

Federal Aviation Administration  
Research, Engineering, and Development Advisory Committee  
Subcommittee on Aircraft Safety

General Aviation Manufacturers Association  
1400 K Street NW  
Washington, DC 20005

August 20 – 22, 2013  
Meeting Minutes

Purpose: Guidance on Development of FY 2016 Research and Development Portfolio  
Designated Federal Official: Eric Neiderman, FAA  
SAS Chair: Joe Del Balzo, JDA Solutions

Day 1 – August 20, 2013

**A<sup>1</sup> Welcome Remarks**

Presenter: Eric Neiderman

Eric Neiderman called the meeting to order at 8:06 AM and welcomed the Subcommittee on Aircraft Safety (SAS) members, FAA participants, and all others in attendance or on the phone. Eric introduced Joe Del Balzo as the SAS Chair and thanked the General Aviation Manufacturers Association (GAMA) and Walter Desrosier in particular for hosting this meeting. After introductions of all present, Eric updated the Agenda by moving the Dennis Filler presentation from August 20 to August 21.

**B Strategic Plan**

Presenter: Eric Neiderman

Eric presented *REDAC SAS Fall 2013 Review - ANG Strategic Plan Discussion*. Eric emphasized that the process began with an unconstrained view of anticipated research areas for the Aviation Research Division (ANG-E2) seven to ten years out. He added that even if these predictions are not correct they have value because they show the thought processes used to distill them. He added that even the best futurists in the business missed the Internet, perhaps the biggest disruptive technology in our lifetimes. One output of this exercise is that it may reveal unexpected benefits by looking at research planning from a different perspective. Although the Aviation Research Division is currently observing many of the R&D best practices, FAA operational needs favor a focus on the near-term often at the expense of allocating resources for the future. Eric also made reference to existing legislation that at least 15% of appropriated R&D funds should be for long-term research projects.

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<sup>1</sup> Letter designations represent location of presentation in the binders distributed at the meeting.

The approach to building the plan included a review of current program areas and a transition strategy for each one that identified people, laboratory, and partnership needs to address future challenges. Andy Lacher (SAS) asked if this was a technology transfer effort. Eric replied that it was more of an R&D organizational transition driven in large part by anticipated changes in technology. The results were condensed into a draft strategic research direction document that was reviewed by FAA and academic specialists. This information is included in Tab B of the Binder.

The next step is to look at other strategic plans and condense the document significantly. The transition strategy is very important, it is where the “rubber meets the road.”

Eric distributed a five-page handout titled *Aviation Safety Systemic Drivers*, dated August 6, 2013. These drivers were mapped to Program Areas, Strategic Research Drivers, and Strategic Research Initiatives. John White (SAS) asked if the Initiatives were prioritized. Eric replied no. Andy Lacher (SAS) asked if the trends came from FAA subject matter experts. Eric replied yes. Andy asked where the disruptive technologies come from. Eric replied that that is unknown but it calls for a wide dissemination of the plan and a readiness to change it accordingly. Ken Knopp (FAA) added that additive manufacturing may be one of those disruptive technologies. Andy suggested that the plan could start with a disruptive technology rather than a systemic driver.

Doug Rohn (SAS) stated that NASA is developing an Aeronautics Plan that considers three systemic drivers. He stated that he will synch the NASA Plan with the ANG-E2 plan.

Todd Sigler (SAS) asked if Boeing could provide input to this project. Eric invited this feedback. Todd added that the FAA should not pursue an area only because of an existing strength. Eric agreed.

Joe Del Balzo offered three items for the SAS members to consider. First, establish a position relative to the 15% legislative set-aside for long-term research projects; second, determine an approach for this plan that chooses between an internal view as shown or a broader Agency-wide view; and third, comment on the content of the current document.

Rob Pappas (FAA) stated that since the law does not define long-term research, his view is since all the projects are long term all the research is long-term and the 15% is satisfied.

Chris DeSenti (Human Factors Subcommittee member) commented that the plan should embrace emergent issues.

This presentation closes Action Item #1 from the Spring 2013 SAS meeting.

## **C Budget Review**

Presenter: Mike Gallivan (FAA)

Mike Gallivan presented *REDAC Aircraft Safety Subcommittee - R&D Budget Status*. Mike summarized his presentation with one word – uncertainty. Mike commented that the FY 2014 R, E&D budget request (\$166M) is about 1% of the overall FAA budget. The House Mark

(\$145M) takes most of the cut from NextGen and zeroes out the JPDO. Environmental research is plussed-up and there is specific language about Alternative Fuels for General Aviation (GA) and a Center of Excellence (COE) for more energy efficient aircraft. John White (SAS) asked if the COE language included more money. Mike said no. On slide 7 Mike commented that although the Senate Mark did not specifically address NextGen - System Safety Management Transformation, a \$6M figure is anticipated. Mike said that the House and Senate are far enough apart at present that a Continuing Resolution (CR) is expected.

The FY 2015 Budget is still under review by the Office of the Secretary of Transportation (OST). It is scheduled to be presented to Congress on February 3, 2014, along with the 2014 National Aviation Research Plan (NARP). The out-year targets established in March 2013 are expected to change in January 2014. The one bit of good news is that the current Authorization of the FAA runs through FY 2015.

John White (SAS) asked if the JPDO is cut, who will do the work. Mike stated that it would be spread across the Agency. John suggested that this might be a relevant topic for the Division's Strategic Plan.

#### **D      FY 2016 AVS R&D Strategic Guidance Review**

Presenter: Robert A. Pappas (FAA)

Rob presented *AVS Aircraft Safety R&D - FY 2016 Strategic & Process Guidance*. Rob announced that this was his last R&D cycle for the next six months. Andrea Schandler (FAA) would take over until an acting replacement was identified.

Rob spoke at length about a cover to cover revision of the AVS R&D Prioritization Process. The crucial key principle of the new edition is a focus on project outcomes. The technical evaluation criteria were assessed across all of AVS through a Working Group. The results (as shown on Slide 6) were not much different from the previous edition, and were condensed from five to four criteria. Rob and Mark Orr (FAA) added that a difference now is that there is a higher burden for data to support the need for the requirement and evidence regarding the outcome (or what AVS plans to accomplish). This point was reemphasized by Rob on Slide 8 (AVS R&D Life Cycle model) when he stated that in the first step it is the outcome, not the research, that is prioritized. John White (SAS) asked how long the life-cycle lasted. Rob said it was specific to the problem but could last eight to ten years. Mark Orr added that pop-ups could be accomplished much quicker.

Rob added that the AVS R, E&D budget is a tool used as needed to achieve future outcomes, and that R&D must be integrated into other AVS processes. Slide 15 (Macro View – Future) depicts this philosophy. In the system level integration of AVS activities, including R&D, must be aligned to measurable outcomes. John White asked how this aligns outside the FAA. Rob replied that there is a common risk-based approach, the common framework is risk. Andy Lacher (SAS) commented that the focus on outcomes was correct but asked if there was a mismatch between the outcomes and the research ideas on the table right now. Rob replied that the focus is on the outcome and the implementation plan. Joe Del Balzo asked if this (focus on

outcome) is any different from the previous process. Rob replied that now it has been formalized into the process.

Chris DeSenti (Human Factors Subcommittee member) asked if the higher burden on justifications is a “bandwidth choke”. Mark Orr replied that you wind up with fewer but more important eggs – the right set not just a big set. Andy Lacher asked about disruptive technologies. Since there is no current safety risk they will not score well. Does this disfavor long-term research? Rob said no, that the requirement sponsors are asked to pursue disruptive technologies and include them in the justification along with quantitative input. Chris then asked about criteria #4 on slide 6 (WG 1 – Improved Evaluation Criteria), particularly the commitments to external drivers like the National Transportation Safety Board (NTSB). Rob replied that not all NTSB recommendations see FAA action.

Rob addressed an open Action Item from the March meeting regarding AVS planning process and accommodation of pop-up requirements. Slides 20 and 21 close this Action Item.

Rob then addressed the FY 2016 AVS Strategic Guidance. He emphasized that this is the first year that the document is not prescriptive, it is guidance. Chris Seher (audience) asked if the Unmanned Aircraft Systems (UAS) elements were embedded in the list of emerging risks listed on Slide 28 (FY 2016 AVS Strategic guidance). Rob stated yes. Todd Sigler then asked if the SAS could review the criteria, data, and assessments that AVS used to develop the list of emerging risks. Rob Pappas took an action to prepare a one hour presentation for the next SAS meeting on this topic. John White commented that the emerging risk areas seemed quite broad. Rob commented that the presentation would clarify this matter.

