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Aviation Safety Issues Database

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Background and Introduction

In 1997, the National Civil Aviation Review Commission (NCARC) report, *A Consensus for Change*, stated that the current course of the air transportation system would impair our domestic economy, reduce our standing in the global marketplace, and result in a long-term deterioration of aviation safety. **One major recommendation of the Commission was that the FAA and the aviation industry develop a strategic plan to improve safety, with specific priorities based on objective, quantitative analysis of safety information and data.** The NCARC reported that problems with the air transportation system can be rectified, but will take dramatic change.

In 2003, President George W. Bush and Congress took a significant step toward transforming the air transportation system with the enactment of the VISION 100 – Century of Aviation Reauthorization Act. The VISION 100 Act established a mandate for the Next Generation Air Transportation System (NextGen) initiative to achieve the goals of accommodating a significant increase in demand for air transportation, accommodate all users, and improve aviation safety. To manage these efforts, Congress created the Joint Planning and Development Office (JPDO) – a unique, cooperative partnership between public and private stakeholders. As part of the JPDO and in response to the NCARC recommendation, the Aviation Safety Working Group was charged with the development of a national strategic plan for aviation safety.

To develop the strategic plan, the JPDO Aviation Safety Working Group chartered a Strategic Planning Standing Committee, comprised of public and private aviation stakeholders. The Standing Committee was charged with developing the National Aviation Safety Strategic Plan (NASSP) with strategies aligned with current and projected aviation safety issues. (The NASSP will be publicly available mid 2009.) A major step in the development of the NASSP was the collection and analysis of these worldwide safety issues. Expanded explanation of the safety issues data is the focus of this report. This report is intended as an accompanying document to the safety issues database.¹

Developing the National Aviation Safety Strategic Plan (NASSP)

The National Aviation Safety Strategic Plan (NASSP) was developed through an iterative process of (1) top-down derivation of safety goals, objectives and strategies, (2) bottom-up identification of strategies being pursued by aviation stakeholders, and (3)

¹ Aviation Safety Issues Database,
http://www.jpdo.gov/library/Safety_WG_2008_Safety_Issue_Database.xls

alignment of the strategies with current and projected aviation safety issues. During and after each step in the development of the NASSP, extensive reviews by aviation safety Subject Matter Experts (SME) were conducted, and changes were made where appropriate.

Top-down Derivation of National Safety Goals, Objectives, and Strategies

The Strategic Planning Standing Committee comprised of public and private aviation safety stakeholders conducted a top-down decomposition of the safety vision described in the JPDO Integrated Plan.² Committee members came from government, industry, and academia and used their expertise and experience to develop national aviation safety goals, objectives, and strategies for the strategic plan. The Standing Committee ensured the decomposition addressed safety concerns for all flight sectors and all stakeholders. The goals, objectives and strategies considered air traffic management, aircraft operations, airport operations, and aircraft maintenance functions; air traffic controllers, flight crews, airport operators, and maintenance personnel; and vehicle categories including, commercial airline, regional carrier, cargo, rotorcraft, general aviation, business aircraft, military, public use and unmanned vehicles.

Bottom-up Identification of Today's Aviation Safety Strategies

The intent of the bottoms-up step of the approach was to improve the comprehensiveness of the strategies defined in the top-down approach. The Standing Committee members studied current aviation safety investments and identified strategies that were not identified during the top-down approach (gap assessment). After the gap assessment, the strategies and sometimes objectives were modified and expanded to include the more comprehensive list. As with each step in the approach, the goals, objectives, and strategies were then reviewed by Subject Matter Experts and adjusted appropriately.

Alignment with Today's Aviation Safety Issues

Alignment of the NASSP to current aviation safety issues included the gathering of safety issues from aviation stakeholders worldwide, and surveying aviation safety Subject Matter Experts (SME). The SME assessed the priority of the worldwide safety issues, the priority of the NASSP strategies, and the applicability of the NASSP strategies to the safety issues. Statistical analyses (including the multidimensional scaling) of the SME assessments were conducted and the results were used to refine the NASSP, and demonstrated compliance with the NCARC recommendation for a national plan based on objective, quantitative analysis of safety information and data.

² Joint Planning and Development Office. Next Generation Air Transportation System Integrated Plan. 2004, <http://jpdo.gov/library/NGATS> v1 1204r.pdf

Developing the Aviation Safety Issues Database

As part of the NASSP substantiation, it was necessary to build a database of aviation safety issues that spanned the NextGen domain. This step was important to ensure the alignment of the NASSP to real-world issues (both current and projected) and to comply with the NCARC recommendation to “develop a strategic plan to improve safety, with specific priorities based on objective, quantitative analysis of safety information and data”. It also proved useful when initiating discussion of national aviation safety priorities. An extensive effort to collect worldwide input on current and future aviation safety issues was conducted by the Strategic Planning Standing Committee of the Safety Working Group. Developing the Safety Issues Database consisted of (1) a call for data, (2) refinement, and (3) consolidation.

Data Call

Potential sources for providing safety issues were first identified. Stakeholder groups from across the broad spectrum of participants in the national air transportation system (including Departments of Defense and Commerce) were identified, along with national and international safety teams for commercial airline, regional airlines, general aviation, public use (including military), and rotorcraft operations. An effort was then initiated to collect the major safety issues from the stakeholders identified. Requests for these issues went out to not only national and international safety teams, but to regulatory authorities, air navigation system providers, manufacturers and service organizations, the U.S. military organizations, U.S. Coast Guard, commercial airlines, maintenance organizations, associations and alliances, cargo operators, airports, and the research community. The call was open in nature, which resulted in a diverse range of issues from top concerns to activities being pursued to address the concerns. Responses were received from both national and international organizations.

