

Advisory Circular

IMPLEMENTATION OF AN AOC HOLDER'S SAFETY MANAGEMENT SYSTEM

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GENERAL

Advisory Circulars (ACs) are issued by the Director-General of Civil Aviation (DGCA) from time to time to provide practical guidance or certainty in respect of the statutory requirements for aviation safety. ACs contain information about standards, practices and procedures acceptable to CAAS. An AC may be used, in accordance with section 3C of the Air Navigation Act (Cap. 6) (ANA), to demonstrate compliance with a statutory requirement. The revision number of the AC is indicated in parenthesis in the suffix of the AC number.

PURPOSE

This AC provides guidance to demonstrate compliance with, and information related to, requirements relating to the implementation of its Safety Management System (SMS) by an AOC holder.

APPLICABILITY

This AC applies to an operator holding an AOC under Air Navigation (119 – Air Operator Certification) Regulations (“ANR-119”).

RELATED REGULATIONS

This AC relates specifically to regulations 5, 12 and 16 of ANR-119.

RELATED ADVISORY CIRCULARS

- AC 1-3 Safety Management Systems

- AC 119-2-2 Safety Management systems – Safety Performance Indicators for an Air Operator Certificate Holder

CANCELLATION

Not applicable.

EFFECTIVE DATE

This AC is effective from 7 February 2020.

OTHER REFERENCES

- ICAO Doc 9859 Safety Management Manual
- ICAO Safety Management Manual (Doc 9859)
- Air Navigation (91 – General Operating Rules) Regulations (“ANR-91”)
- Air Navigation (98 – Special Operations) Regulations (“ANR-98”)
- Air Navigation (121 – Commercial Air Transport by Large Aeroplanes) Regulations (“ANR-121”)
- Air Navigation (135 – Commercial Air Transport by Helicopters and Small Aeroplanes) Regulations (“ANR-135”)
- EASA Easy Access Rules for Air Operations (Regulation (EU) No 965/2012)

1 INTRODUCTION

1.1 This AC provides guidance to AOC holders on the implementation of an SMS, and should be read in conjunction with AC 1-3 Safety Management System which details the key concepts of a generic SMS.

1.2 The AOC holder's SMS should cover its entire scope of operations. The following requirements in ANR-119 specify the establishment of an SMS:

- Regulation 5 requires an applicant for an AOC to submit the Safety Management System (SMS) Manual or equivalent.
- Regulation 12 requires that the Accountable Manager of an AOC Holder appoints a person to be responsible for its SMS.
- Regulation 16(1) requires an AOC holder to implement and maintain an SMS that consist of the 4 components as described in the Third Schedule of the ANR-119.

These components and their elements are:

COMPONENT	ELEMENT
1. Safety Policy and Objectives (SP & O)	1.1 the management's commitment to safety
	1.2 the responsibilities of safety personnel, and their accountability for safety
	1.3 the appointment of key safety personnel
	1.4 the coordination of emergency response planning
	1.5 the documentation of the SMS
2. Safety Risk Management (SRM)	2.1 the identification of hazards
	2.2 the safety risk assessment and mitigation
3. Safety Assurance (SA)	3.1 the measuring and monitoring of safety performance
	3.2 the details of change management
	3.3 the continuous improvement of the SMS
4. Safety Promotion (SP)	4.1 the training and education regarding safety management
	4.2 the communication on safety

1.3 An AOC holder should implement an SMS that is commensurate with the size of the AOC holder and the complexity of its operations, as well as the hazards and associated risks inherent in these activities. The size of the operator and the complexity of its operations are independent and should not be confused with each other.

1.4 Many considerations are taken into account in assessing the complexity of an AOC holder's operations. For example, the AOC holder's operations may be determined to be complex if it:

- (a) operates more than one aircraft type;
- (b) operates a sizeable fleet of aircraft;
- (c) operates in a challenging environment, for example in terms of weather and terrain;
- (d) is approved for any of the operations under ANR-98;
- (e) has more than one geographically operational base; or
- (f) operates under the ANR-121.

- 1.5 An AOC holder may be considered as a small operator when it has a workforce of around 20 full time employees or less. Small operators generally would have a simpler safety management organisational structure (a flatter safety responsibility and key safety personnel structure) and safety promotion component.

Integration of SMS in AOC Holder's Management Programmes

- 1.6 Commercial air operation is dynamic and its scope of aviation activities diverse. Over the years, several safety programmes have been mandated in the Air Navigation Regulations, such as the flight data analysis in regulation 17 of ANR-119; reporting and investigation processes in regulation 26 of ANR-119, etc. These and other AOC holder's safety programmes (those that are required in ANR-121, ANR-98, and ANR-135 for example) should be incorporated in its SMS. An AOC holder may also establish and integrate its SMS with its other organisational management systems such as quality, occupational health and safety and security.

2 IMPLEMENTING THE SAFETY POLICY AND OBJECTIVES COMPONENT

- 2.1 This Policy and Objectives component relates to the AOC holder's organisational structure and management of the SMS, and sets the management's direction on the implementation of the SMS.
- 2.2 The AOC holder has to establish its broad safety policy, and emphasise its commitment to safety. It has to assign responsibilities and accountabilities to its management personnel and staff for the implementation of its SMS.

The Management's Commitment to Safety – Safety Policy

- 2.3 The AOC holder should establish the following commitments in its safety policy as follows:
- (a) Continually improve safety performance;
 - (b) Provide the necessary financial and manpower resources, as well as training, to implement the SMS;
 - (c) Comply with applicable regulations and guidance;
 - (d) Uphold safety is the primary responsibility of personnel;
 - (e) Promote and maintain a positive safety culture, within the organisation.
- 2.4 The AOC holder should also include commitments to encourage behavioural changes or to set its strategic position with regard to safety, such as:
- (a) Non-punitive policy indicating the types of behaviours that are unacceptable and circumstances under which disciplinary action would not apply; and
 - (b) Commitment in promoting safety reporting.
- 2.5 The senior management should communicate its safety policies to all its personnel and demonstrate their commitment to it. In areas where safety management activities and aviation operational activities are carried out, the policy should be prominently displayed.
- 2.6 The AOC holder's management should also set safety objectives (e.g. reduction in number of cabin related incidents, or flight operations related incidents supporting the commitment on improving safety performance commitment etc.) that support the commitments made in the policy.

