

FEDERAL AVIATION ADMINISTRATION
REDAC Subcommittee on Aircraft Safety (SAS)
2016 Fall Meeting Minutes
September 14 – 15, 2016

The 2016 Fall REDAC SAS Meeting was held on September 14-15, 2016 at the Flight Safety Foundation, 701 N. Fairfax Street, Alexandria, VA. On the 2nd day of the meeting, the FAA Associate Administrator for Aviation Safety, Peggy Gilligan, and executives of her management team participated in discussions with SAS members on the strategic needs of aviation safety research as well as emerging challenges and opportunities. This document memorializes discussions and activities that occurred during the meeting, which generated several actions. The meeting resulted in three findings and recommendations (F&Rs). All presentation materials are available and can be downloaded through the FAA REDAC database.

Day 1 – September 14, 2016

Introduction/Opening

The SAS Chair, Mr. Ken Hylander, and the SAS Designated Federal Official (DFO), Dr. Eric Neiderman, jointly kicked off the meeting with brief opening remarks, which were followed by introduction of SAS members and all attendees.

Budget Update

Mike Gallivan, Manager of R, E & D Financial Management presented the FAA R&D budgets. First, he provided a summary of FY2016 R, E&D budget of \$166 million, which was signed on December 18, 2015 and was just a little over 1% of the FAA total budget of \$15.8 billion. The FY2017 R, E&D budget request was \$167.5 million. He presented both House and Senate markup language on specific programs and discussed the differences. The next step would be the House to vote on its budget and then the Conference Committee to create a joint resolution. He also addressed Congressional issues such as the Continuing Resolution currently going through December 9th, Sequestration still being in effect, possible Senate filibusters, and the FAA Reauthorization, which expires on September 30, 2017, among other issues. With the Presidential election, it would be uncertain when the FAA would get its full FY2017 budget.

Following the FY2017 budget presentation, Gallivan highlighted out-year budget targets, FY2018-FY2022, as established in January 2016. SAS members noted that the target funding levels remained flat for the next five years beyond FY2017. Gallivan pointed out that slight increases in those numbers would be below the yearly inflation increases so that the funding levels would be actually reduced if we took into account of inflation.

SAS members pointed out that the Senate had some specific markup languages for certain programs with plus-up funding requirements, including UAS, “unitized airframe structures”, Advanced Materials COD, etc. This was something the FAA needed to pay attention to. It was most likely that the UAS plus-up funding would happen. Although, the Senate bill had plus-up for the total budget, it would be up to the Congress to get the final number. If total funding level was not increased, these plus-ups meant that other program areas would lose funds.

FAA Re-Authorization R&D

Xiaogong Lee of the Aviation Research Division at the FAA William J. Hughes Technical Center presented several R&D and related areas within the FAA reauthorization, FAA Extension, Safety, and Security Act of 2016, which would be of interest to SAS members. The presentations and discussions included SEC 2104 – Laser Pointer Incidents, SEC 2111 – Aviation Cybersecurity, SEC 2208 – UAS traffic management (UTM), SEC 2211 – UAS R&D roadmap, SEC 2212 – UAS-manned aircraft collision research, and SEC 2213 UAS Probabilistic metrics R&D study.

SAS members pointed out that some of the research activities mandated in the FAA authorization have already begun. NASA has been working with the FAA on Unmanned Aircraft System Traffic Management (UTM). NASA also partnered with the National Research Council (NRC) and FAA on probabilistic metrics studies using UAS as use-cases. The efforts will need operational data.

REDAC and SAS Update and Direction

SAS Chair, Ken Hylander, presented his Chair comments on the SAS 2016 Fall Meeting. He opened his remarks with a reminder of the SAS 2016 Spring Meeting objectives: UAS research priorities, FY2018 safety research portfolio, evolution of emerging issues and opportunities, and input to FY2019 strategic guidance. He led additional discussions on the outputs of the 2016 Spring F&Rs with focus on UAS, additive manufacturing, advanced materials, and ice crystal engine test.

Subcommittee members reiterated their concerns on funding impacts to other programs in the safety portfolio due to Congressional markups and funding reallocations and expressed their desires to discuss the issues with the Aviation Safety Management Team (AVSMT). The subcommittee would learn whether the researchers addressed the impacts of reduced budgets, particularly what would not be done as planned. A broader look at the issue would be helpful. Funding has impacts on other safety research portfolio.

Hylander updated the SAS members on activities that occurred since the spring meeting which included a meeting between Ken Hylander, Eric Neiderman, Mark Orr, and the FAA Associate Administrator for Aviation Safety, Peggy Gilligan, and her management team (AVSMT). They approved the FY2018 safety research portfolio, endorsed the overall SAS efforts, and agreed to incorporate the SAS priorities and emerging issues into its FY2019 strategic guidance document. They also expressed their desire to meet with the SAS members.

Hylander informed the SAS members that Gilligan and members of AVSMT would attend the second day meeting to meet with the SAS members to listen to SAS feedback and to discuss FAA safety priorities. To prepare for the meeting, he would hold a member-only caucus as the last item on the first day's agenda to determine what is needed to be discussed, such as Aviation Safety (AVS) view of emerging issues, short-term vs long-term research needs, etc. Subcommittee members pointed out that the emerging issues are real and timely, now, not the future.

Hylander reported back to the subcommittee members on the outcomes of the spring full REDAC meeting, which focused on discussions on UAS, where SAS UAS-related Findings and Recommendations (F&Rs) were fully endorsed by the full Committee. FAA Administrator, Michael Huerta participated in the full committee meeting. The FAA UAS leadership provided detailed reviews of its activities. The REDAC had identified key UAS challenges to focus on its real R&D needs and better communicate FAA UAS strategies and assumptions so that the REDAC could support development of high-level strategic research areas. The REDAC also discussed its future meeting focuses such the big data analytic opportunities and critical research questions.

