

SINGAPORE STATE SAFETY PROGRAMME

Second Edition



Singapore State Safety Programme (SSP) Document

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Foreword

Safety is of paramount importance in aviation. As a party to the Chicago Convention, Singapore has an obligation to oversee and regulate aviation activities within its territory and the operation of Singapore aircraft worldwide.

The Ministry of Transport (MOT), Civil Aviation Authority of Singapore (CAAS) and the Transport Safety Investigation Bureau (TSIB) collectively have the public duty to uphold a safe aviation environment, facilitating the growth and development of the aviation industry in Singapore. A good aviation safety record bolsters confidence in air travel while a safe aviation environment lays the foundation for a vibrant air hub and civil aviation system.

Singapore has, over the years, established robust and progressive regulatory safety oversight and accident investigation capabilities commensurate with its civil aviation activities. We currently have four Singapore air operators, over 200 aircraft in our registry engaged in international commercial air transport, and some 6,000 licensed aviation personnel. Singapore is a leading aerospace hub in the region, with more than 150 maintenance organisations, 38 design and production organisations, and 18 aviation training organisations. Singapore Changi Airport is a key international air hub, serving about 68 million passengers pre-COVID in 2019 whilst the CAAS' air navigation services provider (ANSP) managed over 740,000 annual aircraft movements in the Singapore Flight Information Region - one of the busiest and most complex in the Asia-Pacific region.

Over the past two years, the COVID-19 pandemic has however adversely impacted the aviation sector and air links globally. It is crucial that Singapore remains connected to the rest of the world, given the services we provide to the region and the world, and the importance of the air hub to our economy. Beyond the COVID-19 pandemic, we expect air travel to recover amidst the gradual relaxation of borders restrictions globally to meet a pent-up demand in air travel. As the industry recovers from the pandemic, our organisations must be adequately staffed; aviation professionals competent; and aircraft airworthy.

On a longer horizon, we must continually address the safety risks within our system amidst an increasingly complex and demanding operating environment. Major infrastructure developments such as runway and Terminal 5 construction will bring significant changes to operations, introduce new hazards that must be identified and associated risks mitigated. New technologies including in our modernised air traffic management system and unmanned aircraft systems, will add to the complexity of our operating environment. The interconnected and borderless nature of aviation requires that we focus our safety efforts not only internally within Singapore, but also beyond our borders.

To meet these challenges, we must develop the necessary capabilities and build capacity to ensure that our aviation safety risks are adequately and appropriately managed. We have embarked on a safety management approach since 2010, continuously improved our safety oversight regime and developed a State Safety Programme (SSP), to systematically identify, prioritise and mitigate aviation safety risks.

In this SSP Document, we have articulated our regulatory philosophy, values, and commitments to achieve our safety objectives. This document also describes our safety frameworks, organisational structures and processes to drive aviation safety. Complementing this SSP Document is the National Aviation Safety Plan (NASP) that charts our strategic direction, safety priorities for improvements, and the actions needed to manage safety risks across the aviation sector.

As we continue to mature our SSP, we remain committed to work closely with our stakeholders and partners to evolve our safety management, safety oversight and air accident and incident investigation regimes. Ultimately, we seek to build a safe and robust civil aviation system in Singapore underpinned by a strong safety regime, strong and positive safety culture, and strong safety leadership.

1. Safety Policy and Objectives

Singapore strives for high standards in aviation safety. We have effective and robust safety oversight and air accident and incident investigation regimes that meet our international safety obligations under the Chicago Convention. We seek to proactively manage our safety risks. We aim to nurture and foster a positive safety culture within our civil aviation system, where each individual and organisation in the aviation ecosystem takes responsibility to uphold a high standard of safety. We will commit the necessary resources and equip our staff to carry out their functions proficiently. To this end, Singapore has established the following Safety Policy and Safety Objectives as part of its State Safety Programme.

Safety Policy

Singapore commits, as its Safety Policy, to:

- (a) develop and implement strategies, regulations, systems and processes to enable our civil aviation system to operate and grow in a safe manner;
- (b) set and implement national policies and regulations that are consistent with the Standards, Recommended Practices and Procedures of ICAO;
- (c) ensure sufficient financial, human and corporate support resources for civil aviation including safety management, and accident and incident investigation functions;
- (d) equip staff with the necessary skills and competencies to discharge their responsibilities;
- (e) adopt a risk-based and data-driven approach in the regulation and management of aviation safety, leveraging on safety data and information from different sources to identify and address areas of hazards, risks and safety concerns;
- (f) safeguard the availability of safety data and information by implementing safety information protection policies that are in line with ICAO Standards and Recommended Practices and international best practices;
- (g) actively engage and collaborate with the industry and international partners to address safety matters; and
- (h) promote a positive safety culture supported by a strong reporting and continuous learning culture and an enforcement policy that builds trust within the aviation community.

Safety Objectives

Singapore aims to achieve the following Safety Objectives:

- (a) Enhance the level of safety of Singapore's aviation operations, and in particular, to maintain zero fatal accidents involving entities under its safety oversight;
- (b) Ensure that Singapore's aviation safety oversight, and investigative regimes are effective, robust, aligned with ICAO Standards and Recommended Practices and keep pace with industry developments;
- (c) Ensure that hazards in Singapore's aviation operating environment are proactively identified, and related risks assessed and mitigated to as low as reasonably practicable;
- (d) Foster a positive safety culture and strengthen cooperation among industry stakeholders; and
- (e) Pursue and advocate for the enhancement of aviation safety regionally and globally.

2. State Safety Legislative Framework

Singapore has developed and implemented the appropriate national policies and regulations that are consistent with the Standards and Recommended Practices, and Procedures of ICAO. To this end, our legislation and regulations implement national safety policies, and appropriate regulatory processes to support the implementation of these national policies.

