

# REDAC Subcommittee on Human Factors SUMMER/FALL 2021 | MINUTES

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**Meeting date** | *August 17-19, 2021*

**Meeting location** | *Remote (In-Person meeting cancelled due to COVID-19)*

**Purpose:** Review the Research, Engineering and Development (RE&D) accomplishments and expectations for FY21, and research plans through FY23.

**Tuesday, August 17, 2021**

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**Welcome / Introductions** | **Presenter** *Dr. Bill Kaliardos, Designated Federal Official (DFO)*

Dr. Bill Kaliardos introduced himself and welcomed the subcommittee and other attendees. The DFO reviewed the agenda and the meeting was called to order.

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**Update from Full Committee Meeting** | **Presenter** *Dr. Barbara Holder, HF Subcommittee Chair*

Dr. Barbara Holder began briefing the introductory slides. She provided an update from the Full REDAC Meeting (Winter/Spring 2021), including the two Human Factors (HF) Findings and Recommendations (F&Rs):

1. Human Factors for Aircraft Certification
2. Improving methods to determine individual proficiency of operational personnel

Dr. Holder explained the function of the REDAC committees as well as the various goals of the Human Factors REDAC meeting.

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**ACSSA Legislation – FAA HF Progress Update (W/S 2021 F&R\* #1)-(Summary)** | *Kathy Abbott, FAA Chief Scientific and Technical Advisor for Flight Deck Human Factors*

Kathy Abbott began the briefing on the Aircraft Certification Safety and Accountability Act (ACSAA) Sec. 126. Human Factors Research. Kathy briefed the subcommittee about the HF research requirements that are related to the ACSAA only. It is her understanding that management will commit to funding the research requirements related to this legislation. She asked a member of the Aviation Safety (AVS) Research and Development (R&D) Management Team, Doug Rodzon, to confirm that the intention is there to fully fund these research requirements. Doug confirmed, and briefed the committee on the funding aspects. Kathy provided a review of the requirements for the ACSAA related research projects which are: Pilot Training, Flight Deck Technology, Maintenance Training and HF in Policy and Processes. She also described possible future research that could support the International Civil Aviation Organization (ICAO) panel's working group on Automation Dependency among Pilots, of which Barbara Adams (AFS) is the FAA member. Kathy was asked to clarify what exactly was meant by Pilot Automation Dependency. A member had a question on what the FAA's role in the group is and how the other authorities will interact within the initiative. Kathy explained the ICAO panel and the 4 working groups. Another member had comments on the term "over-reliance", and another member commented that sometimes automation use is driven by operator policy, versus pilot discretion.

**Action:** Kathy will provide the ICAO working paper and Bill can distribute it to the team.

Kathy continued giving the overview of Pilot training research requirements. A comment was made about Pilot reliance on automation, Kathy said the group is looking into this and other data and they would like to make the study available. A member had a question about the performance times for the *Human Factors Considerations for Control Automation and Information Automation* project. Kathy mentioned work with Civil Aerospace Medical Institute (CAMI) is already funded to look at this. A member mentioned Boeing's assistance with the efforts with the Maintenance Training topic and asked if CAMI was leading it. Kathy answered yes, CAMI is leading the work. Kathy ended her briefing with the HF in Policy and Processes project.

Bill asked Barbara if this can be closed out, Barbara agreed.

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## **Break Time-2:15**

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

Bill introduced Dr. Victor Quach to brief the Subcommittee on the NextGen Air/Ground Integration HF research, which is also known as "NextGen Flight Deck Human Factors Research". He began with an overview of the Budget Line Item (BLI) before briefing the FY21 research accomplishments and ongoing and anticipated research in FY22 and beyond.

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

Dr. Chuck Perala briefed the Subcommittee on the Core Flight Deck HF research. He began with an overview of the BLI before briefing the FY21 research accomplishments and ongoing and anticipated research in FY22 and beyond. Barbara Holder asked Chuck if he could explain the focus of the Electronic Flight Bag (EFB) study. Chuck and others explained that there are various EFB related research projects both completed and ongoing (EFB Information, EFB Survey).

There was also a question about the General Guidance document "Human Factors Considerations in the Design and Evaluation of Flight Displays and Controls". It was clarified for the team that some of the current research that is ongoing is for Version 3.0 of the HF General Guidance Document, and the follow up research in the coming years might go into Version 4.0.

