Research, Engineering and Development Advisory Committee (REDAC) MINUTES

Meeting Date and Time: *10/7/2015, 9:30am – 4:30pm* **Meeting Location** *FAA – McCracken Room, 800 Independence Avenue SW, Washington DC*

Purpose	REDAC Guidance on the FY 2018 Research and Development Portfolio and Special Task Discussions on Emerging Issues and Future Opportunities
Facilitator	Dr. John Hansman, REDAC Chairperson, Massachusetts Institute of Technology (MIT)
Note Takers	Lisa Dawson (morning session) Mervette Saadia Abdu (afternoon session)

Ms. Shelley Yak, the FAA Research and Development Executive Director, opened the meeting by welcoming all attendees and reading the public meeting announcement.

Presentation: Welcome Address and Opening Remarks **Presenters:** *Dr. John Hansman, Ms. Shelley Yak*

After reading the public meeting announcement, Ms. Shelly Yak informed the committee that Mr. Dennis Filler retired and stated that she would assume the role of acting FAA Research and Development Executive Chair. She expressed her great appreciation and respect for the REDAC Chairman and communicated that her focus will be to continue to leverage the subject matter expertise from the professionals at these meetings. She indicated that she looks forward to working with the Committee. Dr. John Hansman provided an overview of the agenda and noted that there will be some changes to the schedule for the day. NAS Ops and Environment and Energy would be trading timeslots to support the schedules of participants.

Presentation: Unmanned Aircraft Systems (UAS) Overview **Presenter***: Chris Swider*

Discussion: Mr. Chris Swider began his presentation by thanking the REDAC for the opportunity to provide a briefing on UAS research. Mr. Swider stated that he recognized the significance of UAS research and proceeded to highlight recent changes in the FAA's program organization. He reported that the UAS program has two newly appointed executives. Mr. Marke "Hoot" Gibson, Senior Advisor on UAS Integration, who reports directly to the Deputy Administrator on external outreach and education; interagency initiatives and enterprise level approach to UAS integrations efforts. The second person is Mr. Earl Lawrence, the Director of FAA's UAS Integration Office, who reports directly to the FAA Office of Aviation Safety

(AVS) Associate Administrator. Mr. Lawrence leads FAA's efforts to safely integrate UAS into the NAS with goals to define clear paths for UAS manufacturers and operators.

Mr. Swider highlighted key topics areas that underlie the scope of future unmanned aircraft research. He noted three categories of user groups—Public Operations, Civil Operations, and Hobbyists— each of which has distinct needs, considerations, and rules to enable safe operations.

Mr. Swider reported on the status of the proposed small UAS rule and indicated that the Notice of Proposed Rulemaking (NPRM) which was published on February 23, 2015, resulted in more than 4500 public comments. The FAA is working diligently to adjudicate all the comments received and expects to finalize the rule in 2016.

He also noted that FAA is continuing to process Section 333 exemption requests to enable a bridge for commercial UAS operations before finalization of the small UAS rule. FAA has a good track record for new and existing exemptions. More than 4,000 petitions received to date more than 1,800 exemptions granted. The FAA has improved processing of these requests including issuance of a Blanket COA for operations below 200 feet within visual line of sight during daylight hours and certain distances away from airports and heliports.

Mr. Swider discussed the Pathfinders initiative. He indicated that the FAA has three initiatives that were announced at the Association for Unmanned Vehicle Systems International (AUVSI) in May 2015. The purpose is to identify the safety mitigations that can lead to expanded access for UAS and inform future rulemaking. The three current Pathfinder initiatives and their objectives are:

- **CNN** – UAS in visual line of sight, urban areas over people
- **Precision Hawk** – UAS extended visual line of sight, rural areas
- **BNSF Railways** – UAS beyond visual line of sigh, rural areas.

Mr. Swider also reported on the efforts of the UAS Center of Excellence Program (COE). He and the FAA UAS COE Manager, Sabrina Saunders-Hodge, have worked very closely together since the inception of the COE University Team and expect to be fully executed by January. In his briefing, Mr. Swider listed a wide range of current and future research areas the COE will be supporting.

