

Federal Aviation Administration (FAA)

Research, Engineering, and Development Advisory Committee (REDAC)
Subcommittee on Aircraft Safety (SAS)

William J. Hughes Technical Center
Atlantic City International Airport
Atlantic City, NJ 08405

March 24-25, 2015

Meeting Minutes

2 Federal Aviation Administration (FAA)

3
4 Research, Engineering, and Development Advisory Committee (REDAC)
5 Subcommittee on Aircraft Safety (SAS)

6
7 William J. Hughes Technical Center
8 Atlantic City International Airport
9 Atlantic City, NJ 08405

10
11 March 24-25, 2015

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13 Meeting Minutes

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15 SAS Chair: Ken Hylander, Chair – Flight Safety Foundation

16
17 Designated Federal Official (DFO): Eric Neiderman, FAA, Manager, Aviation Research
18 Division

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20
21 **Day 1 – March 24, 2015**

22 **A¹ Welcome/Opening Comments/Agenda Review**

23 Ken Hylander called the meeting to order at 8:44AM and welcomed the SAS members, FAA
24 participants, and all others in attendance or on the phone. Ken initiated an introduction of those
25 present in the room and on the phone. Eric Neiderman added his welcome to the group.

26
27 Ken commented that this meeting presented an opportunity to maintain continuity from the last
28 meeting (Fall 2014) by striking a balance between the emerging issues identified by the SAS and
29 the individual requirements proposed for FY17.

30
31 Eric distributed a one page document that identified the two key questions for this meeting:

- 32
 - 33 • What are the recommendations and impacts for the FY17 aviation safety portfolio?
 - 34 • What are the long-term considerations?
 - 35 ○ Do we have the right building blocks?

36 Dennis Filler, Director, William J. Hughes Technical Center, agreed with the need to maintain
37 continuity with the last meeting. He addressed the importance of integrating SAS output across
38 the entire FAA RE&D appropriation portfolio. This is especially important in a system-of-
39 systems context.

¹ Letter designations represent location of presentation material in the binders distributed at the meeting.

42 **B Budget Update**

43 Presenter: Mike Gallivan (FAA)

44

45 Mike presented *REDAC Aircraft Safety Subcommittee R&D Budget Status*. Mike's presentation
46 included information about the enacted FY15 RE&D budget and the FY16 RE&D budget
47 request. He added that sequestration is still the law. The FAA presented the FY16 budget to
48 Congress on time (2-2-15) and we expect Congressional mark-ups by this summer.

49

50 The out-year budget targets from FY17 through FY21 are set but expected to change. Mike
51 added that the target is broken into three components: personnel compensation and benefits
52 (PC&B), travel, and contracts. He concluded by mentioned that the FAA has started work on its
53 proposed reauthorization bill. The current authorization runs through FY15.

54

55 Mark Orr (FAA) explained that the FY17 Aircraft Safety portfolio being presented at this
56 meeting used the total FY17 Target figures shown as a starting point. The projected PC&B and
57 travel are deducted from the target yielding an amount available for contracts. The AVS process
58 programs budget to the prioritized requirements based on the cost estimates submitted by the
59 performers until the expected contract dollars are used up. This becomes the Mendoza line.

60

61 **C Strategic Input from Fall 2014**

62 Presenter: Ken Hylander (SAS – Chair)

63

64 Ken presented *Subcommittee for Aviation Safety – Going Forward*. Ken referred back to the
65 special tasking from the FAA in the fall of 2014 to focus on emerging issues and future safety
66 themes. On slide 4 (*SAS Meeting Summary*), he presented the list of emerging issues and future
67 issues for consideration. He added that there were no specific Finding & Recommendations.

68

69 On slide 11 (*Follow Up Meeting with AVS Leadership*), Ken presented his thoughts about the
70 integration of SAS emerging issues with AVS research portfolio and AVS feedback. Ken stated
71 that in his discussions with Peggy Gilligan, she acknowledged there is value in considering the
72 emerging issues while recognizing the real-time horizon needs within AVS.

73

74 The balance of the presentation spoke to methods of connecting the SAS emerging issues to the
75 AVS research requirements embedded in the Budget Line Items (BLIs) that build the R&D
76 budget portfolio. Mark Orr's presentation will expand on this topic.