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## **Discussion of Flight Deck HF Research Gaps, and Homework Assignments-All**

Barbara asked the Subcommittee for comments, concerns or questions that can be put into an F&R. A member asked for future updates as research matured. Dave McKenney asked about the research on Warnings, Cautions and Alerts that was done years ago. Kathy clarified two studies; the Alerting system standardization study (about 30 years ago) on how to standardize alerts in the cockpit and another large study from 2010 by NLR, looking at accident cases to see pilot correct responses to failures. They are both available in digital form. Kathy thinks there can be more research done to standardize the functioning of the alerting systems, since alerting systems have become more sophisticated over the decades, and the operations have become more complex.

**Action:** Dave and Angel proposed an F&R on this. Kathy and Maggie concurred.

Dan mentioned the Air Traffic Control (ATC) study for new signaling systems for Air traffic, led by Keith Ruskin, and that there might be potential for sharing that with the group. Jack Barker asked about the three takeoffs and landings every 90 days and if that is still sufficient for pilot proficiency. Barbara had a question regarding the discussion around flight deck technology and multi-modal interaction and how that is aligned with Advanced Air Mobility design. For the next meeting, she would like a briefing on what New Entrants (e.g., Unmanned Aircraft Systems (UAS), Advanced Air Mobility (AAM)) HF research is being conducted or planned.

**Action:** FAA to provide a briefing at the next meeting on HF research for "New Entrants" such as UAS and AAM.

Dave concurs. Mike Feary said there is some work managed by the Tech Center, which he is conducting, related to new controls for vertical takeoff and landing (VTOL) aircraft.

Bill adjourned the meeting for the day at 4:00.

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## End of Day 1

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**Wednesday, August 18, 2021**

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### **FAA Budget Update | Presenter** *Elizabeth Delarosby, FAA RED Budget Analyst, Manager*

Bill and Barbara thanked everyone for their participation and opened Day 2 of the meeting by introducing Elizabeth Delarosby to brief the budget update. Elizabeth gave an overview of the financial information in her slides.

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### **Improved Methods of Determining Proficiency of Operational Personnel (W/S 2021 F&R\* #2) | Presenters,** *Bill Kaliardos, FAA, Dr. Beth Lyall-Wilson, Dave McKenney, MITRE and Nichola Lubold, Honeywell*

Bill opened up the discussion to the subcommittee on the second F&R from the last meeting in March, *Improved Methods of Determining Proficiency of Operational Personnel*. The discussion included the invited guest presenters from MITRE and Honeywell, since their research is related to the F&R. A member asked was there any work done for Maintenance and not just focused on the flight crew.

Bill introduced Nichola Lubold to provide a brief on Cognitive Skill Degradation. A question was asked about including Rasmussen's skills (in his skills-rules-knowledge taxonomy) based automated functions in the review. Maggie Ma asked a question about, if captains were rated in both A320 and 737 and also pointed out that it would be more helpful to have more pilots involved. Nichola clarified that one pilot walk thru was A320 and the other walk thru was for 737 but they both had extensive experience with other aircrafts. Maggie added another question about increased complexity and does it include unexpected events. Wes Ryan had a question about how the results will be used to feed back into system design (Kathy said that the research is sponsored by Flight Standards, but the results could also potentially be useful for Aircraft Certification). Kim Cardosi asked about how the response would differ if you had line pilots instead of expert pilots. Questions were asked about the different effects on proficiency based on being from different parts of the world, cognition levels between the captain and the second line pilot and also another question regarding the ICAO.

Bill introduced Dr. Beth Lyall-Wilson and Dave to give their briefing. Dr. Lyall-Wilson reviewed the Manual Flight Operations Proficiency project. Dave gave an update on Airline Interviews and Focus Groups. Beth then went over how to define Manual Flight Operations maneuvers, tasks, knowledge and skills. Phil Smith mentioned that research to emphasize that automation impacts not only the users but also the training programs.

The group was asked to review the recommendation and determine if this recommendation should be closed or if a more focused recommendation should be made. This topic was revisited later in the meeting, and it was determined that the research presented was very relevant, but that more target research is needed to meet the intent of the F&R. It was decided to close this F&R, and plan to reissue two new F&Rs targeted on proficiency and skill degradation: one for pilots, and one for air traffic operators.

