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From: Aviation Maintenance Human Factors Program Manager, AAR-100

To: Advanced Qualification Program Branch Manager, AFS-230

Subj: DEVELOPMENT OF GUIDELINES AND TOOLS FOR EFFECTIVE
IMPLEMENTATION OF AN AVIATION SAFETY ACTION PROGRAM
(ASAP) FOR AIRCRAFT MAINTENANCE ORGANIZATIONS

Ref: (a) Air Transport Association (ATA) Letter, Subj: Maintenance Human Factors
Research Recommendations, March 27, 2003

Per reference (a), the ATA Director, Maintenance and Material, and the chairman and co-chairman of the ATA Maintenance Human Factors Subcommittee, have identified "Development of Guidelines and Tools for Effective Implementation of an Aviation Safety Action Program (ASAP) for Aircraft Maintenance Organizations" as one of their top three research recommendations. The overall goal of this research initiative is to identify factors that can maximize the likelihood of successful implementation of ASAP for aircraft maintenance programs, and to develop both guidelines and user tools for that purpose.

Research Tasks:

1. A systematic survey and follow-up interviews of air carrier, repair stations, labor association, and FAA participants in maintenance ASAPs will be accomplished.
2. Best practices will be documented.
3. Strategies for eliciting support from each of the various parties involved in ASAP MOU development and program implementation will be examined.
4. Appropriate methods for collection and analysis of maintenance errors reported under ASAP, categorization schemes for aggregating information on ASAP events and Event Review Committee (ERC) corrective action recommendations, database design, information management, and user interface human factors considerations for archiving and querying ASAP information, and methods to

display the results of ASAP program results to enhance the understanding of all ERC participants will be developed and documented.

5. Recommendations for Flight Standards Service consideration will be developed regarding the issue of appropriate acceptance and exclusion criteria for Maintenance ASAP reports. Within the latter effort considerations will be given to inadvertent errors, intentional disregard for safety, at-risk behaviors, negligence, and reckless behaviors in order to determine the relative usefulness of those terms in a maintenance ASAP context. It will include the development of recommended company guidelines for disciplinary action for ASAP events considered sole source by the ERC (because the only information available to the FAA is the ASAP report), but not considered sole-source by the company (because the company independently discovers the alleged violation, and informs the mechanic of it).
6. Guidelines for how ASAP derived corrective action recommendations may most effectively be communicated and implemented at all levels of the maintenance system, including in particular the organization and design of maintenance documentation so as to reduce the probability of human error by mechanics, will be developed.
7. The project will be executed using an action research methodology comprising of focus group discussions, survey administration, one-on-one field interviews, development of a working prototype ASAP event reporting form (web-based) and database that incorporates sound cognitive science and human factors principles. The three year approach will be as follows:
 - a. Year I:
 - i. Grant Award: AAR-100 will obtain a grant proposal for accomplishing the tasks specified herein. AAR-100 and the sponsoring organization, AFS-230, will schedule a meeting to review the proposed research candidate to ensure that he or she meets the minimum requirements to complete the proposed research tasks.
 - ii. Coordination Phase: The Principal Investigator will develop a clearly articulated development process that acts as a master plan and defines the roles of each participant on the development team. Work will be done in collaboration with airlines and associated labor associations that agree to participate. The FAA will provide assistance in obtaining the collaboration of the various Certificate Management Offices (CMOs) and Flight Standard District Offices (FSDOs) involved in positive as well as negative experiences with the development of maintenance ASAP agreements. The grantee will hold a kick-off meeting with AAR-100 and with AFS-230 to discuss the planned approach prior to contacting any airline.

- AFS-230 will provide the principal investigator with a letter of introduction to management and employee groups involved in maintenance ASAP development and execution. However, industry participation will be entirely voluntary. AFS-230 will elicit industry participation through effectively communicating the benefits of doing so, and by demonstrating responsiveness to participants needs and concerns.
 - AFS-230 will be responsible in identifying how many airlines should participate in this study. Note, there is no obligation that an airline will participate but there needs to be some expectation by the sponsor on how many airlines should be included in this study. AFS-230 will be responsible for coordinating with the researcher team's access to the various CMOs and FSDOs involved in positive as well as negative experiences with the development of maintenance ASAP agreements.
 - AFS-230 will accomplish its above listed responsibilities prior to commencement of the researcher's work -- August 2003.
 - The researcher will work with the Aviation Maintenance Human Factors Program Manager and the sponsor to ensure that the deliverables are meeting the requirements of this execution plan.
 - The output of the coordination phase include (a) the positive agreements from all constituencies involved in maintenance ASAPs—airline management, labor organizations, repair station operators, and FAA inspectors and (b) schedule of first meeting with each partner/organization.
- iii. Data Collection Phase: The data collection phase will consist of three steps: (a) focus group discussions to identify the most important issues concerning maintenance ASAPs; (b) survey questionnaire development and administration to “quantify” the relative importance of success/failure factors and to streamline the definitions of terms such as “inadvertent errors,” “negligence,” “at-risk behaviors,” etc.; and (c) one-on-one interviews with a representative sample of members from management, labor, and the FAA to further develop the understanding of success/failure factors and to document the best practices.
- iv. Quarterly (December, March, June, and September) research progress status reports: Informal e-mail reports from the aviation maintenance human factors program manager to Eleana Edens (AFS-230 representative) with an information copy to Thomas Longridge, program sponsor.