Legislation

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:

Air Navigation Act

The Air Navigation Act (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 may 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 and other areas pertaining to civil aviation.

Civil Aviation Authority of Singapore (CAAS) Act

CAAS is a statutory body established on 1 September 1984 by an Act of Parliament, i.e. the CAAS Act. 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 the airport undertaking. 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.

Air Navigation Order

The Air Navigation Order (ANO) is subsidiary legislation made under section 8 of the ANA and prescribes, among other things, the safety standards and recommended practices 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 CAAS with the approval of the Minister for Transport.

Air Navigation Regulations

The Air Navigation Regulations (ANR) is subsidiary legislation made under section 9 of the ANA and encapsulates Singapore's modernised aviation safety regulatory framework that better supports industry development. Singapore promulgated its first set of ANRs on aircraft operations in 2018, and is progressively developing other ANRs to eventually replace the Technical Requirements (other than those issued under Ministerial Directions). The ANRs are promulgated by CAAS with the approval of the Minister for Transport.

Air Navigation (Investigation of Accidents and Incidents) Order

The Air Navigation (Investigation of Accidents and Incidents) Order (AN(IAI)O) is subsidiary legislation made under section 60 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.

Ministerial Directions

CAAS carries out both regulatory and service provider functions (in the areas of air navigation services and training in air traffic control). To ensure clear functional separation in these areas, the Minister for Transport has given directions to CAAS as to the discharge of CAAS' regulatory and service provider functions. CAAS is required to give effect to the Ministerial Directions.

Technical Requirements

The ANO provides for the issuance of operating requirements (also known as Technical Requirements) by CAAS. Technical Requirements contain 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 airworthiness of aircraft, aerodrome operations, air navigation services provision and training, and personnel licensing and training. The list of Technical Requirements can be found in **Appendix A**.

Guidance Material

Guidance material provide detailed information on topics such as the policies and regulations issued by CAAS, 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, ANRs and the Technical

Requirements. CAAS may also accept alternative means of compliance, if they can adequately meet the equivalent level of safety required by the regulations.

Review of Legislation & Regulations

Singapore regularly reviews its aviation safety policies, legislation, regulations, guidance material and procedures, to ensure that they remain effective, relevant, and in compliance with ICAO Standards and Recommended Practices.

The CAAS Rule Development Committee (RDC) oversees the development and review of policies and rules as well as the rule development process. The rule development process may be triggered as a follow up to the introduction of new or amended ICAO Standards and Recommended Practices, changes to policies, industry feedback and new aviation developments. The RDC reviews the proposed rules and ensures that the rulemaking process, including industry consultation, is adhered to.

Compliance with Legislation & Regulations

Compliance with Singapore's aviation safety legislation and regulations by organisations and persons is crucial to effective safety management. Through regular reviews and consultations with the industry, CAAS keeps its safety regulations up to date and relevant.

In the event of non-compliance, CAAS' primary focus, as articulated in its enforcement policy, is to address the root cause of the non-compliance, and bring the individual or organisation back to compliance. Where necessary, CAAS will take immediate safety actions to address any imminent safety risk.

CAAS, guided by Singapore's Safety Policy, is committed to fostering a positive safety culture in the aviation community. CAAS strives to create an environment of openness, fairness and trust in which organisations and individuals 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, are not tolerated.

When considering whether enforcement action should be taken, CAAS takes into account: (a) type, counts and duration of contravention; (b) circumstances of the contravention; (c) adverse effect on aviation safety; (d) aggravating and mitigating considerations; (e) potential efficacy of proposed actions; (f) totality and parity principles. Where warranted, CAAS may take enforcement action, ranging from administrative action to prosecution, on the holder of its certificates, licences or approvals.

Policies and Procedures

CAAS has put in place internal policies and procedures on safety oversight, safety management and other areas. They cover functional areas such as rule development, grant of licences/certificates/approvals, delegation of powers to inspectors and enforcement personnel, surveillance, investigation and enforcement. They also provide guidance on governance matters such as personal conduct, training and capability building matters as well as administrative matters such as the management of State Letters issued by ICAO. TSIB similarly has policies and procedures for the investigation of aircraft accidents and incidents. They include notification of occurrences, powers of investigators, issuance of safety recommendations, and publications of reports.

CAAS and TSIB have established mutually agreed policies and procedures to coordinate their work and resources, and to strengthen the interfaces between the two agencies, with a view to ensuring clarity of roles in the implementation of the SSP.

3. State Safety Agencies and Resources

Several government agencies viz. Ministry of Transport (MOT), CAAS and TSIB, are established, appropriately staffed and funded to carry out their respective functions to ensure aviation safety.

Civil Aviation Authority of Singapore

The Civil Aviation Authority of Singapore (CAAS) is a statutory body under the MOT and its responsibilities are defined in the CAAS Act. The CAAS Act provides for the appointment of the CAAS Chairman and Authority members. The CAAS regulates and promotes safety and security in civil aviation, and facilitates the development of civil aviation capabilities, skills and services in Singapore.

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 and exercise safety regulatory oversight over civil aviation operations in Singapore and the operation of Singapore aircraft outside Singapore;
- (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 areas 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) to cooperate with Transport Safety Investigation Bureau (TSIB) in relation to investigations under Part 2A of the Air Navigation Act 1966;
- (f) act internationally as the national authority representing Singapore on civil aviation matters;
- (g) encourage, promote, facilitate and assist in the development and improvement of civil aviation capabilities, skills and services in Singapore;
- (h) discharge or facilitate the discharge of the international obligations of the Singapore Government as a Contracting State of the Chicago Convention or otherwise in respect of civil aviation;

- (i) collaborate or enter into agreements and arrangements with organisations in respect of any matter relating to civil aviation matter and any other matter as CAAS thinks expedient;
- (j) foster appropriate education and provide training and training facilities in respect of any matter relating to civil aviation;
- (k) advise the Singapore Government on all matters relating to civil aviation;
- (l) promote understanding of civil aviation policies and programmes; and
- (m) carry out such other functions and duties as are conferred or imposed by the CAAS Act or any other written law.