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## Break Time - 1

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### ATC Human Factors Research, NextGen | Presenter *Karl Kaufmann, ATC NextGen HF Portfolio Manager*

Karl Kaufmann briefed the subcommittee on the NextGen “Enterprise” ATC Human Factors research. He began with an overview of the BLI before briefing the FY21 research accomplishments in addition to ongoing and anticipated research in FY22 and beyond. Chris DeSenti had a question about the “Charting Aviation’s Future” bullet point regarding analysis of the planned changes to ATC, and requested additional information on FAA’s plans.

**Action:** The Subcommittee may request a status briefing at the Winter/Spring 2022 REDAC meeting, to understand the Enterprise ATC plans regarding the FAA planning document, “Charting Aviation’s Future”.

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### ATC Human Factors Research, Core | Presenter *Dan Herschler, ATC Core HF Portfolio Manager*

Dan Herschler briefed the subcommittee on the Core ATC HF research. He began with an overview of the BLI before briefing the FY21 research accomplishments in addition to ongoing and anticipated research in FY22 and beyond.

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## Lunch Break – 2-The break was cancelled in order to stay on the timeline.

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### Discussion of ATC and Flight Deck HF Research Gaps, and Homework Assignments | *All*

Barbara started the discussion with the work that MITRE and Honeywell are doing regarding Proficiency. She inquired, if the recommendation be closed or is there more work that needs to be done in this area? Bill asked Phil if he wanted to speak on previous skill degradation research he has done with American Institutes for Research, which was primarily a broad look at the unintended human performance consequences of automation.

Phil gave a brief overview and sent out the following in the chat: “Reports relevant more generally to the impact of the introduction of automation on user performance”:

Smith, P.J. and Baumann, E. (2019). Human-Automation Teaming: Unintended Impacts and Mitigations for Degraded NextGen Operations.” <https://rosap.ntl.bts.gov/view/dot/43777>

Smith, P. J. (2018). Making brittle technologies useful. In P.J Smith and R.L. Hoffman (eds). Cognitive Systems Engineering: The Future for a Changing World. Boca Raton, FL: CRC Press, 181-208.

[https://www.researchgate.net/publication/346405624\\_Making\\_Brittle\\_Technologies\\_Useful](https://www.researchgate.net/publication/346405624_Making_Brittle_Technologies_Useful).”

Dan mentioned the interaction between fatigue and loss of skill proficiency. Chris commented on how he wanted to connect the brief to the overall spirit of the findings. Dave indicated the need to understand what skills the pilots really need and then apply the training to that. Bill wondered about rewriting a recommendation to particular functions rather than keeping it open to overall proficiency. Barbara inquired with the members about what they would like to do next. The mental model was discussed. Wes Ryan wanted to know what efforts are looking at degradation of skill and how automation can impact that.

**Action:** Barbara requested from the subcommittee, 2 new F&Rs, one for flight crew and one for air traffic so that the recommendation can be tailored more specifically to the research area.

Additionally, Barbara asked for volunteers to draft the recommendations. Chris DeSenti mentioned and initiated to draft the new F&R for ATC, with Phil and Steve Lang supporting the development. Chris Reed was assigned to draft the Flight

Deck F&R, with Dave, Barbara, and Jack Barker supporting the development. Barbara confirmed to close Winter/Spring 2021 F&R #2 and draft new ones.

Meeting adjourned. 4:09pm ET

## End of Day 2

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**Thursday, August 19, 2021**

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### **Update on Access to HF Research (W/S 2020 F&R\* #2)| Presenter *Bill Kaliardos***

Bill provided an update on the previous Action item which was making access to Human Factors Research more readily available. Bill asked Anthony Tvaryanas to give an overview of the Data Management Plans (DMP) for the research. Anthony spoke on how to comply with the DOT's data management policy. He recommends getting the Data Management Plans done before Quarter 1 and then archiving documents when the project is done to make them accessible. Bill asked about how contracts are written and the publishing of documents. Bill requested for the FAA Human Factors Division website ([www.hf.faa.gov](http://www.hf.faa.gov)) to be pulled up to show the group. Carla Hackworth mentioned the cost to doing this, there has to be infrastructure. Kenneth Allendoerfer pointed out why these are things we should be doing anyway. Bill informed the subcommittee know that this item has been closed out and this discussion was for informational purposes. Bill gave a brief overview of the website and the reports section and what is already being published.

