referenced the core research on guaranteed level of safety issue). The safety case to implement new technologies needs to be fleshed out.

The Subcommittee's second Finding related to Unmanned Aircraft Systems (UAS) Research. Dr. Kuchar explained that while UAS-related academic research is targeted at the COE, there remains a large backlog of fundamental UAS research. Other groups outside of the COE may have expertise to leverage in speeding up UAS research. The Subcommittee recommended that the FAA develop alternate funding mechanisms that would facilitate forming research partnerships with academic and other institutions that are not currently included in the COE for UAS. Dr. Hansman recommended that the Subcommittee identify an actionable basis for concern – document the research areas in which the COE is limited, and the additional university research capabilities the FAA should access. Ms.

Yak supported this assessment and identified an action item (see Emerging Technology Accelerator) for Subcommittee follow-up.

The third and final Finding dealt with Wrong Surface Landing (WSL) Prevention analysis. The Subcommittee recommended that the FAA conduct fundamental analyses of surveillance performance requirements and cockpit technology requirements to support WSL detection as a function of distance and geometry during approaches. There is some urgency to this recommendation due to recent WSL incidents.

Dr. Kuchar stated that the next NAS Operations Subcommittee meeting is scheduled for March, 2023. Deep dive topics will be discussed. Dr. Hansman recommended that the Subcommittee review expectations on emergent systems or applications (Artificial Intelligence/Machine Learning Certification framework, Info-centric NAS CONOPS, etc.). Dr. Kuchar stated that additional Subcommittee members are needed; Mr. Jon Schleifer stated that additional members for the Full REDAC are first priority (*Federal Register* notice expected soon); Subcommittees will be staffed at a later date.

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**Presentation:** Subcommittee Report – Human Factors | **Presenter:** Barbara Holder, Ph.D., FRAeS, ERAU

Dr. Barbara Holder began the Human Factors Subcommittee briefing by providing an overview of the agenda and topics discussed during the August 2022 meetings. The Subcommittee reviewed research accomplishments and anticipated FY 2023 research. Dr. Holder commented that the FAA organized the research by completed and planned activities which was appreciated by the Subcommittee. The Subcommittee reviewed five presentations from the FAA on various topics, including obtaining feedback on Unmanned Aircraft Systems (UAS)/Advanced Air Mobility (AAM) taskings. The Subcommittee identified three Findings and Recommendations.

Dr. Holder presented the Subcommittee’s first Finding related to competency-based training for maintainers. The recommendation was that the FAA review International Civil Aviation Organization (ICAO) documentation on competency-based training and assessment to understand what the international community is recommending and how it is different from what is currently done in the U.S. The concern was that something may be missed and that is why the Subcommittee recommended incorporating ICAO training into planned FAA training. Dr. Hansman concurred with this recommendation.

The second Finding and Recommendation of the Human Factors Subcommittee involved operational approval of new applications for the Electronic Flight Bag (EFB). EFB research should be conducted to understand the impact of using a single screen to display information where multiple items of information are needed simultaneously, especially when engaged in manual flight operations. Results of the research could be used to develop guidance for Principal Operational Inspectors in making approval decisions on satisfactory real-world operational uses for EFB systems and for evaluating human performance and operational performance associated with EFB use. Dr. Hansman stated that while the second recommendation focused on Part 121 Operations, he felt there was a bigger issue on the general aviation side. Dr. Hansman recommended expanding the second recommendation to include additional types of operations.

The third and final Finding involved using naturalistic research methods to investigate Air Traffic Controller skill degradation. Dr. Holder stated that there is an opportunity to complement previous studies to help prevent and mitigate this degradation. The Subcommittee’s Recommendation was to conduct long-term research at air traffic facilities to investigate ways to define and assess manual and cognitive skills and determine whether they are at risk for potential degradation from extensive automation use, time away from work, or another factor. Dr. Hansman asked how degradation would be measured in a naturalistic way – and asked if there could be a metric for this. He also inquired about methodologies to track and monitor the overall performance of the system and the people in the system and questioned if this would be limited from a labor-relations standpoint.

