

Aviation Safety Risk Analysis Program

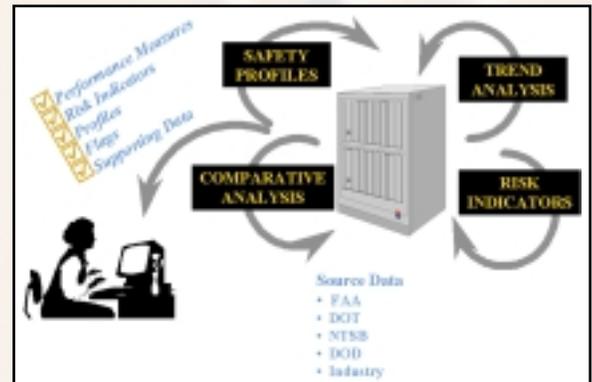
The Federal Aviation Act of 1958 and the Code of Federal Regulations (CFR) provide the FAA with the statutory authority and responsibility to conduct surveillance of air operators, air agencies, aircraft, and air personnel to assure conformance with the CFR and aviation safety standards.

The Aviation Safety Risk Analysis Program (ASRAP) is supporting the FAA in its decision-making processes by developing risk management and decision support tools which provide managers, aviation safety inspectors, and certification engineers the capability to systematically assess potential safety risks and take proactive steps to reduce the rate of aviation-related accidents and incidents.

In order to accomplish the ASRAP research tasks, reliance is made on the following capabilities:

- Operational prototype development of data collection, analysis, and risk management/decision support tools.
- System engineering and system safety model development.
- Risk hazard analysis.
- Accident causation model development.
- The design of system performance measures and risk indicators.
- The acquisition of aviation safety data – either through designing/improving data collection methods used by AVR members or the sharing of data with the aviation industry.

Specifically, ASRAP supports the Aircraft Certification and Flight Standards Services of the Aviation Regulation and Certification Group and focuses its resources on the following areas: Enhance Decision-Making; Improve Mission Performance; and Improve Safety Information Management.



In order to accomplish the research endeavors in an efficient and effective manner, AAR-424 works in partnership with other members of the aviation domain – industry, academia, and foreign governments – to further aviation safety. ASRAP makes use of an interdisciplinary approach of computer science, statistics, human factors, and engineering principals. The program initiatives will enhance the FAA's ability to capture strategic data for safety risk analysis and to further improve the dissemination of information for safety risk management.

ASRAP consists of three major research areas:

- Risk Management/Decision Support
- Aircraft Maintenance: Maintainability & Reliability
- Safety Analysis Methodology

Risk Management/Decision Support will provide a comprehensive set of decision support capabilities for the Flight Standards Service to assist with daily monitoring of certificate holders and other safety related entities. Currently, this includes:

- Systems Engineering Modeling:
 - Develop graphical models of the major functions of air carrier operations including identifying inputs, outputs, resources, and constraints. The models will describe the elements of the air carrier and identify the relationships between these elements.



- Risk Modeling:
 - Provide knowledge about sources of risk using a system functional model.
 - Determine information about factors and conditions that promote, prevent, mitigate, or exacerbate hazards.
 - Identify the effects of organization stressors.
 - Develop accident causation models, hazard descriptions, and hazard criticalities.
- Analysis Concept Development:
 - Investigate and design concepts of decision support, risk indicators, and safety performance measures. Utilize qualitative and quantitative methods to evaluate adequacies of system component performance, existence and severity of hazards, robustness of system organizational defenses, and the quality of system safety attributes.
- Data Acquisition:
 - Develop data collection methods, job task tools, sample sizing plans, and evaluate existing data sources.
- Analytical Methodology and Decision Support System (DSS):
 - Develop DSS tools for end users.

Aircraft Maintenance Maintainability & Reliability is working with the aviation industry to develop methods, procedures, and tools to improve the collection, storage, analysis, and dissemination of aircraft maintenance-related information. Currently those are:

- Enhanced Maintenance Malfunction Information Reporting System (MMIR):
 - Collaborate with Helicopter Association International (HAI) and partners to further develop the MMIR to include capabilities for allowing data submission/dissemination via the Internet, tracking critical helicopter parts, and perform safety/trend analysis on data.
- Flight Safety Critical Aircraft Parts (FSCAP):
 - Develop materials necessary to produce FAA policies, regulatory procedures, and guidance regarding airworthiness of military surplus FSCAP. Provide support for development of advisory circulars, FAA orders, and handbooks.
- Software Reliability & Integrity for Built-In Test Equipment (BITE):
 - Develop uniform/consistent certification standard for acceptance of using aircraft on-board BITE for returning aircraft systems

back to service after maintenance.

- Web-based Information System for Aircraft Maintenance:
 - Analyze current Service Difficulty Reports and Mechanical Interruption Summary in terms of reporting requirements, quality of data, data management, reduction of duplication.
 - Develop improved reporting system.

Safety Analysis and Methodology is supporting the development of risk assessment methodologies, with the inclusion of factors such as operational procedures and human factors, for aircraft certification engineers and inspectors to use in certification of new products and analysis of aircraft continued airworthiness. Those methodologies are:

- Applying Probabilistic Safety Assessment (PSA) to Aircraft Safety:
 - Develop a safety methodology to allow the FAA Transport Directorate personnel to improve the process of new product certification. Improve the risk assessment of continued airworthiness issues and the operational safety of the aircraft fleet.
- Aircraft Certification System Evaluation Program (ACSEP) Engineering:
 - Conduct research to assure the FAA production approval holders, their priority parts suppliers, and delegated facilities are complying with the applicable Code of Federal Regulations (CFR) and the procedures established to meet those requirements.
 - Develop a methodology/system to capitalize on the analysis by producing policy that will mitigate possible safety issues uncovered.

To find out more about the Aviation Safety Risk Analysis Program, contact:

Airport and Aircraft Safety Research and Development Division
Aircraft Safety Research and Development Branch
Risk Analysis Section, AAR-424

Federal Aviation Administration
William J. Hughes Technical Center
Atlantic City International Airport, NJ 08405
Phone: (609) 485-8173
Fax: (609) 485-6128
www.tc.faa.gov

Safety