Subcommittee on Human Factors Summer 2014 | MINUTES

Meeting date | *September 16 - 18, 2014*

Meeting location *TASC, 475 School Street, Washington, D.C.*

Purpose: Developing Strategic R&D Plan for the FAA

September 16, 2014 (Subcommittee Meeting on Human Factors)

Jack Blackhurst and Jason Demagalski welcomed the Subcommittee members.

Presentation REDAC R&D Vision | **Presenter** *Dennis Filler*

Dennis Filler welcomed the Subcommittee and proposed areas of focus for the optimization of Human Factors research. Dennis Filler identified human factors as cross-cutting all other domains, and emphasized that the subcommittee should seek to identify the future demands of humans in systems in order to maximize emerging technologies.

The Subcommittee discussed the following:

- Identification of the roles and responsibilities of humans in automation and decision-making.
- The need for applied human factors within the agency to ensure balance of task allocation between humans and technology and support for the purpose of the technology's implementation.
- Conveying the human factors benefits to stakeholders and benefactors in order to promote the understanding of human system interactions.
- Demystification of some common themes of human factors for sponsors and stakeholders.

Jack Blackhurst proposed subcommittee working sessions and meetings outside of the semi-annual REDAC in order to assist in the FAA in the development of a framework for human factors in the agency.

Presentation Roles and Responsibilities| **Presenter** *Cathy Bigelow*

Dr. Cathy Bigelow reviewed the Subcommittee roles and responsibilities to set the tone and framework for the meeting. The summer meeting provides an opportunity to develop a plan to support the FAA Administrator's Strategic Initiatives by assessing the long-term (10+ years) human factors research needs. This meeting will result in the development of two lists of topics important to the FAA: Emerging Issues and Future Opportunities as reflecting the human factors contribution. Dr. Bigelow stressed the importance of recommendations being clear and actionable.

The Subcommittee will produce a written report and brief results at the Fall Full REDAC.

Presentation Financial Update | **Presenter** *Mike Gallivan*

Mike Gallivan reviewed the RE&D FY 2014 budget status and future budget requests and out year targets. In FY14, the FAA received an appropriation of $158.792M. The request for FY15 is $156.75M, and for FY16, it is $160M.

The current FAA authorization runs through FY 2015. The FAA has started work on its proposed reauthorization bill. The scheduled date of the FY 15 budget presented to Congress is February 2, 2015.

At the request of the Human Factors REDAC Subcommittee, Mike provided charts and information on the FY10 to FY14 Human Factors RE&D and F&E funding levels.

Presentation Review of Human Factors Research Processes | **Presenter** Jason Demagalski

Jason Demagalski discussed the processes used for managing human factors research within the agency. The Human Factors Division ANG-C1 executes the Budget Process for the four Human Factors research BLI's in order to estimate, justify, and obtain the necessary funds to carry out the agency RE&D Mission and to ensure that the necessary research is conducted. This role is critical to allow the agency to conduct core and NextGen Human Factors Research. This presentation was to help the members understand the timescales of the research program to assist them in knowing where their guidance goes to influence the FAA research process.

Jason Demagalski discussed the four Human Factors Action Items assigned to ANG:
- Define the role of human factors
- Define a lexicon of key human factors terms
- Define and document the Human Factors Integration Lead
- Institutionalization of human factors

The Subcommittee discussed how the work completed on these action items can be utilized to expand human factors collaboration on future research within the agency.

Presentation Evolution of the ANG/ATO Strategy | **Presenter** Dino Piccione

Dino Piccione of the FAA Human Factors Division (ANG-C1) discussed the shift of the human factors research program towards increased focused on direct work with ATC/TO safety and training through utilization of input from the operational community. Personnel at facilities are requesting human factors be incorporated in training and operations, and human factors in continuing to integrate in research on high-impact problems.

The research program is focusing on the following strategic areas:
- Top 5 Hazards in the NAS
- Research to support Human Factors in the NAS
- Human Factors in major safety initiatives and Risk Based Decision Making
- Human Factors in policy decisions
- Human Factors in training effectiveness

The Subcommittee discussed these future research areas and the evolving nature of the strategic needs.

Presentation Integrated Control Structure Briefing | **Presenter** Dr. Rachel Seely

Dr. Rachel Seely, Acting Branch Manager of the Human Factors Division (ANG-C1), discussed the use of Control Structures as a means to demonstrate the effect of NextGen on Air Traffic Controllers and Tech Ops Specialists. The control structures use the Operational Improvements of NextGen and translate them to determine human factors implications on actors. This allows the proactive identification of potential human performance hazards introduced by new systems or procedures.

