Minutes
REDAC (Research, Engineering, and Development Advisory Committee)
Subcommittee on Human Factors (HF)
Summer/Fall 2023

Meeting date | *August 29-30, 2023*

Meeting location | Veracity, *955 L'Enfant Plaza (7ᵗʰ Floor) AND Zoom*

Purpose: Review the RE&D accomplishments and expectations for FY23, and research plans through FY26, and advise FAA on future research

Tuesday, August 29, 2023

Welcome / Introductions and Update from Full REDAC Committee Meeting | Presenter *Dr. Barbara Holder, Embry-Riddle University, HF Subcommittee Chair*

Dr. Barbara Holder welcomed the committee and went over the key objectives of the Human Factors REDAC subcommittee meeting.

Dr. Holder began by reviewing topics discussed by the Full REDAC Committee after the last subcommittee meeting in March:
- Shelley Yak presented the strategic outlook for research.
- The FAA has been perceived to be unclear about the strategy.
- The Aviation Noise community was invited to discuss noise outside the airport areas.
- An update from the Associate Administrator of Aeronautics Research from NASA, Robert Pearce and ways to help them focus more on Human Factors and Safety in their work.
- Sabrina Saunders-Hodge presented the results of REDAC feedback on the FAA's UAS plan for UAS research and integration.
- The new FAA Chief Scientist for Machine Learning and Artificial Intelligence (ML/AI) presented the AVS AI/ML roadmap plan.

Dr. Holder also reviewed the Findings and Recommendation (F&R) from the last HF Subcommittee meeting on the use of EVS/SVS and the impact on runway safety, and the Action Items on Advanced Air mobility, Info-Centric NAS and an observation on how Human Factors (HF) needs to be more proactive on integrating HF into the approach for the emerging needs of the human in the system.

The next meeting is March 5-6, 2024, the location still needs to be determined, the Tech Center was a suggestion.

Dr. Bill Kaliardos (Designated Federal Official, DFO) reviewed the agenda. The meeting was called to order.

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Kathy Abbott provided openting remarks on AVS Human Factors research. She appreciates the valuable inputs on emerging needs and emerging risks. The complexity of new entrants is increasing; and these challenges need to be considered.

These remarks set up the two FAA flight deck research portfolios that followed today.

Core Flight Deck Human Factors Research| Presenter *Dr. Chuck Perala, FAA Core Flight Deck HF Portfolio Manager*

Bill introduces Dr. Chuck Perala to brief the subcommittee on the "Core" Flight Deck Human Factors research portfolio. Chuck provided an overview of the program that addresses research, engineering, and development requirements defined by technical sponsors in the Aviation Safety (AVS) organization. Requirements are driven by the human factors needs of FAA Aircraft Certification (AIR) and Flight Standards (AFX) personnel.

The subcommittee discussed:
- What addressing the emerging risks for pilot training and flight operations means.
- Misleading labels of dependency, over reliance and complacency.
- An **Action Item** was requested for a brief on more details on pilot training.
- The connection to the F & R on Vision Systems and Augmented reality and the runway safety context.
- The proposed research on General Aviation pilot's response to unexpected events.
- Surface Interface technologies versus broader interaction design
- Reduced Crew operations and what is the difference between research item OC-2 (Fatigue risk management-future flight ops) and OC-7 (Reduced Crew-transport aircraft); how are they related?
- Questions on AI and Machine learning applications.
- Monitoring physiological eye movement and if they are considering a broader set of interactions data.

Chris DeSenti asked about getting a copy of the SAS REDAC F&R.

Lunch Break-return at 12:30am

NextGen Air/Ground Integration Human Factors Research| Presenter *Dr. Victor Quach, FAA NextGen Air/Ground Integration Portfolio Manager*

Bill introduces Dr. Victor Quach to brief the subcommittee on the NextGen Air/Ground Integration Human Factors research portfolio, The program addresses research, engineering, and development requirements defined by technical sponsors in the Aviation Safety (AVS) organization. Requirements are driven by intersection points between FAA policy documents, NextGen changes, and enabling flight deck technologies and procedures.