There was also discussion of Human Factors Research risk issues/concerns on a remote workforce (e.g., “dispatcher from home”). Dr. Holder stated that the Subcommittee would like to be briefed on other Human Factors-related programs/projects across the Agency to get a big picture view of all the efforts, so that the recommendations will not be duplicative. Dr. Hansman stated that there is a tendency to only want to brief the red budgeted items. He felt that the Subcommittee had the right to request additional information. Ms. Yak recommended that the Subcommittee review the budget tables within the NARP to see what other Human Factors-related programs are ongoing.

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**Presentation:** Subcommittee Report – Aircraft Safety (SAS) | **Presenter:** Terry McVenes, RTCA

Mr. Terry McVenes briefed the REDAC on the Aircraft Safety Subcommittee meetings held in August, 2022. The meetings included review of the FAA budget, follow-up from the spring meeting, and research outputs. Additionally, Mr. McVenes stated that the Subcommittee has unofficially expanded industry membership to include observers. He commented that FAA-provided read-ahead materials have been very helpful for industry to understand priorities and ask questions during the meetings. The briefings included topics such as: Advanced Damage Tolerance and Risk Assessment Methods for engine life-limited parts, improved Non-Destructive Evaluation (NDE) to prevent uncontained engine failures, additive manufacturing related to future NDE, Unmanned Aircraft Systems (UAS) automation and intelligent systems, UAS Cyber Security and Safety, Complex Digital Systems, and adapting a NAS-wide, top-down Safety Risk Model to accommodate bottom-up safety assessments.

Mr. McVenes presented the Subcommittee’s first Finding regarding UAS Cybersecurity oversight and Risk Management. He stated that there was some confusion among Subcommittee members as to what was being addressed. Clarification was requested if the research intent is to address operational risk considerations applicable to UAS.

Mr. McVenes presented the Subcommittee’s second Finding related to Cyber Safety Risk Assessments. The concern was that there was no recognition of previous efforts to address cyber safety risk assessments across the global aviation community. The Recommendation was that the FAA avoid duplication of past research. Dr. Hansman concurred with this assessment and stated that some of the research programs could expand their focus and conduct background research before moving forward. He stated that there was some degree of reinventing the wheel due to the lack of background.

The third Finding of the Aircraft Safety Subcommittee involved Non-Destructive Evaluation for uncontained engine failures. Mr. McVenes stated that the Subcommittee recommended that the FAA expand the Research Landscape to include that of fan blade integrity for blades that are a novel concept and material(s). Dr. Hansman stated that there were two pieces to the Recommendation – are the traditional materials the issue or the inspection techniques appropriate to new composite materials? Dr. Hansman agreed with this Finding but recommended clarifying the research Recommendation.

Mr. McVenes presented the Subcommittee’s fourth Finding related to innovative technologies incorporating Additive Manufacturing of composite fan/rotor blades. The Subcommittee recommended that the FAA include fan and/or rotor blade integrity for blades that are of a novel concept and material(s). Dr. Hansman stated that clarification on the research gap is needed – is it risk analysis regarding inspection or novel materials. Additionally, Dr. Hansman was unsure that blade out testing was considered as a condition in the recommendations.

The fifth and final Finding focused on the FAA response to the Subcommittee’s spring recommendation for Artificial Intelligence (AI)/Machine Learning (ML) roadmap. The Aircraft Safety Subcommittee reiterated its previous recommendation that the FAA expeditiously prepare and publish a detailed phased roadmap for Artificial Intelligence (AI)/Machine Learning (ML) Research and Development required to formulate AI/ML regulatory guidance, accounting for the FAA safety continuum and use case to accelerate deployment for lower risk aviation applications. Mr. McVenes recommended that the Agency look to Europe for its AI/ML roadmap. What kind of guidance does the FAA want to give industry to get AI/ML certified? Industry is moving forward quickly in this area

and needs to understand what the regulatory guidance will be. Dr. Hansman asked that the Subcommittee provide clarification on the roadmap – is it what industry will want to do with AI or is it the roadmap for maintaining safety? He added that he believes the requirement is to develop a process by which AI/ML is not unnecessarily restricted but focused on how it may improve safety or promote innovation (while considering and containing risk).

