Research, Engineering and Development Advisory Committee (REDAC)
Subcommittee on Aircraft Safety (SAS)
Federal Aviation Administration (FAA)
William J. Hughes Technical Center
Director's Conference Room
September 6-7, 2017

Meeting Summary:

The Subcommittee on Aircraft Safety (SAS) met on September 6-7, 2017 in Atlantic City, NJ, at the FAA William J. Hughes Technical Center (WJHTC), for its routine fall meeting. This Subcommittee had three specific objectives on its agenda:

1. Review and provide comments on the FAA's 2017 safety research plan accomplishments and ongoing research.
2. Review and provide comments on the FAA's recently released Cybersecurity Research and Development (R&D) Plan at the request of FAA leadership and REDAC.
3. Conduct deep dives into continued significant topics of Unmanned Aircraft Systems (UAS), general aviation safety, and fatigue management.

To assess the 2017 research plan performance, Subcommittee members continued to use the new portfolio review approach developed for the last meeting. Rather than the traditional quad charts that were historically reviewed, the FAA staff prepared a research program area review. This review bundled current and proposed research into major program areas. This provided an opportunity to gain higher-level insight into the research tasks and performance against planned research deliverables in 2017. Additionally, it provided visibility to more comprehensive funding information which enabled a broader picture of the research efforts. All SAS members agreed that this method of review was better than prior efforts and that it enhanced the Subcommittee's dialogue. Findings and Recommendations (F&Rs) resulting from these discussions are attached to this report.

In advance of the meeting, the FAA's recently completed cybersecurity R&D plan was distributed for Subcommittee review. The Subcommittee was presented a summary of the plan during the meeting and a discussion with the plan's authors followed. Feedback on the plan was provided directly to the plan's authors.

Presentations from MITRE, the Boeing Company, and Honeywell provided views on the future directions of industry. Additionally, the Office of Aviation Safety (AVS) personnel provided a briefing on certification reform. This was beneficial as many of the Subcommittee's research findings and recommendations were certification based.

The next SAS meeting will be on March 14-15, 2018 in Washington, DC. It was anticipated that time would be scheduled for the Subcommittee members to meet with the AVS management team to ensure continued alignment with the Subcommittee and AVS leadership objectives.

Wednesday, September 6, 2017

- **DFO Opening Remarks.**

Eric Neiderman (FAA, ANG-E2) provided opening remarks. He thanked everyone for attending and said that he appreciated their efforts. The agenda was reviewed and thanks were provided to the Subcommittee members for completing the assigned homework and submitting questions in advance of the meeting.

- **Welcome and Introduction from Technical Center Director.**

FAA Technical Center Director Shelley Yak (ANG-E) provided welcome remarks, thanking all for attending and for their work contributions. She indicated that the key questions were: "What are we doing?" and "What is it that you know industry is doing so that the FAA can adjust and respond?" This will help provide insight into 2020 and what the FAA should be crafting for the future.

- **SAS Chair Opening and Report on the full REDAC meeting.**

Ken Hylander provided a recap of where the Subcommittee had been and why and what was being done. Since the last meeting at the Civil Aerospace Medical Institute (CAMI) in March 2017, there had been a full REDAC meeting. A reminder was given of the findings and recommendations from the spring meeting. Ken indicated that it remained difficult to get a complete picture on the research but he was convinced the Subcommittee was getting closer to the needed perspective. He also indicated that the Subcommittee's approach, which includes significant homework, although different, results in success as viewed by the full REDAC and other Subcommittees. Homework for this meeting also included a review of the 2020 Aviation Safety (AVS) strategic guidance.

The May 2017 Full REDAC meeting was discussed. Ken indicated that at the REDAC, the FAA Administrator mentioned that there was a big focus on data, there was some concern as to how to bring future technologies to fruition, cybersecurity and aviation policy and budget were big pieces of his job, and everyone should work toward removing the bright line between regulators and industry moving forward.

Ken offered congratulations on the efforts made to progress the National Aviation Research Plan (NARP). For UAS, the Subcommittee needed to continue to review the plan and conduct a benefit analysis. Additionally, the meeting would determine where future deep dives would be and how to best use the resources and understand the capabilities of the Technical Center.