- v. Annual Report: Grantee will submit an annual report using AAR-100's Productivity Report website <http://www.hf.faa.gov/report/>

b. Year II

- i. ASAP Data Classification Phase: Data contained in specific ASAP reports and ERC corrective action recommendations will be analyzed. Available error classification taxonomies will be tested for applicability in the categorization of ASAP data. Emphasis will be placed on the ability to correlate the errors or error producing conditions with the corresponding ERC recommendations.
- ii. Needs Analysis Phase: A second round of focus-group discussion will be conducted to determine the information needs of various user groups involved in maintenance ASAP. Issues of anonymity and confidentiality will also be addressed. These needs as well as anonymity and confidentiality issues will be considered while developing the prototype web-based ASAP safety-information and program-tracking (WASP) tool.

WASP will be a web-based application. The application will use IIS (Microsoft's Internet Information Services) as the web server and Microsoft SQL Server 2000 for databases. The application will be developed using Active Server Pages (ASP).

Grantee will provide FAA the WASP application through electronic media (the application can be in a CD or can be provide in a zip file through email). FAA will have unlimited licensing rights. Grantee will not copyright the software.

AFS-230 will provide the web server (hardware and software system) to the airline partner. The number of sites to implement the WASP tool will be determined.

Documentation (High Level Design and Users Guide) and Deployment plan of WASP application will be available.

Intranet WASP application will be developed and provided to airlines, so that each participating airline may deploy the WASP application on their own premises, with local access accomplished through an intranet. The purpose of the intranet WASP will be to enable electronic ASAP reporting, data base archiving, and data analysis within the premises of an aircraft maintenance organization.

An internet WASP application will be developed and deployed at a secure website the location of which will be determined in collaboration with the Maintenance Subcommittee of the ASAP Aviation Rulemaking Committee (ARC). Web server will be configured with SSL (secure sockets layer) for secure communication over the Internet. The purpose of the internet WASP will be to enable the voluntary sharing of de-identified ASAP information between industry participants, as well as with the FAA.

- iii. Web-based Tool and database, Prototype Development: The data from the needs analysis phase will be used to develop a prototype of the WASP tool. The focus will be on developing a functional and usable product based on good principles of human computer interface design and continual testing with user groups (maintenance personnel from team partner facilities as well as FAA maintenance inspectors).
- iv. Quarterly (December, March, June, and September) research progress status reports: Informal e-mail reports from the program manager aviation maintenance human factors to Eleana Edens (AFS-230 representative) and to Thomas Longridge, program sponsor.
- v. Annual Report: Grantee will submit an annual report using AAR-100's Productivity Report website <http://www.hf.faa.gov/report/>

b. Year III

- i. Testing and Refinement of the WASP Tool: In the testing stage the team partners will test the beta software extensively – AFS-230 will provide access to facilities. Feedback emanating from this testing will be incorporated so that the software meets design specifications, usability goals and user experience goals.
- ii. Recommendations for FSS Consideration: Recommendations, based on a comprehensive review of focus group, survey, interview, and ASAP case data, will be developed. These recommendations will include the industry consensus on the inclusion and exclusion criteria for maintenance ASAP, especially the definitions of “inadvertent errors,” “at-risk behaviors,” “negligence,” etc.
- iii. Guidelines for Disciplinary Action: A sample set of guidelines will be developed for ASAP-participating companies in order to assist them in developing a practical disciplinary action system and addressing the issue of “sole source” information.

- iv. Guidelines to communicate ASAP-derived corrective actions and recommendations: A set of guidelines will be developed to specifically address the challenge of communicating the ASAP-derived corrective actions and recommendations. Issues of anonymity and confidentiality will be addressed. These guidelines will be in the form of *User Manual* for the WASP tool.
- v. Quarterly (December, March, June, and September) research progress status reports: Informal e-mail reports from the program manager aviation maintenance human factors to Eleana Edens (AFS-230 representative) and Thomas Longridge, program sponsor.
- vi. Annual Report: Grantee will submit an annual report using AAR-100's Productivity Report website <http://www.hf.faa.gov/report/>

8. Deliverables:

Year I:

Best Practices Document

- i. Report on findings of the focus group discussions
- ii. Report on the findings of the survey administration
- iii. Report on the findings of the one-on-one interviews

Year II

- i. Report on the ASAP data and the ERC recommendations data classification system
- ii. Report on the needs analysis of the web-based ASAP safety-information and program-tracking (WASP) tool
- iii. Report on prototype-tests of the WASP tool

Year III

- i. Report on the final WASP tool
- ii. Prototype WASP software (executable and source code)
- iii. Report describing the comprehensive industry consensus regarding the challenges in implementing maintenance ASAP programs, factors that influence success/failure, and consensual definitions of key terms
- iv. Report providing guidance on the development of a practical disciplinary action system
- v. Report providing guidance on communicating ASAP-derived actions and recommendations using the WASP tool.

9. Schedule:

Year I Tasks: FY03/FY04

Year II Tasks: FY04/FY05

Year III Tasks: FY05/FY06

Final Report and Delivery of Web Based Tool: FY06 (September 2006)

William K. Krebs