# Subcommittee on Human Factors WINTER/SPRING 2017 | MINUTES

**Meeting date | *March 28-29*, 2017**

**Meeting location | *NASA Ames, Moffett Field, CA***

**Purpose:** Review the R&D accomplishments for fiscal year 2017.
**Facilitator:** Dr. Sherry Chappell, DFO
**Note Taker:** Dr. Sherry Chappell, DFO

All releasable briefings can be found at: https://redacdb.faa.gov/browse.cfm.

**Meeting Minutes**

## Tuesday, March 28th, 2017

**Welcome and Overview of the Human Systems Integration Division | Presenter** *Alonso Vera, Chief, Human Systems Integration Division*

Alonso Vera provided an overview of the NASA Human Systems Integration Division. He explained that there were different branches of the division. The Human-Machine Interaction Branch is responsible for developing software for space systems. The Human Performance Branch has work in both space and aeronautics and makes up roughly 8-10% of the division's funding. Integration and Training is the largest branch in the division. It has many resources, including the Airspace Ops Lab, the UAS Traffic Management (UTM) Lab, UAS in the NAS program, and the Human-Centered Systems Lab. This branch is also responsible for the review of Aviation Safety Reporting System (ASRS) reports, and they have set up a similar reporting system for the Federal Rail Administration.

Alonso transitioned to an update on planning and scheduling in space, focusing on the Mars Rover. He explained that the Rover's 1st mission was not entirely planned in advance, as the rover is sophisticated to the point that it will analyze in real-time, moving toward scheduling by the people in space, rather than people on earth.

Alonso concluded with the topic of Human Performance, further describing labs that they have as resources (Human Vibration Lab, Fatigue Lab, Virtual Environments Lab). He finished by stating that the FAA has a large role in determining what comes of NASA research.

**National Aviation Research Plan (NARP) Redesign | Presenter** *Shelley Yak, FAA Director of William J. Hughes Technical Center, REDAC Co-Chair*

Shelly Yak briefed the committee on the redesign of the National Aviation Research Plan (NARP). She explained that there were different types of research funding: Airport Improvement Program; Research, Engineering, and Development; and Facilities and Equipment. The latter funds most of the NextGen projects and work at MITRE Center for Advanced Aviation System Development (CAASD).

She explained that the NARP is submitted yearly, and urged the committee to provide feedback. This feedback is necessary to develop a high-level research plan that outlines strategy that aligns with the FAA's mission. Shelly explained that out of the U.S. Government Accountability Office (GAO) audit came recommendations to make the NARP more forward-looking and that the prioritization process should be more transparent. The redesign of the NARP will be carried out by the Research Executive Board (REB) for February 2018. The goal is to receive feedback from the REDAC, then improve based on that feedback for 2019. Shelly stressed that we (Human Factors Subcommittee) must leverage knowledge from the FAA, academia, and interagency partnerships.

- Within the Research, Engineering, and Development Program are the following
  - Pavement
  - Airport & terminal
  - Air traffic management
  - Commercial space
  - UAS (Unmanned Aircraft Systems)
  - Fire safety
  - Aircraft structures
  - Propulsion & fuel systems
  - Digital systems
    - Hardware design
    - Cyber security
  - Weather
    - Forecasting
    - Better weather in cockpit
  - Icing
  - Cross-cutting across all of the above areas
    - Mission support
    - Human engineering
    - Cyber security
    - System safety management
    - Environment & energy/fuels

Shelly continued by explaining the goals of the research plan. Some of these goals include:

- Improving airport operations, air traffic & air space management capabilities
- Accelerating use of new aerospace vehicle & airport technologies
- Increasing infrastructure durability & resiliency
- Identifying emerging technologies & knowledge gaps

Shelly acknowledges that the FAA is not usually involved in the development of technologies, but there are instances where they have (e.g. fuel tank inerting; industry claimed it was too difficult). Finally, Shelly again urged the subcommittee for their feedback.

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**FY19 Requirements: ATC/TechOps Human Factors Efforts | Presenter** *Jason Demagalski, AJI Human Performance Manager*

Jason Demagalski briefed the committee on the FY19 Requirements for ATC/TechOps. He began by explaining that a current struggle was to balance the current demands for information with doing longer-term research. He admitted that the roundtable process was not yet where it needed to be. There are 30,000 people in the ATO and the Human Factors expertise is spread out among many different organizations. He explained that they were currently developing a team resource management course to be delivered where problems existed, but they want to make it available to everyone. They have produced a fatigue app called "Fully Charged" (www.fullychargedapp.com). They also have plans to utilize gaming to enhance ATC training, using games to build skills.

