

PROTECTING DATA COLLECTED FOR SAFETY PURPOSES

ICAO

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SAFETY MANAGEMENT

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UNLOCKS POTENTIAL
OF SMS





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COVER *(Photo by R. Ian Lloyd/Masterfile)*

Several of the feature articles in this issue are dedicated to the topic of safety management systems, a tool that provides performance-based approaches to the management of safety. Under ICAO provisions that took effect in November 2006, airport operators, aerodrome operators, ATS providers and maintenance organizations worldwide are required to implement such systems.

Promoting the Development of International Civil Aviation

The International Civil Aviation Organization, created in 1944 to promote the safe and orderly development of civil aviation worldwide, is a specialized agency of the United Nations. Headquartered in Montreal, ICAO develops international air transport standards and regulations and serves as the medium for cooperation in all fields of civil aviation among its 189 Contracting States.



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ICAO initiative promotes global approach to SMS implementation

With an emphasis on achieving worldwide harmonization, the organization's initial efforts to foster safety management have focused on the development of new regulatory provisions, guidance material and a special training programme

VINCE GALOTTI • ARUN RAO
DANIEL MAURINO
ICAO SECRETARIAT

COMPLIANCE with ICAO standards and recommended practices (SARPs) is a cornerstone of international civil aviation safety. However, a rapidly expanding industry and limited resources at oversight authorities make it increasingly difficult to efficiently and effectively sustain a prescriptive approach to the management of safety based upon regulatory compliance exclusively. This is why it is essential to complement the regulatory approach to safety management with a performance-based approach.

A performance-based approach to safety management can be presented as a three-step process. In the initial stage,

oversight authorities, operators and service providers agree on the level of safety that operators and service providers are expected to achieve. This 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.

During the second step of the process, oversight authorities, operators and service providers decide on the safety requirements necessary to achieve agreed targets. These requirements usually include the array of tools and means available to operators and service providers. In the third and final step, oversight authorities ascertain whether

the envisaged safety performance has been achieved, after which operators and service providers propose measures for correcting any deviations.

Senior management accountability is a fundamental component of the performance-based approach, since the frequency of prescriptive inspections and reviews by oversight authorities can conceivably decrease. In this sense, operations and safety managers assume a bigger stake in ensuring safety.

Performance-based approaches to the management of safety are best exemplified by the safety management system (SMS), and the mature concepts that form the building blocks of an SMS allow for its implementation on a global basis. Indeed, under ICAO provisions that took effect in November 2006, aircraft operators, aerodrome operators, air traffic services providers and maintenance organizations worldwide are required to implement safety management systems.

Management of safety

The efficient and effective management of any aviation organization, regardless of the nature of its functions or size, requires the management of basic business processes such as financing, budgeting, communicating, allocating resources, and so forth. In recent years, managing safety has been added to this list. Managing safety should now be as much a part of running an aviation organization as managing any other business process. Moreover, it has been well established that effective management of safety is good business.

Traditional systems for addressing safety issues are usually set in motion only after some triggering event such as



Rand K. Peck

In companies where management is truly committed to enhancing safety as a core business activity, employees will not be afraid to bring forward their safety concerns

an accident or incident discloses a safety concern. While such efforts will always serve an important purpose, identifying safety concerns through forensic means, they need an outcome in order to react and engage the safety management process. In these systems, responsibility for monitoring outcomes and reacting to the safety concerns related to outcomes may be spread around the organization depending on the type of activity involved (e.g. flight operations, maintenance, ramp and cabin). Furthermore, those accountable for monitoring safety and addressing concerns may not always be clearly identified, and often when they are readily identifiable, the individuals held accountable for safety are only at a middle management level.

The trend today is towards greater emphasis on proactive and predictive systems to manage safety. SMS involves the ongoing 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 the data collected. The SMS may be considered process-driven and proactive. It continuously collects and analyses sizable volumes of data that provide a principled basis for 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 and broad perspective.

An SMS thus comprises a systemic approach to the management of safety that puts in place the necessary organizational structure, accountability, policies and procedures. In order to reinforce the conviction that safety management is a managerial business process, basic SMS requirements should include provisions for an organization to establish lines of responsibility for safety throughout the organization, beginning with the senior management level.

In addition to the systemic and proactive nature of managing safety, which is

BUSINESS PLAN UNDERSCORES COMMITMENT TO SAFETY MANAGEMENT

THE ICAO business plan and the organization’s new focus on safety management might seem as two unrelated efforts born roughly in the same timeframe. On closer inspection, however, one realizes that the two initiatives have a common conceptual anatomy: both are based on the achievement of measurable results, both emphasize accountability, and both feature a performance review process that can lead to self-improvement. This similarity is not a coincidence, but was born out of the necessity to accept two emerging realities: the limits on resources, and a shift from a reactive and prescriptive methodology towards a preventive and performance-based one.

Expedient implementation of safety management systems is one of the key activities arising from ICAO’s safety-oriented business plan. Safety management system (SMS) implementation around the world is one of the “pillars” that make up the high-level strategy through which the safety of international civil aviation is to be advanced.

The overall tactical deployment of ICAO’s resources in the sphere of safety management is aligned and managed through the business plan with the goal of delivering a consistent and harmonized global approach to the concepts and implementation of SMS and the implementation of performance-based safety regulations. These anticipated results are complemented by a defined set of measurable indicators through which the effectiveness and efficiency of the ICAO initiative will be monitored.

SMS is thus firmly embedded within

the safety component of the organization’s business plan, a symbiosis that is mutually beneficial. The business plan independently measures the effectiveness of the SMS programme, while the implementation of SMS by States allows better input and response to the other



Jim Jorgenson

ICAO’s efforts to advance implementation of SMS across all aviation disciplines are in step with the organization’s business-like approach to safety enhancement

safety strategies supported by the business plan. This input is enhanced through the collection of safety data, while response is enhanced through an improved safety culture.

The way forward for both the business plan and safety management programme demands a commitment to safety management systems from the highest levels of an organization, with transparent accountability. Just as ICAO’s business plan evolved from institutional action sparked by its member States, the international standards that apply to safety will require States to implement programmes that include acceptable levels of safety as defined by authorities, operators and air navigation services providers.

For these two interlinked initiatives to survive, patient attention is required from all civil aviation stakeholders. Perhaps

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relatively concrete and understandable, the evolution to a more managed approach to safety and to the SMS also requires a change in the way that people think about safety, a collective perception that may be referred to as culture. Although culture cannot be regulated or implemented in the way that more concrete systems and rules may be, manage-

While many States and organizations have been involved in implementing safety management systems over the years, ICAO has noticed some discrepancies concerning the key terms, concepts and hypotheses they appropriate. This was evident, for example, in the way that States attempted to adapt the notion of an “acceptable level of safety.” Discrepancies

The point of all these efforts has been to facilitate a harmonized global approach to the implementation of SMS. Harmonization will lead to a better and common understanding of SMS, extensive sharing of information and data, rapid expansion of safety management systems, common course material and readily adaptable model regulations, among other things.

Very importantly, one way ICAO has supported SMS implementation has been to amend SARPs to establish harmonized safety management requirements in specific annexes to the Chicago Convention.* The *Safety Management Manual*, a central source of safety management information, offers essential guidance material concerning these harmonized provisions. It includes a section on generic safety management concepts applicable across aviation activities, as well as sections on the specific activities of operators, maintenance organizations, ATS providers and aerodrome operators.

In continuing its initiative, ICAO will have to complete several critical tasks by the autumn of 2007. All Chicago Convention annexes, for example, will have to be assessed to determine the feasibility of developing SARPs compatible with a performance-oriented regulatory approach to safety management. Model regulations will be required to support adoption of a performance-based regulatory approach by States. Material will be needed to guide national oversight authorities in integrating safety management practices and to assist aviation organizations in applying SMS. Finally, a programme of training courses to assist

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* The amended annexes are 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). In all, 18 annexes to the Chicago Convention contain provisions for the safe, secure, orderly and efficient development of international civil aviation.

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Jim Jorgenson

In recent years safety management has been added to the list of traditional business processes that are required to run any aviation organization

ment philosophy can be transmitted in clear and unambiguous terms through an organization.

Once convinced that SMS is good business and that it should become an integral part of an organization, management should take definitive measures to ensure that its commitment to managing safety as a core business activity is recognized by the staff. Over a period of time, staff should feel at ease about bringing forward safety-related information. The combination of rules and regulations and concrete action — together with an explicit change in management philosophy — should result in a greatly improved safety culture.

ICAO action

ICAO's strategic objectives for the period up to 2010 include the enhancement of global civil aviation safety, a goal that calls for the organization to support implementation of safety management systems across all safety-related disciplines in all States.

were also apparent in the use of various terms, as well as in regulatory development and in the manner that SMS was being explained and taught.

The organization initiated a substantial effort in 2005 to harmonize these concepts and terms and to combine all of its safety management guidance into a single comprehensive document entitled the *Safety Management Manual* (ICAO Document 9859). It also began to coordinate, research and study those ideas that were vaguely understood. The result was a clear and common perception of SMS and its components, and a comprehensive guidance document for SMS implementation. The next step involved developing common material to support training and ensure that operational and safety managers, as well as operating personnel, more fully understand fundamental safety and human factors concepts such as “just” culture, the role of latent conditions, and aspects of human error.

Concept of safety management system embraced by many countries

In the United States, a newly issued SMS standard for use by air operators is the product of extensive research and collaboration involving industry, labour and government safety regulators

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A safety management system (SMS) standard for use by aircraft operators of all types and sizes was issued by the Federal Aviation Administration (FAA) in late June 2006. The new standard is the product of extensive research as well as inputs from industry, labour, and both U.S. and other government safety regulators, and is described in an FAA advisory circular entitled *Introduction to Safety Management Systems for Air Operators*.

Under an ICAO provision that took effect on 24 November 2006, member States are required to ensure that aircraft operators, aviation maintenance organizations, air traffic services providers and aerodromes implement safety management systems. The United States, among many other nations, has enthusiastically endorsed the SMS concept.

Product of necessity

The current operating environment for commercial aviation is characterized by complexity and almost constant change. This requires that air operators and aviation service providers constitute open systems, continually adapting to this dynamic environment in order to survive. The modern aviation system is best viewed as a "system of systems" with complex interdependencies and a variety of business models and adaptable relationships.

The FAA, together with ICAO, recognizes the need not only for a more systems-oriented approach to safety than has been previously practised, but for a more managerial approach to safety on the part of both government and industry. Notwithstanding the FAA's responsibility to promulgate regulations and standards, progress in aviation safety can be enhanced with a more integrated and cooperative relationship with industry versus a legalistic, adversarial approach. Safety management is, therefore, more rightly viewed as a shared effort by government and industry.

Trends in management theory indicate that a structured approach to management, where clear goals and requirements are set and where management processes are put in place to assure attainment of these goals, are more reliably effective than other approaches. The FAA is in the process of instituting a completely systems-based approach for air carrier oversight. Both the agency and industry recognize that this transition cannot be effective through the regulator's actions alone. System safety must be infused into the management systems of air operators and other service providers if it is to have the desired effect on safety outcomes.

It is to this end that the SMS standard was developed. The standard is designed to be used by operators to develop a management framework for safety risk management and safety assurance. Moreover, the standard postures the safety management efforts in such a manner that they

can be integrated with the other management systems of the airline as well as provide an interface with the regulatory oversight system.

The process

At the time that the FAA began considering development of SMS standards and implementation by U.S. airlines, several other countries had already developed material on the subject, as had the Air Line Pilots Association (ALPA) and several U.S. airlines. A number of other innovative quality management and system safety efforts were also in play that employed many of the concepts seen in a typical SMS. It was clear at the outset that the future system would benefit from com-

monality and harmonization with existing systems, and so the FAA/industry team commenced a process of research to avoid reinventing the wheel. However, the FAA/industry team has also made its own unique

contribution along the way.

The research project was conducted under contract to the FAA Technical Center after a review of requirements using a focus group with representatives from different FAA entities, several major airlines and ALPA.

The research project entailed a detailed literature search of documented aviation safety management systems, as well as existing management systems developed for quality assurance, occupational safety and health, and environmental protection. Beyond the literature search, site visits and interviews were

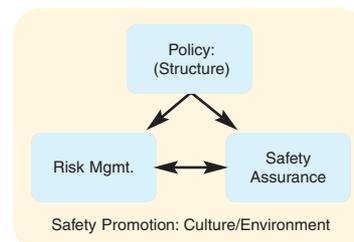


Figure 1. The relationship of major elements of an SMS

conducted with representatives of regulatory agencies and operators in Australia, Canada, New Zealand, and the United Kingdom. Interviews were also conducted with representatives of the Joint Aviation Authorities (JAA) and several third-party industry groups.

The research team also considered the work of several contemporary aviation theorists, notably, Dr. James Reason, and several other common sources of system safety background, such as the U.S. military standard Mil-Std 882.

Standard development. As the project progressed, a growing recognition of the need for a universal standard emerged. The FAA/industry team perceived that there was a need for conceptual harmonization across the various service providers in the aviation system. A team was formed under the FAA's Joint Planning and Development Office (JPDO) to develop a universal SMS standard template that was designed for broad applicability across all types of aviation service providers. This approach

latitude to build programmes that align with their existing or proposed business and management models while assuring a common set of SMS processes across operators.

The individual processes in the standard's clauses were organized under the structure of the "four pillars" defined in the draft SMS manual for the U.S. Air Traffic Organization (ATO), which was already under development because of an earlier ICAO mandate for implementation of safety management systems in the air traffic management (ATM) field. The four pillars constitute policy, safety risk management, safety assurance, and safety promotion. Of these cornerstones, the risk management and safety assurance pillars define the two principal, interactive processes of the SMS. The policy pillar provides structural documentation of the system, including a requirement for assignment of responsibility and authority for management processes and provision of related procedures. The procedure for safety promotion, along with certain policy requirements, provides for an organizational environment that supports a healthy safety culture. *Figure 1* shows the relationship of these elements in the SMS.

Systems must also facilitate audits by both operators and third parties. For this reason, the general format of the ISO standards was favoured as a pattern. The environmental standard, ISO 14001, was chosen as the basic template. This standard was selected because the system requirements for environmental protection, like those required for safety, are based more on objective assessments of the impact on system users and on the public than on customer satisfaction. At the same time, the safety assurance processes of the SMS drew heavily on the auditing, analysis and preventive/corrective action

processes defined in ISO 9000. Therefore, ISO 9000 was used as the basic template in these areas.

Figure 2 provides a functional description of the SMS standard's clauses, showing the organization of the document and the relationships of its principal elements. Clauses four through seven constitute the four pillars of the SMS as described above. Clause 4 (policy) contains a requirement for procedures and organizational controls to be defined throughout the system. A number of individual processes also call for measurable criteria. The remainder of the figure shows subprocesses that are described within each major clause.

Safety policy is the underpinning of the SMS. Effective safety management begins with policies that convey to all staff members the top management's emphasis on safety and their objectives. These policies include assignment of responsibility and authority throughout the organization with respect to all safety-related functions. Policies must also be translated into procedures to provide staff with clear instructions for accomplishing their safety-related functions as well as organizational controls to ensure that these functions are performed as intended.

Safety management is founded on risk management. The fundamental objective of any safety programme is to identify hazards, analyse and assess associated risks, and design and implement controls for those hazards and risk factors. The safety risk management (SRM) pillar in the FAA's SMS standard for air operators is based upon a model that is used in several popular system safety training courses, including the course taught at the FAA Academy. The FAA's SMS standard starts with a careful analysis of the organization's systems and goes on to provide structured processes that result in the development of risk controls. The principal steps in the SRM process include system and task analysis, identification of hazards, and risk analysis, assessment and control. Each of these steps is described in brief below.

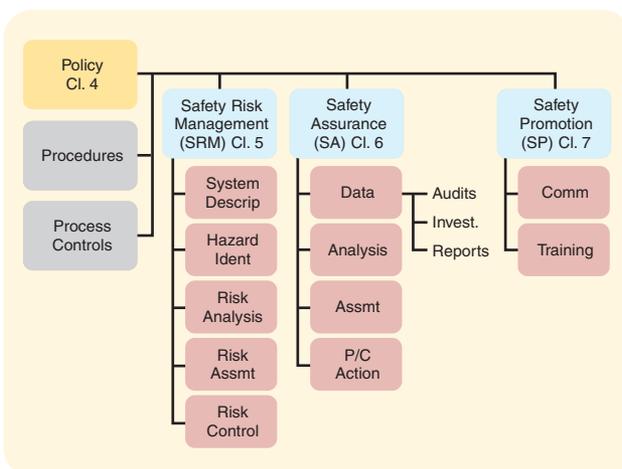


Figure 2. Functional description of the FAA SMS standard

allowed for discussion among representatives of the component industries of the system and their respective oversight organizations, and provided a forum for review of the emerging documents.

