Acceptance of a Service Provider's Safety Management System (SMS) Manual and Safety Performance Indicators (SPIs)

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1. INTRODUCTION

1.1 Under ICAO Annex 19, States are to promulgate regulations to require service providers (i.e. approved training organisations, air operators, approved maintenance organisations, organisations responsible for type design or manufacture of aircraft, ATS providers and operators of certified aerodromes), as well as international general aviation operators of large or turbojet aeroplanes to implement SMS.

1.2 States are also to implement a State Safety Programme (SSP). One of the objectives of the SSP is to ensure the effective implementation of SMS by service providers. Under the ICAO Universal Safety Oversight Audit Programme (USOAP) Continuous Monitoring Approach (CMA), there is also expectation for States to coordinate the safety oversight activities and procedures with respect to SMS across different sectors (e.g. air operations, training, aerodrome, air navigation services).

2. PRINCIPLES

2.1 The CAA's policies, regulations and procedures related to SMS implementation should be consistent with ICAO Standards and Recommended Practices.

2.2 The regulatory oversight of SMS, including the acceptance of SMS and assessment of SMS activities, should be commensurate with the scale and complexity of the service provider's operations and its risk profile. For example, the activities of small organisations such as those conduct non-destructive inspection on aircraft primary load structures may be of significant aviation risks if its activities are not managed adequately. On a similar note, the larger and more complex the service provider gets, the organisational risks would also be higher.

2.3 All the components and elements of the SMS must be adopted by the service provider. The service provider's SMS must also support Singapore's SSP. For example, SMS safety performance indicators (SPIs) should support the SSP safety performance monitoring.

3. SMS ASSESSMENT METHODOLOGY

3.1 To ensure consistency in the evaluation of a service provider's SMS across all the aviation sectors (e.g. aerodrome, ANSP, flight operations, aircraft maintenance), a CAA assessor is to use the SMS evaluation tool, that is based on the PSOe concept, to evaluate the service provider's SMS during the pre-assessment document review and on-site assessment.

3.2 Considering that the PSOe is a relatively new safety management assessment methodology, the CAA adopts a building block approach where this SMS evaluation methodology is applied progressively. A service provider must, at a minimum, achieve a "P" (Present) and should aim towards achieving a full "O" (Operating) for all the expectations. An assessor may also notice that a service provider with matured SMS may achieve an expectation that is beyond "O" (Operating), thereby indicating "e" (effectiveness) in some of the SMS elements[1].

3.3 The PSOe concept provides a standardised method to evaluate each SMS element, and consists of four assessment levels, as outlined below:

a. P (Present) – There is evidence that the CAA's requirements for the SMS element are met and documented within the organisation's SMS documentation. Typically determined during initial assessment.

b. S (Suitable) – There is evidence that the CAA's requirements on the SMS element are met through suitable means given the size and complexity of the service provider's aviation operations and the latter's associated risks, including consideration of the industry sector. Typically determined during initial assessment or when there is change that affect the size, nature and complexity of the service provider.

c. O (Operating) – There is evidence that the tool/ procedure is in use and the output is achieving service provider's operation objectives. Typically determined during both initial and continuous assessment.

d. e (effective) – There is evidence that the desired outcome or expectation of SMS element or component is achieved i.e. meeting CAA's, ICAO Annex 19's and ICAO Doc 9859's expectations. Instead of quantifying effectiveness, a qualitative description of the achievement will be recorded.

[1] Some SMS elements may have more than one expectation.

4. SMS MANUAL

4.1 A service provider is required to submit detailed SMS operating instructions and procedures to the CAA as a basis for certification and the subsequent conduct of operations. These detailed SMS operating instructions and operations typically form the SMS Manual. Figure 4.1 shows a typical service provider's SMS journey.

