IMPLEMENTATION OF SAFETY MANAGEMENT SYSTEMS (SMS) IN STATES

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This article discusses the importance of safety management systems (SMS) as a means to continue ensuring international civil aviation safety, in a rapidly expanding industry and within resource limitations of oversight authorities. The discussion is presented in the context of ICAO's activities to support the implementation of SMS across all safety-related disciplines in States, including ICAO's efforts at harmonizing SMS nomenclature, processes and the regulatory framework. The article stresses the need for the commitment by States to cooperate with ICAO in the aforementioned implementation in a harmonised manner.

INTRODUCTION

Compliance with ICAO Standards and Recommended Practices (SARPs) has been a cornerstone of international civil aviation safety. However, a rapidly expanding industry and resource limitations within oversight authorities make it increasingly difficult to efficiently and effectively sustain a prescriptive approach to the management of safety based upon regulatory compliance exclusively. It is essential to complement the regulatory approach to the management of safety with a performance-based approach.

A performance-based approach to the management of safety can be presented as a three-step process. In the first step, oversight authorities and operators/services providers agree on the safety performance to be expected from the operators/services providers while conducting their core business functions. Safety performance may be expressed in complex quantitative terms using collision risk modeling and associated target levels of safety. However, simpler quantitative approaches as well as qualitative methods, or even a combination of the two are increasingly being used as effective methods for determining and measuring safety performance. In the second step, oversight authorities and operators/services providers agree on the safety requirements necessary to achieve safety indicators and targets. Safety requirements usually include the array of tools and means (programmes, systems, procedures, technology and so forth) available to operators/services providers. In the third and last step, oversight authorities verify achievement of the agreed safety performance or its lack thereof, and operators/services propose corrective measures for observed deviations.

Senior management accountability is also a fundamental aspect of a performance based approach to managing safety as prescriptive inspections and reviews by oversight authorities can conceivably decrease. In this way, operations and safety managers realize a greater stake in ensuring safety.

Performance-based approaches to the management of safety are best exemplified by safety management systems (SMS), and the maturity achieved by the SMS concept allows for its implementation on a global basis.

THE MANAGEMENT OF SAFETY

The efficient and effective management of any aviation organization, regardless of the nature of its functions or its size, requires the management of basic and traditional business processes: financing, budgeting, communicating, allocating resources and so forth. In recent years, managing safety has been added to the list of basic and traditional business processes. Managing safety should now be as much a

part of running an aviation organization as managing any of the traditional business processes. The term **safety management** conveys the notion that the management of safety is a business process that must be considered at the same level and along the same lines as any other business process.

Traditional systems for the management of safety are set in motion only after some triggering event, such as an accident, incident or reportable event, discloses a safety concern. Such system will always serve an important purpose, identifying safety faults through forensic means. For this reason, such approaches may be considered outcome-driven and reactive: they need an outcome in order to react and engage the safety management process. In these systems, responsibility for monitoring outcomes and the remedial action to the safety concerns underlying outcomes may be scattered within the organization, depending on the sector(s) involved (flight operations, maintenance, ramp, cabin and so forth) in the event leading to the outcome. Furthermore, lines of accountability for safety monitoring and safety responses may not always be clearly articulated, and if they are, safety accountability generally stops at the middle management level.

The trend is toward spending greater efforts on proactive and predictive systems to manage safety. SMS, involve the on-going routine collection and analysis of safety data during the course of the activities that an organization must pursue every day while conducting its core business functions, in addition to reacting to outcome data. For this reason, SMS may be considered process-driven and proactive: they continuously collect and analyze sizable volumes of data that provide for a principled basis to the definition of activities and the allocation of resources to address safety concerns in a proactive manner. The term **system** conveys the notion of an integrated set of processes aimed at managing safety that crosses intra-departmental boundaries, thus addressing safety concerns from an integrated, broad perspective.

An SMS thus comprises a systemic approach to the management of safety that includes the necessary organizational structure, accountabilities, policies and procedures. In order to reinforce the notion of safety management being a managerial business process, basic SMS requirements should include provisions for an organization to establish lines of safety accountability throughout the organization, as well as at the senior management level.