Hylander finished his remarks with outlines of three primary objectives of 2016 fall meeting: continuing input on FY2019 guidance, beginning to explore big data questions, and maximizing the value of the opportunity to meet with AVSMT.

Discussions of draft FAA responses to SAS 2016 Spring F&R

As there were no previous open SAS findings and recommendations (F&R), discussions would be focused only on SAS 2016 Spring Meeting F&Rs. There were a total of 14 F&Rs including seven UAS-related and seven other F&Rs. The FAA DFO for SAS, Eric Neiderman, and Aviation Safety R&D Manager, Mark Orr, led the discussions. Neiderman pointed out that, as directed by the REDAC DFO and Chair of the FAA Research Executive Board (REB) and for consistency and actionable response, all the written responses were started with a standard sentence to inform the Subcommittee whether the FAA would “Concur”, “Concur with exceptions”, and “Does not concur or cannot pursue recommendation”. As the official FAA responses had not had the final approval, the draft responses (near final version) presented to SAS members and discussions were followed on each of the 14 responses individually.

Subcommittee members did not agree with some of the FAA responses, particularly with the ones of “non-Concur” ones. However, subcommittee members recognized that recommendations were for FAA consideration and FAA had the responsibility for the final decision. Based on the reviews, discussions, and findings, SAS will make new recommendations.

In reference to the FAA response on the SAS 2016 Spring F&R No. 12 on the Rotor Integrity Subcommittee (RISC) and Jet Engine Titanium Quality Committee (JETQC) initiatives, SAS member, Chris Kmetz stated that it was the most important recommendation from safety perspective and asked the timeframe/schedule of the referred roadmap of research in this area. Kmetz would take an action to communicate to the RISC for its roadmap development on characterization and certification of titanium material.

Hylander stated that the Subcommittee should keep logs of all its Findings and Recommendations to have view of its history. Chinita Roundtree-Coleman pointed out that the FAA did keep records of REDAC F&Rs and took an action to generate one for the SAS.

FY2016 Significant R&D Accomplishments & Quad Chart Reviews:

SDS , FCS , AM , AI , PS , GAF , RS , ES , FCMS , Wx , and SSM

AVS R&D Manager, Mark Orr, SAS DFO, Eric Neiderman, and SAS Chair, Ken Hylander, jointly led the discussions on FY2016 quad charts. The Day-1 Quad Chart Reviews covered the following program areas: Software and Digital Systems (SDS), Fire and Cabin Safety (FCS), Advanced Materials (AM), Propulsion Systems (PS), General Aviation Fuels (GAF), Rotorcraft Systems (RS), Electric Systems (ES), Weather Research (Wx) and System Safety Management (SSM). The quad charts were focused on FY2016 significant accomplishments in each of the research program areas within the safety research portfolio.

All the quad charts were sent to SAS members prior to the meeting to allow time to review and to provide comments. Hard copies were made available to SAS members at the meeting as well. Comments received on those programs were brought up to start the conversation.

SAS members provided several general observations and raised some concerns/issues. It was difficult to see the big pictures from the quad charts. The quad charts should have included information on specific sponsors and sponsoring organizations, internal and external research performing organization, magnitude of funding to gauge accomplishments, and linkages to applicable strategic issues. The actual accomplishments, not just budgets, in the fiscal year listed were informative and helpful to understand research activities. SAS recommended that a four-year view to the quad charts would be nice to better understand the overall efforts.

SAS members raised questions on the SDS program. Given the current cyber environment, would the current research initiatives be fast enough to understand the risks and have mitigations in place?

Should it need to be sped up? SAS members reinforced its view that streamlining the approval processes for Commercial off the shelf (COTS) technologies was extremely important. SAS would like to learn what the FAA overall digital strategy was.

FAA Risk-Based Decision Making – Priority Initiative

Paula Martinez, Manager of Safety Management and Research Planning Division (FAA AVP-300), presented the FAA Risk-Based Decision Making (RBDM) – Strategic Initiative Overview. Martinez' presentation consisted two parts: RBDM defined and RBDM. She explained that this strategic initiative included State Safety Programs, Safety Management Systems, and Risk-based Decision Making to ensure that safety risk was systematically included as part of the equation when decisions were made and outcomes of any management or system activity incorporated safety considerations.

The RBDM initiative is the FAA-wide initiative led by the FAA Associated Administrator for Aviation Safety, Peggy Gilligan, and managed by AVP-300. When fully implemented, FAA personnel will be able to make smarter, risk-based decisions to improve safety in the aviation system. Safety data will be shared among FAA organizations, industry, and international peers, leading to a broader spectrum of available data. Data will be analyzed using safety management principles to identify emerging hazards and predict the associated safety risk. Resulting information will be coordinated and shared with the decision makers—those people who are in the best position to manage the safety risk and make the aviation system even safer.

Martinez discussed the details of RBDM sub-initiatives and activities: improve standardization, data access, and modeling integration; enhanced decision-making process; evolution of safety oversight model; and transition to safety management. This approach would help the FAA to understand what hazards were there and to determine where to put our resources to those hazards. She presented the current status of this strategic initiative and accomplishments to date.