Structure and functions. The standard is designed to take a functional orientation; that is, requirements are laid out to delineate what processes are expected rather than how they will be implemented. This allows operators the maximum

allowed for discussion among representatives of the component industries of the system and their respective oversight organizations, and provided a forum for review of the emerging documents.

- **System/task analysis:** Both physical (e.g. equipment, aircraft, facilities) and organizational systems are to be defined in order to gain a thorough understanding of the conditions in which hazards may arise.

- **Hazard identification:** Systems, processes and tasks are analysed to identify the existence or conditions that could create hazards to personnel or property.

- **Risk analysis:** Hazards are further analysed to determine factors related to risk severity and likelihood. These will later become the basis of risk controls.

- **Risk assessment:** Overall risk is evaluated for its acceptability. The FAA's SMS advisory circular, AC 120-92, uses a risk matrix based upon severity and likelihood definitions provided in the ICAO *Safety Management Manual*.

- **Risk control:** Where necessary, controls are developed to eliminate hazards or to reduce their potential effects. These controls then become system requirements, which will be continuously evaluated by the safety assurance function of the SMS, a process that operates similar to a quality management system.

Safety assurance, the third cornerstone of the safety management system, involves safety, quality and integrated management. Risk controls developed under the safety risk management pillar now become organizational system requirements. Safety assurance involves taking these requirements and applying quality management techniques to the process of ensuring that these controls are being correctly implemented and that they are producing the desired results.

The group that developed the standard kept in mind that airlines are really a collection of systems. There are the technical systems that make up flight operations, ground operations, maintenance and training, as well as other manage-

ment systems that must be in place for the business enterprise to run. Moreover, other areas of health and safety must be managed by these businesses, such as occupational safety and health management systems and environmental management systems. While the focus of the SMS is on safety, the standard was draft-



Jim Jorgenson

The final version of the FAA's SMS standard and associated guidance material will be based on feedback and data analysis involving a diverse group of operators and service providers

ed in full recognition of the need for airlines to balance requirements and to make them fit together with a minimum of duplicated effort.

Safety promotion, the final pillar, is the foundation of a sound safety culture. It was developed with recognition of the importance of a sound safety culture to the safety management process. Employee knowledge, involvement and motivation are crucial to safety management success.

The safety promotion pillar stresses training and awareness, communication, and active participation. It also sets the groundwork for support of a "just culture" in which employees are encouraged to report safety deficiencies with confidence that their management will be fair and responsive to their input, and without fear of punitive actions.

A sound, just safety culture recognizes that well trained, motivated and responsible employees are nonetheless vulnerable to making errors and emphasizes correction of safety deficiencies rather than apportion-

ing blame and punishment. The safety promotion pillar is also closely integrated with the SRM and SA pillars, as it is an important source of information for both.

The foundation of a healthy safety culture is based on well-designed operational procedures that are harmonized cross-functionally and then fully engrained into

employee behaviours using a robust employee training programme. This is clearly a responsibility of the management team. However, the conduct of operational activities in a safe manner rests on the shoulders of each employee as they perform technical and service-related tasks. Safety is, therefore, both an individual and corporate responsibility. Safety promotion is laced throughout all initial and recurrent training activities and also throughout all operations so that it can

continue to nurture the organization's safety culture.

Programme integration

The SMS standard was developed with the understanding that various safety programme components might already exist separately in an organization. The SMS concept provides a framework for integrating all of these government and industry programmes into a comprehensive system. Most of the existing programmes are treated as optional, but current and future efforts will be directed toward more seamless integration.

Several programmes have more extensive requirements that are over and above the minimum requirements of the SMS standard. For example, the standard requires participating operators to have a confidential employee reporting system and to use these reports in the safety assurance process. The Aviation Safety Action Programme (ASAP), for example, provides such a process with detailed data collection, review, analysis and data

management functions. ASAP was designed for large- to medium-sized operators and the requirements may be beyond the resources of many smaller organizations. Thus, the SMS standard was created with fundamental requirements while treating the more extensively developed programmes such as ASAP as an optional means of meeting the requirements for those organizations capable of making the necessary investments. ASAP is one non-punitive reporting system, but other systems can also be designed to meet the requirements of the standard.

The standard is written so that a company can develop an integrated management system to tie safety and quality disciplines together by harmonizing supporting programmes with the organization's risk management efforts. Since

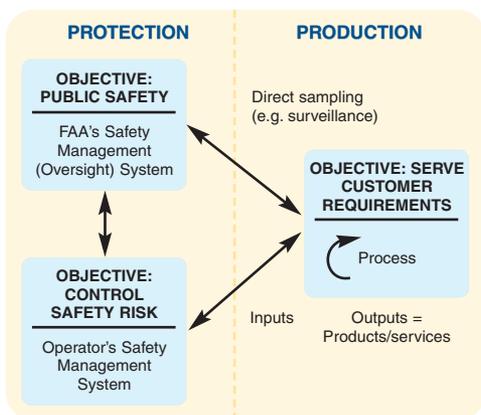


Figure 3. Relationships between an operator's SMS and the oversight system

each of these programmes can identify and assess risk from a unique perspective, integration of management systems can be highly beneficial. The role of an internal evaluation programme (IEP), for example, is to assure the safety of operational activities, verify regulatory compliance, ensure conformance to organizational procedures, and identify opportunities for improvement. An IEP will be more effective if it evaluates safety issues identified by programmes such as ASAP and Flight Operations Quality Assurance (FOQA) or other sources of safety information that may also be in place in the company. Corrective actions are implemented for these safety/quality issues

and system effectiveness is again measured by these component programmes, thus continuing the cycle. Senior management is able to track the organization's health when the information generated by these programmes is effectively integrated and analysed.

Oversight system

The FAA fully supports the ICAO position that safety should be addressed by a managerial approach, and furthermore that there are distinct roles for both government regulators and the business entities that they oversee. The FAA began a movement to a more systems-oriented method of oversight in 1998 with the advent of the Air Transportation Oversight System (ATOS). Since then, the agency has encouraged operators to use the same tools that are used by FAA inspectors to design and evaluate organizational systems. Safety is most effectively achieved through an open and collaborative approach, wherein information moves freely not only inside the oversight system and the airline, but between them as well.

Figure 3 depicts the general relationship between the three main entities in the safety equation. The first distinction made in the model is that between production and protection, a concept brought forward by Dr. James Reason, a prominent organizational theorist. In traditional oversight, most of the interaction between the oversight system and the business entity occurs along the diagonal line, direct, interventionist approach. In the safety management approach, safety assurance by the regulator is primarily carried out via the relationship with the operator's SMS. Safety risk management, which is primarily the responsibility of the operator's management, is carried out in the SMS. However, the continuous and open relationship facilitates close collaboration on both risk management and safety assurance.

The depiction of protective and productive functions does not, however, imply a matching organizational structure. In

fact, the most important functions of the SMS are carried out by line management, those who are responsible for production and who have the authority to direct activity and allocate resources.

The future

Safety management systems are currently voluntary in the United States, and AC 120-92, the current SMS document, describes an optional process for air operators. However, the FAA came out in favour of the recent amendment to ICAO Annex 6, including a new requirement for States to ensure that aircraft operators implement safety management systems, and it intends to implement the Annex 6 provisions according to the prescribed schedule.

To this end, the FAA is in the process of organizing a proof-of-concept with feedback and data analysis across a diverse set of sizes and types of operators and other service providers. In this manner, both industry and government participants can learn important lessons while the systems are still voluntary and can consequently be tailored more freely.

A collaborative approach among the FAA and industry groups, including representatives of management, labour organizations such as ALPA and other industry advocacy groups, will be used over time, and analysis of the proof-of-concept experiences will allow for better implementation of the SMS concept across the industry. The final version of the standard and associated guidance material will be drafted and edited based on experience.

continued on page 39

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Business model focused on risk management enhances safety programme decision-making

Regulator's adoption of a business model for managing its safety programme evolved out of the recognition that aviation safety is best served by analysing and controlling the risks

BRYCE FISHER

TRANSPORT CANADA

ADOPTION of a business model, as Transport Canada has discovered, is an effective way to deliver and manage a civil aviation programme, in part because it applies equally to safety as to other broader management issues.

The business model introduced recently by Transport Canada Civil Aviation (TCCA), which is based on the management of risks, will help the organization make better decisions in an environment that is forever beleaguered by competing demands for limited resources.

While regulatory authorities may find the business model approach worthy of closer examination, aviation companies may as well, because risk management is an integral part of a safety management system (SMS). The tactics and strategies used to mitigate risk may be different, but the processes used to arrive at such tactics and strategies are the same.

Although the focus of this article is on aviation safety, the business model has broad applicability: it can apply to security or environmental topics, and can also apply to other modes of transport or management issues.

TCCA's adoption of the business model that is described below evolved out of recognition that safety is not an absolute condition, but rather one where risks are managed to acceptable levels.

Safety defined

Although Transport Canada has long emphasized the paramount importance of safety, the word "safety" is not defined in

Canadian aviation legislation or departmental policy documents.

The dictionary is equally unhelpful in this regard. The Concise Oxford Dictionary defines safety as: "freedom from danger or risk; being sure or likely to bring no danger; being safe." The dictionary describes an absolute condition while few, if any, situations are completely free from danger or risk. Like all human enterprises, aviation is fraught with risk.

The absence of an operational definition of safety has been problematic for civil aviation. It is susceptible to wide, subjective interpretation, which can lead to conflicting priorities and the consequent allocation of resources to lesser issues; it hinders consistency in the delivery of regulatory programmes and quantitative performance measurement.

Simply put, in the absence of a formal, operational definition of safety, the dictionary's version cannot apply in an aviation context, or any other low-probability, high-consequence industry for that matter. Perhaps it was in a similar light that William W. Lowrance defined safety as "a judgement of the acceptability of risk, and risk, in turn, as a measure of the probability and severity of harm to human health."* He summarizes by stating that "a thing is safe if its risks are judged to be acceptable."

For the reasons stated above, in Flight 2010 — TCCA's current strategic plan — a working definition of safety is provided as "the condition where risks are managed to acceptable levels."

The new mission. Having defined safety in terms of risk, TCCA refined its mission statement, which aligns with the larger departmental mission, as follows: "To

develop and administer policies and regulations for the safest civil aviation system for Canada and Canadians, using a systems approach to managing risks."

That safety is the condition where risks are managed to acceptable levels is not new. It has been implied in the aviation industry for many years. However, the wider, explicit use of this definition is a relatively recent phenomenon. Defining safety in context and expressing the mission in terms of risk helps clarify the regulator's role and limitations. This new mission statement provides clarity of purpose: not only does it spell out TCCA's goal, but it also states how and for whom the organization is delivering its programme.

The business model. All parties involved in delivering on the mission must be able to see the whole, understand how things should work, and, more importantly, how they contribute to value creation. The business model was developed to articulate and illustrate how this works.

Some may argue that, as a government entity, TCCA does not need a business model; it is not a business, as it is not involved in value creation. But the public values safety. Both the public and consumers of aviation services in particular look to TCCA to act as their safety advocate, ready to intervene in the sector as necessary to ensure appropriate measures are taken to manage aviation risks. This is value creation, and TCCA's new mission statement is its value proposition.

A business model incorporates all critical activities needed to deliver the value proposition. To deliver on its new mission and focus its interventions where they can have the most impact despite increasingly limited resources, TCCA has adopted a business model that governs all activities

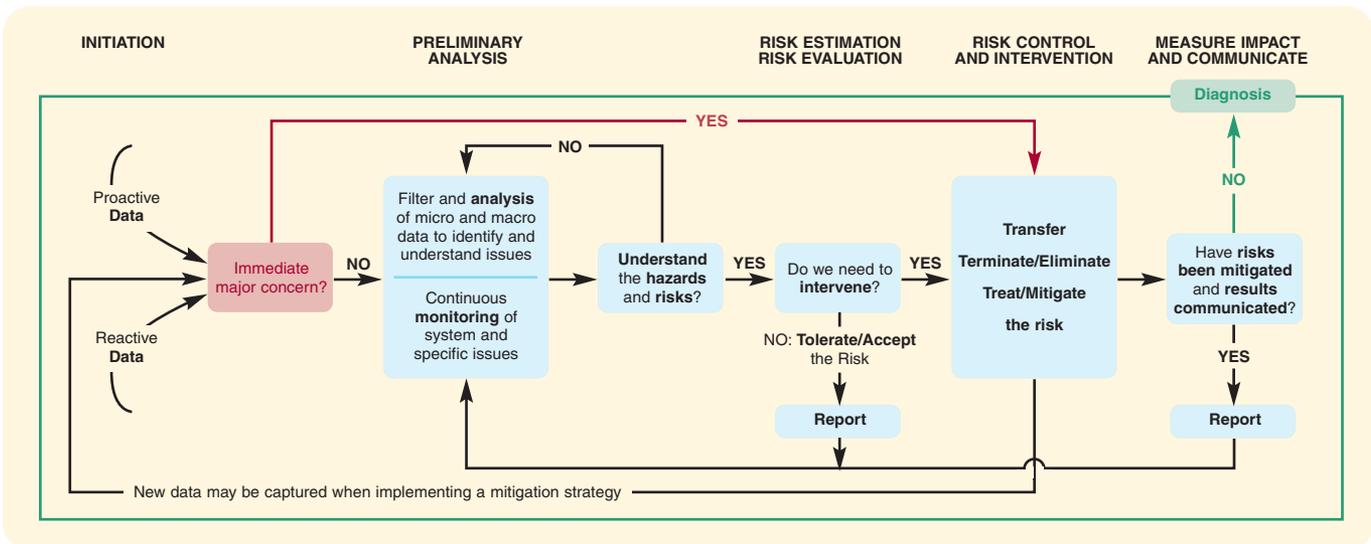


Figure 1. Business model used by TCAA as a means of managing safety through risk management

and processes in the delivery and management of its oversight programme.

As shown in *Figure 1*, TCCA's business model incorporates five phases: initiation, preliminary analysis, risk estimation and risk evaluation, risk control and intervention, and impact measurement and communication.

Initiation and preliminary analysis. Except for those circumstances requiring the immediate tactical intervention on the part of the regulator to stop a situation that poses an immediate threat to aviation safety or respond to an accident or significant incident, the application of the business model requires, first and foremost, the acquisition of safety intelligence before making any decisions.

Safety intelligence is simply the data that are analysed to produce information necessary to understand the risk. When visualized as a pyramid, safety intelligence incorporates data at the bottom layer of the pyramid, from which information, knowledge and wisdom are derived in hierarchical fashion. Through an analytical process, these data are transformed into information; the synthesis of this information leads to knowledge, and over time this body of knowledge becomes the accepted wisdom.

Data collection includes both reactive data obtained from occurrences, plus proactive data that may originate from hazard reports. These data are analysed

to derive meaningful information from which decisions about risk can be made.

Ideally, risk analysis should address all dimensions that could lead to an individual, organizational or systemic accident. These accident dimensions can be broadly categorized as active failures and latent conditions. Regulators must take the broadest view and assume that latent conditions affecting individual behaviour, workplace conditions and organizational factors transcend the boundaries of a particular aviation company and encompass the legislative, socio-economic and political dimensions. Culture must also be considered in the analysis since professional, organizational, industry and national cultures may influence the decisions, behaviours and actions of the players involved.

The SMS approach is being implemented to encourage the proactive management of conditions that could lead to accidents. These dimensions can be applied to normal working situations, hazards, incidents or accidents. By analysing data from each dimension, the output is safety intelligence regarding the actual or emerging hazard expressed in terms of risk, specifically its probability, severity and the degree of exposure.

Risk estimation and risk evaluation. Once the hazard — both the likelihood of its manifestation and its severity — is understood, the question is then asked: “Are the risks associated with the hazard

tolerable or acceptable?” If the answer is affirmative, the risks are considered acceptable and no intervention is required. However, the organization enhances monitoring and contributes to continuous learning by producing a report and storing this in a safety intelligence repository for future use. If the answer is negative, the risks are deemed not acceptable, and the follow-on question becomes: “How do we intervene to bring the hazardous conditions into the range of acceptability?” In exploring possible solutions, the dimension of cost-benefit is examined in the context of risk mitigation. The purpose is to establish whether the benefits of any proposed risk mitigation strategy offset the costs of its implementation.

Risk control and intervention. Generally, there are three strategies for managing risk: eliminate the hazardous condition, mitigate the risks, or transfer the risk by, for example, requiring carriage of liability insurance. In terms of mitigation, regulators can design and execute intervention strategies that address one or more components of the risk equation, in particular the probability, severity or amount of exposure associated with the risk.

Typically, aviation authorities can avail themselves of legislative or policy means to develop a strategy that can be used to varying degrees to mitigate the risks. The accompanying table (*Figure 2*) sum-

marizes some of the more frequent tactics employed in the legislative or policy areas. Such tactics can be effective whether used in whole or in part.

