

Research, Engineering, and Development Advisory Committee (REDAC)

HYBRID SESSION

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Summer/Fall Meeting Minutes

Federal Aviation Administration (FAA) Headquarters

800 Independence Ave, SW, Washington, DC

MacCracken/Huerta Collaboration Center, FOB 10A, 10th Floor

Purpose	REDAC Strategic Guidance Findings and Recommendations on the FAA’s Fiscal Year (FY) 2027 Research and Development (R&D) Portfolio
Facilitators	<ul style="list-style-type: none">• Dr. Robert John Hansman, <i>Research, Engineering, and Development Advisory Committee (REDAC) Chairperson, Massachusetts Institute of Technology (MIT)</i>• Ms. Shelley Yak, <i>FAA William J. Hughes Technical Center for Advanced Aerospace (WJHTC) Director and REDAC Executive Designated Federal Official (DFO)</i>
Note Taker	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 DFO, FAA*

Dr. Robert John Hansman opened the meeting with a brief introduction. Ms. Shelley Yak announced the public meeting notice posted in the *Federal Register* on September 25, 2024, as required. Ms. Yak thanked the Full Committee for their time and stated that the meeting would be her last as she is retiring at the end of October. She described the many improvements to the R&D portfolio made with REDAC input and assistance [including identifying R&D strategic drivers and implementing the Strategic Outlook for Aviation Research (SOAR) charts]. The work is not done yet and it will be key for REDAC to help define the FAA’s five-year plan and strategic view to deliver maximum return on research investments. Ms. Yak stated that Mr. Eric Neiderman will be her successor as the REDAC Executive Designated Federal Official. Dr. Hansman acknowledged Ms. Yak’s extensive contributions to the FAA and to REDAC and thanked her on behalf of the Full Committee.

Presentation: Public Comments – Aviation Impacted Communities Alliance (AICA) | **Presenter:** Darlene Yaplee, *Co-Founder of AICA*

Ms. Darlene Yaplee presented AICA’s formal comments on the FAA’s June 2024 NOISE-CON presentation entitled “Aviation Noise in the United States: The Current State of Federal Aviation Administration Research on Community Response.” Ms. Yaplee stated that AICA disagrees with the results of the FAA-commissioned study that the Day-Night Average Sound Level (DNL) metric is sufficient for noise modeling. AICA supports noise metrics such as N-Above and the Peak Day methodology, which it believes better capture the lived experiences of those affected by NextGen. She referred to public comments made in the FAA Noise Policy Review *Federal Register* notice that support AICA’s position. The group recommended that follow-up noise policy studies undergo peer review by subject matter experts and that REDAC guidance address not only Center

of Excellence for Alternative Jet Fuels and Environment (ASCENT) research but also other FAA-funded studies to ensure a balanced and rigorous approach.

Additionally, Ms. Yaplee encouraged the Full Committee to consider adding stakeholders directly affected by aviation noise to participate in REDAC, particularly on the Environment and Energy Subcommittee. She pointed to REDAC's role under the Federal Advisory Committee Act (FACA), which mandates that committee memberships be balanced in terms of the points of view represented and the functions to be performed.

She also spoke about the need for research at additional airports at lower DNL levels. Monitoring data from San Francisco International Airport and the Stanford Metroplex Overflight Noise Analysis group (part of the ASCENT research network) could provide valuable insights for studies related to NextGen, arrivals, departures, noise metrics, ambient noise levels, Peak Day, and more. This data would strengthen the breadth and accuracy of aviation noise impact research. Ms. Yaplee concluded her remarks by recommending that REDAC help ensure that the FAA's Noise Policy Review is thorough, transparent, scientifically sound, and informed by a broader range of research. This way, future aviation noise policies can better reflect the lived experiences of impacted communities, driving meaningful improvements in addressing noise impacts while advancing the science behind noise policy. Dr. Hansman thanked Ms. Yaplee for her comments.

Presentation: NASA Overview | **Presenter:** Akbar Sultan, *Director, Airspace Operations and Safety Program (AOSP), NASA*

Mr. Akbar Sultan presented NASA's comments on the Evolution of the NAS: Future Airspace and Safety. The NASA Aeronautics Research Mission Directorate (ARMD) is leading four transformations or drivers needed to accommodate future operations. These transformations include Diversity (new vehicles with different performance and missions, in new takeoff and landing locations), Density (increased operations and emergent aviation at lower altitudes), Complexity (new operations and interoperability), and a Human-Centric approach for provision of airspace and safety services. Mr. Sultan then described ARMD research and technology transfers to the FAA, which are based on past accomplishments to make NextGen successful. He emphasized that progress is made on an incremental basis, so it is hard to notice change (only abrupt changes are noticed). Technology transfer success stories include Terminal Sequencing and Spacing; Flight Deck Interval Management; Integrated Arrival, Departure, Surface Operations; Efficient Re-Routes Around Weather; Unmanned Aircraft Systems Traffic Management (UTM) Low-Altitude Small Unmanned Aircraft System (UAS) Operations in Dense Urban Environments; UAS Integration in the National Airspace System (NAS); and Commercial Aviation Safety Team Safety Enhancements.