Questions and Comments

Jack Blackhurst asked what the UAS office was doing to educate the public. Mr. Swider responded that there are many education and outreach efforts underway but acknowledged that more can be done. He cited as one example, the UAS public service announcements.

Dr. Hansman inquired about the process for selecting focus groups Mr. Swider responded that the selection of the focus groups is a five to six month process and the three currently selected core areas were found to be the most responsive to current FAA needs.

John Dermody inquired about research on geo fencing both horizontally and vertically from the runway. Chris Swider responded that there is currently no ongoing research in this area.

Dr. Hansman asked if there is on-going research into tracking unauthorized users. Mr. Swider replied that the program office is trying to collect credible data that can be provided to local enforcement authorities.

Presentation: Subcommittee Report: NAS Operations **Presenter*:*** *Dr. Steven Bussolari*

Discussion: Dr. Bussolari began by stating the Subcommittee's summary will be based on two parts; General Observations and Findings and Recommendations. For the general observations, Dr. Bussolari stated that the Subcommittee had an extended session during the summer meeting. The Subcommittee recognizes the significant effort and substantial progress that the FAA has made in establishing a Concept of Operations for routine UAS access to the NAS. The Subcommittee was very pleased to see the degree to which the FAA has demonstrated significant flexibility in its concepts for small UAS certification and segregation of airspace for operations.

The Subcommittee found that the FAA has yet to substantially engage the UAS stakeholder community on the development of the vision and expectations for operating in the NAS. As UAS markets continue to emerge and technology capabilities accelerate, it becomes increasingly important for the FAA to reach out beyond their capable set of internal subject matter experts and include these new airspace users.

Three focus areas are chosen for exploration and prototyping (i.e. small UAS within visual line for sight, extended visual line of sight in rural areas, and beyond visual line of sight in rural areas). All contain significant limitations (i.e. through the amount of air space that can be allocated to these operations and the number of UAS that can simultaneously operate with that airspace).

Recommendations – During the budget process, the FAA should articulate the relationship between research and development associated with UAS platform safety and certification and the development and validation of operational concepts, procedures, and systems required for UAS integration in the NAS. This should be presented as an integrated program to enable budget decision makers to avoid potential budget disconnects that could unintentionally delay this integration.

Runway Incursion Reduction Program

It was noted that the National Transportation Safety Board (NTSB) recommendations often fail to address the cost/benefit assessment that should be considered in any investment decision. The FAA has not performed a benefit analysis of either the Small Airport Surveillance Sensor (SASS) or Runway Safety Area (RSA) project and cannot accurately estimate the potential safety or efficiency benefit pool available to offset the life cycle cost of the SASS or RSA projects. The decision to not include an estimate for safety benefit in the Low Cost Ground Surveillance Radar (LCGS) investment decision appears inconsistent with the investment decision associated with other safety systems such as Runway Status Lights or Airport Surface Detection Equipment, Model X (ASDE-X), where benefits were largely attributed to safety.

Recommendations – FAA should establish and consistently apply a clear policy with regard to investment decisions on airport surveillance and safety systems that establish what benefits will be included and how those benefits will be calculated. The FAA should use this policy to estimate the benefits pool available for RSA and SASS projects and compare this to a life cycle cost estimate of the RSA and SASS technologies.

Presentation: Subcommittee Report: Environment and Energy **Presenter*:*** *Dr. Mahendra Joshi*

Discussion: Dr. Joshi reported on the Subcommittee's session conducted in Washington DC on August 6th and 7th 2015. The Subcommittee's first finding reiterates that noise continues to be a significant challenge for the implementation of Performance Based Navigation (PBN) for operational efficiency improvements, which are a critical element of NextGen. The Subcommittee recommends that the operational procedure development and implementation work be continued but noted that effective community and airport engagement techniques are an essential part of the implementation. He pointed out that in addition to the recommendations made at the March 2015 Subcommittee meeting, the Subcommittee recommends the FAA initiate research to understand the additional annoyance due to the noise focusing aspects of PBN.

