

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

## HYBRID SESSION

Wednesday, April 17, 2024

### Meeting Minutes

Federal Aviation Administration (FAA) Headquarters  
800 Independence Ave, SW, Washington, DC  
MacCracken/Huerta Collaboration Center, FOB 10A, 10<sup>th</sup> Floor

<b>Purpose</b>	REDAC Findings and Recommendations on the FY 2026 R&D Portfolio
<b>Facilitators</b>	<ul style="list-style-type: none"><li>• Dr. Robert 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. <i>Changeis</i>

**Presentation:** Welcome Address and Opening Remarks | **Presenters:** Robert John Hansman, *REDAC Chairperson, Massachusetts Institute of Technology (MIT)*, and Shelley Yak, *WJHTC Director and REDAC Executive Designated Federal Official, FAA*

Dr. Robert John Hansman opened the meeting with a brief introduction. He commented on the large number of in-person meeting attendees and energy in the room, stating that COVID-19 was definitely in the past. Ms. Shelley Yak announced the public meeting notice posted in the *Federal Register* on March 28, 2024, as required.

**Presentation:** Public Comments – Aviation Impacted Communities Alliance (AICA) |

**Presenter:** Darlene Yaplee, *Co-Founder of AICA*

Ms. Darlene Yaplee reviewed AICA’s formal comment to the Full Committee based on its FAA Noise Policy Federal Register comment, which received 643 endorsements. She presented key points that she plans to make at the June 2024 NOISE-CON entitled “Realizing a 21<sup>st</sup> Century Noise Policy.”

In summary, Ms. Yaplee said that current FAA noise policy does not reflect the 21<sup>st</sup> century airspace environment. Although aircraft are quieter than decades ago, the noise footprints have changed under the NextGen concentration of aircraft, coupled with a greater number of

operations. Airframe noise, not engine noise is now the dominant noise for 50% on arrivals. It is AICA's recommendation that airframe noise get as much or more attention than engine noise.

Ms. Yaplee then explained that more research on the accuracy of the Aviation Environmental Design Tool (AEDT) is needed for communities away from airports now that there are NextGen corridors. This is because AEDT predictions are used to assess noise for significant impact decisions, formulate the Neighborhood Environmental Survey (NES) national curve, and inform follow-on research related to the FAA's future noise policy.

The next point was a recommendation to use Analyzing N-Above Ambient (how many aircraft above ambient noise) as a better metric to measure noise given the large scatter, data variability of community survey data on annoyance. Finally, while acknowledging that no single noise metric can cover all situations, Ms. Yaplee stressed that 21<sup>st</sup> century metrics must represent communities' lived experience while meeting the Aviation Safety and Noise Abatement Act of 1979 (ASNA) requirements.

Finally, Ms. Yaplee illustrated "new thinking" for a 21<sup>st</sup> century noise policy for Committee consideration: address two distinct noise environments (vicinity to airports and overflight communities), use the same metric for decision-making and understanding, use count of events to represent communities lived experience, recognize that ASNA requires a single system not a single metric, and establish error bars on modeled noise for significant impact decisions. Dr. Hansman thanked Ms. Yaplee for her comments.

**Presentation:** FAA NextGen Address | **Presenter:** Paul Fontaine, *Assistant Administrator for NextGen, FAA*

Mr. Paul Fontaine addressed the Full Committee, stating that the Agency is in the middle of the Reauthorization process and is working with its Congressional partners to enact a long-term FAA Reauthorization Bill. House and Senate opinions vary and differ. Mr. Fontaine explained that the Agency has been supporting requests for technical assistance from Capitol Hill and he is interested to see how the bill plays out. Regardless, he emphasized that the NextGen era will wind down in the coming year. The Agency's focus is on the future – supporting the "what next" questions. "What next" topics will be discussed at the Full Committee and will include diverse operations, UAS Traffic Management, drones, Commercial Space, and others.

Mr. Fontaine emphasized the constant change in the aviation industry, referring to the advent of drones, which are predicted to number 2.2 million annually by 2030. There are regulatory pacing challenges from an Agency standpoint. He expressed that the AVS organization is doing a great job of managing Unmanned Aircraft Systems (UAS) integration activities. Former FAA Administrator Billy Nolen formed the Innovate 2028 Team to manage UAS integration. Innovate 28 addressed how, as applicants come out of certification process, they are integrated into the NAS and put into operation. Mr. Fontaine explained that this is a tremendous change to how the system looks today and integration challenges will involve every line of business. Beyond

NextGen, the focus will be on automation evolution and Mr. Fontaine stressed that the FAA must keep pace, citing the move to modern architectures, zero trust frameworks, etc. Additionally, upper airspace is a challenge with growing operations and FAA teams are focused on defining this at a conceptual level. Mr. Fontaine also pointed to Commercial Space operations, frequency of operations, and trends and stated that the goal is to get to a place where this is a routine NAS operation (as it is not routine today). There is lots of work to be done, which is underway and maturing, but there will always be something new to address given the frequency of change.

Mr. Fontaine referred to three phases of the NAS: the legacy NAS, the NextGen NAS, and the future NAS; in terms of the future NAS, he stated that the Agency needs to consider what this will look like and how it will be afforded. The FAA must inform stakeholders of its needs and requirements. There are lots of pieces to this, including budget and a reduction of legacy infrastructure. Mr. Fontaine publicly thanked Mr. Robert Pearce and NASA, stating that they are doing a great job of synchronizing research activities with a Whole-of-Government approach. Regarding the Whole-of-Government approach, Mr. Chris Dyer asked if there were collaborative opportunities on the Department of Energy (DOE) side regarding alternative fuel sources and Sustainable Aviation Fuel (SAF). Mr. Fontaine answered that in terms of Advanced Air Mobility (AAM)/electrification, there is an interagency working group with DOE engagement and in Sept/Oct 2024, the working group will release its first report. He added that time will tell with how industry standardization will evolve. Stakeholders are jockeying for position, but standardization is key for aviation and is starting to occur; Mr. Fontaine emphasized that it will be interesting to see how it continues to mature. Mr. Joe Bertapelle mentioned that approximately 92% of the FAA's budget goes to maintaining existing services/current operations (which is a political challenge). He asked if the REDAC is providing what is needed for NextGen and other areas. Mr. Fontaine stated that this was an interesting question but added that REDAC's focus is much broader than it used to be in terms of topics. Research and development supporting the FAA today is aligned to where it needs to be, but the challenge will be autonomy. Mr. Fontaine concluded his comments by saying that thoughts on what will be needed across the board need to be formulated (e.g., infrastructure changes to the overall system) and longer-term requirements must be defined and met.