Mr. Sultan explained that many of the aforementioned technology transfers are currently being trialed with industry (e.g. the Efficient Re-Routes Around Weather initiative was tested at American Airlines, saving fuel and costs). Additionally, the Small UAS UTM initiative represented the first time that small drones were flown in downtown regions, which was a big accomplishment and not an easy feat. Mr. Sultan also mentioned that the Commercial Aviation Safety Team (CAST) issued six recommendations. He stated that a large amount of NASA R&D has been used to create algorithms to mimic aircraft stalls. These algorithms were then transferred to airlines for incorporation into their pilot trainers.

He explained that the future of aviation is changing. Operations at upper altitudes and lower altitudes will involve diversity, density (with millions of operations for Unmanned Aircraft Services and Advanced Air Mobility (UAS/AAM)), and complexity of mission objectives. A human-centric approach for provision of

airspace and safety services limits scalability. A human-centered approach to safety with automation autonomy is where the future is leading. To address this, the FAA and NASA established the NAS 2040 Strategy (which Mr. Sultan said is going through a rebranding), a service-orientated architecture with more automated safety alerting. To deal with diversity and complexity, the NAS will become a highly automated environment that helps the human. The vision is a seamless integration of future diverse operations.

Extensible Traffic Management Services (xTM) will enable private entities to provide additional services to their vehicles while the FAA continues to regulate and certify the airspace. Mr. Sultan explained that this vision will move towards incorporating 3rd party services into the NAS. NASA and the FAA are jointly delivering four NAS 2040 cornerstones including xTM, integration of Emergent and Autonomous Vehicles, In-Time Aviation Safety Management System (IASMS) and the Digital Services Environment (DIP). Flight testing on the DIP platform is happening now.

Mr. Sultan explained that the NASA/FAA Research Transition Teams (RTTs), which began in 2006/2007, have been successful in highlighting and establishing an early handoff roadmap and eventual transition to the agency. The six active RTTs include Advanced Air Mobility, Digital Mesh Technology and Applications, Upper E Traffic Management, UAS Traffic Management, System Wide Safety, and Wildfire Management.

In summary, Mr. Sultan said that there has been great progress on alignment and evolution of NASA's Sky for All vision. NASA AOSP is positioned to deliver NAS 2040 capabilities and FAA mid-term objectives and is further refining the concept of operations of Sky for All. They are working to establish an autonomy roadmap and other roadmaps, by engaging with the FAA and other stakeholders. Mr. Sultan said there will be a need to move terabytes of data around safety and how to do this must be determined. Verification and Validation (V&V) is very costly for complex systems and projected to get even more expensive over time.

Dr. Hansman commented that environment and sustainability was noticeably absent on the NAS 2040 vision slide. He urged NASA to publicly and formally think about sustainability (e.g., fuel burn, contrails, noise). He suggested that NASA link to the FAA along traditional lines but also on sustainability. Mr. Sultan confirmed that sustainability is definitely part of the vision. He explained that NASA and the FAA are testing operational technologies on noise and contrails, departure and rerouting around weather, and others. Some of these capabilities are already deployed; trials are taking place this year and next year. He also referred to work on oceanic flight fuel reduction, which accounts for 40% of CO₂ emissions. Dr. Hansman emphasized that sustainability is a huge driver, as international restrictions, and market pressures to reduce environmental impact will only increase over time. Dr. James Kuchar asked about the RTTs and how formally the roadmaps are coordinated between the agencies. Mr. Sultan responded that each RTT has a focused, narrow set of requirements, with five to seven years of planned activities. Both agencies have established a Joint Management Plan (JMP) for the RTTs that define what is being delivered by each agency and when. Dr. Kuchar requested that the NAS Operations Subcommittee receive an overview of the RTT roadmaps at their spring 2025 meetings. Mr. Ian Redhead asked how NASA is sizing UAS; Mr. Sultan responded that they follow the FAA's definitions of size and focus more on where they operate (e.g., above or below 400 ft).

Presentation: AVS Safety Thrusts Perspectives| **Presenter:** Ron Stroup, *Aerospace Engineer/Technical Advisor, FAA* and Maria DiPasquantonio, *Aviation Safety (AVS) and Aircraft Certification, FAA*

Ms. Maria DiPasquantonio thanked the Full Committee for the Subcommittee feedback on the AVS Research Strategy last summer. Mr. Ron Stroup reviewed the AVS Research Strategy goals with the Full Committee

which include establishing research goals and gaining support from industry and other agencies, guiding FAA investments in internal and external research, influencing research ideation in priority areas, informing future research appropriations, and informing and leveraging research plans of NASA, other agencies, industry, and academia.