The output of the Human Factors Analysis provides:
- Comparison of increments to current operations
- Tasks impacted by changes proposed within increments
- Control structure showing interactions impacted by change
- Potential human performance hazards associated with change

This tool captures the role of the human in the system, and can be used in order to define the human factors support and influence on the agency's research and development initiatives. The subcommittee expressed interest in applying this tool to convey the role of humans in NextGen systems.

Presentation Human Factors Coordinating Committee Panel Discussion Brief out| **Presenter** *Bill Kaliardos*

Bill Kaliardos (ANG-C1) discussed the cross-agency panel discussion held at the Human Factors Coordinating Committee meeting held in July 2014. The panel sought to discuss human factors problems affecting multiple organizations in the FAA and ways to increase intra-agency collaborations. The panel featured participants from NextGen, ATO—Program Management/Acquisitions, ATO—Safety, ATO—Ops Concepts and Ops Requirements, and AVS.

The discussion highlighted that there is still much human factors analysis needed to assess human performance data, and input would benefit from formalized integration efforts including alignment of key human factors resources and capabilities.

The Subcommittee discussed opportunities to leverage and prioritize the use of human factors talent within the agency to increase engagement.

Presentation Suggested FAA Human Factors Challenges| **Presenter** *Jack Blackhurst*

Jack Blackhurst led a discussion of the following human factors challenge areas in the FAA:
- Certification of Unmanned Aerial System Control Stations
- Methodologies and Certification of Highly Automated Systems
- Efficient and Safe Distributed Collaboration Processes
- Ever Increasing System & Information Complexity
- Optimizing NextGen Capabilities against Role/Responsibility of Human

This discussion provided a framework for sub-committee discussions over the next few days, and established criteria for outlining topic areas. The Subcommittee concurred on a framework and criteria for evaluating research areas.

Jack Blackhurst also discussed FAA research issues and opportunities on a broad scale, and the potential human factors contributions.

Jack Blackhurst provided members with the inputs from Chris DeSenti, a Human Factors subcommittee member unable to attend the summer 2014 meeting.

Presentation OPTICS-Observation Platform for Technical and Institutional Consolidation of Safety research| **Presenter** *Paul Krois*

Paul Krois presented on Eurocontol's OPTICS project, which monitors the safety aspects of the Strategic Research and Innovation Agenda (SRIA), a roadmap of Europe's aviation vision for 2050. The OPTICS project seeks to determine whether the appropriate research for aviation safety is being completed in order to meet strategic goals. A series of four safety workshops, one specifically dedicated to human factors, have been held to elicit feedback on safety capabilities. Through the workshop, the following were determined to be the top priorities of human factors related research:
- Human Performance Envelope
- Human Factors in Design and Manufacturing
- Adaptive Automation
- Automation Support

The subcommittee discussed the use of the workshop to solicit these priorities using a representative group of expertise, and the alignment with coordinating both social and technological change.

Presentation Important Research Focus Areas: The View from OSU| **Presenter** *Phil Smith*

Phil Smith discussed several issues related to the introduction of new technology systems and the development of human factors solutions. An overarching and important consideration is that human factors solutions in old systems may not carry over to new systems, therefore collaboration will need to increase to deal with the new complexity. Good human-centered design practices must be incorporated into research, and any assumptions must be made explicit when modeling system interactions.

The Subcommittee discussed the following issues:
- Integrated management of airport surface and airspace constraints during convective weather
- Collaborative routing to support adaptive air traffic flow management
- Human factors issues in the design and use of RNAC/RNP routes

Presentation Human Factors Research Areas Discussion **Presenter** *Bill Rogers*

Bill Rogers proposed several areas for converging human factors research areas. The Subcommittee discussed the following areas for emerging human factors research and their relation to future FAA R&D.
- AAR-Authority, Autonomy, and Responsibility as a functional allocation problem
- Usability and Security of commercial products
- Proficiency and Training
- Information Management
- Industry Product Timelines

September 17, 2014

Review of Previous Day – Findings and Recommendations Discussion

The Subcommittee discussed the generation of the complete list of human factors research issues and opportunities. The last day of the meeting will be used to create the finalized list, and identify a strategy for the human factors community for the future and the support that will enable it.

