Research, Engineering and Development Advisory Committee (REDAC)

October 7, 2016

Meeting Minutes

Federal Aviation Administration (FAA) National Headquarters
10th Floor Round Room
800 Independence Avenue, SW
Washington, DC 20591

Note Taker: Dennis Flath

09:00 am – Welcome and Opening Remarks

Shelley Yak (FAA, Director, FAA William J. Hughes Technical Center)(REDAC DFO), and
Dr. John Hansman (REDAC Chair; Professor of Aeronautics and Astronautics, Massachusetts Institute of Technology)

Shelly Yak opened the meeting reading the official notice and charter. Shelley turned the meeting over to the Chair, Dr. John Hansman.

Dr. John Hansman noted a smaller gathering than usual due in part to Hurricane Matthew, evacuation of some individuals and travel issues, and conflicts with other scheduled events such as the Commercial Aviation Safety Team (CAST) meeting. The meeting should provide good coverage nonetheless.

John remarked that from his perspective things were generally going well; there was supposed to be a good discussion with the Safety Committee that had to do with Process, and they would get briefing on UAS Overview. They have spent a lot of activity on UAS over the past year. They were one of many voices pushing to get things moving and John felt that things were beginning to move along.

Shelley thanked the members for their time and commitment to the Advisory Committee. Unfortunately, the Administrator was called away; and the Deputy Administrator was participating in an awards ceremony. The good news was that several of the employees were receiving Department of Transportation awards: Gus Sarkos and the Fire Safety team for their safety work with Lithium-ion batteries, and as well as one of the Human Factors personnel.

She stated that it was worth repeating that having attended past meetings of all the subcommittees and the REDAC, she was taking strides working towards a new strategic plan and revamping the NARP having already conducted three off-site meetings with Research Executives working towards that end. The next meeting was scheduled for November 17th. A construct was defined and everyone had homework assigned to bring their research areas in that construct to see if it was workable. Some tools would be looked at as well.

Shelley told the REDAC members the reason for speaking at length to this was that the NARP should be THE document that REDAC should be going to in order to see what the work that the members were advising on – as well as the tools to see the "Big Picture" and to conduct a deep dive for immersion into the details. Ms. Yak committed to the members that in the next season time-frame (February/March) she would return to the various meetings and present what the construct was supposed to be; what the tools look like to get input that they're going in the right direction for the FAA and the members' needs.

The Chair articulated a Thank You in appreciation of the time Shelley had dedicated to the subcommittees. John went on to confess that he never looked at the NARP; a fact Shelley remarked was her biggest 'take-away' because it was never mentioned. John explained that the reason was lag time between approvals, publication and distribution – that by the time it was available, nothing was new that he wasn't already aware of. It may be worth the effort to get it 'glossy'; rather more immediate and responsive.

Shelley informed the members that a recent Office of Inspector General (OIG) audit came out asking the FAA about where the R&D plans were located for NextGen. Consequently, that subject was addressed at an offsite with Assistant Administrator of NextGen; the result an agreement for Air Traffic Management, Environmental and others was supposed to be in the NARP.

For an extended period, committee members discussed application and relevance of the NARP, the legislative mandate, the correct level of detail (Shelley noted that each Subcommittee had been struggling with this item), coverage of funding streams, and cited several other reports (i.e. NAS) that attempt to lay out similar long-range plans covering various lengths of time, and effectiveness of reporting.

The Chair expressed the issue of research alignment and comprehensiveness as being a problem. Other Committee members expressed concern that the current NARP appeared to be a collection of 'things' with little consistency, and line-of-sight; traceability, budget items and strategy were high on the list.

Shelley Yak discussed the potential, exploration, development and application of tools to assist in looking at the high level and, if desired, to drill down to the details. Shelley envisioned providing the tools to REDAC and its Subcommittees. Shelley stated that she projected significant changes, new message and new focus, would be implemented in the 2018 NARP.

09:30 am – Unmanned Aircraft System (UAS) Integration - Progress Update

Bill Crozier (FAA, Deputy Director – FAA UAS Integration Office)

Bill Crozier thanked the Committee for being invited back, stated that he would be providing another update after the last meeting and began with a presentation of slides.

1) **Current Environment:** The volume and pace of pressure on FAA forces us to be agile because everything connected to UAS has higher visibility than traditional aviation due in most part to personal use and the various diverse interest groups involved; the other significant issue is the pace of innovation.
2) **Growing Stakeholder Community**: Bill cited that the stakeholder community is both large and deep including State and local government entities; there are new and diverse applications such as *"Follow Me"* technology which are also accessible, low-cost and require only a relatively low level of skill.
3) **Unmanned vs. Manned Aircraft Registration**: The slide reflected about 40 weeks of data since UAS registry opened and compared traditional manned versus unmanned registrations. He noted that manned registration requests use the traditional paper-based process; for UAS they established the Part 48 process. With online process, the FAA could not have handled through paper based registration; currently about 2,000 per day (550,000+ UAS users registered in 9 months) (compared to 260,165 of traditional aviation during the same period). Bill discussed specifics of registration as to weight and height.