Action Item: AVP will brief the SAS on the development of the list of emerging risks in the AVS Strategic Guidance.

Andrea Schandler passed out copies of the 2013 AVS Aviation Safety R&D Prioritization Process 2013 and the FY 2106 AVS Strategic Guidance.

Rob concluded his review of the AVS Strategic guidance by emphasizing that R&D is not the only element in the guidance and that the Supplemental Research Requirements – FY 2014 is like an Advisory Circular for the strategic guidance.

## **E System Safety Management**

Presenters: Danko Kamar, Scott LeMay, Hossein Eghbali (all FAA)

Danko presented *REDAC SAS Fall 2013 Review - System Safety Management - Part of A11.h and SSM*. The benefits to the FAA are the infrastructure and capabilities to enable information sharing that systematically assess potential safety risks and apply proactive solutions. Planned research in FY 2014 and FY 2015 remains focused on commercial aspects of ASAIS. FY 2016 focal areas will expand ASIAS into GA, rotorcraft, and NAS critical systems. No commercial ASIAS R&D is anticipated in FY 2016 and beyond.

Scott LeMay and Hossein Eghbali presented five Quad charts of FY 2013 requirements. Scott is the new Program Manager for ASIAs, replacing Mike Basehore. Scott mentioned that the commercial ASIAs R&D is a small but important component of ASIAs, somewhat like an incubator. Doug Rohn (SAS) asked if the Technical Reports from MITRE are public. Scott replied that MITRE would need ok any report release. Hossein presented the second half of the FY 2013 ASIAs requirement which is focused on GA and rotorcraft and the next four charts. Todd Sigler (SAS) commented on one bullet on Slide 7 (SSM-13-01 ASIAs-GA/Rotorcraft) that addressed development of Flight Risk Analysis Tool (FRAT) for pilots. Todd asked if there were two FRATS. Hossein said yes, one for pilots, the Flight Risk Analysis Tool, and one for NAS facilities, the Facility Risk Analysis Tool.

Hossein stated that work on Slide 9 (SSM-13-06 Integrated Domain Assessment of Future System (IDA-FS)) would continue past FY 2014 despite no funding beyond FY 2014. Chris DeSenti (HF Subcommittee member) asked if there are any human factors precursors for the work described on Slide 10 (SSM-13-07 Facility Risk Assessment Tool (FRAT)). Scott said yes. Chris asked if the UAS program could look to ASIAs. Scott stated that UAS will merge with ASIAs as the UAS field emerges.

Todd Sigler (SAS) commented the numbering system for the requirements is not easy to follow. He also asked if the measureable outcome from ASIAs R&D is the tool or the use of the tool. Cathy Bigelow (FAA) added that the tool is the output. Todd suggested that this is “seed for thought” to align taxonomy.

## **F Continued Airworthiness – Rotorcraft Systems**

Presenters: Chinh Vuong and Paul Swindell (both FAA)

Chinh presented *REDAC SAS Fall 2013 Review - Rotorcraft Systems TCRG - Part of BLI A11.e – Continued Airworthiness*. Chinh explained that the benefit of the program to the FAA is a reduction in the rate of fatal rotorcraft accidents. He added that this is in concert with the International Helicopter Safety Team (IHST) goal of reducing the worldwide rotorcraft accident rate by 80%. The research in FY 2014 and FY 2015 is a continuation of current programs. The focal area for FY 2016 includes research on Health Usage and Monitoring Systems (HUMS), advanced flight controls, continued operational safety especially at low altitudes, and occupant survivability. Chinh addressed open Action Item #7 from the previous SAS meeting with Slide 6. Cathy Bigelow added the point that the Action Item could not be closed until the handouts for the binders and the web site incorporated these changes.<sup>2</sup>

Paul Swindell presented addressed the Quad chart for the FY 2013 HUMS requirement. He stated that AVS would begin updating Advisory Circular 29-2C MG15 in the FY 2017 timeframe. He mentioned that this entire program effort takes a collaborative team approach with manufactures like Sikorsky and user groups like Helicopter Association International (HAI).

Paul then presented the Quad chart for the FY 2013 Advanced Control Systems requirement. Joe Del Balzo and Todd Sigler both questioned the irregular funding stream from FY 2013 through

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<sup>2</sup> The slide (#6) presented by Chinh was not the same as the one in the binder. A revised slide was distributed to the SAS and the presentation on web site was updated.

FY 2017. Joe asked how one decides to either nickel or dime a program or cut and run. Paul replied that the sponsor drives the decision and usually encourages some investment just to get the program going. Walter Desrosier asked if the fly-by-wire is different for air transport. Paul replied that the level of pilot input for stability is higher for the helicopter pilot.

Andy Lacher and Todd asked if there was any R&D into advanced rotorcraft that has counter rotating pods on the sides of the craft. Chinh replied that the FAA must constantly balance the use of limited resources and that this area was not a high priority. Todd countered that the FAA waits too long to start the R&D. Chris DeSenti asked if there was any work related on on-board warning with HUMS. Chinh replied that there is some discussion within AVS on this topic and that it might be addressed in the Advisory Circular in the FY 2016 timeframe.

## **G Continued Airworthiness – Maintenance & Inspection**

Presenters: Rusty Jones and Dave Galella (both FAA)

Rusty Jones presented *REDAC SAS Fall 2013 Review - Maintenance & Inspection - TCRG - Part of BLI A11.e – Continued Airworthiness*. Rusty informed the audience that this would be the last time he presented this topic. He will be focusing on strategic composite work in the future. Rusty stated that the M&I research has benefited the FAA by adding composite related segments to training programs for both the industry and FAA inspectors. He stated that research through FY 2015 remains focused on non-destructive testing (NDT) of weak bonds and quantification of bond strength in composites, the Holy Grail of M&I. He stated that AVS is developing a strategic plan for composites. He then mentioned a possible pop-up in FY 2014 to address ADS-B and Mode S transponder incorrect reply. John White asked why that was included under the M&I work. Rusty stated that it is a systems issue within Flight Standards (AFS-360).

Dale Hawkins (FAA) presented the FY 2016 focal area that includes personal electronic devices (PEDs). He added that the Avionics Branch in AVS has a need for this. Joe Del Balzo asked why this isn't a pop-up? Dale replied that it is in the works. Todd asked about the scope of M&I. Doug replied that the M&I Technical Community Representatives Group (TCRG) is expanding beyond metals and composites. John White added the SAS is alert to the shift in M&I to Avionics. Rusty replied that the FAA has invested vast amounts of work and money into composites. Todd then asked if the FAA can get the right people.

Dave Galella (on phone) presented the FY 2013 Quad chart for the one M&I requirement. Dave identified eight separate areas of research under this single requirement. Two of the areas are wrapping up in FY 2014, five areas are ongoing, and one is not yet underway. There were no comments.

## **H Continued Airworthiness – Electrical Systems**

Presenters: Paul Siegmund and Mike Walz (both FAA)

Paul (on phone) presented *REDAC SAS Fall 2013 Review - Electrical Systems TCRG - Part of A11.e- Continued Airworthiness*. Paul began by stating that there are no new research requirements for FY 2014 and FY 2015. Current work is focused on completing the FY 2013 requirement, especially infrastructure for +/- 270V DC, and developing internal research

capabilities related to solid state. This research could be leveraging some of the HUMS work by using the aircraft wiring system. Emerging focal areas in FY 2016 include hydrogen fuel cell installation. Current regulations did not foresee this and guidance is necessary. Mike presented the FY 2013 Quad chart and explained that although the funding ceased in FY 2013, he is able to leverage other programs to keep the work going through FY 2015. Slides 7 through 18 demonstrate the level and extent of these activities. John White commented that this is a lot of work for \$1M. Mike replied that much of the work involves partnerships with industry (like Cooperative Research and Development Agreements). Also the FAA laboratory capabilities allow work to proceed beyond the limits of contract dollars.

