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Collegiate Aviation Safety Reporting Systems

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The Federal Aviation Administration has paid close attention to the safety reporting systems of the airline industry over the last thirty years. The Aviation Safety Action Programs, housed at NASA, allow pilots and crews to report safety issues into a central database that tracks these reports and provides valuable knowledge to the industry on safety related issues. However extrapolating information that is pertinent to general aviation from these reports, specifically collegiate aviation, is difficult. One of the barriers to data collection is having a commonly understood language among reporters in order to ensure accurate information is reported. The goals of this project include steps to better understand the hurdles that have impeded safety initiatives at the collegiate level; identification of a common language with operational definitions that would be used in tracking safety information; and to conduct initial testing of the common language in a currently used reporting system.

The current Aviation Safety Reporting System ("ASRS") created by NASA has been successful because of the Federal Aviation Administration's ("FAA") conviction for "identifying deficiencies and discrepancies in the national aviation system to provide a knowledgeable basis for improving the current aviation system; and providing data for planning and improvements to future systems." (Corrie, 1997)

The ASRS program provides for limited immunity protection to the reporter. The immunity protection only applies if a) a violation was inadvertent; b) the incident did not involve a criminal offense, accident or action disclosing a lack of qualification or competency; c) the reporter was not previously found to have committed a regulatory violation within 5 years; and d) the reporter proves that the ASRS report was filed within 10 days of the incident (Corrie, 1997).

The ASRS program provides confidentiality and protects the identity of the reporter and all other parties involved in an occurrence. Once the report is thoroughly screened, the reporter identification strip is removed from the report and returned to the reporter (Corrie, 1997).

The ASRS program requires that incident reports be compiled daily and screened by analysts. Analysts look for potential time-critical issues that require immediate attention of the FAA and industry. Any report meeting certain alerting criteria are flagged and processed through a two pronged alert message system. The two types of alert messages are the Alert Bulletin and the For Your Information. Alert Bulletins are issued when a hazardous condition has been well documented and involve serious safety concerns. The For Your Information bulletins are issued when a problem is not well documented and involve less serious conditions. Finally, the ASRS

program utilizes computer databases to assign unique numbers to reports and search through the information by using coded data and narratives (Corrie, 1997).

The ASRS program has been extremely successful. The FAA along with industry has created an aviation system that is the safest in the world, and getting in front of information flow regarding safety and operation issues will keep it that way (Fiorino, 2003). The ASRS purpose is to collect; analyze and respond to the voluntarily submitted safety reports in order to lessen the likelihood of aviation accidents. It collects data from pilots, controllers and others and includes the general aviation arena (ASRS, 2010).

The ASRS database allows inquires of the general aviation pool however it does not provide a breakout of issues facing collegiate aviation programs. While queries can be narrowed to "training" or filtered through "pilot schools", it is not clear if baccalaureate or associate degree seeking programs submit these reports, or another type of pilot school. Secondly, standardization on the use of the ASRS database is lacking and an understanding of the definitions and terms of use has not been established. Therefore general aviation pilots across the country could potentially be providing descriptions in their reports that spread in to multiple areas across the system without consistency in terminology, which, in turn, could cause analysts to classify the incidents into categories ultimately that are not correct.

During a query of the accident/incident database, narrative text including landing, situational awareness, weather, and pilot error were searched for the calendar year of 2010. Out of 93,450 reports searched, 0 reports came back from the query. The near midair collisions database was queried using the keywords of air congestion, air traffic control and situational awareness for the calendar year of 2010. Out of 6,633 reports searched, 0 reports came back with those keywords. Finally, in the Aviation Safety Reporting System database the keywords searched were landings, weather, air traffic control, and air congestion. Out of 632,677 records 0 were queried by those keywords (ASRS, 2010). It is difficult to use the system and be confident that what is being searched for is actually what is being retrieved. In the description of the ASRS database by the FAA

> "The data received in an ASRS report represents what reporters communicate they saw or experienced. Except through the alert message part of the program, ASRS reports are not investigated, and therefore the accuracy of the report information is not verified. The reporter's experience, visibility conditions, duration of the event, trauma experienced by the reporter or other factors can influence the accuracy of the data. Many factors can influence the decision to file a report, such as, lack of awareness of ASRS, motivation to report which can differ considerably between different segments of the aviation community, and the perceived severity of an incident may influence the decision to report. The cumulative effect of these and other factors is that ASRS reports submitted to NASA represent a portion of the total number of similar events that may and could be reported. For these reasons ASRS information should not generally be used to determine distributions or trends but may be very effective for identifying hazards, accident precursors and safety issues for further analysis." (ASRS, 2010)

The gap in the understanding and the knowledge on safety information that is the foundation of this project is 1) that aviation training in collegiate programs is significantly different enough to warrant a system that can break down the casual factors of risk pursuant to this particular environment; 2) that the terminology be defined and trained to the participating pilots so as to reduce the number of incidents that are misclassified. By addressing these issues, the reports submitted to the safety system can be reliably analyzed in order to provide foundations for more robust methodologies to create change to curriculums, program procedures, attitudes and behaviors and the overall culture of safety at participating institutions.

Current Reporting System

Western Michigan University's College of Aviation has created a Collegiate Aviation Safety Reporting System ("CASRS") to address the gap in knowledge and understanding that is created by co-mingling general aviation safety reporting documents together.

