Bringing Proactive Safety Methods and Tools to Smaller Operators

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A veteran major airline, corporate and general aviation pilot, Captain Cox has flown over 14,000 hours with over 10, 000 in command of jet airliners. Additionally, he has flown as an instructor, check pilot, and test pilot in addition to extensive involvement in global air safety. He holds an Air Line Transport Pilot Certificate with type ratings in the Airbus 320 family, the Boeing 737 family, the Fokker F28 and the Cessna Citation. He is an experienced accident investigator having been involved in six major NTSB investigations (the best known being the US Air 427 accident in Pittsburgh in 1994) and numerous smaller investigations he holds an Air Safety Certificate from the University of Southern California. The International Federation of Airline Pilots Association (IFALPA) certified him as an international accident investigator. For over twenty years he served as an Air Safety Representative for the Air Line Pilots Association rising to the position of Executive Air Safety Chairman, ALPA's top safety job. ALPA awarded him their highest safety award in 1997. A Fellow of the Royal Aeronautical Society, he was awarded a Master Air Pilot Certificate by the Guild of Air Pilots and Air Navigators in October 2004. In December 2004 he retired from airline flying after twenty five years to found Safety Operating Systems a Washington, DC based aviation safety consulting firm.

This paper will describe how proactive safety tools used by large operators can be implemented into smaller flight operations to help investigations of incidents and accidents and to improve the safety of daily flight operations.

Many large airlines have developed systems and processes that allow the confidential collection of routine flight data. These data can be collected from the airplane and flight crews by programs such as, Flight Operations Quality Assurance (FOQA) programs and/or by confidential reports in the Aviation Safety Action Program (ASAP) and the Line Operational Safety Audit (LOSA). Data collection programs such as these provide a real-time review of current safety issues in the flight operations department. Real-time data review facilitates the identification of areas where modifications to training programs or standard operating procedures (SOPs) or other areas might be appropriate. Such training program modification might prevent the occurrence of future safety events (incidents or accidents) and reduce costs as well.

FOQA programs, which evaluate various aircraft parameters recorded in normal flight, are a primary source of objective safety data. However, FOQA (which is by nature quantitative) cannot supply subjective – or qualitative – data. Subjective data, which help explain *why* a situation occurred, are gleaned by operations personnel through confidential safety reporting systems like ASAP. The independent observations from LOSA add a more objective "snapshot" to determine the effectiveness of SOPs, checklists, procedures, and other safety mitigations applied to the operation. These three data sources provide the safety department with a significantly improved ability to communicate the real needs of a specific area of flight operations to the appropriate level of flight operations management. This is a holistic approach allowing the constituent elements of ASAP, FOQA and LOSA to become more that the sum of the parts, further benefiting the operator.

Until recently, smaller operators were unable to take advantage of these proactive methods and tools due to the substantial infrastructure required. The cost of this infrastructure was too high for many operators. Budget constraints, unfortunately, resulted in missed opportunities for safety enhancement.

Today, however, there are new marketplace strategies that allow small operators to have the same proactive safety programs that the large airlines enjoy. This paper will describe how these proactive safety methods and tools, used successfully by large operators, can be implemented by smaller flight operations. The utilization of proactive safety methodology can facilitate investigations and improve the safety of daily flight operations.

Proactive Safety

Accident data (both hull loss and accidents with fatal injuries) show that aircraft accident rates are declining. These data are collected from several sources; this paper will use the Flight Safety Foundation recitation of Boeing data where possible (cited at the IASS Conference 2004).

A gap remains between the accident rate for smaller jet and turboprop aircraft and the accident rate for larger jet transports (greater than 60,000 lbs). This gap, well-known and well-documented, exists even when the data are adjusted for different exposure levels of different fleets.