John White commented that this is a great example of frugal use of limited resources. Joe Del Balzo commented that the lithium battery work slated as a focal area for FY 2016 appears to be too late. This is a pop-up issue right now but the process does not appear to address it. This is similar to the PED issue. Mark Orr replied that the pop-up process is not arduous. The shifting of the money is a problem. Todd stated that it should not be too easy. Andy Lacher added that some flexibility is necessary. Steve Edgar (FAA) closed out the discussion by stating that they are considering the PEDS as a pop-up but haven't decided yet. They are not held back by the process but by the decision to move forward.

## **I Continued Airworthiness – Structural Integrity Metallic**

Presenters: Mark Freisthler, Mike Reyer, John Bakuckas, and Felix Abali (all FAA)

Mark presented *REDAC SAS Fall 2013 Review - Structural Integrity of Metallics (SIM) – TCRG Part of BLI A11.e - Continued Airworthiness*. Mark explained the prime benefit from SIM R&D comes from the data and tools that support rulemaking, policy and guidance development, aircraft certification, continued airworthiness, education, and training. The primary focal areas for FY 2014 and FY 2015 address new alloys, fatigue and durability, structural health monitoring, emerging process intensive materials (additive manufacturing), and risk analysis requirements. The emerging focal areas for FY 2016 are a continuation of FY 2014 and FY 2015 and an emphasis on metallic structures like unitized integral structures. This is explained in greater detail on Slide 19 (*Emerging Metallic Structures Technology (EMST) Roadmap*).

John Bakuckas presented the Quad charts for FY 2013 requirements. John mentioned that due to budget issues the funding for *Emerging Technologies - Active Flutter Suppression (SIM-13-03)* is uncertain for FY 2014 and FY 2015. Todd Sigler asked if there was a sequestration priority list showing how these cuts would impact individual requirements. Andrea Schandler replied that AVS has such a list on their SharePoint site. John pointed out on Slide 12 (*Durability and Damage Tolerance of Emerging Technologies (SIM-13-05)*) that industry helps guide the R&D.

Felix Abali presented the Continued Operational Safety requirement Quad chart. He explained that the prime outcome is AVS implementation through integration into AIR's Monitor Safety/Analyze Data (MSAD) safety concerns risk assessment tools.

Todd asked if there was any partnering with Transport Canada across the entire SIM program. Mark Freisthler replied no, Transport Canada is aware of the SIM work but that the data is used primarily by the FAA. Andy Lacher commented that much of the work is near-term. What

percentage is long-term? Mark referred to Slide 19 (*Emerging Metallic Structures Technology (EMST) Roadmap*) but did not offer a quantitative answer.

## **J Fire Research and Safety**

Presenters: Jeff Gardlin and Gus Sarkos (both FAA)

Jeff (on the phone) presented *REDAC SAS Fall 2013 Review - Fire Research and Safety BLI A11.a - Part of Fire and Cabin Safety TCRG*. Jeff emphasized that the greatest benefit of this R&D is that it reduces loss of life and injuries due to aircraft fires. The success of the program is measured by the number of research products that are implemented in aircraft. Gus reviewed the research implemented over the last 10 years and then focused on implementation over the last year. This includes ICAO Dangerous Goods Panel, Improved Technical Instructions, effective January 1, 2013, and Policy Statement on “Flammability Testing of Interior Materials (Policy No: PS-ANM-25.853-01), August 2012. Gus provided recent examples of the in-house expertise solicited by outside organizations (Slide 6).

Jeff resumed the presentation by reviewing FY 2014 and FY 2015 planned activities and expected research products. He highlighted one of the products, the Micro-scale Combustion Calorimeter test procedures to screen new non-halogen flame retardants. Halon presents a very large environmental and toxicity issue. The emerging FY 2016 focal area includes test methods tailored to the actual threat as opposed to general systems. These include detection and extinguishing technology for inaccessible or hidden in-flight fire scenarios, performance standards for high energy storage/generation devices (e.g., aircraft hydrogen fuel cells), and integrated airplane fire protection system criteria. The thrust is to develop generic testing and regulations.

Gus presented Quad charts for FY 2013 requirements, Slide 10 (Improved Flammability Standards for Aircraft Materials) and Slide 15 (Improved Aircraft Fire Protection & Occupant Fire Survivability). He provided numerous examples through diagrams, photographs, and videos of recent accomplishments with an emphasis on testing of lithium batteries.

SAS members brought up the recent lithium battery fire related to an emergency locator beacon in a B787 and the subsequent damage to the composite structure. Todd asked how much of the research is dedicated to fire prevention. Gus and Jeff replied that the entire Fire Material Section is dedicated to that aspect. Todd followed by asking about work on ignition sources. Jeff and Gus replied that the nature of the problem is not the ignition source, most times it is unknown. Steve Edgar (FAA) asked if the research is long-term. Jeff replied that the fuel cell research certainly is. Walter Desrosier asked if there are any materials vs. material testing. Gus replied that they are proceeding with support for a performance-based rule that gives the manufacturer the benefit of flexibility.

The SAS commented once again about the world-class nature of the work and the highly professional stature of the personnel.

Eric Neiderman passed around a recent news article written by former FAA Technical Director Ann Harlan regarding a recent airplane accident at San Francisco Airport and the role this R&D played in the outcome.

## **K Continued Airworthiness – Flight Controls and Mechanical Systems**

Presenters: Robert Jones and Robert McGuire (both FAA)

Robert presented *REDAC SAS Fall 2013 Review - Flight Controls and Mechanical Systems Part of BLI A11.e – Continued Airworthiness*). He explained that the benefits to the FAA include a reduction in the number of loss-of-control events and fatalities. Anticipated research in FY 2014 and FY 2015 include loss-of-control for Part 23 aircraft and flight critical systems design assurance. Emerging focal areas in FY 2016 include an FAA Flight Control Plan that guides research and rule-making out to 2020. Bob McGuire presented two Quad sheets for the FY 2013 requirements: *Stall Departure: Identification, Recognition and Recovery FCMS-13-01* and *Envelope Awareness and Protection Legacy Transport Airplanes FCMS-13-02*. Bob mentioned that the funding for the later requirement was zeroed out in FY 2014.

Todd Sigler asked if the R&D activities were coordinated with other activities across the world. Robert Jones replied that James Wilburn (FAA AVS) sits on the Commercial Aircraft Safety Team (CAST) and he coordinates through an FAA Aviation Rulemaking Advisory Committee (ARAC) Harmonization Working Group at the national level. They are also trying to coordinate with higher levels groups.

Andy Lacher and Jim Mangie commented that techniques for loss of control accidents require a common outcome across all research efforts.

John Lapointe (FAA) handed out updated versions of Slides 6 and 7 with revised budget figures.

## **L Continued Airworthiness – Engine NDE**

Presenters: Jorge Fernandez and Cu Nguyen (both FAA)

Jorge presented *REDAC SAS Fall 2013 Review - Propulsion Systems Part of 11.e Continued Airworthiness*. Jorge handed out a revised hard copy of the presentation with corrected budget numbers. He explained that the key benefit to the FAA for this work is research into areas of manufacturing processes that haven't been addressed by regulatory means. Anticipated research in FY 2014 and FY 2015 include final development of sonic infrared inspection on critical engine components. This involves eight original equipment manufacturers (OEMs) from around the world. Cu explained that the FAA has the following objectives looking out four years; moving from disk to blisk, composites/ceramics, and human factors aspects of inspection. He added that the industry is interested in engine efficiency, lighter weight, longer distance, and higher temperatures. The FY 2016 focal area includes non-linear ultrasonic testing assessment of diffusion bonded engine components, non-linear imaging for nondestructive evaluation of titanium bonded leading and trailing edges on composite blades, and nondestructive residual stress profiling.

Cu presented the single Quad chart for the FY 2013 requirement. Joe Del Balzo asked about ceramic-based engines. Jorge stated that GE will introduce engines with 10 -15% ceramics. Joe asked if the FAA R&D is too late. Cu stated that the program is working on that right now with bonding of new parts. More resources will be directed to that in FY 2016.

Todd Sigler asked about the seemingly big shift from hard-alpha R&D in the March meeting. Ken Knopp (FAA) explained that that work was associated with a different engine propulsion effort that would be covered later in the meeting.

