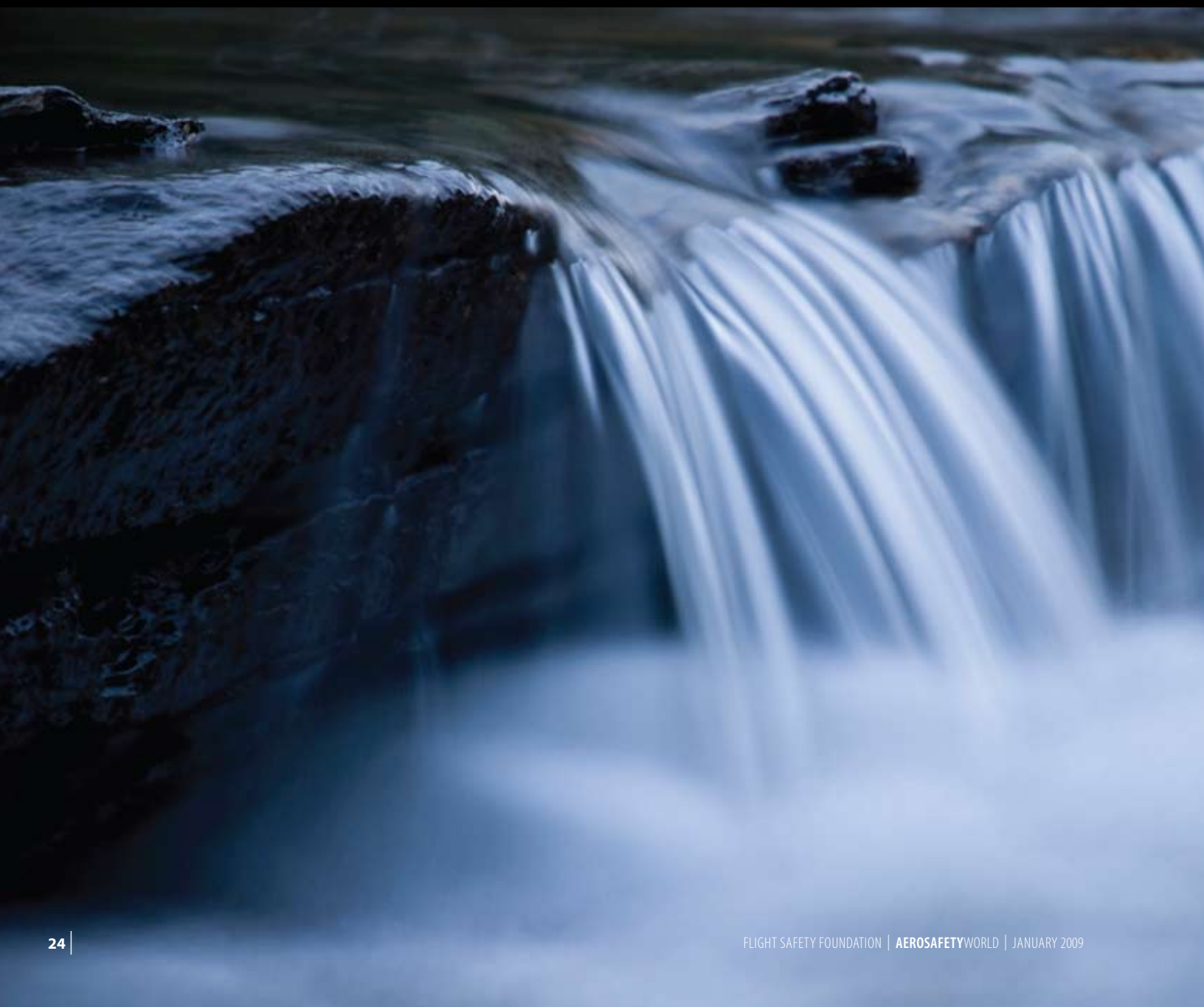


Into the **MAINSTREAM**

Although many operators will miss ICAO's January deadline for implementation of a safety management system, the SMS concept is gaining ground.

BY LINDA WERFELMAN



Propelled into more widespread existence by a 2009 deadline, safety management systems (SMSs) — the subject of years of discussion and planning — are taking hold within airlines and aviation maintenance organizations worldwide. But implementation cannot be completed without the adoption of state safety programs (SSPs) by national governments worldwide.