77

78 **D Budget Line Item Mapping**

79 Presenter: Eric Neiderman (SAS – DFO)

80

81 Eric presented *FY17 Aviation Safety Portfolio Budget Line Item Mapping*. The BLI maps on
82 slides 5 through 8 show the relationship between the Technical Community Representative
83 Group (TCRGs) that identify AVS research needs, the expression of those needs as research
84 requirements, and the capability groupings (BLIs) that plan and conduct the research. The BLIs
85 are made of people, laboratories, partnerships, and fiscal resources.

86

87 Eric made reference to the nickname for this mapping, the Rosetta Stone, and the idea that it
88 could be useful concept when mapping SAS emerging issues to AVS research needs to future
89 research capabilities.
90

91 **E Improving Aviation Safety FY17 BLI Portfolio**

92 Presenter: Mark Orr (FAA).
93

94 Mark presented *FY17 Aviation Safety Portfolio – BLI View*. Mark’s presentation included two
95 separate sections: mapping FY17 requirements to SAS emerging issues; and a complete list of
96 the proposed AVS requirements for FY17.
97

98 The results of the AVS R&D team effort to map FY17 requirements supporting SAS issues to
99 BLIs is shown on slide 4. Slides 5 through 15 provide greater detail of this mapping, including
100 research milestones (shown in red) and implementation milestones (shown in blue). Unfunded
101 requirements are shown on slides 9 through 11.
102

103 The SAS discussed the best way to review and interpret this information, is it the right tool, or
104 how best to extract value from this mapping. The SAS reached consensus that the emerging
105 issues need better definition and that the FAA should consider the use of research roadmaps with
106 both strategic and operational features.²
107

108 The second section, the proposed FY17 requirements, was distributed to SAS in advance of the
109 meeting. SAS members provided commentary on this information via emails prior to the
110 meeting. Pages 3 and 4 of the Agenda identify SAS member comments and FAA approach for
111 reviewing these comments and providing a response.
112

113 Kathy Abbott (FAA - on phone) discussed the status of an open Finding and Recommendation:
114 SAS Fall_2013-3 *Alignment of Human Factors Research*. She explained that there is an on-
115 going coordination process across other research programs and that the HF TCRG is distributed
116 across Flight Standards and actually embedded in the unmanned aircraft system (UAS) program.
117 The SAS members asked for a list of other distributed HF specialists across AVS.³
118

119 At the conclusion of the review of FY17 requirements, SAS members toured the NextGen
120 Integration and Evaluation Capability (NIEC) and Network Operations Center.
121

122 **F Fatigue Structures and Materials**

123 Presenter: Mike Gorelik (FAA)
124

125 Mike presented *Emerging Technologies and Risk Mitigation – Additive Manufacturing*. Mike
126 discussed the emerging technology considerations of additive manufacturing (AM) related to
127 aviation safety. This includes business drivers, technology transition, and the evolution of
128 criticality of AM parts. Slide 19 identified the top five challenges. He also informed the SAS

² See Appendix III for associated Finding and Recommendation.

³ This information (*FY17 Portfolio HF Connected Requirements*) was provided to the SAS during discussions about open F&R SAS Spring_2013-24: Flight Deck/Maintenance/System Integration Human Factors and NextGen Human Factors.

129 that the FAA is forming an AM Steering Group with an initial focus on developing an Agency
130 AM roadmap.⁴

131
132 A second section of Mike's presentation focused on the state-of-the-industry: original equipment
133 manufacturers (OEMs) and government agencies (Air Force, NASA, NIST).

134
135
136 Ken Hylander assigned homework to individual SAS members on three topics: research
137 roadmaps, embedded experts for human factors research⁵, and an additive manufacturing
138 roadmap. There was also a request from the SAS to provide the proposed research requirements
139 and Quad Charts earlier in the process for SAS review.⁶

140
141 Meeting adjourned at 5:25 PM.

142
143 **Day 2 – March 25, 2015**

144
145 Ken Hylander convened the meeting at 8:30 AM and began with a review of the homework
146 assignments. The result of these discussions and subsequent dialogue yielded a set of Findings
147 and Recommendations that the SAS will forward as part of their report to the full REDAC
148 committee.

149
150 The SAS members received a copy of *the AVS Strategic Guidance for Development of the FY*
151 *2017 Research, Engineering, and Development (RE&D) Safety Requirements Portfolio*.