In designing an intervention, care should be taken to ensure that the approach adopted holds promise of mitigating the risks to within acceptable lev-

Legislative	Policy
<p>Rule-making</p> <p>The making, amending, or repealing of:</p> <ul style="list-style-type: none"> • Laws • Regulations • Standards <p>The issuance/withdrawal of orders, exemptions, decrees or other items</p>	<p>Promotion and Education</p> <ul style="list-style-type: none"> • Conferences, symposia, colloquiums • Newsletters, journals, papers • Briefings • Multi-media safety products
<p>Regulatory Oversight</p> <ul style="list-style-type: none"> • Educating for compliance • Monitoring • Inspection • Audits • Enforcement 	<p>Strategic Investments/Divestiture</p> <ul style="list-style-type: none"> • Privatize • Commercialize • Nationalize • Subsidize
<p>Authorizations (certification)</p> <p>The issuance, or withholding the issuance, of certificates, licences, permits, or other authorizing documents</p>	<p>Strategic Leverage</p> <ul style="list-style-type: none"> • Public/Private Partnerships • Industry empowerment

Figure 2. Regular risk mitigation strategies fall under legislative or policy areas

els, meaning that the outputs, intermediate and ultimate outcomes must be observable and measurable. In addition, the strategy must be commensurate to the level of risk in terms of its cost-benefit.

The execution of the risk mitigation strategy should be managed as a project with a team and a project plan that includes project accountability, timelines, resources and performance measures.

Aviation companies have a myriad of strategies at their disposal to mitigate risk as well. These include engineered systems; organizational, procedural, and behavioural fixes, such as training and education; and/or personal protection from hazards. Safety literature would, however, encourage aviation companies to not rely solely on one strategy, but rather, as espoused by James Reason, a combination of strategies that achieve defences in depth.

Measure impact and communicate. After a time, the results of the risk mitigation strategy should be ascertained. This is done to determine whether the planned interventions are achieving the desired results and whether any adjust-

ments to the original plan need to be made. It is also important to justify current or future resource expenditures.

If the risks are managed to acceptable levels, a report is prepared and stored in the safety intelligence repository. The project team may then be disbanded, but the issue at hand must continue to be monitored. The lessons learned in the execution of the risk mitigation strategy can provide further intelligence and help identify the triggers that enhance monitoring capability.

If the risk mitigation strategy failed in achieving the desired results, this leads to a diagnostic exercise to discover where in the application of the business model the failure occurred. The answer may lie in the design or execution of the mitigation strategy, the decision-making process (i.e. the misapplication

or inappropriateness of risk criteria), or the analysis or data-capturing phases.

Regardless of the outcome, an assessment of what worked, how well it worked, and what did not work, should be carried out — if for no other reason than to learn from each experience and improve the processes of the business model itself.

Case study: runway incursions

In 1997, Transport Canada and Nav Canada, the country’s private air navigation services provider, noticed a significant increase in the number of runway incursions. Runway incursion data was collected, validated and analysed. The result of this analysis was a better understanding of the active failures and latent conditions behind runway incursions.

The level of risk posed by runway incursions was deemed unacceptable. To mitigate the risk, a number of both short- and long-term risk mitigation tactics were initiated, including regulatory and procedural changes, increased oversight activities, and launch of an awareness campaign, to name but a few. A team known

as the Incursion Prevention Action Team, made up of a cross-section of aviation specialists, was created to manage the risk mitigation project.

After several years, the risk mitigation strategy has proven successful: the number of runway incursions has stabilized, and more importantly, the severity of runway incursions has decreased. (For more on this safety initiative, see “Study on runway incursions identifies contributing factors and recommends solutions,” Issue 1/2002, pg. 13; and “Problem of runway incursions among most urgent issues facing aviation community,” Issue 3/2002, pp. 26-27.)

Challenges and benefits. The operational definition of safety and the business model it calls for do raise several broad questions. What are the risks inherent in aviation? Who is at risk? And, if the risks are to be managed to acceptable levels, what level of risk is acceptable to those at risk?

Answering questions such as these is not easy, but Transport Canada is prepared to meet this challenge. Out of necessity, it will perform the required calculations to arrive at a benchmark level of risk or risk profile from which it can establish goals, design and execute appropriate mitigation strategies, and measure and report on the results.

The rigorous application of the business model will enable TCCA to target its interventions where they can have the most impact for the safety of consumers of aviation services. It will enable better and more empirical performance measurement, allowing air travellers to connect TCCA’s actions with visible outcomes. In this way, Transport Canada will be able to achieve its twin objectives of improving aviation safety while enhancing confidence in its oversight programme. □

* *Of Acceptable Risk*, by William W. Lowrance (1976)

Bryce Fisher is the Manager of Safety Promotion and Education in the System Safety office at Transport Canada Civil Aviation, Ottawa. This text is an adaptation of an article published in Transport Canada’s *Aviation Safety Letter* (Issue 2/2006), which is distributed to all licensed pilots in Canada.

SAFETY MANAGEMENT SYSTEMS 101

THERE has been much talk in aviation circles in the past few years about safety management systems as if they were something completely new. This is far from the case. The safety management system has a long history in the areas of occupational safety and health, the chemical manufacturing sector, nuclear power generation and research, the environment and elsewhere. It is true that broad application of the safety management system in aviation is a relatively recent event, but the establishment of safety management systems in the provision of air traffic services has been a requirement in Europe, Australia and New Zealand for some time, and the subject has been the focus of many aviation conferences and seminars.

Armed with the knowledge gained from other sectors' experience with SMS, one would have expected aviation's adaptation of safety management systems to be a relatively effortless affair. The opposite seems to have been true, as different aviation disciplines or jurisdictions have adopted inconsistent approaches. While some have opted for engineering models, others have chosen human factors models, or hybrids, and still others have embraced ISO standards based on the tenet that quality and safety are two sides of the same coin. Some companies have achieved positive results, others have not.

This may not be an indication of any failing, but rather evidence of the lack of an underlying and universally accepted construct for safety management systems. As a subject, safety management systems have received their fair share of treatment by various experts. These treatises, however, have tended to examine the concept through a coloured lens, be it a safety, business, legal or other perspective. Rarely have these and other aspects of safety management systems been

broached between the same covers.

Some hold the view that an SMS is a framework for the prevention or reduction of personal injury or death in the workplace. Others view it as a system within which risk management operates. From a financial perspective, accountants and managers believe it is a combination of tactics that contributes to the bottom line. Human factors experts think of it as a system that eliminates, reduces or otherwise attempts to control the conditions within systems and organizations that are conducive to human error.

From a regulatory perspective, an SMS is a means for incorporating measures to ensure compliance with safety legislation. Viewed in a legal light, the SMS is an approach that attempts to minimize lawsuits. For a marketing executive, however, it comprises strategies that will translate into a larger market share. Quality assurance adherents see safety management systems as a continuous improvement loop-type process that aims to reduce failures. There are, in a word, endless viewpoints to consider.

Some experts would argue that these different perceptions of safety management systems work at cross-purposes or are otherwise incompatible, or that safety performance can only be enhanced at the expense of other efforts, as if it were a binary function. Meanwhile, regulators and standards-making bodies must search for an approach to safety management that would be relatively easy to institute and enforce.

It may be that a safety management system is all of these things or has the potential, at a minimum, to embody all these viewpoints. In other words, diverse perspectives can contribute to a fully functioning SMS.

Notwithstanding the absence of a universally accepted construct for an SMS, a comparison of some of the "SMS standards" that have been around for a while, notably in the provision of air traffic services and the nuclear and environmental industries, reveals certain universal principles. What follows is an expose of the principles that formed the basis of TCAA's safety management system briefing campaign, which began in 2001. For a presentation of these concepts and principles, visit the Transport Canada website (www.tc.gc.ca/civilaviation/SMS/Breeze/menu.htm).

The term safety management system has many definitions. But in a speech at a safety conference in Toronto in November 2000, Prof. José Blanco explained it simply by breaking the term down to its constituent parts: the term "safety" is used to mean the condition

where risks are managed to acceptable levels; the term "management" — to distil it to its purest form — can be defined as the allocation of resources; and the term "system" refers to an organized set of things that interact to form a whole (typically interrelated processes supported by policies, procedures and tools) which is required for the delivery of goods or services.

Turning this upside down, we could say that a safety management system is an organized set of interrelated processes to allocate resources to achieve the condition where risks are managed to acceptable levels.

A safety management system can incorporate three strategies focused respectively on safety, management, and business. Safety strategies concern themselves with the achievement of two major goals: they concern compliance with both

One would have expected aviation's adaptation of SMS to be a relatively effortless affair

continued on page 36

Airport operator espouses practical approach to safety management

One strategy for ensuring success is to implement a basic safety management system in stages and gradually win over the trust of operating personnel and management

.....
THOMAS LAU CHRISTENSEN
 COPENHAGEN AIRPORTS A/S
 (DENMARK)

OVER the past few years the focus on safety management and safety management systems has sharpened distinctly. There have been numerous articles on the subject, as well as training courses and conferences, but all this attention has ironically made the subject appear to be more complicated than it need be. Simply put, a functional safety management system (SMS) enables an organization to address safety issues in a structured way.

A practical approach to safety, such as that adopted by Copenhagen Airports A/S (CPH), the aerodrome operator at Copenhagen Airport, can be effective without being complicated. Copenhagen's experience, which stresses the importance of comprehensibility, might serve as an example for other aerodrome operators that are uncertain about how to manage safety.

Copenhagen Airports A/S, like many other international airport operators, recently established an SMS to comply with an airport certification requirement that ICAO introduced in 2001.

CPH began developing its safety management system in January 2005. From the earliest stage there was a dialogue between the Danish Civil Aviation Administration (DCAA) and the airport management. Recognizing that a safety management system can hardly be implemented overnight, the DCAA agreed with CPH on what kind of documentation should be provided in order to qualify for a renewal of its aerodrome certificate.

The first steps in a process that required that CPH change its approach to safety were taken by the aerodrome manager and the operator's senior management. Before proceeding, it was critical to demonstrate that senior management openly supported the entire process for developing and introducing an SMS. The aerodrome manager then appointed a safety manager to take charge of the process. Lastly, a number of activities were undertaken to encourage and promote a positive safety culture. Among these was a presentation about apron safety which was given to all ground handling agencies, including flight caterers. A total of 1,500 persons, all working airside, have attended the presentation so far, and as a result there has been a noticeable improvement in airside safety consciousness.

One reason the first steps were so important was because they underscored a sincere desire by management to change CPH's safety philosophy. Instead of simply reacting to safety concerns, safety was to be approached in a more formal, systematic and proactive manner.

From the beginning, CPH management mandated that the SMS must be practical, effective and easily understood by staff. In other words, the system had to be kept simple. This quality has proven to be the most important criterion for success, encouraging the staff and managers together to claim ownership of the system. An "easy to understand" mantra that governed the development and implementation process proved crucial, for under no circumstances could CPH allow the process to result in a mere theoretical study.

In keeping it simple, as much as possible CPH has adapted safety management

processes that already were in place at Copenhagen Airport. Integrating these practices within the SMS eased the introduction of the system.

To develop and then implement an SMS in accordance with CPH's stated philosophy, a working group was formed, chaired by the newly appointed safety manager. The working group consisted



Arne V. Petersen

mainly of operational personnel and reported to a steering committee, which was chaired by the aerodrome manager.

When CPH initiated this process, extensive guidance material on safety management was available, but guidance relevant to airport operation was very limited. Although the *Manual on Certification of Aerodromes* (ICAO Document 9774) outlines the require-

ments for an aerodrome operator's safety management system, it does not provide specific guidance on its implementation.

The newly released *Safety Management Manual* (ICAO Document 9859) may be regarded as a comprehensive reference for airport operators, but this source was not at hand in early 2005, and with little direction, CPH decided to develop an SMS based on the industry's best practices.

The foundation of the CPH safety management system is a policy that spells out CPH's safety management goals. The draft policy was presented to the CPH Board of Directors early in the development process, as high-level approval was required to confirm the direction that CPH should take.

The CPH safety policy calls for the air-

ence on safety at Copenhagen Airport. While essential, a policy is still only a statement, and it cannot have effect unless it is supported by concrete work processes and requirements that are collectively known as safety strategy. Hence, the safety strategy outlines the tactics to be used to realize the goals articulated by the policy.

CPH's safety strategy is based on 12 strategic principles that fall under three broad categories, namely to achieve, to maintain, and to improve on a high standard of safety.

CPH's safety management system is depicted in the accompanying table (page 20). Much thought has gone into the development of the system, since it was important to ensure it could be easily

and requirements. DCAA approval for the manual was granted prior to 24 November 2005, the ICAO deadline for having an SMS in place.

Implementation process

CPH is in the midst of implementing the 12 strategic principles, which inevitably will have an impact on current work procedures. Besides introducing changes to daily routines, the implementation process also calls for the commitment of organizational resources. Thus, to ensure a successful and practical implementation, CPH has adopted a principle-by-principle approach.

Why not just implement all of the principles instantaneously and obtain safety benefits from Day One? There is no short

View of Copenhagen Airport's Terminal 3. The airport operator expects to fully implement a safety management system by the end of 2007.



answer to this question. However, to create actual safety benefits, both short- and long-term, it is vital first for staff and management to become the custodians of the safety management system.

While building trust among staff members cannot be achieved in a day, it is essential to eventually win their confidence. Without this, the SMS is destined to fail very early in the implementation effort. Possible resistance from those who might view the SMS as just "another bureaucratic management system" would be detrimental to the objectives.

Because the SMS imposes new requirements on some work routines, a new level of competence is imperative. For example, the most radical change is the requirement to complete risk assessments. For this to be done properly, training needs to be provided, and of course training takes time.

An SMS implementation plan was developed detailing the sequence for introducing the strategic principles. The initial focus has been on three of the principles, specifically the reporting and analysis of safety occurrences, the definition of safety levels, and risk assessment.

port operator to work in a systematic, structured and proactive manner to achieve its overall safety goal, which is to reduce the probability of an incident at the airport. This goal goes a step beyond the industry's best practices, which focus on reducing the probability of an accident.

If considered in isolation, of course, CPH's safety policy cannot exert an influ-

understood. It is believed that the final layout of the SMS is very pedagogical.

CPH opted to document the SMS in a standalone publication rather than as part of the aerodrome manual. The manual is deliberately concise since personnel might be discouraged from using a large document. The CPH *Safety Manual* allocates one page for elaborating each principle, describing the related processes

These principles were selected for their tactical advantages, since they provide the organization with positive safety benefits at an early stage of SMS implementation without being a burden on resources. Moreover, obtaining early safety benefits helps foster support among management and staff. The three principles are also considered as precursors to implementa-

in the surrounding environment. In addition, a significant period of time must be devoted to the effort to infuse the safety culture among all airport personnel.

To facilitate implementation within the organization, CPH arranged for a number of presentations on SMS and its impact. Individual meetings were held with managers who are accountable for specific

undesirable trends. According to the Danish regulatory requirements for safety management systems, responsibility for internal investigations of safety occurrences also rests with the safety manager.

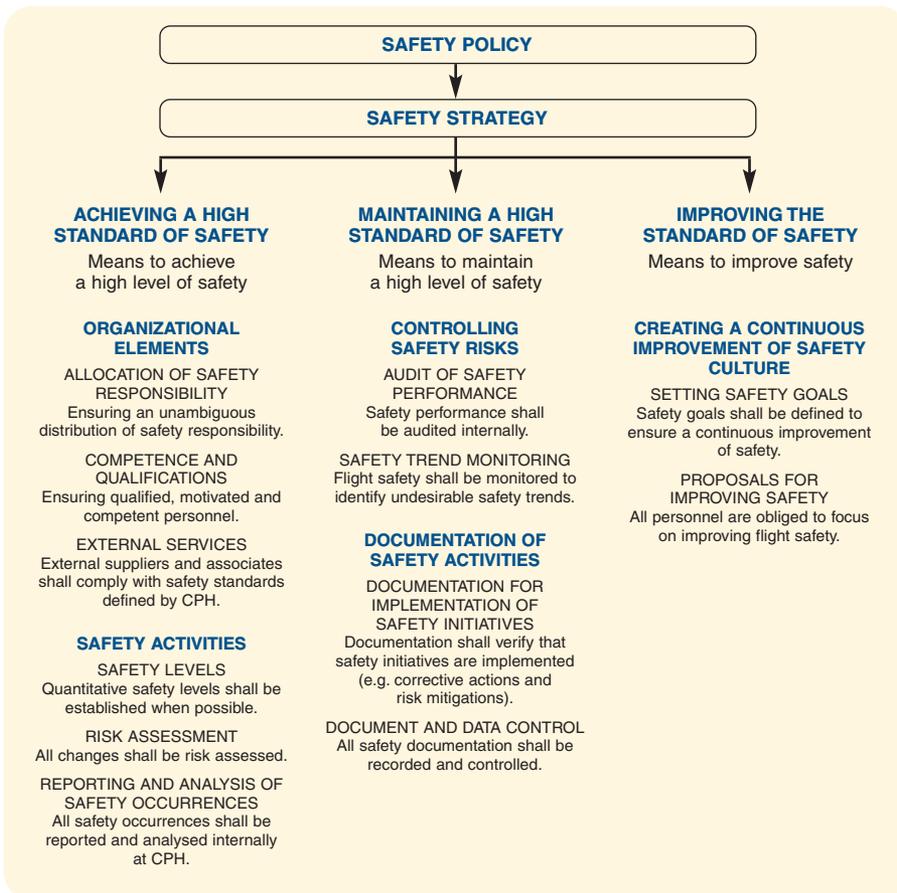
An important detail is to establish clear lines of responsibility for safety. Overlaps or uncertainty about such responsibilities must not be allowed to exist. To ensure that managers are accountable for safety, CPH has begun to document all of their safety responsibilities, a major task as it involves defining accountability at the senior management level down through the organization to individual staff functions. So far, CPH has defined the roles of the aerodrome manager as well as senior and middle-level management.