Dr. Hansman stated that today's research is based on deterministic requirements definition and that research on non-deterministic elements (e.g., pilots) should be considered. What is the approach for determining when critical applications are ready to be used? Dr. Hansman would like NASA to think about this issue.

Mr. McVenes closed the Subcommittee's report by stating that broader technical membership expertise is yielding results on the Subcommittee. Additionally, FAA input templates provided in advance to collect thoughts and ideas has been well received and has helped with efficiency.

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**Presentation:** Subcommittee Report – Airports | **Presenter:** Chris Oswald, ACI-NA

Mr. Chris Oswald began the Airports Subcommittee briefing by giving an overview of the agenda and topics discussed during the September 2022 meetings. Mr. Oswald stated that the portfolio that the Airports Subcommittee reviews is a bit narrower than other Subcommittees. Research briefings included Firefighting Research and the move to Fluorine-Free Foams, Integration of Unmanned Aircraft Systems (UAS) in the airport environment, Engineered Materials Arresting System (EMAS) Signage, and Concrete Research. Mr. Oswald reviewed Subcommittee observations including pilot sites of UAS for the FAA and Transportation Safety Administration (TSA) and how to integrate the two initiatives. Dr. Hansman asked if the focus was on transition from detected event to an actual event and the associated process. Several questions remain surrounding counter UAS. Key risk on counter UAS is a drone incursion that could put a transport aircraft at risk of being taken down. From an airport perspective, Mr. Oswald stated that the concern would surround both safety of flight and economic disruption (he referenced a Gatwick airport example). A question to answer is how detection technologies would be available under a federal program for Airports. Dr. Hansman stated that unless there was a Concept of Operations (ConOps), he would challenge the viability of the economic disruption. There are several concerns from an airport security viewpoint. This remains a multi-agency challenge. Mr. Oswald stated that final detection system test site (located in Seattle) would soon be up and running.

Mr. Oswald presented the Subcommittee's first Finding involving expanding the FAA's airport resiliency portfolio to include considerations beyond climate change. Other aspects of resiliency include disaster recovery, aging critical infrastructure (e.g., energy grid vulnerability), mass evacuation of the terminal, and more. The Subcommittee recommended that the FAA's Office of Airports collaborate on a research tasking to clarify the definition of airport resiliency and provide improved policy and technical guidance regarding how resiliency considerations can be incorporated into airport planning and development efforts. The example Mr. Oswald provided was airport climate resiliency as an airport capital project justification (e.g., for arctic airports). Additional guidance on policy and research is required. Dr. Hansman recommended clarification on the Subcommittee findings to expand the definition of airport resiliency. This would help airports more easily understand what would constitute a resiliency project.

The second and final Subcommittee Finding focused on Firefighting Research, specifically the transition from Aqueous Film-Forming Foam (ARFF) to Fluorine-Free foam (F3). Mr. Oswald stated that airport operators need to understand training requirements, firefighting tactics, and equipment requirements in advance of this transition. The Subcommittee's Recommendation was that the FAA utilize the ARFF Advisory Group to assist in the expedited development of an F3 transition plan that provides guidance to airport operators and ARFF personnel regarding training, equipment requirements, firefighting tactics, and other considerations.

Mr. Oswald concluded the Airports Subcommittee report by stating that the next meeting is planned for March, 2023.