**Mixed Equipage Discussion, *F&R Fall 2016 Recommendation #1* | Presenters** *Kathy Abbott, Chief Scientific and Technical Advisor, Flight Deck Human Factors; Jason Demagalski, AJI Human Performance Manager*

Kathy Abbott and Jason Demagalski led a discussion on mixed-equipage, prompted by a recommendation from the previous REDAC meeting. They started by providing a brief overview on the topic, explaining that currently there was no Human Factors specific research on mixed-equipage, however, it was addressed as part of many research programs. For example, when air traffic procedures are being developed, the FAA looks at accommodating all types of aircraft and pilot qualifications. Flight standards give approval for operators to use a specific type of flight deck equipment; they then monitor operations to ensure there are no safety issues. In addition, the FAA closely monitors the implementation of new procedures.

They went on to explain the Lead Carrier Program, which involves working with the lead airline on a specific procedure at an airport. In evaluating new ATC procedures, simulations have mixed-equipage scenarios that look at the impact of low equipage and almost complete equipage. As new capabilities are being added they are looked at individually, as mixed-equipage as part of the development process. They went on to note that NAS Ops has a Finding and Recommendation (F&R) on mixed equipage, and this information should be leveraged. The subcommittee wants the FAA to be aware of this issue as new capabilities are being implemented. The presenters asked if the F&R could be closed, and the committee agreed that it could be closed. Certain committee members were tasked with developing another F&R.

**NextGen efficiencies increase with HF consultation or HF research, *F&R Fall 2016 Recommendation #4* | Presenter** *Stephanie Kreseen, Scientific & Technical Advisor for Human Factors*

Stephanie Kreseen briefed the committee on NextGen efficiencies increase with HF research. She explained that the HF team was looking at the Established on RNP at Seattle and Denver. The hope was that by doing this, the group will gain lessons learned from these pre-implementation sites. There are six different systems/procedures being developed for the time, speed and spacing tools. The group was also looking at contingency ops in degraded NextGen environments. Stephanie emphasized that involvement of Human Factors research must be done at the pre-implementation period. Post-implementation reviews should only apply to new equipment, not new procedures. Stephanie urged the committee to recognize this, and aid in the effort by continuing the dialogue on this topic. The committee can also contribute by taking a closer look at topics such as airspace restriction, weather, congestion, etc. Stephanie asked the committee if this F&R can be closed, and the committee agreed that it can be closed.

**NASA-FAA UAS Traffic Management (UTM) Research Transition | Presenter** *Tom Prevot, NASA Ames*

Tom Prevot briefed on the UAS Traffic Management (UTM) Research Transition. He began by explaining that this program was a joint NASA-FAA program. UTM is an air traffic management ecosystem for uncontrolled airspace. It is a separate, but complementary system to the air traffic management system. The initial focus is below 400 ft AGL in all but Class A airspace. He explained the conditions that surround the operation of a UAS, specifically for the operator. Communication, navigation, and surveillance all must be in place. The operator must register, then undergo training and qualify to operate the UAS. The operator must comply with airspace constraints, and avoid problematic weather. He went on to explain the regulator's role in this transition, that being able to define and inform the operators of airspace constraints, as well as facilitate collaboration among UAS operators so as to avoid conflicts.

Tom described a test that took place at UAS test sites for 13 flight hours by 14 operators. The test observed a number of conflict alerts, intruder alerts, flight conformance alerts for staying within airspace, priority ops, simulated contingency ops, and others. They acknowledged the major effect that conditions such as wind, temperature, and altitude have on UAS. Tom explained that the next test will have the UAS service supplier technologies & procedures integrating into NASA UTM.

## Wednesday, March 29th, 2017

**Budget Update | Presenter** *Mike Gallivan, Manager RE&D Financial Management*

Mike Galivan presented the budget update. The R, E&D FY 17 Budget Request was $167.5M. The agency was currently under a Continuing Resolution thru April 28, 2017. The agency was operating on a budget based on the FY 2016 appropriation. There were no new starts that were proposed in the FY 2017 Budget Request.

**AVS Research Prioritization Process, *F&R Fall 2016 Recommendation #3* | Presenter** *Mark Orr, AVS R&D Manager*

Mark Orr briefed the committee on the AVS Research Prioritization Process, starting by explaining that the FAA has coordinated with the technical sponsors of the research projects to ensure that the top priorities are addressed. The budget is specified by congress, and his group can move 10% of money in or out of BLIs as needed. The AVS research is applied research according to OMB. There are 3 criteria for evaluating research needs: 1) safety risk reductions, 2) gaps in regulation or policy; and 3) commitments the FAA has made (e.g. NTSB recommendations) or congressional demands.