152
153 **G COE Overview**

154 Presenter: Pat Watts (FAA)

155
156 Pat presented *FAA Air Transportation Center of Excellence*. The presentation covered the
157 legislative authority, selection criteria, and geographic distribution of Centers of Excellence
158 (COE). The universities cost match, dollar for dollar, all research grant awards. This long-term
159 collaborative commitment between the FAA and the COEs provides a valuable benefit to
160 aviation research. Pat also discussed the status of current COEs and the pending COE for UAS.

161
162 **H UAS R&D Overview**

163 Presenters: Chris Swider (FAA on phone) and Claude Jones (FAA)

164
165 Chris presented *REDAC SAS Spring 2015 Review - Unmanned Aircraft Systems (UAS) Research*
166 *Planning*. Chris framed his presentation around the following elements: a) resource changes, b)
167 integrated plans, c) research priorities, and d) partnerships.

168
169 a) The FY15 Appropriation from Congress included \$2M to accelerate key research areas and
170 \$4M towards research at the pending UAS COE.

⁴ See Appendix III for associated Finding & Recommendation.

⁵ This is related to an open Finding and Recommendation SAS Fall_2014-3 Alignment of Human Factors Research.

⁶ See Action Item 5 in Appendix IV.

- 171 b) FAA-wide coordinated planning is underway. The goal is a working level integration plan
172 that supports near- and mid-term needs.
- 173 c) Efforts are underway to get useful research results from the UAS test sites. Sensor fusion
174 research is focused on standards development supporting RTCA SC-228 developments.
175 Emerging priorities include the impact of the small UAS Notice of Proposed Rulemaking.
176 FAA/ATO developed a multi-year UAS-L2 integration timeline.
- 177 d) Internal partners include – ATO, ANG, ARP, and AEE. External partners include MITRE,
178 MIT Lincoln Labs, DoD, NASA, and DHS. Partnerships also extend the six UAS test sites,
179 academia, industry, and international (through Action Plan 24). Slides 26 through 30 expand
180 on the nature of these research partnership linkages.

181
182 Claude Jones presented *UAS R&D Update*. Claude focused on FY15 research activities and the
183 research requirements for FY16. He provided greater detail on multi-sensor surveillance data
184 fusion strategies and UAS system safety criteria.

185
186 This presentation addressed an open REDAC Observation to the Administrator from October 2,
187 2013, and an open Finding and Recommendation, SAS Spring 2014-2, on the UAS Roadmap
188 and UAS R&D Strategy, respectively. In subsequent discussions, the SAS closed out the F&R
189 and elected to establish an Action Item⁷ for the next SAS meeting to provide a UAS presentation
190 with a focus on Pathfinder implications. REDAC has the action to address the open Observation.

191
192

193 **I Unleaded AvGas**

194 Presenter: Dave Atwood (FAA)

195
196 Dave presented *NextGen Alternative Fuels for General Aviation - REDAC Subcommittee on*
197 *Aviation Safety (SAS) - Spring 2015 Meeting*. Dave framed his presentation around a visual on
198 slide 2 that described a Path to Unleaded Avgas. In 2010, a general aviation coalition asked the
199 FAA to take a leadership role to form a public-private partnership. The result was the Piston
200 Aviation Fuels Initiative (PAFI) with a mission to “facilitate development and deployment of an
201 unleaded AVGAS with the least impact on the existing piston-engine aircraft fleet.” He
202 discussed the PAFI process in great detail and the status of testing to date at the William J.
203 Hughes Technical Center.

204
205 The tour of the fuels lab was cancelled due to time constraints.

206
207

208 **J High Performance Computing, Big Data, ASIAs**

209 Presenter: Charles (Cliff) Johnson (FAA)

210
211 Cliff presented: *High Performance Computing, Big Data, & ASIAs - An Overview of*
212 *NextGen Shared Services (NSS) within the NextGen Prototyping Network (NPN)*. Cliff
213 explained the generic nature of big data and its relationship to safety assurance with the aviation
214 industry. More specifically, he described the role that the William J. Hughes Technical Center

⁷ See Appendix IV for list of open and new Action Items.