Ken indicated that the FAA was seeking feedback from the Subcommittee on the recently released Cybersecurity R&D Plan. Cybersecurity would be more and more of an issue and a concern was expressed that the Subcommittee may not have enough expertise in this area.

- **REDAC/SAS Roles and Responsibilities.**

Chinita Roundtree-Coleman (FAA, ANG-E41) provided an overview of the process and protocols for the REDAC Subcommittees. This particular Subcommittee meeting was focused

on a strategic plan for 2020. Clarity and specificity was needed to complete the findings and recommendations. A question was asked about the Subcommittee's requirement to review Centers of Excellence (COE), and it was indicated that there was no formal or informal requirement for this.

- **FAA Budget Update.**

Mike Gallivan (FAA, ABP-330 via phone) provided an update on the budget. The FY17 full appropriation was signed in May. He indicated that the FAA received an increase. The FY18 request was for $150 million and the House passed it. A discussion on the budget followed as well as a discussion on the interpretation of the Congressional language.

- **SAS Findings and Recommendations.**

The FAA presented the findings and recommendations from the Spring 2017 meeting. Draft FAA responses were discussed.

A good presentation responsive to prior Committee input was provided on the Fatigue Risk Management System Database, and it was noted that a fatigue working group was being proposed to help prioritize the research. After discussion, a SAS Finding and Recommendation was proposed in response to this presentation.

- **CASSIE (Computing and Analytics Shared Services Integrated Environment).**

Tom Tessitore (FAA, ANG-E272) provided a brief overview of the history of CASSIE and indicated it had become a collaborative effort. Fire Safety used it for modeling and the Weather Group, Oklahoma City, and Flight Standards were also using it. Data can be shared and is readily available on CASSIE. Data from the National Air Space (NAS) can be pulled in through System Wide Information Management (SWIM). It is also connected to NASA-Ames.

- **Big DAWG (Data Analytics Working Group).**

Mike Paglione (FAA, ANG-E27) provided a briefing on the initiative. The goal of this initiative was to establish an ongoing working group to build on experience, leveraging CASSIE. This resides under Aviation Research Division and FAA's Chief Data Officer. There was a discussion regarding the application of algorithms, intellectual property, and governance of data. The point of contact for this initiative is Tom Tessitore. The Subcommittee recommended that the FAA learn from industry efforts to utilize the existing cloud servers.

- **UAS FAA Integration Research Plan 2017-2022 Status.**

Sabrina Saunders-Hodge (FAA, AUS-300) presented an overview of the UAS FAA Integration Research Plan 2017-2022. A question was asked about whether or not the ongoing research was across partners and other agencies and the answer was yes. It was also noted that the budget was two years in advance, and that requirements could not always be anticipated ahead of time.

A question was posed as to how the research was being used within the FAA. Sabrina responded by stating that the AVS team work out the research requirements, coordinates with sponsors, and determines the rulemaking needs and certification requirements. In initial phases of research, they work with Air Traffic Operations in identifying new roles for controllers and integration of

UAS into the NAS. If research does not align with UAS plan, then the FAA should not be doing it.

- **UAS FY17 Portfolio Accomplishments.**

Nick Lento (FAA, ANG-C2) provided an overview of the UAS research portfolio. He described the mission of the division and the UAS architecture.

- **ASSURE Research Capabilities and Results.**

Nick Lento (FAA, ANG-C2) provided an overview of the UAS Center of Excellence (ASSURE) and the highlights of the program. A summary was provided of completed and active research tasks. A funding profile for the most recent year was presented.

The Subcommittee commended the FAA team for progress towards the plan and a suggestion was made to look at the minimum amount of research needed to get the implementation done. It was indicated that there was a massive amount of work that had been done, but there was uncertainty how or if it would support what was needed. Several Subcommittee Findings and Recommendations related to UAS resulted from the discussions.