### **Improved ATC Learning for Cross-facility Decisions (S/F 2020 F&R\* #1) | Presenters, *Bill Kaliardos, Philip Bassett, Cavan Solutions, Elizabeth Lacher, MITRE***

Bill discussed the recommendation from August 2020 for ATC Cross-Facility Learning and the TBO initiative updates.

Philip Bassett gave an overview of Regional Decision Making research that is currently being conducted within the NextGen ATC HF research portfolio. He suggested a standardized model as a baseline that is easier to train and easier to repeat. Karl Kaufmann asked for the difference in “collaborate” and “coordinate” in the way they are using these terms?

Bill introduced Elizabeth Lacher from MITRE to discuss the TBO Training Roadmap. She gave an overview of the TBO implementation training roadmap. She concluded by saying TBO and Traffic Flow Management needs to be included in the training for controllers. Phil Smith emphasized the important point of providing feedback to the operational staff. Dan concurred about the need for scenario based training, where people have a chance to practice decision making. Phil Bassett mentioned the emphasis on future training, and the need to monitor and train properly to standardize the process. Bill talked about the feedback and collaboration needed to figure out the right decisions. Do we have the ability to make improvements on the decisions? Elizabeth agreed and said the roadmap touches on those themes. Phil Smith noted that an emphasis of the subcommittee discussion was the importance of finding ways to provide effective feedback to the operation staff. Karl pointed out that Cavan Solution's decision model captures, in part, this feedback loop that Phil noted. Bill spoke on the issues mentioned in the F&R about feedback and improved learning, which will be covered in the research.

Barbara suggested that the research encompasses the spirit of the recommendation but she will defer to the ATC experts to see if it's sufficient or if it needs additional draft updates or continuation of the work. She asked the ATC members for their comments. Phil Smith said that the folks have done a nice job moving this forward so he is very happy with the response to the recommendation. Cheryl Quinn concurred and wants to be updated in the future. Chris DeSenti had a question about the roadmap slide. Elizabeth pointed out that there will be ongoing conversation that will be needed to

identify champions of the recommendations. Phil Bassett wanted to point out the emphasis on collaboration, on standardized process and the ability to simulate. Dan asked Phil Bassett if he had a chance to look at any past training on controller/crew resource training.

Bill suggested to close out this recommendation. Barbara concurred and mentioned that an update can be requested at the next meeting.

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## Break Time – back at 2:35pm ET

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### HF Subcommittee Emerging Issues | All

Barbara started the discussion on the Emerging Issues. Chinita Roundtree-Coleman pointed out this is just an update for this cycle. Bill reminded the members that the intent of all of this is for the FAA to hear from stakeholders on what is emerging, so we can stay ahead of the curve on research. Barbara began to summarize each area of the document.

Barbara proposed an **Action:** Get a brief from FAA on what UAS is doing in terms of flight deck HF research (consistent with the Action documented on Day 1).

The subcommittee discussed each area of the Emerging Issues document and the members offered many suggestions and edits to the bullet points.

**Action:** Barbara will edit the document and resend it to the group for review before it is resubmitted.

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### HF Final Subcommittee Findings and Recommendations, and Wrap-up | All

Barbara moved the group to a discussion on the F&R Chris DeSenti submitted on ATC proficiency. Chris briefed the members on his F&R. The subcommittee discussed and provided comments and suggestions to finalize the recommendation. It was suggested that getting it more focused and in plain language would be helpful.

Barbara moved the group onto the next F&R from Angel, Dave and Maggie on Alerting. The group discussed the F&R. Barbara will send it out to the subcommittee members so it can be reviewed offline.

**Action:** Barbara will send out the Flight deck version of the F&R for review once it is drafted and when Chris DeSenti is finished with the new draft for ATC, she can send that to everyone for review.

The subcommittee discussed the next meeting dates. The members agreed to August 16-17, 2022 for the Summer/Fall 2022 (March 23-25 2022 is already confirmed for the Winter/Spring meeting). Bill points out that 3 days might be necessary next August if the meeting is remote again.

The group reviewed a summary of ongoing HF-related research in or relevant to New Entrants such as UAS and AAM. The subcommittee agreed they would like more in-depth briefings on these various research items at a future meeting.