Joseph Bertapelle inquired about the terminology and technical definition of modeler and non-modeler. Bill explained that non-modelers register their aircraft; modelers register themselves. Operating environment does not necessary identify the type of operation. There was a discussion of altitude restrictions; specifically those above or below 400 feet and community-based safety guidelines.

John Hansman sought clarification of hobbyist vs. commercial operator and registration and asked if there's a formal distinction under the rule? He also asked for clarification of commercial and non-commercial classifications. He also posited d a technical and research question: we currently have no good way as operators or regulators of confirming operations above 400 feet; there's no way to measure.

Jack Blackhurst inquired about feedback on the registration process? Bill stated that it has generally been well received on Part 107.

4) **Part 107 Progress**: This slide displays a snapshot and results of applicants taking the "Remote Pilot Knowledge Test", "Remote Pilot Applications in IACRA" as well as Airspace Authorization Requests and the Top 5 waiver Requests by category. John Hansman stated that he took test online and passed but couldn't register; eventually doing so by paper. (*"I can't believe anyone failed the test. Not too challenging."*) Bill

revealed that the average time takes 7 Minutes. There followed a lengthy discussion concerning application and processes for requesting for a waiver. Bill stated that it was not a goal to make it a labor intensive process; that for them, "*it's learning as we go*". The Integration Office has a plan for automating the process following Air Traffic's lead.

Al Pollard (Martin State Airport) inquired about addressing thousands of General Aviation airports across the U.S. (Glass G). Bill: Part 107 requires visual line-of-sight, and must give (priority) way to manned aircraft.

5) **Remote Pilot Forecast**: Forecast Low end of 16,000 at end of 2016. Actual data - 13,672 now
6) **Small UAS (non-model) Fleet**: The slide shows a wide gap between the low and high forecast.
7) **UAS Strategic Priorities**: The FAA has developed three strategic priorities for UAS: Safety, Adaptability and Global Leadership derived from the Administrator's emphasis.
8) **FAA UAS Integration Strategy**: Focus on Low-Risk Isolated operations moving towards Full UAS Integration. FAA started with Section 333s, moving to Part 107 and we hope to issue an NPRM by end-of-year: operations over people. Next year we plan to issue another on Expanded Operations.

John Hansman commented that there was a need for research to be completed before proceeding with milestones. He also asked if there was a refinement of CONOPS?

Sabrina Saunders-Hodge (FAA): Actively conducting research through our Center of Excellence on UAS. Look at all the research and come up with a plan. Through the DAC, the UTM research transition team goes out to NASA-AMES, FAA and the industry group and digs down to look at exchanging data, developing CONOPS with those working/tiger groups. COE on UAS (ASSURE) has been very successful (matching funds).

9) **Building the Regulatory Framework**: A slide that presents a slightly different look - reinforces the framework of starting off with Section 333s to fully Integrated NAS Ops.
10) **Focus Area Pathfinder Operations**: Pathfinder has provided enormous insight into our upcoming rulemaking projects; by the end of the year, our regulatory processes of operations over people. We're looking for expanded rulemaking operations out of Pathfinder 2 and 3.

Jack Blackurst (USAF): What happens to people who don't comply? Bill stated that they are subjected to same rules and regulations that on the books. We have about 5,000 aviation safety inspectors across the nation; issues of legitimate versus illegitimate. We expect voluntary compliance; we investigate if we hear about violations. Keep in mind that we follow a risk-based approach; we don't want to pull resources from commercial airline to spend time on individual. We will add to the structure of Part 107 and it will evolve. We're developing tools and pursuing an information campaign. Illegal operators just may not know the rules; education and outreach are the best tools especially with fire-fighting. Organizers used information campaign (No Drone Zone).

11) **UAS ASSURE Team**: A lot of the research is being conducted through the COE. Membership is 15 core and 8 affiliate universities and over 100 industry partners. Membership representation includes 13 states, 9 countries and over 200 locations, and 3 UAS Test Sites. The COE has 3 international academic affiliates; that being UK, Canada, and Israel. To date, FAA has realized an 88% return on investment via matching which has yielded a research level of effort totaling $11.5 M in less than 2 years. Sabrina Saunders-Hodge interjected that the FAA Integration Office is working across various lines-of-business across the agency because integration touches so many diverse areas of the agency (so opportunities have opened up to leverage many different colors of money – i.e. OPS, RED, F&E – for UAS research.)
12) **Drone Advisory Committee (DAC)**. The Administrator announced the DAC; it's long-term, broad-based with 35 members across industry and academia, and is now tasked to set up subcommittees.
13) **Consensus-Building is Key to Speed**.