**Presentation:** European Union Aviation Safety Agency (EASA) Research Program Overview and Artificial Intelligence (AI) Roadmap | **Presenter:** Ludovic Aron, *EASA*

Mr. Ludovic Aron, EASA representative to the U.S., addressed the Full Committee. He provided an overview of EASA's research and innovation activities, with a specific focus on Artificial Intelligence (AI). Mr. Aron explained the four types of engagements and frameworks used by EASA: Contribution Agreements (aviation requirements/authority needs that EASA must fulfill), which address research needs for its regulation agenda. The second type is Pre-Application Services, where EASA engages with industry to remove barriers to innovation (and determines what regulations need to be changed to embrace the innovation). The third type is Collaboration

Agreements, which address research agendas of member states, providing advice on regulatory framework and constraints. The fourth and final type is Service Contracts and Service Letter Agreements, which are public/private partnerships. He spoke about clean aviation and Single European Sky ATM Research (SESAR), which is a joint undertaking.

The EASA-managed projects funded by H2020/Horizon Europe (\$96B €) are examples of Contribution Agreements, which address new technologies and emerging risks. Awarded in three-year windows, EASA has 24 projects ongoing (they are close to finalization), six closed, and seven in preparation. He then provided an overview of ongoing research projects. Highlights included a big package on lithium batteries and use of electronic devices in the cockpit and storage (dealing with security impacts), environmental protection/cabin air quality, mental and physical health. The projects are wide in scope and hands-on. Projects in preparation include mapping the cybersecurity threat landscape, design of new aircraft structures, and aircraft health safety measures — all of which are relevant to what is going on in the U.S.

Mr. Aron highlighted recent and upcoming EASA research and innovation events. When a project is concluded, EASA briefs its final report in what is called a dissemination event; there are three upcoming. Regarding pre-application services, EASA just announced another which will involve engaging bilaterally with industry. He also highlighted EASA's involvement in the Clean Aviation Programme which is designed to accelerate market uptake of new technologies to decarbonize aviation. EASA is also part of the governance of SESAR 3 and will contribute to the air traffic management (ATM) master plan (strategy development/SESAR objectives). Mr. Aron then described EASA's involvement in the Alliance for Zero Emission Aviation (AZE), which is focused on hydrogen and electric aircraft. The intent is to avoid duplication and perform gap analysis to align with other worldwide regulatory bodies. The topical research reports produced are public information.

Regarding EASA's Artificial Intelligence (AI) Roadmap, Mr. Aron stated that EASA published *AI Roadmap 2.0* (May 2023), which expanded upon the initial Feb 2020 version. They are examining concrete AI use cases with aviation industry stakeholders (including those in the U.S.) with a focus on safety, security, human factors, and ethical considerations [based on European Union (EU) guidelines]. They are now entering Roadmap 2.0 Phase II and completing Phase I (which published guidance for human/machine teaming in March 2024). Roadmap 2.0 Phase II will start rulemaking activities, but Mr. Aron stressed that it does not mean the exploratory work ends. Phase III will involve future work, vision, and strategic thrust. He highlighted some key events in EASA's overview of AI program activity for 2024: EASA AI days are scheduled for July 1-3, 2024 (FAA has been invited to join). They are also launching rulemaking tasks and publishing a final research report. EASA received 900 comments from 34 stakeholders on its Level II Concept paper. EASA's MLEAP Research Project delivered an Interim report in May 2023 and the next step is to proceed with selecting metrics and tools for three AI use cases, which involves experimental, hands-on work to offer support and proof of theories with concrete use cases. The EU AI Act is a regulation in final stages of signature which will soon be formally

enacted. The next step will be to put the Act into the regulatory framework; EASA is working on this now. Mr. Aron invited the FAA to join the rulemaking task and to harmonize on the technical aspects (e.g., human-in-the-loop controlling the AI). A final decision on this rule is expected in 2027.

Dr. Hansman asked whether the results of pre-application services are public or internal. Mr. Aron stated that EASA agreed that it is up to the contractor/industry whether to make results public or not. Dr. Hansman then asked to what extent EASA is coordinating with the FAA as there are many parallels. Mr. Aron responded that they engage with FAA and NASA at different levels. They make known what their plans are to avoid duplicative work and for mutual benefit. The aim is to enhance cooperation on key topics. He did clarify that engagement is on an ad hoc basis and that there is no overall framework for research collaboration, although this is something that could be considered. Dr. Hansman mentioned that he liked EASA's process of outbriefing the research results. He also had a final question on the AI roadmap; regarding human-in-the-loop, and whether there is a separate decomposition or is it implicit in Level 1, Level 2, and Level 3. Mr. Aron answered that it is based on type of application rather than human roles. In Level 1, the AI/ML provides assistance to the human; in Level 2, there is human/AI teaming (but the human is 100% accountable); and in Level 3, there is advanced automation (but not 100% AI). There is an inherent notion of risk associated with all the levels. Dr. Hansman stated that the AI examples mentioned are operational as opposed to using AI to look at data to identify premature failures of some component. Mr. Aron stated they are looking to use AI in the cockpit, with a focus on broad processes and what the human is doing. Mr. Joe Bertapelle complemented the presentation. He asked about stakeholders, and that some results are published or not published – and asked whether this is equivalent to what is done at RTCA. Mr. Aron cited the AI Days, which are similar to technical meetings, in terms of stakeholder engagement. They also use stakeholder advisory groups/bodies, like the REDAC. Often, EASA will publish draft concept papers and solicit comments. For rulemaking, EASA uses comment response tools and dispositions them. Mr. Bertapelle questioned how start and completion dates are managed. Mr. Aron responded that they apply project management concepts, including research, rulemaking, etc. They stick to dates as much as possible, but often they are late due to a variety of factors. Mr. Bertapelle asked for additional explanation on collaboration/public funding. Mr. Aron responded that Horizon Europe is publicly funded. Also, each EU member state has a research body funded by government.