- 2.7 The safety policy and objectives are decided at the AOC holder's SMS Safety Committee (paragraph 2.13) and are reviewed periodically.

Safety Accountability and Responsibilities

- 2.8 The AOC holder's Accountable Manager should undertake the role of accountable executive described in AC 1-3 and be accountable for the effective implementation of the SMS. Functional department heads who manage aviation-related products and services should be accountable to the accountable executive for implementing safety management processes and programmes in their respective departments.

Appointment of Key Safety Personnel

- 2.9 The AOC holder should list its key safety personnel who are appointed with safety management system responsibilities. The following is a typical list:
- (a) Safety manager;
 - (b) Members of its high-level airline safety committee or Safety Review Board,
 - (c) Members of its operations safety sub-committees, or Safety Action Groups.
- 2.10 For a small operator, the Accountable Manager may, in addition to being the accountable executive, assume the responsibility of the safety manager.

Safety Manager

- 2.11 The safety manager is responsible for the SMS implementation, and should meet the following requirements:
- (a) Knowledge of safety management, including the relevant ICAO Standards and CAAS requirements;
 - (b) Knowledge of the operations of the AOC holder, particularly in flight operations and ground handling operations;
 - (c) Knowledge on basic safety investigation techniques and human factors in aviation;
 - (d) Work experience in an air operator or equivalent organisation on aviation safety in a similar capacity or experience as a flight crew member or in flight operations management; and
 - (e) Management and communication skills.
- 2.12 The safety manager's role is to facilitate the SMS implementation. He or she may hold other functions such as quality, security and environmental management but must not be responsible for aviation operations, such as flight operations, engineering and maintenance operations or ground services operations.

Safety Committee or Safety Review Board

- 2.13 The AOC holder may operate within a larger corporation of business organisations or air operators with their corporate business and safety risk management board. Regardless, the AOC holder remains responsible for the effective implementation of its SMS. It should have a Safety Committee (senior management platform) that provides strategic directions for safety policies and oversees the AOC holder's safety performance.

- 2.14 The safety committee should comprise its accountable executive, the safety manager, and the necessary representatives from functional departments (such as engineering, flight and ground handling operations) that have operational safety responsibilities.

Safety Sub-committees

- 2.15 The AOC holder, particular a large operator or one with complex activities, should establish appropriate safety sub-committees to better manage safety risks at the operational level. Operational divisions whose services contribute to air transport operations should form safety committees to manage the Safety Risk Management (such as its hazard identification programme paragraph 3.3) and Safety Assurance of their aviation activities. Such safety sub-committees should focus on safety risks in specific areas. For example, an AOC holder operating in accordance with ANR-121 may form a sub-committee each for Flight Operations, Ground Services, Cabin Services, Engineering and Maintenance Services.
- 2.16 An AOC holder operating in accordance with ANR-135 may have one or two safety sub-committees covering Flight Operations and Engineering and Maintenance, with Cabin and Ground Services operations subsumed within the Flight Operations safety sub-committee.

SMS Documentation

- 2.17 The SMS manual should define the AOC holder's policies with regard to the implementation of its SMS and the implementation procedures. Each of the elements in the SMS framework must be addressed with policies and / or procedures. These should be sufficiently detailed for CAAS to assess that the implementation is suitable and acceptable for the size and complexity of the operations.
- 2.18 The hazard identification procedures for those applicable sources mentioned in paragraph 3.3 should also be included in the SMS Manual.

3 IMPLEMENTING THE SAFETY RISK MANAGEMENT (SRM) COMPONENT

- 3.1 The Safety Risk Management (SRM) component has the strongest influence on the effectiveness of an SMS. It is essential that the AOC holder develop a comprehensive and active hazard identification programme.
- 3.2 The AOC holder should identify hazards for all its aviation activities e.g. flight operations, cabin operations, engineering operations, cargo service operations, ground operations and aircraft handling services provided by external organisations.
- 3.3 The AOC holder should also have a variety of hazard identification sources. These sources should be listed in its SMS Manual. It should include reactive and proactive means, as well as internal and external sources. The list below are some common sources that are relevant to an AOC holder. A few of these sources are mandated in the regulations:
- (a) Internal sources:
 - (i) Voluntary reports on hazards by operational personnel – regulation 48 of ANR-91
 - (ii) Internal investigation (on incidents, accidents and reported occurrences) – regulation 49 of ANR-91, regulation 26 of ANR-119

- (iii) Inspections and audits – regulation 19 of ANR-119
 - (iv) Flight data analysis – regulation 17 of ANR-119
 - (v) Fatigue hazard identification – regulation 178 of ANR-121
 - (vi) Operations monitoring (for ANR-98 special operations)
 - (vii) Safety assessment of systems and aviation operations
- (b) External sources:
- (i) Voluntary report and hazard identification (by its service providers)
 - (ii) External audits on the AOC holder
 - (iii) Accident and incident reports
 - (iv) Technical publications from manufacturers
 - (v) Safety information, alerts and other publications from aviation authorities
 - (vi) Industry sharing network