### **Strategic Plan Discussion and Review of Action Items and Recommendations**

Eric Neiderman lead the discussion regarding the Strategic Plan he presented earlier in the day. There were three questions that framed the discussion: the 15% set-aside for long-term research; the approach for higher level R&D; and comments of the draft Strategic Plan.

Walter Desrosier posed the question; does the 15% constrain or liberate planning? Andy Lacher asked if emergent needs fit the 15% intent. Eric replied to both by saying in general mitigation is near-term and prevention is long-term. It was suggested that the 15% be applied at the Budget Line Item (BLI) level. Andy believed that this is too restrictive. Todd Sigler stated that this issue should not be over complicated. Joe del Balzo stated that convergence on a definition of the 15% is of no consequence to the strategic plan.

Eric asked if there were any comments of the content of the plan as presented. Rob Pappas stated that AVS has not reviewed the document yet. Andy suggested that the entire Agency needs to review it. Ken Knopp (FAA) added that the presentation is the first outreach to the industry. Joe asked what the plan attempts to do. Ken replied that the original intent was for internal guidance for the Aviation Research Division.

Todd referenced an action item from earlier in the day (AVP will brief the SAS on the development of the list of emerging risks in the AVS Strategic Guidance) and deleted his request to align funding stream.

Meeting adjourned for the day.

Day 2 – August 21, 2013

### **Holistic View of Research**

Presenter: Dennis Filler (FAA)

Eric Neiderman opened the session at 8:30 AM and introduced Dennis Filler, the new Director of the William J. Hughes Technical Center Office. Dennis addressed the SAS and audience by identifying the biggest challenge – defending the research budget within the decreasing Congressional budget for the Agency. He stated that the SAS discussions should bear in mind the delicate balancing act necessary for a fully integrated portfolio across the Agency. It is important for the SAS to establish clear priorities that allow his Office the ability to preserve

critical mass. He added that these are business decisions and that everyone must be mindful of developments that intrude on research planning.

Eric then asked the SAS to review the homework assignment from the night before. Andy Lacher asked who in the FAA will do the planning if the JPDO is dissolved. John White said that the JPDO work is now shifting towards implementation. Todd Sigler asked if there is a work statement for the JPDO. Walter Desrosier suggested that the Finding and Recommendation on this topic should wait until the SAS gets a briefing from the JPDO. Joe Del Balzo suggested making a recommendation to the REDAC and then to the Administrator. Dennis added that the JPDO was mandated by Congress but now the House wants to kill it and the Senate wants to put it on life-support. Todd then asked why the SAS should get involved. Joe agreed. Doug Rohn asked if the JPDO mission is complete. The SAS agreed to keep the JPDO issue as a finding only, no recommendation necessary.

Andy asked why there are two Strategic Plans. Cathy Bigelow replied that the AVS Strategic Plan looks out two years while the ANG-E2 plan looks out ten years.

#### **M NextGen – System Safety Management Transformation**

This presentation was removed from agenda.

#### **N Aeromedical Research**

Presenters: Jean Watson and Estrella Forster (both FAA)

Jean Watson presented *REDAC SAS Fall 2013 Review - Aeromedical TCRG BLI A11.j – Aeromedical*. Jean emphasized that the primary benefit of the program concerns the human aspects of protection and survival from exposure to hazardous conditions relative to civil aerospace operations. Success is determined by preventing accidents and improving health, determining the cause of injury and death patterns, and providing accident investigators with near real time data from toxicological and medical aspects of all fatal and high priority aircraft accidents. Jean added that the Air Transportation Center of Excellence for Research in the Intermodal Transport Environment (formerly known as Airliner Cabin Environment) was closing. John White asked if it was closing for a reason other than reaching its 10-year limit. Jean answered that if the requirements are prioritized above the Mendoza line (the funding cut off line) the Center may be able to remain open for two more years. After that the Center must be recompleted.

Estrella presented the anticipated research in FY 2014 and FY 2015 along with expected research products. The focal areas for FY 2016 include implications for medical certification associated with advances in prosthetics and missed diagnoses in aeromedical certification. Todd asked if they were seeing an increase in advanced prosthetics. Estrella answered no but they anticipate an increase.

Estrella presented four Quad charts representing FY 2013 research requirements. The Aerospace Medical Systems Analysis is primarily a data mining effort. Jim Mangie asked where the information goes. The reply was that it goes to AAM-400 for medical certification for GA. Slide 7 provides example of some of the publications from this data. The Accident Prevention &

Investigation requirement focuses on the safety of the human. Jim Mangie asked if suicide is a driver. Estrella said that it is being tracked to see if mitigation is possible. On Slide 9, Jim asked if the referenced manual was new. It is and it is available at the CAMI library. The Crash Survival requirement uses the bio dynamics sled and also studies cabin safety during evacuations. Estrella presented plans for a new sled on Slide 11. Joe Del Balzo asked how this is being funded. Estrella replied that it is part of the larger Technology Refresh, an F&E effort approved by the FAA Joint Resources Council (JRC). The Aerospace Physiology requirement studies high altitudes hazards. John asked if the research involves equipping aircraft with sensors. Estrella replied no, flight attendants wear the sensors.

Jean Watson presented the last FY 2013 requirement Quad chart on the Airline Cabin Environment Purification of Environmental Control System Air Supplies; Bleed Air Contamination. As stated previously, this is the last year for this effort. Jean stated that a report is due out next year on the program. Walter Desrosier asked if the risk of exposure to bleed air in ten years will be the same as today. Jean replied that unless more aircraft enter the fleet mix like the B787 (that does not mix bleed air into the cabin), the risk will not change appreciably. She added the aforementioned report would include the information sought by Walter. Jean referred to a project called VIPER on Slide 15. A crack in one of the structural pylons stopped progress on this R&D effort.

Estrella then provided high-level rationale for prioritizing Aeromedical Requirements, an open Action Item #2 from the previous SAS meeting. Slides 16 through 20 explain the drivers and process for prioritizing research. This presentation successfully closed the first portion of the Action Item. The deep-dive at the Spring 2014 meeting will close this Action Item completely.

During the wrap-up, Andy Lacher asked why the FAA doesn't just make blood work routine for certification. Estrella replied that there are privacy issues and it is not the purview of the research group. If the data show that self-reporting does not work, there may be a need to inform through an educational process.

The SAS commented that this was a very informative briefing.

## **O      Digital System Safety**

Presenters: Barbara Lingberg and Alanna Randazzo (both FAA), and Richard Barhydt (NASA)

Barbara presented *REDAC SAS Fall 2013 Review - Software and Digital Systems A11.d partial*: *Aircraft Icing/Digital System Safety* and *A11.n: Advanced System and Software Validation*. Barbara informed the SAS that beginning in FY 2014 Ray DeCerchio, AIR-120, will assume sponsorship of Onboard Network Security and Integrity. Barbara will maintain sponsorship of Digital Systems, Software, and Electronic Hardware. Barbara then addressed Action Item #4 from the previous SAS meeting (Show explicit outputs and outcomes regarding wireless interfaces on the aircraft). Slide 4 lists specific outputs that result in the outcome: No increase in number of service difficulties or Airworthiness Directives due to use of wireless technologies in aircraft. This closes Action Item 4.

Barbara explained that the benefits of this research program include increased standardization and reduced certification time. The anticipated research for FY 2014 and FY 2015 will focus on complex digital systems research at both systems and implementation level. There are four requirements that encompass the following: approval at the component level, define complexity and its tipping point, single event effects (SEE), continue simulation efforts, does assurance case hold up, model-based development, and electronic work on COTS. The emerging FY 2016 focal area is described on Slides 7 and 8 emphasizing a domain independent assurance.

Alanna Randazzo presented three Quad charts for FY 2013 requirements: *Onboard Network Security and Integrity SDS-13-01*, *Software Development Techniques and Tools SDS-13-03*, and *Software Development Techniques and Tools SDS-13-03*. The first requirement is a means to get cyber security into the FAA. John White asked if there is any evidence of a problem. Barbara replied that simulations with electronic flight bags have identified some vulnerability. Walter asked if this is just with wireless. Barbara answered no it's with wired systems as well. Jim Mangie asked about the extent of cyber security vulnerabilities. Alanna stated that the research is looking into that.

On the second requirement Andy Lacher asked about the migration from DO-178B to DO-178C. Barbara stated that their work helps explain what the document meant to say. The SEE work through Thales tries to evaluate mitigation techniques. There is some discussion about calling these atmospheric events.

