CAAS
Civil Aviation Authority of Singapore

TSIB
SINGAPORE

SINGAPORE STATE SAFETY PROGRAMME

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FOREWORD

The air transport sector is an important contributor to Singapore's economy, representing 6% of our GDP and providing over 160,000 jobs. Central to the success of our aviation system is a safe aviation environment that enables the industry to develop and grow sustainably.

Aviation is growing rapidly, especially in the Asia Pacific region, and business and operating models are evolving in tandem. Our approach towards regulating and managing aviation safety must keep pace with these changes, and still ensure effective safety management at all levels.

This State Safety Programme (SSP) Document charts our strategy to strengthen Singapore's safety management functions for civil aviation activities. It outlines our guiding principles and safety objectives, and the necessary processes to effectively implement this strategy.

The Ministry of Transport, Civil Aviation Authority of Singapore and the Transport Safety Investigation Bureau of Singapore are committed to working closely with our stakeholders to implement the SSP and enhance safety management. We must continue to improve aviation safety to safeguard the wellbeing of the aviation community and air travellers.

Khaw Boon Wan
Coordinating Minister for Infrastructure &
Minister for Transport

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INTRODUCTION

Singapore has established a robust and progressive regulatory safety oversight system, in compliance with the International Civil Aviation Organization (ICAO) requirements. In particular, we have developed safety oversight capabilities that commensurate with the expanse of our aviation activities. Through the ICAO Universal Safety Oversight Audit Programme (USOAP) Continuous Monitoring Approach (CMA), we proactively seek to address gaps in our implementation of ICAO Standards and Recommended Practices (SARPs) and strengthen our regulatory safety oversight to mitigate new and emerging safety risks.

To this end, Singapore is implementing a State Safety Programme (SSP) in line with ICAO's Global Aviation Safety Plan and requirements in Annex 19 to the Chicago Convention. This allows the integration of safety management activities across the industry and at the State level. By moving towards a more proactive and predictive approach to systematically identify, prioritise and mitigate aviation safety risks, we are better able to ensure a safe aviation environment to facilitate the continued growth of a dynamic aviation industry in an increasingly complex aviation landscape.

This SSP document articulates the key pillars of safety management, in the following key areas:

a. State safety policy and objectives;

b. State safety risk management;

c. State safety assurance; and

d. State safety promotion.

The SSP provides a strong foundation for an effective civil aviation safety system, to better address the challenges and priorities that lie ahead. As effective SSP implementation is a continuing process, this SSP document will be reviewed at least once every 3 years to maintain its relevancy. The current version of the SSP document has been approved by the Director-General of Civil Aviation, Civil Aviation Authority of Singapore (CAAS).

CHALLENGES AND PRIORITIES

Challenges and Priorities

1.1 Challenges

1.1.1 Strong Growth in Air Traffic

1.1.1.1 The Asia-Pacific region will be the biggest driver of air travel demand over the next 20 years. By 2030, more people will be flying to, from and within Asia than Europe and North America combined. As a key air hub connecting the region and beyond, Singapore is poised to capture a sizeable piece of the growth in global air traffic. The number of air travellers in Singapore is expected to double in 20 years. In 2016 alone, there were around 365,500 aircraft movements at Changi Airport, and close to 600,000 air traffic movements in the Singapore Flight Information Region (FIR).

1.1.1.2 The growth in air traffic introduces complexities and additional stresses to our aviation system. CAAS will need to continue to facilitate high air traffic volumes, without compromising safety standards.

1.1.2 Increasing Complexity of Our Aviation System

1.1.2.1 Singapore is also a vibrant aviation hub serving various aviation needs. As Singapore moves up the aviation value chain towards more technology and knowledge-based activities, further complexities will challenge conventional regulatory approaches, requiring new expertise.

1.1.2.2 Major infrastructure developments around Changi Airport are also underway to support the projected growth in air travel. These infrastructural expansions pose operational and regulatory challenges that require adept change management.

1.1.2.3 At the same time, Singapore continues to facilitate the growing demand for unmanned aircraft (UA) operations for commercial and public purposes. Given our busy airspace and densely populated urban environment, it is critical to ensure that UA operations do not pose serious risks to manned aviation and public safety.

1.1.3 New Disruptive Technologies

1.1.3.1 Virtual and digital capabilities are also being leveraged in remote tower applications - an area which has potential to be deployed in airports with high-intensity runway operations, such as Changi Airport. CAAS will thus need to develop necessary regulations to address the often disruptive nature of these leaps in technology, without hampering innovations within the industry.

1.1.4 Capability and Capacity Building

1.1.4.1 CAAS is building up and strengthening its capabilities and capacity in tandem with global and industry developments. This will not only ensure adequate safety oversight but will also help to maintain an enabling regulatory environment that facilitates the sustained development and growth of the aviation industry.

1.1.4.2 Regulatory approaches are also changing in response to changing needs and aviation landscape. The evolving aviation environment necessitates performance-based regulation and data-driven regulatory approaches, leveraging predictive analysis and info-communication technology. The regulator's skill sets need to correspondingly expand, as we develop and implement new regulatory approaches.