Occurrence reporting and analysis. As early as 2001, the DCAA had established a mandatory and non-punitive occurrence reporting system, thus taking the first step to create a just safety culture within Denmark's aviation industry.

Stakeholders are obliged to report all safety-related occurrences to the DCAA. In return, the reporter is protected from disciplinary action or punishment by the non-punitive policy. Without a positive safety culture in place, occurrence reporting would be restrained and CPH would have insufficient means for adequately monitoring safety at the airport.

A number of reporting systems had already existed at the airport when the process of developing SMS began. These included reports on airside security, bird control, foreign object damage (FOD) and runway inspections. At the time, most reports were used individually to assess the current state of a specific problem, and were not used systematically and collectively — in a proactive manner — to recognize significant safety trends.

Considered as a whole, Copenhagen Airport is a complex entity, with more than 20,000 persons distributed among 400 companies involved in its operations. On such a scale it is difficult to establish a singular reporting system that will work. Having this as the ultimate goal, CPH decided to use the information available from existing reporting sys-



The safety management system developed by Copenhagen Airports A/S is based on 12 strategic principles

tion of the other nine principles. For example, without reports on safety occurrences (a goal of the first principle) it would not be possible to perform safety trend monitoring, nor would it be realistic to ensure that defined safety levels are achieved or to set new safety goals.

With CPH's incremental approach to SMS implementation, it is envisaged that all 12 strategic principles will have been put into effect by the end of 2007. After reaching that milestone, development of the SMS will not cease entirely. The SMS is perceived as a living mechanism that needs to continually adapt to the changes

safety performance. Support has been provided by a number of key personnel appointed from each department. In addition, risk assessment training courses have been held internally, and some personnel have received accident and incident investigation training.

Organizational elements. The appointed safety manager fills a support function for the CPH aerodrome manager. Besides being responsible for developing, implementing and maintaining the safety management system, the CPH safety manager must ensure that the aerodrome manager is aware of any

tems in order to avoid disrupting the reporting process.

CPH developed a basic database to log all safety occurrences. These data will be used in the future to perform trend monitoring, one of the organization's strategic principles and another element of SMS. A daily drill has now been established to review all incoming reports with the purpose of highlighting significant occurrences. All occurrences are assessed and classified in terms of their impact on safety using an occurrence severity classification scheme. Subsequently, they are analysed with the aim of deciding whether to undertake an investigation.

The objective of such investigations is to identify what went wrong in a particular incident and determine how a reoccurrence can be prevented. The purpose is not to allocate blame, as this is contrary to the goal of creating a just safety culture. The investigative process takes on a wide perspective with the intent of addressing the specific cause of the occurrence.

An Airside Safety Task Force has been established by Copenhagen Airports A/S. This is chaired by the safety manager, who is in direct contact with the aerodrome manager. The intention of the new task force is to conduct incident investigations and recommend corrective actions. The members are selected on the basis of their in-depth knowledge of specific operational or technical fields. Five of the task force's 11 members have attended incident investigation training courses.

The Runway Safety Team has also been established. This is chaired by the aerodrome manager, with representatives from the air traffic services (ATS) provider and domestic air carriers. The focus within the team is to reduce the number of runway incursions at Copenhagen Airport.

With only limited guidance material available to aerodrome operators when CPH began introducing its SMS, the organization opted to develop its own aerodrome occurrence severity classification scheme for classifying the impact of occurrences. The structure of this scheme

was derived from the ICAO model, and uses a scale ranging from AA (Aircraft Accident) to E (Not Determined).

Safety levels. It was decided early in the implementation process to not define and publish an overall quantitative level of safety, at least not for the present. The organization does not yet possess either the expertise or extensive knowledge base needed to define an overall quantitative level of safety. Instead, CPH relies on a top-ten list of the most significant safety risks, enumerated in order of priority. The risks are discerned using information from existing reporting systems and trend monitoring. For each risk, a goal is defined as well as a roadmap for reaching the goal. Examples of risks identified are runway incursions, problems associated with FOD, and taxiway incursions.

Available data are being reviewed to ensure that the priority list is up-to-date, along with the associated goals and roadmaps. Once fully implemented, the list will become integrated in the daily management of the airport.

A primary requirement when defining goals is to ensure that they are practical and measurable. In addition, sufficient data needs to be on hand.

Risk assessment. The requirement for risk assessment represents the most radical change associated with a safety management system. Risk assessments are an important means of ensuring proactive safety management. With this element in place, no change affecting the airport's operation may proceed without a risk assessment showing that all risks are maintained at an acceptable level. Where this is not the case, an appropriate means of mitigating the risks must be found.

If not implemented and then controlled properly, the introduction of risk assessments may jeopardize the successful application of the safety management system, especially considering the system's direct impact on daily work routines. CPH has therefore planned the year-long implementation process very carefully. During

this period Copenhagen Airports A/S will conduct internal risk assessment courses to ensure that relevant personnel are competent enough to make the assessments, which will be based on qualitative, instead of quantitative, data. It will also develop practical material to guide staff in performing their daily work regimen.

The responsibility for making risk assessments currently rests with the project manager and/or the manager responsible for the particular airside activity.

Route to success

Based on the experience gained by CPH in implementing its SMS, these are

a few key recommendations that other aerodrome operators might consider in the event they are just beginning this process.

- *Do not reinvent the wheel.* Extensive literature is available on the subject of safety management systems, including

information tailored to the aviation industry. ICAO's newly released Document 9859 is a comprehensive work of reference.

Adopt what is known as best practices and integrate this into the current organization's regimen. It is important to present safety management as a tool focused on improving flight safety at the aerodrome. An SMS uses many of the same principles found today in quality management and environmental management systems. The aerodrome SMS has a proactive approach to aviation safety; that is, it focuses on accident prevention rather than preventing reoccurrences following an aircraft accident.

- *Ensure senior management support.* The decision to implement an SMS must be taken by senior management, and must be based on a sincere desire to work proactively to advance safety and not simply a wish to fulfil a regulatory requirement. Management support is essential, as SMS introduces procedures that have an effect

Risk assessments are an important means of ensuring proactive safety management

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Thomas Lau Christensen, the Safety Manager for Copenhagen Airports A/S, has been a speaker at recent ICAO seminars on runway safety and ATS safety management.

Implementation of ATM safety management systems remains a priority for Europe

Following two serious aircraft collisions in recent years, European States have intensified their efforts to improve safety in the area of air traffic management. Central to this effort is the widespread promotion of the principles of safety management.

EUROCONTROL

ALTHOUGH aviation is among the safest means of transport, risk is a constant reality — as is true with any human activity — and the fact remains that any aviation operation can lead to an accident.

To promote safe operations, ICAO has developed many standards and recommended practices (SARPs), and other organizations, such as Eurocontrol, develop regulations and issue guidance material for their implementation. However, despite every effort to enhance air safety, accidents still occur.

Early in this decade serious accidents in Europe served as a wake-up call to do more to enhance air traffic management (ATM) safety. In October 2001, a runway incursion at Milan's Linate Airport caused heavy loss of life (see "Numerous factors contributed to fatal runway incursion at Milan Linate Airport," Issue 2/2004, pp 18-19); in July 2002, a mid-air collision occurred over Germany ("Accident report underscores critical importance of com-

plying with ACAS resolution advisories," Issue 5/2004, pp 18-20). Not since 1976 had Europe suffered such disasters.

Eurocontrol took immediate action to address the safety issues arising from these accidents. It instigated a programme to raise awareness of ATM safety requirements and to speed up implementation of ATM safety management systems across Europe.

Eurocontrol is actively involved in improving the safety of ATM operations in European airspace. Indeed, much work has been done over the past decade or so to enhance ATM safety by harmonizing — as far as possible — airspace structure, ATM procedures and technology. This work has been undertaken in cooperation with the European Civil Aviation Conference (ECAC), an inter-governmental body set up in 1955 to promote the continued development of a safe, efficient and sustainable European air transport system.

Recent ATM safety enhancements in Europe have been achieved through several programmes requiring the collaboration of ECAC member States. The current strategy foresees many changes in the way airspace is managed and much closer cooperation between European States. Recently, the European Union (EU) launched a legislative initiative to create a "Single European Sky" (SES), a development that will eventually mean that the airspace over EU member States will be treated as a single continuum (see box, page 23). This concept will have implications for the way that air traffic management in Europe is regulated.

Regulatory context

Since the early 1990s Europe has sought to ensure strong safety oversight by separating safety regulation from its management, and by instilling safety within a gate-to-gate concept. This framework has allowed European States to develop ATM safety systems based on a common, agreed format.

With respect to ATM, safety regulation is based on a core structure of six Eurocontrol safety regulatory requirements (ESARRs). ESARRs and other EU rules require that States take certain actions to ensure that safety systems are developed in a controlled way, with a common baseline. Safety systems must also form the basis for oversight of the ATM system. The foundation for the development of the European ATM safety framework, ESARRs complement and often exceed ICAO standards.

In addition, ECAC member States are audited by Eurocontrol. The audits focus on the timely, uniform and effective implementation of ESARRs at the State level, as well as on the safety oversight capability of States in terms of air traffic management. This latter activity is aligned with the safety oversight audits that are conducted by ICAO. To minimize any overlap between the Eurocontrol and ICAO audits, the two organizations work in unison, having signed a memorandum of cooperation in 2005.

In Europe, the progressive separation of the provision of air navigation services (ANS) from other government activities has led to the establishment of agencies and corporations, both publicly and privately owned, operating in an increasingly market-orientated way. This, in turn,

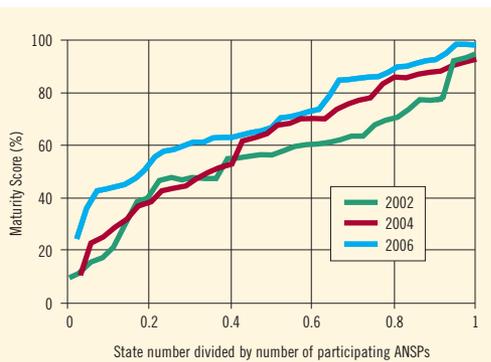


Figure 1. ATM safety frameworks implemented by service providers within ECAC States have matured significantly in recent years

has given rise to the emergence of national or regional bodies needed to regulate this new ATM environment.

The European Commission has also signalled its intention to expand the role of the European Aviation Safety Agency (EASA) to include ATM and airport safety regulation. Since September 2003, when it became operational, EASA has taken over several regulatory functions previously exercised by the national civil aviation administrations of EU member States. Although its role expansion will not occur for a few years yet, preparation of the essential requirements for ATM has now commenced. To ensure a comprehensive approach, Eurocontrol is establishing working links with EASA to manage ATM safety regulatory issues within the context of current institutional responsibilities.

Safety management systems

Safety may be defined as the state in which the risk of harm to persons or property is reduced to, and maintained at or below, an acceptable level through a continuing process of hazard identification and risk management.

In the past, aviation safety has focused on compliance with an increasingly complex set of regulations whose implementation was overseen by regulators. While this situation still exists, the steady increase in air traffic means that the number of accidents can be expected to rise even if the accident rate does not change, a situation that calls for systematic and structured safety management. To maintain a publicly acceptable level of risk despite increased activity, the aircraft accident rate must be reduced, a goal that can only be met by adopting a more proactive approach to safety.

Risk is best managed by implementing a dedicated system for managing safety. Both ICAO and Eurocontrol recognize the importance of this. ICAO Annex 11 requires that air traffic services (ATS) providers worldwide have a safety management sys-

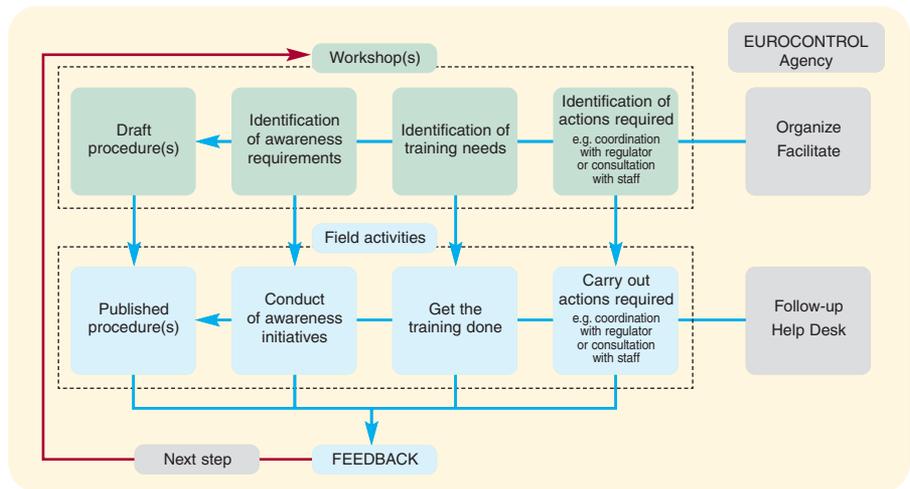


Figure 2. The SASI Project was designed to help ANS providers implement the basic elements of an SMS

tem (SMS) in place, while ESARR 3 specifically requires that Eurocontrol member States (and ECAC member States on a voluntary basis) ensure that all service providers have an SMS in place.

An SMS provides a management structure within which safety roles and responsibilities of organizations and individuals are clearly set out. Guidance is given to managers on how their responsibilities are best put into practice, and best practices are identified. Training requirements are set down and the use of safety tools, such as risk assessment, is explained.

An SMS is required to make safety an explicit activity within an organization. It serves to systematically identify all safety risks and implement appropriate mitiga-

tion measures. The SMS must provide consistent, efficient and practical support for organizational projects as well as demonstrate regulatory compliance. It must support effective operations while adequately addressing safety. With an SMS in place, safety improvements are continuously identified and prioritized.

In early 2006 ICAO issued the first edition of its *Safety Management Manual*, a document aimed at all sectors of the aviation industry. For ATM it covers not only the actions required by service providers, but also those entities involved in accident investigation and safety oversight. The document lists many important factors in the overall management of safety. No single factor will meet today's expectations for risk management, but an integrated application of most of the factors will increase the aviation system's resistance to unsafe acts and conditions.

Failure to implement a robust safety management system could result in safety activities not being carried out, or being carried out at the wrong time or at high cost. If this were to occur, the accident rate may not decline.

Safety enhancement

As a direct result of the aircraft collisions cited above, Eurocontrol instituted a review of ATM safety within ECAC member States. This study led to three fundamental con-

SINGLE EUROPEAN SKY

MUCH PUBLICITY has been given to the formation of the Single European Sky that will transform the currently fragmented approach to air traffic management in Europe. It is anticipated that in the longer term this will lead to fewer service providers and therefore fewer air traffic control units.

Eurocontrol is providing support to the European Commission in drawing up the measures for implementing the Single Sky regulations. Eurocontrol is also providing harmonized guidance and direct support to States, national supervisory authorities and ANS providers to help

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clusions: firstly, that leadership and commitment to safety in many States — for both regulation and safety management — needed to be strengthened; secondly, that resources, particularly trained and qualified personnel, required bolstering; and thirdly, that the level of implementation of ATM safety management systems across Europe was uneven. It was also concluded that until those issues had been resolved, little substantial progress could be made on other issues.

A strategic action plan was drawn up to enhance safety in areas where it would have the most direct impact and, in particular, the areas highlighted by the two major accidents. There were some technical issues, too: It was found, for example, that some guidance material for airborne collision avoidance system (ACAS) procedures was unclear, and in some instances misleading. Early action was therefore taken, in conjunction with ICAO, to improve that situation. Ground-based safety “nets,” particularly the short term conflict alert (STCA), were also addressed because the appropriate standards and guidance material were not yet in place. Since 2002, much work has been undertaken by Eurocontrol on both airborne and ground-based safety protection, which will result in the introduction of European standards for ground-based safety nets during 2007. However, fundamental to the enhancement of aviation safety in Europe was a heightened awareness of ATM safety requirements and the importance of introducing an ATM SMS.