In its second finding, the Subcommittee commended the FAA/AEE for vigorously leveraging the efforts and working with other divisions of the FAA, other government agencies, (e.g., EPA, NASA, DOE, DOD), and industry and for utilizing available databases to advance the Environment and Energy R&D portfolio. A recent example is their use of the Medicare and Women Health Initiative medical databases to understand if there is a correlation between aircraft noise exposure and health impacts. The Subcommittee recommends the FAA continue to seek additional collaboration opportunities. With regard to using databases from other fields of study, the appropriateness and limitations of the databases to support the objectives of the study should be considered.

Dr. Joshi noted that the Subcommittee was very pleased with the successes from the Continuous Lower Energy, Emissions, and Noise (CLEEN) Program in achieving the

maturation and validation of a wide suite of technologies that will reduce noise, emissions and fuel burn from the aircraft fleet. The Subcommittee recommended the FAA continue to implement and execute the second phase of CLEEN (known as CLEEN II) to mature technologies as they will enable the achievement of the CLEEN II goals for noise, emissions, and fuel burn reductions.

The Subcommittee's third finding detailed that the Environment and Energy R&D portfolio delivered significant results and the FAA has made progress in communicating these successes, however, the Subcommittee recommended that these successes be highlighted in public communications to ensure broad visibility.

Based on the information presented by the FAA at the Subcommittee meeting, they felt the Environment and Energy R&D portfolio is reasonably balanced in terms of the resource allocation among technologies, tools, policy / standards development, sustainable alternative fuels, and Air Traffic Management (ATM) and operations improvements.

The Subcommittee encouraged the FAA to leverage efforts with Airport Cooperative Research Program (ACRP) studies such as enhanced data gathering on noise and emissions impacts. The regular evaluation of the Environment and Energy R&D portfolio should be continued with consideration of a view toward desired outcomes in 2025 and beyond.

Finally, Mr. Joshi stated that environmental impacts of Unmanned Aircraft Systems (UAS) are going to be a growing issue and the Subcommittee recommended that the FAA start plans to assess and understand the noise impact of UAS. This would include development of assessment tools and impact mitigation concepts.

Presentation: NextGen Organization Update **Presenter*:*** *Pam Whitley*

Discussion: Ms. Whitley began her presentation with an overview of NextGen improvements to date. She described the distinction between foundational, transformational, and implementation programs. She went on to describe how network enabled weather platforms integrate information from different sources which are now available on System Wide Information Management (SWIM). She also spoke about the voice switch and functional prototypes developed to date.

Ms. Whitley stated that the data communications program is moving along on schedule. The FAA is working with the airlines to test the initial data communications services and preliminary data suggests air carriers are beginning to accrue benefits. She also spoke about the Collaborative Air Traffic Management – Technologies (CATM-T) program and described it as more about strategic activities aimed at balancing traffic flow demand with available capacity.

Questions and Comments

Mr. Blackhurst asked where we were with avionics equipage, and if there were indications that the airlines were willing to cooperate.

Ms. Whitley replied that the airlines are indeed willing and she mentioned that they have visited with every airline to discuss the matter.

Dr. Hansman commented about NextGen's accomplishments, noting that there's a natural tendency to think that with NextGen, the story gets muddier.

Presentation: Subcommittee Report: Human Factors **Presenter:** *Jack Blackhurst*

Discussion: Mr. Blackhurst began by stating that there is not enough time to cover all projects in depth and thus, his goal was to provide baseline information for everyone. He stated that the Subcommittee had two findings.

With respect to Aerospace Medicine Research, the Subcommittee found that there are many advances in the field with potential aviation implications but not as much research funds available. New medical devices and treatments such as synthetic biology and biometric monitors are vulnerable to cyber-attacks. The Subcommittee recommends that the FAA closely track advances in air/space medicine and the extensive research in the field. The Subcommittee believes the FAA can leverage this research and use relevant findings in aviation operational applications.