Rotorcraft ASIAs

Cliff Johnson of the Software and Systems Branch of the Aviation Research Division (ANG-E27) presented the FAA Helicopter Flight Data Monitoring Research for Aviation Safety Information Analysis and Sharing (ASIAs). Johnson presented the overall research objectives to support the goals of reducing helicopter fatal accidents and to improve the safety with industry participation and research support from the FAA General Aviation Center of Excellence – Partnership to Enhance General Aviation Safety, Accessibility, and Sustainability (PEGASAS). Some discussions with SAS members were pursued on picking metrics for safety analysis and assessment.

Real-Time System-Wide Safety Assurance

It was a joint presentation by the co-lead of the FAA-NASA System-wide Safety Assurance (SWSA) Research Transition Team (RTT), Warren Randolph of FAA Office of Accident Investigation and Prevention (AVP) and Jessica Nowinski of NASA Aeronautic Research Mission Directorate (ARMD).

Hylander led the discussions by reminding everyone that this was a SAS emerging issue. Randolph provided a brief introduction of the FAA-NASA RTT programs. He described the objectives of the SWSA RTT to facilitate transition of technologies, tools and knowledge to support safety assurance; to identify common critical safety assurance goals and coordinate research efforts; and to scope work and prioritize by focusing on near-term technology infusion. Randolph provided a status update of the program, since its data mining and prognostics workshop earlier in the year, and planned activity including: potentials of integrating NASA safety modeling tools with the FAA's Integrated Safety Assessment Model – ISAM; Human Performance workshop at NASA Ames, October 12-13, 2016; and Verification and Validation (V&V) workshop planned for Q1 FY17

Following Randolph's presentation, Jessica Nowinski began the presentation with an overview of the six NASA ARMD research areas: Safe, Efficient Growth in Global Operations; Innovation in Commercial Supersonic Aircraft; Ultra-Efficient Commercial Vehicles; Transition to Low-Carbon Propulsion; Real-time System-Wide Safety Assurance (RSSA); and Assurance Autonomy for Aviation Transformation. She presented the details and status updates of the NASA RSSA program including strategies to leverage increasing body of safety related data; key dependencies and strategic partners; intended outcomes; and the research themes.

SAS members discussed the needs as well as challenges of real-time system-wide safety assurance. Gaps and the meaning of real-time were discussed, e.g. real-time might not necessarily be in time, rather be the right time.

SAS Member Caucus

The last agenda item for the first day of the Fall meeting was a subcommittee member caucus in preparation of SAS meeting with AVSMT the next day. SAS DFO and AVS R&D Manager participated in the caucus.

Day 2 – September 15, 2016

Homework review:

Hylander started the meeting with a summary of the first day meeting. Subcommittee members commented on the FAA effort on Risk-based Decision Making (RBDM); rotorcraft ASIAs; industry involvements in real-time system-wide safety assurance; and NASA efforts with monitoring human behavior. Subcommittee members agreed that the FAA should continue industry outreach and should act fast to address the emerging issues.

Best Practices of REDAC

The REDAC DFO and Chair of the FAA Research Executive Board, Shelley Yak, who is also the Director of the FAA William J. Hughes Technical Center, participated the second day meeting and provided opening remarks. Yak emphasized the valuable contribution to FAA's research program that the REDAC and its Subcommittees made to the FAA. Specifically, the Findings and Recommendations were well thought of and reasoned. They had provoked meaningful internal program review. The FAA welcomes continued assistance and advice to increase success in research and development.

Yak discussed the need to engage the REDAC in the development of the FAA National Aviation Research Plan (NARP) in the context of the FAA R&D strategy. She stated that the effort was already underway under the guidance of the FAA Research Executive Board, of which Yak serves as the Chair. It was aimed to revise the NARP in the FY2018 budget cycle. She stressed the importance of balancing the need for higher-level strategic program description and NARP content requirements specified in the statute and strengthening alignment with DOT/FAA strategic priorities through a reduced set of well-defined research goals. The FAA would engage the REDAC to provide status updates and to seek input (i.e. framework, approach, tools/template).

Hylander encouraged the FAA to get as much interagency collaboration as possible and to engage industry to provide expert views.

Writing Actionable Recommendations

Chinita Roundtree-Coleman, the REDAC Program Manager of the FAA Research and Development Management Division, presented an overview of the REDAC roles and responsibilities and writing actionable recommendations. She provided a review of the Statue that mandated the establishment of REDAC, Title 49 United States Code (USC) §44508 - Research advisory committee, which described specific mandatory requirements. Currently, the FAA REDAC has five Subcommittees: Aircraft Safety;

Airports; Environment; Human Factors; and NAS Operations. The Subcommittees would hold two meetings annually: Summer/Fall meeting and Winter/Spring meeting. Chinita addressed the purposes of the meetings:

1. Summer/Fall meeting: To provide strategic guidance to the FAA to develop the upcoming FY+3 research portfolio.
2. Winter/Spring meeting: To review the R&D portfolio developed based on their strategic guidance from fall meeting.

Hylander commented that the meetings were six months out of synch from the FAA budget cycle as the FAA started developing aircraft safety strategic guidance in earlier Spring (February/March) and the SAS inputs on the strategic guidance was scheduled in late Summer (August/September).

SAS members also raised the question that FY2019 portfolio was not presented. AVS R&D Manager Mark Orr responded to inform SAS that the FY2019 portfolio was under development and key points of the AVS Strategic Guidance were presented to the SAS at the Spring-meeting back in March.

Roundtree-Coleman continued her presentation on writing actionable findings and recommendations, where a finding set up the stage with background for the recommendation and its recommendation would be an action telling the FAA what the Subcommittee would like the FAA to do, to consider, to present, etc. She emphasized that the FAA only responds to what is written in the recommendations.