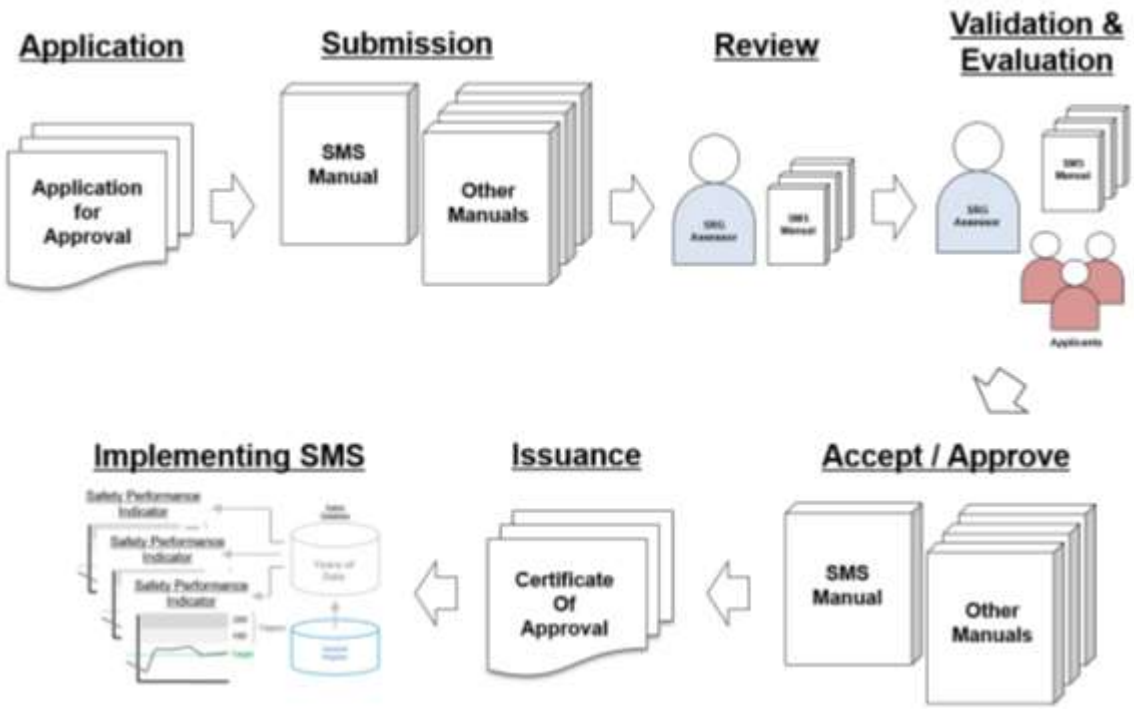


Figure 4.1 Typical SMS Journey

4.2 A SMS Manual typically contains the service provider's SMS framework and associated elements and processes. The SMS Manual could be a stand-alone document or integrated with an appropriate approved manual of the service provider (e.g. the service provider's exposition manual). Where the service provider has established policies or processes in its other documents but not directly in its SMS Manual, there should be appropriate cross-references in the SMS Manual to such policies and procedures. Such policies and processes should be assessed to ensure they serve the intent of the relevant SMS functions.

4.3 The SMS Accountable Executive of the service provider is to approve the SMS Manual before submitting to the CAA for acceptance. Any amendments to the SMS Manual should be submitted by the service provider to the CAA for review and acceptance, prior to implementing these amendments. In cases where the service provider's SMS Manual or exposition is part of a dedicated section or chapter of an existing manual approved or accepted by the CAA, the amendment process will follow that of the parent manual for consistency.

4.4 **Appendix 1** recommends an outline of the content that the SMS manual should minimally include. ICAO Doc 9859 – Safety Management Manual (SMM) also provides guidance on the development of an SMS Manual, including on the format and content.

4.5 The SMS Manual must include 'Safety Risk Management: Hazard Identification, Safety Risk Assessment and Mitigation' and 'Safety Assurance: Safety Performance

Monitoring and Measurement' as these are the core of a SMS. Additional guidance on these elements are provided in the following sections.

5. GUIDANCE ON ESTABLISHING SAFETY RISK MANAGEMENT (SRM)

5.1 The SMS Manual should document the effective implementation of SRM process established to reduce the level of risk to as low as reasonably possible. This process is proactive, entailing hazard identification, risk assessment and subsequent undertaking of remedial actions or mitigation measures.

5.2 A viable hazard identification and risk management (HIRM) process should typically contain:

a. a voluntary hazard reporting procedure within the service provider;

b. a process to register all reported or identified hazards/ threats that may affect the service provider's operations;

c. a process to capture hazard/ threats from other sources, such as from internal or external sources e.g. industry incident investigation reports;

d. a procedure to validate and segregate hazards/ threats which are eligible for systematic SRM action from those which do not require such action[2].

e. procedures which address:

i. how hazards are to be assigned for SRM action
ii. how SRM action teams are to be constituted
iii. the use of SRM tools, which may be in the form of a standard SRM worksheet, supported by a set of customised risk assessment matrices (severity, likelihood, tolerability etc.), or an appropriate software tool (refer to **Appendices 2-1 and 2-2** for illustrations of a SRM Worksheet and an appropriate software tool respectively)
iv. the internal approval process for SRM projects
v. the monitoring of the SRM projects, including implementation of any subsequently modified defences
vi. the periodic review of the SRM projects

5.3 Different types of changes require different types of assessment, based on the impact of the planned changes assessed by the service provide and agreed by the CAA. For example, a high-impact change would require an in-depth safety case, while a low-impact change would require a safety assessment. These changes would require to be managed or mitigated in a timely manner before applying them.