John Hansman remarked that this was a much stronger briefing than those in the past; that headway has been made. He voiced a concern that the funds coming in may not be directed to the research that needs to be done; and inquired about the status of CONOPS. There's a need for strategy and at least notional CONOPS to identify what the holes are; a recommendation that there be collected operational data so there's a basis for risk-based approach. A discussion ensured about CONOPS. In short, Sabrina supported by Shelley, Bill and others advised REDAC that there is a CONOPS Maturation Plan; that is has evolved. The Chair requested that REDAC receive an update, particularly if it's not yet ready for publication.

ACTION ITEM. Make the CONOPS plan available to REDAC.

10:40 am – Subcommittee on Aircraft Safety (SAS) Fall Meeting Report

John White (Air Line Pilots Association) with Eric Neiderman (FAA, Manager, Aviation Research Division)

John White presented for Chair of SAS (Ken Hylander who was unavailable). He began by stating that the SAS was doing very well; it was taking on a lot of work; much of it very valuable - with a goal of obtaining the "biggest bang for the buck".

SAS has continued providing input on guidance to the Research Portfolio aiming towards 2019. Two years ago, REDAC and the Administrator charged SAS to explore Big Data questions, and to maximize their time with the Research and the Aviation Safety management teams. Initially, they looked closely at emerging issues and although it was evolving, the Subcommittee on Aircraft Safety was sticking to the mandate.

SAS continues to work upon the findings of the prior meetings, keeping the previously identified emerging and future concerns to the forefront with the goal of identifying research gaps. They met with the AVS Management Team to ensure that SAS was being useful as a subcommittee towards meeting their advisory needs. SAS had also continued to involve the Chief Scientist Technical Advisors (CSTA's) and have reached outside to industry as well as involving FAA expert participation whenever possible, including DOD and NASA. There's a great deal of expertise on the team, but SAS had been proactive bringing in other advisors. When the Subcommittee sees an item of concern, they request a deep dive and take into consideration the research dollars that are committed, REDAC's priorities and the Committee concern for emerging issues.

In terms of an agenda development guide, the meeting's focused on:
Big Data Questions: This has been a large focus area so I've put this in the forefront. It was an outgrowth of both REDAC's and the Administrator's concern and past discussions have centered on data analytics.

UAS: Given the prior briefing not much more can be said. It remains in the forefront; CONOPS and the Maturation Plan were areas of review and concern.

The other agenda items, to a lesser degree, were: Real Time System-wide Safety Assurance; Certification of Advanced Materials and Structural Technologies; and the AVS Leadership Team or the needs of AVS.

REDAC reached back to Big Data issues and a conversation resulted concerning collection tools, interactivity and the science of analytics; as an example, most notably the Aviation Safety Information Analysis and Sharing (ASIAS) system. The Chair stated that some on the research side suggest that much, much more could be gleaned from ASIAS. He cited a two-fold problem: 1) the technical issues of how you look at the data in developing the tools, and 2) how do you deal with the descriptions in ASIAS. The nation has invested a lot of money into ASIAS and there are things coming out but behind closed doors. Oversight process is a problem since you have to get approval before capturing some of the data.

John Hansman inquired if there were needs that AVS articulated in that meeting?

John White informed REDAC that AVS expressed positive feedback on presentations, focus areas and emerging issues. One of the takeaways was does SAS need to meet more often with AVS? They didn't specify any particular needs that weren't addressed. They felt that focusing on emerging issues was a good exercise. It was more a discussion of how to institutionalize it; it was more a discussion of short-term or long-term? SAS elaborated that they view a 5-year window on emerging issues as short-term. Eric Neiderman contributed that there was recognition to the value of focus on emerging issues so we can get ahead of the research. There's also better perspective, communications and understanding of the constraints on AVS, and near-term concerns. There was a request from the Subcommittee to provide more industry input back to the agency; for example,

pilots to airlines, to manufacturers, and the aeromedical community – things to the left of the certification process.

Dr. Hansman cautioned that you don't want a set of emerging issues every week, but perhaps there's a standard of putting together a list of issues that are revisited as to the right ones…meaning current and future. It might be useful even in these briefings to have that "current" list.

