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North American, Central American and Caribbean Office (NACC)

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20/11/09

Agenda Item 4:

Aviation Safety Matters

4.3 State Safety Programme/Safety Management Systems (SSP/SMS)

ICAO SMS/SSP EVOLUTION AND CURRENT STATUS

(Presented by the Secretariat)

SUMMARY

The evolution of safety concepts and subsequent implementation of Safety Management Systems (SMS) and State Safety Programmes (SSP) present singular challenges to the industry as well as to the regulators. This paper provides a perspective on the evolution, challenges and a few implementation issues that must be overcome as the migration process to the SMS/SSP environment is completed.

References:

- *Annexes 1, 6, 8, 11, 13 and 14*
- *Safety Management Manual (SMM)* (Doc 9859)
- State Letter AN 12/52.1-08/70 dated 13/11/08 – *Implementation of States Safety Programme (SSP) in States*

Strategic Objectives

This working paper is related to Strategic Objective A2.

1. BACKGROUND

1.1 From its aviation infancy the concept of safety has followed an evolutionary path. During its early days, aviation was typically a developing technology without a proper oversight or structured approach aimed at maintaining acceptable safety levels. It was then believed that safety could be guaranteed as long as certain rules and regulations were put in place and subsequently followed.

1.2 In later years, as aviation matured and the concept of safety evolved, accident investigation became a valuable tool in helping to determine the cause of accidents with the aim of reducing their frequency. Although this reactive method for improving safety was shown to be effective, there was still a need for a method or system that would help identify latent conditions to accidents before they actually occurred. Thus, the concept of management of safety was conceived.

1.3 In order to support the implementation of this new approach to the management of safety, the ICAO Safety Management Systems (SMS) Programme was launched in 2004. To further assist States and their service providers with their implementation of SMS, ICAO developed an SMS training course delivering a total of 137 from 2006 to 2009, three in the CAR Region. More recently, an SSP training course was developed with 33 courses delivered during 2009; two in the CAR Region, the last one in Curacao from 1 to 4 December 2009. Also, 6 ECCAIRS courses were delivered during 2009. In addition, the *Safety Management Manual (SMM)* (Doc 9859) was also developed and first published in 2006. The second edition of this manual was published in March 2009 and is currently available through the following website www.icao.int/anb/safetymanagement.

2. ICAO SAFETY MANAGEMENT STANDARDS AND RECOMMENDED PRACTICES (SARPS)

2.1 The ICAO safety management SARPs address three distinct requirements:

- a) requirements regarding the State Safety Programme (SSP), including the acceptable level of safety (ALoS) related to an SSP;
- b) requirements regarding Safety Management Systems (SMS), including the safety performance of an SMS; and
- c) requirements regarding management accountability.

2.2 ICAO safety management provisions, require States to establish a State Safety Programme in order to achieve an Acceptable Level of Safety (ALoS) in civil aviation. In addition, States shall require, as part of their State Safety Programme (SSP), the following service providers to implement a Safety Management System (SMS):

- a) approved training organizations that are exposed to operational safety risks during their air training operations;
- b) aircraft operators;
- c) approved aircraft maintenance organizations;
- d) organizations responsible for type design and/or manufacture of aircraft;
- e) air traffic service providers; and
- f) certified aerodromes.

2.3 A cross reference of the affected Annexes and effective dates for implementation of the various safety management provisions are contained in the **Appendix** to this working paper.

3. ICAO SAFETY MANAGEMENT SYSTEMS (SMS)

3.1 ICAO defines an SMS as a systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies and procedures. The ICAO Safety Management SARPs establish that the SMS shall be accepted by the State and shall, as a minimum:

- a) identify safety hazards;
- b) ensure the implementation of remedial action necessary to maintain agreed safety performance;
- c) provide for continuous monitoring and regular assessment of the safety performance; and
- d) aim at continuous improvement of the overall performance of the safety management system.

3.2 The four processes listed above constitute the core activities aimed at making continuous improvements to the overall level of safety.