- **FY2017 Portfolio Accomplishments - Part One.**

Mark Orr (FAA, AVP-300) led the review and discussion of the research portfolio for FY2017 in the areas of fire safety, propulsion systems, aircraft catastrophic failure prevention, advanced materials/ structural safety, aircraft icing, weather, aeromedical research, and human factors. Some general comments provided by the Subcommittee members were:

  - Fire Safety: There exist a good alignment between research conducted at the Tech Center and with the international fire research group.
  - Research testing in general: Research tests should be performed that are sound and realistic. One specific concern was on research performed that leads to a conclusion that industry might not view as completely rational.
  - Advanced Materials/Lightning Strikes. The research task is to assess the existing 200 μJ energy threshold is adequate and sufficient for composite aircraft structures. The ultimate output is to detail the findings and conclusions of the benchmarking efforts.

- **MITRE Aviation Safety R&D Support**

Andy Lacher (MITRE and SAS Subcommittee Member) discussed the research and technology trends associated with autonomy and autonomous aviation. It was indicated that the research drivers of unmanned aircraft are urban/on-demand air mobility, general aviation safety, and commercial aviation. Also, there were efforts to reduce air crews/pilots, and if technology was being used incorrectly, this may have an impact on that. The commonality to all of this was automation, cybersecurity issues, and oversight of software; all issues that the FAA should be involved in.

Questions posed during the discussion:

"Thales is doing this automation for Air Traffic Control (ATC); is this a reasonable approach for ATC? There, automation could change the job. How is an automated system certified? One way to accomplish this is to tie certification approach to the operational mission.

Is cyber resiliency designed in, or can legacy systems be made resilient with existing techniques? That will have a lot to do with the architecture; how it's designed."

- **Wrap-Up and Assignments.**

The Subcommittee agreed to draft findings and recommendations on the following topics:

Fatigue risk management system, working groups, and database.
Linking research UAS activity and advancements to manned flight.
Applying research (from UAS COE) and considering the minimal amount of research that is needed for implementation.

Thursday, September 7, 2017

- **Review of Day 1 Findings and Recommendations.**

Input on UAS research, ensure direct link between UAS and manned research. Need a point of contact identified in each area, to promote interchange. Intent is to make sure that research developed in UAS will be transitioned to research findings.

FAA overall fatigue program; input from John Crowley for input into final recommendation. Question: Is database subset or parallel activity? Answer: Currently, it is a parallel activity.

- **Cybersecurity R&D Plan.**

John Lapointe, Chuck Agava, and Isidore Venetos (FAA, ANG-E2) presented an overview of the plan and indicated that the plan is a living document. There will be annual releases to the plan. The initial plan has 10 research requirements and each requirement has a sponsor. The funding is solid for FY18, and FY19 is planned/estimated. Feedback was requested.

The plan was created in response to FAA Extension, Safety and Security Act of 2016, Section 2111 Aviation Cybersecurity, enacted on July 15, 2016. The plan received internal FAA acceptance from the Cybersecurity Steering Committee (CSC) after a June briefing. It was noted that Aeromedical concerns should be included, i.e., implantable devices, prosthetic devices. It was also noted that Domain definitions were established by the FAA Cyber Steering Committee (CSC) and the plan was mapped to the CSC plan. Domains were already defined by the CSC at a high level.

The Aircraft Safety Information Security Program (ASISP) was described. The framework is developed, so far up to risk assessment. Cabin communications risk start in FY19. In response to a question asked whether or not this was research or a validation effort based on work done by industry, it was indicated that the idea was to expand research in support of other resources. FAA needs its own perspective of what the issues are and needs to understand the risks outside

of an industry perspective. The FAA is also partnering with the Department of Homeland Security (DHS) as well as others to understand and mitigate risks.

A question was asked about the dividing line between FAA and industry for certification and safety. It was indicated that opportunities can be found between both so that the work is done faster and the wheel is not reinvented. This will be a dynamic process used in assessing risks, and the effort is meant to be collaborative.

The committee was polled in advance of the meeting and again after the presentation for comments on the plan. Almost 100 comments were collated and passed along to the plan presenters. As summary of the comments was also included in the SAAS meeting report to REDAC.