Eric added that Ken Hylander considers bringing in outside experts from other government agencies, other countries to explore where the industry is going and what we should be looking at next – to keep the dialog fresh and active.

The Subcommittee's first "Finding" concerned Real Time System-wide Safety Assurance – the Subcommittee was pleased to see the joint FAA/NASA Research Transition Team (RTT) in place. The recommendation was for the RTT to provide SAS and industry groups updates on their progress and solicit input.

The next "Finding" concerned Additive Manufacturing. We were pleased to see progress being made on accelerating the research through Additive Manufacturing National Team, and MIDO/ACO Aids to Certification. However, the roadmap is under development and not yet shared. The resulting recommendation is that FAA should share the draft roadmap and research plan so industry can comment.

Dr. Hansman raised the issue of the hesitancy of sharing draft material (reminiscent of the same UAS issue); and the concern of discussing strategies and drafts under a public meeting format.

The last Finding focuses on Fatigue Knowledge affecting Aviation Safety. The Subcommittee noted that the February 2014 implementation of Flight and Duty Time regulations was the first revision in decades. Although evaluations are underway, research is occurring across multi-agency portfolios and not shared in an organized manner. Therefore, the Subcommittee recommends that FAA review and present a coherent and holistic view of the fatigue problem and include knowledge gaps and the research being accomplished across government agencies and should include non-aviation fatigue knowledge and research.

In wrapping up, SAS included in Emerging Issues the 2019 Strategic Guidance Document published by AVS in May 2016. There were excellent discussions between FAA Research, Aviation Safety and SAS regarding fulfilling mutual expectations through the REDAC process. It is hoped and desired for more future meetings to be held in Washington with AVS.

BREAK

11:35 am – NextGen Update
James Eck (FAA, Assistant Administrator for NextGen)

Mr. Eck talked briefly about his attendance at the Secretary's Excellence Awards.

He conveyed to REDAC members that the Next Gen Advisory Committee has been listening to REDAC; you've certainly made a lot of recommendations to the agency about applying research, involvement in long-range planning and vision. We're certainly going to partner with NASA and DOD to look at their view of what's happening in airspace and aviation. We plan to partner with other experts as well and put together a long-term vision of 25 years or so. We have some names for it to ensure that we're inclusive; we're not giving it a NextGen name or even a follow on to NextGen so we still have names in play. We need to look at vehicles and the airspace going forward, and we also want to look at our processes and documents - bringing them all together. We'll need to consider environmental groups and their requirements and processes and bring all these things together. Our current document is *"Future of the NAS"*. We had a robust conversation yesterday on a segment of that particular document.

Usually, before discussing where we're going, I prefer to provide a little history of where we've been. Joint Planning and Development Office (JPDO) put together long term vision for aviation and air transportation. Some of you were there and contributed at the beginning. It was JPDOs long term view that intended to drive research – kind of its original purpose and goal. As a result, a lot of research was done and it refined the pathway for work that's been done to date.

The concepts that drove it had its roots 20 years before that, taking advantage of a concerted effort of synchronizing ground and air management systems; automate it and look forward; moving air traffic to a time based paradigm. That involves aircraft that have flight management systems, where air and ground are synchronized taking full advantage of what each knows in an automated fashion. This will help in taking the tactical actions required to keep aircraft separated and vectored. The 'big deal' about time-based is that it informs all actions being taken; if tactile actions need to be taken in light of everything else that is going on. Everybody in the system has to be on the same page to make time-base actually work properly. That means a much broader picture - not simply from the air traffic controllers point of view, but is inclusive of things being done by traffic managers, command centers, pilot and air crew, dispatchers, ground towers…everybody has to be on the same page to make it actually work. Additionally, it has to work under all conditions; bad and good days – it must work even if under a degrading system (weather, system outages, or other constraints). We have to have a system that permits it to move to some other state of time-based management. We can't assume that everyone will be an expert in time-based and an expert in tactical vectoring. We want a system that degrades gracefully, not dramatically. If I'm working in time-based thought process, when things go awry we don't want to find ourselves having to revert to an old system. From a safety perspective we don't want to train personnel in one system, only to be forced to revert to an older one (that we may not have done in a long while because they've been doing something different). All of the actors must have confidence in the system.

John Hansman raised a point, first acknowledging that he supports a time-based strategy that permits graceful degradation, but stated that it may be too constraining. It may be that time-based, graceful degradation may have to switch to another mode because we do have history…such as shrimp boats at one time. In a time-based system, I can make things robust, but at a cost of efficiency. It's always a question of stability.