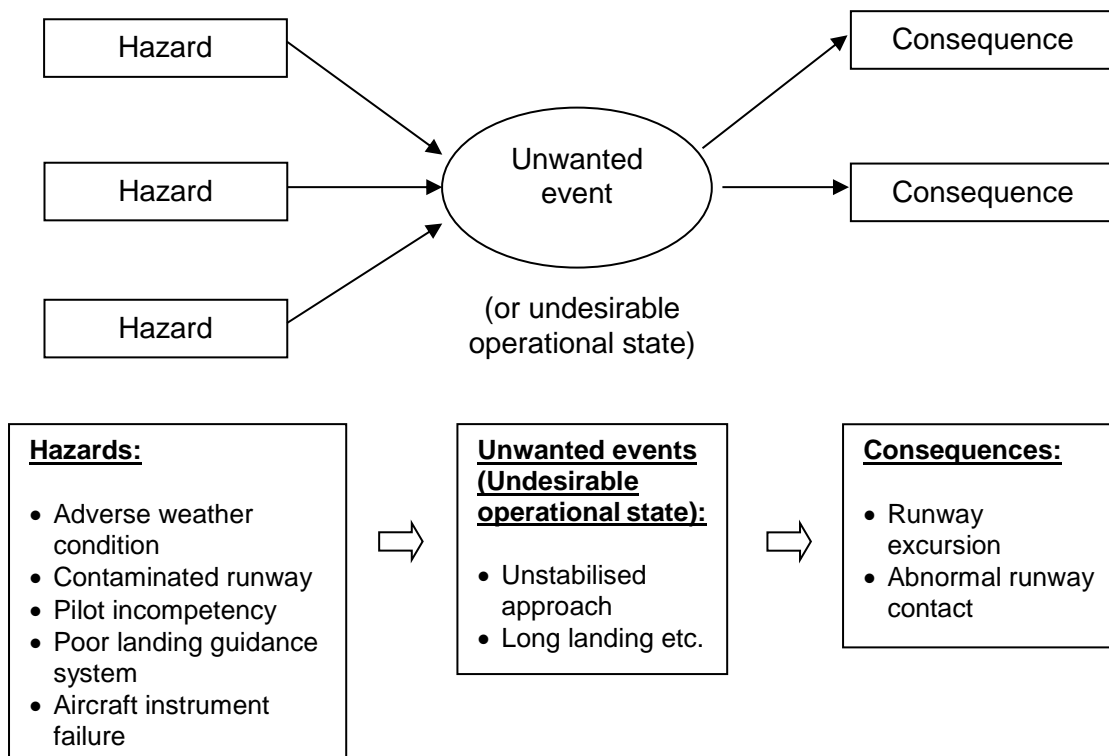
The AOC holder should describe its procedures in identifying hazards from those sources that it has.

- 3.4 Regardless of the size of the operator, it must identify specific hazards and mitigate such hazards for each of its flight if it is deemed as a complex aviation activity.

Hazard Identification Process – AOC Holder’s Accident Causation Model

- 3.5 The AOC holder should facilitate its hazard identification activities with procedures that are operationally simple, clear and practical. The AOC holder should ensure that the relationship between hazard, consequence and risk is clearly understood by its personnel, so that they can effectively identify any hazards when performing their aviation activities and safety management activities.
- 3.6 Formal training has to be provided to its personnel regarding generic and specific hazards that are known for a particular aviation activity and the knowledge on what possible adverse consequences these hazards may have on the aviation activity. An appropriate accident causation model should be adopted to illustrate the relationship between hazards and their adverse consequences. One of the more commonly used models is the ‘Bow-tie’ model which aviation regulators and some larger aviation organisations find useful in identifying hazards and managing risks of the hazards. An AOC holder may adopt this model that is illustrated in the following paragraphs.
- 3.7 Unlike safety management in the general industry where hazards (such as an exposed electrical live wire, or height of a work platform) have immediate consequences, hazards affecting aviation operations often have an intermediate unwanted event (or undesirable operational state¹) before progressing to its final adverse consequence. For example, an adverse weather condition (specific hazard) together with poor landing guidance system (specific hazard) could lead to an undesirable landing event such as an unstabilised approach (unwanted event). If there were no mitigation measures or if the mitigation measures were ineffective, a runway excursion or an abnormal runway contact is likely to occur which are the possible consequences of the specific hazards. They are specific because they relate to the aviation activity of landing in a specific aerodrome and in a specific weather condition. There may also be other hazards that could lead to an unstabilised approach as illustrated in the following example.

¹ Undesirable operational state – The stage in an accident scenario where the scenario has escalated so far that the adverse consequence can be avoided only through successful recovery measure(s) or by chance.



Hazard Identification Process Facilitation – List of Consequences and Unwanted Event

- 3.8 In order to facilitate its safety personnel in identifying specific hazards, the AOC holder should establish a list of adverse consequences that it considers as high safety risk occurrences or incidents for each phase of its aviation activity, for example landing, or en-route. Working upstream from this list, unwanted events (or for flight operations an undesirable operational state) could also be developed.
- 3.9 The AOC holder may use references such as the CICTT² occurrence list³ or the list in the Third Schedule of ANR-91 as references when identifying its adverse consequences and undesirable operational state. **Appendix 1** of this AC provides some examples from the CICTT document and the Third Schedule of ANR-91.
- 3.10 An operator with complex aviation activities may use this model to develop a list of generic hazards and adverse consequences for each phase of its flight for all its generic flights (such as photography, sight-seeing, off-shore operations etc.). This generic list may be used to specify the hazards and mitigation actions for each flight.

Hazard Identification Process Facilitation – Hazard Taxonomy

- 3.11 The AOC holder's operations are often exposed to a large range of hazards. Identifying these hazards and managing them would require the AOC holder to adopt a common

² CICTT: Commercial Aviation Safety Team (CAST) / ICAO Common Taxonomy Team.

Occurrences listed are not differentiated as hazards or consequences. ICAO has adopted this taxonomy set for standardising the industry's data collection 'ADREP' Accident Data Reporting programme.

³ Ref: Aviation Occurrence Categories – Definitions and Usage Notes.