- **Aircraft Certification Service Transformation.**

Chris Carter (FAA, AIR-400) presented an overview of the FAA Aircraft Certification Service (AIR) transformation. The briefing discussed the drivers for the change, the benefits, the strategy, and the role of industry. Discussions took place on workforce development, the Innovation Center, and what changes industry should anticipate. The FAA is moving from a heavy compliance focus to more of a standards and oversight focus with compliance enforcement reserved for difficult or extreme cases.

It was noted that collaboration in practice has been challenging, but the goal of this transformation allows engagement with industry prior to certification. Deciding what is important is where differences can lie, and this reorganization can possibly address this to improve the process.

More information is available at: www.faa.gov/go/AIRTransformation

- **FY2017 Portfolio Accomplishments - Part Two.**

Mark Orr (FAA, AVP-300) led a review and discussion of the research portfolio for FY2017 in the areas of System Safety Management, Terminal Area Safety, Software Digital Systems, Aircraft Safety Information Security Program, Continued Airworthiness – Systems, Continued Airworthiness – Structures, and Alternative Fuels for General Aviation.

Unlike the prior session, there were more questions raised regarding the portfolio. Examples are as follows:

- Question: How big of an issue is emerging materials and should it be considered for the Subcommittee? Answer: Standardization in industry would be more efficient as well as sharing, but proprietary information is always a consideration. This does not require comment by the Subcommittee.
- Question: Is the performance-based air transport pilot (ATP) report done? Answer: It is done, but not available. The report is still under internal (AVS) review.
- Question: For helicopter operational safety advanced vision systems (getting a helicopter for experiment), what is the point of the experiment (fall 2017)? What is being looked at in that program? What is the product going to be -- a test report with data collected from the flight test? Answer: It will be onshore approach procedures as well as offshore approach criteria potentially for FAA advisories and guidance. A basis to evaluate

helicopters using systems on a helipad will be developed and the elements that FAA/pilots need to see at various distances to helipad and advanced vision devices will be addressed.

- Question: Is there an end in sight to post-mortem drug testing? Answer: The drugs that are tested keep changing and new drugs are developed which is why the FAA has to continue to look at this to ensure that there is no aeromedical impact when drugs are used.

- **General Aviation 2030 Exploratory Analysis.**

John Lapointe (FAA, ANG-E2; Bill Crossley, Purdue University) presented an overview of why the effort began and the multiple impetuses to look into general aviation (GA) issues. It is a Purdue, PEGASAS and FAA effort. A few interesting items are that industry has latched on to pilot training -- from "pilot" to an "operator" and the number of pilots needed by 2030. An interim draft report entitled "General Aviation 2030: GA Exploratory Analysis," was distributed. The report identified seven theme areas: GA Pilot Training Proficiency, Autonomy and Automation, Airport and Infrastructure, GA in the Future Airspace, Airframes, Legacy Fleet, and Maintenance, Future Propulsion Systems, and Passenger Safety. These seven theme areas were derived from discussions held during two workshops.

One of the more significant issues in the draft report was the idea of a 20-hour training program that would lead to piloting. Today, instrument rating takes a significant amount of time, and the aviation industry has expressed concern regarding training costs. Pilots will still be needed.

Other issues discussed and identified for further committee review were: (1) determining the impact of future GA on airport infrastructure, (2) distilling meaningful research for FAA to consider, (3) inserting some sort of schedule into the research plan, and (4) arranging for an ad hoc group locally to review the research; it might be worthwhile, in order to examine the gaps.

A third workshop is scheduled on Nov 1-2 to further refine/decompose the theme areas.

- **SAS Presentation – R&D Strategic Direction.**

Dave Polland (Boeing) presented on the R&D strategic issues that Boeing foresees. Boeing is continually striving to be more innovative and revisiting/updating their criteria for their motivation model. Other areas discussed were analytical prediction versus actual testing, structures testing or flight test, etc. It was noted that flight testing is expensive, so elimination would be beneficial. An example of this is cross wind testing. It is very expensive and difficult to nail down locations. Boeing knows they have a predictive capability, but regulation does not allow this avenue for certification. This is equally difficult for the FAA to validate the measures of predictive capability for the safety aspect. The finding is that we are not certain this work is being done, that is the standardization of test capabilities, including predictive capabilities.