1.2 Global and Regional Priorities

1.2.1 Singapore is committed to working with ICAO, international and regional partners to advance aviation safety globally. We contribute actively at ICAO panels and working bodies, as well as in regional bodies and fora such as the Regional Aviation Safety Group – Asia Pacific (RASG-APAC), Asia Pacific Regional Aviation Safety Team (APRAST), Cooperative Development of Operational Safety & Continuing Airworthiness Programme – Southeast Asia (COSCAP-SEA) and the Directors-General of Civil Aviation (DGCA) Asia and Pacific Regions Conferences. Singapore is also spearheading the implementation of some key safety initiatives at Association of Southeast Asian Nations (ASEAN), in support of ASEAN's Single Aviation Market initiative.

1.2.2 ICAO has, through its Global Aviation Safety Plan, identified priorities and targets for States to strengthen safety oversight capabilities, implement their SSPs and build upon their safety management efforts to develop advanced safety oversight systems, including predictive risk management. Three operational priorities have also been identified – improving runway safety, mitigating the risk of controlled flight into terrain (CFIT) accidents and mitigating the risk of loss of control in flight (LOC-I) accidents. These have been incorporated as part of the priorities and targets of the RASG-APAC.

1.2.3 Singapore is committed to achieving these priorities and targets, as well as to addressing the challenges unique to our civil aviation system, through the continuous monitoring, assessment and management of our State's safety performance.

SAFETY OBJECTIVES AND POLICY

Safety Objectives and Policy

2.1 Safety Objectives

2.1.1 Singapore strives for a high level of aviation safety. Effective safety oversight builds confidence in our aviation system, encourages aviation-related investments and operations, and facilitates continued growth. It lays the foundation for a vibrant air hub and civil aviation system.

2.1.2 To achieve this, Singapore will:

a. mitigate aviation safety risks, with the aim of achieving no accidents with fatalities involving entities under its safety oversight;

b. enhance safety management capabilities of the Singapore aviation industry and State agencies, to continuously improve safety performance and risk mitigation;

c. develop progressive and robust aviation safety regulatory and investigative regimes, taking into account and balancing the needs of the stakeholders within the industry, government, travelling public and the international community; and

d. contribute and collaborate effectively in international and regional fora to enhance the safety of international civil aviation.

2.2 State Safety Policy Statement

2.2.1 Our State Safety Policy Statement is as follows:

Singapore's State Safety Policy Statement

Singapore is committed to developing and implementing effective strategies, frameworks and processes to ensure that civil aviation activities under our responsibilities achieve the highest practicable level of safety.

The CAAS promotes and regulates the safety of civil aviation in Singapore. To this end, CAAS will:

a. set national policies and standards that are consistent with the Standards, Recommended Practices and Procedures of ICAO;

b. adopt a data-driven and performance-based approach to safety regulation and safety oversight activities where appropriate, leveraging safety data and information to identify safety trends, and adopt a risk-based approach to address areas of greater safety concern accordingly;

c. monitor and measure the safety performance of our aviation system to identify, address and mitigate aviation safety risks;

d. collaborate and consult with the industry to address safety matters, promote good safety practices and build a strong and proactive safety culture based on safety management principles;

e. encourage the collection, analysis and exchange of safety data and information;

f. contribute effectively to improving aviation safety in international and regional fora;

g. ensure sufficient financial, human and corporate support resources for safety management; and

h. equip staff with the proper skills and expertise to discharge their safety oversight and management responsibilities competently.

As the provider of air navigation services, CAAS will:

a. *implement an effective Safety Management System (SMS) to mitigate aviation safety risks associated with air traffic management;*

b. *enhance our air traffic management capabilities to deliver safety and efficiency improvements to airspace users, so as to support the growth of Singapore's air hub;*

c. *contribute effectively in international and regional fora to improving aviation safety through Air Traffic Management (ATM) modernisation efforts in Singapore and the region.*

The Air Accident Investigation Bureau (AAIB) of the Transport Safety Investigation Bureau (TSIB[1]) under the Ministry of Transport is the authority in Singapore responsible for conducting safety investigations into aircraft accidents and incidents. AAIB promotes aviation safety by drawing safety lessons from the investigations as well as administering a voluntary incident reporting system. To this end, AAIB will:

a. *conduct investigations in a manner consistent with the Standards and Recommended Practices of ICAO Annex 13 on Aircraft Accident and Incident Investigation;*

b. *maintain objectivity, impartiality and independence in the course of its accident and incident investigations;*

c. *collaborate with the international accident investigation community and aviation industry to keep abreast of investigation developments, promote the sharing of expertise, experience and information, and enhance aviation safety;*

d. *allocate sufficient financial, human and corporate resources for accident and incident investigations; and*

e. *equip staff with proper skills and expertise to discharge competently their accident and incident investigation responsibilities.*

[1] The Ministry of Transport (MOT) has restructured AAIB to form the new TSIB on 1 August 2016. AAIB now comes under TSIB.