Mr. Bruce DeCleene stated that the FAA Safety Assurance Roadmap for AI will be published later this year. He remarked that there have not been any significant changes to the roadmap since his last Full Committee briefing. He added that the FAA and EASA have been working together, with effective conversations on methods of compliance. There are notable differences in the strategy however, and this is the challenge that the groups are working together to overcome. The FAA views automation levels and how they are treated as a different issue than regulation of AI and ML; these are not the only technologies that produce automation. Another

key difference between the two regulatory groups is that EASA is initiating rulemaking now; the FAA is working existing rules and has not identified any significant shortfalls yet in current rules. At a detailed level, the FAA and EASA are not finding differences in technical opinions; the differences are in the regulations. Mr. Aron stated that he agreed with Mr. DeCleene. There are concrete certification projects today; both groups are working collaboratively on these. Adaptation of certification requirements will be required. This is an impediment to innovation; time is wasted when industry does not know what will be required. There is an urgent need to define certification requirements. Mr. Aron agreed that the details are not far apart. There is too much noise and disagreements about vocabulary/what things are called. Use the language of industry whenever possible (AI/human teaming/human assurance/etc.).

Ms. Shelley Yak stated that said she was glad to have Mr. Aron speak as there is a lot of interest in this topic. She suggested continuing the conversation with Mr. Eric Neiderman on joint research collaboration. From a university perspective, Dr. Hansman stressed that there is benefit to joint EASA/FAA collaboration at the research level, although it is difficult for EU funds to go to U.S. universities and vice versa. He suggested working on the underlying development of research and standards. Mr. Ian Redhead commented that he found it interesting that the EU path to decarbonization is hydrogen and electric; in the U.S., it is focused on Sustainable Aviation Fuel. Decarbonization and hydrogen is more long-term, although it is a controversial topic. Ms. Yak suggested that EASA walk through different FAA Domains and Budget Line Items (BLIs) with Mr. Neiderman, and that Mr. Aron could discuss Environment and Energy at another Full Committee meeting.

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

Mr. Robert Pearce provided a NASA update. The portfolio is divided into four categories: Ultra-Efficient Airliners, Future Airspace and Safety, High-Speed Commercial Flight, and Advanced Air Mobility. The bulk of resources align to Future Airspace and Safety and Ultra-Efficient Airliners. He mentioned that NASA and the FAA work in partnership to ensure activity alignment. On the Ultra-Efficient Airliner side, Mr. Pearce explained that NASA's role in terms of net zero emissions focuses on enabling industry to craft efficient subsonic aircraft. It is working with the Department of Defense (DOD) to incentivize industry on the hydro wing body and has put in decades of research on these concepts. There are large benefits to supersonic, but challenges to high-speed are significant (both from an environmental and cost perspective) and there is a need to get a sonic boom down to a sonic bump for community over-flights. Mr. Pearce stated that community over-flights need to be tested; then, the community will need to be surveyed regarding noise. This testing is well underway, and wheels up is expected by fall 2024.

Mr. Pearce explained that for short-distance flights, the network matters and that lots of work is being done on electric Vertical Takeoff and Landing vehicles (eVTOLs). Industry has commented that NASA-produced tools are at the heart of their ability to develop these aircraft.

NASA is working with the FAA on how to operate an Advanced Air Mobility (AAM) network at density where safety is critical. It is also working with the FAA and industry on key site activity with Unmanned Aircraft Systems (UAS) Traffic Management (UTM)/ Beyond Visual Line of Sight (BVLOS).

NASA's Aeronautics Research Mission Directorate (ARMD) consists of five programs: Airspace Operations and Safety, Advanced Air Vehicles, Integrated Aviation Systems, Transformative Aeronautics Concepts, and Aerosciences Evaluation and Test Capabilities. ARMD pushes the next generation of ideas. Mr. Pearce commented that there is not a lot of work in hydrogen fuels currently, but they are exploring concepts with university partners. He also stated that the Aeronautics FY2025 budget request was recently released. While FY24 was equivalent to FY23, there is a small increase for the FY25 President's budget. Mr. Pearce highlighted certain initiatives, including composite aircraft manufacturing (which is not economical today) and greenhouse gas emissions (for a better scientific study of persistent contrail formation/aviation-induced cloudiness).

Mr. Pearce then spoke to the benefits of the Sustainable Flight National Partnership, with the biggest take away that next-generation transports are up to 30% more efficient. Regarding trajectory optimization, he explained that new architecture enables this efficiency, and a series of flight trials will be ongoing to 2030. There is also a pre-departure planning tool undergoing trials. Research on ultra-efficient sustainable flight is being pushed to the right due to funding challenges, however.