Mr. Stroup then reviewed common misconceptions regarding aviation safety. He emphasized that aviation safety is a shared responsibility. The AVS Research Strategy will provide direction and accelerate the research but will not drive all research (reauthorizations, appropriations, the FAA Administrator, and others will also influence Agency research). Mr. Stroup discussed the overview of relationships and how the artifacts drive budget formulation. He covered strategies (which include challenges and opportunities), research thrusts (which project work three to five years out), key technology roadmaps (which are paths for the safe introduction of technology), and project plans (traditional plans including resources and schedules). In April 2024, REDAC was asked to review the AVS Research Strategy to determine if the Agency was moving in the right direction (e.g., what if any themes are missing). Eleven comments were received on the Research Strategy (which were followed up by AVS) and the workshop was reworked to drive additional feedback. Mr. Stroup said that the FAA is updating the AVS Research Strategy based on REDAC feedback and will publish an initial version by the end of 2024.

Additionally, Mr. Stroup explained that during the summer AVS and REDAC Strategy Workshop, the working group decided to bundle the strategic thrusts based on how they relate to one another. Therefore, the 10 thrusts now fall into three bundles: Safety of the System Research Bundle, Certification Research Bundle, and the Improvement Research Bundle.

During the August 2024 AVS and REDAC Strategy Workshop, Mr. Stroup said that lots of good information was received; the detail was not sufficient for the Strategy itself but for the technology roadmaps and research project plans. Updates included defining scope to AVS/Office of Senior Technical Experts (AIR) responsibilities three to five years out; reducing thrusts from 11 to 10 (removed Digital Engineering as a standalone thrust but distributed it across the remaining 10 thrusts); including a Cybersecurity thrust; integrating Human Factors across all the thrusts; among others.

Discussion also covered strengthening the relationship between the National Aviation Research Plan (NARP) and the AVS Research Strategy to inform the President's budget. Mr. Stroup said that the Strategy should be completed by end of year. In summary, he concluded that AVS is moving in right direction as there is now stronger alignment between SOAR charts and strategic thrusts. Dr. Hansman said that it was good to have traceability from the Strategy Workshop to the initial version of the document (tracking additions and deletions). He did ask about how a topic made the cut to be included in the AVS Research Strategy; Mr. Stroup responded that while there was not a formal criterion on how to include topics in the Strategy, it was more tied into current Agency efforts. The FAA integrated safety across existing stovepipes tied into oversight. Dr. Hansman asked about cross-cutting topics for the strategic thrusts, including Digital Engineering and Human Factors. He is concerned that the cross-cutting topics are just fit in if they are not standalone thrusts and may be lost in the shuffle. Mr. Stroup responded that Mr. Bruce DeCleene, Senior Technical Expert, AIR, made the executive decision that Human Factors be part of the other thrusts. Since Digital Engineering is driven by companies developing products, Dr. Hansman said that the FAA must hold these products to its safety standards or risk suppressing industry by refusing to certify the products, causing tension. He added that there is specific

research which falls within the Agency's certification or approval wheelhouse. Dr. Hansman concluded his remarks by stating that he remains concerned about the cross-cutting topics.

Presentation: FAA Grants/Centers of Excellence (COE) Overview | **Presenter:** Brian Copeland, *Program Manager, Grants Management Branch, FAA*

Mr. Brian Copeland began the FAA Grants and Centers of Excellence (COE) discussion by thanking the Full Committee for support of the program and continued use of the COEs. New programs include Aviation Workforce Development (AWD), which is designed to enhance the pipeline of aviation maintenance workers and pilots, and Fueling Aviation's Sustainable Transition (FAST). Both programs came from The Inflation Reduction Act of 2022. Aviation Research is a long-running program. COE has five active programs; only colleges and universities are eligible to receive grants under COE.

Mr. Copeland explained that each COE program has different performance end dates, but all can be extended; all are currently being recompeted. COE core members as of Fiscal Year (FY) 2024 (24) are spread over most of the country. Mr. Copeland then reviewed the five COE programs and the FY24 funding for each: Alternative Jet Fuels and Environment (ASCENT) had \$34.1M in FY24; General Aviation (PEGASAS) had \$1.4M in FY24; Joint Center for Advanced Materials and Structures (JAMS) had \$14.5M in FY24; Technical Training and Human Performance (TTHP) had \$1M in FY24, and Unmanned Aircraft Systems Research (ASSURE) had \$10.8M in FY24.