On the third requirement Barbara stated that the airline industry does not drive COTS. The research tries to level the playing field for applicants looking for certification. Andy suggested that the FAA may be able to learn from the manner in which DARPA conducts this type research.

Richard Barhydt presented *NASA-FAA Research Collaboration in Software and Digital Systems Safety Assurance – Status Report to FAA REDAC and SAS*. The presentation included a research transition roadmap example and a schedule of work for the first year. One expected application is to support FAA guidance for the use of tools for software safety assurance. Cathy Bigelow asked about funding levels. Rich could not be specific but Doug offered that the overall NASA program is in the multi-million dollar range.

John White highlighted the importance of this FAA/NASA collaboration. Andy commented that this may present an outline for how the FAA could leverage DOD activities.

## **P      Propulsion and Fuel Systems**

Presenters: Jorge Fernandez and Joe Wilson (both FAA)

Jorge presented *REDAC SAS Fall 2013 – Propulsion Systems TCRG Part of BLI A11.b Propulsion and Fuel Systems*. Jorge explained that the benefits to the FAA from this research include methods and tools used to establish methods of compliance to 14CFR Part 33.70 and continued operational safety for Advisory Circular (AC) 39-8. Anticipated research in FY 2014 and FY 2015 continues with DARWIN. It is expected to be finished in FY 2015. The final version will provide the basis for developing AC 33.70-4. The emerging focal areas for FY 2016

include methods and tools to address fretting fatigue and edge-of-contact problems; and damage tolerance analysis of non-rotating components.

Joe Wilson presented the one Quad chart requirement for FY 2013, Incorporate Damage Tolerance into the Safe Life Rotor Design Process (PS-13-01). Damage tolerance is the basis for the AC. The release of DARWIN version 8.1 is the accomplishment for FY 2013.

John White recognized that this research program is coming to a successful end. When the design tool is built it will be left in the hands of industry and the FAA investment will be done. Joe Del Balzo stated that this is a successful conclusion.

## **Q Aircraft Icing**

Presenters: Tom Bond and Jim Riley (both FAA)

Tom (on phone) presented *REDAC SAS Fall 2013 Review - Aircraft Icing TCRG A11.D 6DB Aircraft Icing* and *A11.K Weather Program (AVS Weather - Icing)*. One of the main benefits to the FAA from this research is an improvement of certification processes, especially Appendix C. Todd Sigler asked about benefits that contribute to NextGen. Tom replied that one example is an icing weather tool like the Terminal-Area Icing Weather Information System (TAIWIS). Tom mentioned that all the anticipated research activities in FY 2014 and FY 2015 are an extension of current research. He added that the two-year ground icing study with Southwest Airlines and UPS needs one more year. Tom explained that the FY 2016 focal area targets a means of compliance for the Supercooled Large Droplet (SLD) rule that is due out in early 2014. Certifications to this new rule are expected within a couple of years as new type certificates (TCs) and supplemental type certificates (STCs) are submitted. Existing tools are considered inadequate by the industry. FAA is working with NASA to develop new research strategies to improve engineering tools capabilities.

Jim Riley presented the six Quad charts representing the FY 2013 requirements including two from the Weather Program (the AVS Wx wedge). The Research on Ice Crystal & Other Appendix C Exceedance Icing Conditions (AI-13-01) includes a Memorandum of Cooperation with Transport Canada. The research effort under Safe Operations and Take-off in Aircraft Ground Icing Conditions (AI-13-02) should be completed in FY 2014, at which time the Flight Standards Office should have enough information regarding holdover times on sloped surfaces. Jim made mention that the research for Material for ACO Engineers for Icing Certification of Rotorcraft (AI-13-04) was a one-year effort. The AVS Wx wedge requirements are funded through the Weather program (A11.k). The first, Mitigating the Ice Crystal Weather Threat to Aircraft Turbine Engines – A11.K: WX-03, is being done through a partnership with NASA and collaboration with the Australian Bureau of Meteorology the European High Altitude Ice Crystal Project. The flight campaign, with a French Falcon 20, is scheduled for early 2014 in Australia. NASA withdrew their test plane from the program in 2013. Jim mentioned that research related to Terminal Area Icing Weather Information System (TAIWIS) – A11.K: WX-01 will be integrated with NextGen through collaboration with the Flexible Terminal Sensor Network (FTSN) project at FAA Technical Center and work with NASA on its Icing Remote Sensing Project for Terminal Area that will provide information on liquid water aloft for TAIWIS.

Todd Sigler asked about the out-year funding for Safe Operations and Take-off in Aircraft Ground Icing Conditions (AI-13-02). Jim replied that FY 2015 was about \$470k and FY 2016 and FY 2017 were TBD. Jim Mangie commented that this research requirement has an indefinite life. Tom Bond observed that continued operational criteria from the airlines to operate in new conditions drives continued research to expand take-off conditions. Jim Mangie confirmed this observation and commented that this type research needs to continue. Todd emphasized the point that the aviation community has no means of compliance for the emerging SLD rule expected in 2014.

Joe Del Balzo commented that these are long-term requirements and the FAA must insure adequate bench strength. What, he asked, has the FAA done about this. Ken Knopp replied that the program support is broader than just Jim Riley but that it could benefit from additional personnel.

## **R      Advanced Materials/Structural Safety**

Presenters: Curtis Davies, Larry Ilcewicz, and Joseph Pellettiere (all FAA)

Larry presented *REDAC SAS Fall 2013 Review - Advanced Materials and Structures (SIC) Crashworthiness (F&CS) A11c Advanced Materials and Structural Safety*. Larry identified the benefits from the structural integrity of composites program include benchmarks on best industry composite practices to support rulemaking and regulatory policy and guidance development; identifying safety problems; broadening awareness of related critical safety and certification issues; standardizing related composite practices, and developing related training. He added that benefits from the crashworthiness program include evaluation of composite technologies used by industry and industry workshops and safety awareness course content. He covered anticipated research for FY 2014 and FY 2015, mostly a continuation of current research. Larry provided a list of focal areas for FY 2016 (Slides 7 and 8) that flow from current research requirements. Jim Mangie asked how the composite work interfaced with the fire research program. Larry replied that they only intersected in a post-crash fire setting. Todd Sigler asked if the ditching research was a outcome from NTSB. Larry replied yes but it has been on their radar for several years because the work is applicable to more than just ditching scenarios.

Curtis presented a list of the research requirements for FY 2013 with a status on funding availability. He followed with Quad charts for each of the active FY 2013 requirements. Curtis explained that most of the R&D is through the Joint Air Transportation Center of Excellence for Advanced Material (JAMS).

## **S      Unmanned Aircraft Systems Research**

Presenters: Jim Williams, Kerin Olson, John Reinhardt, and Sabrina Saunders-Hodge (all FAA)

Jim Williams, FAA Unmanned Aircraft Systems Executive, opened the discussion by saying that the UAS Integration Roadmap had been completed on 2-14-2013 but was sent to OMB for review. He noted that the word "Integration" has been added to the title. To date there were 169 comments from 12 Executive Branches, and 40 comments back on resolution. The Roadmap should be ready for publication in about a month. The UAS Aviation Rulemaking Committee (ARC) took a look at roadmap. One of the comments they sent back was that the roadmap was

not as comprehensive as needed. They submitted what they thought it should be and UAS Program Office is considering their input to develop a costing plan. Action Item # 8 from the previous SAS meeting will remain open.

The OMB review is considered a total Government review and will address privacy issues. The Roadmap will cut across other Agencies to some degree. Jim added that the JPDO comprehensive plan is much broader still. Activities in the Roadmap are keyed to expected budgets. Todd Sigler asked about funding individual requirements, can you distinguish between “nice to have” vs. “must have.” Jim replied that they must be able to react to new technologies and without new money one must reprioritize accordingly. One of the tasks for FY 2014 is to help build internal story. We need to figure the relationship between the comprehensive plan and the roadmap and the work breakdown structure. Right now there is no way to meet congressional mandates as written with current funding available. There is an effort to also integrate the FAA money which is relatively small with the larger money from other Agencies. John White asked how this works with NASA. Jim replied that NASA has five task areas they are working and they consider the FAA to be the customer. Each project is coupled with the FAA.