In terms of Sustainable Aviation Fuel (SAF) impact on contrails, NASA completed a flight campaign using a NASA DC8 (which will be retired) and will be replaced with a 777 aircraft. This research is done in partnership with Boeing and GE using 100% SAF advanced combustors. They have received European, university, and FAA feedback/data on the test, but more data is needed. Mr. Pearce then described the partnering approach for AAM technology demonstrations. NASA has good partnerships lined up and they are preparing the first Technology Capability Level (TCL) for this initiative. He then described aviation operations in support of wildfire management. Today, operations are very manual and completed in Visual Flight Rule (VFR) conditions which limits the impact. Modern technology can do more for the wildfire manager, with data integrated into decision support tools. The TCL process will be used for this work as well to push the boundary of autonomy while combating wildfires worldwide. Dr. Hansman commented that he was glad to see NASA coordination with the FAA on the operations side.

**Presentation:** Aviation Safety Research Strategy | **Presenter:** Bruce DeCleene, *Director, Office of Senior Technical Experts, FAA*

Mr. Bruce DeCleene stated that his presentation is intended to be a formal request for REDAC input to the Aviation Safety (AVS) Research Strategy. He emphasized that the strategy intent is not limited to FAA-funded research, but across the aviation sector (industry, other government

entities, academia), answering the question of how research can help drive safety forward. What are the long-term strategic goals and how should the FAA align with other stakeholders on the strategic goals. The objective is to use a REDAC-vetted aviation strategy to guide future investments in aviation safety, and to inform budget requests in FY26 and beyond.

Mr. DeCleene noted the misconception that the strategic thrusts focus only on FAA research. His intent is to lend an FAA voice to a broader conversation – what are the strategic drivers of the aviation community. Strategic thrusts aim to identify important problems and the direction the Agency wants to move; there is no destination yet (which is the whole idea of research). Mr. DeCleene is trying to define the direction and get acceleration. Another misconception is that all FAA research should align to a strategic thrust. Mr. DeCleene stated that strategy is not everything and some priorities will fall out of the strategy. The idea is to pick important problems and figure out how to work those problems together.

Mr. DeCleene shared that a draft document has been developed, containing the AVS scope, and ten strategic thrusts. He has briefed several Subcommittees on the thrusts (adding that there should be another thrust on Cybersecurity, but it was not yet ready). He would like REDAC to engage with AVS on the draft strategy and improve it. The request is for REDAC to review and make recommendations for updates – are there missing priorities, are some not as important, etc. Other areas for feedback include the vision for each strategic thrust, the strategy to get there, and the schedule expectations (e.g., a two-year vs. 20-year project). Ideally, Mr. DeCleene would like input by the Summer/Fall REDAC meeting. He announced that Mr. Ron Stroup is dedicated full-time to this initiative. Mr. DeCleene envisions collaborative engagement with REDAC between now and the Summer/Fall REDAC.

The FAA has identified ten strategic thrusts: (1) Operational Safety, (2) Safety Analytics and Risk Synthesis, (3) Future of Oversight, (4) Emerging Entrants, (5) Sustainable Flight, (6) Public Health Preparedness, (7) Increasing Automation and Complexity, (8) Digital Engineering, (9) Artificial Intelligence, and (10) Structure, Materials, and Manufacturing. Mr. DeCleene concluded his remarks with a rhetorical question - how can the FAA support REDAC to provide good feedback.

Dr. Robert John Hansman replied that his one meta question is what is the objective? The system is safe which is a good thing. If Air Traffic Operations change, the Agency is limited by the ability to guarantee safety and not degrade the system. Is the objective to maintain system safety while improving overall performance of the system? Mr. DeCleene replied that there are four main motivations in each thrust: improve safety, certification readiness (i.e., the predictability of demonstrating something is safe to bring into service), continuous improvement (which is aligned with EASA research (lower cost to establish safety/shorter time/more thorough)), and the fourth motivation is public good. Mr. DeCleene said the scope does not include air traffic changes, and that the focus is on the external community. Dr. Hansman stated that safety is an objective, but regarding innovation, safety is a constraint as it is difficult to make improvements

to the system when all are worried about degrading system safety. This is something to think about long-term. Mr. DeCleene concluded his comments by saying there is a need to understand the current system and the level of safety that has been achieved.

Dr. Hansman then opened the floor for comments from the Full Committee to ask if REDAC members want to support the strategy and how could it be done. He said that there is a history of a similar request: a task force on controller training and awareness. There are three structural options – since it is a Safety strategy, let the Aircraft Safety Subcommittee do a review, but there are cross-cutting factors (Human Factors, NASA, Weather, etc.). Another option would be a separate task force with REDAC Subcommittee volunteers. A third way would be to have each Subcommittee review the strategy separately. Ms. Shelley Yak stated that she and Mr. DeCleene have worked closely together on the strategy, that Strategic Outlook for Aviation Research (SOAR) charts are a component of it, but the strategy takes it a step further. She added that there will be domain-based SOAR charts by the Summer/Fall REDAC, and the charts will also be rolled out as part of the FY26-FY30 National Aviation Research Plan (NARP).

Dr. James Kucher (NAS Operations Subcommittee) stated that he is very interested in participating as Mr. DeCleene briefed his Subcommittee last month. He suggested coordinating with the FAA Landscapes framework and that the most efficient way to execute this ask is a task force comprised of Subcommittee members, who reach back to individual Subcommittees as needed for support. Mr. Chris Dyer [Aircraft Safety Subcommittee (SAS)] also stated that he supports this effort, has already discussed the idea with Mr. DeCleene and his Subcommittee constituents, but is concerned about the timeframe. SAS could lead this with help from other Subcommittees, but he wants to do what is most efficient. Dr. Barbara Holder (Human Factors Subcommittee) had Mr. DeCleene present at her Subcommittee. She is interested in providing feedback and would prefer to review the strategy as a Subcommittee, dedicating time in meetings for discussion. Dr. Hansman agreed that it would be good to have cross-pollination, but the timeframe is difficult (referencing that UAS took one year). Another option would be an initial review by Subcommittee(s) and then create a task force. Mr. Chris Oswald (Airports Subcommittee) added that he has a limited number of people on his Subcommittee to dive into this. Mr. Ian Redhead (Environment and Energy Subcommittee) stated that his Subcommittee has not yet received the AVS briefing.