Eurocontrol’s objective is to raise the level of SMS implementation across Europe to at least 70 percent of the safety requirements being met. To that end, a strategic safety action plan was in effect from February 2003 until the end of January 2006, an initiative that was followed by a new European safety programme for ATM. With the strategic safety action plan in effect, ATM safety frameworks within ECAC States matured sig-

nificantly, as illustrated in *Figure 1* (page 22).

A number of activities related to these safety programmes, as described below, contribute to the overall aim of fully implementing a European ATM safety framework.

SMS implementation support for ANS providers. In 2004, as part of its strategic safety action plan, Eurocontrol launched a project to provide support to ANS providers. The main objective of the SASI Project, as it is known, is to help service providers implement the basic elements of an SMS. This is a fundamental step in enhancing ATM safety in the ECAC area, and currently support is being provided to service providers in 21 ECAC member States, with more planned for 2007.

The SASI Project consists of a series of working sessions followed by a 16-week long field implementation in the ANS provider’s own environment, with support from Eurocontrol experts. It aims at achieving basic ICAO Annex 11/ESARR 3 compliance (as a first step) by mid-2007.

The first SASI activities cover the development of a meaningful and customized safety policy, the implementation of the fundamental principles of safety

occurrence reporting, investigation and competency, and lastly the progressive introduction of safety assessment and surveys (see *Figure 2*, page 23).

This approach requires a strong commitment from the management at each service provider, notably by encouraging and supporting designated safety managers

in implementing the recommended actions. It also relies on a timely implementation of the recommended actions by individual ANS providers.

SASI working sessions. One-week working sessions are organized at Eurocontrol’s Brussels headquarters for each SMS element to be implemented. Safety managers have the opportunity to develop their own draft procedures, identify awareness requirements and associated key messages, identify training require-

ments and develop an action plan.

The working sessions are labour intensive, and highly interactive, so that experiences and ideas can be shared. Twenty-one ANS providers participated in the working sessions to the end of 2006. Activities for 2007 are already planned, with one phase of the project set to be completed in June 2007. In addition, beginning in May 2007 a specific SASI initiative is planned for five more ANS providers over the 2007-09 period.

Field implementation and support. Once back within their own organizations, safety managers are expected to apply their action plan (after its approval by their organizations). Further support may be required from Eurocontrol during field implementation, the last and most delicate phase of the SASI Project, as safety managers may be involved in numerous other tasks and may also lack adequate resources.

By the end of January 2006, ATM safety frameworks within Europe had on average achieved 70 percent of full implementation. The objective is to raise safety systems in all States in Europe to at least 70 percent implementation by the end of 2008.

Incident reporting. An integral part of any SMS is a comprehensive occurrence reporting system, since hazard identification is a critical step in managing safety. Each hazard identified must be evaluated and prioritized, a process that requires the compilation and analysis of all available data using appropriate analytical tools. With this information about hazards, risks are identified, assessed and finally managed. A database may be required to facilitate the storage and retrieval of information, and a safety “cycle” needs to be established to ensure that identified risks are managed properly.

States are required by ICAO Annex 13 to establish a mandatory incident reporting system to facilitate the collection of information on actual or potential safety deficiencies. They are also encouraged to establish a voluntary incident reporting system and adjust their laws, regulations and policies in such a way as to encourage reporting.

Before SES can become a reality, robust safety management systems must be put in place by all service providers

As highlighted by a 1998 Eurocontrol report on ATM performance, “significant variations exist in the scope, depth, consistency and availability of ATM safety data” across the ECAC area. The report underscored the fact that achievement of consistent high levels of aviation safety and ATM safety management required the effective use of harmonized occurrence reporting and assessment schemes. Harmonized schemes would lead to more systematic visibility of safety occurrences and their causes, and would highlight the appropriate corrective actions and areas where safety could be improved through changes to the ATM system. Harmonized schemes would also provide the data needed to operate an SMS. The report led to the publication of ESARR 2, a regulation concerning the reporting and assessment of safety occurrences in ATM, and an ATM safety database. Moreover, the EU has issued a directive on occurrence reporting in civil aviation, and set up a database for information collected through the requirements set out in the directive.

Over the past few years European States and ANS providers have made considerable progress towards implementing incident reporting schemes. However, the process is still not comprehensive, and the quality of the data still varies significantly from country to country. Despite the clear benefits of sharing information, some States and ANS providers remain concerned that their safety record might be compared unfavourably with others.

A “*just culture*.” In addition, ATM professionals have expressed concern about public perception and especially the attitude of the judicial system. There is growing concern about the occasional intervention of the legal system, a trend that engenders fear of sanctions among reporters. Furthermore, certain media have dealt unsympathetically with apparent breaches of safety within certain air-

lines and service providers. All of these factors have had the cumulative effect of reducing the level of reporting and therefore information sharing.

Such issues have been addressed by Eurocontrol by setting up a task force in 2005. It concluded that while changes to current legislation were not required to protect safety data, there did exist considerable variations in the approach of judi-



Eurocontrol's efforts to accelerate implementation of ATM safety management systems across Europe are motivated in part by the safety challenge posed by the continent's steady growth in air traffic

cial systems. In some States, good practices were supported by appropriate legislation, but sometimes good practices were still embedded within an ambiguous legislative framework, and sometimes neither the good practices nor the necessary legislative framework were in place.

The Eurocontrol task force also concluded that in a significant number of cases the credibility of safety regulation, including the oversight of safety reporting and assessment processes by States, is threatened by a lack of human and financial resources. A number of its recommendations concentrated on getting States to adapt their national legislative frameworks to foster a “*just culture*,” improve staffing levels, raise awareness of the reporting requirements, and disseminate best practices. The group encouraged Eurocontrol's governing bodies to take a lead in improving the situation.

The recommendations of the Eurocontrol task force have, among other

things, been adopted for the European Safety Programme for ATM, and a safety data analysis function for ATM occurrences is now being established in conjunction with the European Coordination Centre for Aviation Incident Reporting Systems (ECCAIRS), the Europe-wide database for all aviation occurrences. However, the European ATM community still needs a risk warning system supported by a common safety information repository.

The question of legal impediments is being addressed by opening a dialogue with the judiciary and by holding ad hoc workshops. Eurocontrol has also issued guidance material on establishing a just culture to complement ESARR 2.

Summary

Serious accidents in recent years have caused European ATM authorities to review the status of ATM safety frameworks across the 42 States of ECAC, and to put in

place a programme to advance implementation of such frameworks, where necessary. By early 2006, half of the service providers across Europe had established safety management systems whose level of maturity exceeds Eurocontrol's implementation target.

As an outgrowth of efforts to improve ATM safety in Europe and encourage States and service providers to ensure robust safety management systems have been put in place, Eurocontrol and ICAO are cooperating more closely on ATM safety matters. The ICAO regional office in Paris and Eurocontrol are working together to help ICAO member States of

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The European Organization for the Safety of Air Navigation (Eurocontrol) develops, coordinates and plans for implementation of pan-European ATM strategies and their associated action plans in a collective effort with all stakeholders. The primary objective of the organization, which currently numbers 37 member States, is the development of a seamless ATM system across Europe. For more information, visit www.eurocontrol.int.

Guidance material addresses concerns about protection of safety information

Legal guidelines developed recently by ICAO focus on enactment of national laws and regulations that safeguard data collected for safety purposes while also allowing for justice to take its course

SILVÉRIO ESPÍNOLA • MARCUS COSTA
DANIEL MAURINO
ICAO SECRETARIAT

INTERNATIONAL civil aviation's outstanding safety record is largely attributable to the dedication to safety shown by aviation organizations and their personnel. Equally important is a continuous learning process based on the development and free exchange of safety information, as well as industry's ability to turn

incident investigations has long formed the backbone of activities aimed at improvements in equipment design, maintenance procedures, flight crew training, air traffic control systems, airport design and functions, weather support services, and other safety-critical aspects of the air transport system. In recent years, technological advances have led to an accelerated development of safety data collection, processing and exchange systems. Safety data collection and processing systems (SDCPS) form the pillars of a safety man-

in time to deal with them appropriately. Moreover, since accidents and incidents represent failures of the aviation system, human performance data obtained through investigations inevitably reflect unsuccessful system and human performance, or what might be called *unmitigated* operational errors.

On the other hand, a typical aviation operation – not unlike any human activity – involves frequent, minor and, most importantly, inconsequential errors such as selecting wrong frequencies, dialling wrong altitudes or acknowledging incorrect read-backs. Some of these types of errors reflect natural limits in human performance, while others are fostered by systemic shortcomings, but most are a combination of both. Nevertheless, the fact remains that these frequent and minor errors have the same damaging potential as rare and major errors underscored by accident and incident investigation.

Fortunately, the damaging potential of minor errors is mitigated by the successful coping strategies employed by operating personnel and the protective role of specific system defences that act to contain errors. Emerging SDCPS systems capture successful coping strategies and effective system defences. Simply put, they highlight what works well in the operating sphere.

Countermeasures to operational errors are best developed by combining the lessons gleaned from occurrence investigations with information about successful strategies and defences obtained from safety data collection and processing systems. The latter systems rely on one of three methods for collecting data: self-reporting, electronic capture or direct observation. With few exceptions, such



Jim Jorgenson

Safety data collection and processing systems highlight successes in mitigating operational errors and can therefore lead to more insightful conclusions about safety

operating errors into preventive actions.

Endeavours aimed at improving aviation safety must build upon empirical data. Fortunately, there are several sources of such data available to the aviation community. In combination, these sources of information provide the basis for a solid understanding of the strengths and weaknesses of aviation operations.

Information gathered from accident and

agement system (SMS), and generate information that is used to implement corrective safety actions and proactive, long-term strategies.

Accidents and serious incidents are rare occurrences, usually reflecting the interplay of circumstantial factors. It is often difficult, when using information from the investigative process exclusively, to uncover unsafe operating practices

data programmes are voluntary in nature and, without exception, confidential and non-punitive. Since they never cease functioning, emerging safety data collection and processing systems generate a great volume of information to support safety efforts, including long-term strategies.

All safety data collection and reporting systems can highlight system and human success in mitigating operational errors. Such systems lead to more complete conclusions about safety, thus enhancing development of countermeasures to human error.

One example of an industry initiative to collect safety data through voluntary reporting is the Aviation Safety Action Programme (ASAP). Flight data analysis programmes such as the Flight Operations Quality Assurance (FOQA) Programme are based on electronic capture of safety data. Examples of the third category of SDCPS, involving direct observation of personnel at work by specially trained experts, are the Line Operations Safety Audit (LOSA) and the Normal Operations Safety Survey (NOSS). (For more on LOSA, see Issue 4/2002, a special edition dedicated to this topic. For details about NOSS, see Issue 3/2004, pp 14-16.)

International situation. Safety data collection and processing systems have made possible a deeper understanding of operational errors. Without question, in general operational errors in aviation are inadvertent and involve well-trained and well-intentioned people who may err while conducting operations or maintaining well-designed equipment. For those rare situations involving sabotage or reckless misconduct, enforcement systems ensure that those responsible are held accountable.

This two-prong approach, balancing enhanced understanding of inadvertent operational errors with appropriate enforcement of rules in cases of misconduct, has served civil aviation well.

While promoting safety, it also denies immunity to violators.

In recent years, however, information from these systems has been used for disciplinary and enforcement purposes and has also been admitted as evidence in judicial proceedings where criminal charges have been brought against individuals involved in aviation occurrences. This trend is a concern, since the inappropriate use of safety data may hinder the development and free exchange of information that is essential to efforts to improve aviation safety.

The civil aviation community has repeatedly attempted to ensure the protection of safety data, with mixed success. Such efforts must strike a very delicate balance of interests between the need to protect safety information and the responsibility to administer justice. A cautious approach is necessary to avoid making proposals that prove incompatible with national laws and policies.

Within ICAO, a number of provisions address the protection of certain sources of safety information, among them an Assembly resolution urging States to ensure that national laws, regulations and policies comply with ICAO Annex 13. In addition, the ICAO Assembly has called for voluntary and non-punitive reporting systems to be implemented, and has

directed ICAO to participate in efforts to improve safety information reporting and sharing of information.

ICAO Annex 13, *Aircraft Accident and Incident Investigation*, establishes (para 5.12) that information gathered by a safety investigation — including statements from persons, communications between persons involved in an aircraft operation, medical and private information, cockpit voice recordings and transcripts, and opinions expressed in the analysis of information — shall not be made available for purposes other than accident or incident investigation unless the appropriate authority for the administration of justice determines that their disclosure outweighs the adverse domestic and international impact such action may have on that or any future investigations.

Annex 13 also establishes (para 8.3) that voluntary incident reporting systems shall be non-punitive, and sources of information shall be protected. ICAO Annex 6, *Operation of Aircraft* (Part I, para 3.2.4) stipulates that flight data analysis programmes shall be non-punitive and shall contain safeguards to protect sources of data.

ICAO provisions protecting certain accident and incident records are explicit regarding their admissibility in judicial proceedings. While this is the case for



Jim Jorgenson

Legal guidance developed by ICAO is designed to prevent the inappropriate use of information collected solely for the purpose of improving aviation safety

information obtained from cockpit voice recorders and transcripts, similar protection is not evident with respect to information obtained from emerging SDCPS systems. In the absence of explicit wording such as that contained in Annex 13, information from safety data collection systems is protected by agreements established by operators and service providers. However, the legal protection such agreements afford to SDCPS information within the different judicial systems around the world is rather difficult to ascertain.

Few States have promulgated national legislation protecting information obtained from self-reporting safety and electronic safety data collection systems, and in some countries legal reform may be required to accommodate such legislation. Moreover, protection of information from direct observation safety data collection systems is not currently addressed by legislation in any State.

Since current ICAO provisions, as well as international and national legislation, do not sufficiently address the protection of information obtained from SDCPS systems other than certain accident and incident records, in many States national legislation may give inadequate protection to such information. This has created the need for legal guidance that covers the protection of all relevant safety data collection and processing systems, and that is the product of a cautious international consensus.

Legal guidance. ICAO has formulated legal guidelines that address concerns about the protection of safety data. This material was drawn up in response to a request by the ICAO Assembly, which adopted a resolution in 2004 directing the organization “to develop appropriate legal guidance that will assist States to enact national laws and regulations to protect information gathered from all relevant safety data collection and processing systems, while allowing for the proper administration of justice in the State.”

As a first step in preparing these guidelines, States were called on to provide examples of their relevant laws and regulations relating to the protection of information obtained from SDCPS. Subsequently, ICAO conducted an analysis of the submissions received, seeking common threads and conceptual points. The legal guidance that resulted takes the form of a series of principles that has been distilled from such laws and regulations.

As the guidance material primarily relates to two chapters of ICAO Annex 13, the most effective means of disseminating the information was through an attachment to Annex 13. Consequently, notes were added to Chapters 5 and 8 of Annex 13, with a further note added to Annex 6 (para 3.2.4 of Part I),

Protection of qualified safety information under specified conditions is a State's responsibility

referring to the legal guidance contained in new Attachment E to Annex 13.

The objective of the guidance material is to prevent the inappropriate use of information collected solely for the purpose of improving aviation safety.

To provide States with the flexibility to draft laws and regulations in accordance with their national policies and practices, the legal guidance is formulated in a way that can be adapted to meet the particular needs of the State. Following is a brief outline of the guidance material in terms of its general principles, as well as its principles of protection and the question of public disclosure.

Providing protection to qualified safety information under specified conditions is part of a State's safety responsibilities. The sole purpose of protecting such information from inappropriate use is to ensure its continued availability so that proper and timely preventive actions can be taken to improve aviation safety. The protection of safety information is not intended to interfere with the proper administration of justice.

National laws and regulations protecting safety information should ensure that a balance is struck between the need for protection and the need for the

proper administration of justice. National laws and regulations protecting safety information should prevent its inappropriate use.

The ICAO guidance material sets out a number of tenets related to the protection of safety information. Safety information should, for instance, qualify for protection from inappropriate use according to specified conditions that should include, but not necessarily be limited to, a commitment to collect the information for explicit safety purposes and to avoid any disclosure that would inhibit the continued availability of such information. Protection should be specific for each system by being based on the nature of the safety information it contains. In addition, a procedure should be established to provide formal protection to qualified safety information in accordance with specified conditions.

Safety information should not be used in a way that is different from the purposes for which it was collected. Furthermore, its use in disciplinary, civil, administrative and criminal proceedings should be carried out only under suitable safeguards provided by national law.

According to ICAO guidelines, exceptions to the protection of safety information should only be granted by national laws and regulations when there is evidence — or whenever an appropriate authority considers that circumstances reasonably indicate — that the occurrence was caused by an act legally defined as conduct with intent to cause damage, or conduct with knowledge that damage would probably result, behaviour that is equivalent to reckless conduct, gross negligence or wilful misconduct.