By mid-December 2008, the number of airlines with an SMS in place or under development had increased dramatically from the 10 percent estimated one year earlier, according to Miguel Ramos, technical officer in the Integrated Safety Management Section of the International Civil Aviation Organization's (ICAO's) Air Navigation Bureau. Ramos said, however, that ICAO lacks a precise count of how many airlines and aviation maintenance organizations are developing an SMS — or exactly how many had one in place as the organization's January 2009 deadline neared.

Even without knowing exact numbers, Ramos said, it is clear that “SMS has really evolved.”

He noted that airlines and other service providers — including airports, maintenance organizations, regulators and air traffic management organizations — are moving away from the *reactive* mode of managing safety in which safety advances typically follow accident investigations and the resulting investigations, and toward the more *predictive* mode of managing safety in which data collection and analysis enable risks to be identified and addressed before they cause an accident or serious incident.

“That’s a major improvement,” Ramos said. “SMS is now being considered a major system involved in running an airline or another aviation service provider.”

In recent months, in response to complaints about vague requirements for SMS — defined by ICAO as “a systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies and procedures” — ICAO overhauled its *Safety Management Manual (SMM)*.¹

The second edition, still in the final editing process in late 2008, provides guidance to

civil aviation authorities for the development of the regulatory framework for SMS, to service providers for the implementation of SMS, and to ICAO member states for the establishment of SSPs — all in greater detail than the first edition, published in 2006.

“That doesn’t mean that the guidance material will be perfect for everything and everyone,” Ramos said. “Everything that’s in there, people have to adapt to their own operations.”

The *SMM* describes an SMS as similar to “a toolbox that contains the tools that an aviation organization needs to be able to control the safety risks of the consequences of the hazards it must face during the delivery of the services that are the reason why the organization is in business. ...

“SMS simply is a protective shell that ensures proper and timely storage, availability and utilization of the tools needed to deliver specific safety management processes in the organization. Without the proper tools inside, SMS is only an empty shell.”

The *SMM* describes how airlines and other service providers might fill those empty shells — for example, with safety audits, surveys, safety libraries, flight data analysis and other safety tools — and how safety management must permeate a service provider’s organizational chart.

‘Complex’ Implementation

One of the first civil aviation authorities to start work on SMS regulations was Transport Canada (TC), which began its SMS efforts in 1999.

“On the surface, it appeared quite a simple task: Develop a set of regulatory instruments and the supporting tools to facilitate the implementation of SMS in Canadian aviation,” said Jacqueline Booth-Bourdeau, chief of technical program evaluation and coordination in the TC Standards Branch. “SMS regulation and implementation in Canada were infinitely more complex than we had first imagined.”²

In a presentation to Flight Safety Foundation’s October 2008 International Air Safety Seminar in Honolulu (see “SMS Implementation Experiences,” p. 28), Booth-Bourdeau said that



Booth-Bourdeau

to ensure aviation safety or the safety of the public.”

Booth-Bourdeau said that, “from a practical perspective, this means that an organization must develop, maintain and integrate a management system comprised of six basic components: a safety management plan, training, safety oversight (reactive and proactive), documentation, quality assurance and emergency preparedness.”

In recent years, critics have challenged TC’s approach to

SMS as a form of deregulation or industry self-regulation.

“None of these things is true,”

Booth-Bourdeau said. She cited a May 2008 report by the Office of the Auditor General of Canada, noting the office’s finding that TC, the first civil aviation authority in the world to produce SMS regulations, had “developed appropriate

procedures and processes for SMS implementation and made efforts to apply them consistently.”³

The auditor general’s report also noted “several weaknesses” in TC’s management of the transition to SMS and issued nine recommendations — including calls for improved transition planning, a better defined standard for an acceptable level of oversight and establishment of performance indicators to evaluate the extent to which SMS and other programs are contributing to TC’s long-term objectives. TC accepted all nine recommendations.

Phased Implementation

At press time, the Australian Civil Aviation Safety Authority (CASA) was reviewing aviation industry comments on proposals to require SMS for all regular public transport operations. CASA planned to adopt the proposals as amendments to the Civil Aviation Orders on Jan. 1, 2009, with a phased implementation schedule “to assist

the implementation of SMS required organizations to change the ways they manage safety and to enhance their internal safety culture.