Mark emphasized that with this money, the people are paid before any amount goes towards research. Under a Continuing Resolution (CR), the numbers from the previous year's budget are used, so a cut to a BLI continues through the CR. In the year of execution, unbudgeted research can be funded. A committee member questioned if the FAA is able to retain a core expertise that will support the important HF issues. They also separately asked if the FAA should identify areas that they have in-house expertise. A new F&R will be coming from this.

Mark asked the committee if this F&R can be closed, and the committee agreed that it should be closed.

**FY19 Requirements Flight Deck Core & NextGen | Presenter** *Kathy Abbott, Chief Scientific and Technical Advisor, Flight Deck Human Factors*

Kathy Abbott briefed the committee on FY19 Flight Deck Requirements for both Core and NextGen. Beginning with Core, Kathy explained that industry comes to the FAA to get approval, so research is necessary for Avionics & New Technologies to support guidance and regulations. Moving on to NextGen, a committee member asked if an F&R on NextGen Complexity would be helpful; the committee did not reach a consensus.

Kathy continued onto emerging issues, explaining that in 2019, there will be a new requirement to train pilots on monitoring. Europeans are requiring pilots to be trained in resilience/mental flexibility; Alonso mentioned that NASA has already introduced this as part of its selection process for astronauts. Kathy's team is currently looking at developing a new Advisory Circular (AC) on flight path management. The Pilot Controller Procedures and Systems Integration Working Group is looking at phraseology issues, including differences between ICAO & FAA. The

committee discussed whether there should be an F&R on resiliency/complexity in order to get funding from NextGen. The committee agreed that there should be and one would be drafted.

**FAA's UAS Human Factors Outreach Program, *F&R Fall 2016 Recommendation #2* | Presenters** *Stephen Plishka, Human Factors Engineer; Michelle Yeh, AIR R&D Manager*

Stephen Plishka and Michelle Yeh briefed the committee on the FAA's UAS Human Factors Outreach Program. At a UAS Symposium that week – Stephen provided UAS developers with the general guidance documents. Stephen will see about putting a link on the UAS website to the general guidance documents. Kathy Abbott has plans for a workshop on UAS Autonomy. A committee member asked if the FAA had a list of all the meetings on automation; Stephen answered saying he will check with his management. Stephen and Michelle asked the committee if this F&R can be closed; the committee agreed that it could be closed.

**Update on UAS HF Research, *Action Item #3* | Presenter** *Ashley Awwad, Scientific & Technical Advisor for Human Factors*

Ashley Awwad briefed the committee on the UAS Human Factors Research Plan. She explained that the current approach for UAS is a "clean slate" approach. They were not basing the control station design on manned aviation, as this was tried by the Air Force and was not shown to be a good approach. Leah will share the Air Force's findings on competencies for border patrol UAS pilots. A committee member asked if the research addresses ATC procedures as well; Ashley explained that it does not at this time. Stephen Plishka made a point that AFRL had done a lot of work on multiple UAS for a single operator; however, this did not get funded for FY19. He also noted that there was a NATO Panel looking at autonomy in this area.

**Aviation Safety Reporting System UAS Findings | Presenter** *Linda Connell, Director, Aviation Safety Reporting System*

Linda Connell briefed the committee on the Aviation Safety Reporting System (ASRS) as it related to UAS. She explained that all ASRS UAS reports go into the database. They then analyze the context of the UAS event, given the information in the report. They can do call-back studies for ~$75K/year. They also have the ability to create software that triggers another data collection if an ASRS report is filed on a certain topic.

**Flight Deck Task Management | Presenter** *Barbara Holder, Technology Fellow, Honeywell Aerospace*

Barbara Holder briefed the committee on a project for the FAA's Human Factors Division on Flight Deck Task Management. Task management was identified in the FltDAWG report as being a major factor in flight path management, both the strategic and tactical aspects of task management. The industry survey revealed that workload management was often taught instead of or in conjunction with task management. Currently, training on information management is viewed as important, but it is not in place. Another topic was that of disruption management. In her study, all operators visited had training on this; however, nominal disruptions are left to pilot judgement. They also learned that instructors need training on how to train and evaluate task management. She emphasized that effective task management balances workload & keeps pilots ahead of the aircraft.