In FY24, improved processes enhanced the efficiency of awarding grants. Dr. Robert John Hansman had questions on the Grants process, which was modified according to Mr. Copeland. Dr. Hansman said his understanding was that delays were due to approvals – he asked where this stood and whether grants needed to go to the Office of the Assistant Secretary for Research and Technology (OST-R) for approval. Dr. Hansman voiced concerns about substantial delays with the process and whether the Full Committee needed to make a Finding or Recommendation addressing the issue. His understanding was that the award cycle took 100 business days from when the grants office receives a notification to make an award to OST-R signature. Ms. June Green, FAA Director of Procurement Services and Grants Management, stated that since February 2024, the average grants cycle is 86 days. She said her office has spent lots of time conversing with the Department of Transportation (DOT) to reduce the cycle time. Ms. Green reiterated that her office is tracking each grant package that goes to DOT. Dr. Hansman clarified that REDAC had been hearing six months to a year for the cycle duration, which was the reason for concern. Mr. Copeland further explained that previously there were separate rounds, or bundles, for grant awards; now the awards are run continuously year-round. Bundling added more delays and created bigger award packages, which meant more time required for review. Dr. Hansman communicated that he wishes to see continued pressure on this issue to ensure the positive momentum continues. Ms. Green confirmed that her office will maintain an active conversation with DOT to stay on top of the issue.

Ms. Shelley Yak said another purpose of the briefing was to educate the Committee about the COEs so they can advocate using them in R&D projects. Dr. James Kuchar asked about the process for starting a new COE. Mr. Copeland responded that the current COEs were established by Congressional legislation. Ms. Green asked for Committee help defining requirements for when appropriate investments are needed. Mr. Ian Redhead endorsed the ASCENT COE but stressed that when there is a grants delay, it negatively impacts university students and their funding.

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

Mr. Paul Fontaine addressed the Full Committee, and recognized Ms. Shelley Yak. He said her retirement will be bittersweet for him as NextGen enjoyed a wonderful partnership with the William J. Hughes Technical Center for Advanced Aerospace. He also cited the incredible job that Ms. Yak's team does on a daily basis, and that he will miss her leadership at REDAC.

In accordance with the FAA Reauthorization Act of 2024, Mr. Fontaine communicated that the NextGen organization will be officially sunset as of December 31, 2025. Planning for this transition is underway. 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, Unmanned Aircraft Systems (UAS) Traffic Management, drones, Commercial Space, and others. The new vision beyond NextGen is NAS 2040, which will look at diverse operations beyond traditional Air Traffic Control. Mr. Fontaine explained that this is a tremendous change to how the system looks today and integration challenges will involve every line of business in the Agency. Concepts of operations have been formulated for each of the new environments. Mr. Fontaine said that the bigger initiatives will be kicked off after the presidential election and will address what NextGen looks like going forward. Mr. Fontaine explained that the FAA has launched an Autonomy Working Group to consider what more automation within the system will look like. While the group is in its infancy, it will include stakeholders outside of the FAA (e.g. NASA). The group is actively provisioning for no pilot in the cockpit and is looking at new systems coming online. Initially, the group will look for gaps against the system as it is today, answering questions of how the Agency should respond to the new challenges. In Dallas, large scale operational evaluation of UAS Traffic Management (UTM) systems has started. Additionally, the Autonomy Working Group is looking at the human interface to automation (assuming that a human is not in the cockpit). Mr. Fontaine said that an industry kickoff event will be held in the November timeframe. Currently, industry plans for automation within the system vary greatly and will need to be rationalized.

Dr. Robert John Hansman added that diverse operations will not show up in the system that fast. But he said that the driver will be sustainability concerns and system inefficiency. He asked whether there are initiatives within NAS 2040 to improve operational efficiency and sustainability and admitted that this is a “soapbox” issue for him – an emergent factor because industry will push for it, and it is currently under communicated. Mr. Fontaine responded that recently he met with MITRE's Aviation Advisory Committee where he brought up the sustainability issue. He admitted that gaining maximum efficiency out of the system will be a both challenge and a goal. Dr. Hansman stated that the sustainability piece needs to be articulated. Mr. John Dermody (Airports) added that each FAA line of business is looking at sustainability. He gave examples: solar powered lighting, sustainable aviation pavements, and more. Dr. Hansman emphasized that sustainability will be bigger than the delay crisis that kicked off NextGen. Mr. Fontaine said the NAS 2040 conversation should address how to gain maximum efficiency out of the system by combining all the emerging capabilities.

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 August 2024 at FAA Headquarters. She gave an update on topics reviewed during that meeting. Members received a briefing on two Human Factors research portfolios (Flight Deck and Air Traffic), an FAA budget overview, and a review of the Artificial Intelligence (AI) Safety Assurance Roadmap. Invited presentations

included the new FAA Aviation Safety (AVS) R&D Program, a review of Human Factors contained in the FAA Reauthorization Act of 2024, a review of Artificial Intelligence and Machine Learning across the FAA, and Runway/Surface Safety R&D. Members provided feedback on the AVS Research Strategy in the meeting, which was incorporated into the document. The Subcommittee offered four Findings and Recommendations (F&Rs): (1) new uses for Heads-Up Displays (HUDs), (2) information management strategy, (3) advanced flight deck alerting systems, and (4) complexity and new human-automation interactions.