Finally and related to a Winter 2015 finding on NextGen implementation, the Subcommittee recommends continuation of Human Factors work focusing on design and implementation of effective flight deck procedures for Performance Based Navigation (PBN), and on associated implications for design of automated flight-path management systems.

Presentation: Subcommittee Report: Aircraft Safety **Presenter:** *John White*

Discussion: Mr. John White represented Ken Hylander, Subcommittee Chair, at the meeting and presented the Subcommittee's report. The Subcommittee met for two days at the FAA William J. Hughes Technical Center to continue to build on the work of prior Aircraft Safety (SAS) meetings. Program officers presented approximately seventy (70) research "quad" charts detailing research requirements, desired sponsor outcomes, FY15 research, and upcoming critical milestones and more. They also presented deep dives in various topics including certification of advanced materials and structural technologies, dependability of increasingly complex systems, mixed UAS and manned aircraft operations, and real time system-wide safety assurance.

One of the presentations was from a European group on the Future Sky Program and it was noted that the FAA participates on their Advisory Board. They recommended that the FAA take more of a leadership role in collaboration with the European group on Aviation Safety research. Additional findings and recommendations addressed immediate needs for Additive Manufacturing Certification Support.

The Subcommittee also found there is a need for research to mitigate the impact of cockpit laser strikes. Mr. White noted that the Civil Aerospace Medical Institute (CAMI) has been addressing this issue.

Remarks

Dr. Hansman stated that while Mr. White had just mentioned the deep dives, the Subcommittee's written report did not reflect this. He suggested that the Subcommittee needs to include this in their report so that it does not fall off the radar. When making recommendations to the Administrator, it is helpful to report on the full scope of the Subcommittee's discussion

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Presentation: Subcommittee Report: Airports **Presenter:** *Alfred Pollard*

Discussion: Mr. Al Pollard represented Mr. Chris Oswald, Airports Subcommittee Chair, at the meeting and presented the Subcommittee report. The Subcommittee met on August 25 - 26, 2016 at the FAA William J. Hughes Technical Center in Atlantic City, NJ. Mr. Pollard noted the accomplishments that Airports branch staff on the varied airport safety, planning, design, and pavement projects within the research portfolio, reviewed the proposed FY2016-2017 budget and discussed potential additional work for FY2018.

Mr. Pollard summarized the four findings resulting from the Subcommittee meeting. First, the Subcommittee found that the Airport Technology Research Program is on a solid footing and supports the proposed allocations of program funds for FY2016 and 2017. The Subcommittee also believed that FY2018 project priorities are appropriate, excepting the minor comments contained in subsequent findings and recommendations in this report.

The Subcommittee recommended that the Branch staff expedite their efforts to classify projects by Research Program Areas (RPA) and provide budget and spending reports using these classifications well in advance of the Subcommittee's Spring 2016 meeting so they have ample time for review and comment.

Based on its review of the long life pavement design project, the Subcommittee found that local materials—especially aggregates—can meet FAA specifications but may result in a wide range of resulting performance. As the system moves towards more engineering based designs understanding this variability and accounting for it in the design process is critical in providing consistent long-life pavements. Thus, the Subcommittee recommends that a study be initiated to look into the variability of asphalt and concrete mix designs that meet FAA specifications.

Special attention should be paid to a range of local materials—especially aggregates—that meet national specifications that are known to have marginal performance.

Mr. Pollard reiterated the support the Subcommittee expressed in their Spring 2015 report regarding the low cost ground surveillance system (LCGSS) technology being pilot tested at Seattle-Tacoma International. He pointed out, however, that given the ongoing development of alternative surface surveillance systems, continuing reductions in the costs associated with Automatic Dependent Surveillance-Broadcast (ADS-B) transponders, and the oncoming 2020 ADS-B equipage deadline, the Subcommittee is interested in understanding the role LCGSS are likely to play at airports if and when they are available for implementation before significant additional research into these systems is conducted.