The Minister for Transport has designated CAAS, through a letter dated 21 March 2017, as the organisation responsible for the administration and coordination of the implementation, operation and maintenance of Singapore State Safety Programme, with the Director-General of Civil Aviation (DGCA), as the office-holder accountable for discharging this responsibility.

Safety Regulation Group (SRG)

The Safety Regulation Group (SRG) of CAAS, is the main group responsible for CAAS' performance of its safety regulatory oversight responsibilities which include development and review of aviation safety policies, licensing and certification of individuals and organisations in the aviation system, safety surveillance and enforcement, and safety promotion. More details of the SRG can be found in **Appendix B**.

Unmanned Systems Group (USG)

The Unmanned Systems Group (USG) of CAAS is responsible for the safety oversight of unmanned aircraft systems (UAS) and operations in Singapore. The USG formulates policies and regulatory framework to regulate UAS, conducts surveillance and enforcement over UAS activities in Singapore; and communicates regularly to the industry and the public on UAS matters.

Air Navigation Services Airspace Policy Division (ASP)

The Air Navigation Services Airspace Policy (ASP) Division is responsible for the development and the implementation and review of national and international airspace policies. Its responsibilities include safeguarding aircraft operations against hazards posed to safety of air navigation and ensuring the safety and optimal operation of aerial activities in Singapore.

Transport Safety Investigation Bureau

The Transport Safety Investigation Bureau (TSIB) a division of the MOT, is the investigation authority for air, marine and rail accidents and incidents in Singapore. Its mission is to promote transport safety through the conduct of independent investigations into air, marine and rail accidents and incidents. It conducts air safety investigations in accordance with Part 2A of the ANA, the Air Navigation (Investigation of Accidents and Incidents) Order 2003 and Annex 13 to the Chicago Convention.

The sole objective of TSIB's investigations is the prevention of aviation accidents and incidents. It is not the purpose of the investigations to apportion blame or liability.

TSIB's functions pertaining to aircraft accidents and incidents, which are set out in Part 2A of the ANA, include the following:

- (a) carry out investigation into any accidents or serious incidents that have occurred in Singapore;
- (b) carry out investigation into any accidents or serious incidents outside Singapore, that involve 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;
- (c) carry out investigation into incidents from which air safety lessons may be derived;
- (d) make public all final reports of investigations carried out by TSIB; and
- (e) carry out any other function / duty imposed by the ANA or any other written law.

Ministry of Transport

The Ministry of Transport (MOT) is the parent ministry of CAAS and TSIB. 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 for Transport has been charged under the Constitution of the Republic of Singapore with the responsibility for civil aviation in Singapore.

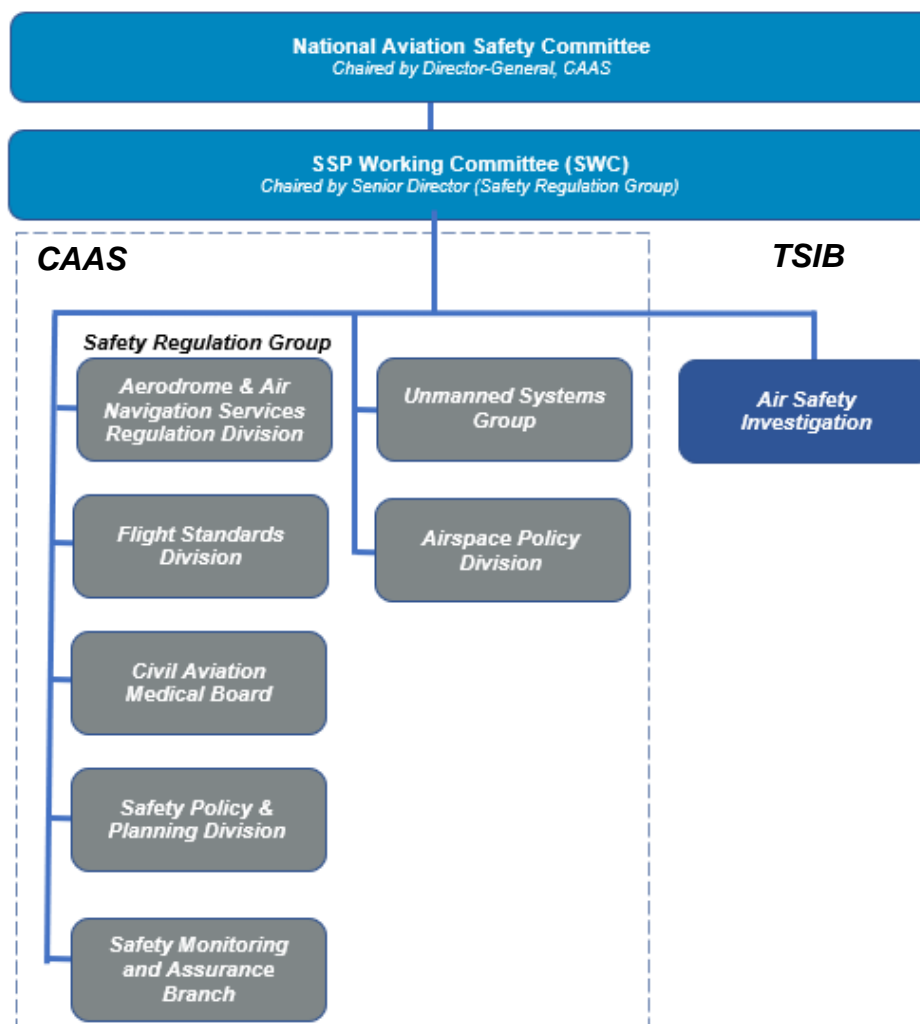
National Aviation Safety Committee

The National Aviation Safety Committee (NASC) is a national-level committee established to oversee and coordinate the implementation of the SSP. Chaired by the DGCA, the NASC comprises representatives from MOT, TSIB and relevant Groups/Divisions within CAAS involved in safety regulation. The Republic of Singapore Air Force (RSAF) participates in the NASC as an observer. The RSAF coordinates with CAAS in airspace planning and use.