Are differences in equipment part of the reason for the accident rate gap? Terrain Awareness Warning Systems (TAWS) have significantly reduced (some would argue

have eliminated) Controlled Flight Into Terrain (CFIT) accidents in aircraft equipped with TAWS. The TAWS example suggests that differences in equipage might be a partial explanation for differences in accident rates between the communities of larger and smaller aircraft. However, other factors come into play when analyzing the accident rate gap. For example, another factor contributing to the gap in accident rates might be airport facilities. Significant additional infrastructure is available to a large, intercontinental jet operator landing at a big international airport, compared to that available to the small turboprop operator landing at a tiny, remote airport. Economies of scale (size and infrastructure) often allow a large operator to enjoy significant operational advantages. Dedicated in-house safety departments, highly qualified technical writers, well developed cultures of SOP usage, and extensive reporting systems are demonstrably advantageous.

Safety reporting systems (such as ASAP, FOQA, and LOSA) allow the large operator to harvest reams of data, upon which a keener understanding of the realities of the operation can be based. These data-rich environments, which facilitate a pro-active approach to problem solving, have paid off in appreciable improvements to safety and operational efficiency. For example, adjustments and enhancements in training programs, revisions to SOPs, and modifications to checklists can be facilitated before an accident or incident occurs. Thus the cost of an incident or accident may be avoided (and the overall risks lowered) by the proper and timely use of the information extracted from these reporting systems.

These same highly successful data analysis tools have the potential to improve the accident rate gap between smaller jets/turboprops and large jets. Unfortunately, most small jet/turboprop operators, as well as some small operators of large jets and some large operators of large jets do not gather FOQA data. Older aircraft with low-tech flight data recorders (FDRs) make gathering these data very difficult and expensive. How can smaller operators gain the same benefits from safety reporting systems that large operators enjoy? How can these needed data be gathered, evaluated, and used by a smaller operator at a reasonable cost?

Virtual Safety Departments

The cost of a large, extensive, and dedicated aviation safety department is high. Those that shoulder this high cost usually see a quantifiable reduction in risk. Large operators around the world have found this to be a good investment. The payback on the outlay has been considerable. With a large fleet there is direct contribution to the profitability of the company by FOQA, ASAP and LOSA data-reporting programs. Millions of dollars have been saved by information obtained from FOQA, ASAP and LOSA. One US airline saved over one hundred million dollars in a single year by using FOQA data to explain the causes of engine Exhaust Gas Temperature (EGT) exceedances. This allowed the engine to stay on wing, in service, for a longer time. This same operator was able to use combined FOQA and ASAP data to show the FAA of the need to redesign an instrument approach to reduce excessive descent rates. LOSA subsequently verified the

effectiveness of the improved approach. For the smaller operator to reap similar advantages, the barrier of high initial cost must be addressed.

Cost-of-operation is a major concern to most aircraft operators nowadays. Fuel prices have climbed faster than a high performance jet, and revenue is as hard to find as affordable fuel. As a result, outsourcing has become the standard. For example, large operators once had their maintenance performed "in house." Today it is often performed "off-shore" on a "bid-for-contract" basis. The drive to lower operating costs has become an integral part of today's flight operation.

So the question arises: Can a smaller operator gain the benefit of data gathering programs without having the high costs of a dedicated safety department? The answer is: "Maybe." That answer, too, depends on the exact requirements of the small operators. Germane questions could include: Does the operator fly charters? Does the operator fly internationally? Can the small operator define what aspects of the operation could be improved? Is the operator willing to seek solutions from outside the company?

An operator might hire an outside source to compile the aviation safety reports. That independent contractor would then evaluate the safety reports and provide recommendations (e.g., training, SOPs, and checklists) if appropriate. The small operator could benefit from the arrangement. There are, however, important issues that must be clearly identified before "outsourcing" is initiated. What are the characteristics of a successful outside consulting firm? The arrangement with an outside source should add

value to the operator's business. To thus enhance the operation, the outside consulting firm might provide cost savings and/or a significant level of expertise otherwise unobtainable by the aircraft operator. Any other additional expertise of the consultant to potentially enhance the operation should be considered.

The proper handling of aviation safety reports is critical. How the data and the reports are to be transmitted to the outside safety company must be determined. In today's electronic age (identity theft, hacking), the encryption of data is essential to maintain confidentiality and security. It is imperative that the security of this sensitive information be insured from the beginning of the project. There must be a non-punitive reporting environment so that reports can be filed without fear of disciplinary or certificate action. The non-punitive aspects of an aviation safety reporting program apply only to sole-source, non-criminal and non-deliberate actions.