FY2016 Significant R&D Accomplishments & Quad Chart Reviews: TAS, HF, MI, SIC, SIM, and UAS

Orr, Neiderman, and Hylander jointly led the discussions on remaining sets of FY2016 quad charts. The Second Day Quad Chart Reviews covered the following program areas: Terminal Areas Safety (TAS), Human Factors (HF), Maintenance and Inspection (MI), Structure Integrity – Composite (SIC), Structure Integrity – Metallic, and Unmanned Aircraft Systems (UAS). The quad charts were focused on FY2016 significant accomplishments in each of the research program areas within the safety research portfolio.

All the quad charts were sent to SAS members prior to the meeting to allow time to review and to provide comments. Hard copies were made available to SAS members at the meeting as well. Comments received on those programs were brought up to start the conversation.

Subcommittee members questioned the additional needs for more research on runway friction reporting in the Terminal Areas Safety (TAS) and asked when the technology was going to be implemented. Dan Brock of FAA Flight Standards R&D stated that the FAA Flight Standards Service would need to look at it in more details. Hylander indicated that major US airlines had been gathering data starting two years ago and asked how the research results could be applied to benefit actual operations. Subcommittee members questioned why the FAA did not conduct its research in both airworthiness and operations in parallel. FAA representatives explained that the FAA Aircraft Certification Service who sponsored the original research started 4-5 years ago and now the sponsorship had been transitioned to Flight Standard Service to look at operational issues. It had to first understand whether concept was technically possible before conducting research on operational issues.

Hylander stated that he would ask Subcommittee member Captain Jim Mangie of Delta Airlines to understand the current status and how to synch it up the technology with airlines.

Subcommittee members discussed the needs of holistic views on fatigue research initiatives and how the FAA should address how the research would lead to Research Sponsor's outcomes to address fatigue mitigation in flight operations. The HF quad chart related to this research should have listed critical research milestones.

Subcommittee members decided to draft a Finding and Recommendation in this area and assigned SAS members, Dr. John Crowley and Mangie, to do so.

Subcommittee members also discussed the studies of unstable approaches under the TAS program, particularly whether the FAA should define detailed parameters for a stabilized approach and develop detailed criteria indicating when a missed approach should be performed as recommended by the National Transportation Safety Board (NTSB) A-01-69.

UAS CONOPS & CONOPS Maturation

The UAS ConOps and ConOps Maturation were presented jointly by Sherry Magyarits, FAA NextGen Advanced Concept Branch, and Maureen Keegan, FAA Air Traffic Organization Technical Analysis & Operational Requirements Group. The development was primarily focused on concept development, validation, requirements, and system-engineering process to provide structure and traceability from operational perspective. The first version of the ConOps was developed in September 2012 and had been updated regularly. It was coordinated throughout various FAA lines of business (LOBs).

Magyarits and Keegan presented an overview of UAS ConOps maturation to ensure the ever evolving UAS operations. They highlighted anticipate operational milestones within the mid-term timeframe, 2018-2020, where certain dependencies of NextGen capabilities would be available to support UAS operations, for example data communications, NAS digital voice switches, etc. The ConOps considered 22 mid-term operational scenarios including visual line of sight (VLOS), extended visual line of sight (EVLOS), and beyond visual line of sight (BVLOS) UAS operations.

They also presented the joint effort with NAS on UAS Traffic Management (UTM) systems for lower altitude UAS operations in working with the joint FAA-NASA research transition team (RTT).

Subcommittee members suggested that the FAA should take any one of the operational concept and to make it work operationally, which would help to speed up the integration process.

Additive Manufacturing – National Team Research Plan

The FAA Chief Scientist and Technical Advisor (CSTA) for Fatigue and Damage Tolerance, Michael Gorelik, and the FAA Senior Technical Specialist (STS) for Nondestructive Inspection and Composite Materials Maintenance, Rusty Jones jointly presented the FAA Additive Manufacturing (AM) program.

Jones presented the establishment of the FAA AM National Team (AMNT) with membership across various FAA Office of Aviation Safety (AVS) including engineering, manufacturing, flight standards, CSTA, STS, and research organizations. The AMNT was chartered for two years. The AMNT would apply the principles of the safety management System (SMS) and risk-based decision-making (RBDM) to address the safe implementation of AM technology. The AMNT was chartered to develop the AM roadmap that would identify any potentially significant safety hazards and associated risk mitigation strategies, which are necessary for safe implementation of AM technology into certified products. Rusty highlighted some of the FAA accomplishments to support implementation of AM technology in certificated products.

Gorelik updated the SAS members with recent FAA major AM activities. He discussed the joint FAA and US Air Force Workshop on Qualification/Certification of Additively Manufactured Parts, which was held on August 30- September 1, 2016 in Dayton, Ohio. Gorelik emphasized that the objectives of the Workshop were to continue educating FAA workshop in AM technology, to benchmark evolving certification requirements and considerations across regulatory agencies, and to promote interagency collaborations as well as industry, academia and Government partnership.

Gorelik provided an update of the AIA AM Industry Working Group, which was established at the FAA request to engage industry, such aircraft manufacturers, suppliers, maintenance and repair

organizations, aviation trade associations, etc., to address FAA regulatory challenges. The Industry Working Group was established in February 2016.

Gorelik also updated the status of the FAA AM roadmap development. The AM Roadmap would be a multi-year strategic plan addressing technology and industry trends. It would consist of five major elements: training and workforce education; development of regulatory documents; research and development plan; active engagement with standards development organizations; and interagency coordination.