215 can fill by providing high performance computing, secure storage and data access mechanisms,
216 and analytical tools. Slides through 18 through 28 addressed specific resources and activities
217 now active at the FAA Technical Center.
218

219 The SAS commented on slide 26 *Big Data & ASIAs – Rotorcraft Research*, as a good example
220 of solving a current problem with a long-term beneficial approach. The SAS also observed that
221 this work seems to meet several emerging issues identified previously by the SAS. Though not
222 yet real-time, this provides a backbone or an essential step-one to addressing emerging issues.
223

224

225 **Wrap Up**

226

227 The SAS then revisited open F&R SAS Spring_2013-24: *Flight Deck/Maintenance/System*
228 *Integration Human Factors and NextGen Human Factors*. Michele Yeh (FAA) presented
229 information, *FY17 Portfolio HF Connected Requirements*, which showed the distribution of
230 AVS sponsors across numerous TCRGs and requirements. The SAS agreed to close the F&R
231 and prepare a new Finding⁸.
232

233 John Lapointe addressed open Action Item #7. The SAS accepted the new information but
234 deferred closing this Action Item until Joe Del Balzo, author of the Action Item and previous
235 SAS Chair, had an opportunity to review the material.
236

237 The SAS also decided to keep Action Item #8 open but asked John Cavolowsky to address this
238 matter at the next SAS meeting.
239

240 Randy Bass (FAA) addressed open F&R SAS Spring_2014-1: *Weather and Decision-making*.
241 He presented *REDAC Subcommittee on Aircraft Safety (SAS) Open Recommendation -*
242 *Understanding Probabilistic Weather Information*. This presentation was prepared for the FAA
243 2014 SAS meeting. The SAS concurred that this presentation successfully closed out the F&R.
244

245 The SAS briefly discussed significant lessons-learned from the meeting. They agreed that the
246 ability to review and comment on the requirement Quad charts prior to the meeting is beneficial.
247

248 Next SAS meeting is scheduled for September 9 and 10, 2015, at the William J. Hughes
249 Technical Center.
250

⁸ See Appendices III and IV for new Findings and Recommendations and status of old and new Action Items.

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253	Appendices
254	Appendix I: Agenda
255	Appendix II: Attendance
256	Appendix III: Findings and Recommendations
257	Appendix IV: Action Items
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Appendix I:

AGENDA

FEDERAL AVIATION ADMINISTRATION
 REDAC Subcommittee on Aircraft Safety (SAS)
 William J. Hughes Technical Center
 March 24-25
 Director's Conference Room
 Dial in Access: (609) 916-1975, passcode 257511

Tuesday, March 24, 2015

Time	Agenda	Speaker
8:30 – 8:50	Welcome/Opening comments <ul style="list-style-type: none"> • Introductions (all) • Opening remarks/comments (Chair & DFO) 	Kenneth Hylander (Chair) Eric Neiderman (SAS DFO)
8:50 – 9:00	Welcome	Dennis Filler (REDAC DFO & WJHTC Director)
9:00 – 9:15	Budget Update	Mike Gallivan
9:15 – 9:45	Strategic Input from Fall 2014	Kenneth Hylander
9:45 – 10:15	Budget Line Item (BLI) Mapping	Eric Neiderman
10:15 – 10:30	Break	
10:30 – 11:15	Improving Aviation Safety FY17 Budget Line Item (BLI) Portfolio	Mark Orr
11:15 – 12:15	Review of FY17 Quad Charts – Session 1 See Page 2 for Review Topics	All
12:15 – 1:15	Lunch	Cafeteria
1:15 – 2:15	Review of FY17 Quad Charts – Session 2 See Page 3 for Review Topics	All
2:15 – 3:15	NextGen Integration and Evaluation Capability (NIEC) & Network Operations Center Tour	Hilda DiMeo
3:15 – 3:30	Break	
3:30 – 4:30	Fatigue Structures & Materials	Mike Gorelik
4:30 – 5:30	Discussion/Summary/Homework/Actions	Kenneth Hylander/ Eric Neiderman
6:30	Group Dinner: <i>Touch of Italy</i> , 6629 Black Horse Pike, Egg Harbor Township, NJ 08234	(609) 646-1855