Regarding the first recommendation on HUDs, Dr. Robert John Hansman stated that the issue is really the evaluation and approval process to enable the HUDs. He compared it to performance-based navigation in that it is hard to know what information to put in a HUD and whether the right processes exist to test and evaluate the HUDs. Dr. Hansman stated that the recommendation made him uncomfortable, while Dr. Holder said the intent was to ensure how best to roll out HUDs. Dr. Hansman clarified that he was fine with the first finding. Mr. Joseph Bertapelle questioned whether the first recommendation was more a vendor looking for a customer. He questioned how the agency will know what the right information is for a given task and/or the appropriate quantity and complexity of that information. Dr. Hansman agreed with Mr. Bertapelle's observation and compared this to the generic issue on the flight bag; how to determine limits with lots of emergent technology and the point of task saturation. For the first recommendation, Dr. Hansman concluded that more evaluation standards are needed. Mr. Akbar Sultan asked whether it would make sense to engage with the Department of Defense and manufacturers who have developed HUDs for stressful environments. Dr. Holder responded that the Subcommittee is working on this, although the military environment is very different from the commercial environment.

Dr. Hansman said he struggled with the recommendation about complexity and new human-automation interactions. There is tension between the desire to understand the complexity of these automatic flight deck capabilities and how they will impact pilot performance versus the cumulative effect of introducing all the individual pieces. The question is how this technology will change the demands on pilots. So far, Dr. Hansman stated that the focus has been flight deck centric. The deeper issue is remote operations (e.g. Wisk Aero); there is not the same situational awareness. The interfaces are different and minimum information requirements have yet to be determined. Dr. Holder said that her Subcommittee took an action for a briefing on this topic. Dr. Hansman encouraged the Subcommittees in general to be interested in what they are not being briefed on. Ms. Shelley Yak added that, under Mr. Eric Neiderman's leadership, the agency completed Strategic Outlook for Aviation Research (SOAR) charts for each R&D domain; she suggested that each Subcommittee review all the SOAR charts to see what the FAA is anticipating, to identify gaps, etc. She added that this forward-looking R&D information will also be incorporated in future National Aviation Research Plans (NARP). Ms. Maria DiPasquantonio added that, in response to Subcommittee feedback, the automation roadmap is another focus area for AVS. Dr. Hansman urged the Subcommittee to discuss autonomy. He also recommended Subcommittee sessions to examine important emerging topics that have not yet been briefed by the Agency.

Presentation: Subcommittee Report – Aircraft Safety (SAS) | **Presenter:** Akbar Sultan, *NASA*

Prior to delivering the SAS Subcommittee report, Mr. Akbar Sultan commented that the sidebar discussions and knowledge sharing at the Full Committee are hugely valuable. He added that after delivering NASA's report, he wondered whether sustainability is an individual research driver or whether the other three drivers should be done sustainably. He concluded that sustainability should be an individual driver.

Mr. Sultan reported that the SAS Subcommittee met in September at the William J. Hughes Technical Center for Advanced Aerospace (WJHTC). He added that it was great to engage with WJHTC personnel and to see some of the laboratories and the great work being done. Topics included an FAA Budget Update (including FY24 obligations that could be shifted to FY25), Overview of the Spring 2024 SAS Findings and Recommendations (F&Rs), Industry Briefings, and Researcher Briefs. The Subcommittee offered three observations and one F&R: Detection of Bleed Air Contaminants. F&Rs were based on bi-directional input between the Agency and Subcommittee. In terms of Findings, the Subcommittee noted that a short-haul fatigue study is close to completion; NASA engaged with overseas partners to provide fused data (data from pilots with specific operators), which is not available in the U.S. due to labor regulations. The Subcommittee requests a briefing on this topic at the March 2025 meeting, and a future briefing where the agency fiscal year +3 years out plans are reviewed.