- **SAS Presentation – R&D Strategic Direction.**

Jeff Radke (Honeywell) presented on the R&D strategic issues that Honeywell foresaw. As part of their Enhanced Ground Proximity Warning System, Honeywell is developing a *Runway Awareness & Advisory System, SmartRunway/SmartLanding* that will alert pilots to unstable approaches and long landings and will reinforce the need to go-around when a potentially unsafe

condition materializes. In addition, Honeywell had been developing and flight testing (since 2013) scalable detect and avoid technologies. A couple of other areas that are specific to aircraft safety include: engine icing research, e.g., super-cooled large droplets, ice crystal mixed phase, and flight testing of a *Radar High Altitude Ice Crystal Detecting Prototype.* In addition, Honeywell was a voting member of the ASISP Aviation Rulemaking Committee.

There was general discussion surrounding the presentations from MITRE, Boeing, Honeywell and FAA/Purdue relating to GA. This type of presentation helps keep the Subcommittee up to speed and stay current. There is a lot of common ground including what the FAA says about their evolving certification strategy. It would seem that there is a common understanding around the key issues and what needs to change.

An action for the Subcommittee is to review the existing emerging issues, developed in fall 2014, and see if there is a new focus or revisions needed to make them more relevant to these issues. Perhaps this should be a topic at the next meeting. How do we structure the communication to pull all the information together and get the strategy on target?

- **Closure**

The meeting ended at 5:00PM with both the Subcommittee Chair and Designated Federal Official (DFO) thanking all for organizing/participating in the meeting

2017 Fall REDAC SAS Meeting
Agenda
September 6-7, 2017

Dress code: ***Business Casual***
Location: FAA William J Hughes Technical Center, Building 300
Atlantic City, NJ
Site Info: Director's Conference Room, B-300-4-2 (K-35); Room ID: 4S019
Telecon:

- Dial In Access: (USA Only) **888-924-3230**
- Dial In Access: (Direct Dial) **609-916-1975**
- Dial In Access (Alternate USA Only) **888-335-6670**
- Dial In Access (Alternative Direct Dial) **405-225-2375**
- Chairperson Passcode: **589742**
- Participant Passcode: **868925**

WebEx:

- https://aviationresearch.webex.com/aviationresearch/j.php?MTID=me6a62e08833524154e4fda1e13fa1ddb
- Meeting number: 994 529 726
- Host key: 193863
- Meeting password: redac

September 6, 2017 Wednesday		
Time	Topic	Presenter(s)
7:30 – 8:00	Security Check in and badging	WJHTC Visitor Center
7:45 – 8:15	Transportation from Visitor Center to Building 300	
8:15 – 8:30	Welcoming and Introductions	Shelley Yak
8:30 – 8:45	AVP Executive Director Remarks	Stephen Gottlieb
8:45 – 9:00	DFO Opening Remarks	Eric Neiderman
9:00 – 9:15	SAS Chair Opening & Report on REDAC meeting	Ken Hylander
9:15 – 9:30	REDAC/SAS Roles and Responsibilities	Chinita Roundtree-Coleman
9:30 – 9:45	FAA Budget Update	Mike Gallivan
9:45 – 10:00	Break	
10:00 – 10:30	SAS Finding and Recommendations – FAA Responses	Eric Neiderman, Mark Orr
10:30 – 11:00	Fatigue Risk Management System Database Update	Carla Hackworth, Tom Nesthus, Katrina Avers
11:00 – 11:30	UAS FAA UAS Integration Research Plan 2017-2022 Status	Sabrina Saunders-Hodge
11:30 – 12:00	UAS FY17 Portfolio Accomplishment: Non-COE	Nick Lento
12:00 – 12:30	ASSURE Research Capabilities and Results	Nick Lento
12:30 – 1:30	Lunch	
1:30 – 2:30	FY2017 Portfolio Accomplishments: Fire, PS, ACFP, AM/SS, AI*	Eric Neiderman/Mark Orr
2:30 – 2:45	Break	
2:45 – 4:00	Structure and Materials Lab - Tour	Ken Knopp/Ed Weinstein
4:00 – 4:30	MITRE Aviation Safety R&D Support	Andy Lacher
4:30 – 5:00	Wrap-up and Assignments	Eric Neiderman/Ken Hylander
5:00	Transportation from Building 300 to Visitor Center	
6:30 - Group Get-together		