5.4 A completed SRM project documentation should include an appropriate safety risk mitigation report showing the identity of project members involved, approval office and other relevant administrative details. An illustrative SRM report form is in **Appendix 2-3**. The main document in the SRM report is the completed SRM Worksheet or the Output Diagram of the electronic SRM tool used. An overview of identified hazards/ threats and their projected unsafe events and ultimate consequences for correlation and congruence should be done. The nature and scope of preventive controls and recovery measures should also be reviewed for relevance to their projected Unsafe Event or Ultimate Consequence, as applicable.

[2] Hazards/ threats which are eligible for SRM action are usually recurring or permanent in nature, and which cannot be permanently eliminated or adequately resolved through conventional corrective actions.

Note:
Each service provider has the discretion to devise its own SRM report form. It is not necessary for the service provider to use the SRM report form contained in Appendix 2-3, as long as the safety risk mitigation is documented properly.

5.5 Where the service provider has contractual relations with sub-contractors or customers, it may be necessary for the former to contractually require from such subcontractors' hazard identification and risk management processes, where appropriate. Where a subcontractor has an accepted SMS, the issue of necessary interfaces needs to be addressed by the service provider.

6. GUIDANCE ON ESTABLISHING SAFETY ASSURANCE (SA)

6.1 The SMS manual should include SMS-SPIs and safety performance markers i.e. target/alert settings. The SMS SPIs are to be aligned with the service provider's safety policies and objectives, measuring safety performance to address safety risks. The safety performance markers establish an objective mechanism to trigger intervention by the service provider whenever an SPI has reached an unacceptable level or abnormal trend. **Appendix 3** shows sample SMS-SPI charts incorporating alert and target settings.

6.2 The CAA may request service providers to provide SMS-SPIs and relevant supporting data to support State safety risk management and State SPIs. As an example of the correlation, the SSP-SPIs involving operational occurrence data may be the aggregate data of all service providers' operational occurrences within the same sector. The service provider's SMS should therefore include essential SPIs or collected data that track operational occurrences relevant to State SPIs.

7. SMS MANUAL ACCEPTANCE

7.1 As part of an approval application, service provider is required to submit the necessary documents, including a SMS Manual, to the CAA. On receipt of the SMS Manual, the CAA assessor will perform a review to assess whether the service provider's SMS covers all the applicable regulations and is suitable to the size and complexity of its operations. Once the acceptance process is satisfactory completed i.e. meeting all the relevant regulations, the service provider's SMS Manual will be accepted by the CAA.

7.2 A formal letter should be issued to the service provider's Accountable Executive to indicate that the SMS Manual has been reviewed and accepted by the CAA. The CAA acceptance letter is usually signed by the respective Division head or delegated section head. It is important for the sample acceptance letter to indicate the version of SMS Manual that was reviewed during the acceptance process. To ensure proper accountability, records, including a controlled copy of the SMS Manual should be kept by the relevant CAA Division.

7.3 In the case where the service provider is just initiating its SMS, the service provider may not have enough data to develop meaningful Safety Performance Indicators (SPIs) and Safety Performance Target (SPTs). In this case, the CAA assessor might consider accepting them later in the implementation phase.

7.4 Once the service provider has collected enough safety data, the service provider proceeds to select and define its SPIs and set its SPTs. Usually, these SPIs and SPTs are subsequently added into the SMS Manual or in other separate documents.

8. ACCEPTANCE OF SMS MANUAL AMENDMENTS

8.1 Amendments to keep the SMS Manual updated and current must be submitted to the CAA for acceptance.

8.2 After the CAA assessor has reviewed the amendments to SMS Manual, the service provider should be notified whether the amendments are accepted.

9. SAFETY PERFORMANCE INDICATORS (SPIs) ACCEPTANCE

9.1 A SMS-SPIs package may be deemed as acceptable when the following basic features are present:

a. it represents a reasonably adequate safety performance monitoring coverage of the service provider's aviation related operations;

b. it includes fundamental SPIs that track the service provider's operational/ non-conformance[3] occurrences;

c. its format and type is compatible with the CAA's State SPIs, such that the data collected for that sector can contribute to the sectoral aggregate data;

d. it has a balanced mix of leading and lagging SPIs where applicable;

e. its operational/ non-conformance SPIs have incorporated objective safety performance markers, such as target/ alert settings, which take into account the data collected, where appropriate;

f. the targets reflect continuous improvement;

g. there is evidence that each SPI's data trending charts have been kept updated according to its intended data update intervals; and

h. where there is any abnormal or undesirable data trend (in relation to recent historical performance), or when established alert levels have been breached, there is evidence of action being taken to evaluate/ correct the trend.