Other notes:

- Kathy Abbott was to give a briefing on Distance Learning & Training Methodologies Research
    - Keep action item open

- Next meeting – Kim Cardosi will brief on their analysis on UAS ASRS study

In addition to the presentations, the subcommittee received the following demonstrations:

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| UAS Detect and Avoid Simulation | **Jay Shively,** Sub-Project Manager for DAA for UAS in the NAS |
| Demonstration UAS Traffic Management | **Tom Prevot,** Manager for UAS Traffic Management |
| Demonstration of NASA's Program for Real-Time Safety Monitoring | **Matt Daigle,** Indranil Roychoudhyru, and Lilly Spirkovska, Discovery and Systems Health |

## Attendees

## March 28, 2017

| NAME | COMPANY | |
|---|---|---|
| Kenneth Allendoerfer | FAA, WJHTC | |
| Jack Blackhurst | USAF | |
| Maureen Molz | FAA WJHTC | |
| Alan Jacobsen | Boeing | |
| Dan Herschler | FAA ANG-C1 | |
| Daniel Brock | FAA/Flight Deck | |
| Leah Rowe | USAF AFRL | |
| Chris DeSenti | MITRE | |
| Mark S. Orr | FAA, AVS R&D Mgr | |
| Paul Krois | FAA | |
| Alonso Vera | NASA | |
| Sherry Chappell | FAA | |
| Jimmy Bruno | FAA | |

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|---|---|---|
| Stephanie Kreseen | FAA | |
| Carla Hackworth | FAA | |
| Robert Barhydt | NASA | |
| Kim Cardosi | DOT/Volpe | |
| Kathy Abbott | FAA | |
| Tom Prevot | NASA | |
| Jason Demagalski | FAA | |
| Indranil Roychoudhury | NASA/SGT | |
| Wendy A. Okolo | NASA | |
| Lilly Spirkovska | NASA | |
| Matthew Daigle | NASA | |
| Chinita Roundtree-Coleman | FAA | |
| Barbara Holder | Honeywell | |
| David McKenney | ALPA | |
| Maura Lorenz | DOT/Volpe | **VIA TELEPHONE** |
| Regina Bollinger | FAA | “ “ |
| Carol Manning | FAA CAMI | “ “ |
| Roger ? | | “ “ |
| Phil Smith | OSU | “ “ |

| | | |
|---|---|---|
| Shelly Yak | FAA | **VIA TELEPHONE** |
| Ashley Awaad | FAA | “ “ |
| Carl Bertson | FAA Contractor | “ “ |
| Evan Harvey | FAA Contractor | “ “ |

**March 29, 2017**

| NAME | COMPANY | |
|---|---|---|
| Sherry Chappell | FAA | |
| Kathy Abbott | FAA | |
| David McKenney | ALPA | |
| Richard Barhydt | NASA | |
| Barbara Holder | Honeywell | |
| Chris DeSenti | MITRE | |
| Mark Orr | FAA | |
| Jimmy Bruno | FAA | |
| Jessica Nowinski | NASA | |
| Stephanie Kreseen | FAA | |
| Linda Connell | NASA AMES | |
| Jack Blackhurst | USAF | |
| Alan Jacobsen | Boeing | |
| Leah Rowe | USAF | |
| Kim Cardosi | DOT/Volpe | |

| | | |
|---|---|---|
| Maureen Molz | FAA | |
| Carla Hackworth | FAA | |
| Kenneth Alexander | FAA | |
| Dan Herschler | FAA | |
| Daniel Brock | FAA | |
| Paul Krois | FAA | |
| Evan Harvey | FAA Contractor | **VIA TELEPHONE** |
| Carl Bentson | FAA Contractor | “<br>“ |
| Michele Yeh | FAA | “<br>“ |
| Ashley Awaad | FAA | “<br>“ |
| Stephen Plishka | FAA | “<br>“ |