Dr. Hansman summarized the mixed response from Subcommittees, acknowledging that there is interest and availability to make this happen. He added that while the Subcommittees do not have to meet Mr. DeCleene's timeline, participation of all Subcommittees is needed. A task force model or SAS leadership (if enough critical mass) would make sense. He suggested approaching each of the Subcommittees for volunteers with interest in the strategy. Ms. Yak added that the AVS strategy could be distributed to the Subcommittees by the end of the week. She recommended either an agenda item at the next Subcommittee meetings or a special day for interested parties to examine this; not necessarily an entire Subcommittee conversation but the "task force" could report out to the Subcommittees. Dr. Hansman added that to do this right, it

needs to be a dedicated effort. Float the idea through each of the Subcommittees to see who would be interested (knowing that interested parties can be supplemented from outside REDAC). Mr. DeCleene said that so far in conversations, the level of engagement changes depending on the research thrust/topics of interest. He offered to help schedule the meetings, voicing that if the effort is totally dynamic, it might fall apart. A core group interested in all 10 thrusts is needed. Ms. Yak questioned whether a deep dive in each thrust area is needed. Mr. DeCleene responded that each thrust contains an associated vision/objective/strategy/schedule and suggested a thrust-by-thrust review. Dr. Hansman also suggested that Mr. DeCleene schedule workshops for each REDAC Subcommittee, thrust topic by topic. He added a meta question – are there missing thrusts? Mr. Robert Pearce recommended a couple-day workshop to work through all the tasks; suggesting that this would be easier to do. Mr. Dyer agreed with Mr. Pearce. The first question to be answered is how many will volunteer to do this; then, work with that. Mr. Joe Bertapelle questioned whether there are other entities to review the strategy document other than REDAC. Mr. DeCleene answered that his preference is the support of REDAC Subcommittee volunteers in a workshop format.

**Presentation:** Subcommittee Report – Human Factors | **Presenter:** Barbara Holder, *Embry-Riddle Aeronautical University (ERAU)*

Dr. Barbara Holder provided an update on the Human Factors Subcommittee meetings, which took place in March 2024 at FAA HQ (while it was a hybrid meeting, most members attended in person). She gave an update on topics reviewed during the meeting. Mr. Bruce DeCleene provided an update on the AVS research strategy, which generated lots of discussion. MITRE presented research on digital flight deck alerting systems, which members were excited to see in the list of topics, but the project is not confirmed. This is a gap in the portfolio and a complex research area, which would take several years to complete. The Subcommittee offered two Findings and Recommendations (F&Rs): (1) prioritize advance flight deck research alerting systems, and (2) prioritize aviation maintenance Human Factors research (as the maintainer workforce has been traditionally under-represented), a gap that the Subcommittee has noted for some time. The Subcommittee requested a briefing on Artificial Intelligence/Machine Learning (AI/ML) in FAA software and systems as incoming pilots are lacking expertise. The next Subcommittee meeting will be held in August 2024 in the DC area.

Dr. Robert John Hansman asked for more information on why the guidance for Flight Deck Alerting Systems was out of date. Dr. Holder emphasized that these systems are 20 years out of date. New aircraft are using advanced technologies for which there is no modern guidance about how they (e.g., Advanced Vision Systems) will be integrated into the flight deck. Operators are also planning to leverage technologies from other suppliers. Ms. Kathy Abbott stated that today there are umbrella messages, combining alerts/different alerting levels, and no guidance at all. Dr. Holder emphasized that the challenge is to get alerting information in a form that is usable. She said that the concern is the alerting structure and the interface. Dr. Hansman stated that the recommendation is general to what the real concern is; he suggested making the F&R more

specific to make the recommendation more powerful. Mr. Chris Dyer said that the Aircraft Safety Subcommittee also had a conversation about this topic but believed it was better left with Human Factors Subcommittee.

**Presentation:** Subcommittee Report – Aircraft Safety (SAS) | **Presenter:** Chris Dyer, *Pratt & Whitney*

Mr. Chris Dyer reported that during the March meetings, the Aircraft Safety Subcommittee received a briefing on the AVS Cybersecurity and R&D Strategies from Mr. Bruce DeCleene, an FAA Budget Update from Ms. Tennille Blackwell, and an Introduction to the FAA Research Portfolio from Mr. Mark Orr and Mr. Dave Atwood (specifically Aircraft Safety Assurance, Digital Systems and Technologies, and Environment and Weather Impact Mitigation). The Subcommittee offered four Findings and Recommendations (F&Rs): (1) adding Cybersecurity to future thrusts, (2) detection of bleed air contaminants, (3) leveraging FAA Centers of Excellence (COEs), including increasing their visibility and funding, and (4) a process for the COEs to propose R&D projects to the FAA and REDAC for consideration. Mr. Dyer pointed out that several Subcommittee members did not know how the COEs worked and there was good dialogue at the March meeting on this topic. Mr. Dyer added that the Subcommittee appreciated the efforts around critical thrusts as the landscape changes daily. He mentioned the integrated efforts around regulatory organizations and other government agencies. Mr. Dyer concluded his remarks by stating that the next Subcommittee meeting will be in August 2024 at the William J. Hughes Technical Center (WJHTC).