2.3 State Safety Legislative Framework

2.3.1 Legislation

2.3.1.1 Singapore has a national aviation safety legislative framework supported by the necessary aviation regulations to implement the Chicago Convention and its Annexes. The following legislation have been enacted:

a. Air Navigation Act (Cap. 6) (ANA)

The ANA, originally enacted in 1966, is an Act of Parliament and provides for the implementation of the Chicago Convention and its Annexes. The ANA provides for the regulation of aviation safety, including the various actions that CAAS could take in the event of non-compliance with legislation and regulations or when it is assessed that there are potential safety risks to the civil aviation system, accident and incident investigation and other areas pertaining to civil aviation. The ANA also provides for the establishment of AAIB and the appointment of Inspectors of Accidents and a Chief Inspector of Accidents by the Minister for Transport[2].

b. Civil Aviation Authority of Singapore Act (CAAS Act)

CAAS is a statutory body established on 1 September 1984 by an Act of Parliament, i.e. the CAAS Act (Cap. 41, 1985 Rev. Ed.). CAAS was reconstituted under a new CAAS Act, which came into force on 1 July 2009, arising from the restructuring of CAAS and the corporatisation of Changi Airport. The CAAS Act empowers CAAS to regulate safety and exercise regulatory oversight over civil aviation operations in Singapore and the operation of Singapore aircraft outside Singapore.

c. Air Navigation Order (ANO)

The ANO is subsidiary legislation made under section 3 of the ANA and prescribes, among other things, the safety regulatory requirements as contained in the various Annexes to the Chicago Convention. The ANO also provides the legal basis for the issuance of Technical Requirements, which are mandatory requirements for various aviation activities. The ANO is promulgated by the Authority[3] with the approval of the Minister for Transport.

[2] Work is underway to establish TSIB by legislative enactment.
[3] The Authority refers to the CAAS established under section 4 of the CAAS Act. It comprises a Chairman and other members as appointed by the Minister for Transport. The Authority regulates and promotes safety and security in civil aviation, facilitates the development of civil aviation capabilities, skills and services in Singapore, as well as cooperates with AAIB in relation to investigations.

d. Air Navigation (Investigation of Accidents and Incidents) Order (AN(IAI)O)

The AN(IAI)O is subsidiary legislation made under section 14E of the ANA which prescribes the processes and procedures of an investigation of aircraft accidents and incidents in accordance with Annex 13 to the Chicago Convention, including the issuance of investigation reports and safety recommendations. The AN(IAI)O is promulgated by the Minister for Transport.

2.3.2 Technical Requirements

2.3.2.1 The ANO provides for the issuance/publication of various operating regulations (also known as Technical Requirements) by CAAS. Technical Requirements contain more detailed mandatory requirements for compliance with the aviation safety standards found in the Annexes to the Chicago Convention, and have been issued for areas such as: aircraft operations, airworthiness of aircraft, aerodrome operations, air navigation services provision, and personnel licencing and training. The list of Technical Requirements can be found in Appendix A.

2.3.3 Guidance material

2.3.3.1 Guidance material provides detailed information on topics such as the policies and regulations issued by CAAS, safety recommendations, guidelines for regulatory processes and administrative instructions. Where appropriate, guidance material also provide service providers with the acceptable means of compliance (AMC) with the ANO and the Technical Requirements. CAAS may also accept alternative means prior to implementation, if they can adequately meet the intent of the regulatory requirements.

2.3.4 Policies and procedures

2.3.4.1 Policies and procedures for civil aviation regulation and investigation of aircraft accidents and incidents have been established, and are applicable to the relevant CAAS and TSIB staff, respectively. They cover functional areas such as rule development, delegation of powers to inspectors and regulatory staff, grant of licences/certificates/approvals, enforcement, surveillance and investigation. They also provide guidance on governance matters such as personal conduct, training and capability building matters as well as administrative matters such as the handling of State Letters issued by ICAO.

2.3.4.2 Mutually agreed policies and procedures have also been put in place to coordinate the work and resources between CAAS and TSIB.

2.3.5 Ministerial Direction

2.3.5.1 CAAS carries out both regulatory and service provider functions (in the areas of air navigation services, training in air traffic control, and airport rescue and firefighting). To ensure clear functional separation in these areas, the Minister of Transport had given directions to CAAS pursuant to section 9 of the CAAS Act (Cap. 41) as to the discharge of CAAS' regulatory and service provider functions. CAAS is required to give effect to all such directions given by the Minister.

2.3.6 Review of Legislation & Regulations

2.3.6.1 There are policies and procedures in place to review aviation safety legislation, regulations, guidance material, policies and procedures, to ensure that they remain effective and relevant to Singapore's aviation system.

2.3.6.2 The CAAS Rule Development Committee (RDC) monitors the rule development process and oversees rule development projects. The rule development process is triggered through various channels such as the introduction of new or amended ICAO SARPs, changes to policies, industry feedback and new aviation developments. The RDC reviews proposed rules and ensures that the rulemaking process is adhered to.

2.3.6.3 Additionally, a CAAS SSP Working Group regularly reviews the SMS regulations and guidance materials, covering the entire ICAO SMS framework in two-year cycles. The regular review ensures specific operating regulations, guidance materials and implementation policies on SMS remain relevant and appropriate to service providers, and identifies areas of improvements in our safety oversight of SMS implementation by service providers.

