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Threat and error management becomes part of the safety management system dialogue.

SMS Aspects at CASS

BY J.A. DONOGHUE | FROM PALM HARBOR

Details on the wisdom and the ways of incorporating safety management systems (SMS) into corporate flight departments dominated the presentations and discussions at the 53rd annual Corporate Aviation Safety Seminar (CASS) in Palm Harbor, Florida, U.S.

During the meeting, a joint presentation of Flight Safety Foundation (FSF) and the U.S. National Business Aviation Association, flight department managers and aviation safety professionals detailed their progress installing SMS tools and procedures into their operational frameworks.

A common theme relating to SMS implementation was the importance of having support from the highest levels of corporate management. Rick Boyer, chief pilot for SCANA, a Southeast U.S. power company, took that theme one step higher, saying, "Our safety culture has to be a subset of the larger company's culture. We cannot coexist if we're not part of the same culture."

Boyer's co-presenter, Tom Garcia, formerly a U.S. Navy safety specialist and now a consultant, cited statements by several organizations that a positive safety culture is a prerequisite for implementation of an SMS. For example, the International Civil Aviation Organization said, "Before an organization can implement an effective SMS, it needs to possess an appropriate safety culture."

"Culture," Garcia added, "is a group phenomenon … the learned and shared assumptions, values and beliefs that result in the behavior of an organization."

But conclusions about the state of the current safety cultures mean more than just making assumptions, he said. The U.S. National Aeronautics and Space Administration thought it had a good safety culture following the investigation of the 1986 Challenger space shuttle disaster, only to learn through the loss of the Columbia shuttle in 2003 that "it was still a broken safety culture, unchanged in the 17 years between shuttle disasters.

"The common thread [in managers mis-analyzing their own safety culture]

is that there is always at least one assumption [of an effective culture that] no one else could see," he said.

Maria Jeanmaire, team leader, aviation safety, and a pilot for the Harley-Davidson Motor Co., said Harley-Davidson (H-D) adopted SMS in 2004 during its IS-BAO (International Standard for Business Aircraft Operations) registration, "although that is not necessary." Since then, the company has commissioned an annual audit, twice as often as required by IS-BAO, because that's what is needed for the company's ISO 9000 certification.

Getting and sustaining employee commitment to the process is essential, she said, and H-D achieves that commitment through a process that includes communicating benefits, rewarding participation, enforcing accountability, embracing change and demanding excellence.

In an SMS, change is not only possible, "it is routine," she said. "SMS is a living document."

In considering an SMS, it is important to realize that "safety is not 'first.' Safety is the mortar between everything you do. It permeates all of it," said Michael L. Barr, director of the Aviation Safety Program at the University of Southern California's Viterbi School of Engineering. Barr noted that SMS had its roots in ISO 9000 quality management systems (QMS), but the ISO 9000 was a reactive process, not data driven, so "some things were not getting done," a failing which led to the development of SMS.

Another flight department to appreciate the strong link between IS-BAO and SMS is Daedalus Aviation Services, where David Bjellos is president. "The IS-BAO framework of best practices is a great start toward SMS."

Even if your flight department is a safe operation in a safe segment of the industry, SMS "will take you to the next level. Risks still exist, and SMS will make you safer," he said.

The goal of a unified company safety culture was achieved in an unusual way at Agro Industrial Management, Daedalus's parent company. "An unintended consequence of our aviation SMS is that it migrated to our primary business — agriculture. The QMS in place was well established and incorporated many protocols to mitigate loss. When we introduced SMS, they saw something in our system that was lacking in the manufacturing side, and the QMS was revised to include the checklist style procedures we used."

In Bjellos' opinion, "The common thread of open communications removes the barriers to an effective SMS program. Without that, SMS is just another document. But by proactively addressing issues daily, our group is able to discuss anything freely about any part of the flight operation."

