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 Eurocontrol’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.
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

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 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.
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

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.

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

- 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 McKenney:

- 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
  o 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.
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.

Brief Human Factors Subcommittee on the current state of NextGen and the relationship to the ATO/ANG Top 7.

Provide a research to reality/strengths and benefits briefing at Spring 2015 meeting and make this a standard inclusion at future meetings.

**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](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)**

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<thead>
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<th>Time</th>
<th>Activity</th>
<th>Presenter(s)</th>
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</table>
| 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 |
### Day 1 (Monday September 15)

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<thead>
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<th>Time</th>
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<tr>
<td>11:45 - 12:45</td>
<td>Lunch</td>
<td>All</td>
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<tr>
<td>12:45 - 13:45</td>
<td>Review of Findings and Recommendations &amp; Actions</td>
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<td>13:45 - 14:30</td>
<td>REDAC Member Presentation/Discussion</td>
<td>Jack Blackhurst</td>
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<tr>
<td>14:30 - 15:15</td>
<td>OPTICS Briefing</td>
<td>Paul Krois</td>
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<tr>
<td>15:15 - 15:30</td>
<td>Coffee Break</td>
<td>All</td>
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<tr>
<td>15:30 - 16:00</td>
<td>REDAC Member Presentation/Discussion</td>
<td>Phil Smith</td>
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<td>16:00 - 16:30</td>
<td>REDAC Member Presentation/Discussion</td>
<td>Bill Rogers</td>
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<tr>
<td>16:30 - 17:00</td>
<td>Wrap up – Homework Assignments</td>
<td>Jack Blackhurst</td>
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### Day 2 (Wednesday September 17)

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<tr>
<td>08:30 - 09:00</td>
<td>Review of Previous Day</td>
<td>Jack Blackhurst</td>
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<td>09:00 - 10:00</td>
<td>NASA Presentation</td>
<td>John Cavolowsky</td>
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<td>10:00 - 10:30</td>
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<td>10:45 - 11:15</td>
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<td>11:30 - 12:30</td>
<td>Presentation from AVS HFCC</td>
<td>Kathy Abbott</td>
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<td>12:30 - 13:30</td>
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<td>16:15 - 16:45</td>
<td>Wrap up – Homework Assignments</td>
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<td>18:30</td>
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**Day 3 (Thursday September 18)**

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<td>Jack Blackhurst</td>
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<td>09:00 - 10:30</td>
<td>Discussion to identify Top 5 Future</td>
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<td>Research Issues</td>
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<td>10:30 - 10:45</td>
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<tr>
<td>10:45 - 12:15</td>
<td>Discussion to identify Top 5 Future</td>
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<td>Research Issues</td>
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<tr>
<td>12:15 - 12:45</td>
<td>Assignments and Next Steps</td>
<td>Jack Blackhurst</td>
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<tr>
<td>12:45 - 13:00</td>
<td>Closeout of HF Subcommittee</td>
<td>Jason Demagalski</td>
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