Dr. Robert John Hansman asked for clarification on the recommendation and what the research should be looking for. What should be the narrow scope of the next set of research studies – should specific contaminants be examined? Or specific contaminant levels? Or Occupational Safety and Health Administration (OSHA) standards on those materials? The study under the FAA Reauthorization Act of 2018 was to determine whether nanoparticulates were making it into the cabin; the study confirmed that this is happening (e.g. deicing elements and engine oils have been linked to harmful effects so a problem may exist). Mr. Sultan said an additional study could confirm whether action may be needed. For example, should sensors be used to detect harmful contaminant levels? Are bleed air contaminants rare or routine? Today, contaminant thresholds are unknown; they must be known to be mitigated. Dr. Hansman said this is tricky; if it is an aeromedical study, it could be hard to conduct. He added that correlating reports to illness is a difficult research program. Dr. Hansman emphasized that the Recommendation has raised an important question: what is the magnitude of the bleed air contaminant issue and is there a certification issue as well? Sensor manufacturers should be given a baseline requirement and Concept of Operations (CONOPS). Dr. Hansman added that he is struggling with how to do this in a safe way. He suggested that the Subcommittee clarify the F&R; since the contaminant thresholds are unknown, approaches to get to the thresholds must be determined. Mr. Sultan added that the aeromedical aspect of bleed air has not yet been studied (including the implications against any OSHA standards that exist).

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 August 2024 hybrid meeting. A variety of standard and new topics was covered. The meeting included six invited briefings – two related to Artificial Intelligence (AI), an overview of the Strategic Outlook for Aviation Research (SOAR) framework (which Dr. Kuchar said he is pleased to see coming together and recommended an annual update in order to track changes), an Unmanned Aircraft System (UAS) and Advanced Air Mobility (AAM) integration research update, an Unmanned Aircraft Systems (ASSURE) Center of Excellence (COE) program update, and an Office of Commercial Space Transportation R&D update. The Subcommittee offered four Findings and Recommendations (F&Rs): (1) SOAR, (2) guidance for third party service provider NAS integration, (3) human factors considerations for NAS integration with third party service providers, and (4) research supporting generative artificial intelligence (AI) for aviation applications.

Dr. Hansman stated that he believed that the third Recommendation (regarding human factors considerations for NAS integration with third party service providers) may be a case of the cart before the horse. He asked whether

it was focused on a particular application because what may work in one domain may not work in another domain. Today, there are mechanisms in place to certify third party service providers. Dr. Hansman said he is concerned that bundling is happening with the F&Rs. Dr. Kuchar clarified that the Finding delegated responsibility for air traffic services, including Extensible Traffic Management (XTM) applications, Unmanned Aircraft System Traffic Management (UTM), etc. Dr. Hansman appreciated the clarification and said that today, authority belongs to the FAA. He wondered under what conditions the Agency would delegate its authority to a service provider. Mr. Fontaine said that the third Finding is to be determined; the Agency has concepts of operations, but they never survive intact. Given the variety of different AAM operators, the FAA has been creating Cooperative Research and Development Agreements (CRADAs) at the William J. Hughes Technical Center for Advanced Aerospace. The CRADA includes the R&D work as operations are integrated into the FAA airspace (he cited the example of Wisk Aero). He added that much more research must be done to consolidate all the visions (vendors have a vision, Air Traffic has a vision, etc.). Dr. Hansman reiterated that the fundamental issue is under what conditions and what is necessary for the FAA to delegate its authority (e.g., separation between two airplanes): what are the requirements? Is the delegation conditional or dynamic? Since the second part of the third Finding is human factors-related, Ms. Shelley Yak recommended expanding the Recommendation, giving guidance first and then examining the human factors considerations. Dr. Hansman added that he believed it was more valuable to examine what is needed to guarantee the system integrity, define the interfaces, and to bring the Recommendation up to a higher level. Finally, Dr. Kuchar reviewed the requested Subcommittee briefings for the March 2025 meeting, in addition to requesting documents for Subcommittee review prior to that meeting.

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

Mr. Ian Redhead briefed the Full Committee on the Environment and Energy Subcommittee meetings held in July 2024 at FAA Headquarters. He reported that the Subcommittee was very happy with the R&D portfolio presented. The Subcommittee also received a presentation from the Environmental Protection Agency (EPA), which demonstrated great collaboration between EPA and FAA's Office of Environment and Energy. The Subcommittee presented five Findings and Recommendations (F&Rs) to the FAA: (1) Continue leadership in Sustainable Aviation Fuel (SAF) development and ensure continuation of SAF-related R&D, (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.

Dr. Robert John Hansman recommended strengthening the third Recommendation by explaining why it is important to maintain a leadership position at ICAO CAEP, including what would happen if the leadership role is not maintained. He suggested articulating the disadvantages to U.S. companies and adding risks to the Recommendation.

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 July 2024 meetings at the William J. Hughes Technical Center for Advanced Aerospace

(WJHTC). He reviewed the Subcommittee observations, including referencing the Strategic Outlook for Aviation Research (SOAR) charts and how helpful they have been to identifying key priorities that need to be elevated. Mr. Oswald also addressed the need to bolster key subject matter expertise within the Subcommittee, including adding those with expertise in new entrant technologies (counter UAS technologies, and others). He requested a briefing on airport and aircraft emissions research for the March 2025 Subcommittee meetings. The Subcommittee presented one Finding and Recommendation (F&R) to the agency: evaluate how a field testing program for autonomous/automated ground vehicles could be integrated into the program's ongoing automated ground vehicle research projects (including scope to permit field testing for these vehicles).