ACTIVITIES BY ICAO

The Strategic Objectives of ICAO for 2005 to 2010 include Strategic Objective A: Safety – *Enhance global civil aviation safety,* Key Activity A8: Support the implementation of safety management systems across all safety-related disciplines in all States.

Many States and organization have been involved in implementation of SMS for many years however, ICAO had noticed some discrepancy concerning key terms and concepts and notions. This was evident in the way that States attempted to adapt the notion of “acceptable level of safety”, in the use of terms such as safety programme and safety management system, in the development of regulations and in the way that SMS was explained and taught. Therefore, ICAO began a substantial effort in 2005 to harmonize these concepts and terms, to combine all of its safety management guidance into one comprehensive document: the ICAO Safety Management Manual (Doc 9859), and to coordinate, research and study those notions that were vaguely understood and to clarify these. The result was a clear and common notion of SMS and its components and a comprehensive guidance document. The next step was to develop common course material to support training and to ensure that operational and safety managers, as well as operational personnel, would more fully understand fundamental safety and human factors concepts such as “just” and “safety” culture, the notion of latent conditions and aspects of human error.

The goal of these efforts is to facilitate a harmonized approach, on a global basis, to the implementation of SMS. This harmonization will lead to a better and common understanding of SMS, extensive sharing of information and data, rapid expansion of SMS through common dialogue and easy understanding, common and readily available course material and easily adaptable model regulations, among other things.

Very importantly, work on Key Activity A8 included an amendment to ICAO SARPS that harmonizes safety management provisions in Annex 6 — *Operation of Aircraft*, Part I — *International Commercial Air Transport — Aeroplanes*, and Part III — *International Operations — Helicopters*, Annex 11 — *Air Traffic Services*, and Annex 14 — *Aerodromes*, Volume I — *Aerodrome Design and Operations*. The *ICAO Safety Management Manual* is essential guidance material to support the harmonized provisions relating to safety management in Annexes 6, Parts I and III, 11 and 14, Volume I. This manual is a unified source of safety management information. It includes a section that discusses generic safety management concepts, applicable across aviation activities, followed by sections on specific activities (operators, maintenance organizations, air traffic service providers and aerodrome operators.

In the continuation of the work, the following critical tasks will be completed over the next two years:

a) analysis of all Annexes to assess the feasibility of developing Standards and Recommended Practices (SARPs) compatible with a performance-oriented regulatory approach to the management of safety in States;

b) development of model regulation to support a performance-based regulatory approach to the management of safety in States;

c) development of guidance material for the integration of safety management practices by national oversight authorities, as well as the application of safety management concepts and practices in aviation organizations; and

d) delivery of a programme of training courses, one in each ICAO Regional Office, to assist States to implement the harmonized provisions discussed in the previous paragraph.

This will complete the first phase of the implementation of Key Activity A8, planned to coincide with the next Ordinary Session of the ICAO Assembly in September 2007.

THE IMPORTANCE OF TRAINING

The importance of training for the implementation of SMS on a global basis, based upon a synergistic partnership between ICAO and States, was recognized by the Conference of the Directors General of Civil Aviation on Global Strategy for Aviation Safety, held in Montreal from 20 to 22 March 2006. The Conference produced Recommendation 2/2 that, among others, requests States to engage in far-reaching cooperation with ICAO in the programme of training courses and to engage in exchange of information to progress in the implementation of SMS. The recommendation also requests the ICAO Council to continue work towards the development of training, guidance material and other enabling tools to help Contracting States expedite the implementation of SMS.

As a response to this recommendation, ICAO has developed a Safety Management Systems (SMS) Training Course for States. Three regional training courses were delivered during 2006, and four training courses will be delivered during 2007. These courses will build upon the harmonized safety management provisions and Doc 9859. The goals of the ICAO Safety Management Systems (SMS) Training Course are to develop participants' knowledge of safety management concepts and ICAO Standards and

Recommended Practices (SARPs) on safety management in Annexes 6, 11 and 14, and related guidance material, as well as develop participants' knowledge to certify and oversee the implementation of key components of a basic SMS, in compliance with relevant ICAO SARPs and national regulations. The target audience for the courses includes representatives from civil aviation authorities responsible for the implementation of safety programmes, and the oversight and/or implementation of safety management systems, in the areas of aircraft operations, air traffic services, and aerodromes.