271

272 Review of FY17 Quad Charts – Session 1

Time	SAS Member Comment	Who is Needed?	What to Present
11:15-12:15	<i>KH: System Safety Management (A11G.HF.10, A11H.SSM.9, A11H.SSM.11, A11H.SSM.13) - Large budget driver and strong (I think) connection to the Real Time System Safety SAS emerging issue. We should explore this further.</i>	A11.HF.10 Dr. Bill Johnson (CSTA) Dr. Don Arendt (Sponsor POC) A11H.SSM.9 Mark Liptak (Sponsor POC) Cliff Johnson (Research Provider) A11H.SSM.11 & A11H.SSM.13 Dr. Julia Pounds (Sponsor POC) Vasu Kolli and Huasheng Li (Research Providers) Dan Brock Danko Kramar Frank Wondolowski (RED Group Members)	Discuss research Discuss connection to emerging issue
	<i>KH: Rotorcraft FDM Data Gathering and Analysis for ASIAs (A11H.SSM.9) - not sure I understand how this is research related. I have no debate that this work should be done but don't we know how to do this already through the many FDM and ASIAs efforts in place in industry? Seems more like an operating budget requirement vs. research requirement unless I am missing something.</i>	Mark Liptak (Sponsor POC) Cliff Johnson (Research Provider) Danko Kramar (RED Group Member)	Discuss research vs. ops
	<i>KH: Onboard Network Systems (A11D.SDS.1, A11D.SDS.4) - Seems to fit nicely with the SAS emerging issue of "Dependability of Increasingly Complex Systems" item.</i>	Barbara Lingberg (Sponsor POC) Alanna Randazzo (Research Provider) Michelle Yeh (RED Group Member)	Discuss alignment to emerging issue.
	<i>KH: Fire Safety - Large budget driver and NOT something that we identified as a SAS priority or emerging issue. Did we miss something last Fall?</i>	A11A.FCS.1 Steve Edgar (Sponsor POC) Gus Sarkos (Research Provider) Michelle Yeh (RED Group Member)	Show tasking and their alignment to emerging issues

	<p><i>DS/Boeing: the only question we have ahead of the actual meeting is in reference to the Flutter Suppression R&D. We would like to know where this subject stands in FAA priorities, and what particular research is planned to be accomplished in the next three years.</i></p>	<p>Ian Won (Sponsor POC) David Westlund (Research Provider) Michelle Yeh (Red Group)</p>	<p>Tasking and timeline</p>
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Review of FY17 Quad Charts – Session 2

<p>1:15-2:15</p>	<p><i>KH: Advanced Materials and Structural Safety – See my first comment about overlapping research and I'd like to understand the AVS Composite Plan that is referenced in many of the Quad charts.</i></p>	<p>Larry Ilcewicz/Rusty Jones (AVS Composites Plan)</p> <p>A11E.MI.1 /A11E.SIM.5 Ian Won (Sponsor POC) Curtis Davies (Research Provider)</p> <p>Dan Brock Michelle Yeh (RED Group Members)</p>	<p>Composites plan one pager</p> <p>Discuss research overlap-industry</p>
	<p><i>CK: There seems to be areas of overlap that could be explored to accelerate and / or streamline research. The mapping above might help identify these areas of overlap. For example:</i></p> <ul style="list-style-type: none"> ○ <i>Vision systems for helicopters A11H.TAS.5 versus Advanced Vision Systems A11G.HF.4</i> ○ <i>Mitigating Ice Crystal Threat A11K.WX.3 versus Research on Ice Crystal and SLDA11D.AI.1</i> 	<p>A11H.TAS.5 Mike Webb (Sponsor POC) Cliff Johnson and Dr. Andrew Cheng (Research Providers)</p> <p>A11G.HF.4 Terry King (Sponsor POC)</p> <p>A11K.WX.3 & A11D.AI.1 John Fisher (Sponsor POC) Dan Brock Michelle Yeh (RED Group Members)</p>	<p>Discuss research, point out differences</p>

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282**Dial in Access: (609) 916-1975, passcode 257511****Wednesday, March 25, 2015**

8:30 – 9:00	Review of Homework Assignments from Previous Day – Findings and Recommendations Discussions	All
9:00 – 9:15	Opening Remarks – FAA Aircraft Safety R&D Action Items & Recommendations	Eric Neiderman
9:15 – 9:45	COE Overview	Pat Watts
9:45 – 10:00	Break	All
10:00 – 11:30	UAS R&D Portfolio	Claude Jones Sabrina Saunders-Hodge
11:30 – 12:30	Lunch	Cafeteria
12:30 – 1:30	Unleaded AvGas (NextGen BLI)	Dave Atwood
1:30 – 1:45	Travel to Building 292 for Tour	
1:45 – 2:45	Unleaded AvGas Tour	Dave Atwood
2:45 – 3:00	Break	
3:00 – 4:00	High Performance Computing, Big Data, ASIAS	Charles (Cliff) Johnson
4:00 – 5:00	Wrap up	All
	SAS Fall Actions & Recommendation Review	Kenneth Hylander/ Eric Neiderman
	SAS Feedback/Future Planning	Kenneth Hylander