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**Presentation:** Committee Closing Discussion, Findings and Recommendations, Future Actions | **Presenter:** Dr. John Hansman, Ms. Shelley Yak, and Committee Members

The Research, Engineering, and Development Advisory Committee (REDAC) agreed to schedule the Unmanned Aircraft Systems (UAS) virtual meeting for Friday, November 18th from 9:30 AM to 12:30 AM EST. There was a question about how comments from Subcommittees should be handled. Ms. Shelley Yak recommended starting the meeting with a brief plan summary and then solicit commentary from the Subcommittees to highlight issues, concerns, and suggestions.

In the general discussion of Findings and Recommendations, Dr. John Hansman recommended that FAA research focus on areas where the FAA has a unique requirement – certification and system-safety guarantees. He suggested a change to the way the Agency performs safety engineering, moving to a target level of safety.

Ms. Yak thanked the Committee and those in attendance, stating that she appreciated feedback from the Subcommittees. The Committee then discussed global comments and meeting themes, including the topics of Environment and Energy Research leadership, the growth of Artificial Intelligence (AI)/Machine Learning (ML) and opportunities for the FAA to increase its understanding of complex National Airspace (NAS) Operations to improve aviation safety and sustainability, and the tracking of NAS performance to identify opportunities for improvement and risks.

Dr. Hansman recommended that the Subcommittees review the public forum recommendations on Aviation Noise and Advanced Air Mobility/Unmanned Aircraft Management (AAM/UAM) but noted that there is no obligation to separately formally respond, as the topics are addressed in the continued evaluation of FAA Research and Development programs. Dr. Hansman pointed out that there is overlap with what the public forum raised as issues and ongoing research. Additionally, Dr. Hansman stated that the public forum process is limited to 45 minutes of REDAC agenda, so if the forum becomes more popular, a lottery to select speakers may need to be implemented.

Dr. Hansman and the parent Committee will finalize the Findings and Recommendations Report from the Summer/Fall 2022 Research, Engineering, and Development Advisory Committee (REDAC) Meeting. The report will be provided to the FAA Administrator as formal submission of advice and guidance for Agency review and future implementation, as appropriate.

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#### Action Items for Follow Up:

<i>Action Item</i>	<i>Person Responsible</i>	<i>Date (if applicable)</i>
Include the issue surrounding grant awarding in Environment and Energy (EE) Findings and Recommendations.	Ian Redhead	
Present the Emerging Technology Accelerator; solicit proposals across academia and industry.	Shelley Yak	
Provide a sustainability briefing for leadership.	Jim Kuchar	
Lack of staff issues – resource support for AEE.	Ian Redhead	

<i>Action Item</i>	<i>Person Responsible</i>	<i>Date (if applicable)</i>
Artificial Intelligence (AI)/Machine Learning (ML) certification: capture fundamental research to support this, including longitudinal studies and monitoring of overall system performance. Define an approach and metrics.	Barbara Holder	
Determine if the FAA is participating in the National Academy.	Shelley Yak	
Receive a briefing in the Winter/Spring 2023 REDAC on the Info-centric NAS and other NextGen vision documents/roadmaps to understand FAA assumptions and plans for the use and development of automation to enable the vision.	Barbara Holder	

**HYBRID SESSION**  
**FAA Headquarters/Zoom**  
**October 5, 2022**

**Final Agenda**

**Morning Session – FAA HQ (10A)**  
**5<sup>TH</sup> Floor, Conference Room – 5AB**

<b>Time</b>	<b>Topic</b>	<b>Presenter(s)</b>
9:30 AM	Welcome Address and Opening Remarks	John Hansman Shelley Yak
9:45 AM	NASA Overview	Robert Pearce
10:15 AM	FAA Environment and Energy Overview	Jim Hileman
10:45 AM	Subcommittee Report – Environment and Energy	Ian Redhead
11:15 AM	Public Forum – C. Christensen / D. Yapple	John Hansman
11:30 AM	Lunch	
	<b>10<sup>TH</sup> Floor, McCracken – Huerta Coll. Ctr.</b>	
	<b>Afternoon Session – FAA HQ (10A)</b>	
12:30 PM	Subcommittee Report - NAS Operations	Jim Kuchar
1:00 PM	Subcommittee Report – Human Factors	Barbara Holder
1:30 PM	Subcommittee Report – Aircraft Safety	Terry McVenes
2:00 PM	Subcommittee Report – Airports	Chris Oswald
2:30 PM	Committee Closing Discussion - Findings and Recommendations - Future Actions	Committee Members
3:30 PM	Chairperson’s Closing Remarks	John Hansman
4:30 PM	Adjournment	