Dr. Robert John Hansman clarified that the Recommendation is to evaluate how to run a field test on an autonomous system. He reiterated that it is a good recommendation, suggesting that the Subcommittee document the testing use cases (safety case, airport movement area, etc.). Mr. Oswald stated that the Subcommittee wants to hear back from the WJHTC to identify any barriers that would make this field testing difficult. Mr. Bruce Holmes asked to what extent have conversations occurred with European counterparts exploring autonomous ground vehicles for maintenance and inspections. He questioned if any standards and regulatory issues had been identified. Mr. Chris Oswald responded that Europe is tracking similarly to the U.S. The next Airports Subcommittee meetings are scheduled for March 2025.

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. In the formal submission of advice and guidance for Agency review and future implementation, Dr. Hansman communicated that he will make a statement about the Agency grants process, emphasizing that while cycle times are improving, attention to this topic should continue.

Additionally, Dr. Hansman highlighted the sustainability discussion, which came out of multiple Subcommittees as an emerging driver. Sustainability needs to be communicated more loudly.

Autonomy, which came up in the Human Factors Subcommittee discussion, needs to be assessed more closely along with the basis for its approval. Ms. Shelley Yak recommended that the Subcommittees schedule a brief from the Autonomy Working Group to inform their assessment.

Dr. Hansman then discussed the various Agency research frameworks that have emerged (e.g., SOAR, NARP, AVS Research Strategy, NAS 2040). He emphasized that the messaging can be confusing both internally and externally. A configuration management process should be implemented for these frameworks. While Dr. Hansman stated that this research strategy configuration management suggestion would not be put into the formal guidance letter to the Agency, it is something to be considered.

The fifth topic discussed was that the NASA/FAA Research Transition Teams (RTTs) may be obsolete. Mr. Akbar Sultan confirmed that the RTTs have been closed out and had a finite duration. Dr. Hansman suggested a strategic integration on the RTTs (he wondered why there were six). Mr. Sultan added that the RTTs are not meant to be a clearing house and have highest value when multiple groups work together (e.g., ANG/AVS/ATO work together with multiple NASA centers). Mr. Paul Fontaine added that the RTTs align to the broader framework of diverse operations integration. At the basic working level, he stated that there is lots of cross-coordination happening to support the RTT structure and for the FAA, it allows for formal technology transfer

(which Congress is very interested in). Mr. Fontaine pointed to several examples (e.g. UTM). Dr. Hansman still wondered why certain topics were missing and would like NASA to provide rationale for how both agencies define their RTTs. He suggested that they be centered around core areas to be managed. Ms. Yak suggested that NASA create SOAR charts for the RTTs.

Dr. James Kuchar asked for an update on REDAC membership. Ms. Yak responded that if any Subcommittees wish to add new members, they can do so. Mr. Sultan asked when new Full Committee members would be fully approved and vetted. Ms. Chinita Roundtree-Coleman stated that the new Full Committee members completed the White House and DOT vetting process. The next step is an Ethics Office and Legal Counsel review. Once this is complete, the Agency will release formal letters adding the new members. An optimistic timeframe for completion is six weeks. Ms. Yak told the Subcommittees to notify Ms. Roundtree-Coleman, Mr. Eric Neiderman, or Dr. Hansman if they wish to add members.

Dr. Hansman concluded the meeting by thanking the Full Committee for their time.

Action Items for Follow Up:

Action Item:	Person Responsible:	Date (if applicable):
Schedule briefing on NASA RTT roadmaps.	James Kuchar	March 2025 – NAS Operations Subcommittee meeting
Schedule briefing on Human Factors Considerations with Autonomy and Remote Operations.	Barbara Holder	March 2025 - Human Factors Subcommittee meeting
Schedule Subcommittee sessions to brainstorm R&D gaps.	Subcommittee Chairs	TBD
Schedule briefing on the Short Haul Fatigue Study in Passenger Operations.	Chris Dyer	March 2025 - Aircraft Safety Subcommittee meeting
Schedule briefing for the Aircraft Safety Subcommittee on agency fiscal year +3 years out plans.	Eric Neiderman	TBD
Obtain documents for review: Aviation-Specific responsible AI Framework, Updated UAS/AAM Integration Research Plan.	James Kuchar	Prior to March 2025 – NAS Operations Subcommittee meeting
Request briefings: GAMA: CNS roadmap for supervised flight operations of autonomous systems; future spectrum issues and research; ACY remote tower testbed status and plans; air/ground SWIM connected aircraft; AI	James Kuchar	March 2025 – NAS Operations Subcommittee meeting