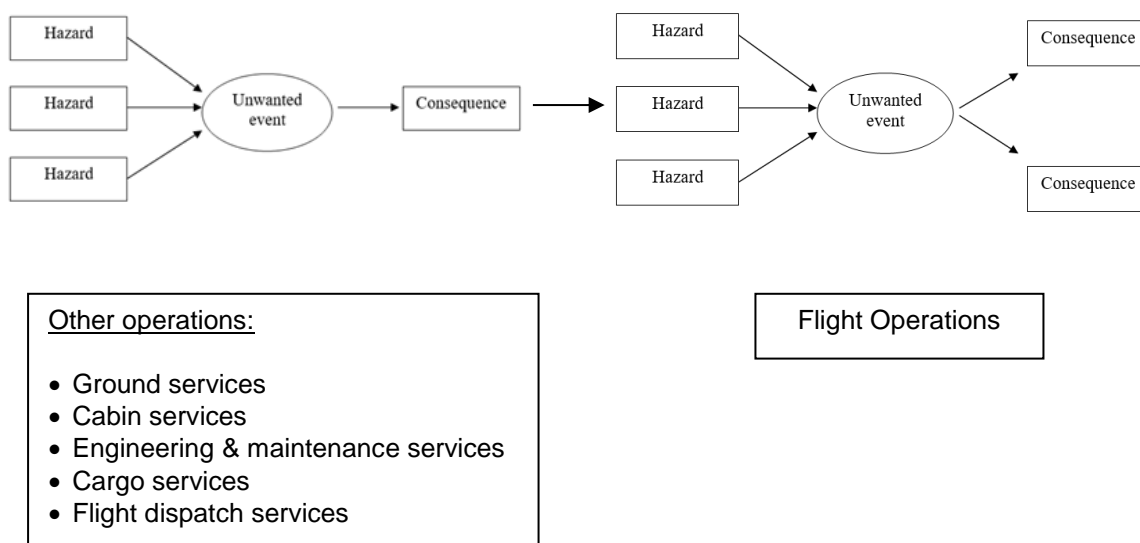
Occurrences in the CICTT's list may not be consequences or undesirable operating states, for example Aerodrome and Turbulence are not undesirable operational state or adverse consequences but hazards in the Bow-tie model.

taxonomy and categorization system. The AOC holder may develop its scheme, but it should include both human and organisational categories.

- 3.12 Alternatively, the AOC holder may adopt the industry schemes in categorizing hazards. The CICTT scheme that is adopted by ICAO and CAAS groups hazards into four main categories⁴, Human (HUM), Environment (ENV), Technical (TECH) and Organisational (ORG) categories. Each of these four categories of hazards is further grouped into sub-categories where specific hazards can be assigned to. The AOC holder may refer to **Appendix 2** which contains taxonomy examples adapted from ICG Hazard Taxonomy examples⁵ which are developed using the CICTT scheme.

Hazard Identification Programme

- 3.13 The scope of an AOC holder hazard identification programme should include all its aviation activities that have safety risks (activities identified to have probability of adverse consequences). The AOC should not restrict its hazard identification schemes to flight operations, but also include other operational activities such as ground operations, cabin services, and engineering and maintenance operations.
- 3.14 The aviation activities and operational context of each of these operational groups are vastly different. Their consequences, unwanted events and specific hazards may also be different. Hence, each operational group should develop its list of hazards, unwanted events and consequences. Typically, the relationship between each operational groups can be simplified below.



- 3.15 The AOC holder is responsible to engage its contractors who provide aviation activities that support its operations. Safety risks of these aviation activities should be managed with safety risk management procedures acceptable to the AOC holder.

⁴ Ref: Hazards – Definitions and Usage Notes. CAST/ICAO Common Taxonomy Team (CICTT).

⁵ Ref: Hazard Taxonomy Examples – Safety Management International Collaboration Group.

- 3.16 The AOC holder should analyse the data from various sources to identify hazards. An effective hazard identification programme would utilise data and information from various Safety Data Collection and Processing Systems (SDCPS)⁶.

Hazard Documentation Process

- 3.17 Hazards must be properly recorded⁷ and systematically managed with an hazard register(s). An AOC holder may do so using a Hazard and Risk Register. **Appendix 3** provides a spreadsheet template that may be used.

Safety Risk Assessment and Management Procedures

- 3.18 The AOC holder has to establish its safety risk assessment model and document its formal procedures⁸ for assessing and managing its safety risks.
- 3.19 The AOC holder should establish its safety investigation procedures in compliance with regulation 26 of ANR-119. The objectives for these investigations⁹ are to identify the 'causes' and 'contributing factors', and to develop preventive measures against recurrences.
- 3.20 As safety investigation is one of the reactive sources for identifying hazards in SMS, it is necessary for the AOC holder to identify the hazards¹⁰ related to the investigated occurrence or unwanted consequence.
- 3.21 The investigator may then use the Bow-tie model to re-assess the safety risks of the unwanted event and consequence, taking due considerations of the preventive and recovery measures that are presently in place and their effectiveness.
- 3.22 Safety risk assessment for proactive hazard identification sources such as audits, voluntary reports on hazards, change management or system assessment starts with projecting unwanted events and consequences from the identified hazards. Their safety risks are then assessed, taking into consideration the effectiveness of the preventive and recovery measures that are in place.
- 3.23 The process of a safety risk assessment is illustrated below. **Appendix 4** provides a template for risk assessment on a reported occurrence and the flow of data into the Hazard or Risk Register.