The subcommittee discussed:
- Tasks, knowledge and skills for MFO (Manual Flight Operations) and are pilot skills being assessed at different intervals.
- Information Automation Systems-Connected Aircraft research funding and what it includes.
- What are the differences between Human Error and Complex Systems research on FD Information Management and Information Automation Systems-Connected Aircraft and are there any connections.

- Is digital communications part of the Human Error and Complex Systems research, and if it covers general areas.
- What is the driving need behind all of the Advanced Vision Systems research.

Questions for Victor on Flight Standards will be discussed tomorrow during the F & R discussion on Advanced Visions Systems and Runway Safety.

FAA Technical Center Director Remarks | Presenter *Shelley Yak*

FAA William J. Hughes Technical Center director, Shelley Yak, provided an update on the Budget Authorization and the hope for a CR (Continuing Resolution). They are preparing the budget submission for 2025. The return to the workplace is still being discussed and Covid-19 is still an issue. The FAA's 1st Advanced Air Mobility Summit was held in Baltimore in August and the main theme was collaboration and integration. She asks the subcommittee to inform them of the opportunities for strategic partnerships of the technologies to assure the Agency isn't behind the industry. Find out what the research drivers are in the area of Human Factors and get to the point of being able to focus on those. She talked about the Strategic Outlook for Aviation Research (SOAR) charts and the need to get a sense of what should be the focus in 5-year increments. She asks for the attendees to start being more strategic in the investments because of the limited resources.

The subcommittee discussed:
- The SOAR charts availability and reviewing them during the next REDAC.

Aviation Safety Research Strategy | Presenter *Bruce DeCleene*

Bruce DeCleene provided a presentation on how research is being managed in the Aviation Safety organization. They made a change in how they manage their research portfolio over the summer by taking advantage of the Senior Technical Experts program and asking them to provide direction on where they should take the research program in the future. Priorities are changing for 2024 and they would like your inputs. The research has to be more responsive to the risks and potential mitigations that are in the system today. They value any feedback on any strategic priority areas they have not covered.

The subcommittee discussed:
- Clarification on various uses of "certification", versus just aircraft certification.
- Public and private partnership and the government's role.
- Human Factors as a critical element of the strategic thrust and where it is not as critical.
- Operational component representation on the list
- Wes Ryan had a comment in the chat: Bruce it is rather important to point out that rules are listed in the normalization phase so those asking for rule change during discovery and application are possibly out of sync, right?
- Wes Ryan said in the chat: Do lower risks uses need to wait on normalization for all use cases or the most critical use case, for example the use of AI in small UAS before it is normalized in larger aircraft.

Break 2:24-2:35

FAA UAS Beyond Visual Line-of-sight (BVLOS) Rulemaking Update | Presenter *Jessica Brightman (FAA) (AUS-440)*

Jessica Brightman presented the UAS Beyond Visual Line of Sight Rulemaking update. The rulemaking will cover things such as BVLOS operations for things like infrastructure, package delivery, agriculture and other ConOps for aircraft up to 1320 lbs. It will also create a regulatory framework for UTM (Traffic Management) services. She talked about the BVLOS exemptions and the 5 federal register notices which included 4 precedent setting exemptions with 1 including BVLOS policy questions.

The subcommittee discussed:
- Scope of the BVLOS spectrum
- Shielding or masking Ops and 3rd party services
- Ground Station design safety considerations
- Wes Ryan said in the chat: Does complexity = risk in this context?

FAA UAS Detect-and-Avoid (DAA) HF Research | Presenter *Adam Hendrickson (FAA)*

BREAK for technical difficulties at 3:18pm

Adam Hendrickson from Flight Standards presented his brief on the challenges and the human factors research being done on UAS Detect-and-Avoid.