Dr. Robert John Hansman wanted to discuss the COEs based on the F&Rs. He observed that ASCENT COE (focused on alternative jet fuels and the environment) Is working very well, with good engagement, direction, and plenty of industry interest/matching funds. He contrasted ASCENT with PEGASAS, the General Aviation (GA) sustainability COE; industry has no money for this and there is not much interest. Dr. Hansman emphasized the totally different dynamic between the two and how this is problematic. Dr. Hansman stated that, in ASCENT, it is not the universities proposing what the work should be, it is the FAA's Office of Environment and Energy determining the requirements. Other COEs are more problematic, and this is the bigger issue. The COE has become the default by which most of the university/FAA research occurs. Dr. Hansman stated that it is hard for universities outside of the COEs to work with the Agency on research. He acknowledged that it is an interesting topic, but a deeper issue in terms of how to get and maintain healthy relationships with the university system. Mr. Dyer added that the difference is the topic. GA will not get a lot of funding as there is a misalignment of research sponsors/requirements development and the topic itself. In AVS, research requirements come from many different areas and are problem driven. Dr. Hansman believes that there is an over focus on COEs, and that the FAA should decouple from that. He suggested that the Agency go to the best players in research based on FAA priorities. Ms. Shelley Yak agreed that the COEs and the grants program have changed a lot over the years. She suggested a briefing about COEs, grants, requirements gathering and transparency at the Summer/Fall REDAC. Dr. Hansman

asked a rhetorical question about how to get emerging proposals from universities to create innovation. He concluded that the relationship between universities and government relating to aviation is not as healthy as it should or could be.

**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 February 2024 meetings. He emphasized that he appreciated Mr. James Layton and teams; all have been incredibly helpful to the Subcommittee. Mr. Oswald also thanked Ms. Chinita Roundtree-Coleman for making the Subcommittee’s job easier. He mentioned two major themes for the February Subcommittee briefing – safety projects and accommodation of new entrants, with a half-day dive into pavements.

From an observation’s standpoint, Mr. Oswald cited unrepresented stakeholders and key emerging technologies, identifying where help is needed (e.g., Vertiports Design and how to handle in urban areas). He also mentioned that operator elements and construction stakeholders (for the safety component) are missing on the Subcommittee. One Finding and Recommendation (F&R) came out of Subcommittee discussion: explore Engineered Materials Arresting System (EMAS) technologies and expand the range of EMAS solutions approved by the FAA. Mr. John Dermody said that EMAS systems must demonstrate specific performance standards. Then, the FAA determines whether the EMAS product meets the requirements (there are buy American requirements, but most buying decisions are left to the free market). Dr. Robert John Hansman asked about EMAS and degradation. Mr. Dermody explained that when exposed to the weather, EMAS strength is pretty good, but moisture degrades it over time. The next Airports Subcommittee is scheduled for July 2024.

**Presentation:** Subcommittee Report – Environment and Energy | **Presenter:** Ian Redhead, *Unison*

Mr. Ian Redhead briefed the Full REDAC Committee on the Environment and Energy Subcommittee meetings held in February 2024 at DOT Headquarters. He stated that he is happy to have Ms. Julie Marks (FAA Executive Director, Office of Environment and Energy) and Dr. Anna Oldani (FAA Chief Scientist and Technical Advisor, Office of Environment and Energy) on the team. Mr. Redhead added that while the FAA team is doing a good job of maintaining a balanced R&D Portfolio, the Subcommittee does not have the participation that it formerly had. The Subcommittee presented five Findings and Recommendations (F&Rs) to the FAA: (1) Maintain a leadership role in SAF development to ensure that rulemaking will be beneficial to U.S. industry, (2) allocate robust funding for public/private partnerships (e.g. Continuous Lower Energy, Emissions, and Noise (CLEEN), Commercial Aviation Alternative Fuels Initiative (CAAFI), and Center of Excellence for Alternative Jet Fuels and Environment (ASCENT)) to continue research advances, (3) maintain a global leadership position at the International Civil Aviation Organization (ICAO) Committee on Aviation Environmental Protection (CAEP) in

order to influence policy and rulemaking, (4) prioritize noise research given the amount of new entrants into the NAS, and (5) streamline the approval and award process for grant programs.

Ms. Marks reiterated the last recommendation and spoke about grant package delays – and finding a path forward. She cautioned about the risk that delays in awarding grants can cause — funding may dry up which would cause a lack of student talent to perform needed research. Ms. Marks stated that Dr. Oldani came from a university program. She also suggested tracking students as part of the ASCENT program to obtain information about where they end up (public sector, industry, etc.); this is critical workforce development. Dr. Oldani added that she believes REDAC provides a great opportunity to get critical feedback on the work her group is doing and where the focus should be.

**Presentation:** Subcommittee Report – NAS Operations | **Presenter:** James Kuchar, *MIT-Lincoln Laboratories*

Dr. James Kuchar began the NAS Operations Subcommittee briefing by providing an overview of the agenda and topics discussed during the March 2024 hybrid meeting. A variety of standard and new topics was covered. The meeting included five invited briefings – Artificial Intelligence (AI) certification framework (which is included in the Findings and Recommendations (F&Rs)), an Innovate 28 update, an overview of the ability to estimate turbulence using Automatic Dependent Surveillance Broadcast (ADS-B) vertical rate data, an overview of the FAA Aviation Safety Research Strategy, and a Wisk briefing on its Advanced Air Mobility (AAM) vision. The Subcommittee presented four F&Rs to the FAA: (1) research efforts conducted under AVS (AI Roadmap) should be closely and strategically coordinated with efforts under ANG and Human Factors Artificial Intelligence (AI)-related research, (2) consider operational impact when determining the degree of rigor to be applied in its AI/Machine Learning (ML) certification process for traffic management applications, (3) enhance and coordinate AAM-weather-relevant research with in the FAA weather program and Unmanned Aircraft Systems (UAS)/AAM Integration program to develop appropriate guidance for AAM weather information providers, and (4) expand research on performance standards for weather information in regions remote from observation systems. Dr. Kuchar also communicated topics that the Subcommittee would like to examine in the September 2024 meeting.