This principle would also apply when an appropriate authority determines that the release of the safety information is necessary for the proper administration

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Silvério Espínola is the Principal Legal Officer in the Legal Bureau at ICAO headquarters, Montreal. Marcus Costa is the Chief of the Accident Investigation and Prevention (AIG) Section in the ICAO Air Navigation Bureau; Capt. Daniel Maurino, of the Flight Safety (FLS) Section in the Air Navigation Bureau, is the Coordinator of the ICAO Flight Safety and Human Factors Programme.

Information gleaned from recent accidents provides basis for safety improvements

Final reports issued by investigation authorities, plus safety alert arising from the August crash of a regional jet transport, serve the aviation community by underscoring various safety issues

WHILE they may not be proactive in nature, unlike the other tools associated with a safety management system, reports of aircraft accidents and serious incidents continue to be a time-honoured means of promoting safety, in part because they present recommendations for change that could enhance safety, but also because they alert managers and operating personnel to critical issues.

Under ICAO Annex 13, States routinely forward copies of their reports of investigations of fatal aviation accidents and serious incidents to ICAO, which are then entered into the organization's accident and incident reporting (ADREP) system for trend analysis and risk assessment within ICAO, among other things. The final reports on accidents of special interest are included in the ICAO Aircraft Accident Digest.

Among notable accident reports received in recent months was that of the Helios Airways Boeing 737 crash near Athens, Greece in August 2005, disseminated by the Hellenic Air Accident Investigation and Aviation Safety Board (AAIASB) in October 2006. Also of note was the report on a fatal Boeing 747 freighter crash at Halifax, Canada in October 2004, released by the Transportation Safety Board of Canada (TSB) in June 2006.

Following are brief summaries of the conclusions contained in these reports. (Space constraints prevent reproduction of report findings and recommendations, however, website links have been indicated for readers who are interested in reviewing the full report.) Also highlighted below is a safety alert arising from the crash of a Comair Bombardier CRJ100 in the United States in August 2006.

Helios Airways Flight 522

On 14 August 2005, a Boeing 737-300 operated by Helio Airways departed Larnaca, Cyprus at 0607 local time for Prague, Czech Republic, via Athens, Greece. The aircraft was cleared to climb to FL340 and to proceed direct to the RDS very high frequency omnidirectional radio range (VOR). As the B737 ascended through 16,000 feet, the captain contacted the company Operations Centre to report a take-off configuration warning and an equipment cooling system problem (a warning horn had sounded and the avionics bay temperature warning light had illuminated). The warning horn to which the captain had responded in fact concerned the cabin altitude and was activated by a lack of pressurization.

Several communications between the captain and the Operations Centre concerning the problems confronting the flight crew took place over a period of eight minutes, ending as the aircraft climbed through 28,900 feet. Thereafter, there was no response to radio calls to the aircraft. The flight crew, who had not donned oxygen masks, probably lost useful consciousness as a result of hypoxia some time after their last radio communication on the company frequency at 0620, approximately 13 minutes after take-off. (During the climb, passenger oxygen masks deployed automatically at an aircraft altitude of 18,200 feet, but the pilots

did not become aware of this fact.) As programmed, the aircraft levelled off at FL340 and continued on the route entered into the flight management computer.

At 0721, the aircraft flew over the KEA VOR, then over the Athens International Airport, and subsequently entered the KEA VOR holding pattern at 0738. At 0824, during the sixth holding pattern, the Boeing 737 was intercepted by two F-16s of the Hellenic Air Force. One of the F-16 pilots observed the aircraft at close range, reporting at 0832 that the captain's seat was vacant, the first officer's seat was occupied by someone who was slumped over the controls, the passenger oxygen masks could be seen dangling, and three

motionless passengers could be seen in their seats with oxygen masks donned. No external damage or fire was noted. The crew did not respond to radio calls from the military escorts.

At 0849, the F-16 pilot reported that a person (later determined to be a flight attendant who held a commercial pilot's

licence) not wearing an oxygen mask had entered the cockpit and occupied the captain's seat. At 0850, the 737's left engine flamed out due to fuel depletion, and the aircraft started descending. At 0854, two Mayday messages were recorded on the cockpit voice recorder (CVR).

At 0900, at an altitude of approximately 7,100 feet, the right engine also flamed out. The aircraft continued to descend rapidly and impacted hilly terrain at 0903,



The digital pressure control panel of the B737-300. The AUTO and ALTN positions provide automatic cabin pressure control, while the MAN position allows manual control

in the vicinity of Grammatiko, Greece, approximately 33 kilometres north-west of the Athens International Airport. The 115 passengers and six crew members on board were fatally injured, and the aircraft was destroyed.

The AAIASB determined that the accident resulted from both direct and latent causes. Among the direct causes, the investigation determined that the crew did not recognize that the cabin pressurization mode selector was on the manual position during performance of their pre-flight,

Altitude (1 000 ft)	Rapid disconnect (moderate activity)	Rapid disconnect (sitting quietly)
22	5 minutes	10 minutes
25	2 minutes	3 minutes
28	1 minute	1 minute 30 seconds
30	45 seconds	1 minute 15 seconds
35	30 seconds	45 seconds
40	18 seconds	30 seconds
65	12 seconds	12 seconds

The length of time an individual can maintain useful consciousness when suddenly deprived of oxygen is primarily related to altitude (Carlyle, 1963)

before-start and after-take-off checklists (the selector had been placed on MAN during unscheduled maintenance). In addition, the crew did not detect the reason for the activation of the cabin altitude warning horn, apparently interpreting this as a take-off configuration warning instead; nor did they notice an indication of passenger oxygen mask deployment or the master caution light. With the flight crew incapacitated by hypoxia, the aircraft was flown by the flight management computer and autopilot until the fuel was depleted, resulting in engine flameout and impact with the ground.

Among latent causes cited by the AAIASB were deficiencies in the operator's organization, quality management and safety culture, as well as the regulatory authority's inadequate execution of safety oversight. Also highlighted were the inadequate application of crew resource management (CRM) principles and the ineffectiveness of measures taken by the aircraft manufacturer in response to previous pressurization incidents involving the same aircraft type.

The AAIASB cited a number of factors that could have contributed to the acci-

dent, among them the fact that the cabin pressurization mode selector was not placed on the automatic position following aircraft maintenance. Also noted were the lack of cabin crew procedures (at the international level) for addressing events involving the loss of pressurization and continuation of a climb despite the deployment of the passenger oxygen masks, and the ineffectiveness of international aviation authorities in enforcing implementation of action plans that address the deficiencies documented in audits.

In the months following the accident, the AAIASB made a number of interim safety recommendations that were addressed to the U.S. National Transportation Safety Board (NTSB), the aircraft manufacturer, the Cyprus Air Accident and Incident Investigation Board, Cyprus-based airlines, and the Hellenic Civil Aviation Authority (HCCA). As a result of the investigation, the AAIASB noted, the U.S. Federal Aviation Administration (FAA) issued an airworthiness directive requiring a revision of B737 flight manuals to reflect improved procedures for pre-flight setup of the cabin pressurization system and crew responses to cabin altitude warnings and take-off or landing configuration warnings.

The report highlighted additional safety deficiencies related to maintenance procedures, pilot training, normal and emergency procedures, airline organizational matters, and safety oversight of maintenance and flight operations. The final report of the AAIASB included an additional 11 safety recommendations addressed to Cyprus, the European Aviation Safety Agency (EASA) and Joint Aviation Authorities (JAA), and ICAO.

The 164-page report may be reviewed at the AAIASB website (www.rndt.eu/FINAL_REPORT_SB-DBY.pdf).

MK Airlines B747 freighter

The fatal crash of an MK Airlines

freighter at Halifax International Airport on 14 October 2004 underscores the need for better systems to ensure correct take-off speed and thrust, according to an investigation by the Transportation Safety Board of Canada. The final report (No. A04H0004) is available at the TSB's website (www.tsb.gc.ca/en/reports/air/2004/A04H0004/a04H0004.pdf).

The MK Airlines B747 was being operated as a non-scheduled international cargo flight from Halifax, Canada to Zaragoza, Spain. At about 0654 Coordinated Universal Time, 0354 Atlantic Daylight Time, MK Airlines Flight 1602 attempted to take off from Runway 24 at the Halifax International Airport. The aircraft overshot the end of the runway for a distance of 825 feet, became airborne for 325 feet, then struck an earthen berm. The aircraft's tail section broke away from the fuselage, and the aircraft remained in the air for another 1,200 feet before it struck terrain and burst into flames. The aircraft was destroyed by impact forces and a severe post-crash fire. All seven crew members suffered fatal injuries.

The report concluded that the speed and thrust settings selected by the crew members in preparation for their flight to Spain were incorrect for the weight of the Boeing 747-244SF.

The investigation found that the crew did not receive adequate training on the Boeing Laptop Tool, a computer programme used to calculate the take-off velocity and power necessary in light of factors such as fuel weight, payload and environmental conditions. TSB investigators also found that crew fatigue and a dark take-off environment may have compounded the likelihood of error. As a consequence, the board called on Canadian and international regulatory authorities to ensure that crews of large aircraft are alerted in time where there is not enough power to take off safely. The board recommended that "The Department of Transport, in conjunction with ICAO, the U.S. Federal Aviation Administration, the European Aviation Safety Agency, and other regulatory organizations, establish

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ICAO addresses security concern highlighted by failed terrorist plot

In the wake of the planned terrorist plot to sabotage several airliners over the North Atlantic, unveiled by U.K. authorities in mid-August 2006, ICAO has developed security guidelines for screening liquids, gels and aerosol products to be carried in the passenger cabin, and the ICAO Council has recommended that member States implement these guidelines no later than 1 March 2007.

As a result of the new security concerns, the Council has also decided to form a Secretariat study group to develop long-term, cost-effective and harmonious security measures that will not impact on the overall objective of safe and efficient civil aviation operations. The new group, to be composed of members of the Aviation Security (AVSEC), Facilitation and Dangerous Goods Panels as well as economic and industry experts, is expected to present its recommendations before the end of June 2007.

The newly developed screening guidelines for carry-on liquids cover all gels, pastes, lotions, liquid and solid mixtures, and the contents of pressurized containers such as shaving foam. Under the new guidelines, the affected containers are restricted to a maximum capacity of 100 millilitres each even if only partially filled. Such containers should be placed in a transparent, resealable one-litre plastic bag that is then presented for visual inspection at the screening point, with a limit of one bag per passenger.

Exempted from the new screening process are medications, baby milk and foods, and items related to a special dietary requirement, although an appropriate and proportionate means of verifying the nature of such liquids also needs to be available. The guidelines recommend exemptions for liquids purchased either at airport duty free shops or on board aircraft, provided these products are packed in a sealed plastic bag that readily reveals tampering and that displays a satisfactory proof of purchase on the day of the journey.

A revised list of prohibited items, intended to deal with the threat posed by liquid, gel and aerosol products that may be used in improvised explosive devices, is also under development. The revised list is to be based partly on the work of the ICAO International Explosives Technical Commission (IETC), which recently evaluated carry-on substances having characteristics that could make them attractive for use in a terrorist attack. The list of prohibited items is considered a complex matter as it involves law enforcement, explosives technologies, evaluation of trace detection equipment, training of security personnel, logistics and commercial considerations.

The ICAO Council has also adopted a recommendation by explosives experts to encourage States to continue their efforts to develop appropriate processes and technologies for dealing with the real threat from homemade explosives, while in the meantime applying some form of control or restriction on liquids through screening points. It called for the Ad Hoc Group of Specialists on the Detection of Explosives (AH-DE) to convene a workshop in early 2007 to

share the results of ongoing work in this area and to develop common approaches and best practices for the longer term.

Emphasizing the importance of cooperation with intelligence agencies and regulators, ICAO has developed a point of contact (PoC) network for rapidly sharing significant security information on an international basis. The PoC network, which uses a secure website for communications, so far involves registered participants in some 70 States. Those States that are not yet part of the network are being urged to join without delay.

Over the long term, ICAO intends to review and revise its security standards and guidance for dealing proactively with any emerging threat. It will focus on how to further enhance the integrity of airside security, including screening of workers and cargo, catering products and hold baggage, and the possible relevance of other security measures such as behavioural pattern recognition. □

Disclosure authorized

A total of 82 ICAO Contracting States and two territories had agreed by 23 November 2006 to the disclosure of either their full safety oversight audit report or an executive summary of the audit report at ICAO's website. The decision to release the results of ICAO safety oversight audits to the public was made by the world's directors general of civil aviation at a safety conference at ICAO headquarters in late March 2006. □



FIRST MEETING

The first meeting of the Commission of Experts of the Supervisory Authority of the International Registry was held at ICAO headquarters from 6 to 8 November 2006 under the chairmanship of Laurent Noël (Switzerland). The commission advises ICAO Council on matters related to the registry, which was created by an international treaty — the Cape Town Convention and Aircraft Protocol — that came into effect in early 2006. The registry is a central feature of the regime which will reduce the risks of lending for aircraft financiers, banks and other financing institutions involved in aircraft purchasing and leasing, thus reducing the cost of credit.

SMS implementation leads to safety enhancement despite strong industry growth

Central to its efforts to respond more effectively to the needs and expectations of member States, ICAO is focusing on the implementation of safety management systems designed to achieve measurable results in aviation safety, ICAO Council President Roberto Kobeh González informed participants of an international safety forum in early November.

The emphasis of ICAO's first-ever business plan, the Council President explained, is performance-based programmes and initiatives that "provide the greatest return on investment of limited human and financial resources, through working methods and management practices that lead to identifiable results." Safety management systems are one such initiative, a means of enhancing safety despite challenging industry growth that strains safety oversight resources.

"Safety management systems are the most effective way of responding to the need for effective supervision with a relatively small workforce," stated Mr. Kobeh González. "Many member States are implementing or exploring safety management systems to complement the existing regulatory structure. We encourage them to do so ...".

ICAO, the Council President added, offers concrete assistance in the form of standards and related guidance material for establishing safety management systems, including a set of aligned safety management provisions for aircraft operations, air traffic services and aerodromes, as well as model legislation to make it easier to implement SMS.

Other areas in which ICAO is concentrating its resources are the development of global performance-based security measures amongst States; the pursuit of unified and coordinated measures to reduce civil aviation's adverse impact on the environment; and the implementation of harmonized air

traffic management systems and performance-based efficiency improvements.

The Council President's 2 November address to the U.S. Federal Aviation Administration (FAA) International Aviation Safety Forum elaborated on safety policy, including the shift toward increased visibility of safety information, a development that "should encourage States to correct more quickly the safety deficiencies that remain in their aviation systems and make it easier for States and donors to provide more rapid and more effective assistance to those that require much needed financial or human resources."

Mr. Kobeh González remarked that so far some 80 States have authorized ICAO to disseminate information on ICAO safety oversight audits at its public website, and other States are expected to join them. In any event, the results from all ICAO safety oversight audits will appear in summary form at ICAO's website beginning in March 2008, ushering in a new era of openness.

"This is an unprecedented development in terms of increasing transparency and sharing of information among States, as well as with the industry and the travelling public," Mr. Kobeh González said.

In reflecting on the theme of the 2006 symposium, *Safety from Top to Bottom*, the Council President asserted that safety demands "a firm commitment from senior management of airlines, airports, service providers, manufacturers, regulators and all other stakeholders, no matter how small, for aircraft operations to be as safe as is humanly possible.

"The commitment to safety must flow from the top like a waterfall and permeate every part of an organization," he asserted.

The Council President's full address to the 3rd Annual FAA International Aviation Safety Forum is available at the ICAO website (www.icao.int). Also available at the website is the President's address to the 27th Assembly of the Latin American Civil Aviation Commission (LACAC) in Panama City on 6 November. □

Council elects VPs and committee chairmen for 2006-07

The ICAO Council has elected three vice-presidents to serve for the 2006-07 period. The newly appointed vice-presidents are: Igor Lysenko, Representative of the Russian Federation, as First Vice-President; Dr. Attila Sipos, Representative of Hungary, as Second Vice-President; and Julio Enrique Ortiz Cuenca, Representative of Colombia, as Third Vice-President.

The Council also elected the chairmen of the five Council committees for a one-year period. Those appointed are: Air Transport Committee, Silvia Gehrler (Austria); Joint Support Committee, Bong Kim Pin (Singapore); Finance Committee, Dr. Nasim Zaidi (India); Unlawful Interference Committee, Donald Bliss (United States); and Technical Cooperation Committee, Daniel Oscar Valente (Argentina).

The ICAO Council, the governing body of the organization, comprises representatives of 36 States elected by the ICAO Assembly. □



FUNDING GRANT

ICAO received a grant of U.S. \$405,000 from the Government of Canada during a brief presentation at ICAO headquarters on 12 September 2006. The funding is in support of the ICAO/Canada Security Awareness Training Programme. Debra Normoyle, Director General of Security and Emergency Preparedness at Transport Canada, is seen presenting the grant on behalf of Foreign Affairs and International Trade Canada to Mohamed Elamiri, Director of the ICAO Air Transport Bureau.