⁶ SDCPS refers to processing and reporting systems and databases and schemes to record information and include occurrence, mandatory and voluntary incident reporting systems, self-disclosure reporting systems and records. (ICAO Annex 19 Chapter 5)

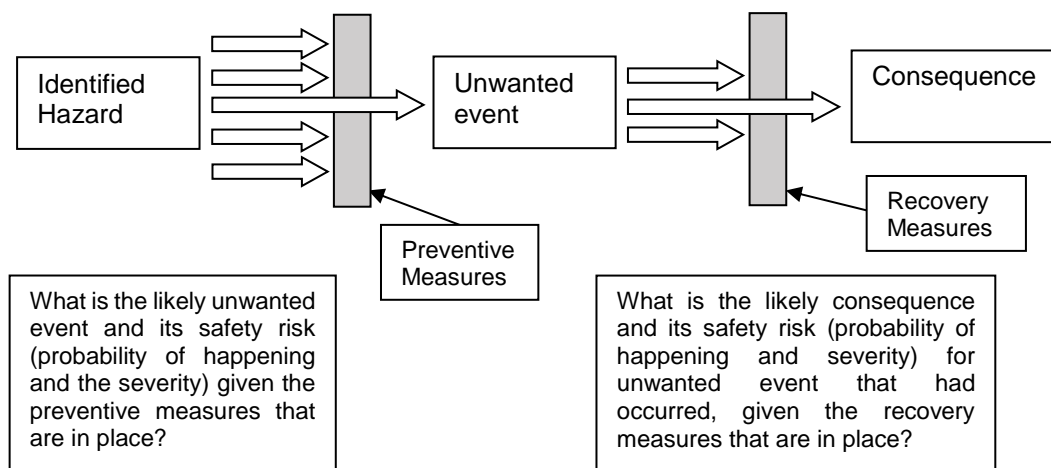
⁷ Record is an evidence that the hazard identification programme is operating and proxy for assessing the effectiveness of the AOC holder's hazard identification programme

⁸ The procedures, risk assessment tables, matrices and indices have to be documented in the AOC holder's SMS manual.

⁹ The industry's guidance for incident/accident investigation, according to ICAO Annex 13, is to identify 'Causes' and 'Contributing Factors'.

Causes – Actions, omissions, events, conditions, or a combination thereof, which led to the accident or incident. Contributing Factors – Actions, omissions, events, conditions, factors or a combination thereof, which, if eliminated, avoided or absent, would have prevented or reduced the probability of the accident or incident occurring, or would have mitigated the severity of the adverse consequences of the accident or incident.

¹⁰ Note the definitions of 'hazards', 'causes' and 'contributing factors' are overlapping.



- 3.24 The risk management is completed when decisions are made on whether there are requirements to implement additional or whether there is a need to strengthen the current preventive and /or recovery measures. The levels of management who have the authority to make decisions regarding the tolerability of safety risks should be specified.
- 3.25 The decision should be recorded¹¹ in the Hazard and Risk Register for analyses of safety data and safety information to support the AOC holder's safety performance management activities.

4 IMPLEMENTING THE SAFETY ASSURANCE COMPONENT

- 4.1 The Safety Assurance (SA) component in the SMS framework basically serves two functions. One of them is to measure the effectiveness of the safety risk controls that are implemented in the SRM process and to manage the safety risks that may arise with any management of change. The other function is the monitoring of the safety performance and the performance of its SMS.
- 4.2 This component is complementary with the Quality System that is required in regulation 19 of ANR-119. The AOC holder may address the quality assurance and safety assurance of these two systems with a common set of procedures and programmes, such as planning the quality and safety management audits together.
- 4.3 In implementing the Safety Assurance component, the AOC holder is required to:
- (a) measure and monitor its safety performance,
 - (b) manage changes in its operations by reviewing and addressing safety risks associated with the changes, and
 - (c) review its SMS activities and procedures for continuous improvement.

Safety Performance Monitoring and Measurement – verifying the safety performance

- 4.4 The AOC holder should identify a set of measurements or Safety Performance Indicators (SPI) that reflect its safety performance. It also needs to identify specific

¹¹ Recording enables independent assessment on the implementation of the risk management procedures and quantitative information on the overall effectiveness of the AOC holder safety risk management.

issues in its operations that are of safety concern and identify the safety objectives of these issues and have a set of SPIs to monitor these issues.

- 4.5 Safety issues have to be discussed at the AOC holder's Safety Review Board, and decisions are made by the Board on the safety objectives on these issues. The Board may decide to review its safety policy to commit the management in addressing the issues, where needed. Targets for improvement may be set on the SPIs for the respective operational groups to achieve.
- 4.6 For guidance on identifying safety issues and safety performance indicators, the AOC holder should refer to AC 119-2-2.
- 4.7 In addition to monitoring safety performance with SPIs, the AOC holder should review its aviation activities periodically, as the specific hazards that have been managed earlier may have evolved. This can be done through safety audits¹².
- 4.8 Aviation activities which the AOC holder identified as having significant safety risks should be reviewed periodically, e.g. when operating in challenging airports or in congested airspace. Additionally, safety reviews and reassessments should also be conducted after a management of change project, e.g. introduction of a new station, or introduction of new operational procedures or new aircraft.

Management of Change

- 4.9 The AOC holder should have a list of identified internal and external change that may have adverse effect on safety. For a large operator, each operational division should have its own list.
- 4.10 Some common management of change that affect the safety are:
 - (a) Introduction of new technology or equipment;
 - (b) Changes in the operating environment;
 - (c) Changes in operational procedures;
 - (d) Operating to new stations;
 - (e) Changes in contractors providing maintenance and ramp services; and
 - (f) Significant changes in key appointment holders or staffing levels.
- 4.11 The records on such change events should be maintained.

Continuous Improvement of the SMS

- 4.12 It is necessary that the AOC holder audits its SMS processes during their internal audits. The audit should be looking for the presence of policies and procedures in addressing the SMS elements, assessing the suitability of these policies and procedures in addressing the SMS elements, the application of these procedures by the respective safety personnel, and assessing whether the outcome of the application of these procedures are effective.
- 4.13 The AOC holder may conduct its SMS audit concurrently with the AOC holder's quality system audit. The scope includes:
 - (a) Evaluation of facilities, equipment, documentation, records and procedures;

¹² Safety audits focus on the integrity of the management system and periodically assess the status of safety risk controls.