The ICAO Safety Management Systems (SMS) Training Course is delivered in five days, and comprises ten modules and six case-studies to allow participants to apply the newly-acquired knowledge in a practical setting. Topics covered include basics of safety, fundamentals of safety management, hazard identification and risk management; ICAO SMS regulation; and development, implementation and operation of an SMS. The course includes daily progress tests and a final examination.

The programme of seven safety management systems (SMS) training courses discussed above is an initial response to the needs of States regarding implementation of SMS. However, further action is necessary to ensure that sufficient training opportunities on SMS exist and meet the intent of Recommendation 2/2 of the Conference of the Directors General of Civil Aviation on Global Strategy for Aviation Safety.

ICAO will therefore deliver "train the trainer" courses on SMS to allow the development of resources in greater numbers than what the regional SMS training courses would allow. The objective of this training is to enable States to become self-sufficient both in SMS implementation as well as in imparting SMS training. It is further envisioned that States developing internal resources will engage in cooperation to assist other States in the implementation of SMS, thus achieving the synergistic partnership recognized as necessary for the global implementation of SMS by Recommendation 2/2 of the Conference of the Directors General of Civil Aviation on Global Strategy for Aviation Safety. This training will be delivered upon specific request from individual States or group of States, and under the following conditions:

a) ICAO will provide training to officials from requesting States up to a maximum of 30 participants per course. This will include delivery of the ICAO course materials in electronic format to States. Presently, course delivery and course materials are available in English and Spanish, and activities to extend these to other languages are being advanced;

b) The custodian of the ICAO course materials must be the civil aviation authority, or the designated official training institution of the requesting States;

c) The requesting State or group of States must provide all travel and living expenses associated with training delivery for two ICAO instructors;

d) Once the training is completed and States' instructors endorsed, States may utilize the ICAO training course and its materials without restrictions;

e) ICAO will provide, in electronic format, States with updated versions of the training course and course materials as appropriate;

f) ICAO will retain, and States will formally agree to, the responsibility for quality control of course contents and delivery on two-year cycles. All expenses associated with the quality control visits by one ICAO staff will be borne by States; and

g) When resource limitations so dictate, priority will be given to requests by groups of States over requests by individual States.

FUTURE WORK

Work beyond the first phase of Key Activity A8 can only be envisioned at the present time, since the need and direction of follow up activities will, to a large degree, be dictated by the experience obtained during the first two years of implementing the Activity. Nevertheless, the following is proposed as broad projection of future work:

(a) the development of focal points and enablers to further pursue safety management activities, including safety management training, on a regional basis;

(b) the establishment of safety data collection and analysis systems in States;

(c) the development of safety data analysis capabilities in States;

(d) the establishment of regional systems for the exchange of safety information and analysis;

(e) the networking of regional systems for the exchange of safety information and analysis with ICAO; and

(e) the enactment of national legislation(s) to protect all relevant sources of safety information.

CONCLUSIONS

Under the prevailing situation in international civil aviation, it is becoming increasingly difficult to dissociate safety from efficiency. Aviation organizations, no matter their core business activity or geographical location, must not only be safe but also efficient. Even organizations that are not directly involved in a measurable production activity, such as civil aviation administrations, are under the pressure to discharge their mandate in the face of ever-diminishing resources, thus facing efficiency issues. Hence, the value and importance of SMS.

SMS presents the international aviation community with a principled, data driven approach to the prioritization of resources towards safety concerns that hold the greatest risk potential, and towards activities likely to produce the biggest return on resources invested. In this manner, SMS presents the international aviation community with clear means to achieve more, safety-wise, with less.

ICAO has worked determinedly toward harmonizing SMS notions, guidance material and SARPs, in addition to developing a comprehensive training course and is now preparing to deliver this course as far and wide as possible.

The full potential of SMS will be realized when the concept is adopted in a global basis, by all Contracting States and, through States, by as many aviation organizations as possible. In order for this global implementation to take place, States need to be fully aware and informed about the SMS concept and the means and tools for its implementation.

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