10. PERIODIC SMS REQUIREMENTS & GUIDANCE MATERIAL REVIEW

10.1 In CAA assessor's interactions with the service provider, such as during routine SMS assessment, the assessor may have received or gathered feedback on the SMS requirements, guidance materials or procedures used by the CAA. The feedback and suggestions should be conveyed to the SSP Working Committee for consideration as part of the CAA's mechanism to periodically review SMS requirements and processes to ensure they remain relevant and appropriate.

[3] Non-conformance events SPIs could include component failure rates, rate of warranty claims, rate of quality rejects, customer inspection pickups, final inspection defects and post-delivery defects

APPENDIX 1: *RECOMMENDED CONTENT IN SMS MANUAL*

The SMS Manual may be formatted in the following manner:

a. **Section headings**
   b. **Objective**. This paragraph provides a short write-up on what the section is intended to achieve.
   c. **Consideration**. This paragraph provides a non-exhaustive list of points to consider in evaluating the section.

Cross-reference documents, with information supporting the SMS elements found in other relevant manuals or SOPs of the organisation, may be included in the SMS Manual.

Manual Contents

1.	Document Control
2.	SMS Regulatory Requirements
3.	Scope and Integration of the Safety Management System
4.	Safety Policy
5.	Safety Objectives
6.	Safety Accountabilities and Key Personnel
7.	Reporting Policy
8.	Safety Reporting
9.	Hazard Identification, Safety Risk Assessment and Mitigation
10.	Safety Performance Monitoring and Measurement
11.	Safety Investigations
12.	Safety Training and Communication
13.	Continuous Improvement and SMS Audit
14.	SMS Data and Records Management
15.	Management of Change
16.	Coordination of Emergency Response Plan

1. Document Control

Objective

Describe how the organisation intends to keep the manual up to date and ensures that all personnel have the most current version.

Considerations

- Describe the correlation of this manual with updates to other documentation, such as Company Exposition Manual, Maintenance Control Manual, Operations Manual, as applicable.
- Describe the process for periodic review of SMS documentation to ensure relevance and effectiveness.
- Describe the format of the document and how the distribution would be carried out.
- Describe how the manual is made readily accessible by staff members.
- Show the manual is approved by the Accountable Executive.

2. SMS Regulatory Requirements

Objective

Elaborate on how the organisation complies with current the CAA's SMS regulations and ensures that all personnel are aware of SMS regulatory requirements.

Considerations

- Describe the current CAA's SMS regulations and make reference to the CAA's SMS guidance advisory material.
- Explain the relevance and implications of the regulations to the organisation.

3. Scope and Integration of the Safety Management System

Objective

Describe scope and extent of the organisation's aviation related operations and facilities within which the SMS will apply. The scope of safety risk management processes, equipment and operations should also be addressed.

Considerations

- Describe the nature of business and its interaction with other aviation service providers.
- Identify equipment, facilities, work scope, capabilities and other relevant aspects of the organisation within which the SMS will apply.
- Identify the scope of the relevant processes, operations and equipment which are deemed to be eligible for the organisation's safety risk management processes.
- Where the SMS is expected to be operated or administered across a group of interlinked organisations or contractors, describe the accountabilities of each player.
- Management systems may have been implemented for other purposes e.g. quality management system, human factor (HF) and error management systems, environment management systems, occupational health and safety management system and security management systems. Describe the interaction of these management systems with SMS.

4. Safety Policy and Safety Objectives

Objective

Describe the organisation's intentions, management principles, and commitment to improving aviation safety in the company.

Considerations

- Describe the safety policy and safety objectives.
- Show that the safety policy and objectives are approved by the Accountable Executive.
- Describe the process for periodic review of the safety policy and objective.
- Describe the process for staff at all levels to be able to get involved in the establishment and maintenance of the SMS.
- Describe the process for communicating the safety objective and policy to all staff to raise awareness of their individual safety obligations.

6. Roles and Responsibilities

Objective

Describe the safety authorities, responsibilities and accountabilities for personnel involved in the SMS.