* PS-Propulsion Systems, ACFP-Aircraft Catastrophic Failure Prevention, AM/SS-Advanced Material/Structural Safety, Ai-Aircraft Icing, AR-Aeromedical Research, HF-Human Factors

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September 7, 2017, Thursday		
Time	Topic	Presenter(s)
7:30 – 8:00	Transportation from Visitor Center to Building 300	
8:00 – 8:30	Review Day-1 homework, feedback, etc.	Ken Hylander, Eric Neiderman, & Mark Orr
8:30 – 10:00	Cybersecurity R&D Plan (includes Aircraft Systems Information Security Program)	John Lapointe, Chuck Agava, Isidore Venetos
10:00 – 10:15	Break	
10:15 – 10:45	Aircraft Certification Service - Transformation	Chris Carter
10:45 – 12:30	FY2017 Portfolio Accomplishments: SSM, TAS, SDS, ASISP, CA-Sys, CA-Str, AM, HF,AFGA**	Eric Neiderman, Mark Orr
12:30 – 1:30	Lunch	
1:30 – 2:30	CASSIE Demonstration & Tour	Mike Paglione, Tom Tessitore
2:30 – 2:45	Break	
2:45 – 3:30	GA Strategic Plan	J. Lapointe / Bill Crossley
3:30 – 4:00	SAS Presentation – R&D Strategic Direction	David Polland, Boeing
4:00– 4:30	SAS Presentation – R&D Strategic Direction	Jeff Radke, Honeywell
4:30 – 5:00	Closing remarks SAS F&R discussions and feedback	Ken Hylander, Eric Neiderman & Mark Orr
5:00	Adjourn /Transportation from Building 300 to Visitor Center	

** SSM-Systems Safety Management, TAS-Terminal Area Safety, SDS-Software Digital Systems, CA-Sys-Continued Airworthiness Systems, CA-Str-Continued Airworthiness Structures, AFGA-Alternative Fuels for GA, AM-Aeromedical, HF-Human Factors

Attendance:

Research, Engineering and Development Advisory Committee	
Aircraft Safety Subcommittee - Sept. 6-7, 2017	
NAME	**COMPANY**
Shelley Yak	FAA
Eric Neiderman	FAA
Mark Orr	FAA
Steve Gottlieb	FAA
Chris Kmetz	Pratt and Whitney
David Polland	Boeing
Andrew Lacher	Mitre
Ken Knopp	FAA
Ryan King	FAA
Jackie Simmons	FAA
Michelle Yeh	FAA
Dan Brock	FAA
Steve Ramdeen	FAA
Isidore Venetos	FAA
Jimmy Bruno	FAA
Tim Evans	FAA
Chuck Agava	FAA
John Peace	FAA
Chris Seher	ARA
Richard Mendell	FAA
Thomas Glista	FAA
Michel Hovan	FAA
Xiaogong Lee	FAA
Stacey Zinke-McKee	FAA
Marguerite Thompson	FAA
Alanna Randazzo	FAA
Cliff Johnson	FAA
Jim Mangie	Delta Airlines
Chris Heck	ALPA
Dress Zellweger	Self
Maureen Molz	FAA
Susan Kaelin	Alpha-Native Services
Somil Shah	FAA
Tom Tessitore	FAA
Michael McNeil	FAA
John Lapointe	FAA

Jim Riley	FAA
Chinita Roundtree-Coleman	FAA
Jeff Radke	Honeywell
Greg Bowles	GAMA
Mike Gallivan	FAA
Frank Wondowlowski	FAA
Mark Muchler	FAA
Steve Edgar	FAA
Nick Lento	FAA
Sabrina Saunders-Hodges	FAA
Pete Sparacino	PLS Consulting
Bill Crossley	Purdue University
Ken Hylander	Flight Safety Foundation
Vic Patel	FAA
Angela Campbell	FAA
Huasheng Li	FAA
Hossein Eghbali	FAA
Srini Mandalapu	FAA
Vasu Kolli	FAA
Jolea Rosetto	FAA