



FEDERAL AVIATION ADMINISTRATION
AAR-100 (Room 907)
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From: General Aviation Human Factors Program Manager, AAR-100
To: General Aviation Human Factors TCRG, (POC: Anne Graham, AFS-800)
Subj: A New Approach to Aviation Accident/Incident Prevention/Mitigation Execution Plan
Ref: (a) General Aviation TCRG September 2nd, 2004 meeting minutes
(b) General Aviation requirement entitled "A New Approach to Aviation Accident/Incident Prevention/Mitigation."

1. Requirement Background: Per references (a) and (b) a new approach to aviation accident/incident prevention/mitigation was ranked 7th by the GA/VF TCRG. Although the ranking was low, it was approved based on CAMI internal funding.

The prototype human factors intervention matrix (HFIX) was presented as an outgrowth of the work conducted for the past five years by the Civil Aerospace Medical Institute (CAMI) and the University of Illinois in which over 20,000 general aviation accidents have been analyzed using HFACS. Over the last several years the HFACS framework has been reliably used to analyze the underlying human factors associated with both commercial and general aviation accidents and has helped identify general trends in the data (Wiegmann & Shappell, 2001, 2003; Shappell & Wiegmann, 2003). These findings indicated that while traditional approaches to accident prevention may have impacted other areas of general aviation, there was little evidence that they had a significant impact on human error. Therefore it was determined that a new method for identifying human factors interventions was required, including the further development and validation of HFIX.

2. Project Objectives: This line of research will address a new approach to the development of accident/incident prevention/mitigation. Specifically, this project will build upon the prototype HFIX that maps the unsafe acts of operators (i.e., skill-based errors, decision errors, perceptual errors, and violations) on to several intervention approaches (e.g., organizational, human-centered, technology, task, and environment) contained within the upper three tiers of HFACS (i.e., preconditions for unsafe acts, unsafe supervision, and organizational influences). Other features will also be integrated into the model/matrix such as feasibility, efficacy, and acceptance. Once developed, HFIX will be validated and assessed using interventions and

recommendations proposed by the NTSB and FAA Joint Safety Intervention Teams. Mapping of proposed interventions will allow the FAA and other safety professionals to identify gaps in current intervention programs.

3. Research Questions to be Addressed: specific research questions to be addressed include, but are not limited to:

- What are the different intervention approaches or models used within other transportation modes, government agencies, and industry to address human error?
- Where do the NTSB recommendations fit within the Human Factors Intervention Matrix?
- Will the Human Factors Intervention Matrix be a valid tool for use within the FAA?
- Where are the gaps in the FAA's approach to aviation accident/incident prevention?
- What intervention strategies need to be generated to target specific human error issues identified within the ultra-fine grained analysis of the GA data, requirement entitled "Ultra-fine grained human factors analysis of selected aircrew errors."

4. Tasks and Schedule:

- a. Complete development of Human Factors Intervention Matrix (July 2005)
- b. Provide initial baseline assessment of GA safety programs by completing evaluation of NTSB and JSIT recommendations using the Human Factors Intervention Matrix (August 2005)
- c. Provide report to sponsors regarding FAA interventions and gap analysis of FAA safety program (September 2005)
- d. Provide initial report to sponsors regarding NTSB recommendations. (September 2005)
- e. Using data obtained from requirement "Ultra-fine grained human factors analysis of selected aircrew errors," identify gaps in proposed, existing, and recommended intervention/prevention programs. (April 2006)
- f. Where gaps exist, using subject matter experts (pilots, certified mechanics, human factors experts, etc.) identify additional safety programs to address known human factors vulnerabilities. *Note: This requirement is dependent upon data from requirement "Ultra-fine grained human factors analysis of selected aircrew errors" and will follow that analysis. That is, if it is determined that decision errors will be addressed in year 1 by "Ultra-fine grained human factors analysis of selected aircrew errors" requirement then decision errors will be addressed using HFIX in that year, followed by other error categories as determined by the sponsors.* (September 2006).
- g. To be determined based upon sponsor input and data from requirement "Ultra-fine grained human factors analysis of selected aircrew errors" requirement.

5. Deliverables:

- i. Provide annual and interim reports as well as briefings addressing HFIX analysis of proposed, recommended, and existing general aviation accident intervention programs to the sponsors (ACE-100, AFS-800) and contract monitor.
 - ii. A final report containing a summary of all analyses of selected GA aircrew human factors data conducted during the duration of the grant. The Final Report will be formatted to permit development of appropriate guidance material by AFS-800.
 - iii. Additional reports and briefings as needed to address “pop-up” requirements
 - iv. Quarterly (December, March, June, September) research progress status reports: Informal e-mail reports from the program manager general aviation human factors to General Aviation Human Factors TCRG.
 - v. Annual five page report
 - vi. Program Review: Grantee will participate in the annual program review.
6. AFS-800 Responsibilities
- Identify AFS-800 point of contact who will serve as AFS-800 representative between the researcher and ATO-P R&D HF for this project
 - Make available personnel and resources to investigator
 - Implement project deliverable into the FITS program
7. Communication:
- Monthly telephone meetings will be conducted between the investigator, ATO-P R&D HF representative, and AFS-800 representatives. The purpose of the telephone meetings will be to monitor the project’s progress and to obtain sponsor feedback.
 - The researcher will present meet sponsor representatives at least three times each year to brief progress of the project. Unless directed by ATO-P R&D HF, primary location of meeting location will be FAA headquarters. Meeting dates will occur in Q1, Q2, and Q4 of each year.

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