Considerations

- Describe the roles of the Accountable Executive, Safety Manager and safety platforms, meetings or working groups.
- Define and document the Safety authorities, responsibilities and accountabilities of personnel at all levels of the organisation.

7. Reporting Policy

Objective

Describe the system or policy under which employees are encouraged to report errors, safety deficiencies, hazards, accidents, and incidents.

Considerations

- Describe the policy and processes in place that encourages employees to report errors, safety deficiencies, hazards or occurrences.

8. Safety Reporting

Objective

Safety data and information can be collected from mandatory reports, voluntary and confidential hazard reports, safety surveys and audits. Describe how the organisation's reporting system is designed to collect this data. Factors to consider include: report format, confidentiality, data collection and analysis and subsequent dissemination of information on corrective actions, preventive measures and recovery controls.

Considerations

- Describe the process or system that provides for the capture of internal information including incidents, accidents, hazards and other data relevant to SMS.
- Describe how information is received from all areas of the organisation within the scope of the SMS.
- Describe how reports are reviewed at the appropriate level of management.
- Describe the feedback process to notify contributors that their reports have been received and to share the results of the analysis.
- Provide form(s)/template(s) that are simple, standardized and accessible across the organisation.
- Describe the process to monitor and analyse trends.

9. Hazard Identification, Risk Assessment and Mitigation

Objective

Describe the organisation's hazard identification system and related schemes, from the collation of data to safety risk assessments and implementation of preventive action plans.

Considerations

- Describe the process for the assessment of risk associated with identified hazards, expressed in terms of severity and likelihood.
- Describe the risk assessment and tolerability of the organisation and mitigating factors to be put in place.
- Describe the risk control strategies that include corrective action plans.
- Describe the process for evaluating the effectiveness of risk control strategies.

10. Safety Performance Monitoring and Measurement

Objective

Describe how the organisation plans to review the effectiveness of your SMS. This includes the review of the safety performance through safety performance indicators.

Considerations

- Describe the formal process to develop and maintain a set of safety performance indicators and safety performance targets for monitoring.
- Indicate how the of safety performance indicators and safety performance targets are linked to the safety objectives.

11. Safety Investigations

Objective

Describe how accidents and incidents are investigated. Explain how the contributing factors to accidents and incidents are determined and how corrective actions are implemented to prevent recurrence. Describe how such corrective/preventive actions are reviewed to update any existing safety assessments. Describe how newly uncovered hazards/risks initiate safety assessments.

Considerations

- Describe the process for investigation of reported occurrences. Show that the investigation identifies contributing or causal factors, identifies and ensures the implementation of necessary corrective actions.
- Show appropriate SMS follow up actions from the investigations, such that identified controls are implemented to prevent a repetition of occurrence.

12. Safety Training and Communication

Objective

Describe the type of SMS and other safety related training that staff receives and the process for assuring the effectiveness of the training. Describe the safety communication processes/ channels within the organisation.

Considerations

- Show that the SMS training is part of the organisation's overall training programme.
- Describe the training scope (initial and recurrent training), eligibility criteria and training requirements for staff.
- Describe the validation process that assures the effectiveness of training.
- Describe the safety communication processes/ channels within the organisation.

13. Continuous Improvement and SMS Audit

Objective

Describe the process for continuous improvement and review of your SMS.

Considerations

- Describe the process for periodic reviews of safety performance indicators to ensure their continuing suitability, adequacy and effectiveness.
- Describe the regular audit/reviews of company's SMS.
- Describe any other programs contributing to continuous improvement of the organisation's SMS and safety performance.

14. SMS Data and Records Management

Objective

Describe your method of recording and storing all SMS related documents.

Considerations

- Describe the records system that ensures the generation and retention of all records necessary to document the SMS.
- Provide records of hazard reports, risk assessments reports, meeting notes, safety performance monitoring charts, SMS audit reports, SMS training records etc.

15. Management of Change

Objective

Describe how the organisation manages organisational internal or external changes that may have an impact on safety.

Considerations

- Describe the procedures and policies to perform or review safety assessments for all substantial internal or external changes which may have safety implications.
- Include all concerned stakeholders within or outside of the organisation in relevant reviews.
- Describe how the reviews are documented and approved by management as applicable.

16 Coordination of Emergency Response Plan

Objective

Describe the organisation's intentions and commitment to dealing with emergency situations and their corresponding recovery controls, where applicable. Outline the roles and responsibilities of key personnel. The Emergency Response Plan can be developed as a separate document or it can be placed in this manual.