The first step down the road to an SMS, said Darol V. Holsman, FSF manager, safety audits, "is a gap analysis," comparing the existing system with the SMS defined in several documents. Holsman recommended Transport Canada's Advisory Circular 107-001, *Guidance on Safety Management Systems Development*; the slightly older U.S. Federal Aviation Administration AC 120-92 and the International Business Aviation Council's "Tools for Efficient SMS Design," which Holsman called "the best tool we have found for all categories of flight operators," including those with no SMS or safety program experience, or an initial IS-BAO Stage I. He added, "An SMS linkage with IS-BAO is not mandatory."

Ultimately, Holsman said, "the key to success in SMS is documentation, documentation, documentation. Implement your plan with milestones to measure your success. The overall goal of an SMS should be to reduce risk to a level *as low as reasonably practicable*," a standard Holsman offers as the acronym ALARP. Goals should be set that are both strategic for long-term achievement, and tactical for short-term implementation.

Speakers from left, Boyer, Holsman and Trekell
Photos: J.A. Donoghue

Numerous speakers stressed the importance of developing an SMS appropriate for the operations, aircraft and personnel of the department under consideration.

Boyer reported that when SCANA started its SMS under then-chief pilot Robert Sumwalt, now vice chairman of the National Transportation Safety Board, early in the process "we looked at the hazards experienced by similar flight departments flying similar missions," swapped safety advisers between companies for a while, and joined a peer review group with 20 flight departments to make up the Southeast Aviation Safety Roundtable.

For the second consecutive CASS, Peter N. Stein, base manager and chief pilot for Johnson Controls, discussed threat and error management (TEM), a system that has gained great acceptance in the airline community but is just beginning to take hold in the corporate aviation world as an important hazard identification tool.

Unconsidered threats can result in errors, he said. TEM goes beyond just identifying the threats and errors to include developing strategies and countermeasures should errors occur to arrive at a desirable outcome.

"A threat is any influence external to the operator, both expected and unexpected, that may reduce safety margins," he said, adding, "intentional noncompliance is not an error."

Examples of mismanaged threats include failure to activate engine anti-ice before entering icing conditions, an unstable approach, failing to stow galley equipment before entering moderate turbulence, an engine access panel unsecured before dispatch and leaving wing trailing edge static wicks without warning flags on parked aircraft.

The point of TEM is to avoid "undesired states, a condition that clearly reduces safety margins."

TEM strategies should be included in simulator recurrent training, which now focuses on technical skills and procedures, creating a gap between technical and nontechnical skills, Stein said.

Adding TEM to simulator training should begin with a classroom discussion of TEM applied to known accidents, a brainstorming session that fits neatly into SMS processes, he said. "Then design simulator scenarios to explore typical errors, applying undesired-state management" to achieve a good outcome. The pre-training briefings should mirror what ideally is done before each flight, listing the expected threats, discussing strategies to manage those threats, anticipating the potential for common error-producing conditions and the employment of error-resistance countermeasures, he said.

Incorporating TEM into simulator training "results in a higher degree of realism and developing a systematic mindset to using TEM, allowing abstract concepts to become more concrete." However, TEM should not be injected into initial simulator training sessions, where technical skills and operating procedures must take precedence, Stein added.

Turning to operational issues, Donald D. Trekell Jr., CAE SimuFlite's lead instructor, advanced programs, said that while automation is more necessary than ever to deal with increasingly complex airspace environments, a higher reliance on automation makes operators more vulnerable to hazards. The pace of air traffic control reduces the amount of time available to manage automation, Trekell said. The increased workload of managing the automation "constitutes a new threat, with more procedures, last-minute changes, lower [approach] minimums, more precise navigation and less [aircraft] separation" combining to boost the potential for pilot task saturation, he said.

Automation also decreases situational awareness, in part because the systems are so reliable "we tend to trust them" and become less aware of other tools, such as charts, Trekell said. This, in turn, means pilots "are less prepared for unexpected changes, less prepared for malfunctions, and are easier to surprise." ●