Ownership of the information is a difficult question. Are the provided data the property of the operator or the outside safety contractor? Clear definitions of data ownership and authority to access information are fundamental. All parties must agree upon how the data will be stored, as well as when and how it will be de-identified and finally destroyed.

What reports the safety company will provide to the operator? How often? What will the reports contain exactly? Will the operator indemnify the safety company for the content of the reports? These are a few of the many issues that require agreement before an outside safety contractor can begin to use data gathered or reported by an operator's

pilots. The outside safety company must keep all data it receives isolated and confidential. However, the outside contractor might request, for the purpose of enhanced statistical validity, that an operator's data be compared in-the-blind to like-data from similar operators.

Data analysis, in this case, requires a standard of comparison, or it is of very limited value. Pooling sanitized data enhances the overall base of information. Comparing like-operators with similar data provides a much better understanding of the real world flight operation. A safety company with several similar operator-clients can observe and track trends and report to an operator without any loss of confidentially. By compiling data into trends over time and comparison to other similar operators the maximum benefit for the collective few can be achieved.

Achieving consensus

There must be agreement between the operator, the regulator, the pilot representative organization (if applicable) and the safety company. This agreement will result in a memorandum of understanding (MOU or similar written document). The specifics of how the data and reports can be used will be clearly stated in this document. The MOU becomes the backbone of the relationship between the operator, the regulator, the pilot representative body (if applicable) and the outside safety contractor. Successes at larger operators have proven that achieving a good, solid MOU is a good predictor of notable safety enhancements from the safety reporting program.

Guidance material from the FAA provides standard recommendations on the construction of MOUs for large operators. These templates can be downloaded from the FAA website. Additionally, the outside safety company should have access to other approved MOUs. These recommendations and examples from other operators can provide the framework for a virtual safety department. The cost of the virtual safety department is usually defrayed for individual operators when the independent safety company contracts with a number of operator-clients. In numbers, it becomes a symbiotic, win-win relationship.

A theoretical example

The following is a purely fictional example of the benefits gained by a virtual safety department. Any resemblance to a real event, person or company is purely coincidental.

Tiny Air, a small jet airline with ten aircraft and eighty-five pilots accepts a bid from "Safety R Us," an aviation safety firm, to provide FOQA and ASAP reports. A meeting is held between Tiny Air and Safety R Us officials and the exact requirements are specified. The senior flight management of Tiny Air, the regulating authority's Principle Operations Inspector, the Chairman of Tiny Air's pilot association, and the senior management of Safety R Us meet to detail exactly how safety data will be gathered, evaluated, held and reported.

There is agreement by all parties that de-identified reports will be presented to an Event Review Committee (ERC), made up of a representative from flight operations management, the regulator and the pilot association, which will meet once a month to accept or decline reports into the program. The reports reviewed by the multi-party ERC are referenced only by number, so that "Safety R Us" is the only party with the ability to identify a flight crew. Should the ERC determine that it is imperative that the flight crew submitting a report be contacted, the ERC will submit, in writing, a request that the pilot association representative be given the name(s) of the flight crew. The pilot association representative will then call the flight crew members for clarification of their report. The representative of the pilot association will then report the results of the call to the ERC.

Once the ERC has determined that a reports meets the criteria for admission into the program (sole-source, non-criminal, not a deliberate act, etc.), it is logged into the system for evaluation. No disciplinary action or certificate action will be taken against the flight crew once the report is accepted into the program.

Safety R Us evaluates the report and compares it against other similar reports. If a trend is evident, Safety R Us will advise Tiny Air that an undesirable trend is developing. Any trend report generated by the outside safety company will include recommendations for mitigation of the problem.

Reports are de-identified after two weeks after the ERC meeting so that only a reference number is maintained. The reports can be used to make up month-over-month and year-over-year trend evaluations so that training effectiveness, SOP changes, and other items of emphasis can be observed, evaluated, and quantified.