Considerations

- Describe the emergency plan that outlines roles and responsibilities in the event of a major incident, crisis or accident.
- Describe the notification and staff mobilization processes.
- Describe the arrangements with other organisations for aid and the provision of emergency services as applicable.
- Describe the procedures for emergency mode operations where applicable.
- Describe the procedure for overseeing the welfare of all affected individuals and for notifying next of kin.
- Describe procedures for handling media and insurance related issues.
- Describe the processes for preservation of evidence, securing affected area and mandatory/governmental reporting.
- Describe the emergency preparedness and response training to be carried out for staff involved in emergency response.

- Describe the disabled aircraft or equipment evacuation plan in consultation with aircraft/ equipment owners, aerodrome operators or other agencies as applicable.
- Describe the procedure for post–occurrence review including debrief and record of significant lessons learned.

APPENDIX 2-1: *RISK MITIGATION WORKSHEET*[i]

Table A Hazard Identification & Risk Mitigation (HIRM) Worksheet [Risk mitigation illustration]	Hazard code:	
1. OPERATION/ PROCESS:		
2. HAZARD / THREAT [H/T]:		
3. UNSAFE EVENT [UE]:		
4. ULTIMATE CONSEQUENCE [UC]:		

Table B

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Hazard / Threat	>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>> **Unsafe Event** Mitigation (as applicable) >>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>																												**Unsafe Event**
	Existing Preventive Controls [E-PC]												**Existing RI & T**		**New Preventive Controls [N-PC]**												**Resultant RI & T**		
	1. Emergency	2. Backup System	3. Abnormal Procedure	4. SOP	5. Special Inspn	6. GM	7. Organization Approval	8. Personnel Approval	9. TRNG	10. Others	Escalation Factor [EF]	Escalation Control [EC]	Severity x Likelihood	Risk Level	1. Emergency	2. Backup System	3. Abnormal Procedure	4. SOP	5. Special Inspn	6. GM	7. Organization Approval	8. Personnel Approval	9. TRNG	10. Others	Escalation Factor [EF]	Escalation Control [EC]	Severity x Likelihood	Risk Level	

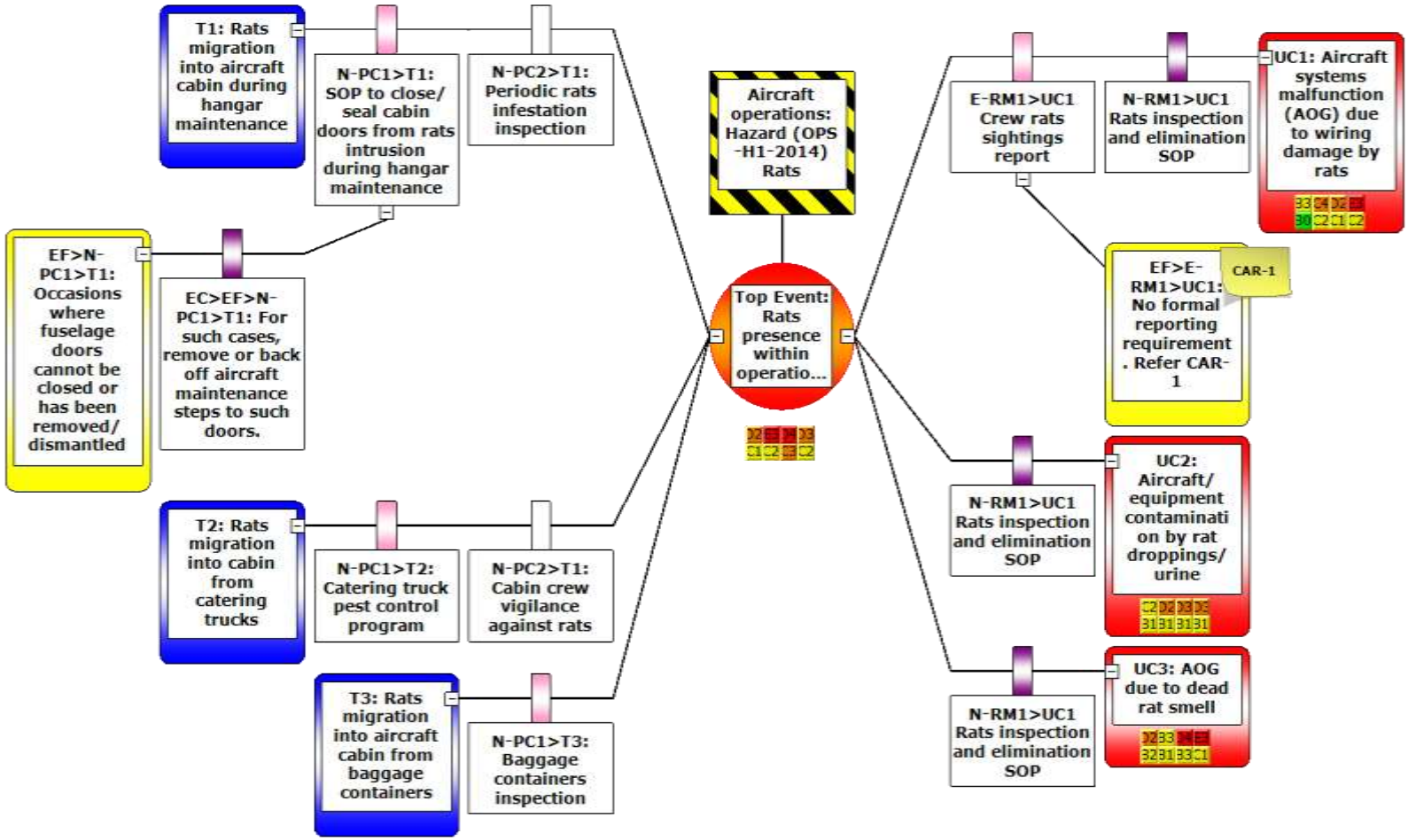
Table A Hazard Identification & Risk Mitigation (HIRM) Worksheet [Risk mitigation illustration] (c'td)	Hazard code:	
1. OPERATION/ PROCESS:		
2. HAZARD / THREAT [H/T]:		
3. UNSAFE EVENT [UE]:		
4. ULTIMATE CONSEQUENCE [UC]:		

