

Safety Management Systems – 2010

POSITION PAPER

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31 January 2011*

“Measuring safety is challenging but not impossible. You have to make sure your indicators are meaningful. Accidents are now so rare that assessing safety just on the basis of hull losses is not sufficient – we need to be much smarter in setting our indicators.”

David McMillan, Director General EUROCONTROL, Keynote Address IASS Milan 2010

Introduction

The Safety Management System (SMS) is the product of a continuing evolution in aviation safety. Early aviation pioneers had little safety regulation or policy to guide them and had not yet discovered all the technological fundamentals that we now understand. Over time, careful regulation of aviation activities along with improvements in technology and industry best practice contributed to significant gains in safety. In the next major phase of improvement to safety, a focus on individual and crew performance or "Human Factors" further reduced accidents. The past decade has seen SMS introduce an evolutionary process in system safety and safety management. While SMS policies and procedures are highly developed, the challenge now facing the industry is to implement the processes which are necessary to bring the system to maturity – to make SMS perform effectively.

In this new world of aviation safety, prescription and regulatory compliance is being overtaken by a performance-orientated regime. Nations expect a continuous improvement in the overall performance in safety and are calling for the State Safety Program (SSP) at the regulatory level and the Safety Management System (SMS) of their airlines, air traffic service providers and maintenance organisations to deliver that performance in terms of safety targets and carefully negotiated Acceptable Levels of Safety. In doing so, these organisations are moving rapidly beyond the reactive mode of managing safety. Now more proactive, indeed predictive processes are being established under SMS in which data collection and analysis enable risks to be identified and controlled before they result in unacceptable and costly outcomes.

Aim

This position paper originates from the FSF International Advisory Committee (IAC). The paper aims to share the experience of SMS implementation as this great change takes place across the aviation industry. It builds on previous IAC papers about SMS and takes account of the latest material presented at IASS 2010 in Milan.

Definitions

The SMS for service providers can be defined rather in the same way as the SSP for States. Both are structured programs, becoming increasingly inseparable from one another, that obligate organisations to manage safety with the same level of priority that other core business processes are managed.

ICAO defines SMS as a systemic approach to managing safety, including the necessary organisational structures, accountabilities, policies and procedures. The FAA has a similar definition, introducing the term “safety risk” thus: SMS is the formal, top-down business approach to managing safety risk, which includes a systemic approach to managing safety, including the necessary organisational structures, accountabilities, policies and procedures.

ICAO SMS Requirements

Detailed SMS requirements have been set out in the ICAO Safety Management Manual (SMM) 9859 issued in 2006 and released as a second edition in late 2008. Service providers are responsible for establishing an SMS while States are responsible, under the SSP, for the acceptance and oversight of a service provider’s SMS. With the publication of the ICAO SMM there comes a strong expectation that SMS should be established as soon as practicable. However, implementation of SMS by service providers cannot be completed effectively without the corresponding adoption and implementation of an SSP by national governments. Unfortunately, in some parts of the world the lack of an SSP is proving to be an impediment to the implementation of SMS.

With its emphasis on “implementation” of SMS, ICAO has been careful to define the boundaries of SMS “integration”. Aviation organisations are often described as “a system of systems”. This is because they must develop and operate a number of different management systems to achieve their production goals. For example, in addition to SMS an organisation might need to operate a Quality Management System (QMS); an Environment Management System (EMS); an Occupational Health and Safety Management System (OHSMS); a Security Management System (SEMS); a Supplier Management System (SUMS) or, even more holistically, an Enterprise Risk Management (ERM). It is important to note that this degree of integration is currently beyond the ICAO safety management Standards and Recommended Practices (ISARPS).

IATA SMS Provisions

The IATA Operational Safety Audit (IOSA) is playing an increasingly important role in achieving consistency of implementation and integration of SMS in terms of the ICAO framework. The recent introduction of IOSA Standards Manual (ISM) Edition 3 has presented 62 SMS ISARPS and interlinking audit requirements which have to be assessed. Under ISM Edition 3 the Operator should have an SMS which is implemented and integrated throughout the organisation to address the safety of aircraft operations. Conformity with this “control” provision is possible only when the Operator has met all of the IOSA standards plus all IOSA recommended practices that are identified as SMS related. Such conformity means that an operator has established a “baseline” SMS. Most importantly, the new ISM addresses the processes which an Operator *should* have for its safety risk assessment and mitigation program and those for setting performance measures as a means to monitor the operational safety performance of the organisation and to validate the effectiveness of safety risk controls. With the new IOSA ISM, IATA is introducing a comprehensive SMS Implementation Guide which complements the ICAO SMM by focusing on processes, making a clear differentiation between processes and outcomes.

Implementation at the Regulatory Level

A key feature of the second edition of the ICAO SMM is the detailed guidance given to civil aviation authorities for the development of the SSP, and additionally there is some excellent guidance material being provided by various regulatory authorities for SMS implementation. Although in the United States SMS is not mandated, the Federal Aviation Administration (FAA) is vigorous in its efforts to develop specific SMS requirements and some US operators have SMS implemented in various stages. Meanwhile in Australia and Canada SMS has been mandated. In the European Union SMS has been mandated to implement by 2014, although some EU States have mandated SMS by 2011. The UK is aiming for implementation by 2013.