- (b) Assessment on functioning of SMS and identify areas of improvement on reporting procedures, hazard identification and risk assessment processes or communication and promotional activities; and
- (c) Evaluation to verify the effectiveness of the risk mitigation process.

5 IMPLEMENTING THE SAFETY PROMOTION COMPONENT

- 5.1 The Safety Promotion (SP) component consists of training for its personnel on SMS implementation and establishing its communication procedures with regard to safety. The AOC holder could integrate this component within its organisational personnel training programme and its communication system.
- 5.2 The AOC holder should provide training on SMS implementation for all its personnel as well as to its contractors who are involved in its safety management. It should establish a system for communicating safety matters.

Training regarding SMS – Training Programme

- 5.3 The AOC holder should develop and document a training programme for all its personnel and those personnel employed by its contractors who are providing services to its operations. The SMS training programme is normally a part of the regular organisational training plan and is managed by the AOC holder's Safety or Human Resource division. This system should maintain the records of all the SMS training that is provided.
- 5.4 The training scope should include both the fundamentals of SMS and the AOC holder's SMS implementation. It should also cover the AOC holder's safety policy and objectives and its reporting process.
- 5.5 For a large operator, it is recommended to expand the training scope to cover more areas. A suggested list is provided in **Appendix 5**.

Communication on Safety Matters

- 5.6 The AOC holder should document in its SMS Manual, the safety communication media it has for its SMS. The information should include the name of the channel, its issuing office, media format, brief description of the scope, its target audience and frequency.
- 5.7 Generally, the communication channels for SMS would ride on the existing channels for management and staff communication such as electronic broadcasting, seminars, publications or orientation programmes.

6 AOC HOLDER'S SMS INTERFACE WITH STATE SAFETY PROGRAMME (SSP)

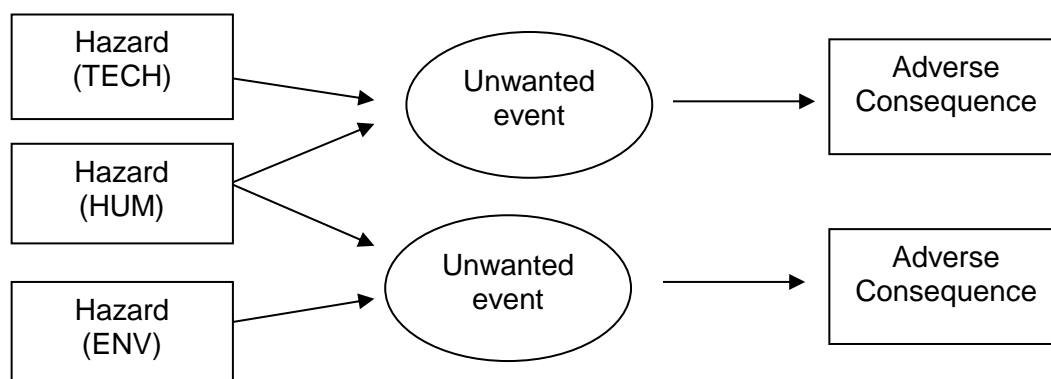
- 6.1 CAAS is responsible to oversee the safety management of its aviation industry.
- 6.2 The AOC holder should actively contribute to the SSP by providing CAAS with relevant safety data and information:
 - (a) that it needs to support the SSP's safety performance measurement and monitoring process;
 - (b) on hazards that it identifies as significant for the SSP's safety risk management; and

- (c) for SSP's safety promotion and sharing of safety information among the air operators and aviation service providers.

7 AOC HOLDER INTERFACE WITH ITS SERVICE PROVIDERS' SMS

- 7.1 An AOC holder should identify its safety related activities that are provided by service providers and contractors and establish a mechanism for sharing of relevant safety data and / or information with these organisations to enhance the safety of their support activities.
- 7.2 Safety data includes hazard and safety information includes safety performance that are related to the AOC holder's aviation activities.

APPENDIX 1 – ADVERSE CONSEQUENCES AND UNDESIRABLE OPERATIONAL STATES



Examples of hazards / threats leading to undesirable event	Undesirable operational state (unwanted event)	Adverse Consequence (occurrence with high safety risk)
HUM - <ul style="list-style-type: none"> Human error and other disruptions Fatigue / decreased alertness during flight operations Flight crew incapacitation ENV - <ul style="list-style-type: none"> Aerodrome conditions, runway / taxiway characteristics, lighting conditions / markings Wildlife Windshear or thunderstorm Turbulence encountered Bird ATM/CNS related Laser interference Runway vehicular and aircraft incursion TECH - <ul style="list-style-type: none"> System component failure or malfunction Errors and occurrences related to loadsheet, tie-down and loading Control system failures affecting flight control surfaces ORG - <ul style="list-style-type: none"> Errors, inconsistencies in aeronautical chart data in aircraft database) 	<ul style="list-style-type: none"> UA (unstable approach) ARC (abnormal runway contact) HS RTO (high speed rejected take-off) LLAND (landing long or deep) 	RE (runway excursion)
	<ul style="list-style-type: none"> SMI (separation minima infringement) AI (airspace infringement) LB (level bust) TCAS RA NAV ERROR (lateral deviations from cleared flight path) 	MAC (mid-air collision and near misses)
	<ul style="list-style-type: none"> SPEED (low speed and high speed including stick shaker cases) LPITCH (loss of pitch control) LROLL (loss of roll control) FIRE (fire or smoke on aircraft) 	LOC I (loss of control in flight)
	<ul style="list-style-type: none"> QNH (incorrect altimeter pressure setting) GPWS 	CFIT (controlled flight into or towards terrain)
	<ul style="list-style-type: none"> TAXI (Error in taxi to and from runway) LOC G (loss of control – ground) 	GCOL (ground collision)