Action Item:	Person Responsible:	Date (if applicable):
certification framework update; and NASA airspace operations and safety program update.		
Schedule briefing on Airport and Aircraft Emissions Research.	Chris Oswald	March 2025 – Airports Subcommittee meeting
Report from the WJHTC on any barriers that would make autonomous/automated ground vehicle field testing difficult.	TBD	TBD
Schedule a brief from the Autonomy Working Group.	Subcommittee Chairs	TBD
Create SOAR charts for the NASA/FAA Research Transition Teams.	Akbar Sultan	TBD

HYBRID SESSION
FAA Headquarters / Zoom
October 16, 2024
Final Agenda
FAA HQ (FOB 10A)
MacCracken/Huerta Collaboration Center, 10th Floor

Time	Topic	Presenter
10:00 AM	Welcome Address and Opening Remarks	Robert John Hansman Shelley Yak
10:10 AM	Public Comments	Public Representatives
10:20 AM	NASA Overview	Akbar Sultan
10:50 AM	AVS Safety Thrusts Perspectives	Ron Stroup Maria DiPasquantonio
11:20 AM	AM BREAK	
11:30 AM	FAA Grants/COE Overview	Brian Copeland
NOON	LUNCH	
1:00 PM	FAA NextGen Overview	Paul Fontaine
1:20 PM	Subcommittee Report – Human Factors	Barbara Holder
1:40 PM	Subcommittee Report – Aircraft Safety	Chris Dyer Akbar Sultan
2:00 PM	Subcommittee Report – NAS Operations	Jim Kuchar
2:20 PM	Subcommittee Report – Environment and Energy	Ian Redhead
2:40 PM	Subcommittee Report – Airports	Chris Oswald
3:00 PM	Committee Closing Discussions - Findings and Recommendations -Future Actions	REDAC
4:00 PM	Chairperson’s Closing Remarks	R. John Hansman
4:30 PM	Adjournment	

List of Attendees

First Name, Last Name	Affiliation
Okoineme Giwa-Agbomeirele	FAA
Beth Arnz	Changeis
Paul Aussendorf (<i>virtual</i>)	Government Accountability Office
Mary Ann Bernacki (<i>virtual</i>)	Changeis
Carl Bernstein (<i>virtual</i>)	FAA
Joe Bertapelle	JB Consulting
Laura Bonomini (<i>virtual</i>)	Government Accountability Office
Cris Bosetti (<i>virtual</i>)	FAA
Dan Brock (<i>virtual</i>)	FAA
Kristina Carr	FAA
Nancy Clarke	Changeis
Chinita Roundtree-Coleman	FAA
Kevin Comstock (<i>virtual</i>)	FAA
Jean Cook (<i>virtual</i>)	FAA
Brian Copeland	FAA
John Dermody	FAA
Maria DiPasquantonio	FAA
Jon Doyle (<i>virtual</i>)	FAA
Chris Dyer	Pratt & Whitney
Paul Fontaine	FAA
Peggy Garcia (<i>virtual</i>)	Government Accountability Office
James Geibel (<i>virtual</i>)	Government Accountability Office
Brandon Graham (<i>virtual</i>)	FAA
Fabio Grandi	FAA
June Green	FAA
Carla Hackworth (<i>virtual</i>)	FAA
Mark Hale (<i>virtual</i>)	Diakon Solutions
Robert John Hansman	Massachusetts Institute of Technology (MIT)
Tiayonna Hawkins (<i>virtual</i>)	FAA
Beverly Hite (<i>virtual</i>)	FAA
Barbara Holder	ERAU
Bruce Holmes	FAA
Eric Hudson	Government Accountability Office
Edward Johnson	FAA
Jim Kuchar	MIT Lincoln Laboratory
James Layton (<i>virtual</i>)	FAA
Julie Marks	FAA
Monique Moore	FAA
Eric Neiderman	FAA
Robert Ochs (<i>virtual</i>)	FAA
Vanessa Onyullo	ALPA
Mark Orr	FAA
Chris Oswald (<i>virtual</i>)	ACI-NA
Mike Paglione (<i>virtual</i>)	FAA

First Name, Last Name	Affiliation
Alexandra Papantoniou	FAA
Anthony Pocchio (<i>virtual</i>)	Changeis
Steve Rabinowitz	Government Accountability Office
Ian Redhead	Unison Consulting
John Reinhardt (<i>virtual</i>)	FAA
Lisa Smith (<i>virtual</i>)	FAA
Ron Stroup	FAA
Akbar Sultan	NASA
Rahul Tangri (<i>virtual</i>)	FAA
Lisa Thomas (<i>virtual</i>)	FAA
Kelly Wulf (<i>virtual</i>)	Relativity Space
Shelley Yak	FAA
Darlene Yaplee (<i>virtual</i>)	Public Forum Participant (AICA)