Refinement

There were 306 issues collected from 46 different stakeholders worldwide, which were categorized as shown in Table 1. The stakeholders were asked to provide their top 5 to 10 major safety problems, but the responses were very diverse and included hazards, risks, safety requirements, causal factors, outcomes, concerns, accident and mishap factors, and research and development (R&D) recommendations. The inputs reflected the diversity of stakeholders, and had both positive and negative characterizations. Upon analysis of this diverse input, it was decided that the word “issue” was the best overall descriptor of the inputs received. In formatting and clarifying the issues, great measures were taken to ensure the resulting descriptions accurately captured the original intent as defined by the provider. Refinement required iterations with the stakeholders and confirmation of the final product.

| Stakeholder Category | Count |
|-----------------------------------|--------------|
| • Air Navigation Service Provider | 7 |
| • Aircraft Operator | 4 |
| • Defense Organization | 8 |
| • Industry Association | 11 |
| • Industry-Academia Report | 1 |
| • Joint Government-Industry Team | 6 |
| • Maintenance Organization | 1 |
| • Manufacturer | 4 |
| • Safety Oversight Organization | 4 |
| Total | 46 |

Table 1. Sources providing aviation safety issues.

Consolidation

It was noted that many issues appeared on multiple stakeholder submissions. It was also necessary to reduce the number of safety issues to use the survey tool selected for analysis. Considering these factors, a “common set of issues” was developed. This common set reduced the 306 issues down to 45, as shown in Table 2. The combination and collation of the issues provided a more reasonable set of issues to use in the survey conducted to substantiate the NASSP. Careful attention was paid to insure each of the original 306 issues mapped to an issue in the common issues set. The common issues set was reviewed in a Safety Work Group meeting and is provided on the last spreadsheet in the safety issues database.

| | |
|--|--|
| <ul style="list-style-type: none"> • Abnormal Runway Contact • Aeromedical Fitness • Aeronautical Decision Making • Air Traffic Service Failures • Airspace Violation-Aircrew • Airworthiness-Materiel • Airworthiness-Operational • Airworthiness-Propulsion • Animal Encounter • Attracting/Retaining Qualified Workforce • Automation Degradation • Automation Limitations • Automation Maintenance • Contaminated Runway Operations • Controlled Flight Into Terrain (CFIT) • Failure to Communicate • Fire/Smoke-Post Impact • Fire/Smoke-Pre-/Non-Impact • Human Factors-Automation • Human Factors-Maintenance • Human Factors-Operational • Human Fatigue • Inadequate Airport Construction | <ul style="list-style-type: none"> • Inadequate Investigation • Inadequate Organizational Oversight • Inadequate Procedures • Inadequate Reference Material • Inadequate Regulatory Oversight • Inadequate Safety Analysis • Inadequate Safety Culture • Inadequate Safety Monitoring • Inadequate Safety Standards • Loss of Control-In Flight • Loss of Situation Awareness • Mid-Air Collision • Non-Stabilized Approaches • Procedure Non-Compliance • Runway Excursion • Runway Incursion • Safety Data Sharing • Safety Management System • Strategic Airspace Usage-ATM • Support Operations • Training • Weather Information |
|--|--|

Table 2. List of 45 common issues derived from 306 issues submitted.

Resulting Aviation Safety Issues Database

The resulting sets of safety issues, along with the definitions provided by the stakeholders, are presented in a Microsoft Excel workbook.³ The issues database consists of a spreadsheet for each stakeholder providing safety issues with the spreadsheet tab identifying the stakeholder. Each spreadsheet presents a listing of the stakeholder’s top aviation safety issues, along with a category name, and a description of each issue. In many cases the description of the issue includes a definition, background information, and some examples of the issue for further clarification. There were cases where the stakeholder did not provide a definition for an issue, but in these cases a definition was generated for them to approve or correct. The names of some of the stakeholders have been generalized to de-identify the responders. The common issues and their descriptions are located on the last spreadsheet as a reference to the reader.

Summary Remarks

The aviation safety issues database was instrumental in the refinement and substantiation of the National Aviation Safety Strategic Plan (NASSP). The issues database is a comprehensive set of issues from an extremely broad base of aviation functions, personnel, and vehicle categories, both nationally and internationally.

³ Aviation Safety Issues Database,
http://www.jpdo.gov/library/Safety_WG_2008_Safety_Issue_Database.xls

Several aviation safety stakeholders such as the Commercial Aviation Safety Team (CAST) have already used the database. This broader interest was the genesis to making the database publically accessible and writing this report.

Future plans call for this database to be updated in 2009 with the following “lessons learned” applied: a) be more explicit about having the stakeholders express their issues as problem statements, b) assure that all problem statements are accompanied with the stakeholder’s definition, c) have the stakeholder not only provide today’s safety problems, but also what they see as tomorrow’s safety problems considering the NextGen and/or the Single European Sky ATM Research (SESAR) environments, and, d) include safety problems for unmanned vehicle systems (UVS) operating in the National Air Space (NAS) environment. In addition, the updated issues will be provided in a relational database instead of an Excel workbook.

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