APPENDIX 2 – HAZARD CATEGORISATION

Category	Sub-category	Specific hazard / threat
ORG – Organisational - management, documentation, processes and procedures, supervision	Management System	Lack of or incomplete description of roles, accountabilities and responsibilities
		Limited or lack of resources availability or planning, including staffing
		Lack of or ineffective policies
		Lack of or poor management and labour relationships
		Lack of or ineffective organisational structure
		Poor organisational safety culture
		Lack of or ineffective safety management processes, including risk management, safety assurance, auditing, training and resource allocation
		Lack of ineffective audit procedures
		Lack of or limited resource allocation
		Incorrect or incomplete of lack of training and knowledge transfer
		Unofficial organisational structures
		Changes, upgrades or new tools, equipment, processes or facilities
		Incorrect or ineffective shift/crew member change over procedures
		Changes or turnover in management or employees
		Informal processes
	Lack of, poor staffing recruitment / assignment	
	Documentation, Processes and Procedures	Incorrect, poor or lack of internal and external communication including language barriers
		Lack of, incorrect or incomplete manuals, or operating procedures
		Lack of, incorrect or incomplete employee duty descriptions
		Lack of, incorrect or incomplete reports and records
		Lack of, incorrect or incomplete control of necessary documents for personnel (licenses, ratings and certificates)
	Supervision and operational task demands	Flight planning – high risk tasks with low crew exposures
		Team fitness –physical and mental conditions, amount of rest and accommodation at rest period
		Operational complexity – consider amount of exposure to known hazards, the predictability of hazards
		Pressure to achieve – company/commercial pressures
		Management’s personnel policies – crew pairing, operational control, operational support, scheduling, duty time
		Workload task demands – work overload/task saturation, additional workload (unexpected, administrative, unfamiliar)
		Time pressure – FTL, night curfew
		Operational task demands – caused by pax, ground operations, technical problem/failure, ground services, technical support.

Category	Sub-category	Specific hazards (Adapted from Eccairs)
HUM - limitation of the human which in the system has the potential for causing harm	Cognitive – Experience, knowledge and recency	Inadequate or inaccurate knowledge (adequacy of knowledge)
		Personal experience and qualification (experience & qualification)
		Recency factors (route or operational activity)
	Physiology – factors related to physiological conditions of persons	Illness / incapacitation
		Impairment – fitness (alcohol, drugs, medication, pain, stress, depression)
		Fatigue/alertness (sleep deficit, disorder, disruption, jet lag)
		Vestibular or visual illusion
		Personal physical or sensory limitations
		Personal workload management (adapting to short notice, inappropriate allocation of tasks, shedding of tasks etc)
	Psychological limitations – factors which involves thinking such as learning, memory, personality or attitudes	Human judgement factors (spatial, separation, timing/speed)
		Information processing (assumption incorrect, comprehension, mind-set/expectancy, confirmation bias, misrecognition, misunderstanding)
		Mental/emotional state (alertness, apprehension, panic factor, boredom)
		Psychological – Attention (boredom/monotony, distraction, attention, vigilance)
		Personality and attitude (complacency, 'press on it is', risk-taking)
		Skills/technique/ability (airmanship)

Category	Sub-category	Specific hazards
ENV – Aerodrome affecting landing, taxiing and parking operation	Runway/taxiway characteristics, conditions or lighting/markings	Vehicles and people movement
		Distracting lights
		Laser beams
		Deficient approach lighting
		NOTAM deficiency
	Aerodrome condition	Poor condition or improper runway surface
		Misleading or unclear markings and lighting
		Inadequate runway length, sloping runway
		FOD
		Taxiway and runway system complexity
		Bay gradient / lack of space / visual interference
ENV – ADRM affecting landing taxiing and parking operation	Wildlife condition	Wildlife on airfield
		Flying wildlife
	Geography	Mountains or bodies of water
		Altitude at the aerodrome
	Weather / natural disasters	Extreme weather
		Ash – volcanic or burnt
		Excessive or cross wind
	Climate condition	Extreme temperature, icing,
TECH - Air Navigation services affecting landing, take-off, climb, cruise, descent, approach.	Traffic pattern	Excessive aircraft in pattern or given airspace
	ATC actions	Loss of separation between aircraft
		Incomplete clearances
		Incorrect, confusing or incomplete communication
	ATC technical	Communication system failures or anomalies
		Navigation aid failures or anomalies
TECH - Air Operation	Pre-flight preparation	Poor airworthiness verification
		Poor fuelling processes
		Obsolete documents, manuals and charts
	Aircraft loading	Incorrect cargo loading and distribution
		Unauthorised hazardous materials carriage
		Improper weight & balance calculation
	Flight operations	Lack of or poor CRM
		Improper execution of procedures in all phases
		Inadequate or complicate procedures
		Equipment & instruments for particular flight not available or malfunctioning
		Deficient communication (with all operation support)
	Ground Handling	Deficient communication
		Reckless vehicular movement in vicinity of aircraft
		Unattended loose objects near vicinity of aircraft
		Poorly maintained handling equipment
	Technical Handling	Incomplete maintenance at aircraft hand over
		Incomplete maintenance release such as MEL
		Deficient communication
	Aircraft systems	Technical deficiencies in aircraft, components, systems, subsystems and related equipment Aircraft design deficiencies affect the human / machine interface