Subcommittee members asked whether the Europeans would be engaged in the discussions. Gorelik answered that the European Aviation Safety Agency (EASA) was involved, plus others such as USAF, NAVAIR, NavCanada, and NIST (although it was not a certification agency). Subcommittee members discussed the importance of the AM technology in aviation and asked to be able to review the Roadmap document. It was suggested that the FAA might consider moderate incremental investments to modifying the FAA engine design DARWIN[®] (Design Assessment of Reliability With INspection) code for AM.

Subcommittee members were pleased to see a lot of progress made and appreciated the effort from the industry perspective. The presentations were comprehensive. SAS would provide a finding and recommendation on AM to request a presentation of the AM Roadmap with its five-year plan. SAS member, Chris Kmetz, was assigned to write up the F&R.

Discussion with AVS Senior Management Team

FAA Associate Administrator of Aviation Safety Peggy Gilligan and members of AVS Management Team, participated in discussions with SAS members. Members of her management team included John Hickey, Deputy Associate Administrator of Aviation Safety (AVS-2); David Hempe, Deputy Director of Aircraft Certification Service (AIR-2); John Barbagallo, Deputy Director of Flight Standard Service (AFS-2); Steve Gottlieb, Deputy Director of Accident Investigation & Prevention Service (AVP-2); and Bill Crozier, Deputy Director of Unmanned Aircraft Systems Integration Office (AUS-2).

Gilligan stated that the FAA needed much more agility to meet the challenges of ever-evolving new aircraft technology and to be proactive to solve problems. The AVS would need the Subcommittee's help to be more agile and to determine what is the right priority and when to stop. The Subcommittee is an independent group that can really help the FAA to be forward looking. Although the FAA needs to do what the Congress asks us to do, but AVS needs help from REDAC to pull it together and where the focus should be. The SAS adds the value to help AVS to understand the big pictures and to deal with emerging issues before they become problems.

Hickey emphasized the need of REDAC to overcome the challenges to identify FAA needs in R&D as the AVS is moving from bottom-up R&D portfolio development to AVS strategic guidance-based approach. As we were doing less day-to-day operational issues and looking more into the future, the challenging is where the priority should be to support the AVS needs. REDAC can certainly help.

Both Gilligan and Hickey addressed the challenges the FAA was facing as rapid technology development and implementation in aviation. It was difficult to have a clear view what it would be looked like in 3-5 years. For example, cybersecurity has been a big issue recently and will be certainly getting worse. The FAA does not have the expertise and we need help in this area, especially it changes rapidly. More agility would help to solve challenge. It would be very helpful if the Congress stops the earmarks to allow us to focus on the important things that we need to do.

Hickey asked to Subcommittee members to consider UAS R&D challenges. The FAA has several priority R&D needs such as UAS as sense and avoid. The FAA is very concerned about injection of UAS into

aircraft engines. Although aircraft are certified to sustain certain level of bird strikes, there is a big unknown on UAS. As the number of small UAS had been drastically increased, it was unavoidable such incidents would happen and the FAA needs to understand the safety impacts.

Hickey stated that the AVS R&D should focus on compliance technology, as the industry is looking at technology development and implementation. He pointed out that another challenging R&D area was computer modeling to meet certification requirements and to demonstrate compliance (certification by analysis) instead of actual testing to save both time and money. Dave Hempe emphasized that the FAA, particularly AIR, needs to maximize credits of modeling in aircraft certification process.

Hylander stated that the Subcommittee was looking at that, especially what the better ways to certify an aircraft and was struggling to get the big AVS R&D picture to have a holistic view of the portfolio. The biggest challenge in the last two-day meeting was to understand the big picture while reviewing the 77 individual quad charts, each of which had different research goals and objectives. We were identifying emerging issues and opportunities so that the FAA could deal with them earlier on avoiding last minute panics.

Hylander also pointed out that there would be a need to add discussions on impacts if we were not doing something, not just why the research was needed, while developing the AVS research requirements so that it would provide a complete picture. He also stated that the Subcommittee members spent too much time to review FAA research portfolio and R&D plans. He suggested that the Subcommittee should be looking at what the industry needs as well.

Hickey stated that that was a big deal for the FAA. The research had really helped the FAA to effectively deal with some safety-critical issues. The aircraft central-tank fuel inserting system was an excellent example. The FAA convened two Aviation Rulemaking Advisory Committees (ARACs) to provide the FAA recommendations on this issue. Both ARACs came back to the FAA with solutions that would cost over \$20 billion. The Tech Center researchers developed the low cost and safety effective solution that is now available to everyone worldwide. The entire US fleet would be equipped with such system by next year (2017).

Hempe pointed out that AIR needed to change its 30-year-old certification model to move into proactive approaches. Instead of waiting for applicants come to the FAA certification offices, the FAA was going to talk to their marketers to understand where the technology was driving it. The challenging thing for the FAA was the protection of proprietary information, particularly in their earlier stages of development. The now-certified composite technology for airframes and the additive manufacturing technology being adopted were good examples. The electric propulsion systems would be another challenging technology in terms of certifications and compliances.

SAS Findings & Recommendations, Action Items, and Wrap-up

Hylander and Neiderman led the discussions about the usefulness and the needs of quad charts as part of the meeting agenda items for future meetings. The SAS determined that they were not useful and there would be no more quad charts in future meetings. Instead, the meeting should focus on budget line items (BLIs) to include description, major challenge, benefits, and specific research activities.

The presentation on Real-time System-wide safety had the right level of detail. The AM presentations showed the good approach taken by the FAA, but the SAS would like to be briefed in details about its roadmap and its 5-year plan. SAS would draft up an F&R for each of these two areas, respectively. SAS members, John Cavolowsky and Ken Hylander, would prepare F&R for real-time system-wide safety; and Chris Kmetz, for AM.