Symposium puts spotlight on ATC safety

ICAO will hold a global symposium on threat and error management (TEM) and the process for conducting a normal operations safety survey (NOSS) in air traffic control in Washington, D.C. from 7 to 8 February 2007. Developed by the ICAO Flight Safety and Human Factors Programme, the symposium is intended to assist States and air traffic services (ATS) providers in their efforts to monitor safety during normal ATS operations as part of a safety management system (SMS). Open to officials from civil aviation administrations, ATS providers, airlines, training institutions and professional associations, the event is being hosted by the U.S. Federal Aviation Administration (FAA).

The symposium will highlight guidance material developed by ICAO in recent years. With the assistance of a team of experts known as the Normal Operations Safety Survey Study Group (NOSSSG), the organization developed a circular on the subject of TEM in air traffic control which promotes safety management and provides training guidance. It has also developed a protocol for conducting the normal operations safety survey, and has arranged for several ATS providers to undertake NOSS trials. The symposium will feature case studies based on the experience with implementing NOSS; these will be presented by Airservices Australia, Nav Canada, Airways New Zealand and Eurocontrol. The event will conclude with a presentation and panel discussion on the safety benefits of NOSS.

The event, to be conducted in English, is the second of its kind. The first symposium on TEM and NOSS in ATC was held in Luxembourg in November 2005, with Eurocontrol as host. For details on NOSS, see "ICAO examining ways to monitor safety during normal ATS operations," Issue 3/2004, pp 14-16.

The venue for the Washington symposium, L'Enfant Plaza Hotel, can accommodate a maximum of 150 participants. Registration is on a first-come, first-served basis, and closes on 10 January 2007. For more information, contact Capt. Dan Maurino (dmaurino@icao.int, with a copy to fls@icao.int). □

Experts to discuss performance framework for air nav system

A global symposium on the performance of the world's air navigation system will take place at ICAO headquarters from 26 to 30 March 2007. Government policy makers will join regulators, air navigation services (ANS) providers, airport operators and airspace users in Montreal to discuss the performance of the air navigation system from the perspectives of safety, economics and management, operations, and technological developments. Some 500 participants are expected at the five-day event, which is seen as a follow-up to the 11th Air Navigation Conference held in 2003, during which a performance framework for an air navigation system based on the global air traffic management (ATM) operational concept was outlined (see "11th Air Navigation Conference adopts global framework for airspace management evolution," Issue 8/2003, pg 24).

The symposium, which will heighten awareness of the need to create a performance framework for the purpose of enhancing safety and efficiency in the air navigation system, is open

to participation by the wider aviation industry as well as other parties interested in air navigation and air transport performance, among them financiers, consultants and members of the academic community. Prominent moderators and speakers will lead the discussion on immediate and future issues related to the performance of the air navigation system.

More information, including registration procedures, is available at the ICAO website (www.icao.int/perf2007). □

Safety data system marks 30th anniversary

The ICAO accident/incident data reporting (ADREP) system, which contains some 34,000 occurrence reports on aircraft having a certificated maximum take-off mass of over 2,250 kilograms (5,000 lb), has now been in use as a safety tool for 30 years.

ADREP began in 1976 as a simple batch processing system. Managed by the Accident Investigation and Prevention Section (AIG) of the ICAO Air Navigation Bureau, ADREP was last upgraded in 2004 by implementing a data system specifically developed for occurrence reporting. The same data system, developed by the Joint Research Centre (JRC) of the European Union, has been installed in several EU member States as well as a number of countries outside the EU, and permits the reporting of data to ICAO electronically.

ICAO encourages the establishment of safety data sharing networks. Information on data sharing and related taxonomies is available at the organization's website and can also be found at the JRC website.

ADREP information is available for accident prevention purposes and is provided on request to authorized officials in ICAO member States. ICAO receives some 130 ADREP queries from member States annually. The data is also used in various ICAO safety-related initiatives. □

ICAO Council appointment



*K. Kammann-Klippstein
(Germany)*

Karin Kammann-Klippstein has been appointed Representative of Germany on the Council of ICAO. Dr. Kammann-Klippstein's appointment took effect on 1 July 2006.

Dr. Kammann-Klippstein is a graduate of the Universities of Hamburg and Geneva, where she specialized in international law and law of the European Communities. After serving as Counsellor for International Shipping Policy at the German Federal Ministry of Transportation, she was appointed Transportation Counsellor at the Permanent Mission of Germany to the United Nations and other international organizations in Geneva. From 1992 to 1996, Dr. Kammann-Klippstein served as Deputy Head of the Division for International Transportation Policy at the Federal Ministry of Transportation in Bonn. She was then appointed Transportation Counsellor at the German Embassy in Washington, D.C., a position she held until her appointment, in 2002, as Deputy Head of the Division for Coordination of Aviation and Shipping Policy at the Federal Ministry for Transportation, Building and Urban Development in Berlin. □

AIR TRANSPORT BRIEFS

Global Symposium on Liberalization ... An ICAO symposium on air transport liberalization held in Dubai, United Arab Emirates on 18-19 September 2006 attracted over 250 participants from 65 States and 11 international organizations. Led by prominent speakers, the event provided an opportunity to share information, discuss issues and challenges, and explore ways to advance liberalization. The symposium was hosted by the Dubai Department of Civil Aviation.

Traffic forecasts for transpacific and intra-Asia/Pacific ... The ICAO Asia/Pacific Area Traffic Forecasting Group recently developed a set of passenger and aircraft movement forecasts for transpacific and intra-Asia/Pacific routes, as well as passenger forecasts for major city-pairs of intra-Asia/Pacific and transpacific (the latter to the year 2010). The group also carried out analyses of flight information region (FIR) data for a sample week (1-7 July) for 2004-06 for the Fukuoka, Bangkok and Hong Kong FIRs, including the analysis of transpacific peak-hour aircraft movements. These forecasts and analyses are included in the report of the group's October 2006 meeting, which will be available to Contracting States on the ICAO-NET and on CD-ROMs to others in December. In addition, it will be posted on a dedicated ICAO aviation statistics website (www.icaoata.com).

Aviation emissions trading ... ICAO Secretariat organized a series of briefings recently to update the ICAO Council and

Air Navigation Commission (ANC) on the work of the Committee on Aviation Environmental Protection (CAEP) and some of the key achievements anticipated for CAEP's next meeting in February 2007 (CAEP/7). Of particular note were briefings on aviation emissions trading to better acquaint the Council and ANC of key issues. These were presented by the Secretariat of the United Nations Framework Convention on Climate Change, the European Commission and CAEP's Emissions Trading Task Group.

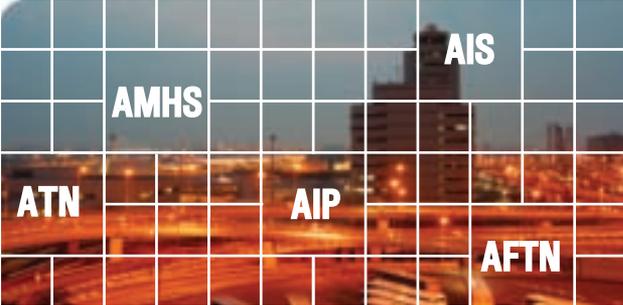
CNS/ATM business case analysis tool ... A computer application has been developed by the ICAO Air Transport Bureau in support of the implementation of CNS/ATM systems. The CNS/ATM database and financial analysis computer system (DFACS) model is an interactive, analytical tool that enables air navigation services providers and airspace users to build, evaluate and compare the economics of alternative options or scenarios for the implementation of CNS/ATM systems. A CD-ROM containing the computer application, along with a user's manual and an illustrative example, has been made available to ICAO regional offices. States may download the application and the documents from the ICAO-NET website (Electronic publications/ ICAO documents).

Latest on trade-in-services matters ... ICAO is closely following work of the Council for Trade in Services (CTS) of the World Trade Organization (WTO), which has commenced discussions on the second review of the Air Transport Annex of the General Agreement on Trade in Services (GATS), covering developments in the civil aviation sector during the period 2000-05. The first review ending in 2000 did not result in any expansion of the annex, which covers three air transport services (aircraft repair and maintenance, computer reservation systems, and selling and marketing). Aviation authorities need to actively participate together with their trade counterparts in the discussions at CTS in order to exert a leadership role by ICAO in the process of economic liberalization within a safe and secure air transport environment.

Noise and emissions workshops ... The third Workshop on Aviation Operational Measures for Fuel and Emissions Reduction was jointly organized by ICAO and Transport Canada on 20-21 September 2006 in Montreal to disseminate information on fuel and emissions reductions contained in ICAO's Circular 303, *Operational Opportunities to Minimize Fuel Use and Reduce Emissions*, and to share practical experiences and successful programmes that have contributed to emissions reductions in all aspects of the aviation industry. In addition, ICAO organized and held the third Regional Aircraft Noise Certification Workshop on 6-7 November in Bangkok, Thailand.

Course on user charges ... A training course on international policies and practices for the establishment of airport user charges was conducted in Zurich, Switzerland from 23-27 October 2006. The course was the second in a series that ICAO and the Airports Council International (ACI) are offering to airports (see Issue 4/2006, pg 16).

The next ICAO/ACI workshop on airport user charges to be offered in the English language will be convened in Kuala Lumpur, Malaysia on 12-16 February 2007. French and Spanish language workshops will also be conducted in 2007. □



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Pandemic influenza guidelines now available at website

Guidelines that States can apply to reduce the risk of pandemic influenza being spread through air transport operations have been posted at the ICAO website (www.icao.int).

Concurrently, a new provision has been adopted for ICAO Annex 9, *Facilitation*, requiring that Contracting States establish a national aviation plan for an outbreak of a communicable disease posing a public health risk. The changes, which become applicable on 17 July 2007, revise the health information part of the aircraft general declaration form. They also call for the introduction of a passenger locator card that public health officials can use to trace passengers who may have been infected by a serious communicable disease.

In a related development, the ICAO plan for the air transport sector's response to the outbreak of a communicable disease has been incorporated into a United Nations action plan that spells out the role of various UN agencies and partners in the event of a health emergency that requires a coordinated global response.

The guidelines which are now available from ICAO are an important step in preparedness planning. Avian influenza currently poses a substantial risk to the global population because it is likely that at some unpredictable point in the future a strain of influenza will emerge that transmits easily between humans. If this were to occur, the World Health Organization (WHO) may call on the aviation community to implement measures to limit the spread of disease. Moreover, aviation would undoubtedly be detrimentally affected by decreased traffic to areas where there is a perceived increased risk of disease. For both reasons it is therefore necessary to plan for such an event.

The guidelines were developed over a period of months in cooperation with WHO, the Centers for Disease Control and Prevention (CDC), Airports Council International (ACI), International Air Transport Association (IATA), and other organizations with appropriate expertise. The international effort was coordinated by ICAO, which gained experience in developing related guidelines during the severe acute respiratory syndrome (SARS) outbreak in 2003.

Generic in nature, the ICAO guidelines are based on the WHO *International Health Regulations* published in 2005, and can be applied to many communicable diseases, not only influenza. They will continue to be modified over time as more information is gained on preparedness planning and on the behaviour of relevant infectious agents.

In addition to guidelines that are directed towards States, more detailed guidance has been developed specifically for use by airport operators and airlines. This information is available from ACI and IATA respectively.

ICAO has also been active in promoting a coordinated response to any health crisis. The Asia/Pacific region is the first to be involved in an ICAO project that aims to harmonize preparedness plans across the globe, known as the Cooperative Arrangement for Preventing the Spread of Communicable Diseases through Air Travel (CAPSCA). The purpose of this project is to ensure that international airports have a preparedness plan in place that is aligned with ICAO guidelines. Another important aim is the development of a

regional network of experts who can provide advice to the aviation sector on preparedness planning, and in the event of an outbreak of a serious communicable disease.

If successful, the CAPSCA project will be extended to Africa in 2007, and subsequently to other regions as well. □

ICAO and the Republic of Korea announce training programme

ICAO and the Republic of Korea have signed a memorandum of understanding on training programmes tailored for aviation personnel from developing countries. Under the agreement signed in September 2006, the Korea Civil Aviation Training Centre (KCATC) will provide selected participants with courses on the global navigation satellite system (GNSS), nav aid maintenance, radar approach control and other technical subjects. To commence in 2007, the training programme will be established and administered jointly by the Korean Civil Aviation Safety Authority (KCASA), the Korea International Cooperation Agency (KOICA) and the ICAO Technical Cooperation Bureau.

The initial programme is being offered on an annual basis for a three-year period, at which point it may be extended. The training initiative will accommodate about 39 participants per year initially, and is being funded by the Ministry of Construction and Transportation of the Republic of Korea (MOCT) and the KOICA.

The annual curriculum will reflect the changing needs of developing countries and is intended to promote the development and safety of international civil aviation. To be conducted in English, the programme will be available to specific countries identified by ICAO and the MOCT, with final selection of the students to be determined by the Republic of Korea.

The Korea Civil Aviation Training Centre, also known as the Korea Civil Aviation Academy (www.catc.airport.co.kr/), was established in 1984 with financial and technical assistance from the United Nations Development Programme (UNDP) and ICAO, and with the objective of meeting the developmental needs of civil aviation in the Republic of Korea. KCATC has played a major role in the enhancement of technical expertise in Korean civil aviation, and has offered an international fellowship programme since 2001. During the 2001-06 period, the centre provided fellowship training to 173 participants from 49 countries.



An instructor with students at the Korea Civil Aviation Training Centre. Beginning in 2007 the centre will provide training for participants from developing countries under an MOU signed by ICAO and the Republic of Korea. □

ATM safety

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the region that are not members of ECAC to review and strengthen their ATM safety frameworks.

The introduction of the Single European Sky presents fresh safety challenges for European authorities, and with this in mind Eurocontrol recently launched a new safety initiative known as the European Safety Programme for ATM. The proactive programme looks forward and identifies areas that need improvement to meet the challenges presented by the ever-increasing level of traffic and SES implementation. In particular, the reporting of ATM occurrences and the sharing of lessons learned need to be improved.

Over the past four years European ATM providers have strengthened and improved their safety management systems. There is now a much greater awareness among ATM providers of what is required in respect of safety frameworks, and there is greater cooperation between the various organizations and associations active in Europe. The next few years will see targeted workshops on different aspects of SMS that will be held across Europe and Northern Africa.

An ATM safety management system provides a structured basis on which to develop, organize and manage all of the various elements that are required to ensure that air traffic is managed in the safest way. Considering that risk must be managed daily, with steadily increasing traffic and the advent of new technology and new procedures, it is incumbent on everyone involved to maintain the highest level of safety possible. Safety cannot be left to chance, and together we must ensure that accident rates are reduced to compensate for the expected future growth in air travel. □

SMS fundamentals

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statutory and internally promulgated safety rules, and secondly, they focus on prevention and/or reduction of harm arising out of a firm's decisions and operations.

Management strategies attempt to systematize management functions and processes to enhance or optimize organizational performance. With respect to a business strategy, as with any management system, a safety management system must provide opportunities to create and capture shareholder value. This approach recognizes that a firm is in the business of making money for its owners.

In order to achieve the goals of ensuring compliance and preventing or reducing harm arising out of a company's decisions and actions, safety strategies incorporate a number of elements, specifically those concerned with compliance, risk management, prevention, containment and remedial action.

Management strategies refer to the system by which managers perform their functions, in particular their efforts to lead, plan, organize, control and achieve improvements. The goal of these management strategies is to enhance organizational performance in terms of effectiveness, efficiency and economy.

To be truly effective, efficient and economic, a safety management system requires leadership. A company's executives must possess the commitment to pursue safety as a core value of their organization. They must be cognizant of the safety risks faced by their firm and competent enough to put in place the measures that can bring about effective and lasting results.

Like any other aspect of business, safety management systems demand that a plan be drawn up. This plan attempts to ensure that all safety issues are listed and assigned priority, and that action is initiated with sufficient allocations of people, time, money, tools and the processes needed to do the job properly.

Organizing tasks usually entails the striking of a safety team, with a manager responsible for the achievement of the plan's goals. The team should be made up of personnel with the needed skills set. This may involve a significant degree of coordination between organizational units.

Controls are put in place, and the environment monitored for change. This involves benchmarking safety performance or comparing this performance with a departure point, measuring the results and making corrections if the desired results are not achieved. Finally, management system thinking demands continuous improvement. It demands continuous learning and searching for better ways of doing things and institutionalizing those processes that prove their worth.

In summary, a safety management system consists of components and elements that provide for a comprehensive approach to safety, an effective organization to achieve safety, and the systems needed to provide for safety oversight.

Safety philosophy and policies. A comprehensive corporate approach to safety speaks to the need for aviation organizations to establish a safety philosophy and appropriate policies. This calls for organizations to establish their fundamental approach to managing safety in terms of leadership and direction, planning, controlling, and measuring performance, as well as related functions that permeate the entire organization.