Canadian Aviation Regulations define an SMS as “a documented process for managing risks that integrates operations and technical systems with the management of financial and human resources

Wayne Rosenkrans



Canada was an early SMS adopter. Shown here is Toronto Pearson International Airport.

the aviation industry [in managing] the work and costs of developing and putting in place safety management systems, human factors training and non-technical skills assessment.”

CASA’s proposed schedule would give operators six months to develop an SMS implementation plan and up to two years to complete the implementation.

The agency said that the changes eventually would be incorporated into Civil Aviation Safety Regulations.⁴

“At that time, the requirements will be extended to cover all air transport operations, including charter flights,” CASA said. Many major airlines, including Qantas, and smaller operators already have implemented SMS, in advance of the regulatory requirements.

Missed Deadline

A number of operators also have implemented SMS in the United States, where the Federal Aviation Administration (FAA) is continuing its efforts to develop

specific SMS requirements. The FAA planned to file a difference with ICAO to explain that, although the agency intends eventually to develop SMS regulations and policies, they would not be ready in time to meet the Jan. 1 deadline.⁵

In a memo to operators, the FAA said that, although it has not developed SMS regulations, it has encouraged adoption of SMS within the industry and has published Advisory Circular 120-92, *Introduction to Safety Management Systems for Air Operators*, which contains information on the development and implementation of SMS on a voluntary basis. Additional supporting material is being developed, the FAA said.

Management for Managers

As airlines and other service providers have moved ahead, Ramos said, it has become clear that they have made considerably more progress with SMS than most regulatory authorities have made with development and implementation

of their internal safety management apparatus — the SSP.

Few regulatory authorities have a fully functioning SSP, Ramos said, noting that the *SMM* devotes separate guidance to the regulators responsible for that program, defined by ICAO as “a management system for the management of safety by the state.”

An SSP has four components: state safety policy and objectives, including a legislative framework, accident and incident investigation and enforcement policy; state safety risk management, including safety requirements for the SMSs operated by service providers; state safety assurance, including safety data collection, analysis and exchange; and state safety promotion, including internal and external training, communication and dissemination of safety information.

ICAO considers implementation of an SSP a prerequisite for the implementation of effective SMSs by service providers.



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SMS Implementation Experiences

In addition to the presentation by Jacqueline Booth-Bourdeau of Transport Canada (see “Into The Mainstream,” p. 24), three other panelists described their experiences with safety management system (SMS) implementation during the Joint Meeting of the Flight Safety Foundation 61st annual International Air Safety Seminar, International Federation of Airworthiness 38th International Conference and International Air Transport Association in Honolulu. Moderator David Mawdsley, aviation safety adviser for Super Structure Group and an instructor at Cranfield University, said that many aviation organizations find change management to be the greatest implementation challenge.

“An airline or other enterprise is composed of a system of systems, which are integrated and inter-supported,” Mawdsley said. “With SMS implementation comes the need [first] to integrate SMS within the organization as a whole. In the next 10 to 15 years, emphasis on integration of SMS will be increased, changing from integration within an organization to integration across the interface [with the industry].”

Peter Simpson, manager, air safety, Cathay Pacific Airways, believes that some SMS guidance material unwittingly has discouraged organizations by framing the implementation process at the outset as “costly, time-consuming, troublesome and

difficult.” A more positive and productive approach is to recognize existing capabilities and simplify implementation from the existing elements: “There is no airline or other organization in aviation that has to start from scratch,” Simpson said. “If your organization has passed the International Air Transport Association Operational Safety Audit [IOSA], and has IOSA accreditation, that also implies that you’ve got the building blocks, the basic components of the SMS. The real challenge is to make that SMS effective. Assessing risk is perhaps the most complex or over-complicated part. It is quite misunderstood, but it doesn’t need to be.”

Extensive guidance resources, templates and examples — many already compiled in one place by Eurocontrol’s SKYbrary Web site <www.skybrary.aero> — answer common questions about accepted ways of conducting risk assessment activities, he said.