## List of Attendees

First Name, Last Name	Affiliation
Ludovic Aron <i>(virtual)</i>	EASA
Beth Arnz	Changeis
Dave Atwood <i>(virtual)</i>	FAA
Jodi Baker <i>(virtual)</i>	FAA
Joseph Bertapelle <i>(virtual)</i>	Airlines Consultant
Caprice Brown <i>(virtual)</i>	FAA
Josh Larson <i>(virtual)</i>	ALPA
C.L. Christensen <i>(virtual)</i>	Public Forum Participant (AICA)
Nancy Clarke	Changeis
Chinita Roundtree-Coleman	FAA
Thomas A Van Dillen <i>(virtual)</i>	FAA
Colleen Donavan <i>(virtual)</i>	FAA
Hossein Eghbali <i>(virtual)</i>	FAA
Barbara Esker <i>(virtual)</i>	NASA
Jorge Fernandez <i>(virtual)</i>	FAA
Jeff Gardlin <i>(virtual)</i>	FAA
Tara Holmes Gibson <i>(virtual)</i>	FAA
Rich Golden <i>(virtual)</i>	FAA
Dave Guy	FAA
Carla Hackworth <i>(virtual)</i>	FAA
Dr. John Hansman	Massachusetts Institute of Technology (MIT)
Pete Harding	FAA
Patricia Hiatt	FAA
James Hileman	FAA
Sabrina Saunders-Hodge <i>(virtual)</i>	FAA
Barbara Holder	Embry-Riddle Aeronautical University (ERAU)
Christine Joseph <i>(virtual)</i>	House – Science, Space, and Technology
Bill Kaliardos <i>(virtual)</i>	FAA
Don Kauffman <i>(virtual)</i>	Honeywell
Patrick Kong <i>(virtual)</i>	FAA
Jim Kuchar <i>(virtual)</i>	MIT Lincoln Laboratory
Josh Larson <i>(virtual)</i>	ALPA, E&AS
James Layton <i>(virtual)</i>	FAA
Todd Lewis <i>(virtual)</i>	FAA
Chris Loring <i>(virtual)</i>	FAA
Andres-Jose Matos <i>(virtual)</i>	Guideposts Strategies
Terry McVenes	RTCA
Monique Moore	FAA
Nick Nadarski <i>(virtual)</i>	GAO/House Homeland Security
Eric Neiderman	FAA
Mark Orr	FAA

First Name, Last Name	Affiliation
Chris Oswald	ACI-NA
Mike Paglione ( <i>virtual</i> )	FAA
Robert Pearce ( <i>virtual</i> )	NASA
Victor Quach ( <i>virtual</i> )	FAA
Ian Redhead	KCMO
Larry Reising	FAA
Doug Rodzon ( <i>virtual</i> )	FAA
Jon Schleifer	FAA
Paul Strande ( <i>virtual</i> )	FAA
Ronald Stroup ( <i>virtual</i> )	FAA
Steve Summer ( <i>virtual</i> )	FAA
Anthony Tvaryanas ( <i>virtual</i> )	FAA
Suellen Wagner ibook ( <i>virtual</i> )	Public Forum Participant (Studio City for Quiet Skies)
Shelley Yak ( <i>virtual</i> )	FAA
Darlene Yaplee ( <i>virtual</i> )	Public Forum Participant (AICA)
Phil Yeung ( <i>virtual</i> )	FAA
Trish Hiatt	FAA
Fabio Grande	FAA
Kathy Abbott	FAA
Kim Pyle	FAA
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