Table B

31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59
>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>> **Ultimate Consequence** Mitigation (as applicable) >>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>																												**Ultimate Consequence**
Existing Recovery Measures [E-RM]												**Existing RI & T**		**New Recovery Measures [N-RM]**												**Resultant RI & T**		
1. Emergency Procedure	2. Backup System	3. Abnormal Procedure	4. SOP	5. Special Inspn	6. GM	7. Organization Approval	8. Personnel Approval	9. TRNG	10. Others	Escalation Factor [EF]	Escalation Control [EC]	Severity x Likelihood	Risk Level	1. Emergency Procedure	2. Backup System	3. Abnormal Procedure	4. SOP	5. Special Inspn	6. GM	7. Organization Approval	8. Personnel Approval	9. TRNG	10. Others	Escalation Factor [EF]	Escalation Control [EC]	Severity x Likelihood	Risk Level	

APPENDIX 2-2: ***RISK MITIGATION SOFTWARE TOOL***

- **Illustration of the Results Diagram of BTXP SRM software Tool**



APPENDIX 2-3: ***SAFETY RISK MITIGATION REPORT***

SAFETY RISK MITIGATION REPORT

Organization Name		Report No:
Operation / Process / Equipment		Date:
Hazard Description[4]		Department:
		Section:
Hazard ID / Code*		Reserved
Project start date	Project completion date	Next Review Date
Documents Attached:		

Item	Document
1	Schematic output of the completed SRM project.
2	Completed HIRM Worksheet.
3	Highlights of changes to Operation/ Process/ Equipment or Defences resulting from this SRM project.
4	Other Attachments (substantiation documents, drawings, references, standards, exceptions, etc.), if any
5	Next Review/ Others:

SRM Project Team Leader:

Date	Name/ Signature	Designation

SRM Project Team Members:

Reviewed by SMS Office/ Facilitator:

Date	Name / Signature	Designation

Approved by Department Head:

Date	Name of Division Head	Signature

[4] "Hazard Description" field is applicable for single Hazard SRM projects. Multiple combinations (threads) of Hazard(s) > Top Event(s) > Consequence(s) within a given operational process/ area may be documented as sub-set SRM tasks within an overall SRM project.