**Federal Aviation Administration REDAC Human Factors Subcommittee**

**NASA Ames Research Center, Bldg N262 Room 100, Moffett Field, CA**

Meeting Agenda, March 28-29, 2017

**DAY 1 – Tuesday, March 28, 2017**

Join WebEx meeting

Meeting number: 994 126 996
Host key: 515461
Meeting password: PG6XMTD$

| Time | Topic | Presenter |
|---|---|---|
| 8:00 am – 8:30 am | Pick up visitor badge/register vehicle at NASA Visitors Facility | |
| 8:30 am – 9:00 am<br>30 minutes | Welcome / Opening comments / Introductions | **Jack Blackhurst**, HF Subcommittee Chair<br>**Sherry Chappell,** DFO |
| 9:00 am – 9:30 am<br>30 minutes | Welcome & Overview of the Human Systems Integration Division | **Alonso Vera,** Chief, Human Systems Integration Division |
| 9:30 am – 10:00 am<br>30 minutes | National Aviation Research Plan (NARP) Redesign | **Shelley Yak,** FAA Director of William J. Hughes Technical Center, REDAC Co-Chair |
| 10:00 am – 10:30 am | Morning Break | 30 minutes |
| 10:30 am – 11:30 pm<br>60 minutes | FY19 Requirements ATC/TechOps and Center of Excellence Human Factors efforts | **Jason Demagalski,** AJI Human Performance Manager |
| 11:30 am – 1:00 am | Lunch | 90 minutes |
| 1:00 pm – 1:20 pm<br>20 minutes | Mixed Equipage Discussion<br>*F&R Fall 2016 Recommendation #1* | **Kathy Abbott,** Chief Scientific & Technical Advisor, Flight Deck Human Factors<br>**Jason Demagalski,** AJI Human Performance Manager |
| 1:20 pm – 1:40 pm<br>20 minutes | NextGen efficiencies increase with HF consultation or HF research<br>*F&R Fall 2016 Recommendation #4* | **Stephanie Kreseen,** Scientific & Technical Advisor for Human Factors |
| 1:40 pm – 2:25 pm<br>45 minutes | Demonstration of NASA's Program for Real-Time Safety Monitoring<br>*Action Item #4* | **Kai Goebel**, Tech Area Lead for Discovery and Systems Health |
| 2:25 pm – 2:40 pm | Afternoon Break | 15 minutes |
| 2:40 pm – 4:00 pm<br>80 minutes | NASA-FAA UAS Traffic Management (UTM) Research Transition | **Tom Prevot** |
| 4:00 pm – 4:45 pm<br>45 minutes | Demonstration UAS Traffic Management<br>Bldg N262 room H211 | **Tom Prevot** |
| 4:45 pm – 5:00 pm<br>15 minutes | Homework Assignments – Review of Action Items | **All** |
| Evening | Dinner – location TBD | **All** |

**Federal Aviation Administration REDAC Human Factors Subcommittee**

**NASA Ames Research Center, Bldg N262 Room 100, Moffett Field, CA**

Meeting Agenda, March 28-29, 2017

**Day 2- Wednesday March 29, 2016**

Join WebEx meeting

Meeting number: 993 062 538
Host key: 983767
Meeting password: YCCnXx@6

| Time | Topic | Presenter |
|---|---|---|
| 8:00 am – 8:20 am<br>20 minutes | Budget Update | **Mike Gallivan,** Manager, R,E&D Financial Management |
| 8:20 am – 9:00 am<br>40 minutes | AVS Research Prioritization Process<br>*F&R Fall 2016 Recommendation #3* | **Mark Orr,** AVS R&D Manager |
| 9:00 am – 10:00 am<br>60 minutes | FY19 Requirements Flight Deck Core & NextGen | **Kathy Abbott,** Chief Scientific & Technical Advisor, Flight Deck Human Factors |
| 10:00 am – 10:30 am | Morning Break | 30 minutes |
| 10:30 am – 11:00 am<br>30 minutes | Q&A/Finding and Recommendation Discussion | **All** |
| 11:00 am – 11:15 am<br>15 minutes | FAA's UAS Human Factors Outreach Program<br>*F&R Fall 2016 Recommendation #2* | **Stephen Plishka,** Human Factors Engineer<br>**Michelle Yeh,** AIR R&D Manager |
| 11:15 am – 11:45 am<br>15 minutes | Update on UAS HF Research<br>*Action Item #3* | **Ashley Awwad,** Scientific & Technical Advisor for Human Factors |
| 11:45 am – 1:15 pm | Lunch | 90 minutes |
| 1:15 pm – 2:15 pm<br>60 minutes | UAS Detect and Avoid Simulation<br>Bldg 243, DSRL Lab | **Jay Shively,** Sub-Project Manager for DAA for UAS in the NAS |
| 2:15 pm – 2:45 pm<br>30 minutes | Aviation Safety Reporting System UAS Findings | **Linda Connell**, Director, Aviation Safety Reporting System |
| 2:45 pm – 3:15 pm<br>30 minutes | Flight Deck Task Management | **Barbara Holder,** Technology Fellow, Honeywell Aerospace |
| 3:15 pm – 3:35 pm | Afternoon Break | 20 minutes |
| 3:35 pm – 3:55 pm<br>20 minutes | Distance Learning & Training Methodologies Research<br>*Action Item #9 & 10* | **Kathy Abbott,** Chief Scientific & Technical Advisor, Flight Deck Human Factors |
| 3:55 pm – 4:30 pm<br>35 minutes | Q&A/Findings and Recommendations Discussion/Wrap up-Homework Assignments-Review of action Items | **All** |
| EVENING | Networking – location TBD | |