APPENDIX 3 – SAMPLE OF A HAZARD / RISK ASSESSMENT REGISTER

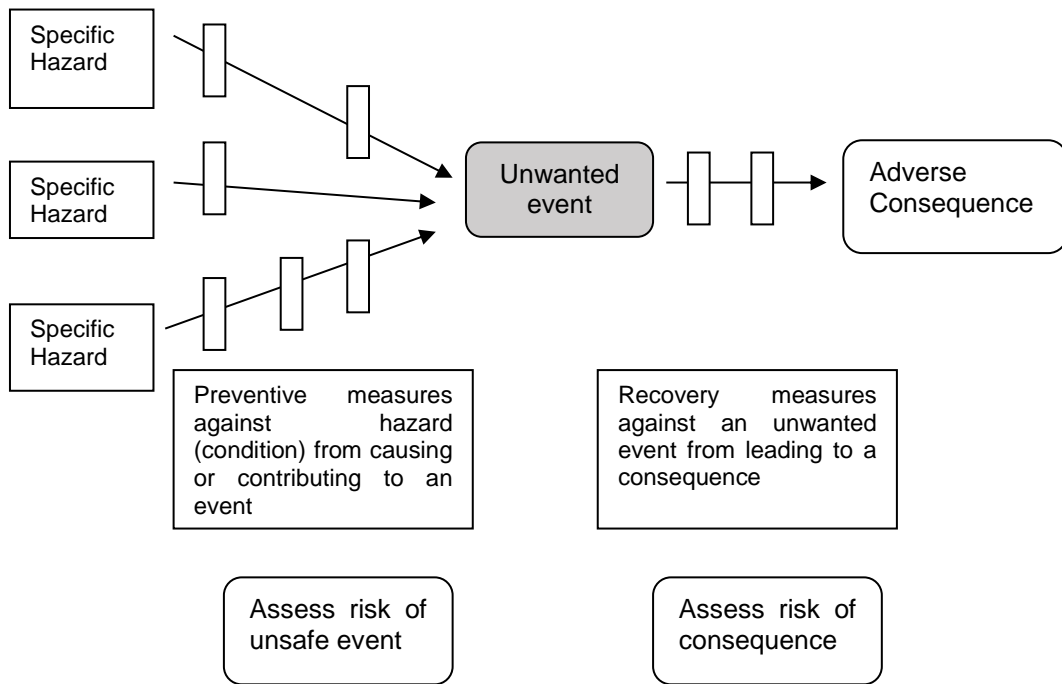
Identification source	Hazard related to flight phase	Date / time of occurrence	Location of occurrence	Hazard family (CICCT)	Hazard Sub-Category	Specific hazards	Hazard description	Reported or projected unwanted event	Current preventive controls	Assessed Risk	Projected adverse consequence	Current Recovery controls	Assessed risk
Occurrence investigation, crew report, agent report, audit, safety review, FDAP, FRMS, external report.	Apron, taxi, Take-off, climb, cruise, descend, approach, landing.		FIR, airport, apron, runway, taxiway	ENV, HUM, TECH, ORG	Tech related	Taken from list in Appendix 2		ARC, AMAN, USOS, RI, RE, LOC-I, LOC-G from list in Appendix 1			CFIT, CTOL, MAC from list in Appendix 1		
					ENV related								
					HUM related								
					ORG related								

APPENDIX 3 (cont')

Identification source	Hazard related to flight phase	Date / time of occurrence	Location of occurrence	Assessed risk	Additional Mitigation required	Post mitigation assessed risk	Actions and owners of actions	Monitoring and review requirements
Occurrence investigation, crew report, agent report, audit, safety review, FDAP, FRMS, external report.	Apron, taxi, Take-off, climb, cruise, descend, approach, landing.		FIR, airport, apron, runway, taxiway					

APPENDIX 4 – INVESTIGATION ON OCCURRENCE:

OCCURRENCE / HAZARD FOLLOW-UP FORM	
Occurrence Report No.:	Aviation Activity (Flight/Ground/Maint/CAB etc):
1. PRELIMINARY ANALYSIS	
Performed by:	Date:
<p>Description of the occurrence – (an unwanted event, identified hazard or near miss)</p> <p>The specific hazards present in the occurrence:</p> <p>The preventive measures in place for the hazards and why the occurrence occurred – Preventive measures that failed or were ineffective:</p> <p>What is the potential adverse consequence of this occurrence and reasons why it did happen – Recovery measures that were effective:</p> <p>What are the assessed risks of the unwanted event and the consequence:</p>	
Classification based on the Safety Risk Matrix	
ACCEPTABLE	TOLERABLE
UNACCEPTABLE	
2. ADDITIONAL ANALYSIS BY THE SAFETY COMMITTEE or SAFETY ACTION GROUP (If the risk is not Acceptable)	
Validated by:	Date:



Risk Likelihood	Risk severity				
	Catastrophic A	Major B	Moderate C	Minor D	Negligible E
Frequent (5)	Unacceptable	Unacceptable	Unacceptable	Review	Review
Occasional (4)	Unacceptable	Unacceptable	Review	Review	Review
Remote (3)	Unacceptable	Review	Review	Review	Acceptable
Improbable (2)	Review	Review	Review	Acceptable	Acceptable
Extremely improbable (1)	Review	Review	Acceptable	Acceptable	Acceptable

Data on event, consequences, identified hazards and preventive / recovery measures and their risks are recorded in the SDCPS or Hazard Register (Appendix 3).

APPENDIX 5 – TRAINING SCOPE ON SMS IMPLEMENTATION

Contents	Training Objectives
Safety Policy	Understand the main elements of the AOC holder's Safety Policy.
Organisation, roles and responsibilities	Understand the organisation, roles and responsibilities concerning the AOC holder's SMS. Everyone to know his or her own role in the SMS.
Safety Objectives	Understand the AOC holder's safety objectives.
Emergency Response Planning (ERP) (reinforced through practical simulations)	Understand the various roles and responsibilities in the AOC holder's ERP. Everyone to know his or her own role in the ERP.
Occurrence and hazards reporting	Knowledge of AOC holder's hazards taxonomy, unwanted events and consequences related to the aviation activities and the AOC holder's process for reporting occurrences and hazards.
Safety Risk Management (SRM) process including roles and responsibilities	Understand the AOC holder's Safety Risk Management process. Everyone to know his or her own role in the SRM.
Continuous improvement of safety performance	Understand the principles and AOC application of continuous improvement of safety performance.
Responsibility when contracting activities	Understand the AOC holder's responsibilities when contracting out its aviation activities. Everyone should know his or her own roles and responsibilities regarding this subject.