2.3.6.4 In line with international best practice and to better support industry development, CAAS has embarked on the modernisation of Singapore's aviation safety regulatory framework. CAAS is developing a set of Air Navigation Regulations (ANRs) to eventually replace the Technical Requirements (except those issued under Ministerial Directions) and some parts of the ANO. The ANRs will be organised in a numbered-parts system that has been widely adopted internationally, to enhance the navigability of CAAS's regulations.

2.3.6.5 CAAS also plans to adopt principle-based or outcome-based approach where appropriate, when drafting the ANRs. This allows the industry more room for flexibility, provided that both the safety intent of the requirement and an equivalent level of safety can be achieved.

2.4 State Safety Responsibilities and Accountabilities

2.4.1 The Ministry of Transport (MOT) is the parent ministry of CAAS and TSIB. The subsequent paragraphs describe the roles of the various organisations in relation to civil aviation and the coordination of the SSP.

2.4.2 Ministry of Transport (MOT)

2.4.2.1 MOT's mission is to strengthen Singapore's transportation connectivity and develop the transport sector's potential to advance the economic competitiveness and quality of life in Singapore. Among other responsibilities, the Minister of Transport has been charged under the Constitution of the Republic of Singapore Notification 2015 with the responsibility for civil aviation safety oversight in Singapore.

2.4.3 Air Accident Investigation Bureau (AAIB)

2.4.3.1 AAIB is responsible for conducting investigations into aircraft accidents and incidents in accordance with Annex 13 to the Chicago Convention. Its functions, which are set out in Part IIA of the ANA, include the following:

a. carry out investigations into any accidents or serious incidents which occurs in Singapore;

b. carry out investigations into any accidents or serious incidents outside Singapore, that involves a Singapore registered aircraft or an aircraft operated by a Singapore operator, if the investigation has been delegated to Singapore, or the occurrence is in a non-contracting state with no intention of carrying out the investigation; and

c. carry out investigations into incidents from which air safety lessons may be derived.

2.4.4 Civil Aviation Authority of Singapore (CAAS)

2.4.4.1 CAAS is a statutory body under MOT and its responsibilities are defined in the CAAS Act. The functions and duties of CAAS which are set out in section 7 of the CAAS Act, include the following:

a. regulate safety and promote safety and security in civil aviation;

b. exercise licensing and regulatory functions in respect of the operation of airports and the provision of airport services and facilities in Singapore;

c. provide air navigation services within the Singapore Flight Information Region and such other area as the Minister for Transport may authorise;

d. provide or coordinate search and rescue services to aircraft in distress within the Singapore Search and Rescue Region;

e. act internationally as the national authority representing Singapore on civil aviation matters;

f. discharge the international obligations of the Singapore Government as a Contracting State or otherwise in respect of civil aviation;

g. collaborate or enter into agreements/arrangements with organisations on civil aviation matters and any other matter deemed expedient;

h. foster appropriate education and provide training and training facilities in respect of any matter relating to civil aviation;

i. advise the Government on all matters relating to civil aviation;

j. promote understanding of civil aviation policies and programmes; and

k. carry out any other function/duty imposed by the CAAS Act or any other written law.

2.4.4.2 The Safety Regulation Group (SRG) is responsible for aviation safety regulatory oversight and safety management, with a key role in upholding a safe aviation environment and laying the foundation for a vibrant air hub and civil aviation system in Singapore.

2.4.4.3 To carry out the SSP responsibilities, SRG is organised into 4 Divisions with key areas of responsibilities as follows:

a. Aerodrome and Air Navigation Services Regulation (AAR) Division

i. Conduct of safety oversight of the aerodrome operator, air navigation service provider and aeronautical meteorological services provider, as well as the development and implementation of regulations for aerodrome operations and air traffic services (ATS); and

ii. Ensuring compliance with relevant Annexes to the Chicago Convention:

- Annex 3: Meteorological Service for International Air Navigation
- Annex 4: Aeronautical Charts
- Annex 5: Units of Measurements to be used in Air and Ground Operations
- Annex 10: Aeronautical Telecommunications
- Annex 11: Air Traffic Services
- Annex 12: Search and Rescue
- Annex 14: Aerodromes
- Annex 15: Aeronautical Information Services

b. Airworthiness & Flight Operations (A/FO) Division

i. Conduct of safety oversight, and development and implementation of regulations relating to:

- operations of Singapore air operators
- airworthiness of Singapore-registered aircraft
- maintenance, design and production organisations
- general aviation aircraft and operations
- qualification of flight simulation training devices
- aeronautical product designs
- carriage of dangerous goods
- unmanned aircraft systems
- surveillance of foreign operators

ii. Ensuring compliance with relevant Annexes to the Chicago Convention:

- Annex 6: Operation of Aircraft
- Annex 7: Aircraft Nationality and Registration Marks
- Annex 8: Airworthiness of Aircraft
- Annex 16: Environment Protection
- Annex 18: Safe Transport of Dangerous Goods

c. Civil Aviation Medical Board (CAMB)

i. Development of aeromedical policies and standards relating to medical fitness certification of flight crew and air traffic controllers; implementation of the medical examination and fitness certification system; and the provision of training for and supervision of Designated Medical Examiners (DMEs) appointed by CAAS and nomination of suitably qualified physicians to be appointed as Medical Assessors to support the fitness certification system.

d. Safety Policy and Licensing (SPL) Division

i. Management of Singapore's obligations under the ICAO USOAP CMA; implementation of the SSP and coordination with external stakeholders on relevant SSP activities; identification and analysis of safety trends and monitoring of safety indicators; formulation and review of aviation safety policies across SRG; management of the development of regulations, guidance material and internal procedures; regulation and licensing of flight crew, aircraft maintenance engineers and air traffic controllers; and conduct of safety oversight of approved training organisations and flight simulation training devices.

ii. Ensuring compliance with relevant Annexes to the Chicago Convention:

- Annex 1: Personnel Licensing
- Annex 2: Rules of the Air
- Annex 19: Safety Management

2.4.5 National Aviation Safety Committee (NASC)

2.4.5.1 The NASC is a national-level committee established to coordinate SSP activities. Chaired by the Director-General of CAAS, the NASC comprises representatives from TSIB and relevant Divisions within CAAS involved in safety regulation. The NASC oversees the development and implementation of the SSP and reviews the level of safety performance and policies and practices related to SSP.

2.4.6 Coordination between CAAS and TSIB

2.4.6.1 Besides working closely on SSP activities, CAAS and TSIB also facilitate work in the following areas:

a. Classification of Occurrences

TSIB and CAAS ensure consistency in the classification of occurrences involving Singapore air operators and Singapore-registered aircraft, and accurate reporting of information to ICAO under the Accident/Incident Data Reporting (ADREP) System.

b. Sharing of safety information

The Singapore Aviation Accident / Incident Reporting System (SAIRS) and Singapore Confidential Aviation Incident Reporting (SINCAIR) programme, are safety data and information collection systems administered by CAAS and TSIB respectively. Air operators and maintenance organisation approval holders are required to report safety occurrences through CAAS' SAIRS. The SINCAIR programme is a voluntary, non-punitive confidential reporting system for aviation incidents and safety deficiencies, where the reporter's identity is protected by TSIB. For the purpose of conducting safety trend analysis, safety information from SAIRS and de-identified information from SINCAIR is shared between CAAS and TSIB.

c. Issuance of Safety Recommendations

CAAS receives safety recommendations from TSIB based on its investigations and other sources including foreign accident investigation authorities. CAAS is also informed of safety recommendations issued by TSIB to the Singapore aviation industry, so that this additional information can be used to support the conduct of safety oversight.

d. Technical Support for Investigation

CAAS provides technical experts to TSIB as appropriate, upon request, to support the conduct of an investigation.

2.5 Accident and Incident Investigation

2.5.1 TSIB's investigations are independent and separate from judicial or administrative proceedings. Through their investigations, TSIB analyses the circumstances leading to the occurrences of accidents and serious incidents, identifies safety issues and makes recommendations to address these safety issues.

2.5.2 CAAS also conducts investigations of occurrences. Such investigations continue independently in parallel with TSIB's investigations as much as possible. The investigations conducted by CAAS aim to expeditiously determine safety gaps to prevent recurrence, assess breaches of regulations and guidance material, and identify improvement areas in the safety regulations and oversight processes.

2.6 Enforcement Policy and Framework

2.6.1 Compliance with Singapore's aviation safety legislation and requirements by organisations and persons is crucial to effective safety management. Through regular reviews and consultations with the industry, we ensure that our regulations are up to date and relevant. We also provide guidance to the industry on how to achieve compliance.

2.6.2 In the event of non-compliance, our primary focus is to address the root cause of the contravention, and bring the individual or organisation back to compliance. Where necessary, CAAS will take immediate safety actions to address any imminent safety risk.

2.6.3 CAAS is committed to fostering a just culture in our aviation community. We will strive to create an environment of openness, fairness and trust in which people are encouraged to report or share safety-related information, including their own errors. Accountability is important to ensure integrity of the system, and unacceptable behaviours such as gross negligence and intentional and wilful acts to flout our rules, will have to be dealt with appropriately.

2.6.4 When considering whether enforcement action should be taken, we take into account: (i) type, counts and duration of contravention; (ii) circumstances of the contravention; (iii) adverse effect on aviation safety; (iv) aggravating and mitigating considerations; (v) potential efficacy of proposed actions; (vi) totality and parity principles. Where warranted, CAAS may take sanctions against contraveners, ranging from verbal and written warnings, to administrative action on the Aviation Safety Instrument, to prosecution.

STATE SAFETY RISK MANAGEMENT

State Safety Risk Management

3.1 Overview

3.1.1 While the conventional approach of checking for regulatory compliance has thus far yielded effective aviation safety outcomes, the global aviation community is moving towards safety management. States and industry each takes a systematic approach towards identifying and mitigating safety risks, and puts in place organisational structures and mechanisms to track safety performances.