The SAS and DFO agreed that the SAS 2017 Spring Meeting would be held March 8-9, 2017 at the FAA Mike Monroney Aeronautical Center, FAA Civil Aeromedical Institute (CAMI) in Oklahoma City, Oklahoma.

SAS members suggested the following research topics to be presented/discussed at the SAS 2017 Spring meeting for consideration by the FAA DFO and AVS R&D manager:

- a. Real-time System-Wide Safety Management
- b. Big Data – supporting real-time system-wide safety assurance initiatives
- c. Cyber-resiliency/cyber-security
- d. 2019 research portfolio and plan
- e. 2020 AVS strategic guidance
- f. Fatigue management and human factors
- g. CAMI update

The SAS Chair, FAA DFO, and AVS R&D manager would jointly decide, in consultation with SAS members, on actual discussion topics during their planning meetings.

Meeting Findings and Recommendations:

1. Real-time system-wide safety assurance (Ken Hylander & John Cavolowsky);
2. Additive Manufacturing (Chris Kmetz);
3. Fatigue knowledge affecting aviation safety;
4. Commercial-off-the-shelf (COTS) technology for aircraft applications (Greg Bowles, FAMA).

(It was noted that the 4th F&R was not submitted to REDAC due to time constraints. Hence, it was not considered.)

SAS 2016 Fall Meeting Adjourned

Meeting Agenda
2016 Fall REDAC SAS Meeting
Agenda (v2017-01-06)
September 14 – 15, 2016

Date: September 14, 2016 Wednesday
Location: Flight Safety Foundation (in the United Way Worldwide Building)
Meeting Room: Mary Gates Learning Center – 104
 701 N. Fairfax Street, Suite 250, Alexandria, VA 22314-2058
Telecon: (609) 916-1975, Passcode: 600418
WebEx: <https://aviationresearch.webex.com>
 Meeting number: 998 765 873
 Meeting password: fall
 Click [here or type/copy the following WebEx address to join the meeting directly:](https://aviationresearch.webex.com/aviationresearch/j.php?MTID=m026131d7bf1794d1f211d5f8e68bfda5)
<https://aviationresearch.webex.com/aviationresearch/j.php?MTID=m026131d7bf1794d1f211d5f8e68bfda5>
Site Info: See Page 13 for Parking/transportation and lodging information

September 14, 2016, Wednesday

Time	Topic	Presenters
8:00 – 8:15	Introduction/Opening	Ken Hylander, Chair Eric Neiderman, DFO
8:15 – 8:30	Budget Update	Mike Gallivan, AFN
8:30 – 8:45	FAA Re-Authorization R&D	Xiaogong Lee, ANG-E2
8:45 – 9:45	Discussions of draft FAA responses to SAS 2016 Spring F&R	Mark Orr, AVS R&D Eric Neiderman, DFO
9:45 – 10:00	REDAC and SAS Update and Direction	Ken Hylander, Chair
10:00 – 10:15	Break	
10:15 – 12:00	FY2016 Significant R&D Accomplishments & Quad Chart Reviews: SDS ¹ , FCS ² , AM ³ , AI ⁴ , PS ⁵ , GAF ⁶ , RS ⁷ , ES ⁸ , FCMS ⁹ , Wx ¹⁰ , and SSM ¹¹	Eric Neiderman, DFO Mark Orr, AVS R&D Ken Hylander, Chair
12:00 – 1:00	Lunch	
1:00 – 1:30	FAA Risk-Based Decision Making – Priority Initiative	Paula Martinez, AVP
1:30 – 2:00	Big Data and Data Analytics – FAA SWIM Program	Jeri Groce, SWIM PM
2:00 – 2:30	Rotorcraft ASIAs	Cliff Johnson, ANG-E2 Walt Hogan, AVP-220
2:30 – 2:45	Break	
2:45 – 3:45	Real-Time System-Wide Safety Assurance: a. Review of SAS Emerging Issue b. FAA/NASA RTT update on real-time safety technology c. NASA ARMD update on Smart-NAS, RTSM, etc. d. Committee discussions on possible research gaps	Ken Hylander, Chair Warren Randolph, AVP Jessica Nowinski, NASA Ken Hylander, Chair
3:45 – 5:00	Subcommittee Caucus & homework assignment Preparation for meeting with AVSMT	SAS Members DFO/AVS R&D

Group Dinner – TBD

¹ SDS – Software and Digital System Safety including aircraft cybersecurity (ASISP)

² FCS – Fire and Cabin Safety (Fire Safety and Crashworthiness)

³ AM – Aviation Medicine

⁴ AI – Aircraft Icing

⁵ PS – Propulsion Systems

⁶ GAF – Unleaded Alternative Fuels for General Aviation

⁷ RS – Rotorcraft Systems

⁸ ES – Electric Systems

⁹ FCMS – Flight Controls and Mechanical Systems

¹⁰ Wx – Weather Research

¹¹ SSM – System Safety Management (ASIAs, etc.)