The NASC reviews the safety performance and sets strategic directions for safety enhancements. It approves key changes to the SSP such as the safety policy and objectives, State-level safety risks and safety performance indicators.

Chaired by the Senior Director (SRG), the SSP Working Committee (SWC) comprises representatives from TSIB and CAAS Groups/Divisions (SRG, USG, and ASP). The SWC supports the NASC and oversees all SSP activities to ensure their effectiveness and alignment to national legislation and regulations. The SWC regularly reviews the implementation of SSP-related initiatives with its stakeholders.

Operating structure of the NASC



Coordination between CAAS and TSIB

CAAS and TSIB have signed a Memorandum of Understanding (MoU) for the coordination and collaboration in support of the SSP. Under the MoU, the two agencies have established joint procedures and areas of collaboration as follows:

Classification of occurrences

CAAS and TSIB ensure consistency in the classification of occurrences involving air operators, aircraft, the aerodrome operator and the air navigation service provider.

Sharing of safety information

CAAS and TSIB may exchange and share information to support proactive safety management at the State-level, with a view to improving aviation safety. Safety information that may be shared includes de-identified information from voluntary reporting system *Tell Sarah*, hazards that are contained in the State Hazard Register, and hazards identified during accident and incident investigations.

Issuance of safety recommendations

TSIB may issue, for CAAS' action, safety recommendations to CAAS. TSIB will also forward safety recommendations issued to CAAS by foreign investigation authorities for CAAS' actions. In addition, TSIB will inform CAAS of any safety recommendations issued to the Singapore aviation industry. Such additional information may be used to support CAAS' conduct of safety oversight.

Technical support for investigation

TSIB may request CAAS to nominate a suitable advisor with required expertise to assist in an TSIB investigation carried out in accordance with the AN(IAI)O when there is no conflict of interest to do so.

Human Resources

CAAS and TSIB are adequately staffed to carry out their functions. CAAS has over 120 staff responsible for safety oversight and safety management activities. TSIB employs 10 full-time air safety investigators and has access to other relevant technical experts when needed.

CAAS and TSIB ensure that their respective staff are equipped with the necessary skills and competencies. Both have institutionalised training frameworks to build technical and functional competencies among their staff at basic and advanced levels, covering various aviation domains.

CAAS and TSIB officers undergo training at different phases (such as during the early stage of induction when they first join the respective organisations), and specific and recurrent functional and on-the-job-training. CAAS' training framework equips relevant CAAS officers with the necessary knowledge, skills and experience to carry out their safety regulation duties effectively. The TSIB air safety investigators are also put through practical training, investigation exercises, and equipped with foundational SMS and SSP knowledge. These SMS and SSP training help investigators to investigate into the safety management related aspects of an occurrence. Training is conducted mainly at the Singapore Aviation Academy (SAA), which is the training arm of CAAS. Officers are also sent for specific training overseas when required

Financial Resources

CAAS and TSIB have the necessary financial resources to carry out their functions. Adequate financial resource allocation is part of our commitments as contained in our Safety Policy.

CAAS, as a statutory body, is self-funded from its revenue streams. CAAS' audited annual statements are contained in CAAS' Annual Reports. TSIB is funded through the MOT's budget which is approved annually as part of the Singapore Government Budget.

4. State Safety Risk Management

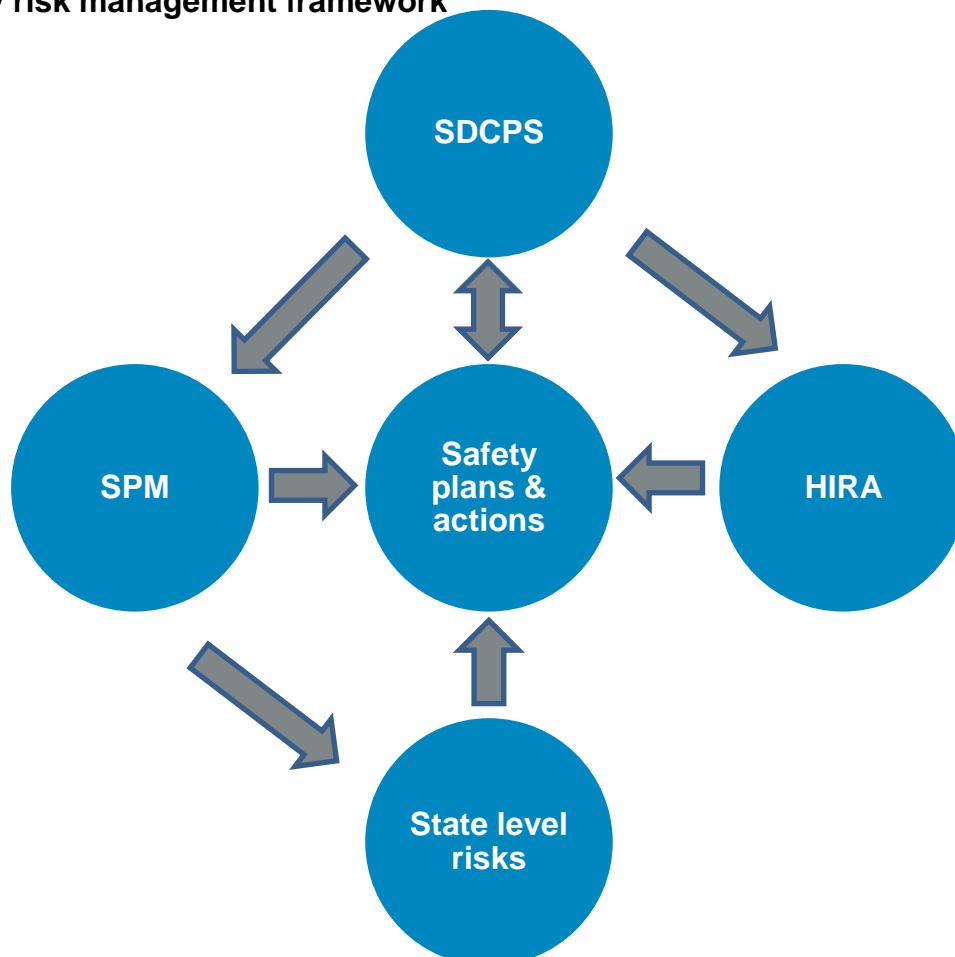
Singapore takes a systematic approach towards managing safety risks in our operating environment. Over the years, CAAS has established and are continually enhancing its mechanisms to identify, assess and mitigate safety risks. A State Safety Risk Management framework has been put in place to integrate all safety risk management activities at the State level.

