# FAA REDAC Subcommittee on Human Factors

# Findings and Recommendations

# Summer/Fall 2022

Barbara E. Holder Ph.D., FRAeS

EMBRY-RIDDLE
Aeronautical University

# Subcommittee on Human Factors Summer/Fall Meeting

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- Meeting was held virtually on August 16-17, 2022
- Reviewed research accomplishments and anticipated research in FY23
  - 4 HF BLIs
  - NextGen Portfolio renamed HF Flight Deck/Maintenance/Systems Integration
- Subcommittee appreciated the improved format and presentation of material
- Subcommittee appreciated its input is reflected in planned portfolios
- Reviewed 3 F&Rs and 5 Actions
- Obtained feedback on UAS/AAM Tasking

# Finding and Recommendation 1

**Finding: Competency-Based Training for Maintainers**

- The Subcommittee received a briefing on FY2022 Flight Deck research and potential project plans on (1) maintenance training and (2) methods to identify root cause(s) of human factors risks in maintenance programs.
- Although this research plans to review industry activity and needs across these areas, however there was no mention of the emerging application of competency-based training for maintainers.

# Finding and Recommendation 1

**Recommendation: Competency-Based Training for Maintainers**

- The Subcommittee recommends that the planned research proposed by the FAA in Aviation Maintenance Human Factors and Training include additional activities that include reviewing ICAO documentation on competency-based training and assessment (CBTA) to understand what the international community is recommending and how it is different from what is currently done in the United States.
- Sample industry activities on CBTA to identify associated benefits and challenges, specifically CBTA development, implementation, and means of evaluating the effectiveness of available methodologies and practices.
- Identify opportunities for global harmonization and collaboration in maintenance training, e.g., methods, data exchange, and use of new technologies.

**Consequences:** Without reviewing and examining new training approaches recommended by ICAO and IATA and ongoing industry works, the FAA's proposed and planned Maintenance Training and Human Factors projects may not realize potential benefits of new approaches to training or understand its implications, positive or negative.

# Finding and Recommendation 2

**Finding: Guidance for Operational Approval of New Applications for the Electronic Flight Bag (EFB)**

- The FAA provided a briefing at the SF22 meeting that showed the FAA has performed a significant amount of research on EFB job aids and operational approval guidance.
- However, it appears additional work is needed to address specific gaps in the EFB operational approval guidance.

# Finding and Recommendation 2

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**Recommendation: Guidance for Operational Approval of New Applications for the Electronic Flight Bag (EFB)**

- EFB research should be conducted to understand the impact of using a single screen to display information where multiple items of information are needed simultaneously, especially when engaged in manual flight operations.
  - For example, when at the gate, pilots need to simultaneously look at the Dispatch release, 10-9 Chart, Standard Instrument Departure Chart, Minimum Equipment List, and Normal checklist. How many (and which) of these can be safely migrated to the EFB?
  - When in-flight with a non-normal situation, pilots need to look at the Approach chart, 10-9 chart, Normal checklist, and Quick Reference Handbook simultaneously; how many (and which) of these can be safely migrated to the EFB?
- The results of this research could be used to develop guidance for Principal Operational Inspectors in making approval decisions on satisfactory real-world operational uses for EFB systems and for evaluating human performance and operational performance associated with EFB use.

**Consequences:** Inspectors might not have sufficient expertise to evaluate the operational and human performance impacts of adding new applications to the EFB that may over task pilots at critical flight phases or situations.

# Finding and Recommendation 3

**Finding: Naturalistic Research for Air Traffic Controllers**

- The Subcommittee noted the need to conduct research to determine whether “skill degradation” is occurring due to extensive use of automation, long periods away from work, lack of practice, or by some other means.
- Past research, both in aviation and in other fields, has relied on interview studies and controlled experimental studies which, while useful, have not been conclusive regarding the occurrence of skill degradation and its prevention or mitigation if it is occurring.
- There is an opportunity to complement these previous studies with *naturalistic studies* that leverage the ability to study the potential for skill degradation at air traffic facilities, and over extended periods of time.

# Finding and Recommendation 3

**Recommendation:**

- The FAA should conduct long-term research at air traffic facilities to investigate ways to define and assess manual and cognitive skills and determine whether they are at risk for potential degradation from extensive automation use, time away from work, or some other factor.
  - For example, the research could first assess manual and cognitive skills developed by air traffic personnel before some new type of automation support is introduced at a facility, and then reassess those skills after they have been performing their tasks with the automation support (e.g., decision-support tools) after an extended period of time.
  - Such research could be conducted by analyzing actual job performance over the course of time, to determine if skill degradation occurs, why it occurs, and how to mitigate it. This longitudinal research also could be used to evaluate the effectiveness of proposed mitigations focused either on the design of automation and associated procedures, or on training strategies.

**Consequences:** There is limited data available on the definition and assessment of manual and cognitive skills. While it is assumed that skill degradation is occurring, it is not clear why or how this happens; either from automation use or something else. It is necessary to fully understand the nature and impact of this phenomenon and to provide objective data to guide the design of mitigations. Longitudinal naturalistic studies can help ensure the ecological validity of guidance to mitigate such impacts.

# Observation

- The Human Factors Subcommittee is pleased to note the responsiveness of the FAA to its previous findings and actions.
- The current and planned future projects have incorporated several of the Subcommittee's inputs into the FAA research plan, including Flight Deck information management, pilot training, coordination and collaboration across FAA air traffic control facilities in order to effectively manage air traffic, and human factors considerations for the integration of artificial intelligence and machine learning capabilities into air traffic control, air traffic management and maintenance operations.
- Such research will help to provide guidance to ensure the successful continued evolution of the aviation system in the future.

# Actions

**Action 1:**

- At the SF22 meeting, several human factors projects that fall outside of the four Human Factors BLI's were briefed, and the Human Factors Subcommittee noted there are several HF programs or projects that are not briefed to the Human Factors Subcommittee.
- The Subcommittee requests a briefing on the other Human Factors related programs/projects across the Agency at the next meeting (WS23).
- The briefing could provide a list of said Human Factors programs by BLI, so that the Subcommittee is informed of the projects that are typically not reviewed.
    - E.g. the AVS research roadmap documents other BLIs is requested to be included in the briefings received by the Subcommittee at each meeting.

**Action 2:**

- The Human Factors Subcommittee recognizes FAA is in the process of developing a future vision for aviation evolution.
- The Subcommittee requests a briefing at the next meeting WS23 on the Info-centric NAS and other NextGen vision documents/roadmaps to understand FAA's assumptions and plans for the use and development of automation to enable this vision.


Thank You