Jim Eck stated that everything he said is aspirational; that on a practical note not everything in the NAS will end up as a time-based system. But if you start by designing to that end – move towards it, you can walk before you run. You can try things out. The methodology for moving forward is using some tools; some are working, some not ready yet, but it provides opportunities to think through how we manage a cultural change of this magnitude and think differently. We haven't had the opportunity in the past to explore this approach since we didn't have the available technology…now we do; we've had successes so we should take advantage of it. And we're at the point now where we have flight management systems with incredible capabilities. We're very close to the point of where it meritorious to move forward, that we no longer talk about the theoretical. We've got a wide assortment of tools available now. But we are confronted with "how do we roll these tools out?" How do we march through technology revolution on a time basis? The methodology now is driven by operational experience and that has its place.

The Chair noted there tends to be a lot of focus on tools, and not procedures or the scheme. John said that probably 7 or 8 years ago the REDAC did study on transition and he recalled that the major "take away" was the importance of senior level buy-in. If you're serious, you need to have buy-in by industry and senior level but it has to focus on the procedures, over scheme or whatever. If you make it reliant on a tool, you just kick the can down the road further that may be 10 years away.

REDAC members discussed the merit of having industry buy-in and confidence that the system will work…predictability.

Jim continued that when he came into ANG, he discovered that the organization didn't have good tie-ins in to what was going on in the systems world – commercial space world, cyber. There were good things going on, but not in an integrated way.

So I asked from an ANG perspective to focus on OPS concepts, commercial space, on drones, cybersecurity…not that we're running those things, there's plenty of people with the knowledge and authority. But what ANG should be doing is the operation concepts and constructs.

A recent discussion reminded us that JPDO had an element called Increased NAS Access - access for local communities who may not have access today…concepts making room for new entrants, for example, manned spaceflight, suborbital airspace, drones to operate safely, rule basis that guides some of that…rules can tell you only so much. We need an operational concept on how these elements interact with the air traffic management system today and operate safely, and how do we then work the air traffic management system to accommodate that.

John Hansman inquired about how far along ANG is. Looking at UAS, as an example, AVS kicked the can down the road a small way. Taking UAS as an example, guidelines need to be established and there will be a mechanism for direct communication in the architecture. John expressed that you do need a baseline that defines CONOPS. For example, REDAC's position for a number of years has been that they can't figure out what the NAS integration R&D should be because we don't have enough assumptions or scoping of what the CONOPS could be. For example, large UAVs are just like another vehicle in the system.

Mr. Eck informed REDAC that FAA has updated a set of CONOPS (Shelley Yak noted that there was an earlier discussion about providing REDAC with a copy). Graduated set of constructs that has been presented to the White House and advisory committees; they've indicated that they are not looking for the traditional R&D FAA driven solution; they want the space to innovate. There was an interesting dialog from one committee member who stated *"I get all the performance based stuff…wanting it to evolve, understand doing not-prescriptive, my company is not big enough to just try out and see if that's the one solution the FAA is going to approve or accept".* Other players in the community want the space, leave us alone, to innovate and try a hundred different things. It's an interesting paradigm, conundrum, and challenge that players there will always be on the back end if performance based is the way we choose to operate.

The Chair expressed the opinion that FAA's role or position is that there's an air traffic control system that they must adhere to and it's up to the industry to acclimate and accommodate "to the parts we need" and you (industry) will have to operate to the rules; you can innovate but we must maintain the system and baseline.

This portion of the discussion turned to specifics of unmanned systems and issues related to ADSB and the feasibility of

Mr. Eck stated that some environments (drones) we may need to be flexible since some communities may innovate beyond the assumptions we've made. We need to review our Ops concepts and review what the key assumptions that are driving it are. When I think about the operational context there are architectural issues, technology issues and human factors issues.

Wrapping up the session, the Chair expressed appreciation for the briefing and offered REDAC's help if there are places the Committee can assist.

LUNCH

12:35 – Subcommittee on Environment and Energy

Mahendra C. Joshi (Boeing Airplanes, Chief Engineer, Noise & Emissions)

Mahendra reported that the Subcommittee on Environment and Energy met on August 30th and 31st. Their focus was strategic guidance to the FAA on the current research portfolio.

In particular, specific areas: 1) CAEP (Committee on Aviation Environmental Protection) tools usage and further development; 2) Aircraft technology modeling and assessment; and 3) Noise exposure trend analysis. Goals are well established.

The Subcommittee's findings and recommendations were as follows:

1) The Environment and Energy RE&D program has a strong strategic content with well-established goals. The R,E and D plan considers balancing between improved scientific understanding and tools, technologies that reduce environmental impacts, improving operational efficiency, development of sustainable alternative fuels, and finally, exhibiting U.S. leadership in global aviation environmental policies.