4. ICAO STATE SAFETY PROGRAMME (SSP)

4.1 It is a basic premise that Service providers' SMS cannot work in isolation. In order for service providers to be fully successful in the implementation of their SMS programmes, they require an enabler on the part of the State to properly implement their activities. That enabler is the State Safety Programme (SSP) that provides an enabling platform for a State and its various civil aviation organizations to apply two basic safety management principles to the discharge of their safety responsibilities: safety risk management (SRM) and safety assurance (SA). The SSP also provides a structural framework that allows the State safety oversight authority and service providers within the State to interact more effectively in the resolution of safety concerns.

4.2 A critical concept within the SSP is that of the Acceptable Level of Safety (ALoS) as an essential ingredient for the effective operation of an SSP. The introduction of the notion of ALoS responds to the need to complement the historical approach to the management of safety based upon regulatory compliance, with a performance-based approach. Unless the notion of ALoS is understood and properly developed and implemented, progress toward a performance-based regulatory environment will be difficult to achieve. In this context, an effective relationship between the safety performance of an SMS and the ALoS of an SSP has to be clearly defined and established.

5. DATA COLLECTION AND MANAGEMENT

5.1 An important basis for all activity related to the management of safety is the collection of safety information. This means that the establishment of databases for analysis in order to effectively carry out SMS/SSP functions is a critical step in the process of implementation.

5.2 Until now, the safety data analysis needs of ICAO have been mostly single-source and mono-dimensional, i.e., analysis of accident and incident data. Under the SMS/SSP concept there is now a requirement to develop the means for convergence of relevant data from multiple databases to a common point, to allow for multi-source and multi-dimensional safety data analysis.

5.3 In support of this effort, an important function of ICAO is the development of safety programmes in response to emerging hazards and safety concerns. The safety programme development by ICAO is based on information derived from reactive and proactive identification of systemic deficiencies, and/or information derived from directed studies. Currently there are two projects being advanced by ICAO in this regard:

- a) the Integrated Safety Data Collection and Analysis System (ISDCAS), and
- b) the Comprehensive Runway Safety Programme

5.3.1 Integrated Safety Data Collection and Analysis System (ISDCAS)

5.3.1.1 The first project aims at developing a web-enabled tool, the Integrated Safety Data Collection and Analysis System (ISDCAS) which, through the confluence of multiple data sources available to ICAO, will allow for the development of robust analytic processes to support safety risk-based identification of safety concerns and prioritization of action plans in response to safety concerns.

5.3.1.2 ISDCAS will also allow assessing progress of actions plans in response to safety concerns; and supporting the monitoring of key safety performance indicators to track the implementation of results regarding achievement of relevant Strategic Objectives of the Organization reflected in the Business Plan. A governance framework for the above will also be developed.

5.3.1.3 The ISDCAS design will be presented to ICAO for review and acceptance of the architecture for a web-enabled tool that supports multi-source and multi-dimensional safety data analysis and includes:

- a) a framework for aggregate safety data analysis that supports safety risk-based identification of safety concerns and prioritization of action plans in response to safety concerns. The framework will include the identification of data requirements as well as methodologies to define the correlation between safety risk factors and functional aspects of aviation operations that will make it compatible with the requirements and methodologies of the Commercial Aviation Safety Team (CAST);
- b) a framework for performance metrics to assess progress of action plans in response to safety concerns. The framework will include advanced analysis techniques through the aggregation and integration of multiple safety data sources that will make it compatible with the analysis techniques of the Aviation Safety Information Analysis and Sharing (ASIAS) initiative;
- c) a framework for key safety performance indicators to track the implementation of results regarding achievement of relevant Strategic Objectives of the Organization reflected in the Business Plan. The framework will include techniques and methodologies that enable comparative benchmarking analysis and track implementation of safety enhancements that will make it compatible with similar processes in CAST and ASIAS; and
- d) a governance framework for the above.