Dr. Robert John Hansman questioned recommendations 3 and 4. He stated that they sound good, but he is not clear on the specific weather requirements for AAM operations. Is it a microenvironment issue on turbulence? Dr. Kuchar answered that the recommendation was intended to set requirements for weather needs. Small UAS (sUAS) require more accurate wind information at lower altitudes; it is still limited to visual line of sight. But as they get into longer-range missions beyond visual light of sight, more information for small UAS is needed. The intent was to get ahead of the issue. Dr. Hansman added he is having difficulty understanding the concept of operations for high-resolution data; what does an operator do with that kind of data and who will pay for the system just for sUAS.

**Presentation:** Committee Closing Discussion: Findings and Recommendations, Future Actions, and Chairperson’s Closing Remarks | **Presenter:** Robert John Hansman and Committee Members

Dr. Robert John Hansman summarized the meeting meta topics and themes. There is general awareness of Artificial Intelligence/Machine Learning (AI/ML) applications (and that it crosscuts several Domains), there is Full Committee interest in supporting the AVS development strategy (although how to execute remains to be determined), and the issue of Cybersecurity. Dr. James Kuchar said it is important for the Safety Subcommittee to address Cybersecurity. Mr. Chris Dyer recommended a near-term, Cybersecurity “thrust” to expand over time. He said this would allow the Agency to stay ahead of the topic and partner with other government organizations to gain insight. Dr. Hansman said generally there has been a strategy to control the entire ecosystem to minimize risk. Mr. Bob Pearce said NASA as an Agency is also weighing compliance vs. risk management. Dr. Hansman said Cybersecurity is an operational issue that the FAA needs to figure out, and there is both need and value for Cybersecurity research, which will become more important over time. He is not sure that the Agency has the people to perform that research. Mr. Bruce DeCleene added that cybersecurity risk is due to new entrants and the conventional techniques to protect systems against “bad actors.” He also wondered what industry will need to get FAA approval that its cybersecurity systems are robust and adequate. Mr. Ian Redhead added that under the Department of Homeland Security, there is the Cybersecurity and Infrastructure Security Agency (CISA); airports and cities are increasingly requiring contractors to comply with its requirements. He wondered what is special about airplane vulnerability (e.g., air traffic control, flight systems) and what are the approval/certification processes for these types of systems (autonomous operations). Mr. DeCleene responded that CISA does not cover the aircraft. The FAA works with Occupational Safety and Health Association (OSHA) and the U.S. Environmental Protection Agency (EPA) as well, but it is the FAA pre-eminence argument. Mr. Redhead added that the grants issue persists and is a meta issue. Ms. Shelley Yak again recommended a deep dive on the grants process; she will communicate that the Full Committee is still concerned and interested to hear about progress that has been made.

The Full Committee then discussed the best path forward on support for the AVS Research Strategy. Ms. Shelley Yak reviewed the different options that had been discussed. Since the next Subcommittee meetings are July-September timeframe, and the next Committee meeting is October 9th, one idea was a workshop over several days to review the strategy and hold Subcommittee meetings in parallel. Another idea was to leave Subcommittee meetings as scheduled and have a subset/taskforce of Subcommittee volunteers meet for a two-day workshop (July timeframe). Then, the taskforce could provide an update to the Subcommittees at the summer meetings. Mr. DeCleene wondered since it is a REDAC workshop, could the meeting be hosted by a REDAC company; Ms. Yak countered that there are restrictions for REDAC to hold meetings outside of FAA/DOT facilities. Ms. Chinita Roundtree-Coleman stated that a request for a different meeting location outside of metro DC requires a justification and Departmental

authorization. Mr. Dyer stated that the Subcommittee members have already booked travel for meeting times as scheduled. He preferred a smaller workshop with a subset of participants outside of the Subcommittee meeting dates; Subcommittees could stick to their original plans and receive an outbrief on the AVS plan. Ms. Yak then suggested that the AVS strategy workshop take place in September, with a brief out at the Full REDAC in October. Mr. DeCleene suggested that if the workshop was in June/July, his team could synthesize the information for the Subcommittees. He then asked who within REDAC would be the strategy point person. Mr. Dyer offered to co-lead with Mr. DeCleene on this topic. Mr. DeCleene said he would reach out to other Subcommittees; Mr. Dyer emphasized that the sooner the better. He added that it would be good for Subcommittee Chairs to attend the workshop. Mr. Redhead wanted to review the AVS Strategy documentation since his Subcommittee had not yet received a briefing. Mr. Joe Bertapelle asked if there is a limit on number of participants; Dr. Hansman replied he was not worried about the number. The tasking order will be sent to Dr. Hansman and distributed to all Subcommittees. Subcommittee Chairs should talk to their Subcommittees now to gauge interest, with a minimum representation of one person per Subcommittee (but Dr. Hansman would like to have more). Environment and Energy Subcommittee can decide their level of participation, but the topic is more directly aligned to the other Subcommittees. One idea was to hold the workshop at the DOT Volpe facility in Cambridge, MA.

Mr. Dyer asked for a status on Subcommittee membership. Mr. Neiderman replied that FAA/DOT is still in the Legal clearance process; Ms. Yak added that she recognizes the uncertainty this puts on all the Subcommittees. She said the goal is to first get Full Committee membership approved, and then address Subcommittee membership (over which Ms. Yak and Dr. Hansman have jurisdiction). Ms. Yak also stated that she has been holding off on revising the structure of the Full Committee and Subcommittees; she is concerned about Digital Systems and Technologies but is open to thoughts and ideas. She also reported that SOAR charts at the budget line item (BLI) level are complete and will be rolled up to the domain-level. Many of the offices with developed SOAR charts are using them for other communications. Dr. Hansman concluded the meeting by thanking the Full Committee for their time.