3.1.2 To strengthen safety risk management, Singapore has progressively put in place the supporting elements, from establishing SMS regulations, to working with industry on their safety performances.

3.2 Safety Requirements for Service Provider's SMS

3.2.1 CAAS requires the following service providers to implement SMS:

a. Singapore Air Operator Certificate holders;

b. Singapore Airworthiness Requirements (SAR)-145 Approved Maintenance Organisations (AMOs) (except SAR-145, Subpart D organisations)

c. Aviation Training Organisations (ATOs) approved by CAAS that are exposed to safety risks during the provision of their services;

d. Aeronautical meteorological service provider in Singapore;

e. Air navigation service (ANS) provider in Singapore;

f. Operator of certified aerodromes in Singapore; and

g. General aviation operator of large/ turbo-jet aeroplanes and helicopters for corporate aviation operations approved by CAAS.

3.2.2 A service provider's interfaces with other service providers and subcontractors can have a significant contribution to the safety of its products or services. Hence, CAAS, as the air navigation service provider, requires the maintenance contractors of CAAS' communications, navigation and surveillance systems to implement an SMS each through a contractual agreement.

3.2.3 Service providers are required to implement an SMS, in compliance with CAAS Technical Requirements. A list of relevant CAAS Technical Requirements and guidance material is shown below:

Service Provider	SMS Requirements found in	Guidance Material
Air operator	AOCR	AC 1-3
Approved maintenance organisation	SAR Part 145 – AMOs	AC 1-3
Aerodrome operator	MOAS	AC 1-3
Air navigation services provider	MOS – ATS, MOS- ATE and MOS- AIS	AC 1-3, ATS Safety Publications, ATS Information Circulars
Aviation training organisation	SASP Part 10	AC 1-3
International general aviation operators	SGAR – Aeroplane SGAR – Helicopter	AC 1-3
Aeronautical meteorological service provider	MOS –MET(IAN)	AC 1-3, ATS Safety Publications

3.3 Agreement on Service Provider's Safety Performance

3.3.1 Service providers are required to define safety performance measurements as part of their SMS performance monitoring mechanism. The measurements refer to the indicators, alerts and targets used to measure and monitor safety performance over time. Safety performance measurements take into account the nature of the operations, the safety objectives of the service providers and the aviation safety risks faced. The service providers are also required to review their safety performance measurements regularly to ensure relevance with their safety objectives and prevailing hazards and risks. These safety performance measurements are agreed between CAAS and the service providers.

SAFETY ASSURANCE

Safety Assurance

4.1 Overview

4.1.1 Safety assurance at the State level provides a self-check to ensure that CAAS is exercising the regulatory functions that constitute safety risk controls within the aviation system. State safety assurance is accomplished through safety oversight of service providers, as well as quality assurance on Singapore's safety oversight system.

4.2 Safety Oversight

4.2.1 CAAS has implemented a data-driven surveillance programme to ensure that resources are focused on and prioritised according to the areas of concern.

4.2.2 Safety Oversight of Service Providers

4.2.2.1 CAAS has put in place a safety oversight system to ensure ongoing compliance with regulatory requirements by service providers through surveillance activities such as mandatory reporting, audits, inspections, interviews and onsite/offsite checks. These activities are generally carried out on a continuous monitoring basis, using a risk-based approach to place priority on areas of greater safety concern or need.

4.2.2.2 Non-compliances, deficiencies or improvements may be identified during surveillance activities. When identified, the service provider concerned will be required to take appropriate actions within a stipulated timeframe, to get back to a safe state, so as to be able to continue their service provision. Where safety risk is assessed to be imminent, enforcement actions such as suspension or imposing conditions on particular activities may be taken.

4.2.3 Quality Assurance on Singapore's Safety Oversight System

4.2.3.1 Singapore is committed to fulfilling its ICAO USOAP CMA obligations. The effectiveness of the Singapore's safety oversight function is monitored through regular audits carried out by either an appropriately trained internal audit team or a team of external consultants.

4.3 Safety Data Collection, Analysis and Exchange

4.3.1 CAAS and TSIB collect, analyse and exchange safety data and information for the purpose of safety improvement. Safety information is also shared with service providers, other States/Administrations and ICAO as appropriate.

4.3.2 Mandatory Occurrence Reporting

4.3.2.1 SAIRS provides the platform for mandatory reporting by service providers to CAAS. The scope of safety data collection is not limited to aircraft accidents and incidents, but also safety hazards and threats. In this regard, the ANO and the Technical Requirements specify the mandatory reportable occurrences and events and the processes for reporting. CAAS also encourages the reporting of potential safety deficiencies that could affect flight safety.

4.3.3 Confidential Voluntary Reporting

4.3.3.1 The SINCAIR programme administered by TSIB aims to enhance aviation safety through the collection of voluntary feedback on incidents. Incidents can be related to flight operations, ground operations, air traffic management, aircraft maintenance and passenger handling operations. The SINCAIR programme does not eliminate the need for mandatory reporting of aircraft accidents and incidents to CAAS under the ANO and other relevant authorities under the existing law.