Presentation NASA Aeronautics Research Strategic Analysis, Vision, and Program Planning | **Presenter** John Cavolowsky

John Cavolowsky, Director, NASA Airspace Operations and Safety Program, presented on the NASA Aeronautics Research Mission Directorate Strategy & Vision, Six Strategic Thrusts, and FY15 Program Organization.

John Cavolowsky provided an overview of NASA's approach to creating the Research Strategic Plan, and the use of Strategic Trend Analysis to set a framework for portfolio development. He emphasized the importance of regulation providing oversight to technological innovation while enabling evolution.

The Subcommittee discussed the following:

- NASA's identification of three "mega-drivers" that will change the face of aviation over the next 20 years: Global Mobility, Environmental Challenges, and Technology Convergence.
- NASA's organization of research portfolios into Six Strategic Thrust areas: Safe, efficient growth in global operations, Innovation in commercial supersonic aircraft, Ultra-efficient commercial transports, Transition to low-carbon propulsion, Real-time, system-wide safety assurance, Assured autonomy for aviation transformation

The Subcommittee also discussed NASA's increased efforts to work with FAA at early stages in concept development through research transition teams and roadmap development. There is opportunity within their program structure for program development.

Presentation FAA REDAC Human Factors R&D Recommendations | **Presenter** Tom Prevot

Tom Prevot presented on subject areas for Human Factors R&D. Tom Prevot discussed the findings from his poll of NASA researchers for input on the Top 5 human factors challenges the FAA may face in the next 10 years. The Subcommittee discussed the following areas identified by Tom Prevot:

- Systems design, engineering, procedures and training for human/automation teaming
- In-service performance evaluation and human factors analysis of operational improvements
- Transition to increasingly autonomous systems
- Complex systems: containment, standards, verification, validation and certification
- Providing a pathway for commercial applications and consumer electronics

Presentation Thoughts on Emerging Human Factors Issues/Opportunities | **Presenter** John Hansman

John Hansman presented on Human Issues areas in the NextGen Change Process. The Subcommittee discussed the following areas identified by John Hansman:

- Impact of proliferation of non-certified devices and decision support aids in cockpits and ATC
- Data mining human factors performance
- Rapid evaluation and approval of advanced procedures
- Psychological issues associated with perception of aircraft noise
- Operator interactions in potential UAV con-ops
- Debunking the automation myth

The Subcommittee discussed the optimal usage of HITLs in research.

Presentation Today's Human Factors Challenges, Tomorrow's Vision | **Presenter** *Kathy Abbott*

Kathy Abbott presented an update to the briefing provided at the Flightpath 2050 workshop held by Eurocontrol in July to discuss Europe's vision for aviation. The presentation covered the challenges identified for the future of aviation safety and the perceptions of acceptable risk in aviation.

The Subcommittee discussed the following challenges to aviation human factors presented by Kathy Abbott: Increase in knowledge and skills needed, Human Factors is much more than

research, Human Factors workforce, Integrating Human Factors into every aspect of aviation, Changing operator roles, Automation/autonomy.

The subcommittee discussed the increases in the set of information that pilots and controllers are expected to know. Additionally, the mediums and tools used to convey this knowledge need to be addressed using neutral research that will improve integration. The subcommittee suggests increased exploration of new training methods and simulations.

The subcommittee discussed the usage of available safety data in order to extrapolate human performance related information. Parameters should be developed in order to quantify the human performance data for analysis purposes.

Presentation Gulfstream Human Factors Presentation| **Presenter** *Susan Taylor*

Susan Taylor presented on human factors engineering in Gulfstream flight deck development and certification. Susan Taylor discussed the safety and customer needs drivers for Gulfstream technology development. Human factors engineering in Gulfstream resides within systems engineering and is applied within all new programs.

Susan Taylor discussed the benefits of standardizing human factors engineering methods, and the challenges to and recommendations for the standardization process. The Subcommittee discussed the following challenge areas to human factors engineering integration:
- Industry acceptance of human factors engineering role as integral to aircraft development
- 25.1302 compliance, Human Error Analysis difficult to standardize
- Simulation methods reduce prototyping and flight test time
- Crew workload testing
- Staffing qualified HFEs

Presentation Human Factors Research Issues and Opportunities| **Presenter** *Alan Jacobsen*

Alan Jacobsen presented on the following human factors research areas/drivers. The Subcommittee discussed the following areas identified by Alan Jacobsen:
- Changing pilot demographics and demand for new pilots
- Changing pilot tasks
- Increases in system complexity
- Growth in new and emerging technologies
- Emerging safety risks