State Safety Risk Management Framework

The State Safety Risk Management Framework includes the following: -

- (a) Determination of State-level risks;
- (b) Safety performance monitoring (SPM);
- (c) Hazard identification and risk assessment (HIRA);
- (d) Development of safety plans and actions;
- (e) Safety data collection and processing systems (SDCPS).

State safety risk management framework



Determination of State-level risks

In Singapore's context, a State-level risk is one that may result in significant detrimental consequences to the aviation system if not sufficiently mitigated. In its determination of State-level risks, Singapore takes into account:

- (a) global and regional benchmarking, including from the ICAO Global Aviation Safety Plan and the Asia Pacific Regional Aviation Safety Plan;
- (b) global or regional developments;
- (c) international organisations' aviation safety research and studies;
- (d) safety performance, data and trends, including data from safety reporting systems and surveillance activities;
- (e) outcomes of investigations into safety occurrences;
- (f) hazard identification and risk mitigation activities;
- (g) service providers' safety data and analysis.

Safety Performance Monitoring

Singapore monitors and tracks the safety performance of its aviation activities through a set of safety performance indicators (SPI). The SPIs are reviewed regularly, and revised as necessary, to ensure their relevance to the current operating environment and to the State safety objectives. The SPIs are also used to assess whether the risk controls are effective in addressing the safety risks identified. A mix of leading and lagging safety indicators have been chosen so as to provide a balanced view of our safety performance.

Singapore determines the SPIs to be monitored through an iterative process based on the following considerations:

- (a) applicability to the operations in Singapore and the operations of entities approved by CAAS outside of Singapore,
- (b) relevance to State safety objectives;
- (c) relevance to identified State-level risks;
- (d) availability of data and reliability of its measurements; and
- (e) appropriately specific and quantifiable.

Safety targets are set where necessary to maintain safety performance, or to drive improvements in safety performance. Safety triggers to alert of adverse safety trends are also set. In setting safety performance targets, CAAS takes into consideration factors such as the prevailing level of safety risks, the historical performance of the SPI (where data is available), and benchmarking. The setting of a safety trigger is based on a methodology that takes into account the standard deviation from the monthly moving average over a monitoring period.

The NASC approves and periodically reviews these indicators. The SWC monitors the performance of these indicators via a Safety Performance Dashboard and initiates appropriate interventions. Safety performance is also reported to the NASC. Supporting these safety indicators are safety data and information that are collected through the various safety data collection and processing systems.

Hazard Identification and Risk Assessment

CAAS has a hazard identification and risk assessment framework to facilitate a more systematic analysis and management of the hazards and safety risks within Singapore's aviation environment. This framework includes:

- (a) identification of hazards;
- (b) recording of the hazards in the State Hazard Register;
- (c) analysis of the potential consequence(s) of these hazards;
- (d) determination of the existing defences to prevent or mitigate the consequence(s) contributed by the hazards;
- (e) assessment of new defences to prevent or mitigate the consequence(s) contributed by the hazards;
- (f) determination of the risks associated with the consequence(s); and
- (g) conduct of a safety risk management (SRM) exercise where required.

Safety Data and Information from Accident, Incident and Safety Investigations

TSIB's investigations are independent and separate from judicial or administrative proceedings. Through its 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.

CAAS also conducts investigations of occurrences. Such investigations aim to expeditiously determine safety gaps to prevent recurrence, to determine whether enforcement action should be taken where there is a contravention of legislation and regulations, and to identify improvement areas in the safety regulations and oversight processes.

CAAS and service providers may receive safety recommendations from investigation authorities arising from the accident and incident investigations. Where these safety recommendations are adopted and implemented by CAAS or service providers, CAAS monitors the implementation of the safety recommendation(s).

Mandatory Safety Reporting

The Singapore Aviation Accidents / Incidents Reporting System (SAIRS) provides the platform for persons to make reports to CAAS on safety matters in accordance with section 29 of the ANA. In this regard, the ANO, ANRs and the Technical Requirements specify the mandatory reportable occurrences and events and the processes for reporting. While potential safety deficiencies or hazards are not required to be reported in a mandatory safety report, CAAS encourages the reporting of potential safety deficiencies or hazards that could affect aviation safety through the SAIRS as well.