Note: Upon approval, forward original Copy to SMS Office for HIRM Master Register update

*Hazard Code: SSS-OOO-DDDDD-HHH-YY [Sector ID - Organization ID - Dept ID - Hazard # - Year]
SRM Report Form: xxx

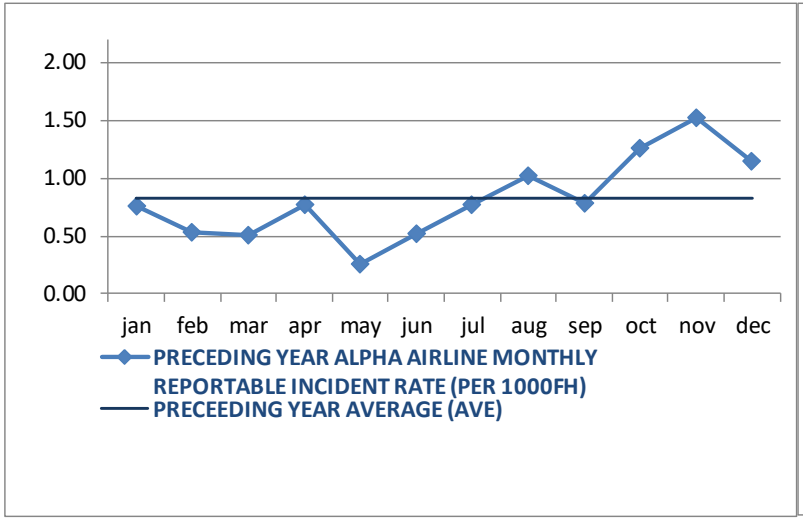
SRM Annex 1 - Schematic Output of SRM Project [e.g. BTXP Output Diagram(s)]

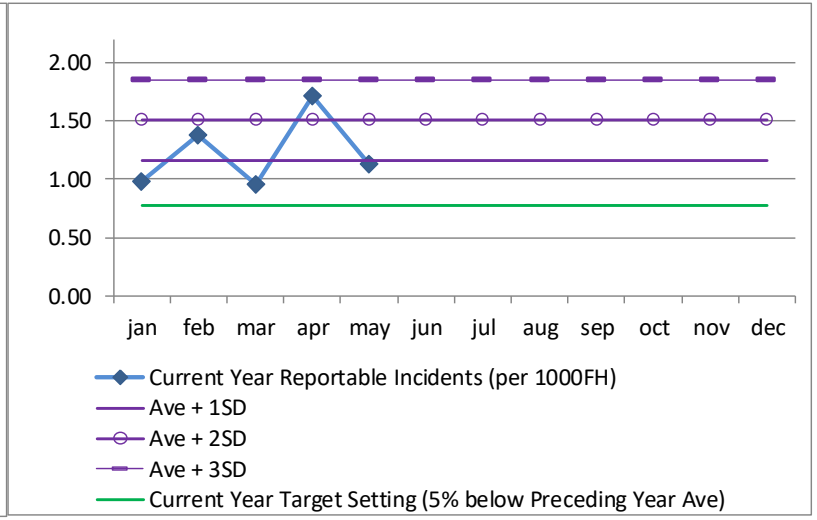
SRM Annex 2 - Completed HIRM Worksheet

SRM Annex 3 - Highlight of Changes to Operation/ Process/ Equipment or Defenses
(Consequent to this SRM project)

SRM OTHER Attachments (substantiation documents, drawings, references, standards, exceptions, etc.), if any

APPENDIX 3: *SMS SAFETY PERFORMANCE INDICATOR*[ii]





A) **Alert Level** Setting:

Alert level for a new monitoring period (current year) is based on the preceding period's performance (preceding year), namely its data points Average & Std Deviation. The 3 alert lines are Ave+1SD, Ave+2SD and Ave+3SD

B) **Alert Level** Trigger:

An Alert (abnormal/ unacceptable trend) is indicated if **ANY** of the conditions below are met for the current monitoring period (current year):
- Any single point is above 3 SD line
- 2 consecutive points are above 2 SD line
- 3 consecutive points are above 1 SD line

When an Alert is triggered (potential high risk or out of control situation), appropriate follow-up action is expected, such as further analysis to determine source and root cause of the abnormal incident rate and any necessary action to

C) Target Level Setting(Planned Improvement) :

Target setting may be less structured than Alert level setting - eg target the new (current year) monitoring period's Ave rate to be say 5% lower (better) than the preceding period's Ave value.

D) Target Achievement:

At end of the current year, if the Ave rate for the current year is at least 5% or more lower than the preceding year's Ave rate, then the set Target of 5% improvement is deemed to have been achieved.

E) Alert & Target Levels - Validity Period:

Alert & Target levels should be reviewed/reset for each new monitoring period, based on the equivalent preceding period's Ave rate & SD, as applicable.

References:

[i] Adapted from (2013) *Example of a Safety Risk Mitigation Worksheet*. SMM (3rd Ed.) Appendix 2 to Chapter 2.

[ii] Adapted from (2013) *SMS Safety Performance Indicators*. SMM (3rd Ed.) Appendix 6 to Chapter 5. Table 5-A6-5