CASRS is a web-based, non-punitive safety event reporting system that employs a process to identify event types and causal factors in a manner that facilitates data analysis. At key points in the process, e-mails are generated to key individuals in order to provide timely notification of the event. When e-mails are generated, what information (i.e., data fields) is included and to whom the e-mails are to be sent are all selectable. Causal factors, as many as two per event, are fixed and based on the work of Dr's Krokos and Baker of the American Institute for Research (2005). They include:

- Air traffic congestion
- Conflicting ATC clearance
- Frequency congestion
- Hear back/read back
- Incorrect ATC clearance
- Late ATC clearance
- Unclear ATC clearance
- Uncontrolled airport, Non-standard procedures
- Aircraft damage
- Aircraft equipment malfunction
- Equipment limitation
- Ground equipment inoperative or malfunctioned
- Inadvertent or intentional disregard for policy or procedure
- Misapplication of flight controls
- Attention to detail
- CRM – Communication
- CRM – Leadership and command
- Experience level
- Fatigue
- High workload/task saturation
- Interruption/distraction
- Personal attitudes towards safety

- Self-induced time pressure
- Situational awareness
- Inadequate training
- Conflicting policies or procedures
- Confusing policies or procedures
- Inaccurate policies or procedures
- Lack of policy or procedure
- Animal/bird strike
- Excessive cold
- Icing
- Low visibility/low ceiling
- Ground surface contamination

Extensive use is made of drop-down menus (e.g., aircraft type, aircraft registration, phase of operation, etc.) where possible and is also amendable. CASRS is housed in a server that is accessible from on or off site for the submission of reports and administration of the system via the internet. The server automatically removes identifying information and stores both identified and de-identified data for retrieval. Only de-identified data is available for sharing. Identified data remains the province of the unit. The server also collates the data on a weekly basis, in two matrices, one by event type and the other by causal factors. The collated reports are color coded by the number of reports of a type in a week and individual reports are selectable directly from the matrix (Jones, 2009).

Access to CASRS is limited to students, faculty and staff members of the College of Aviation plus invited guests of the college. With the exception of members of the College of Aviation Safety Committee, access to CASRS is limited to the submission of reports (Jones, 2009).

When an individual submits a report, an e-mail is generated to key individuals including the Director of Safety. The Director of Safety randomly assigns the report to two members of the Safety Committee for their independent assignment of as many as two causal factors to the event. This moves the report from an "open" status to "pending review." If the assigned causal factors are identical from both individuals, the report moves from "pending review" to "reviewed." If the members don't agree, CASRS so advises the members and they get another opportunity to submit. If they still don't agree, the Director of Safety will assign causal factor(s). At the next biweekly Safety Committee meeting, all reports submitted during the previous two weeks are reviewed by all the members for general consensus. After the meeting, the Director of Safety makes any modifications mandated by the committee and closes the reports. This moves the report status from "reviewed" to "closed." (Jones, 2009)

The Director of Safety currently has the authority to edit reports, questions, users, causal factors, display and e-mail settings. As the system evolves and expands, protocols will be needed to structure some of those functions. The Director of Safety can also designate which reports will not be included in the data base in the event of duplicate reports. (Jones, 2009)

This system has collected over 600 safety reports at WMU. Initial research on the system examined the hurdles that have impeded safety initiatives at the collegiate level; and identification of a common language with operational definitions that would be used in tracking safety information.

Methods

In 2010 an internal research development award was given to the author by WMU. Objectives included preliminary steps towards the establishment of a common safety language and an initial look at how the current safety reporting system at WMU would need to change.

Collaborators from the Historically Black College Consortium, which include Delaware State University, Hampton University and Florida Memorial University, came together with WMU to provide insights to the project. The use of these institutions provides strong academic and flight standards, coupled with a diverse way of completing flight training and unique safety concerns. WMU owns and maintains over 40 aircraft in-house, instructing over 400 professional pilot students, while Delaware State University also owns and maintains their aircraft it is on a smaller scale and therefore have different safety concerns. Hampton University and Florida Memorial University both contract their flight training to outside flight schools. This makes for an interesting position in terms of safety reporting and brings a unique perspective to the discussion as a whole. All the participating programs have interesting weather concerns that will also provide for interesting discussions.

All the collaborating institutions provided subject matter experts to answer an electronic survey to identify the most appropriate operational definitions to the thirty-five causal factors currently listed in the safety reporting system.

The survey was designed to provide the operational definition of all causal factors currently listed in the safety reporting system as well as two alternatives. There was also an opportunity to write in comments or notes on each question. Subject matter experts from each of the collaborating institutions were then asked which operational definition was most appropriate. If they thought none were, they were asked to provide one of their own, or at least make comments as to why they did not consider any of the options appropriate.

Findings

Twenty-five out of the thirty-five causal factors had a majority agreement (>52%) to an appropriate operational definition, leaving ten for further discussion and analysis. Those ten include:

Air traffic congestion
Conflicting ATC clearance
Incorrect ATC clearance
Uncontrolled airport non-standard procedures
Inadvertent disregard for policy or procedure
Intentional disregard for policy or procedure

CRM-Leadership and Command
High workload/Task saturation
Conflicting policies or procedures
Lack of policy or procedure

A positive working foundation for a common safety language has been established with this initial research.

Preliminary discussions with subject matter experts on the user interface of the current safety reporting system revealed the need for even more drop down menus, for easier query functions and for more delineated categories. This feedback allowed WMU to begin understanding the necessary workload needed to introduce these enhancements to the current reporting system. A proposal being developed for the submission to the FAA looks to advance both of these initiatives to the point of usability.

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