Voluntary Safety Reporting

CAAS has appointed a third-party organisation independent of CAAS and TSIB to administer “*Tell Sarah*”, Singapore’s voluntary reporting system. *Tell Sarah* aims to enhance aviation safety through the collection of voluntary feedback on aviation hazards and safety deficiencies. The sources of voluntarily provided information are protected by the ANA and through de-identification by the third-party organisation.

Tell Sarah does not eliminate the requirement for mandatory reporting of aircraft accidents and incidents to CAAS and TSIB under the ANA and other relevant authorities under the existing law.

To better identify safety risks and hazards in aircraft and aerodrome operations, CAAS has entered Memoranda of Understanding with Singapore air operators and the aerodrome operator on the sharing of safety information from their voluntary reporting systems. In line with safety information protection principles, such safety information shared by the service providers is to be used solely for improving aviation safety.

Other sources of Safety Data and Information

Besides collecting data and information through the SAIRS and *Tell Sarah*, CAAS collects data and information from its surveillance activities, de-identified information provided by TSIB and other sources. CAAS analyses these data and information for the purposes of improving safety. Hazard identification and risk assessment are carried out for significant events and as required for safety risk management.

Protection of Safety Data and Safety Information

Singapore has developed appropriate safety information protection policies to ensure the continued availability of safety information that is voluntarily reported. These policies are aligned with the safety information protection principles in Annex 19 to the Chicago Convention. They aim to safeguard safety information and their sources, build trust and promote information sharing, and encourage active sharing of safety issues without fear of punitive consequences.

Records of accident and incident investigations conducted under Annex 13 to the Chicago Convention are accorded the necessary protection under section 59 of the ANA. Safety information that is essential to safety management is accorded the appropriate protection under Division 6 of the ANA.

Safety Oversight of Service Providers

Under Singapore's safety oversight system, CAAS ensures ongoing compliance with regulatory requirements by service providers through surveillance activities such as audits, inspections, and onsite/offsite checks. These activities are carried out on a continuous monitoring basis, using a data-driven, risk-based approach to place priority on areas of greater safety concern or need.

Non-compliances or deficiencies may be identified during surveillance activities. When identified, the service provider concerned is required to take appropriate corrective actions within a stipulated timeframe. Where safety risk is assessed to be imminent, immediate enforcement actions such as suspension or imposing conditions on activities may be taken.

SMS Implementation

CAAS requires the following service providers to implement a safety management system (SMS):

- (a) Singapore air operators;
- (b) Approved maintenance organisations;
- (c) Aviation training organisations (ATOs) 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;
- (g) Aerial work operators; and
- (h) General aviation operators of large/ turbo-jet aeroplanes and helicopters; or corporate aviation operations.

Service providers are required to implement an SMS, in compliance with the Singapore Air Navigation Regulations or the CAAS Technical Requirements. The list of relevant requirements and guidance material is shown below:

Service Provider	SMS Requirements found in	Guidance Material
Air operator holding an AOC	ANR-119	AC 1-3 AC 119-2-2 AC 119-2-4
Approved maintenance organisation (AMO)	SAR-145	AC 1-3
Aerodrome operator	MOAS	AC 1-3
Air navigation services (ANS) provider	MOS – ATS, MOS- ATE and MOS- AIS	AC 1-3, ATS Safety Publications, ATS Information Circulars
Aviation training organisation (ATO)	SASP Part 10	AC 1-3
Aerial work operator	ANR-137	AC 1-3
International general aviation operators	ANR-125	AC 1-3

Service Provider	SMS Requirements found in	Guidance Material
Aeronautical meteorological service provider	MOS –MET(IAN)	AC 1-3, ATS Safety Publications

CAAS uses a standardised performance-based methodology to evaluate the maturity level of SMS implementation by service providers. Furthermore, CAAS works with service providers to continually improve the effectiveness of their SMS through regular engagements and assessments.

Service Provider’s Safety Performance

Service providers are to define safety performance measurements as part of their SMS performance monitoring mechanism. These 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, the state-level safety risks and operational safety risks faced. The service providers also review their safety performance measurements regularly in consultation with CAAS safety inspectors to ensure that they remain relevant, are aligned with their safety objectives, and address prevailing hazards and risks.

5. Safety Assurance

To assure that Singapore's safety processes and safety risk controls are effective, and in line with its safety objectives, CAAS has put in place appropriate monitoring mechanisms. These mechanisms include having safety indicators to monitor safety performance, conducting surveillance activities to ensure service providers meet safety standards, and carrying out regular external audits on its safety oversight and investigation systems.

Safety Performance Monitoring

CAAS establishes, regularly reviews and revises where necessary safety performance indicators as described in Chapter 4 (*Safety Performance Monitoring*). These safety performance indicators include accidents, serious incidents and other occurrences in each sector of Singapore's aviation operations, namely, air navigation services, aerodrome operations, flight operations); and process indicators on State safety oversight responsibilities including safety oversight, rulemaking and enforcement. Based on the targets and safety triggers designed for these indicators, CAAS develops follow-up actions, including rules amendments, focused surveillance activities, or increased stakeholder engagements, to address safety issues in a timely manner.

Data-driven Safety Oversight

CAAS prioritises its surveillance activities, so that resources are deployed in areas that require greater focus. To this end, CAAS has taken a risk-based approach for the planning of surveillance activities.

CAAS adjusts the scope, depth and/or frequency of its surveillance activities based on each operator's or service provider's risk profile. The risk profiling takes into consideration factors such as the operator's or 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 any significant safety issues.

Quality Assurance on Singapore's Safety Oversight System

Singapore is committed to fulfilling its ICAO USOAP CMA obligations. The State Aviation Activity Questionnaire, compliance checklists for the safety-related Annexes, and corrective action plans are updated in the ICAO USOAP Online Framework. In addition to the regular conduct of self-assessments, the quality and 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.