The subcommittee discussed:
- The system design and human operator error considerations informing the research.
- Key site operation and performance-based standards and who is going to evaluate the performance requirements for DAA as part of Operational evaluations.
- Waivers for DAA

Action Items & F &R Discussion Wrap up

Barbara asks the subcommittee to join the conversation on any thoughts for F & Rs. Discussion topics included:

- **Write an observation to summarize the subcommittee's input on the Aviation Safety Research Strategy and the drivers of the strategy. Chris DeSenti volunteered to draft it.**
- **Action for an update brief with Bruce DeCleene after they have launched the Safety Strategy research. Barbara will write the action for the follow up brief.**
- **Future briefing on the bigger picture for Connected aircraft system.**
- **F & R on identifying funding priority for Advanced Vision Systems.**
- **SAS REDAC request that the HF REDAC look at Pilot State Monitoring and writing in F & R**
- **Asking UAS about their state of practice for collecting the key site data**

Day 2 will start with another F & R discussion.

End of day 1 at 4:31pm

Wednesday, August 30, 2023

General Review of Day 1 | All

Barbara welcomed everyone to Day 2 of the REDAC and discussed the findings and tentative plan from Day 1.

- **Observation**: Chris DeSenti and Dave McKenny have started writing the observation on the incorporation of Human Factors in the Aviation Research Strategy.
- **Action:** Provide the feedback Bruce DeCleene requested on the Aviation Research Strategy and send them to Barbara for consolidation of the subcommittee's messaging.
- **Action:** Request additional briefings on the AVS Safety strategy in the future.
- **Action:** Request information on the drivers behind the significant investment in Advanced Vision System research
- **Action:** Data Collection during UAS Key Site Test

Finding & Recommendation from Winter/Spring REDAC|FAA Response on Advanced Vision Systems and Runway Safety | Presenter *David Newton (FAA)*

David Newton provided a response to the recommendation from the winter/spring 2023 HF REDAC. He spoke on current and planned research on Head-worn displays which include runway incursions scenarios. The HF Subcommittee had recommended that the FAA research the effect of the use of Enhanced Vision Systems (EVS), Synthetic Vision Systems (SVS), and Augmented Reality Systems (AR) on pilot attention to the visual ques needed for timely pilot response to runway safety information presented directly to the pilot.

The subcommittee discussed:
- Runway incursions
- Connections between EVS work in the Military and the FAA.
- Tony D. Darnell in chat: AFWERX could be a good place to coordinate the sharing of HUD display research.
- Phil Smith suggests an **Action** for a presentation on the bigger picture of the research projects identifying runway incursions from a Human Factors perspective.

F &R was satisfied and can be closed.

Break-back at 11:05

FAA Enterprise Human Factors and ATC/Tech Ops Research | Presenter *Karl Kaufmann, ATC/Enterprise HF Portfolio Manager*

Karl Kaufmann briefed the subcommittee on the current FY23 NextGen Enterprise Air Traffic Human Factors research and the planned activities for beyond FY24.

The subcommittee discussed:

- What is meant by rule-based reality procedures?
- Human Readiness Levels (HRL) evaluation criteria specifics

Karl Kaufmann briefed the subcommittee on the ATC/Tech Ops Human Factors research and the planned activities for FY24 and beyond.

The subcommittee discussed:
- Getting the guidance on upcoming technologies before they are used.
- The context and the nature of machine learning.
- ATC workload and Fatigue Assessment and the different types of fatigue.

Lunch Break -12:20-1:15.

FAA Budget Briefing | Presenter *Thomas Kelly, FAA RE&D Budget Analyst*

Tom Kelly provided an overview of the FAA RE&D budget presentation. The FY2024 RE&D Presidents budget request is $255.1M. They've added two new BLIs and closed out two environmental BLIs. Grants for UAS and workforce increased.

The subcommittee had no questions on the budget.