Bill and Barbara gave the closing statements and thanked everyone for attending.

## Meeting Adjourned-4:01pm ET

## Agenda

### DAY 1 – Tuesday, Aug 17, 2021

Time	Topic	Presenter
<b>1:00 ET</b> (30 min)	Welcome / Introductions	<b>Barbara Holder</b> , Honeywell, HF Subcommittee Chair; <b>Bill Kaliardos</b> , FAA Designated Federal Official (DFO)
	Update from Full Committee Meeting	<b>Barbara Holder</b> , HF Subcommittee Chair
	Opening Subcommittee Discussion	<b>All</b>
<b>1:30 ET</b> (45 min)	ACSSA Legislation – FAA HF Progress Update (W/S 2021 F&R* #1)	<b>Kathy Abbott</b> , FAA Chief Scientific and Technical Advisor for Flight Deck Human Factors
<b>2:15 ET</b> (15 min)	<b>Break</b>	
<b>2:30 ET</b> (60 min)	Flight Deck HF Research, NextGen	<b>Victor Quach</b> , FAA Flight Deck NextGen HF Portfolio Manager
	Flight Deck HF Research, Core	<b>Chuck Perala</b> , FAA Flight Deck Core HF Portfolio Manager
<b>3:30 ET</b> (30 min)	Discussion of Flight Deck HF Research Gaps, and Homework Assignments	<b>All</b>
<b>4:00 ET</b>	<b>End of Day 1 Session</b>	

### DAY 2 – Wednesday, Aug 18, 2021

Time	Topic	Presenter
<b>1:00 ET</b> (15 min)	FAA Budget Update	<b>Elizabeth Delarosby</b> , FAA RED Budget Analyst, Manager



<b>Time</b>	<b>Topic</b>	<b>Presenter</b>
<b>1:15 ET</b> (60 min)	Improved Methods of Determining Proficiency of Operational Personnel (W/S 2021 F&R* #2)	<b>Bill Kaliardos</b> , FAA <b>Beth Lyall and Dave McKenney</b> , MITRE <b>Nichola Lubold</b> , Honeywell
<b>2:15 ET</b> (15 min)	<b>Break</b>	
<b>2:30 ET</b> (45 min)	FAA ATC HF Research, NextGen	<b>Karl Kaufmann</b> , FAA NextGen Enterprise HF Portfolio Manager
	FAA ATC HF Research, Core	<b>Dan Herschler</b> , FAA ATC Core HF Portfolio Manager
<b>3:15 ET</b> (15 min)	<b>Break</b>	
<b>3:30 ET</b> (30 min)	Discussion of ATC and Flight Deck HF Research Gaps, and Homework Assignments	<b>All</b>
<b>4:00 ET</b>	<b>End of Day 2 Session</b>	

**DAY 3 – Thursday, Aug 19, 2021**

<b>Time</b>	<b>Topic</b>	<b>Presenter</b>
<b>1:00 ET</b> (15 min)	Update on Access to HF Research (W/S F&R* #2)	<b>Bill Kaliardos</b>
<b>1:15 ET</b> (45 min)	Improved ATC Learning for Cross-facility Decisions (S/F F&R* #1)	<b>Bill Kaliardos</b> <b>Philip Bassett</b> , Cavan Solutions <b>Elizabeth Lacher</b> , MITRE
<b>2:00 ET</b> (15 min)	<b>Break</b>	
<b>2:15 ET</b> (30 min)	HF Subcommittee Emerging Issues	<b>All</b>
<b>2:45 ET</b> (15 - 45 min, as needed)	HF Final Subcommittee Findings and Recommendations, and Wrap-up	<b>All</b>
<b>3:30 ET</b>	<b>Meeting Adjourned</b>	