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WebEx Directions
SAS FALL Meeting
Date: March 24-25, 2015

SAS Spring 2015

Tuesday & Wednesday

8:00 am | Eastern Daylight Time

[Join WebEx meeting](#)

Meeting number: 397 881
708

**Meeting
password:** spring

[Add this meeting](#) to your calendar.

Can't join the meeting? [Contact support](#).

IMPORTANT NOTICE: Please note that this WebEx service allows audio and other information sent during the session to be recorded, which may be discoverable in a legal matter. By joining this session, you automatically consent to such recordings. If you do not consent to being recorded, discuss your concerns with the host or do not join the session.

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Appendix II

Attendance

299	Kathy Abbott	322	Michael Gorelik	345	Mark Orr
300	Allan Abramowitz	323	Tony Gurcsik	346	Maria Paine
301	Chuck Agava	324	John Hensyl	347	Steve Ramdeen
302	Dave Atwood	325	Mark Hesselton	348	Alanna Randazzo
303	Katrina Avers	326	Michel Hovan	349	Jim Riley
304	John Bakuckas	327	Ken Hylander (SAS Chair)	350	Manny Rios
305	Randy Bass	328	Cliff Johnson	351	Chinita Roundtree-Coleman
306	Daniel Brock	329	Claude Jones	352	Rachel Seely
307	Jimmy Bruno	330	Rusty Jones	353	Chris Seher
308	Angela Campbell	331	Chuck Kilgore	354	Mark Slimko
309	John Cavolowsky (SAS)	332	Ryan King	355	Peter Sparacino
310	Andrew Cheng	333	Chris Kmetz (SAS)	356	Fred Synder
311	John Crowley (SAS)	334	James Knight	357	Paul Tan
312	Curtis Davies	335	Ken Knopp	358	Isidore Venetos
313	Walter Desrosier (SAS)	336	Danko Kramar	359	Pat Watts
314	Stephanie DiVito	337	Andrew Lacher (SAS)	360	Ed Weinstein
315	Steve Edgar	338	John Lapointe	361	Jim White
316	Hossein Eghbali	339	Xiaogong Lee	362	John White (SAS)
317	Bill Emmerling	340	Jim Mangie (SAS)	363	Frank Wondolowski
318	Jorge Fernandez	341	Michael McNeil	364	Michelle Yeh
319	Jamie Figueroa	342	Mark Mutchler	365	Dres Zellweger
320	Dennis Filler	343	Eric Neiderman (FAA DFO)	366	
321	Mike Gallivan	344	Kerin Olsen	367	
				368	

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372 **Appendix III**

373 **Findings & Recommendations**

374 **Previous**

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377 **SAS Spring_2013_24:** Flight Deck/Maintenance/System Integration Human Factors and
378 NextGen Human Factors

379 Recommendation: The Subcommittee recommends that, for funding and functional purposes,
380 AFS and AVS explore the possibility of closely aligning human factors research requirements
381 with the other research areas they support, even though those issues fall outside of the traditional
382 human factors portfolio. For instance, research on artificial vision and the complexity of
383 instrument approaches both support increasing airspace capacity, which is a NextGen issue.
384 Additionally, the Subcommittee recommends that more support and priority be given to human
385 factors research that supports significant new or revised regulation.
386

387
388 **FAA Response:** Michele Yeh (FAA) presented information, *FY17 Portfolio HF Connected*
389 *Requirements*, which showed the distribution of AVS sponsors across numerous TCRGs and
390 requirements. The SAS agreed to close the F&R and prepare a new Finding. **CLOSED**

391
392 **SAS Fall_2013_3:** Alignment of Human Factors Research

393 Recommendation: The Subcommittee recommends that, for funding and functional purposes,
394 FAA explore the possibility of closely aligning human factors research requirements with the
395 other research areas they support, even though those issues might fall outside the traditional
396 human factors portfolio.
397