A complication for large organizations is deciding how SMS, as a concept originated among safety specialists, will be relevant given line managers’ existing commitments to other corporate systems. “Some airlines have integrated safety, security, quality and environmental management [departments], yet people in the departments do not speak to each other,” he said. “An integrated SMS is the way to go.”

The SMS at Qantas Airways is the evolutionary product of nine years of learning, feedback and operational adjustments, added Robert Dodd, the airline’s general manager, group safety. “For an SMS to be effective, it has to be like any other element in aviation engineering; you cannot just throw all these elements together and not think about

the way they feed back on each other and the way they work,” he said. “Safety management is done by line managers, people who control resources, not by safety departments. Those line managers have lots of other things to do; they don’t just know how to manage safety. There aren’t a lot of resources [or] time, and we can’t expect managers to turn themselves into safety experts overnight. If they have a comfort level with certain aspects of existing systems or reporting, you need to build on that. You’re not trying to make SMS work for the safety manager, you are trying to make it work for the line manager.”

Integrated safety data from multiple sources — such as safety reports, telephone calls and line operations safety audits — have a critical function in the SMS concept, but making decisions and taking action to mitigate known risks are more important than collecting and manipulating data.

“Qantas makes sure that safety data are of value to the line managers, that we measure the effectiveness of what they do based on data, and that [data] that tell senior management how part of the business is going are the same data that the manager sees — so there is no ‘second set of books’ going on,” he added.

“We put a lot of focus on the assessment process, which basically looks at three dimensions: Does the organization have the capability to do this? Are people implementing the [plan, for example] to train people, and have they rolled this out to their business? Are people ... actually performing against the plan? A large number of organizations go part way through the [SMS] process. They collect enough information to adequately describe the nature of a problem. What they don’t do is put as much energy into making sure that they actually have fixed it.”

Since 2005, airports worldwide have discovered advantages during SMS

Wayne Rosenkrans



Simpson

implementations, said Gerhard Gruber, manager, rescue and airport operations, Vienna (Austria) International Airport. Regardless of the wide diversity among airport implementations, the SMS has helped many of them to cope with difficult operational pressures linked to rapid traffic growth, airport privatization and compliance with harmonized international standards.

“The optimum use of existing infrastructure is a challenge,” Gruber said. “You have airports that already have a safety system in place — they just name it ‘SMS’ and [other] airports do not have a single element of SMS. ... Any inconsistency, carelessness or deviation from safety standards [such as snow-covered runways, low visibility or missing/misleading visual aids] may result in a disaster.” The airport operator’s scope of responsibility for an SMS includes a comprehensive safety policy; a person dedicated to running the SMS; staff awareness and training;

and safety interface with contractors, such as ramp service companies and other third parties.

A special challenge for airports has been some airside employees’ low level of education, sometimes coupled with low personal motivation, compared with the personnel in areas like flight operations and air traffic control (ATC), Gruber said. Awareness, data presentations and training therefore have to be tailored to what each individual needs to know — including simplified SMS theory — in order to do their part. “Everyone should understand what SMS means to be able to follow the ideas and the policies,” he said.

When people see themselves as elements of a larger system beyond their immediate job, the level of safety increases. “For example, an aircraft taxiing out for departure [at Vienna] missed an intersection,” Gruber said. “ATC gave alternative instructions and, finally, the aircraft had to make a sharp

turn, 140 degrees. This turn was not designed for aircraft [crews] taxiing without a yellow centerline, however, and the inner gear of this aircraft flattened the edge lights of the taxiway, then the crew completed the takeoff.

“This was observed by a marshaller from a distance of 1.5 km [0.8 nm]. The marshaller reported to the operations officer that he saw the [aircraft wheels crush the] edge lights. The operations officer informed ATC, and ATC informed the pilot that there might be tire damage and [risk of] an unsafe landing. [Using SMS practices,] we had a discussion with Vienna ATC and found out that ATC was not aware that there was no yellow centerline and that the routing assigned should not have been used. ... The pilot involved had never had training for a taxi turn more than 90 degrees, so his company subsequently implemented that training.”