Presentation Human Factors Research Issues and Opportunities**| Presenter** *Dave McKenney*

Dave McKenney discussed current and emerging issues in human factors research.
The Subcommittee discussed the following emerging issues identified by Dave McKennney:

- Improving pilot performance in line operations in order to develop new/improved Training Devices, Methodologies, and instructor skills for current and future technology, including addressing the effects of automated systems.
- Properly designing and delivering Distance Learning, and provide specific guidance to POI's and operators on how to effectively develop, deliver, and measure pilot performance for desired training and operational outcomes.
- Development and approval process for properly designing and incorporating Information Automation / EFB into the flight deck so it improves pilot performance.
- Effects of current and future automated systems on existing Crew Resource Management (CRM) practices and training and how CRM training should be modified in order to improve pilot and crew performance during line operations.
- Improving the pilot (aircraft) – air traffic integration efforts to synergize communication and training to achieve harmonization and improved performance between the different NAS components.

The Subcommittee discussed the following future areas related to Human Factors where R & D could benefit the FAA identified by Dave McKennney:

- Simplifying Flight Deck design and make it more human-centric, reducing complexity with respect to operating the aircraft in the NAS.
- Understanding the Human Performance Envelope and how to measure human performance.
- Developing a human factors framework for incorporating new technology into the existing NAS or NextGEN.
- Developing a human factors framework for managing change that improves or maintains resilience in the system.
- Effective Synergy of Human/Automated Systems

September 18th, 2014

Review of Previous Day – Findings and Recommendations Discussion

The Subcommittees discussed the homework assignments from the previous day. Subcommittee members were assigned a research area and asked to describe potential future issues and opportunities within the areas as relating to human factors. The focal points for Day 3 are: Review of action items and previous recommendations, generate the final list of Top 5 research issues, and determine future Subcommittee operations.

Committee Operations Discussion
- The Subcommittee identified the week of February 23rd (2/24-2/26) for the Spring Human Factors Subcommittee Spring 2015 meeting. The location is TBD.
- The Subcommittee discussed expanding the representation within the group to potentially include additional stakeholders or discipline areas. The chair will contact the subcommittee members for thoughts on membership
- The Subcommittee was in agreement for meeting and working group sessions outside of the bi-annual REDAC Subcommittee meetings.

Findings and Recommendations and Action Item Discussion
- Discussions and drafting occurred of findings, recommendations and actions at the Summer 2014 Human Factors REDAC Subcommittee
- A discussion and review of the following outputs from previous meetings took place to establish the current status of each
    - Human Factors REDAC Subcommittee Recommendation from Fall 2012, Spring 2012, Fall 2013, Spring 2013, and Spring 2014.
    - Action list of the Human Factors REDAC Subcommittee Recommendation.

- Rachel Seely will provide a briefing on the HSI Roadmap and Control Structures at the February meeting to show interactions between actors in systems. The Subcommittee will discuss research strategy for UAS at the February meeting.
- The Subcommittee is interested in overviews or research products resulting from group member action item completion. The Subcommittee will seek to create agenda blocks at future meetings to update the group on research products.

Action items	Person responsible	Deadline
The Human Factors REDAC Subcommittee has generated a list of Top 5 emerging research issue areas. The Subcommittee would like to review the outcomes and results of this task and future steps.	Dennis Filler	2/26/2015
Brief Human Factors Subcommittee on the current state of NextGen and the relationship to the ATO/ANG Top 7.	Rachel Seely	2/26/2015
Provide a research to reality/strengths and benefits briefing at Spring 2015 meeting and make this a standard inclusion at future meetings.	Rachel Seely	2/26/2015

Presentation Top 5 Research Issues and Opportunities | *Jack Blackhurst*

Jack Blackhurst facilitated the discussion to identify the Subcommittee's list of emerging Human Factors research areas for the FAA's Strategic R&D Plan.

The Subcommittee generated a list of Human Factors research areas that will be presented to the full the October REDAC Committee.

Presentation Wrap Up | **FAA DFO** *Jason Demagalski*

Thanks were also given for the time and support of all the members of the Subcommittee.

The FAA DFO adjourned the meeting at 1pm.