Sabrina added that the FAA has 18 tasks across 10 requirements and an R&D portfolio matrix team with 30 people. She distributed a copy of the UAS R&D Portfolio matrix team. She added that this R&D is mapped to the JPDO plan. The plan should be available soon and it will be followed by a gap analysis. John White asked how the R&D stitches together. Jim stated that MITRE helps with the integration.

Joe Del Balzo asked if the JPDO has been helpful. Jim stated that they are indispensable, especially with human factors aspects. Joe asked if the matrix approach is working. Jim said that it is, especially with the Memorandum of Understanding with ATO to put the structure in place. Dennis Filler observed that the bulk of UAS operations are in uncontrolled airspace. What is the plan for flying with other airplanes? Jim replied that the burden will be on the UAS to maintain a well-clear situation. We need an electronically translated definition of well clear so the UAS will not be disruptive. Information security is also necessary for the control stations similar to current DOD standards.

Kerin Olson presented *REDAC SAS Fall 2013 Review - Unmanned Aircraft Systems (UAS) Part of BLI A11.1 – UAS*. Kerin stated that the primary purpose of the research is to enable civil certification of UAS in the NAS. Detect and avoid is a major part of this effort. Kerin addressed anticipated research in FY 2014 and FY 2015 across eight areas (Slides 5 through 9). On the UAS System Safety Criteria slide, Todd Sigler asked Kerin to define lethality in the context of the expected final report detailing key lethality characteristics and lethality thresholds. She replied that safety thresholds are driven by the kinetic energy and shape of the aircraft. Andy Lacher added that there is not much available data on what is lethal vis-à-vis kinetic energy. This work is closely coupled with NASA. Kerin spoke to the research on simulating UAS in the NAS as beneficial for AOV oversight responsibilities. Kerin listed seven areas being considered as focal areas for FY 2016. She added that UAS Maintenance and Repair will extend beyond small UAS.

John Reinhardt presented Quad charts for five FY 2011 requirements, two FY 2012 requirements, and five FY 2013 requirements – all under execution in FY 2013. John added that the goal for the Sense and Avoid (SAA) work (Slide 19) is to support development of Minimum Operational Performance Standards (MOPS) in coordination with RTCA 228. It was asked how the SAA effort relates to the NASA work that was briefed to the SAS last year. Andy Lacher replied that there is none yet because you want to develop independent models for a better safety case. John informed the SAS that the FY 2013 requirement Sense and Avoid (SAA) System Multi-Sensor Surveillance Data Fusion Strategies (A11L.UAS.2) was cancelled. Also the requirement UAS Command and Control (C2) (A11L.UAS.02) was sunset in FY 2013. The requirement UAS C2 - Time Critical Low Latency Control Response for UAS with Low Levels of Automation (A11L.UAS.3) will be completed by the second quarter of FY 2014.

The meeting adjourned for the day.

### Day 3 – August 22, 2013

Eric Neiderman opened the meeting at 8:00AM.

The SAS discussed some minor edits to the homework assignments. No new recommendations were offered. Xiaogong Lee (FAA) began a discussion about an open SAS recommendation (Spring 2008 -14): *The FAA and NASA should jointly develop clear and actionable integrated roadmaps spanning all NextGen-required safety R&D and other safety-related R&D. The roadmaps should identify timelines, deliverables, and decision and transition points for the R&D's insertion into infrastructure or regulatory products. Absent a more mature description of research needs, the Safety Subcommittee suggests that the 183 research issues from the ConOps be used as the basis for launching the NextGen-related roadmap process.* Joe Del Balzo commented that the remaining open portion of this recommendation referred to the NASA Langley research activities aligned with the Weather-in-the-Cockpit program. Since NASA funding for this research was cancelled a joint roadmap will not be developed. The recommendation is closed. Joe added that as the SAS sees the need for individual integration between roadmaps they will issue a separate Action similar to the UAS roadmap.

### **T Weather Program**

Presenter: Warren Fellner (FAA)

Warren (on phone) presented *REDAC SAS Fall 2013 Review - Weather Program*. Warren opened by stating that Roger Sultan was called away and could not participate and that he would cover Roger's portion. He described the Weather Program as applied research to minimize the impact of weather on the NAS. He also distinguished between the Core Aviation Weather Research Program (AWRP) and the AVS Weather Program (AVS Wx wedge). The former deal with capacity related hazards and the latter are safety related, two of which are managed by Jim Riley. Warren spoke to numerous FY 2014 and FY 2015 anticipated research activities (Slides 4 -7). Todd Sigler asked about wind compression in the terminal area (Slide 5). Warren replied that sometimes winds are higher than expected and arrival spacing is impacted, that is the wind can bring aircraft too close to each other. The research effort with National Oceanic and Atmospheric Administration is to determine when this begins and ends and inform ATC

accordingly. Roger (on phone) gave an example at Newark Airport where changes in wind speed at different levels can wreak havoc on traffic flows. On the same slide Todd asked if the volcanic ash work is linked with ICAO. Warren said that one component of the research is global integration. John White asked if there are any on-board sensors for the ash. Warren replied that there were none under the AWRP but there is some effort in Scandinavia.

On Slide 6, Andy Lacher asked if the lightning storm forecast under the Convective Storms bullet was shared air-to-air or air-to-ground. Warren said both were relevant and that the goal for the FAA is to share this forecast mostly in the terminal area with an emphasis on ramp operations. Warren presented two slides on the focal areas for FY 2016 that essentially continue on-going work. He then presented ten Quad charts representing the active AWRP research areas in FY 2013 (Slides 10 -19). He also presented three Quad charts representing the AVS Wx wedge research requirements. Andy Lacher asked about the operational use of Turbulence research on Slide 12. Warren stated that the information can help specify a flight path or altitude.

SAS members commented that Quality Assessment (QA) and Aviation Weather Demonstration and Evaluation (AWDE) Services programs appear to overlap. Warren replied that that QA was a scientific, meteorological assessment of weather product quality, while AWDE assessments targeted human factors, operational suitability, and operational ATM impacts. Chris Benich expressed an interest in the outcomes for Lower Visibility for CAT 1 Approaches and RVR Conversion (Slide 22) and Safety Driven Weather Requirements for Wake Mitigation (Slide 23). Warren explained that since Roger was pulled away to another meeting he would provide information at a later time.

## **U      Weather Technology in the Cockpit**

Presenter: Gary Pokodner (FAA)

Gary presented *REDAC SAS Fall 2013 Review - Weather Technology in the Cockpit (WTIC) BLI - A12.d*. He described the major benefits of the program as enhanced GA safety and increased NAS efficiency. He presented the focal areas and associated expected research products for FY 2014 and beyond for both GA and Part 121/135. The GA discussion focused on determining a price point and how it relates to COTS and the R&D conducted under the Digital System Safety program discussed earlier. One point made by Gary is that the WTIC program does not drive the technology. The R&D effort is to identify meteorological (MET) information and pilot decision-making shortfalls in the cockpit that are causal factors in GA accidents, and then identify equipage, services, and training that the GA community will adopt. Several SAS members argued that if the solutions are too expensive, then GA will not adopt them. Andy Lacher added that there is also a risk that the products may get ahead of the FAA. There is evidence that many Wx products are getting into GA cockpits already. Joe Del Balzo stated that this is not much different than hand-held navigation aids getting into the cockpit. Todd said that you can impede safety by being too conservative, and then too expensive to be used. Mark Orr said that the FAA is aware of this but that there is a continuum of safety that must be recognized. They are rewriting Part 23 with a motto in mind – twice the safety at half the price.

The Part121/135 slides and dialogue focused on shortfalls of MET information and resultant operational inefficiencies. Turbulence and wake dissipation were highlighted. Andy asked if

this work related to other FAA wake turbulence R&D. Gary replied that there is collaboration with RTCA committees and other FAA R&D. There are also human factor element studies at the Technical Center.

The SAS members commended the focus and strategic approach of the program. The program has many facets but it does not appear to relate to the process guidance shown earlier and it is not clear how the outcomes will impact operations. Gary said that except for the last two AVS Wx wedge requirements, AWRP does not follow the AVS process.