Appendix II
Meeting Agenda (continued)

Date: September 15, 2016 Thursday
Location: Flight Safety Foundation (in the United Way Worldwide Building)
Meeting Room: Mary Gates Learning Center – 104
 701 N. Fairfax Street, Suite 250, Alexandria, VA 22314-2058
Telecon: (609) 916-1975, Passcode: 600418
WebEx: <https://aviationresearch.webex.com>
 Meeting number: 998 765 873
 Meeting password: fall
 Click [here or type/copy the following WebEx address to join the meeting directly:](https://aviationresearch.webex.com/aviationresearch/j.php?MTID=m026131d7bf1794d1f211d5f8e68bfda5)
<https://aviationresearch.webex.com/aviationresearch/j.php?MTID=m026131d7bf1794d1f211d5f8e68bfda5>

September 15, 2016, Thursday

Time	Topic	Presenters
8:30 – 9:00	SAS homework review	SAS Members
9:00 – 9:30	Best Practices of REDAC	Shelley Yak, REDAC DFO
	Writing Actionable Recommendations	Jaime Figueroa, ANG-E
9:30 – 10:15	FY2016 Significant R&D Accomplishments & Quad Chart Reviews: TAS ¹² , HF ¹³ , MI ¹⁴ , SIC ¹⁵ , SIM ¹⁶ , and UAS ¹⁷	Eric Neiderman, DFO Mark Orr, AVS R&D
10:15 – 10:30	Break	Ken Hylander, Chair
10:30 – 11:15	Quad Chart Reviews continued ...	
11:15 – 12:15	UAS CONOPS & CONOPS Maturation	Sherri Magyarits, ANG-C5 Maureen Keegan, AJV-73
12:15 – 1:15	Lunch	
1:15 – 2:00	Additive Manufacturing – National Team Research Plan	Michael Gorelik, AVS Rusty Jones, AFS-300
2:00 – 3:15	AVS MT Strategic Research Discussion Emerging issues and opportunities	AVS-1 & SAS Chair
3:15 – 3:30	Break	
3:30 – 4:30	SAS Findings & Recommendations; Action Items; and Wrap-up	Ken Hylander, Chair Eric Neiderman, DFO

¹² TAS – Terminal Area Safety

¹³ HF – Human Factors (flight deck)

¹⁴ MI – aircraft Maintenance and Inspection

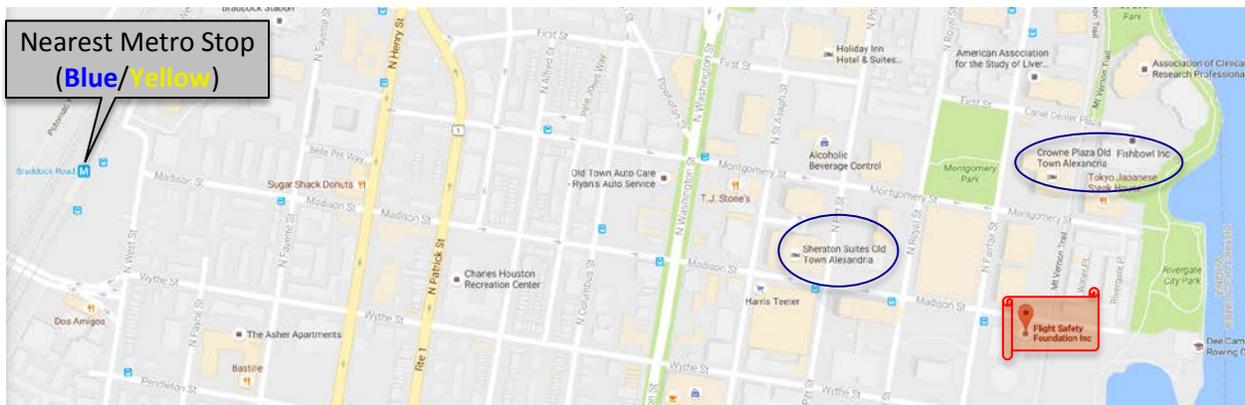
¹⁵ SIC – Structure Integrity – Composite

¹⁶ SIM – Structure Integrity – Metallic (including additive manufacturing & emerging materials)

¹⁷ UAS – Unmanned Aircraft Systems

REDAC/SAS 2016 Fall Meeting
Meeting Site Info: Parking/Transportation and Lodging

Site Map:



Flight Safety Foundation Headquarters (in the United Way Worldwide Building)

Meeting Room: [Mary Gates Learning Center – 104](#)

701 N. Fairfax Street

Alexandria, VA 22314-2058

Phone: +1.703.739.6700

PARKING/TRANSPORTATION

Limited on-site parking is available in the open lot located to the right as you enter the United Way Building main driveway. If no spaces are available, on-street parking (for up to two hours only---no meter) or the user-pay lot at the [Crowne Plaza Hotel Old Town](#), located two blocks away at 901 North Fairfax, are available. For guests arriving by Metrorail, the nearest rail station is [Braddock Road](#) on the blue and yellow lines with a connection to the DASH bus AT2/Lincolnia, AT4/Old Town, or AT5/Landmark Mall. Disembark at the intersection of North Fairfax and Madison Streets. Not a fan of the bus? Take [UberX](#) from Braddock Road station to our office for approximately \$5 one-way or a taxi for approximately \$8 one-way.

NEARBY HOTELS

[Crowne Plaza Hotel Old Town](#)

[Sheraton Suites Old Town Alexandria](#)

SAS 2016 Fall Meeting Actions

Action 1: Chinita Roundtree-Coleman will generate a list of SAS Findings and Recommendations from previous meetings of historic records.

Action 2: Chris Kmetz, SAS Member, will communicate with the Rotor Integrity Sub-Committee (RISC) to get information on the development of research roadmap on characterization and certification of titanium material.

Action 3: Captain Jim Mangie, SAS Member, will get an update on current status of real-time runway friction reports using aircraft performance data at major US airlines and how to sync it up the technology with airlines.

2016 Fall Meeting Summary Report

The Sub-committee for Aircraft Safety of the REDAC met on September 14 and 15, 2016 in Alexandria, VA at the headquarters of the Flight Safety Foundation for its routine fall 2016 meeting. The main objectives of the meeting were as follows:

1. Provide continual input and guidance to the 2019 FAA research portfolio
2. Begin to explore questions around Big Data as requested at the Spring full REDAC meeting
3. Chart a path forward to maximize SAS value to the FAA Aviation Safety Management Team.