FAA Advanced Air Mobility (AAM) "Innovate 28" | *Mitchell Bernstein (FAA)*

There was a delay before the presenter, Mitchell Bernstein, joined the meeting.

While the committee waited for Mitchell to come online, a question was asked about how to integrate advanced technologies into machine learning and human machine systems. Barbara asks Karl Kauffman if he would like the subcommittee to write and F & R for this and Karl agreed that one should be created.

Mitchell Bernstein provided the Integrating Advanced Air Mobility in the NAS presentation to the subcommittee, much of which is under the FAA's "Innovate 28" effort. AAM is working towards operationalizing an AAM ecosystem. They are working with the aviation community and other stakeholders from international, national and local communities; to safely and responsibly usher in this new era in aviation.

The subcommittee discussed:
- Wes Ryan in the chat: "Is there an emerging approach/process for the FAA to consider acceptance/certification of automation functions that relate to ops procedures/airspace management functions currently done by humans that are being proposed to be performed by automation on how will the expected safety levels be set?" Mitchell said that there isn't a process; they are identifying that now.
- Evaluating the automation levels for different vehicles
- Service providers for communications

Human Factors Research Considerations for AAM | Presenter *John Illson (Supernal)*

John Illson, Chief Safety Officer from Supernal presented the research considerations for Advanced Air Mobility (AAM).

The subcommittee discussed:

- What do the SVO (Simplified Vehicle Operations) progression levels really mean?
- Operational concept on the vehicle itself
- Long term timeline for SVO
- Is SVO a means to an end to complete autonomous operations?

Break-back at 2:15pm

Human Factors Considerations for Scaling AAM | Presenter *Mark Nikolic (Joby Aviation)*
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Mark Nikolic gave a presentation on Human Factors Considerations for Scaling AAM.

The subcommittee discussed:

- How would the Detect and Avoid (DAA) research differ from AAM than what is already in place?
- Pilot training needed for these vehicles.

New F&Rs/Subcommittee Discussion| All Attendees

Barbara talked about the Open items:

- F& R from the SAS REDAC on Pilot State Monitoring which also came up today in the Core Flight Deck presentation.

The Subcommittee discussed possible recommendations, actions, etc., to be refined over the coming weeks:

Findings and Recommendations
- **Urban/Advanced Air Mobility Research Timeline**
- **Competency Based Training and Assessment Timeline**
- **AI/ML Human Factors Research Plan**
- **Training and Checking Program Changes due to Changing Pilot Entry-Level Experience and Skills**

Action Items

- **Briefing on Advanced Vision Systems Research Motives and Budget**
- **Briefing on AVS Research Strategy**
- **Data Collection During UAS Key Site Test**

Observations
- **Observation on AVS Research Strategy**

Next Human Factors REDAC Meeting-
WINTER/SPRING-March 5-6, 2024-Washington, D.C.
SUMMER/FALL-August 20-21, 2024-Possibly at the Tech Center.

Meeting Adjourned-4:24 pm ET Day 2

REDAC Human Factors Subcommittee Meeting

DAY 1 – Tuesday, August 29, 2023

Time (EDT)	Presenters	Agenda Item	Duration
10:00 – 10:20am	Barbara Holder (ERAU) Bill Kaliardos (FAA)	Welcome / Opening Remarks	20 mins
10:20 – 11:00am	Chuck Perala (FAA)	FAA Core Flight Deck HF Research	40 mins
11:00 – 11:15am	All Attendees	Session Break	15 mins
11:15 – 12:00pm	Victor Quach (FAA)	NextGen Flight Deck Human Factors Research Portfolios	45 mins
12:00 - 1:15pm	All Attendees	Lunch Break	75 mins
1:15 - 1:30pm	Shelley Yak (FAA)	FAA Technical Center Director Remarks	15 mins
1:30 - 2:15pm	Bruce DeCleene (FAA)	Aviation Safety Research Strategy	45 mins
2:15 - 2:30pm	All Attendees	Break	15 mins
2:30 - 3:00pm	Jessica Brightman (FAA)	FAA UAS Beyond Visual Line-of-sight (BVLOS) Update	30 mins
3:00 - 3:20pm	Adam Hendrickson (FAA)	FAA UAS Detect-and-Avoid (DAA) HF Research	30 mins
3:20-3:30pm	All Attendees	Session Break	15 mins
3:30 - 4:00pm	HF Subcommittee	Action Items & Discussion	30 mins
4:00pm	All Attendees	Adjourn Day1	