**V Terminal Area Safety**  
Presenter: Jeff Schroeder (FAA)

Jeff presented *REDAC SAS Fall 2013 Review - Terminal Area Safety Part of BLI A11.h – System Safety Management*. Jeff explained that the prime benefits to the FAA from this program are reduced loss-of-control fatalities and reduced runway incidents and excursions. The anticipated research in FY 2014 and FY 2015 includes developing a process for creating representative stall models, estimating runway friction in real-time, and investigating feasibility of specifying universal missed-approach criteria. This is from both an operational and safety standpoint, recognizing there is a difference between landing at Aspen or Atlanta.

The FY 2016 focal areas include prognostic safety through simulation and improving GA safety in the terminal area. Jeff presented three Quad charts representing the FY 2013 requirements. For TAS-13-01 Advanced Maneuvers, he showed a movie clip that involved pilot startle. For TAS-13-02 Determine Runway Friction from Aircraft Data, he emphasized that the target is operations under snow and ice conditions. For TAS-13-03 Simulator Motion Cueing Criteria, Jim Mangie asked if ICAO has objective motion criteria. Jeff replied that no one does but committees are looking at it. Jeff made reference to the ICAO Doc 9625 Manual of Criteria for the Qualification of Flight Simulation Training Devices.

The SAS recognized this as very good and important work but what's "good enough". Jeff said that the point is well taken and the FAA plans to address this through a training matrix.

**W Flightdeck/ Maintenance/ Systems Integration Human Factors**  
Presenters: Kathy Abbott and Tom McCloy (both FAA)

Kathy presented *REDAC SAS Fall 2013 Review - Human Factors TCRG BLI A11.g - Flightdeck/ Maintenance/ Systems Integration Human Factors*. Kathy identified reducing risks associated with human performance while ensuring safety in aviation operations and maintenance activities as the prime benefit of the research program. She commented that almost ¾ of all accidents include pilot error as a primary factor. Kathy presented selected accomplishments from FY 2011 and FY 2012 and three Quad charts representing the approved FY 2013 requirements. HF-13-01: Flight Training Methods for Jet Upset Prevention, Detection and Recovery was accompanied with a diagram depicting Upset Recovery Research – Relationship Among TCRGs. She also briefed three charts that mapped the planned research for these requirements through FY 2016, including mitigations for startle, surprise, and distraction; how to prepare a pilot for sensor failure. HF-13-02: ADS-B Human Factors – AIR & AFS Equipment Design, Evaluation,

and Operational Approval Guidance was also accompanied by charts with planned research out through FY 2016. She mentioned that the ADS-B HF R&D is applicable for both airborne and ground operations. Jim Mangie referred to planned FY 2016 research on Slide 14 related to integration issues with tablet technologies in the flight deck and asked how the program stays relevant. Kathy replied that they see the need but do not have the resources. HF-13-03: A Multi-Disciplinary Approach to Fatigue Risk Management in Maintenance included one chart for planning out through FY 2016. Kathy commented that there are multiple products planned for each of the four areas.

Kathy presented Slide 18 which represented the flight deck research areas through FY 2016. She made mention of a Notice of Proposed Rulemaking for operational credit for advance vision systems. She added that the GA safety improvement research was coordinated with the FCMS program and that the HF for rotorcraft operational safety includes night-vision goggles, fuel management, and runway incursions.

For the on the HF integration issues related to iPads project on Slide 14, Joe Del Balzo commented that this issue comes up after the money is already frozen (programmed). Kathy replied that HF is so lean that they can't do any trade-offs. Todd stated that the problem is how the FAA racks and stacks. He and Chris Benich asked if the FAA could reprioritize. John White reminded the SAS that they were seeing the results of the process that the SAS endorsed. John added that HF is improving on the quality of the requirements but the timing remains a problem. Jim Mangie agreed that the relevance of the research is better defined but that maybe it should be embedded in other research. Kathy replied that HF would be accomplished in an HF TCRG with coordination with other TCRGs. Todd asked if the SAS should confer over prioritization and that he still doesn't understand the process. Joe stated that the SAS will distill this issue into a Finding.

## **X NextGen – Alternative Fuels for General Aviation**

Presenters: Peter White and Dave Atwood (both FAA)

Peter (on phone) presented *REDAC SAS Fall 2013 Review - All.m - NextGen Alternative Fuels for GA*. He stated that the major benefit to the Agency from this program is implementation of the recommendations of the Unleaded Aviation Gasoline Transition Aviation Rulemaking Committee (UAT ARC) to transition the aviation industry to an unleaded avgas. They will do this by developing standardized test procedures to certify a fleet on a proposed unleaded fuel and to understand and mitigate any potential safety impact. The planned research for FY 2014 and FY 2015 follows the UAT ARC recommendations. Peter covered the emerging focal areas for FY 2016 on Slide 5.

Dave Atwood (on phone) presented four Quad charts representing the requirements for FY 2013. These requirements follow the UAT ARC recommendations. As a NextGen funded program, it is not subject to the AVS prioritization process.

## **Y      Aircraft Catastrophic Failure Prevention Program**

Presenters: Jay Turnberg and Chip Queitzsch (both FAA)

Jay (on phone) presented *REDAC SAS Fall 2013 Review - Propulsion Systems TCRG Part of A11f - Aircraft Catastrophic Failure Prevention Program*. Jay identified certification by analysis in lieu of full-scale testing as the major benefit to the FAA from this program. The anticipated research in FY 2014 and FY 2015 will focus on predictive impact modeling, improved material properties tabulation, improved analysis tools for debris interaction, and open rotor certification issues. The FY 2016 focal area will begin to shift the focus from metal impact modeling to composites.

Chip presented the single Quad chart representing the requirement for FY 2016. He emphasized that before the FAA can go to certification by analysis, the research must provide valid material properties. Todd Sigler asked if there was any link to EASA. Chip said yes. Michael Dostert of the FAA Transport Airplane Directorate (TAD) interacts with EASA and coordinates issues through Bill Emmerling (FAA research provider).

Chip distributed a two page document (prepared by Jay) that addressed Action Item #6 from the previous SAS meeting – *Provide an implementation plan for incorporating Aircraft Catastrophic Failure Prevention research into regulatory products*. Jay stated that the current rules require full-scale engine tests. The implementation plan uses policy to give applicants the flexibility to use structural dynamic analysis for blade containment and rotor balance tests. The SAS was satisfied with the content and explanation provided by Jay and closed the Action Item.

## **Z      SAS Recommendation Review, Feedback, and Future Meeting Planning**

Presenters: Eric Neiderman (FAA) and Joe Del Balzo (SAS)

SAS recommendation Spring 2008-14:

The FAA and NASA should jointly develop clear and actionable integrated roadmaps spanning all NextGen-required safety R&D and other safety-related R&D. The roadmaps should identify timelines, deliverables, and decision and transition points for the R&D's insertion into infrastructure or regulatory products. Absent a more mature description of research needs, the Safety Subcommittee suggests that the 183 research issues from the ConOps be used as the basis for launching the NextGen-related roadmap process.

Joe Del Balzo commented that the only remaining open item in this recommendation referred to the NASA Langley research activities supporting the WTIC program. With NASA funding cancelled this roadmap will not be developed. SAS closed the recommendation with the caveat that as the SAS sees the need for individual integration between roadmaps they will issue a separate Action similar to the UAS roadmap.

SAS Recommendation Spring 2011-18:

The subcommittee recommends that future PBN research include analysis of the performance improvements of NextGen satellite-based navigation solutions (e.g., RNP,

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SBAS, GBAS) over classic navigation sensors (e.g., ILS). This analysis, which should include RNP to GBAS approach and landing operations, should result in data that can be applied to regulatory criteria that establish operational advantages (e.g., lower landing minima) for these NextGen capabilities.

SAS closed the recommendation.

Joe stated that the briefings continue to get better. But the FAA is not taking advantage of the opportunity to reprioritize on-the-fly. John White added that posting the briefing information on the web site is positive. Joe added that he would post today's write-ups on the web site by August 26.

March 17, 2014 was offered as a possible date for the next meeting. Eric suggested that it may be possible to arrange the SAS and Human Factors meetings to overlap for one day to enable information exchange.

Joe and Eric thanked all the presenters and the host GAMA for such a productive meeting.

Meeting adjourned at 2:30 PM.

