REDAC / Human Factors

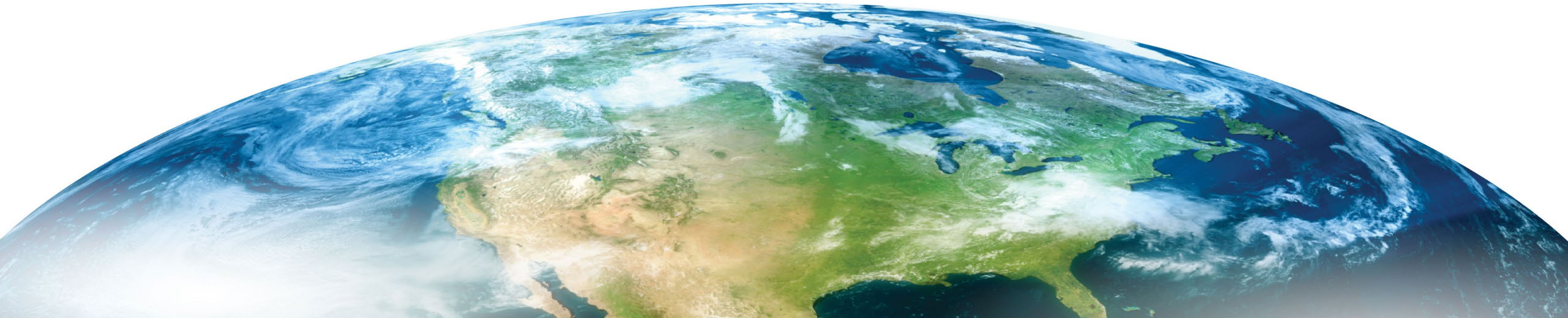
Name of Program: Flight Deck, Maintenance, System Integration (“Core Flight Deck HF”)

BLI Number: A11G (8AA)

Presenter Name: Chuck Perala

Date: August 18, 2020

Review of FY 2020 - 2023 Proposed Portfolio



Flight Deck, Maintenance, System Integration Overview

Program Scope

- This program addresses research, engineering, and development requirements defined by technical sponsors in the Aviation Safety Organization (AVS). Requirements are driven by the human factors needs of FAA Aircraft Certification (AIR) and Flight Standards (AFS) personnel (field, Headquarters)
- This program also considers rapid changes to current-day technologies, procedures, and emerging issues

FAA Benefits

- Program outputs are transferred to AVS technical sponsors to develop and maintain, as appropriate, human factors-related rules, guidance, procedures, Orders, standards, job aids, and other materials
- Work products benefit AIR and AFS personnel responsible for the evaluation, certification, approval, and continued airworthiness of aircraft; and the certification of pilots and mechanics

Measures of Success

1. Sponsor Satisfaction – did the research meet AVS's needs?
2. Access to Research – is there sufficient awareness/access to results?
3. Application of Results – did the research support or inform a data-driven decision?
4. Contribution to Safety – how did the research support improvements to human and system performance?

Flight Deck, Maintenance, System Integration Program Managers and Performers

Program Managers

- Tara Holmes, Division Manager (Tara.Holmes@faa.gov)
- Chuck Perala, Program Manager (Chuck.Perala@faa.gov)

Performers and Laboratories

- FAA Civil Aerospace Medical Institute (CAMI)
- Volpe National Transportation Systems Center, DOT
- FAA Center of Excellence for Technical Training and Human Performance (COE TTHP)
  - Auburn University
  - Wichita State University
  - PEGASUS Consortium
- University of Central Florida
- University of Michigan