   The Subcommittee recommended that priority focus be given to Noise and Operations; Maturation of environment technology (i.e. CLEEN); Alternative aviation fuels; and lastly, emphasis on tools for U.S. leadership in policy development.

2) The second finding concerned environmental assessment tools were developed and delivered. These tools permitted informed policy decisions; demonstrated the United States leadership in ICAO; enhanced the user base; and improved usability and functionality.

   The Subcommittee recommends reviewing development needs of the Aviation Environmental Design Tool suite (AEDT); Value and Urgency should be considered when prioritizing development. This is due in great part since RE&D will be funding development and may conflict with other high-priority research.

3) The Subcommittee recognized the ongoing collaboration between FAA, NASA and other agencies. NASA revamped its' aeronautics program which may provide additional collaboration opportunities. The Subcommittee membership expressed concern about the availability of FAA-AEE staff to execute the program efficiently.

   Therefore, the Subcommittee noted two specific recommendations: 1) that NASA's work in gathering noise and emissions data could help projects currently in FAA's portfolio; and 2) FAA needs to continue to feed the engineer 'pipeline'.

   Mahendra noted that the establishment of Centers of Excellence has resulted in generating trained individuals.

The Chair acknowledged that FAA should be leading in noise, operations, and tools, but he asked about 'the argument' as to why the FAA should be doing "CLEEN" versus NASA. Certification issues are the responsibility of FAA; not necessary FAA's role in developing new technologies. Mahendra informed REDAC that the work has been a joint effort; however, NASA's focus had been Long-term. It was redirected about 15 years to go further out so there was a need for FAA to step in. Now NASA is revamping their program.

John Hileman (FAA, Chief Scientific and Technical Advisor for Environment and Energy) added that industry develops technologies, but to a point – that there's not a compelling business case to take it beyond the current regulations. That CLEEN filled that Gap and CLEEN2 is following in the footsteps.

Wrapping up this section, Mr. Hansman acknowledged an understanding of a more stringent approach for certification to the betterment of the public. AEE is relatively unique in having a more strategic outlook on research since it's not parsed in different places; you truly know everything that's in the environmental portfolio.

12:55 pm – Subcommittee on Human Factors

Jack Blackhurst (USAF, Director, Human Effectiveness Directorate, 711th Human Performance Wing)

Last time there were seven findings and recommendations and the Subcommittee was pleased with FAA's response; they had accepted them and were moving out on them with the exception of one. The Human Factors group was reaching out to stakeholders to get a better handle on requirements and that was a plus.

The Subcommittee made three observations:

1) The core budget is struggling took a hit, and short on contract funds; all of the efforts are moving towards NextGen and UAS. We hope that prioritization will help and that FAA will make sure the human factors budget is aligned with that. With the Agency's establishment of the UAS Board, which will oversee the development of UAS Implementation Plan, it will help establish FAA research priorities and resource needs.
2) As NextGen is implemented into the field, they are running into human factor issues that affect efficiency. It's not surprising but, once implemented, they have to deal with it out in the field. One can't go back to the beginning and start anew.
3) In the upcoming fall meeting, the Subcommittee needs to focus on mixed equipage which was one of the top 5 or 6 of the committee. We're not getting research or that and with all complexity controllers will encounter over the 5-10 years should be looked at.

So for the purpose of this meeting, we generated one slide to address our concerns. One of our previous findings was that as UAS moves out to the marketplace FAA has HF expertise that would be helpful to industry. We recommended that FAA reach out to the UAV industry and manufacturers to provide guidance that is available now about UAV human factors. Perhaps FAA could establish workshops, or whatever mechanism works best, to help industry to incorporate human factors. The current timing is insufficient; it must be sped up.

The Subcommittee hasn't written up its' formal recommendations yet seeking advice from REDAC given the aforementioned summaries and thoughts.

The Chair responded to the three observations:
On the first, it is useful and appropriate to cite the core budget as an issue, but to specify what is significant especially if safety were to be compromised.

On the second item, affecting efficiency, we would not hesitate to make the recommendations.

The last item (mixed equipage) it's important to maintain consistency of issues – no matter how many times you've stated it. As an example, John stated that he can't remember the number of times that the issue of UAS or digital software was raised. It's the consistency of the committee that carries the message.

John Hansman reiterated that the HF Subcommittee made the assertion that HF guidance for operations was available for dissemination – is there?

Jack said that the original recommendation was that the FAA experts document the information. Now it's how to get information out quickly versus 1 to 2 years for a formal process.

REDAC members made various suggestions such as getting the word out through industry meetings, the Center of Excellence and other venues (the Drone Advisory Committee (DAC) could be one venue). There are other guidance documents that might prove helpful (such as those currently based on manned aircraft). Articulate that they disseminate best practices.