**Tuesday, August 20, 2013**

<b>Time</b>	<b>Subject</b>	<b>Presenter</b>
800	Welcome <ul style="list-style-type: none"> <li>• Introductions</li> <li>• Agenda Review</li> <li>• Discussion of changes and expectations</li> </ul>	Joseph Del Balzo/ Eric Neiderman
820	Strategic Plan	Eric Neiderman
840	Budget Review	Mike Gallivan
855	FY 2016 AVS R&D Strategic Guidance Review	Robert Pappas
930	System Safety Management	Scott LeMay/ Hossein Eghbali
1015	Continued Airworthiness <ul style="list-style-type: none"> <li>• Rotorcraft Systems</li> </ul>	Chinh Vuong/ Paul Swindell
1045	Break	
1100	Continued Airworthiness <ul style="list-style-type: none"> <li>• Maintenance and Inspection</li> </ul>	Rusty Jones/ Dave Galella
1130	Continued Airworthiness <ul style="list-style-type: none"> <li>• Electrical Systems</li> </ul>	Paul Siegmund/ Mike Walz
1200	Lunch	
1300	Continued Airworthiness <ul style="list-style-type: none"> <li>• Structural Integrity Metallic</li> </ul>	Ian Won/ John Bakuckas
1345	Fire Research and Safety	Jeff Gardlin/ Gus Sarkos
1415	Continued Airworthiness <ul style="list-style-type: none"> <li>• Flight Control Mechanical Systems</li> </ul>	Robert Jones/ Bob McGuire
1445	Continued Airworthiness <ul style="list-style-type: none"> <li>• Engine NDE</li> </ul>	Jorge Fernandez/ Cu Nguyen
1515	Break	
1530	Strategic Plan Discussion	All
1600	Review Action Items and Recommendations	All
1630	Adjourn	

*Note: Dress code is business casual*

**Wednesday, August 21, 2013**

<b>Time</b>	<b>Subject</b>	<b>Presenter</b>
830	Review Action Items and Recommendations	Joseph Del Balzo
930	Aeromedical Research	Jean Watson/ Estrella Forster
1015	Break	
1030	Digital System Safety (NextGen Advanced Systems & Software Validation)	Barbara Lingberg/ Alanna Randazzo
1130	Propulsion and Fuel Systems	Jorge Fernandez/ Joe Wilson
1200	Lunch	
1300	Aircraft Icing	Tom Bond/ Jim Riley
1345	Advanced Materials/Structural Safety	Larry Ilcewicz/ Curt Davies
1430	Break	
1445	Unmanned Aircraft Systems Research	Kerin Olson/ John Reinhardt
1545	Review Action Items and Recommendations	All
1615	Adjourn	
1800	Dinner Old Ebbitt Grill (15 <sup>th</sup> & G NW) (202) 347-4800	

*Note: Dress code is business casual*

**Thursday, August 22, 2013**

<b>Time</b>	<b>Subject</b>	<b>Presenter</b>
800	Review Action Items & Recommendations	Joseph Del Balzo
830	Weather Program	Roger Sultan/ Warren Fellner
915	NextGen - Weather Technology in the Cockpit	Gary Pokodner
945	Break	
1000	Terminal Area Safety	Jeff Schroeder/ Andrew Cheng
1045	Flightdeck/Maintenance/System Integration Human Factors	Kathy Abbott/ Tom Chidester/ Tom McCloy
1130	Lunch	
1230	NextGen – Alternative Fuels for GA	Peter White/ Dave Atwood
1315	Aircraft Catastrophic Failure Prevention Research	Jorge Fernandez/ Ken Knopp
1345	SAS Recommendations Review	Eric Niederman/ Xiaogong Lee
1415	SAS Feedback	Joseph Del Balzo
1430	Future Meeting Planning and Discussion	Joseph Del Balzo
1500	Adjourn	

*Note: Dress code is business casual*

### **Open Action Items**

1. Provide deep-dive of Aeromedical program at the Spring 2014 meeting (this is a carryover from the Spring 2013 SAS meeting). (Robert Johnson)
2. Present UAS Integration Roadmap (this is a carryover from the Spring 2013 SAS meeting). (Jim Williams)
3. AVP will brief the SAS on the development of the list of emerging risks in the AVS Strategic Guidance. (Rob Pappas)
4. Provide additional information on outcomes for Lower Visibility for CAT 1 Approaches and RVR Conversion, and Safety Driven Weather Requirements for Wake Mitigation. (Roger Sultan)
5. Provide additional information to the members to clarify the distinction between the Quality Assessment (QA) and AWDE (Aviation Weather Demonstration & Evaluation) bullets on slide 5 with slide 17 of the Weather Program. (Warren Fellner)
6. Provide a briefing on FAA efforts to document UAS research linkages with NASA, DoD, and DHS as well as efforts to identify potential research gaps. (Jim Williams)

### **ACTION ITEMS (SAS MEETING SPRING 2013)**

1. 1. Present the Draft ANG-E-2 Strategic Plan at the next SAS meeting. (ANG-E2 Division Manager) CLOSED
2. 2. (a) Provide a high-level rationale for prioritizing Aeromedical requirements at the next SAS meeting (CLOSED); and (b) provide deep-dive at the Spring 2014 SAS meeting. (Robert Johnson) REMAINS OPEN
3. 3. Update Fire and Cabin Safety Quads charts with correct out-year funding levels. (Rob Pappas) CLOSED
4. 4. Show explicit outputs and outcomes regarding wireless interfaces on the aircraft. (Barbara Lingberg) CLOSED
5. 5. Provide out-year funding levels for Continued Airworthiness – NDE. (Rob Pappas) CLOSED
6. 6. Provide an implementation plan for incorporating Aircraft Catastrophic Failure Prevention research into regulatory products. (Jorge Fernandez) CLOSED
7. 7. Investigate opportunities for FY 2014 funding for the Advanced Control Systems (RS-15-02) requirement based on progress in FY 2013. (Chinh Vuong) CLOSED
8. 8. Release of the UAS Roadmap will remain an open Action Item (#5 from previous SAS meeting). (Jim Williams) REMAIN OPEN

(Not included on original list)

The Subcommittee requests a briefing on the AVS planning process that has been put in place to prioritize its portfolio of projects in a way to meeting growing requirements. Examples of how the process has been used to accommodate a popup and changing priorities will be helpful. (Rob Pappas) (CLOSED)

## ATTENDANCE

### **SAS Members:**

Chris Benich  
Joe Del Balzo (Chair)  
Andy Lacher  
Jim Mangie  
Doug Rohn  
Todd Sigler  
John White  
Eric Neiderman, DFO

### **Participants:**

Felix Abali  
Kathy Abbot  
Dave Atwood (phone)  
John Bakuckas  
Richard Barhydt  
Cathy Bigelow  
Tom Bond (phone)  
Daniel Brock  
Tom Chidester (phone)  
Bill Crossley  
Curtis Davies  
Raymond DeCerchio  
Walter Desrosier  
Chris DeSenti  
Gloria Dunderman  
Steven Edgar  
Hossein Eghbali  
Warren Fellner (phone)  
Jorge Fernandez  
Dennis Filler  
Estrella Forster  
Mark Freisthler  
Dave Galella (phone)  
Mike Gallivan

Jeff Gardlin (phone)  
Larry Ilcewicz  
Dale Hawkins  
Michel Hovan  
Robert Jones  
Rusty Jones  
James Knight  
Ken Knopp  
Danko Kramar  
John Lapointe  
Xiaogong Lee  
Scott LeMay  
Barbara Lingberg  
Teresa Lucchesi  
Rich Lyon  
K. Maris  
Tom McCloy  
Robert McGuire  
Nelson Miller  
Cu Nguyen  
Kerin Olson  
Lee Olson  
Mark S. Orr  
Robert A. Pappas

Joseph Pellettiere  
Gary Pokodner  
Chip Queitzsch  
Alanna Randazzo  
John Reinhardt  
Mike Reyer  
Jim Riley  
Gus Sarkos  
Sabrina Saunders-Hodge  
Andrea Schandler  
Jeff Schroeder  
Chris Seher  
Paul Siegmund (phone)  
Peter Sparacino  
Roger Sultan (phone)  
Paul Swindell  
Jay Turnberg (phone)  
Chinh Vuong  
Michael Walz  
Jean Watson  
Jim White  
Peter White (phone)  
Jim Williams  
Joe Wilson