398 **FAA Response:** Kathy Abbott (FAA) discussed the alignment of human factors research.
399 Kathy explained that there is an on-going coordination process across other research programs
400 and that the HF TCRG is distributed across Flight Standards and actually embedded in the
401 unmanned aircraft system (UAS) program. **CLOSED**

402
403 **SAS Spring_2014-1:** Weather and Decision-making

404 Recommendation: There is a significant body of knowledge about how people deal with
405 probabilistic information for decision making in situations involving risk. It is recommended that
406 the Weather program get sufficient understanding, using such information where appropriate, to
407 help them design weather forecast displays, decisions support tools, and associated training that
408 make use of probabilistic weather information.
409

410 **FAA Response:** Randy Bass (FAA) addressed weather and decision-making with a presentation
411 to the SAS: *Understanding Probabilistic Weather Information*. This presentation was prepared
412 for delivery at the FAA 2014 SAS meeting but was postponed to Spring 2015. The SAS
413 concurred that this presentation successfully closed out the F&R. **CLOSED**

414
415 **SAS Spring_2014-2:** UAS R&D Strategy

416 Recommendation: The FAA should develop a holistic implementation plan to include a detailed
417 R&D strategy which would address the research needs from both the regulator and airspace
418 operator perspectives.
419

420 The SAS requested further details on the UAS R&D plan reflecting deliverable validation
421 milestones against the published FAA Integrated UAS Roadmap.
422

423 **FAA Response:** Chris Swider (FAA) presented *REDAC SAS Spring 2015 Review - Unmanned*
424 *Aircraft Systems (UAS) Research Planning*. Chris framed his presentation around the following
425 elements: a) resource changes, b) integrated plans, c) research priorities, and d) partnerships.
426 Claude Jones presented *UAS R&D Update*. Claude focused on FY15 research activities and the
427 research requirements for FY16. The SAS agreed to close out the F&R and elected to establish
428 an Action Item⁹ for the next SAS meeting to provide a UAS presentation with a focus on
429 Pathfinder implications. **CLOSED**
430

431
432 **New**
433

434 **Finding:** The subcommittee was fully briefed on the UAS safety research plan. We are
435 encouraged by the progress made in the past year regarding organization and networking of
436 different stakeholders. We encourage the continuation of this integrated research planning.
437 There appears to be a focus on real problems and growing consideration of evolving issues.
438

439 **Recommendation: SAS Spring 2015-1: UAS Portfolio Flexibility**

440 We recommend building flexibility into the FY17 UAS budget that can address emerging issues
441 that may not be understood currently. We also recognize the focus on Beyond Line of Sight
442 (BLOS) operations but recommend consideration of other emerging "long term" issues such as
443 complete autonomous operations. We also recommend that UAS NAS integration R&D focus on
444 sense and avoid technology vs aircraft robustness in case of impending collision.
445

446 **Finding:** There has been visible progress in terms of developing a process to prioritize research
447 based on priorities and need. Review of the 2017 strategic guidance, quad charts, and list of
448 emerging issues highlighted a need to provide greater linkage between the proposed and funded
449 research and the FAA's strategic plan. The strategic plan should not be a static document; it will
450 require regular updates to address the changing needs of the FAA and the NAS and to ensure that
451 the research is appropriately targeted.
452

453 **Recommendation: SAS Spring 2015-2: Research Roadmap Development**

454 SAS understands and recognizes the ongoing need for research focused on operational safety of
455 the current fleet. Notwithstanding, focused research must be conducted to address emerging
456 issues. The FAA should develop and implement a process to produce 5 to 10 year research
457 roadmaps to guide sponsors in the development of research requirements and to assist in
458 prioritizing and focusing research on strategically significant elements. The roadmaps should
459 define the FAA's vision for the future, quantify success measures to the greatest extent possible,

⁹ See Appendix III for list of open and new Action Items.

460 and identify the research areas necessary to support the roadmap vision. It is further
461 recommended that the FAA make available and use the roadmaps as the basis for its
462 comprehensive strategic research plan, research needs, program initiatives, and intended
463 outcomes for aviation safety.

