EMBRY-RIDDLE Aeronautical University

FAA REDAC Subcommittee on Human Factors

Findings and Recommendations

Winter/Spring 2024

Barbara E. Holder Ph.D., FRAeS

April 17, 2024

Subcommittee on Human Factors Winter/Spring Meeting

Held at FAA Headquarters
March 28-29, 2024

- Opening Remarks, Deputy Director Eric Neiderman
- Flight Deck Human Factors Research Portfolios
- FAA Budget Update
- ATC Human Factors Research Portfolios
- Review FAA responses to prior F&Rs
- Invited Presentation, Mr. Bruce DeCleene, AVS Research Strategy

Meeting Outcomes:

- 2 Findings and Recommendations
- 1 Action
- 3 Observations

Advanced Flight Deck Alerting Systems

Finding: The REDAC Human Factors Subcommittee was delighted to see that under Operational Capabilities for Advances and Innovation in New Technologies and Operations, a new project is proposed to develop *Design Standards for New and Advanced Alerting Systems*. This research was planned to commence mid-2024 and finish in late 2025 and was supported by the Human Factors Subcommittee's recommendation at a prior Winter/Spring 2022 meeting. However, this project is no longer confirmed for funding.

Due to the complexity of this challenging research, it is anticipated the project may take several years to complete. Complexity increases with the integration of the alerting capabilities with other systems and technologies such as Head Up Displays, Head Worn Displays, Artificial Intelligence, etc. Complexity also increases as new technologies and new aircraft are developed. With new aircraft on the horizon, there is an urgent and timely need for updated guidance that accounts for new forms of information integration and utilization of advanced technologies.

Advanced Flight Deck Alerting Systems

Recommendation: Due to the criticality and urgency for guidance and design standards for new and advanced crew alerting systems, the Human Factors Subcommittee recommends this project be assigned high priority to ensure research begins in a timely manner to meet industry and FAA needs. The project should also include the participation of a consortium of experts (e.g., Original Equipment Manufacturers, Suppliers, Academia, Airline operators, Pilots, etc.) to ensure the needed industry expertise is utilized in the research.

Consequences: The current guidance for flight deck alerting systems is woefully out of date. Without new guidance to develop effective advanced alerting systems, the FAA and industry will have to work the issues simultaneously as they develop these systems. This could potentially result in divergent standards and designs that could impact safety and certification standards.

Aviation Maintenance Training Projects

Finding: The subcommittee commends the FAA for introducing and funding several research projects focused on aviation maintenance training. These projects will identify knowledge, skills, and experience gaps that may have contributed to maintenance-related accidents and incidents in global transport category aircraft accidents from 2010-present. The suite of projects will also identify the training and operational policies/procedures needed to address gaps in existing FAA guidance and identify ways to design effectively for maintainability. The subcommittee believes these projects provide a good balance of investment across work groups in the portfolio.

EMBRY-RIDDLE Aeronautical University

Aviation Maintenance Training Projects

Recommendation: The subcommittee recommends the FAA continue to invest in maintenance human factors and to prioritize these planned projects to ensure that support for improvements in aviation maintenance is realized and that these projects are commenced in a timely manner.

Consequences: This research is long overdue, and without it the FAA will not have the needed information to create appropriate guidance for existing operations and new guidance for new aircraft.

Action: Briefing on integration of Artificial Intelligence/Machine Learning (AI/ML) into FAA software and systems

The REDAC Human Factors Subcommittee requests a briefing by ANG-C5 at its next meeting on the results of the FAA's analysis of the opportunities and issues associated with the integration of Artificial Intelligence/Machine Learning (AI/ML) into FAA software and more generally into software to improve performance within the aviation system, such as in flight deck systems. The subcommittee wishes to understand the FAA's perspective on the types of aviation applications that may benefit from such technologies and to identify how different underlying AI/ML implementations could support such uses of these technologies. The subcommittee specifically requests the briefing include the human factors considerations for technology selection and the specification of functional and interface design requirements, as well as design and development methods. For example, what are the human factors considerations being considered for integration into safe and effective human-centered system designs and the human-automation interactions within an overall workflow with associated procedures? The insights from this briefing should help the Subcommittee consider future research needs associated with the use of AI/ML technologies for aviation applications.

Observation 1: AVS Research Strategy and Human Factors

The Subcommittee received a briefing on the Aviation Safety (AVS) research strategy. After reviewing the AVS portfolio, it became apparent to the Subcommittee that the new process for deciding project funding and prioritizing research introduced discontinuities in the timing for and funding of several Human Factors projects that were already approved. As a result of this process, the human factors planned research projects are unconfirmed making it challenging for the subcommittee to advise on that portfolio. Mr. DeCleene asked the Subcommittee to provide its preferred prioritization of the projects and specify projects that are high/low priority and to identify research gaps.

Observation 1: AVS Research Strategy and Human Factors continued…

However, the Subcommittee felt that without the full background and rationale for each project it would be inappropriate to definitively prioritize the list of projects. The Subcommittee suggests the FAA consider the following guidance as they finalize the decision process for those projects that are under consideration.

The full set of projects merit careful consideration and the FAA should provide insight and justification into each research projects such as:

- Issues/Concerns to be addressed and their timeliness;
- Current metrics of incidents/reports on human factors issues and concerns;
- Plan to identify gaps or degradation in human factors metrics;
- How the research would reduce the issue or concern

The Subcommittee suggests that the FAA provide full transparency into the project prioritization process including the rationale for human factors project prioritization.

EMBRY-RIDDLE Aeronautical University

Observation 2: Flight Deck and Air/Ground Information Integration

The subcommittee observed the FAA previously recognized the importance of investigating information integration from multiple sources and its presentation on the flight deck, by conducting preliminary research on the differentiation of certified and uncertified information presented to the pilot. However, that work has concluded, and despite the prominence of the "connected aircraft" concept in the FAA's vision, there's no ongoing work, proposed for several years to address the challenge of integrating offboard information from multiple sources with onboard information into the flight deck operational environment. With the proliferation of mobile devices and various "apps", and, already finding their way onto the flight deck, as well as the long lead time required to understand the safety implications of integrating new information into flight operations, the subcommittee strongly suggests the FAA continue progress in this area. Concurrently, it appears that the proposed work in the Air/Ground integration portfolio is also stalled without research planned on information integration. The subcommittee is concerned that information integration needs for air and ground will not be considered in time to meet the industry's needs.

Observation 3: Training and Checking Program Changes

After discussions with the FAA at the FY24 Winter/Spring meeting, the subcommittee understands that the FAA has determined that the situation described in our previous S/F 23 Finding and Recommendation 4, *Training and Checking Program Changes due to Changing Pilot Entry-Level Experience,* does not suggest a research need, but agreed that the issue raised is a concern.

The subcommittee observes that this issue, is a clear and present concern and suggests that the FAA give it due attention internally, even if new research is not deemed necessary to address it. The objective of this effort would be to proactively manage emerging risks in the system rather than being reactive to events when they arise.

EMBRY-RIDDLE Aeronautical University

Upcoming Meetings

Summer/Fall: August 20-21, 2024

Winter/Spring: March 25-26, 2025