An "effective organization to achieve safety" speaks to such things as roles, responsibilities, accountabilities, structure and means of achieving coordination among organizational units. "Systems to achieve safety" speaks to the establishment of the various means for accomplishing this. Such systems must be introduced in order to achieve compliance with statutory or internally promulgated rules; identify the hazards and risks associated with different operations; assess and mitigate the known risks; report safety deficiencies, accidents and incidents; contain accidents and prepare for likely emergencies; investigate accidents and incidents, and disseminate the lessons learned and correct system deficiencies — all the while documenting the processes, decisions and actions throughout.

Transport Canada believes that a safety management system will enable aviation organizations to better manage risk and contribute to their bottom line. To quote James Reason, SMS helps aviation firms "navigate the safety space" between bankruptcy and catastrophe by providing the means to better balance investments in protection and production.

Managers face myriad challenges in their attempt to make money. But at their most fundamental level, safety management systems can help a company reconcile the social demand for enhanced safety with the shareholder's expectation for better financial returns and, perhaps, keep the regulator happy at the same time. □

Safety information

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a requirement for transport category aircraft to be equipped with a take-off performance monitoring system that would pro-

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ICAO Council appointment



G. Shin
(Republic of Korea)

Ambassador Gil-sou Shin has been appointed Representative of the Republic of Korea on the Council of ICAO. His tenure commenced on 26 September 2006.

Ambassador Shin is a graduate of the Seoul National University, where he majored in economics. He joined his country's Ministry of Foreign Affairs in 1978, and served in a number of positions of increasing responsibility both at home, in different divisions of

the Ministry of Foreign Affairs and Trade (MOFAT), as well as abroad, in embassies of the Republic of Korea in Africa, Asia and Europe. His most recent assignments have included those of Counsellor at the Permanent Mission of the Republic of Korea to the United Nations Secretariat and International Organization in Geneva; the Deputy Director-General for Commerce and Trade Policy at the MOFAT; and the Minister of the Embassy of the Republic of Korea in the Philippines.

In addition to his recent appointment as Representative on the ICAO Council, Ambassador Shin is currently serving as Consul General of the Republic of Korea in Montreal. □

vide flight crews with an accurate and timely indication of inadequate take-off performance.”

Comair Flight 5191. The U.S. Federal Aviation Administration (FAA) has issued a safety alert in the wake of the 27 August 2006 crash of a Comair Bombardier CRJ100 at Lexington, Kentucky Blue Grass Airport (KLEX). The safety alert for operators (SAFO), No. 06013 dated 1 September 2006, is available at the FAA's website (www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/safo).

The recent accident, in which a commuter jet took off from the wrong runway, “brings into focus the importance of maintaining situation awareness and adherence to CRM procedures,” the FAA stated. “It is important to note that many airports are involved in construction activities that result in changing environments. This heightens the importance of pilot vigilance.

“There are many other factors that can distract a pilot and cause the loss of situational awareness. Even subtle distractions could demand a share of the pilot's workload, such as dealing with company procedures, passengers, running late and even personal issues,” the SAFO stated.

“It is imperative that flight crews maintain the highest levels of airmanship discipline and crew resource management. This is especially significant during the critical phases of flight, take-off and landing.”

The SAFO reminded flight crews of the following existing guidance:

- As part of pre-flight planning, review airport layouts and know airport signage.
- Review NOTAMs for information on runway and taxiway closures and construction areas.
- During taxi operations, have a current airport diagram readily available for reference and check the assigned taxi route against the diagram, paying special attention to any unique or complex intersections.

- Write down complex taxi instructions. When unsure of the taxi route, request progressive taxi instructions from Air Traffic Control (ATC).

- If the flight has more than one crew member, it is important that both fully understand taxi clearances and runway assignments.

- During taxi operations, the pilots' maximum attention should be placed on maintaining situational awareness. The pilot taxiing should have his attention focused outside the aircraft at all times while the other pilot should monitor the taxi progress by reference to the airport diagram and give guidance to the taxiing pilot.

- Apply CRM procedures to identify and resolve conflicting perceptions of ATC instructions; confirm, by using the challenge-and-response technique, proper execution of ATC instructions; and confirm, using this same technique, that the aircraft is actually positioned on the assigned runway by reference to the heading indicator.

- Use all available resources to ensure the aircraft is positioned on the proper runway. One technique for aeroplanes that are equipped with a flight management system (FMS) is to verbally announce that the proper runway and departure procedure are selected in the FMS and that the aircraft heading agrees with the assigned runway for take-off.

The U.S. NTSB is continuing its investigation of the accident, which occurred when the aircraft attempted to take-off from an inoperative 3,500-foot runway instead of the 7,000-foot runway that it had been assigned by ATC. □

Business Plan commitment

continued from page 7

the greatest challenge is that of putting these programmes into practice. While both the business plan and SMS implementation are evolved forms of past ideas, proper execution demands that they be seen as new concepts. While seemingly a subtle distinction, this approach prepares one mentally to go beyond simple adaptation of past practices and behaviour to formulate new strategies based on the best practices and operational experience.

Over the next decade, the ICAO business plan and safety management concept will undergo a series of trials and iterations. The ICAO Assembly will streamline the organization's strategies, and the effects of this enhanced institutional efficiency will be obvious to all from the organization's updated business plan and associated performance indicators. At the same time, the governing boards of operators of countless aviation systems worldwide will periodically adjust their safety indicators and targets to meet their acceptable levels of safety.

And while the SMS and ICAO business plan will ultimately grow outdated — like all other forms of management that have preceded them — they can be expected in the meantime to provide an effective response to the safety concerns that may emerge over the coming decades. □

SMS implementation

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States in implementing the harmonized provisions will be delivered in each of ICAO's seven regional offices.

While a great deal is being done to implement SMS as a tool for managing safety, it is important to bear in mind that this implementation does not obviate the need to comply with the

specifications and regulations in force.

Importance of training. Training that can assist States with the global implementation of SMS is very important, and consequently ICAO recently developed such a course. During 2006, the organization conducted three courses for different regions, and four more courses will be delivered next year.

The goals of the ICAO SMS training course, which builds upon the harmonized safety management provisions and Document 9859, are to expand the knowledge of the safety management concepts and related SARPs contained in ICAO Annexes 6, 11 and 14, as well as guidance material. Another goal is to develop States' capacity to certify and oversee the implementation of key components of a basic SMS in compliance with ICAO SARPs and national regulations.

The target audience for the courses includes civil aviation administration officials who are 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 SMS training course, delivered in five days, comprises 10 modules and six case studies to allow participants to apply their newly acquired knowledge in a practical setting. Topics covered include safety basics, fundamentals of safety management, hazard identification and risk management, ICAO SMS regulation, and the development, implementation and operation of an SMS. The course includes daily progress tests and a final examination.

To provide sufficient SMS training opportunities in the years ahead, ICAO plans to develop training for course instructors as this will allow States to become self-sufficient both in SMS implementation and in imparting SMS training. Moreover, as States develop these internal resources, they will be in a position to assist other States with their implementation of safety management systems, thus achieving the synergistic partnership necessary for the global execution of safety management systems.

SMS training is available from ICAO on request from individual States or groups of States. The course, designed for a maximum of 30 participants, includes study materials provided to States in electronic format. At present, it is conducted either in English or Spanish, but it is expected that availability will be expanded to other languages.

Once the training has been completed and instructors have been endorsed, States may use the ICAO training course and its materials without restrictions. From time to time, the course material may be updated by ICAO, in which case States will be provided with new material in electronic form. States may obtain further details on the SMS training programme at ICAO's website (www.icao.int/anb/safetymanagement).

ICAO's initial effort in assisting States with implementing SMS will continue for another year, at which point further activities may be undertaken. These could involve identifying a means for further pursuing safety management activities, including related training, on a regional basis. It could also entail the development of guidance material and provision of assistance for the establishment of safety data collection and analysis systems in States. Future work might involve efforts to improve safety data analysis capabilities in States, and the linking of regional systems for the exchange of safety information and analysis. Also envisioned is the development of guidance material and provision of assistance for the enactment of national legislation to protect all

relevant sources of safety information.

Conclusion. 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 efficient. Even organizations that are not directly involved in a measurable production activity, such as civil aviation administrations, are under pressure to discharge their mandate in the face of ever-diminishing resources. Hence, the value and importance of SMS.

SMS presents the international aviation community with a principled, data-driven approach to determining priorities and allocating the resources required to address safety concerns that hold the greatest risk potential, and towards activities likely to produce the biggest return on resources invested. SMS also provides the means to address safety systemically and proactively through hazard analysis and risk assessment and mitigation. 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 concepts, 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 on a global basis, by all Contracting States and, through States, by as many aviation organizations as possible. In order for this worldwide implementation to take place, States need to be fully aware and informed about the SMS concept and the means and tools for its implementation. □

SMS standards

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Another initiative is to better integrate the existing suite of advisory circulars into a comprehensive safety and quality management system concept for the aviation industry. Part of this effort will include the development of more sophisticated operational risk analysis techniques including the effects of operational changes on system safety. Particular targets for these efforts will include existing advisory circulars and other documentation for an internal evaluation programme, continuing analysis and surveillance systems and the Voluntary Disclosure Reporting Programme (VDRP). Along these same lines, future study will also explore safety management in other fields of aviation, as well as industry-developed management programmes in common use.

The FAA further plans to infuse the concepts of SMS into the agency's oversight systems. The four pillars will be applied to the processes of producing regulations, standards and policies such that these will be viewed as system risk controls. Future rulemaking will be based more on risk analysis so that the FAA can be sure that necessary controls are in place, and that obsolete regulations that no longer are needed to control risk can be eliminated.

In a similar manner, safety assurance of the overall aviation system will be based on analysis of data coming from FAA field elements as well as directly from aviation service providers. Information sharing will receive much greater emphasis than before as a fundamental part of the FAA risk management and safety assurance strategy. In this manner, the total government/industry safety management strategy can be made more effective and efficient. □

Single European Sky

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them establish a certification regime compliant with Single European Sky principles and place them in a position to verify and show compliance with the common certification requirements.

As part of the move towards SES, ESARRs are now being progressively transposed into European Communities law. They are appearing as EC regulations, which have direct applicability in EU member States, and as EC directives, which need to be transposed at the national level.

Ensuring that safety management systems are embedded throughout the Single European Sky is a fundamental prerequisite to the safe transition to new procedures. ESARR requirements for safety management systems have therefore been included as essential criteria to be met by ANS providers before they can be certified. □

Representative of Australia



*S. Clegg
(Australia)*

Simon Clegg has served as the Representative of Australia on the Council of ICAO since mid-2003. Prior to assuming his current post, Mr. Clegg held a number of positions in his country's Department of Transport and Regional Services.

Mr. Clegg played a leading role in most of the major reforms to Australian aviation in the past decade, including the privatization of major airports and the establishment

of two specialized agencies, Airservices Australia and the Civil Aviation Safety Authority of Australia. Mr. Clegg was leader of the government task force set up to deal with the effects of the terrorist attacks of 11 September 2001 on the aviation insurance market. During 2001-02, he served as Chairman of the ICAO Special Group on War Risk Insurance.

Mr. Clegg's most recent position in Australia was that of Director, Aviation and Maritime Legal, a role in which he advised widely on a range of legal issues associated with Australia's international and domestic aviation policy. In this capacity, he worked closely with aviation safety investigation teams and spearheaded development of comprehensive new national legislative regimes for both aviation and maritime security. In addition, Mr. Clegg chaired several government working groups, among them the GNSS Legal Issues Working Group and the Joint Australia-New Zealand Working Group. The latter group developed the legislation for mutual recognition of aviation certificates, a necessary step in implementing arrangements for a single aviation market for the two countries.

Mr. Clegg holds degrees in economics, commerce and law from the University of Adelaide, and is a barrister of the High Court of Australia. He has been a visiting lecturer at the Australian National University, where he conducted a post-graduate course in international air law for several years. Before joining the Australian Government, he worked for the chartered accounting firm, Ernst & Young. □

Protection of safety data

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of justice, and that its release outweighs the adverse domestic and international impact such release may have on the future availability of safety information.

In addressing the subject of public disclosure, the ICAO guidelines propose — subject to the principles of protection and exception outlined above — that the onus to justify the release of information should be on those seeking disclosure. Formal criteria for disclosure should be established and should require that several conditions be met. Information may be released provided its disclosure is necessary to correct conditions that compromise safety or to change policies and regulations, so long as the disclosure does not also inhibit the availability of information in the future. Such disclosures should be made in a de-identified, summarized or aggregate form. Moreover, disclosure of relevant personal information included in the safety information needs to comply with applicable privacy laws.

The legal guidelines also discuss the responsibility of the custodian of safety information, proposing that each SDCPS should have a designated guardian. This protector is responsible for applying all possible safeguards to the information unless consent for disclosure has been granted by the originator, or the custodian is satisfied that its release is justified for exceptional reasons.

Lastly, the guidelines address the protection of recorded information, which ICAO recommends be treated as privileged protected information (i.e. information deserving enhanced protection) since ambient workplace recordings required by legislation, such as cockpit voice recorders (CVRs), may be perceived as an invasion of privacy. What's more, ICAO proposes that national laws and regulations provide specific measures of protection to such recordings, upholding their confidentiality and spelling out rules for public access. Specific measures of protection for workplace recordings could include orders denying public disclosure. □

Airport safety

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on current resources.

- *Keep it simple.* If the safety management system is to be "saleable" to all staff, it is important that it remain simple and understandable. Gaining trust in the system is another important facet. Both staff and management must embrace ownership of the system.

- *Use and enhance existing practices.* Each organization is bound to have current practices that may be incorporated into the safety management system. For example, a procedure for investigation of incidents already exists in many organizations. Adapting existing practices as much as possible is advantageous because this can support a trouble-free implementation.

- *Share the responsibility.* The safety manager is the individual responsible for developing and implementing a safety management system. The safety manager should organizationally serve in a support role to the aerodrome manager. It is important to emphasize, however, that this individual is not alone in being responsible for safety at the aerodrome. Rather, safety must be the responsibility of the entire airport management. □

IN THE SPOTLIGHT...



14-BIS MODEL

Brazil presented ICAO with a miniature replica of the aircraft piloted by aviation pioneer Alberto Santos-Dumont on the 100th anniversary of his first flight in October 1906. The replica serves as a reminder to the international community of how one man's gift to the world still inspires us today. Brig. Sérgio Luiz de Oliveira Freitas, of the Brazilian Embassy in Washington, D.C., stated during the presentation on 25 October. Shown on the occasion are (l-r) Brig. Freitas; ICAO Council President Roberto Kobeh González; ICAO Secretary General Taïeb Chérif; and Pedro Bittencourt de Almeida, the Representative of Brazil on the Council of ICAO.



FOCUS ON WAFS

The third meeting of the World Area Forecast System Operations Group (WAFSOPSG) took place at the ICAO European and North Atlantic Regional Office in Paris in late September 2006. In addition to operational issues, the group addressed development of the WAFS and endorsed introduction of trial grid-point forecasts for icing, turbulence and convective clouds that are to be evaluated before their anticipated operational implementation in 2010. Given the slower-than-expected operational implementation of the BUFR-coded significant weather forecasts by States, the group agreed that this information would continue to be made available in PNG chart form, as a back-up, until 2010. The third meeting of WAFSOPSG was attended by 28 experts from 14 States and four international organizations, representing all ICAO regions.



DEPOSIT BY COLOMBIA

Colombia deposited its instrument of ratification of the *Convention on the International Recognition of Rights in Aircraft*, signed at Geneva in June 1948, during a brief ceremony at ICAO headquarters on 8 September 2006. Shown on the occasion are (seated, l-r): Gloria Cecilia Rodriguez Varon, Ministry of Foreign Affairs, Colombia; Denys Wibaux, Director of ICAO Legal Bureau; Julio Enrique Ortiz Cuenca, Representative of Colombia on the Council of ICAO; and Maria Cecilia Salazar Cruz, Civil Aviation Administration, Colombia. Standing (l-r): Luis Miguel Garcia Lancharos, Delegation of Colombia to ICAO; Cesar Augusto Bejarano Ramon, Delegation of Colombia to ICAO; and Walter Amaro, of the ICAO Technical Cooperation Bureau.



HUNGARIAN SCULPTURE

Hungary recently presented ICAO with a bronze statue entitled "Generations" that was created by Hungarian sculptor Robert Csikszentmihalyi. The gift commemorates ICAO's 60th anniversary. Shown following the presentation at ICAO headquarters in June 2006 are (l-r): Dr. Attilio Sipos, Representative of Hungary on the Council of ICAO; Roberto Kobeh González, then ICAO Council President-elect; Dr. Assad Kotaite, then ICAO Council President; Dr. Laszlo Kiss, Director General of Civil Aviation, Hungary; and ICAO Secretary General Dr. Taïeb Chérif.



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