**Attendee List****DAY 1 – Tuesday, Aug 17, 2021**

<b>Name</b>	<b>Organization</b>
Abigail Pasmore	ALPA
Adam Rhodes	NATCA
Al Secen	FAA
Angel Millan	Boeing
Barbara Holder	Honeywell
Bill Kaliardos	FAA
Carl Bernsten	Booz Allen Hamilton
Carla Hackworth	CAMI
Carrie Bell	FAA
Cathy Swider	FAA
Cheryl Quinn	NASA
Chinita Roundtree-Coleman	FAA
Chris DeSenti	MITRE
Chris Reed	Jet Blue
Chuck Peralá	FAA
Colleen Donovan	FAA
Dan Brock	FAA
Dan Herschler	FAA
Dave McKenney	MITRE
Doug Rodzon	FAA
Eddie Austrian	Fort Hill Group
Evan Harvey	Humanproof
Hannah Baumgartner	FAA
Ian Johnson	FAA
Jack Barker	ALPA
Jeff Dressel	FAA
Jon Schleifer	FAA
Jonathan Archer	FAA
Karl Kaufmann	FAA
Kathy Abbott	FAA
Kevin Comstock	ALPA
Kevin Siragusa	Fort Hill Group
Kevin Williams	FAA
Kim Cardosi	Volpe
Laudra Wood	
Maggie Ma	Boeing
Marlo Allen	JMA
Mike Feary	NASA
Phil Basset	Cavan Solutions
Phillip Smith	Ohio State University
Randy Mumaw	NASA
Rany Azzi	FAA
Russel Tokarski	FAA
Stephanie Kreseen	FAA
Steve Lang	Cavan Solutions
Tara Gibson	FAA
Terry McVenes	RTCA
Thomas Nesthus	FAA
Thomas Van Dillen	FAA
Victor Quach	FAA

**DAY 2 – Wednesday, Aug 18, 2021**

<b>Name</b>	<b>Organization</b>
Abigail Pasmore	ALPA
Al Secen	FAA
Angel Millan	Boeing
Barbara Holder	Honeywell
Beth Lyall-Wilson	MITRE
Bill Kaliardos	FAA
Carl Bernsten	Booz Allen Hamilton
Carla Hackworth	CAMI
Carrie Bell	FAA
Cheryl Quinn	NASA
Chinita Roundtree-Coleman	FAA
Chris DeSenti	MITRE
Chris Reed	Jet Blue
Chuck Peralá	FAA
Dan Brock	FAA
Dan Herschler	FAA
Dave McKenney	MITRE
Eddie Austrian	Fort Hill Group
Evan Harvey	Humanproof
Ian Johnson	FAA
Jack Barker	ALPA
Jason Demagalski	FAA
Jeff Dressel	FAA
Jonathan Archer	FAA
Karl Kaufmann	FAA
Kelvin Courtney	FAA
Kenneth Allendoerfer	WJHTC
Kevin Comstock	ALPA
Kevin Siragusa	Fort Hill Group
Kevin Williams	FAA
Kim Cardosi	Volpe
Laudra Wood	
Maggie Ma	Boeing
Mandy Fiery	FAA
Marlo Allen	JMA
Phil Basset	Cavan Solutions
Phillip Smith	Ohio State University
Rany Azzi	FAA
Russel Tokarski	FAA
Steve Lang	Cavan Solutions
Thomas Nesthus	FAA
Thomas Van Dillen	FAA
Victor Quach	FAA

**DAY 3 – Thursday, Aug 19, 2021**

<b>Name</b>	<b>Organization</b>
Al Secen	FAA
Angel Millan	Boeing
Barbara Holder	Honeywell
Bill Kaliardos	FAA
Carl Bernsten	Booz Allen Hamilton
Carrie Bell	FAA
Chandra Smith	FAA
Cheryl Quinn	NASA
Chinita Roundtree-Coleman	FAA
Chris DeSenti	MITRE
Chris Reed	Jet Blue
Chuck Perala	FAA
Colleen Donovan	FAA
Dan Brock	FAA
Dan Herschler	FAA
Dave McKenney	MITRE
Evan Harvey	Humanproof
Ian Johnson	FAA
Jack Barker	ALPA
Jeff Dressel	FAA
Jon Schleifer	FAA
Karl Kaufmann	FAA
Kathy Abbott	FAA
Kenneth Allendoerfer	WJHTC
Kevin Comstock	ALPA
Kevin Gildea	FAA
Kevin Siragusa	Fort Hill Group
Kim Cardosi	Volpe
Laudra Wood	
Maggie Ma	Boeing
Marlo Allen	JMA
Phil Basset	Cavan Solutions
Phillip Smith	Ohio State University
Rany Azzi	FAA
Steve Lang	Cavan Solutions
Thomas Van Dillen	FAA
Victor Quach	FAA