5.3.2 The Comprehensive Runway Safety Programme

5.3.2.1 This project has been divided into three distinct, yet inter-related areas, described below. All three areas are to be developed and delivered at the end of the project.

- a) conduct a directed study to identify systemic safety vulnerabilities in runway operations;
- b) conduct a gap analysis of safety regulation regarding runway safety, and runway safety materials and programmes sources available to ICAO; and
- c) define the requirements for a range of runway safety mitigation strategies and safety enhancements.

6. FUTURE CHALLENGES

6.1 The implementation of an effective SSP on the part of States will require a concentrated, structured, specific plan in order to be effective. As it is known, ICAO has developed an SSP framework made up of four components and eleven elements to assist States in the implementation of the SSP. The implementation of some of the elements may be challenging and will require specific efforts to be carried out.

6.2 One of those challenges is how States should develop regulations such as safety risk controls as opposed to just administrative controls which has been customary practice. This new approach requires that the process of rule-making be carried out utilizing risk management principles providing a platform in which service providers can collect and analyze data to monitor and report safety performance.

6.3 Traditionally, oversight authorities have performed inspections based on prescriptive elements and strict compliance with those requirements. Under the new SMS/SSP concept, the nature of regulations will be one where as prescriptive elements are maintained, the addition of performance-based compliance is fostered in order to meet ALoS goals supported by safety performance goals of the various service providers SMS. This mind-shift on the part of how the oversight work of the authorities is carried out will require safety training programmes not only on the part of the State's staff but also for personnel from the various aviation organizations in each State.

6.4 Two key components in ensuring success in the establishment of effective SSPs and SMSs, are the requirements to establish an acceptable level of safety (ALoS) at the State level and of a safety performance at the individual service provider level. Clear definitions of these two elements and their interaction will also play a critical role in defining the success of the SMS/SSP efforts.

7. CONCLUSION

7.1 As it may be surmised from the foregoing, safety management is a continually evolving process within which constant adjustments to supporting programs and efforts need to be made. ICAO is proving a great enabler in the strategic approach to safety management implementation projects around the world. The ICAO support to contracting States in their SMS/SSP implementation plans greatly facilitates their efforts in this regard.

7.2 In a similar fashion, States that have not already done so should develop an SSP implementation plan. Even though ICAO has a limited number of instructors available to provide technical cooperation upon a State's request, they are making all efforts to fulfil every request at a nominal cost. States desiring to take advantage of this offer or to obtain more information on this topic may contact the ICAO NACC Regional office or visit the ISM website at: <http://www.icao.int/anb/safetymanagement>.

8. SUGGESTED ACTION

8.1 The meeting is invited to:

- a) note the information contained in this working paper;
- b) urge States that have not already done so, to begin a SSP implementation in order to comply with ICAO SARPs;
- c) urge States that so desire, to request the ICAO NACC Regional Office to deliver a basic SSP implementation course for Civil Aviation Authorities' staff; and
- d) take any other action deemed necessary with regard to the implementation of SSP/SMS in the E/CAR Region.

APPENDIX

Safety Management SARPs for Service Providers			
Annex	Intended Audience	Denomination	Date Applicable
11	Air traffic services providers	Safety Management Programme	Nov, 2001
14	Certified Aerodromes	Safety Management Programme	Nov, 2001
2005 – Harmonization of Safety Management SARPs			
6, 11 and 14	A/C Operators & AMOs	SMS	Jan, 2009
2008 – 2nd Harmonization of Safety Management SARPs			
1	Training Organizations	SMS	Nov, 2010
8	Manufacturers	SMS	Nov, 2013
1, 6, 11, 14		SMS Framework	Nov, 2010

Safety Management SARPs for States			
Annex	States	Denomination	Date Applicable
2005 – Harmonization of Safety Management SARPs			
6, 11 and 14	States	Safety Programme	Nov, 2006
2008 – 2nd Harmonization of Safety Management SARPs			
1, 8 and 13	States	SSP	Nov, 2010
1, 6, 8, 11, 13, 14	States	SSP Framework	Nov, 2010

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