DAY 2 – Wednesday, March 29, 2023

Time (EDT)	Presenters	Agenda Item	Duration
10:00 – 10:15am	HF Subcommittee	Subcommittee Discussion	15 mins
10:15 – 10:45am	David Newton and others (FAA)	Finding & Recommendation from Winter/Spring REDAC FAA Response on Advanced Vision Systems and Runway Safety	30 mins
10:45 – 11:00am	All Attendees	Session Break	15 mins
11:00 – 12:00pm	Karl Kaufmann (FAA)	FAA Air Traffic Human Factors Research Core and NextGen (Enterprise)	60 mins
12:00 - 1:15pm	All Attendees	Lunch Break- Meeting	75 mins
1:15 - 1:30pm	Thomas Kelly (FAA)	FAA Budget Overview	15 mins
1:30 - 2:00pm	Mitchell Bernstein (FAA)	FAA Advanced Air Mobility (AAM) "Innovate 28"	30 mins
2:00 -2:30pm	John Illson (Supernal)	Human Factors Research Considerations for AAM	30 mins
2:30 -2:45pm	All Attendees	Session Break	15 mins
2:45 – 3:15pm	Mark Nikolic (Joby Aviation)	Human Factors Considerations for Scaling AAM	30 mins
3:15-4:00	All Attendees	New F & Rs and Subcommittee Discussion	45 mins
4:00pm	All Attendees	Adjourn Day 2	

HF = Human Factors
F&R = Finding and Recommendation by REDAC
RED/RE&D = Research, Engineering, and Development
AVS = FAA Office of Aviation Safety
UAS = Unmanned Aircraft Systems
AAM = Advanced Air Mobility

Attendee List

Human Factors Subcommittee REDAC
Summer / Fall 2023
Tuesday August 29, 2023

Number	Participant Name	Participant Organization
1	Marlo E Allen	JMA Solutions (CTR)
2	Jack Barker	ALPA
3	Christina Shelly	FAA
4	Okoineme Giwa-Agbomeirele	FAA
5	Divya Chandra	Volpe
6	Alexandra Papantoniou	FAA
7	Jon Schleifer	FAA
8	LaTesha Holloman	Booze Allen Hamilton (CTR)
9	Todd Truitt	FAA
10	Chuck Perala	FAA
11	Chris Lawler	Cavan Solutions
12	Thomas A Van Dillen	FAA
13	Meredith Carroll	Florida Institute of Technology (FIT)
14	Kelene Fercho	FAA
15	Cheryl Quinn	NASA
16	David McKenney	MITRE CAASD
17	Phil Bassett	Cavan
18	Patrick Kong	FAA
19	Todd Lewis	FAA
20	Carolina Zingale	FAA
21	Heidi Kim	FAA
22	Jessica Cruit	Oasis
23	Angela Campbell	FAA
24	Jordan Sakakeeny	NASA ARC
25	Maura Lohrenz	Volpe
26	Andrea Sparko	Volpe
27	Jorge Fernandez	FAA
28	Wes Olson	MIT Lincoln Lab
29	Lauren J. Thomas	FAA
30	Sarah V. Ligda	FAA
31	Monique Moore	FAA
32	Tara Gibson	FAA
33	Carrie Smith	FAA
34	Rany Azzi	FAA