Flight Deck, Maintenance, System Integration – Accomplishments in FY20

Project	Description/Product	Vendor
Maintenance HF for General Aviation	**Sponsor Report** An internal FAA report outlined the types of errors occurring in recent general aviation (GA) maintenance operations. Data was grouped into event outcome categories, common error types, error frequency, and trends. **Final Report** Final report describing viable taxonomies, which could be adapted, for classifying the contribution of human error to GA maintenance events. In current-day operations, a taxonomy specific to human error in GA maintenance does not exist.	**CAMI**
Maintenance HF Risk-Based Decision Making (RBDM)	**Final Report (Study 1)** Final report describing current-day challenges with the implementation and use of risk-based oversight across the FAA maintenance domain. Human factors recommendations and out-year research plans are presented. **Final Report (Study 2)** Final report summarizing the different types of checklists available for industry use in managing and mitigating human factors related risks. A draft checklist to assess the overall health of human factors within a maintenance organization was developed, along with a proposed plan to validate the instrument.	**CAMI**
Evaluation of Concurrent Use and Differentiation of EFB Applications	**Final Technical Report** Final report describing the impact of Electronic Flight Bag (EFB) location on the flight deck to pilot performance – forward panel (installed system mixing certified navigation data & uncertified electronic chart data) vs. side panel (portable electronic device). A human-in-the-loop (HITL) simulation was conducted to examine the effectiveness of display features that could help distinguish uncertified data from certified data when using an EFB on an installed system. Outputs may help clarify the "concurrent use" and information "differentiation" concepts referenced in AC 120-76D.	**CAMI**
HF Maintenance (Mx) Risk Management – Fatigue	**Guidance and Training for Aviation Safety Inspectors Tied to Maintenance Fatigue Findings** Finalized human factors inputs to the Guidance and Training for Safety Inspectors deliverable which aims to improve awareness, detection, and response to maintenance fatigue risks/events based on research findings.	**CAMI**
HF in Mx Safety Management Systems (SMS) Programs	**Final Report** Final report describing a technical approach to improve the depth, consistency, and usability of voluntary safety report data and post-event investigation data. The report also describes human factors tools and methods that will be explored, including blended taxonomies (MEDA, HFACS) and training to support consistent application.	**CAMI**
HUD with Localizer Guidance in Lieu of Required Infrastructure for Takeoff	**Final Report** Final report describing results of HITL simulation which examined human factors considerations when using a HUD with localizer guidance symbology in lieu of required infrastructure (centerline lights) for lower than standard takeoff minima. Results have the potential to inform operational credit changes which could allow more reduced visibility takeoffs and increase the number of viable airports for takeoff under low visibility conditions.	**CAMI**

Flight Deck, Maintenance, System Integration Ongoing and Anticipated Research in FY21+

Ongoing Research Activities – Advanced Vision

Project	Description/Product	Vendor	Est. Completion
Quantifying the contribution of HUD to Pilot Performance on Approaches Where HUD is Used, But Not Required, to Transition to Landing (visual segment of SA CAT I approach)	Evaluate pilot performance and human factors considerations when using a HUD (flight information only) during the visual segment of an SA CAT I ILS approach or during the visual segment of approaches that have a high DA and long visual segment	**CAMI**	**TBD due to COVID**
Evaluation of HF & Crew Coordination Aspects of Dual HUD CAT III Operations Compared to Single HUD CAT III Operations. Evaluate Whether Active Monitoring Improves Crew Performance Over a Baseline Condition	– Evaluate human factors and crew coordination impacts when using dual HUD during CAT III approach, landing, and rollout operations vs. single HUD CAT III flight operations – Examine whether dual HUD provide the pilot monitoring with active monitoring capabilities (e.g. early detection of flightpath changes)	**CAMI**	**TBD due to COVID**
Pilot Performance Using HUD, SVGS, and Flight Director During the Instrument Segment of an Approach	– Evaluate the implementation of SVGS technology and flight director information on a head-up display (HUD) – Examine pilot performance and human factors considerations when SVGS-HUD with flight director is used during the instrument segment of a CAT I ILS approach	**CAMI**	**FY2022 Q4**
Pilot Performance and Operational Impacts Associated with using a HUD to Conduct CAT II and CAT III Approaches Using Other than ALSF I or ALSF II Approach Lighting Systems	Examine pilot performance and human factors considerations when using a HUD (flight information only) to conduct CAT II and CAT III approaches to a runway with using alternate approach lighting systems (other than ALSF I, ALSF II)	**CAMI**	**TBD due to COVID**
Pilot Performance and Human Factors Considerations using SVGS on an SA CAT I Approach with Less than a MALSR Approach Lighting System	Examine pilot performance and human factors considerations when using SVGS-HDD to conduct an SA CAT I ILS approach to a runway with an approach lighting systems that has fewer visual characteristics than a MALSR approach lighting system	**CAMI**	**TBD due to COVID**

Flight Deck, Maintenance, System Integration Ongoing and Anticipated Research in FY21+

Ongoing Research Activities – Training and Checking Methods

Project	Description/Product	Vendor	Est. Completion
Training the Emerging Pilot Workforce	Provide scientific and technical efficacy data on potential FAA training and checking methods for the current and projected pilot workforce; areas of emphasis include information management, decision-making, and command judgment	**Auburn University**	**FY2023 Q1**
Modern Training Practices: Methods and Assessment in the Air Carrier Industry (Distance Learning)	Provide recommendations to help decide which topics, skills, and knowledge in aviation training are appropriate for modern training practices, and which are better suited for other learning methods	**University of Central Florida**	**FY2021 Q4**
Crew Resource Management (CRM) Human Factors Reference Document (HFRD)	Develop a single-source reference document for human factors-related rules and guidance that pertain to CRM, including relevant issues to consider when AFS personnel evaluate CRM aspects of proposed operations, procedures, and training	**University of Central Florida**	**FY2022 Q4**