The Subcommittee thus, recommends that the Branch staff develop a Concept of Operations (CONOPs) that defines the roles and applications of the LCGSS in the National Air Transportation System given other surface surveillance programs and technology deployments that are underway, particularly surface surveillance systems that rely on ADS-B technology. The Concept of Operations should consider what unique capabilities or deployment opportunities would exist for LCGSS as well as those capabilities that are likely be duplicated by ADS-B based surface surveillance systems. Mr. Pollard stated that the Subcommittee strongly recommends increased collaboration among the FAA's research programs with NASA regarding both surface surveillance and airport surface management.

Lastly, the Subcommittee found that research is needed to develop rational overload criteria for flexible pavements (e.g., asphalt concrete pavements). The current ICAO overload criteria for flexible pavements limits overload to 10 percent above the reported pavement classification number (PCN) for rigid pavements (e.g., Portland cement concrete), the limit is five percent (5%) above the reported PCN. The research shows that the ten percent (10%) flexible pavement overload may be overly conservative for thin flexible pavements.

The Subcommittee recommends that the overload project be expanded to reevaluate the five percent (5%) overload criteria for rigid pavements and ten percent (10%) overload criteria for flexible pavements.

Questions and Discussion

Mr. Bussolari asked if there is a methodology to test local aggregates and what the end result will be. Mr. Pollard answered that he did not know.

Michel Hovan commented that they are moving to extend the life of the pavement and are aiming to expand the life of pavement to 40 years. He stated that they are looking at performance based specification on which to base additional testing.

Mr. Bussolari stated that the NAS Ops Subcommittee observation is that there is a long history of low cost airport surveillance plans but they usually end up being too expensive. The recommendation is to do the benefits analysis up front instead of focusing on the costs only.

Final Remarks

Dr. Hansman summarized the action plan and schedule for preparing and delivering the report to the Administrator. He commented that other than UAS there did not appear to be any major burning issues. Recognizing that this is a high priority issue for the Agency, Dr. Hansman said that for the next six (6) months, the Subcommittees will focus on UAS.

Members in Attendance

Jack Blackhurst
John Hansman (Chair)
Mahendra Joshi
Al Pollard
John White
Steve Bussolari

Others in Attendance

Shelley Yak, FAA
Chris Swider, FAA
Mervette Saadia Abdu, FAA
Dan Brock, FAA
Jimmy Bruno, FAA
Nancy Clarke, FAA
Lisa Dawson, FAA
John Dermody, FAA
Jaime Figueroa, FAA
Mike Gallivan, FAA
Michel Hovan, FAA
James Knight, FAA
Ralph Nicosia Rusia, FAA
Paula Nouragas, FAA
Kerin Olsen, FAA
Lee Olson, FAA
Mark Orr, FAA
Bob Pearce, NASA
Al Pollard, MAA/AAAE
Chinita Roundtree-Coleman, FAA
Rachel Seely, FAA
Chris Seher, ARA
John White, ALPA
Frank Wondolowski, FAA
Amer Younussi, FAA

Research, Engineering, and Development Advisory Committee Federal Aviation Administration (FAA) FAA Headquarters, 800 Independence Avenue, SW Washington, DC – 10th Floor Round Room
October 07, 2015

Agenda

9:30 am	Welcome Address and Opening Remarks	John Hansman Shelley Yak
	Chairman's Overview	John Hansman
10:00 am	UAS Overview	Chris Swider
10:30 am	Subcommittee Report – NAS Ops	Steve Bussolari
11:00 am	Subcommittee Report – Environment and Energy	Mahendra Joshi
11:30 am	Break	
11:45 am	NextGen Update	Pamela Whitley
12:15 pm	Lunch	
1:00 pm	Subcommittee Report – Human Factors	Jack Blackhurst
1:30 pm	Subcommittee Report – Aircraft Safety	John White
2:00 pm	Subcommittee Report – Airports	Alfred Pollard
2:30 pm	Committee Discussion - Recommendations - Future Committee Activities	John Hansman
4:00 pm	Adjourn	