01:10 pm – Subcommittee on NAS Operations

Joseph Bertapelle, (JetBlue, Director Strategic Airspace Programs)

Joseph Bertapelle reported that the Subcommittee had numerous briefings and presentations during the summer and fall meetings. They've compiled two findings and recommendations that were most notable. The Subcommittee had asked for and received a briefing on the UAS Concept Maturation Plan, and it appears that it's a step in the right direction. We wish to commend the FAA in continuing to make progress responding to the challenge of integrating UAS into the NAS.

The first finding is a bit of an outlier. The FAA has started to engage the UAS stakeholder community as part of the NASA UAS Traffic Management (UTM) workshops. The FAA has also established a framework for engagement with the Drone Advisory Committee and a UAS External Stakeholder Plan. We applaud both these efforts and think it should continue.

The second finding reflects a Subcommittee concern about agency-wide UAS leadership; that being, the senior UAS Board, a UAS Executive Committee, and the UAS Implementation Plan. These are fairly recent and are valuable in accelerating the pace of FAA with industry. But these actions alone may not be sufficient to sustain the pace necessary to avoid the industry and government losing ground in economic opportunities. Moreover, during FAA's briefing on the FY2017 budget, the Subcommittee noted change in the language from earlier submissions. Whereas previously the Budget Line Item (BLI) was used to perform safety-related research overseen by AVS – such as airframe safety and certification, the new language permits a portion of the BLI to "develop and validate operational concepts and procedures supporting integration of UAS into NAS.

As a result of the aforementioned findings, the Subcommittee provided the following recommendations. Concerning the first finding our recommendation is that the FAA continue its' momentum, placing considerable emphasis on communicating it technical and operational challenges and share documents such as the UAS Concept Maturation Plan with the user community. It should also merge input received from stakeholders into its future planning activities. Recognizing the FAA has the ultimate responsibility for NAS safety and efficiency, these open dialogs of the issues with the user community will foster an environment of collaboration that may help to solve them.

As to the second finding, the Subcommittee recommended that the FAA leverage the new UAS leadership structure to prioritize and plan R&D across budget elements and across organizations. FAA should broaden safety-related efforts to an increased emphasis on UAS integration into the NAS. Our emphasis was on potential changes to funding in this R&D area.

John Hansman made a few editorial suggestions…most notably that the second recommendation more succinctly reflect a request to communicate and distribute the UAS Concept Maturation Plan to a wider and diverse audience, if in fact that is the Subcommittee's intent.

13:20 pm – Subcommittee on Airports

Alfred Pollard (Airport Director, Martin State Airport, Baltimore, Maryland)(for Christopher Oswald, Chairperson)

Mr. Pollard informed the Committee that he would be presenting in behalf of Christopher Oswald who was unavailable.

Addressing the Airports Subcommittee findings, Alfred Pollard expressed their pleasure with the outstanding work being conducted by the Pavements group at the Technical Center.

As to Finding 1: The Subcommittee was pleased with work on reflective cracking under RPA2. They do believe that research needs to consider the vehicular and environmental effects of vertical loads on such cracking.

John Hansman requested an explanation of "reflective cracking", and "RPA2". Alfred explained that "RPA2" referred to pavements research (RP) and more specifically the national airport pavement materials center (A2). Reflective cracking when subgrade/sub-base begins to shift reflects, the surface reflects what is happening below. Research needs to be considered for the effects of vertical loads both vehicular and environmental on cracking.

As to Finding 2: The effects of environmental conditions on asphalt concrete pavement were not being fully considered in the current FAA pavement design guidance. This was notable for sustained exposure to high temperatures. The Subcommittee recommended that pavement testing provide the necessary data to incorporate a wider range of environmental factors into FAA pavement design software under RPA P7.

John Hansman requested that although it's sufficient for the Subcommittee to report on items like RPA P7, when it gets distributed more widely, that the acronyms be spelled out and /or defined.
ACTION: Write out acronyms before wide distribution.

As to Finding 3: The Airports Subcommittee and the FAA staff believe that additional subject matter expertise was needed to ensure that aircraft breaking friction research being conducted under runway surface technology (RPA S6). This would ensure that it is producing valid data and is appropriately synchronized with other FAA and industry research. The recommendation from the Subcommittee strongly supported the creation of an expert working group. This group should be comprised of representatives from FAA, academia, aircraft/braking system manufacturers, and others.

REDAC members discussed prior efforts involving onboard data acquisition. Other work was being done on certification and standards sides using the aircraft itself to inform the next aircraft in line. REDAC members agreed that it made sense to have an integrated look and see what the technologies are; also recommend looking at ongoing data in ASIAS.