Experiences of Service Providers

Transport Canada's experience, as well as other SMS implementation activity around the world, indicates phased implementation of a "robust" SMS takes approximately three years. Common themes in the lessons learned about SMS implementation are as follows:

1. Senior leadership commitment is vital: "walk the talk".
2. Regulators are slow to document their SSP.
3. Integrate SMS training across the organisation.
4. Data/analytical lessons – what to capture, how to capture it, and how to make use of data across the organisation.
5. Reduce complexity and subjectivity of Risk Assessment Methodology.
6. Involve regulators early in the SMS implementation process.
7. The critical role of communication, awareness and culture.
8. "Silo bust" the different organisations involved in SMS integration.

Probably the main concern amongst airlines and other service providers is countering negative perceptions of the SMS implementation task, too often portrayed as costly, time-consuming, troublesome and difficult. A positive and productive approach is to recognise existing capabilities of the organisation. Many airlines are using IOSA - itself based on ICAO Standards - as the benchmark and a reliable means of identifying the SMS "gap" on which the implementation plan can be based.

Above all, for the SMS to be truly effective it must be appreciated that the safety management is done by line managers, the people who endeavour to match task and resources. The SMS implementation plan should be designed with a view to building on the existing well-proven parts of the safety system, recognising that SMS is likely to introduce significant change for line managers who have all sorts of other pressures upon them. Training in SMS for the line manager is therefore a vital part of implementation. The aim is not simply to make SMS work for the safety manager but also to make it relevant to the line manager.

Safety Risk Management

Safety Risk Management has a very central role in the ICAO SMS Framework. This is where safety is delivered by identifying hazards, risk assessing them, and by taking action to manage the risks. Risk-based information is also very useful for "Safety Assurance" and the "Management of Change". The era of the multiple Hazard and Risk Register has arrived.

There are various solutions available to assess the risks. The oil industry gave aviation safety the “Bow-tie” model which is rather complex to use. The aviation industry norm is to use the ICAO Risk Management Process and the “5 by 5” severity and likelihood matrix but this is already being regarded by some as rather subjective.

What is needed is a methodology which is user-friendly and which reduces subjectivity as much as possible. To this end the Airline Risk Management Solutions (ARMS) methodology has been developed by safety practitioners from airlines and other organisations. More material on this methodology can be found on the website Skybrary.aero.

Safety Culture

Safety is not just about procedures and a good SMS. It requires a hearts and minds acceptance by all members of an organisation. There are core values which reflect a positive safety culture in the SMS, a set of shared beliefs about safety, and how safety concerns will be dealt with.

In Europe the development of objective criteria for assessing safety maturity of organisations has helped to generate remarkable improvements over the past decade. EUROCONTROL is surveying safety culture along six dimensions: Responsibility, Involvement, Commitment, Teamwork and Communication, Trust, Reporting and Learning. The Agency generates an overall Safety Culture “footprint” (otherwise known as a spider performance diagram). Similar methodology for developing a safety culture index is now being adopted by the airlines and being included on an SMS performance dashboard presented at board level.

It is noteworthy that researchers at the University of Illinois at Urbana-Champaign (UIUC) developed a measure associated with safety culture in high-reliability organisations. The Safety Culture Indicator Scale Measurement System (SCISMS) has been distributed throughout the aviation industry.

Safety Data and SMS

There are some other challenges impacting at the very core of SMS beginning with the preservation of the life blood of the system: its data. A lack of proper reporting and release of data may be the single greatest obstacle to implementation of SMS. The role of the FSF as an independent body is so important here. The Foundation is doing all it can to foster a global culture in which people are willing to admit innocent mistakes, without fear of prosecution. FSF, together with the other stakeholders in safety, must continue to work closely together with the judicial authorities so that much greater willingness to share information can be achieved. An effective SMS employs a generative, just safety culture and a voluntary employee reporting system which analyses data and shares information across the organisation, indeed across the industry as a whole in programs such as IATA STEADES, which now includes 120 data-subscribing airlines.

Once the data is obtained, the process of unlocking the value of the data and turning it into useful information is largely achieved by having the right tools and the expertise. Today’s powerful safety risk management software enables the risk exposure to be controlled not only in the operational safety arena but across the aviation enterprise as a whole. Such data-driven integration is vital to the implementation of an SMS and helps to galvanise the whole organisation into action. Operating at the process level, the integrated approach reduces complexity, crosses organisational boundaries, improves business efficiency, reduces costs, identifies threats and delivers countermeasures. Most importantly, learning from shared information is at the heart of initiatives such as interactive benchmarking at the international level currently being offered by the IATA Global Safety Information Centre.

SMS Performance Indicators

Safety is a performance expectation. For effective, continuous monitoring of the SMS performance, the right safety targets must be set and then attacked. Too often, this exercise is regarded as a “soft” item, as it is not an easy task to agree such targets. The industry is beginning to see a plethora of indicators purporting to measure safety. As reactive safety management is joined by proactive and predictive tools within the SMS, it is vital to ensure that the accompanying process of performance measurement is sufficiently reliable and robust so as not to distort the subsequent mitigation efforts.

More research is required into finding the right safety performance metrics. There is currently a risk that organisations are being seduced by the bold metrics which are becoming increasingly rare or they are distracted by a litany of reactive metrics which are likely to be easier to extract. Those indicators which warn proactively and predicatively are more likely to be more realistic. They exist at the process level of the service provider where the mature SMS will be working. The aviation industry must make sure these safety indicators are identified and that they are meaningful. Indeed, the industry does need to be much smarter in setting our SMS performance indicators and safety targets. It follows that there would be great benefit in sharing information to achieve a consensus on the safety metrics currently being applied across the industry during SMS implementation.

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