Flight Deck, Maintenance, System Integration Ongoing and Anticipated Research in FY21+

Ongoing Research Activities – Maintenance / RBDM

Project	Description/Product	Vendor	Est. Completion
Maintenance Human Factors - Safety Culture	Understand the current state of maintenance safety risk management, and examine the effectiveness of applied tools to verify and address potential human factors vulnerabilities	**CAMI**	**FY2021 Q2**
Maintenance Human Factors – Failure to Follow Procedures	Propose and test the effectiveness of human factors countermeasures for failure to follow procedures (FFP)	**CAMI**	**FY2021 Q4**

Flight Deck, Maintenance, System Integration Ongoing and Anticipated Research in FY21+

Ongoing Research Activities – Improved Rotorcraft Op Safety

Project	Description/Product	Vendor	Est. Completion
Scenario Based Training (SBT) for Improved Rotorcraft Operational Safety	Does the use of SBT result in improved pilot performance (Parts 61, 91, 141, 135) in off-nominal conditions including inadvertent flight into IMC, LOC prevention & emergency procedures (e.g. white-/brown-out recovery), and scenarios with sudden or gradual onset (e.g. engine loss at cruise speed, auto-rotation)?	**CAMI**	**TBD due to COVID**

Ongoing Research Activities – Fatigue Mitigation

Project	Description/Product	Vendor	Est. Completion
Fatigue Mitigation in Flight Operations Research	– Obtain, document, and examine Fatigue Risk Management System (FRMS) data to improve the FAA's understanding of fatigue during operations that exceed 14 CFR Part 117 limitations (Duty Day/Rest) – Develop a human factors research plan which could be executed to verify the effectiveness of pilot fatigue mitigations in line operations	**CAMI**	**FY2021 Q1**

Flight Deck, Maintenance, System Integration Ongoing and Anticipated Research in FY21+

Ongoing Research Activities – Avionics and New Technologies

Project	Description/Product	Vendor	Est. Completion
Electronic Flight Bag Survey and Additional Survey Data Analysis	Gather human factors data to understand how pilots access and manage information used for EFB functions	**Volpe**	**TBD**
General Guidance Document Update, Version 3.0	Review FAA rules, guidance, Technical Standards Orders (TSOs), industry documents, and human factors literary sources to incorporate relevant changes into Version 3.0 of the General Guidance Document (GGD)	**Volpe**	**FY2023 Q2**
Visual Scanning Techniques in Transport Category Aircraft	Understand the visual scanning techniques used by pilots in transport category aircraft to provide the FAA with a data-driven foundation for identifying the acceptability of design assumptions and mitigations for new flight deck layouts/designs	**University of Michigan**	**FY2023 Q2**

Flight Deck, Maintenance, System Integration Ongoing and Anticipated Research in FY21+

Planned Research Activities – Dependent on funds and AVS priorities

Project	Description/Product	Vendor	Est. Completion
Human Factors Considerations and Emerging Trends Associated with Helicopter Air Ambulance Operations	Conduct human factors research to evaluate and address causal and contributing human factors (e.g., crew resource management, fatigue, etc.) to Helicopter Air Ambulance (HAA) accidents/major incidents.	**CAMI**	**FY2024 Q4**
Pilot Training, Qualification, Procedures, and Flight Operations	Conduct human factors research to address emerging issues across the following topics: • Flightcrew Training and Operational Effectiveness • Crew Resource Management • Adapting Training and Flight Operations To Address Emerging Risks • Pilot Training and Procedures for Runway Safety	**CAMI Academia Industry Volpe**	**FY2024 Q4**
Advanced Vision Systems (EFVS, EVS, SVS, CVS), Head-Up Displays (HUD), and Head Mounted Displays (HMD): Operational Standards & Approval Criteria	Conduct human factors research to support the expanded use of existing technologies, such as HUD-SVGS, HDD-SVGS, or others, during low visibility flight operations.	**CAMI**	**FY2024 Q4**
Fatigue Mitigation in Flight Operations	Conduct a longitudinal study to understand and verify the effectiveness of mitigations developed by industry to manage pilot performance issues caused by high frequency, multiple segment, short-haul flights.	**CAMI**	**FY2024 Q4**

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