6. Safety Promotion

Singapore is committed to actively engage and collaborate with its industry on safety matters via various safety promotion efforts, in line with the Safety Policy. CAAS and TSIB carry out a series of activities to communicate safety information, to encourage dialogue with the aviation industry and the public, and to foster a positive safety culture.

Internal Communication and Dissemination of Safety Information

The NASC and the SWC meet regularly to discuss, coordinate and disseminate relevant safety policies and safety information. In addition, the CAAS and TSIB communicate and regularly exchange relevant safety information.

CAAS holds regular internal meetings and engagement sessions, providing opportunities for senior management to engage staff or for staff to exchange information amongst themselves on aviation safety issues, ranging from international developments, work plans, culture, to training. Safety inspectors are encouraged to share and exchange their experience on topical issues. TSIB investigators are also invited to such sharing sessions.

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.

External Communication and Dissemination of Safety Information

CAAS holds regular meetings and engagements with its service providers to discuss aviation safety issues as well as exchange information on new developments in our aviation environment.

CAAS has various engagement platforms such as the Aviation Safety Forums and CAAS Safety Series to keep the aviation industry up-to-date on developments in safety policies and regulations. The TSIB organises conferences and seminars to discuss issues relating to the organisation, infrastructure and management of accident and incident investigation as well as disseminates safety lessons learnt from foreign investigations which are appropriate to the local aviation industry. Engagement tools such as webinars, social media, and surveys are used to engage and seek inputs on safety matters such as safety culture and unmanned aircraft. In addition, CAAS continues to maintain its traditional outreach platforms, such as through 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.

Both CAAS and TSIB maintain their corporate websites, sharing up-to-date information such as changes to requirements and investigation reports. As part of its safety promotion efforts, the CAAS SRG and TSIB work with the Singapore Aviation Academy (SAA) to curate and conduct aviation safety courses on topics such as SMS and SSP implementation, to cater to a wide range of participants, from industry to regulators, at various levels. Many of the SAA programmes are developed in line with ICAO Standards and Recommended Practices to equip course participants to perform their regulatory, operational and safety duties.

The TSIB collaborates with the SAA to conduct accident and incident investigation training, as well as to host international and regional fora, conferences and workshops in investigation for counterparts in Asia-Pacific States. The TSIB also conducts joint exercises with the police and fire fighters to enhance response coordination by streamlining respective agencies' procedures.

Appendix A: Reference Documents

Singapore Legislation and Technical Requirements

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

- Air Navigation Act (ANA)
- Civil Aviation Authority of Singapore Act (CAAS Act)
- Air Navigation (Voluntary Reporting) Rules
- Air Navigation Order (ANO)
- Air Navigation (Investigation of Accidents and Incidents) Order

Aircraft Operations

- Air Navigation (91 – General Operating Rules) Regulations
- Air Navigation (98 – Special Operations) Regulations
- Air Navigation (99 – Breath Testing for Alcohol) Regulations
- Air Navigation (119 – Air Operator Certification) Regulations
- Air Navigation (121 – Commercial Air Transport by Large Aeroplanes) Regulations
- Air Navigation (125 – Complex General Aviation) Regulations
- Air Navigation (135 – Commercial Air Transport by Helicopters and Small Aeroplanes) Regulations
- Air Navigation (137 – Aerial Work) Regulations

Unmanned Aircraft Operations

- Air Navigation (101 – Unmanned Aircraft Operations) Regulations

(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 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 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/Directives

Aerodromes

- Manual of Aerodrome Standards (MOAS)
- Manual of Standards - Aerodrome Rescue and Fire Fighting Training (MOS – ARFFT)

Air Navigation Services

- Manual of Standards
 - Air Traffic Services (MOS – ATS)
 - Aeronautical Telecommunication (MOS – AT)
 - Aeronautical Information Services (MOS – AIS)
 - Instrument Flight Procedure Design (IFPD)
 - 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)