— Wayne Rosenkrans

“One of the objectives of an SSP is to generate a context that supports the implementation of SMS by service providers,” the *SMM* said. “The service providers’ SMS cannot effectively perform either in a regulatory vacuum or in an exclusively compliance-oriented environment. In such environments, service providers will only implement and demonstrate, and the state authorities will only assess, the tokens of SMS. [Effective performance of] SMS by service providers can only flourish under the enabling umbrella provided by an SSP. The SSP is therefore a fundamental enabler for the implementation of effective SMS by service providers.”

The *SMM* laid out several steps to implementing an SSP. First, a “gap analysis” should be conducted to assess the status of existing programs that might constitute elements of an SSP. The analysis should be followed by development of legislation and operating regulations for the SSP.

Early in the implementation process, a training program should be developed for

employees of regulatory authorities to ensure that they understand safety management concepts and related ICAO standards and recommended practices (SARPs), and to ensure that they have the knowledge to “accept and oversee” implementation of the key components of an SMS, in compliance with national regulations and ICAO SARPs.

In order for an SSP to specifically support SMS implementation, additional steps are required — the development of SMS requirements for service providers and related guidance materials, and the revision of the civil aviation oversight authority’s enforcement policy.

“During the course of normal safety management activities under the respective SSP and SMS, the state and the service providers will exchange safety data,” the *SMM* said. “The service providers’ safety data received by the state will be [proprietary] data, a part of which the state will convert into aggregate data. A significant amount of all these data will reasonably refer to safety concerns

“The service providers’ SMS cannot effectively perform either in a regulatory vacuum or in an exclusively compliance-oriented environment.”

identified through the normal course of the service providers' SMS processes. If the response to this data by the civil aviation oversight authority is enforcement action, the safety management process in the state will grind to a halt."

To prevent such situations, the SMM said, revision of enforcement policies is required "to ensure continuing flow and exchange of proactive and predictive safety management data with service providers who operate under an SMS environment."

The SMM recommended that the SSP include provisions to ensure that, although "gross negligence, reckless conduct and willful deviations should be dealt [with] through established enforcement procedures," some specific safety concerns should be handled internally by airlines and other service providers and within the context of the provider's SMS.

'Ambitious Undertaking'

One of the few regulatory authorities to have implemented an SSP is the U.K. Civil Aviation Authority (CAA), which in late 2008 published the supporting document.⁶

In the foreword to the document, Peter Griffiths, the U.K. director general of civil aviation, described development of the SSP as an "ambitious undertaking."

He added, "For a state to produce an SSP, it requires the state to examine its own legislation, policies and processes in a new light. Although it may be assumed that all was in order, the SSP may reveal issues that should be resolved to improve the way in which aviation safety is managed in the state."

For the CAA, development of the SSP was complex because of the involvement of other organizations — most notably the Department for Transport and the European Aviation Safety Agency (EASA) — in the regulation of

aviation in the U.K. and the need to accommodate the U.K.'s relationships with its territories and dependencies overseas. In addition, because military aircraft are so active within U.K. airspace, the CAA decided that the SSP would address both civil and military aviation.

Details of the roles to be played by EASA and the European Community will be described in the Community Safety Programme (CSP) being developed by EASA. The CSP, which will be EASA's version of an SSP, is expected to be issued in 2009.

The gap analysis found that although "most essential elements of the safety framework are well established," some items were identified for improvement, Griffiths said.

Training Sessions

For regulatory authorities still without an SSP, ICAO plans to conduct training beginning in March to aid in SSP development and implementation, as well as the collection, analysis and exchange of aviation safety data.⁷

The training, which will be offered, on request, to personnel in regulatory authorities, is designed to aid in the development of the resources required to implement their SSPs and to extend their safety data management capabilities. The objective is to encourage self-sufficiency in SSP operations and in the handling of safety data.

ICAO Secretary General Taïeb Chérif said that, in addition, countries that have developed an SSP are expected to cooperate to help regulatory personnel from other countries, "thus achieving the synergistic partnership recognized as necessary for the global implementation of safety management practices."

Flight Safety Foundation's International Advisory Committee (IAC) said some of the benefits associated with

SMS already are being realized, "not only in terms of safety, but [SMS] has given greater clarity to air transport organizations and resulted in enhanced operational efficiency."

Nevertheless, the IAC said, "SMS implementation is proving to be a tougher road than expected." ➤

Notes

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