#### **Action Items for Follow Up:**

<b>Action Item:</b>	<b>Person Responsible:</b>	<b>Date (if applicable):</b>
Schedule July session for AVS Strategy Review; get list of participants from Subcommittees	Shelley Yak, Bruce DeCleene	Summer 2024 - REDAC Subcommittee meetings/Full REDAC
Schedule briefing on Artificial Intelligence/Machine Learning (AI/ML) in FAA software and systems. Revise the F&R wording on flight	Barbara Holder	August 2024 - REDAC Human Factors Subcommittee meeting

<b>Action Item:</b>	<b>Person Responsible:</b>	<b>Date (if applicable):</b>
deck alerting systems to make it more powerful.		
Schedule briefing on FAA COEs, grants, requirements gathering, and transparency	Shelley Yak	October 2024 - Summer/Fall REDAC
Schedule briefings: (1) SOAR strategy, (2) AI Certification Framework applied to use case, (3) AVS AI Roadmap, (4) ASSURE COE program update, (5) Commercial Space Transportation R&D Plan update	FAA	September 2024 – REDAC NAS Operations Subcommittee meeting
Schedule deep-dive on FAA grants process	Shelley Yak	TBD
Circulate the AVS strategy support task order to REDAC Subcommittees.	Bruce DeCleene	ASAP

HYBRID SESSION  
FAA Headquarters/Zoom April 17, 2024  
Final Agenda

FAA HQ (FOB 10A)  
MacCracken/Huerta Collaboration Center, 10th Floor

<b><u>Time</u></b>	<b><u>Topic</u></b>	<b><u>Presenter(s)</u></b>
10:00 AM	Welcome Address and Opening Remarks	John Hansman Shelley Yak
10:15 AM	Public Comments	Public Representatives
10:25 AM	FAA NextGen Address	Paul Fontaine
10:40 AM	EASA Research Program Overview/AI Roadmap	Ludovic Aron
11:00 AM	NASA Overview	Robert Pearce
<del>11:20 AM</del>	<del>FAA Budget Overview</del>	<del>Tennille Blackwell</del>
11:40 AM	Aviation Safety Research Strategy	Bruce DeCleene
12:15 PM	LUNCH	
1:00 PM	Subcommittee Report – Human Factors	Barbara Holder
1:30 PM	Subcommittee Report – Aircraft Safety	Chris Dyer
2:00 PM	Subcommittee Report – Airports	Chris Oswald
2:30 PM	Subcommittee Report – Environment and Energy	Ian Redhead
3:00 PM	Subcommittee Report – NAS Operations	James Kuchar
3:30 PM	Committee Closing Discussion - Findings and Recommendations - Future Actions - Chairperson’s Closing Remarks	John Hansman REDAC Members
4:30 PM	Adjournment	

### List of Attendees

First Name, Last Name	Affiliation
Kathy Abbott	FAA
Okoineme Giwa-Agbomeirele	FAA
Beth Arnz	Changeis
Ludovic Aron	EASA
David Atwood ( <i>virtual</i> )	FAA
Rany Azzi ( <i>virtual</i> )	FAA
Timothy Barry ( <i>virtual</i> )	GE Aerospace
Mary Ann Bernacki ( <i>virtual</i> )	Diakon Solutions
Joseph Bertapelle ( <i>virtual</i> )	JB Consulting
Tennille Blackwell	FAA
Dan Brock ( <i>virtual</i> )	FAA
Andrew Brooks	FAA
Kristina Carr	FAA
Martha Chow ( <i>virtual</i> )	General Accounting Office
Nancy Clarke	Changeis
Jack Cline ( <i>virtual</i> )	Senator S. Capito (R-WV) Office
Chinita Roundtree-Coleman	FAA
Bruce DeCleene	FAA
John Dermody	FAA
Maria DiPasquantonio ( <i>virtual</i> )	FAA
Kent Duffy ( <i>virtual</i> )	FAA
Chris Dyer	Pratt & Whitney
Jorge Fernandez ( <i>virtual</i> )	FAA
Jaime Figueroa	FigAero Consulting
Paul Fontaine	FAA
Fabio Grandi ( <i>virtual</i> )	FAA
L. Bernard Green ( <i>virtual</i> )	FAA
Carla Hackworth ( <i>virtual</i> )	FAA
Mark Hale	Diakon Solutions
Robert John Hansman	Massachusetts Institute of Technology (MIT)
Barbara Holder	ERAU
Bill Kaliardos	FAA
Heidi Kim ( <i>virtual</i> )	FAA
Jim Kuchar	MIT Lincoln Laboratory
Mike Lawrence	FAA
James Layton ( <i>virtual</i> )	FAA
Nateri Madanav	NASA
Julie Marks	FAA
Monique Moore	FAA
Nick Nadarski ( <i>virtual</i> )	GAO

First Name, Last Name	Affiliation
Eric Neiderman	FAA
Kimberly Noonan ( <i>virtual</i> )	FAA
Anna Oldani	FAA
Lee Olson	FAA
Shane O'Neill ( <i>virtual</i> )	Atlantic Aviation Group
Mark Orr	FAA
Chris Oswald	ACI-NA
Alexandra Papantoniou ( <i>virtual</i> )	FAA
Robert Pearce	NASA
Anthony Pocchio ( <i>virtual</i> )	Changeis
Ian Redhead	Unison
Danielle Rinsler ( <i>virtual</i> )	FAA
Douglas Rodzon ( <i>virtual</i> )	FAA
Jon Schleifer	FAA
Purvi Sharma	FAA
Rachel Stephenson ( <i>virtual</i> )	FAA
Andrea Stevenson ( <i>virtual</i> )	ARA
Ron Stroup	FAA
Akbar Sultan	NASA
Steven Summer ( <i>virtual</i> )	FAA
Anthony Tvaryanas ( <i>virtual</i> )	FAA
Shelley Yak	FAA
Darlene Yaplee ( <i>virtual</i> )	Public Forum Participant (AICA)