4.3.3.2 The sources of voluntarily-provided information are protected by de-identification. In addition, TSIB officers who administer the SINCAIR programme cannot be compelled to disclose the information obtained under the SINCAIR programme[4] (ref: Evidence Act section 126).

[4] Section 126 of the Evidence Act provides that no public officer shall be compelled to disclose communications made to him in official confidence when he considers that the public interest would suffer by the disclosure.

4.3.4 Safety Data and Information Analysis

4.3.4.1 Besides collecting data and information through the SAIRs, CAAS collects data and information from surveillance activities, de-identified information provided by TSIB, accident and incident reports and other sources. CAAS analyses these data and information for the purposes of improving safety. Hazard identification and risk management are carried out for significant events and as required for safety risk management.

4.3.5 Acceptable Level of Safety Performance (ALoSP)

4.3.5.1 CAAS has developed safety indicators to monitor the safety performance of the aviation system. These indicators include accidents, serious incidents and occurrences within broad domains of aviation operations (e.g. air navigation services, aerodrome operations, flight operations). Based on the targets and alerts designed for these indicators, CAAS develops follow-up actions to address safety issues in a timely manner.

4.4 Data-driven Safety Oversight

4.4.1 Prioritisation of surveillance activities allows CAAS to dedicate resources towards areas of greater safety concern. CAAS has therefore taken a risk-based approach towards the planning of surveillance activities.

4.4.2 Surveillance activities are carried out based on the organisation risk profile, which determines the scope, frequency and resources needed to carry out the surveillance on a service provider. The risk profiling includes considerations on the service provider's safety performance track record, the scope and complexity of work that the organisation is involved in, the trends of operational events and the presence of significant safety issues.

4.4.3 The scope and frequency of surveillance activities are further adjusted based on CAAS' safety priorities and the safety performance analysis carried out by CAAS.

SAFETY PROMOTION

Safety Promotion

5.1 Overview

5.1.1 Training frameworks have been institutionalised by CAAS and TSIB to promote sharing and retention of knowledge to strengthen the technical competencies of staff. With respect to safety promotion for industry, CAAS and TSIB carry out a series of activities to communicate safety information and encourage dialogue with the aviation industry and the public.

5.2 Internal Training, Communication and Dissemination of Safety Information

5.2.1 Training

5.2.1.1 Training is provided to CAAS and TSIB officers, ranging from generic 'soft-skill' training, technical training to functional training. These training occur at different phases, such as during the early stage of induction, on-job-training and the period of recurrent training. CAAS' Technical Training Framework equips CAAS SRG officers, including inspectors with basic, specialised and recurrent training to carry out their safety regulation duties effectively. The basic induction training includes on-job-training under guided supervision.

5.2.1.2 TSIB officers are also put through practical training, investigation exercises, and equipped with generic SMS and SSP knowledge. Training is conducted mainly at the Singapore Aviation Academy (SAA), which is the training arm of CAAS.

5.2.2 Communication and Dissemination of Safety Information

5.2.2.1 CAAS maintains electronic document management systems and communications tools for retention and communication of safety information. Annual SRG Forums are held, providing opportunities for SRG senior management to engage staff on aviation safety issues, ranging from international developments, work plans, culture to training.

5.2.2.2 TSIB conducts departmental and investigation meetings regularly to ensure sharing of essential information among staff. Active communication of safety information within the workforce is encouraged and practised.

5.3 External Training, Communication and Dissemination of Safety Information

5.3.1 Training

5.3.1.1 Safety assurance is a shared responsibility between regulators and service providers. Understanding safety management from the perspectives of international organisations and regulators augments various facets of state safety assurance, including safety oversight and safety data collection analysis and exchange. To achieve this, the SAA conducts various aviation safety courses to cater to a wide range of participant profile, from industry new hires to veterans.

5.3.1.2 TSIB collaborates with SAA to conduct accident investigation training, as well as host international and regional fora, conferences and training in investigation for counterparts in Asia-Pacific States. TSIB also extends training opportunities to the State's police and fire fighters to enhance response coordination by streamlining respective agencies' procedures.

5.3.2 Communication and Dissemination of Safety Information

5.3.2.1 Industry engagement platforms such as the CAAS Safety Series are held to keep the aviation industry up-to-date on developments in safety policies and regulations, while the TSIB organises conferences and seminars to discuss issues relating to the organisation, infrastructure and management of accident investigation. Regular meetings and dialogue sessions serve as opportunities to discuss aviation safety issues with the regulated entities and the industry.

5.3.2.2 Both CAAS and TSIB maintain websites for industry and public access, sharing up-to-date information on changes to requirements, investigation reports, and safety lessons learned from the review of foreign investigation reports. In addition, CAAS also maintains a social media account to increase outreach to the general public.

5.3.2.3 Furthermore, CAAS continues to maintain its outreach through traditional media, such as the regular publications of "The Leading Edge" and "Bridging Skies" newsletters which share international developments in aviation safety and the latest developments in Singapore's aviation sector respectively. Useful de-identified SINCAIR reports are also shared through TSIB Singapore annual bulletins.