Meeting Attendance

Members

Jack Blackhurst
John Hansman
Alan Jacobsen
David McKenney

Tom Prevot
Bill Rogers
Phil Smith

Member Apologies

Chris DeSenti

Other Attendees

Dennis Filler, FAA
REDAC DFO

Jason Demagalski, FAA
HF REDAC Subcommittee DFO

Kathy Abbott, FAA
Dan Brock, FAA
Cathy Bigelow, FAA
John Cavolowsky, NASA
Kevin Comstock, ALPA
Mike Gallivan, FAA
Dan Herschler, FAA
Bill Kaliardos, FAA
Jim Knight, FAA
Paul Krois, FAA
Carol Manning, FAA
Tom McCloy, FAA
Tom Nesthus, FAA
Monique Norris, FAA

Jessica Nowinski, NASA
Lee Olson, NASA
Mark Orr, FAA
Dino Piccione, FAA
Ashley Reives, TASC
Sam Rozier, CSSI
Chinita Roundtree-Coleman, FAA
Andrea Schandler, FAA
Rachel Seely, FAA
Cathy Swider, FAA
Paul Tan, FAA
Susan Taylor, Gulfstream
Michelle Yeh, FAA

Phone Attendees

Kenneth Allendoerfer, FAA
Regina Bolinger, FAA
Carla Hackworth, FAA
Kerin Olson, FAA

FAA REDAC Subcommittee on Human Factors

(Summer 2014) Meeting Agenda – September 16-18 2014

TASC Conference Room A, 475 School Street SW, Washington, DC 20024

Web meeting information - https://global.gotomeeting.com/join/943118701

Dial +1 (213) 493-0602

Access Code: 943-118-701

Audio PIN: Shown after joining the meeting

Meeting ID: 943-118-701

Day 1 (Tuesday September 16)

08:30 - 09:00	Welcome Opening Comments Introductions	Jack Blackhurst Jason Demagalski
09:00 - 09:15	Roles and Responsibilities	Cathy Bigelow
09:15 - 09:45	Financial Update	Mike Gallivan
09:45 - 10:30	Review of FAA Human Factors Research Processes Human Factors Action Items Evolution of the ANG/ATO Strategy	Jason Demagalski Rachel Seely Dino Piccione
10:30 - 10:45	Coffee Break	All
10:45 - 11:15	Integrated Control Structure Briefing	Rachel Seely
11:15 - 11:45	Human Factors Coordinating Committee Panel Discussion Brief out	Bill Kaliardos

Time	Activity	Presenter
11:45 - 12:45	Lunch	All
12:45 - 13:45	Review of Findings and Recommendations & Actions	All
13:45 - 14:30	REDAC Member Presentation/Discussion	Jack Blackhurst
14:30 - 15:15	OPTICS Briefing	Paul Krois
15:15 - 15:30	Coffee Break	All
15:30 - 16:00	REDAC Member Presentation/Discussion	Phil Smith
16:00 - 16:30	REDAC Member Presentation/Discussion	Bill Rogers
16:30 - 17:00	Wrap up – Homework Assignments	Jack Blackhurst

Day 2 (Wednesday September 17)

Time	Activity	Presenter
08:30 - 09:00	Review of Previous Day	Jack Blackhurst
09:00 - 10:00	NASA Presentation	John Cavolowsky
10:00 - 10:30	REDAC Member Presentation/Discussion	Tom Prevot
10:30 - 10:45	Coffee Break	All
10:45 - 11:15	REDAC Member Presentation/Discussion	John Hansman
11:15 - 11:30	Coffee Break	All
11:30 - 12:30	Presentation from AVS HFCC	Kathy Abbott
12:30 - 13:30	Lunch	All
13:30 - 15:00	Gulfstream Human Factors Presentation	Susan Taylor
15:00 - 15:15	Coffee Break	All
15:15 - 15:45	REDAC Member Presentation/Discussion	Alan Jacobsen

15:45 - 16:15	REDAC Member Presentation/Discussion	Dave McKenney
16:15 - 16:45	Wrap up – Homework Assignments	Jack Blackhurst
18:30	**DINNER SOCIAL**	**All Invited**

Day 3 (Thursday September 18)

08:30 - 09:00	Review of Previous Day	Jack Blackhurst
09:00 - 10:30	Discussion to identify Top 5 Future Research Issues	All
10:30 - 10:45	Coffee Break	All
10:45 - 12:!5	Discussion to identify Top 5 Future Research Issues	All
12:15 - 12:45	Assignments and Next Steps	Jack Blackhurst
12:45 - 13:00	Closeout of HF Subcommittee	Jason Demagalski