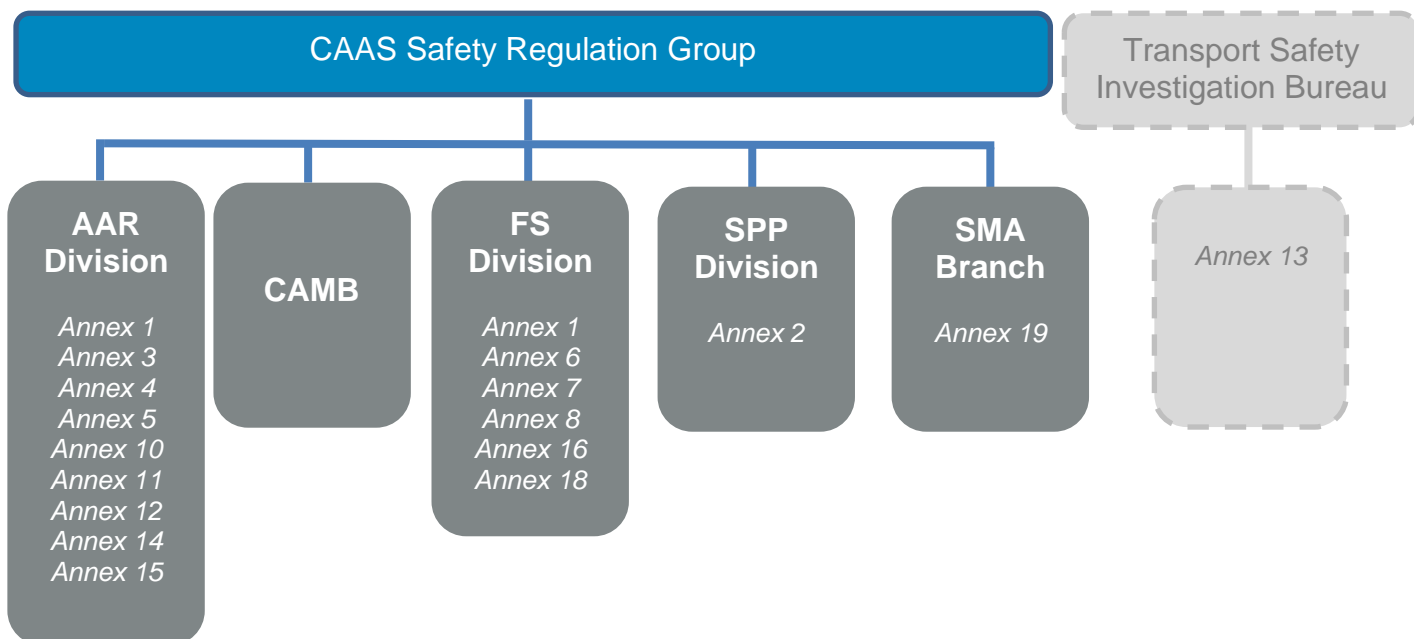
Guidance Material

(Available on the CAAS website)

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

Appendix B: Organisational structure of the Safety Regulation Group in CAAS

To ensure aviation safety oversight in personnel licensing and training; aircraft operations; airworthiness of aircraft; air navigation services; and aerodrome and ground aids, the Safety Regulation Group (SRG) in the CAAS is organised into 4 Divisions and a Branch with the following key areas of responsibilities:



Aerodrome and Air Navigation Services Regulation (AAR) Division

The Aerodrome and Air Navigation Services Regulation (AAR) Division is responsible for the safety oversight of the aerodrome operator, air navigation service provider, aeronautical meteorological services provider, the licensing of air traffic controllers, provision of ATC and aerodrome rescue and firefighting (ARFF) training, as well as the development and implementation of regulations for aerodrome operations, air traffic services (ATS), and ATC and ARFF training organisations.

AAR Division ensures compliance with the following Annexes to the Chicago Convention:

- Annex 1: Personnel Licensing (with respect to air traffic controllers)
- 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

Civil Aviation Medical Board (CAMB)

The Civil Aviation Medical Board (CAMB) is responsible for the 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.

Flight Standards (FS) Division

Flight Standards (FS) Division is responsible for the safety oversight, and the development and implementation of regulations relating to:

- operations of Singapore air operators
- initial airworthiness of Singapore-registered aircraft
- continuing airworthiness of Singapore-registered aircraft
- maintenance organisations
- design and production organisations
- aeronautical product designs
- general aviation aircraft and operations
- qualification of flight simulation training devices
- carriage of dangerous goods

- operations of foreign operators into and out of Singapore
- licensing of flight crew and aircraft maintenance engineers

FS Division ensures compliance with relevant Annexes to the Chicago Convention:

- Annex 1: Personnel Licensing (flight crew and aircraft maintenance personnel)
- Annex 6: Operation of Aircraft
- Annex 7: Aircraft Nationality and Registration Marks
- Annex 8: Airworthiness of Aircraft
- Annex 16: Environment Protection Volumes I, II and III
- Annex 18: Safe Transport of Dangerous Goods

Safety Policy and Planning (SPP) Division

The Safety Policy and Planning (SPP) Division is responsible for formulating and coordinating SRG's safety strategies through active identification, monitoring and analysis of safety risks, safety trends and safety indicators; and for coordinating and driving SRG's safety promotion efforts.

The SPP Division ensures compliance with Annex 2: Rules of the Air of the Chicago Convention.

Safety Monitoring and Assurance Branch (SMA Branch)

The Safety Monitoring and Assurance Branch (SMA Branch) is responsible for coordinating within CAAS and with external stakeholders on ICAO USOAP matters; and for implementing a quality assurance system on SRG's internal processes.

The SMA Branch is the secretariat to the National Aviation Safety Committee (NASC) and the SSP Working Committee (SWC).

Appendix C: Acronyms/ Abbreviations

AAR	Aerodrome and Air Navigation Services Regulation
AC	Advisory Circular
AIS	Aeronautical Information Service
AMC	Acceptable Means of Compliance
AMO	Approved Maintenance Organisation
AN(IAI)O	Air Navigation (Investigation of Accidents and Incidents) Order
ANA	Air Navigation Act 1966
ANO	Air Navigation Order
ANR	Air Navigation Regulations
ANS	Air Navigation Services
ATO	Aviation Training Organisation
ATS	Air Traffic Services
CAAS	Civil Aviation Authority of Singapore
CAAS Act	Civil Aviation Authority of Singapore Act
CAMB	Civil Aviation Medical Board
CMA	Continuous Monitoring Approach
DGCA	Asia and Pacific Directors-General of Civil Aviation
DME	Designated Medical Examiner
FIR	Flight Information Region
FS	Flight Standards
ICAO	International Civil Aviation Organization
IFP	Instrument Flight Procedure
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
RDC	Rule Development Committee
SAA	Singapore Aviation Academy
SAIRS	Singapore Aviation Accidents/Incidents Reporting System
SAR	Singapore Airworthiness Requirement; or Search and Rescue
SARP	Standard and Recommended Practice

SASP	Singapore Air Safety Publication
SDCPS	Safety Data Collection and Processing Systems
SMS	Safety Management System
SPI	Safety Performance Indicator
SPP	Safety Policy and Planning
SRG	Safety Regulation Group
SSP	State Safety Programme
TSIB	Transport Safety Investigation Bureau of Singapore
USG	Unmanned Systems Group
USOAP	Universal Safety Oversight Audit Programme