APPENDICES

Appendix A: Reference Documents

Singapore Legislation

(Available on the CAAS and Attorney-General's Chambers websites)

- Air Navigation Act (Cap. 6) (ANA)
- Air Navigation Order (ANO)
- Air Navigation (Investigation of Accidents and Incidents) Order (AN(IAI)O)
- CAAS Act

Singapore Technical Requirements

(Available on the CAAS website)

Personnel Licensing and Training

- Singapore Air Safety Publications (SASP):
    - Part 1 - Licensing of Student Pilots and Private Pilots
    - Part 2 - Licensing of Professional Pilots
    - Part 3 - Flying Instructor Ratings
    - Part 5 - Licensing of Flight Engineers
    - Part 7 - Authorised Flight Examiners
    - Part 9 - Medical Requirements for the Grant or Renewal of Flight Crew Licences and Air Traffic Controllers
    - Part 10 - Approval of an Aviation Training Organisation
    - Part 11 - Flight Simulation Training Devices (Aeroplane)
    - Part D - Definitions

- Singapore Airworthiness Requirements (SAR)
    - Part 66 - Aircraft Maintenance Licensing
    - Part 147 - Approved Maintenance Training Organisations

- Manual of Standards (MOS)
    - Licensing of Air Traffic Control Personnel
    - Air Traffic Control Training Organisation (ATCTO)

Aircraft Operations

- Air Operator Certificate Requirements (AOCR)

- Singapore General Aviation Requirements (SGAR)
    - Aeroplane
    - Helicopters

Aircraft Maintenance/ Design/ Production

- Singapore Airworthiness Requirements (SAR)
    - Part 21 - Certification of Products and Articles and of Design and Production Organisations
    - Part 39 - Airworthiness Directives
    - Part 145 - Approved Maintenance Organisation

- Airworthiness Notices

Aerodromes

- Manual of Aerodrome Standards (MOAS)
- Aerodrome Safety Directives
- MOS - Aerodrome Rescue and Fire Fighting Training

Air Navigation Services

- Manual of Standards
    - Air Traffic Services (MOS-ATS)
    - Aeronautical Telecommunication (MOS-ATE)
    - Aeronautical Information Services (MOS-AIS)
    - Instrument Flight Procedure (IFP) Design
    - Search and Rescue (MOS-SAR)
    - Units of Measurement to be used in air and ground operations (MOS-UOM)

Meteorological Service

- MOS - Meteorological Service for International Air Navigation MET(IAN)

Guidance Material

- Advisory Circulars (ACs)
- Information Circulars (ICs)
- Safety Publications (SPs)

Appendix B: Acronyms/Abbreviations

A/FO	Airworthiness/Flight Operations
AAIB	Air Accident Investigation Bureau of Singapore
AAR	Aerodrome and Air Navigation Services Regulation
AC	Advisory Circular
ADREP	Accident/ Incident Data Reporting
AIS	Aeronautical Information Service
ALoSP	Acceptable Level of Safety Performance
AMC	Acceptable Means of Compliance
AMO	Approved Maintenance Organisation
AN(IAI)O	Air Navigation (Investigation of Accidents and Incidents) Order
ANA	Air Navigation Act
ANO	Air Navigation Order
ANR	Air Navigation Regulations
ANS	Air Navigation Service
AOCR	Air Operator Certificate Requirements
APRAST	Asia Pacific Regional Aviation Safety Team
ASEAN	Association of Southeast Asian Nations
ATE	Aeronautical Telecommunication
ATM	Air Traffic Management
ATO	Aviation Training Organisation
ATS	Air Traffic Services
CAAS	Civil Aviation Authority of Singapore
CAMB	Civil Aviation Medical Board
CFIT	Controlled Flight into Terrain
COSCAP-SEA	Cooperative Development of Operational Safety & Continuing Airworthiness Programme – Southeast Asia
CMA	Continuous Monitoring Approach
CNS	Communications, Navigation, Surveillance
DGCA	Asia and Pacific Regions Directors-General of Civil Aviation
DME	Designated Medical Examiner
FIR	Flight Information Region
IC	Information Circular
ICAO	International Civil Aviation Organization
IFP	Instrument Flight Procedure

LOC-I	Loss of control in flight
MET(IAN)	Meteorological Service for International Air Navigation
MOAS	Manual of Aerodrome Standards
MOS	Manual of Standards
MOT	Ministry of Transport
NASC	National Aviation Safety Committee
RASG-APAC	Regional Aviation Safety Group – Asia Pacific
RDC	Rule Development Committee
SAA	Singapore Aviation Academy
SAIRS	Singapore Aviation Accidents/Incidents Reporting System
SAR	Singapore Airworthiness Requirement; or Search and Rescue
SARP	Standards and Recommended Practice
SASP	Singapore Air Safety Publication
SGAR	Singapore General Aviation Requirements
SINCAIR	Singapore Confidential Aviation Incident Reporting
SMS	Safety Management System
SP	Safety Publication
SPL	Safety Policy and Licensing
SRG	Safety Regulatory Group
SSP	State Safety Programme
TSIB	Transport Safety Investigation Bureau of Singapore
UA	Unmanned aircraft
USOAP	Universal Safety Oversight Audit Programme

Notes

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