In order to accomplish these objectives the SAS received presentations, and held detailed discussions, on topics covering; risk based decision making, big data and data analytics, UAS CONOPS, Additive Manufacturing and real time system-wide safety assurance. SAS also reviewed over 75 quad charts detailing existing research programs and priorities and had the opportunity to ask questions to FAA expert sponsors and performers. There were several findings and recommendations to come forth from these deliberations. These findings and recommendations are detailed in this report.

Additionally, we had the opportunity to have dedicated sessions with both the FAA's Research and Development and Aviation Safety management teams to discuss expectations, both of the FAA leadership and the SAS, regarding the direction and output of the SAS. These were extremely helpful, enabling great dialogue among the participants, which clarified some direction for the SAS to take as we structure future meetings, activities and reports to the FAA. We discussed the SAS' continuing efforts to better understand the overall big picture of the research portfolio and how the various efforts fit together in a complex array of budgets, fiscal management policies and research demands. We also discussed the need to achieve the balance of relatively immediate, mandated, safety research vs longer term research needed to help the agency avoid future currency shortfalls in critical safety and certification areas. The SAS has taken an action item to reconsider how it structures its meetings in support of these objectives. We jointly agreed that future meetings of this sort would be beneficial to all parties involved.

In addition to the findings and recommendations noted below SAS would like to draw attention to the findings and recommendations from our Spring 2016 meeting. These were also intended to be of value and offer early thoughts on the 2019 Research Portfolio. Specific topics mentioned in those recommendations related to Additive Manufacturing, Advanced Materials Research for engine materials and nondestructive evaluations (NDE), and Ice Crystal Icing are still valid in our opinion. We were able to observe the draft responses to our recommendations and encourage this information sharing in the future. Additionally we would like to thank the Aviation Safety Management Team for including our previously identified emerging and future issues in their 2019 Research Strategic Guidance published in May, 2016, shortly after our joint briefing on SAS activities.

The next SAS meeting is scheduled for March 8 and 9, 2017 to be held at FAA's Civil Aerospace Medical Institute.

Respectfully Submitted,

Kenneth Hylander
Chairman, Safety Sub-committee, REDAC
September 22, 2016

**FEDERAL AVIATION ADMINISTRATION
REDAC Subcommittee on Aircraft Safety (SAS)
Fall 2016
September 14-15, 2016**

In Attendance

September 14, 2016

John Reinhardt, FAA
Jimmy Bruno, FAA
Frank Wondolowski, FAA
Danko Kramar, FAA
Ken Knopp, FAA
Estrella Forster, FAA
Eric Neiderman, FAA
Jeff Radke, Honeywell
Dres Zellweger
John White, ALPA
Greg Bowles, GAMA
Chris Heck, Airline Pilots Assoc.
John LaPoint, FAA
Bill Crossley, Purdue
Kerin Olson, FAA
Daniel Brock, FAA
Ferne Friedman-Berg, FAA
Jorge Fernandez, FAA
Steven Edgar, FAA
Steve Ramdeen, FAA
Peter McHugh, NIA
David Throckmorton, NIA
John A. Cavolowsky, NASA
Andrew Lacher, MITRE
Jim Mangie, DELTA
Carlos Guzman, BOEING
Michel Hovan, FAA
Xiaogong Lee, FAA
Mike Gallivan, FAA
Jaime Figueroa, FAA
Jessica Nowinski, NASA
Hossein Eghbali, FAA
Jim Lignugaris, FAA
Warren Randolph, FAA

Paula Martinez, FAA
Cliff Johnson, FAA
Andrea Giordani, FAA
Chinita Roundtree-Coleman, FAA
Mark S. Orr, FAA
Ken Hylander, FSF

Via Telephone

Chris Kmetz
Rob Fuller
Bob McGuirre
John Peace
Isidore Venetos
Alanna Randazzo

September 15, 2016

Chris Heck, APA
Hossein Eghbali, FAA
Bill Crossley, Purdue
Ken Knopp, FAA
Frank Wondolowski, FAA
Jorge Fernandez, FAA
Estrella Forster, FAA
Monique Moore, FAA
Michelle Yen, FAA
Thanh Trang, FAA
John LaPointe, FAA
Kerin Olson, FAA
Jimmy Bruno, FAA
Daniel Brock, FAA
Jessica Nowinski, NASA
John White, ALPA
Dres Zellweger
Jeff Radke, Honeywell
Shelley Yak, FAA
Jaime Figueroa, FAA
Eric Neiderman, FAA
Ken Hylander, Flight Safety Foundations
Mark S. Orr, FAA
John A. Cavolowsky, NASA

Andrew Lacher, MITRE
Chris Kmetz
Carlos Guzman, Boeing
Xiaogong Lee, FAA
David Throckmorton, NIA
Peter McHugh, NIA
Steve Ramdeen, FAA
Steve Edgar, FAA
Ferne Friedman-berg, FAA
Dipasis Bhadhara, FAA
Jackie Simmons, FAA
Claude Jones, FAA
Sherri Magyaritis, FAA
Maureen Keegan, FAA
Bill Crozier, FAA
Jim Lignugaris, FAA
Chinita Roundtree-Coleman, FAA
Angela Campbell, FAA
Regina Bolinger, FAA

AVSMT Executives

Steve Gottlieb, AVP-2
John Barbagallo, AFS-2
John Hickey, AVS-2
Bill Crozier, AUS-2
Dave Hempe, AIR-2
Peggy Gilligan, AVS-1