This fictitious airline now has the ability to take a realistic look at its flight operation. Tiny Air can now learn of operational “near misses” that would have gone undetected previously. For the first time Tiny Air can make safety improvements before an incident or accident occurs. Tiny Air is in the proactive league. The little airline has made a significant improvement in safety at a fraction of the cost of doing it “in house”.

The regulator now has a means to monitor safety issues without waiting for an incident or accident. These data allow the regulator to work with the airline to resolve potential safety problems much earlier than previously possible. Additionally, the regulator can compare the airline to other similar airlines with similar programs to better understand how effectively the safety programs are working.

The pilot association now has a means to submit safety reports with the necessary protections from self-incrimination in place. NASA’s highly successful Aviation Safety Reporting System has clearly demonstrated the value of confidential aviation safety reports. Through their non-incriminatory reporting system, NASA was informed of many, many near-miss events that otherwise might have gone un-reported.

The ERC group members each become a part of the solution to the reported problems or issues. Not only do the ERC members accept a report into the program, they recommend corrective action so that the likelihood of recurrence is reduced or eliminated. The combination of the airline, regulator, pilot association (if applicable) and the outside safety company brings together a team to recognize, evaluate, and solve safety issues facing the airline.

The process is similar for FOQA data. The data are harvested from Tiny Air's fleet of aircraft and sent to Safety R Us where it is evaluated for "exceedances". Should an exceedance be observed, it is plotted, and a trend report is provided to Tiny Air monthly. This objective data, when combined with the ASAP reports, provide a comprehensive evaluation of the performance of the flight operation. The same process of data protection and reporting used in the ASAP program is used with FOQA data. Over time, maintenance cost alone can pay for this type of program. For example, careful monitoring of fuel burns can identify specific aircraft that may need rig adjustment.

LOSA data are never identified, so the confidentiality issues are slightly different. The flight deck observations and recordings during normal line operations result in the tabulation and classification of observed problem areas. Specially trained LOSA auditors, like the ERC members, should come from company flight operations, the regulator, the pilot association, and the outside safety company. The uniquely qualified LOSA auditor/pilots mark a form which classifies errors made by the flight crew. This

data is then compiled by the outside safety company and presented to the other participant groups for a consensus-based solution.

Limited resources and increased expectations

As the media widely reports the airline industry's ever-improving safety record, airline customer's expectations of safer flights rise accordingly. Paradoxically, the flying public expects the airline industry to continue to improve flight safety while offering low fare tickets, all in the face of record-high fuel prices.

The current economic squeeze is affecting some tangential aspects of the airline industry too. Regulatory agencies (FAA in the US) face increased pressure on budgets. Those agencies must often do more work with fewer personnel. Regulatory oversight, while still mandated to improve aviation safety, is under significant fiscal pressure. New tools are needed to facilitate the administration of regulatory agencies and enhance aviation safety - concurrently.

One way to meet the emerging safety needs of the airline industry is to take big-airline proactive safety methods to the small operators. These methods of improving and enhancing operational safety are well understood and proven. Since small operators are held to the same standards as large operators and the virtual safety department is a reality, *cost* is no longer a viable excuse for not having a dedicated safety department using all

available safety tools. The virtual safety department offers the best of both worlds: the services and benefits enjoyed by the larger operators at a very affordable price.

All operators can now enjoy the benefit of reduced risks and improved efficiencies. Early detection and reporting of safety issues, followed by proper mitigation of those issues, is a time-honored methodology to achieve continuous improvement of aviation safety. That continuous improvement in operational safety will result in cost efficiencies throughout the airline.

A safer airline has fewer on-the-job injuries, often has lower insurance costs, has fewer passenger injuries (and resulting litigation), and can expect better resale price for equipment. The safer airline, too, may enjoy better relationships with the media and the regulator.

The aviation industry has historically been a leader in safety. Our industry has the most enviable safety record in all of public transportation. Our accident rates have declined sharply over the years. This trend must continue. One method to help keep the safety trend going in the right direction is the utilization of all the means available for the early detection and mitigation of safety deficiencies. The methodology to improve safety at the small operator exists at the large operator. Those successful safety solutions from the greater part of the industry must now be applied at the lesser part. The virtual safety department brings proactive safety methods and tools to smaller operators, efficiently and at an affordable price.