The Chairman recommended in writing the report, start with Finding 3 versus the current order since the last appears to be the larger item.

13:30 pm – Committee Discussions/Chairman's Final Thoughts

Dr. John Hansman (REDAC Chair; Professor of Aeronautics and Astronautics, Massachusetts Institute of Technology)

Dr. Hansman expressed "good news" in that for the past couple of cycles REDAC is generally happy. Most notable and substantial is the effort to relook and rethink the National Aviation Research Plan (NARP) strategic effort. REDAC supports making it more integrated; it would be a great tool for REDAC and the ability to communicate the research strategy to the outside community.

REDAC members gave praise to the FAA and Subcommittees for good work.

Mark Orr expressed the desire to have REDACs recommendations as soon as possible, that the turnaround time be better so the FAA can frame its respond earlier. Ms. Chinita Roundtree-Coleman replied that there were sometimes hold-ups in receiving comments from the dash one or dash two's which in turn must be corrected and then passed again for AOA review. That was why a draft was provided this time to permit a proactive upfront look at it, and as for the content, except for minor editorial changes, for the most part will be the same. You can start to have your CSTAs and subject matter experts to preview and start to frame the response.

Dr. Hansman and Shelley Yak inquired an issue about how to approve pre-released information.

Chinita advised REDAC that for the most part this is a public forum; that information discussed here is accessible to the public and is therefore subject to the Freedom of Information Act (FOIA). Any pieces of that you would prefer to stay here in a 'closed setting', this is not the forum for it. The Federal Advisory Committee Act states that this particular advisory committee scope is required to be a public setting and that applies to all the meetings conducted by this group.

Dr. Hansman questioned if anything discussed in draft with REDAC before formal release as an act is being 'forced'. Can working documents or briefings, such as CONOPS, be discussed in a public forum? His expectation is that there is a mechanism since other working groups - RTCA processes, for example – have technical discussions and public forums.

Shelley Yak committed to discussing the issue of public forums and working documents with the FAA Office of General Counsel (AGC).

Chinita expressed supporting the dissemination of information and obtaining a definition of a formal release of policy, versus for information only. We must brief our folks that the dissemination is for information but doesn't become official formal guidance. There's a mechanism but you must know how far it will go.

13:40 pm – Adjourn

03:00 PM – *Adjournment*

Research, Engineering and Development Advisory Committee
Federal Aviation Administration (FAA)
FAA Headquarters, 800 Independence Avenue, SW
Washington, DC – 10th Floor Round Room
October 06, 2016

Agenda

9:00 am	Welcome Address and Opening Remarks	John Hansman Shelley Yak
9:15 am	Chairman's Overview	John Hansman
9:30 am	UAS Overview	Bill Crozier
10:00 am	Subcommittee Report – Aircraft Safety	John White
10:30 am	Break	
10:45 am	Subcommittee Report – Human Factors	Jack Blackhurst
11:15 am	NextGen Update	James Eck
11:30 am	Lunch	
12:30 pm	Subcommittee on Environment and Energy	Mahendra Joshi
1:00 pm	Subcommittee on NAS Operations	Joseph Bertapelle
1:30 pm	Subcommittee on Airports	Alfred Pollard
2:00 pm	Break	
2:15 pm	Committee Discussions - Recommendations - Future Committee Activities	ALL
3:15 pm	Chairman's Final Thoughts	John Hansman
4:00 pm	Adjourn	

Attendee List
Research, Engineering and Development Advisory Committee Meeting – October 6, 2016

Mark S. Orr, FAA

Joe Bertapelle, Jet Blue

Regina Bollinger, FAA

Mahendra Joshi, Boeing

Michelle Yeh, FAA

John White, ALPA

Katrina Warren, Zodiac Arresting System

Dennis Flath, FAA

Jim Patterson, FAA

Eric Neiderman, FAA

Lee Olson, FAA

Maureen Molz, FAA

Sherry Chappell, FAA

Glenn Roberts, MITRE

Emily Stelzer, MITRE

Jennifer Solomon, FAA

Chinita Roundtree-Coleman, FAA

Gloria Dunderman, FAA

Sabrina Saunders-Hodge, FAA

Jack Blackhurst, USAF

Anton Koros, FAA

Shelley Yak, FAA

Al Pollard, Martin State

Mike Gallivan, FAA

Jaime Figueroa, FAA

Xiaogong Lee, FAA

Bill Crozier, FAA

John Dermody, FAA

James Eck, FAA

J.R. Hansman, MIT

Monique Moore, FAA

Nancy Clarke, FAA

Mervette Abdu, FAA