464
465 **Finding:** There have been significant developments in additive manufacturing technologies and
466 capabilities that are expected to rapidly proliferate in aviation applications due to many potential
467 benefits including reduction in material cost, fewer part details, and enabling of more complex
468 designs. However, additive manufacturing technologies have a number of technical risk factors
469 that could have significant impact on design, production, and maintenance. The FAA must be
470 prepared to address these factors in order to ensure appropriate airworthiness and certification
471 standards and methods of compliance. The subcommittee received a briefing from the FAA
472 fatigue and damage tolerance Chief Scientific and Technical Advisor (CSTA) on the
473 establishment of an FAA Additive Manufacturing Steering Group to address these issues. The
474 SAS strongly supports the high level of coordination with other government and industry
475 initiatives and development of a detailed roadmap identifying near-term and strategic areas that
476 focus FAA's activities on the safe implementation of these technologies. Current planning is to
477 develop the additive manufacturing roadmap over the next 18-24 months. This roadmap will
478 inform regulatory, policy, and R&D program needs. The subcommittee also noted and strongly
479 endorsed the addition of additive manufacturing materials into the Metallic Materials Properties
480 Development and Standardization (MMPDS) process and handbook (under research requirement
481 A11E.SIM.4) to provide standardized and acceptable design and compliance data and tools.

482
483 **Recommendation: SAS Spring 2015-3: Additive Manufacturing Research Acceleration**
484 There is significant activity across all major aviation industry sectors in the application of
485 additive manufacturing technologies affecting current production systems and new product
486 designs. The subcommittee recommends that the FAA accelerate the development of the
487 additive manufacturing roadmap over the next 12 months in order to inform FAA's existing
488 regulatory, policy, and R&D program needs. In addition, the subcommittee recommends that the
489 FY17 and FY18 R&D portfolio includes consideration of proactive research necessary to ensure
490 an understanding of key properties/characteristics of additive manufacturing to identify hazards
491 and mitigations necessary to establish the appropriate standards and methods of compliance
492 necessary to enable safe implementation of these technologies.

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495 **Observation:** The Subcommittee continues to emphasize the importance of human factors
496 research in all aspects of aviation safety. The Subcommittee also recognizes the importance of
497 the human factors issues that AVS has identified for funding and further research. Human
498 factors research covers a broad spectrum of regulations and guidance. Unfortunately, this
499 significance and importance has not always been consistently recognized. As a result of this
500 observation, the Subcommittee previously recommended that AVS closely align human factors
501 research requirements with the other research areas they supported, even though those issues fell
502 outside of the traditional human factors portfolio.

503
504 The committee is pleased to hear that FAA human factors specialists are closely involved (rather
505 than just consulting) with many research efforts throughout the portfolio. The committee also

506 sees value in human factors specialists' involvement during the requirements phase of research
507 efforts and is pleased to be advised that this is happening.

508

509 **Observation:** Based on the feedback received from multiple REDAC subcommittees, it is
510 evident that crosscutting capabilities should be engaged at earlier stages of setting requirements
511 and concept development. As operational concepts are explored, experts from all research
512 disciplines should work jointly to establish operational requirements and objectives. Earlier
513 coupling across multiple disciplines may result in reduced development time and costs.

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Appendix IV

Action Items

Carry-over Action Items:

Spring 2014 Action Item 7: Eric Neiderman will provide an explanation of SDSS core capability at the next SAS meeting. REMAIN OPEN (Prepare background slides for Joe Del Balzo review and include in DSS Deep-dive presentation at Fall 2015 meeting)

Spring 2014 Action Item 8: Eric Neiderman will provide information regarding the NASA Ames tool to track safety cases. REMAIN OPEN (John Cavolowsky will address this issue at next SAS meeting.)

New Action Items:

Action Item 1: Provide FY17 BLI to requirements mapping (Rosetta Stone) showing full funding for BLIs. (CLOSED)¹⁰

Action Item 2: Provide deep-dive presentations on SSM and DSS requirements as they relate to SAS emerging issues. (Action - John Lapointe see Carry-over Action Item #7 above)

Action Item 3: Provide UAS presentation with focus on Pathfinder implications. (Action - Chris Swider)

Action Item 4: Provide human factor presentation on operator fatigue issues. (Action – Mark Orr)¹¹

Action Item 5: Provide requirements list with Mendoza Line and items below in advance of future Spring meetings. (Action – Mark Orr)¹²

¹⁰ Action Completed on April 8, 2015.

¹¹ Mark Orr will prepare AFS plan and forward to SAS.

¹² Mark will provide AVS approved FY17 list to SAS this May.