	Wes Ryan NGC	Northrop Grumman
36	Vicki Ahlstrom	FAA
	Deborah M Shaibe	FAA
38	Rebecca Morrison	RTCA
	Katrina Avers	FAA
40	Ian Johnson	FAA
	Adam Hendrickson	FAA
42	Kenneth Allendoerfer	FAA
	Florian Jentsch	University of Central Florida (UCF)
44	Carla Hackworth	FAA
	Justin Nelson	Air Force Research Laboratory
46	Joey Jaworski	FAA
	Elly Smith	MITRE CAASD
48	Ferne Friedman-Berg	FAA
	Blake Nguyen	University of Central Florida (UCF)
50	MaryAnn Bernacki	Diakon Solutions
	Andrew Cheng	FAA
52	Katie Constant-Coup	FAA
	Shelley Yak	FAA
54	Lisa Smith	FAA
	Kevin Williams	FAA
56	Tara (Holmes) Gibson	FAA
	Lisa Thomas	FAA
58	Angel Milan	Boeing
	Sabreena Azam	FAA

Human Factors Subcommittee REDAC
Summer / Fall 2023
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Number	Participant Name	Participant Organization
1	John Hansman	Massachusetts Institute of Technology (MIT)
2	Victor Quach	FAA
3	Thomas A Van Dillen	FAA
4	Marlo E Allen	JMA Solutions (CTR)
5	Jack Barker	ALPA
6	Christina Shelly	FAA
7	Divya Chandra	Volpe
8	Alexandra Papantoniou	FAA
9	Todd Truitt	FAA
10	Chuck Perala	FAA
11	LaTesha Holloman	Booze Allen Hamilton (CTR)
12	Vicki Ahlstrom	FAA
13	Jorge Fernandez	FAA
14	Tracy Streagle	FAA
15	Deborah M Shaibe	FAA
16	Chris Lawler	Cavan Solutions
17	Todd Lewis	FAA
18	Rebecca Morrison	RTCA
19	Ian Johnson	FAA
20	Michael Bartron	FAA
21	Rany Azzi	FAA
22	David McKenney	MITRE CAASD
23	Kelene Fercho	FAA
24	Alex Konkel	FAA
25	Jerry Crutchfield	FAA
26	Mandy Fiery	FAA
27	Phil Bassett	Cavan Solutions
28	Wes Olson	MIT Lincoln Lab
29	Heidi Kim	FAA
30	Carla Hackworth	FAA
31	Ferne Friedman-Berg	FAA
32	Tony D Darnell	FAA
33	Wes Ryan	Northrop Grumman
34	Carolina Zingale	FAA
35	Cheryl Quinn	NASA

36	Tara Gibson	FAA
	Rob Bastholm	FAA
38	Catherine M. Graham	FAA
	Scott McLellan	FAA
40	Matt Harmon	FAA
	Laura Wood	FAA
42	Monique Moore	FAA
	Andrea Sparko	Volpe
44	Patrick Kong	FAA
	Joseph M Jaworski	FAA
46	Katie Constant-Coup	FAa
	Katrina Avers	FAA
48	Kenneth Allendoerfer	FAA
	Adam Hendrickson	FAA
50	Andrew Cheng	FAA
	Justin Nelson	Air Force Research Laboratory
52	Phil Yeung	FAA
	Lisa Thomas	FAA
54	Braden M Tanner	FAA
	Brett S Torrence	FAA
56	Jamie Barrett	FAA
	Jason Demagalski	FAA
58	Tina Beard	NASA
	Adam Rhodes	FAA
60	Carrie A Roberts	FAA
	Sarah V. Ligda	FAA
62	Jon Schleifer	FAA
	Meredith Carroll	Florida Institute of Technology (FIT)
64	Jon Holbrook	NASA
	Mitchell Bernstein	FAA
66	Juksana Mai Ngam	FAA
	Mark Nikolic	Joby Aviation
68	Carrie Smith	FAA
	Elly Smith	MITRE CAASD