International Civil Aviation Organization

ICAO

Tenth Meeting of the ICAO Asia/Pacific Search and Rescue Workgroup (APSAR/WG/10)

Siem Reap, Cambodia, 27 – 30 May 2025

Agenda Item 5: Asia/Pacific Regional SAR Plan

UPDATE OF THE ASIA/PACIFIC SEARCH AND RESCUE (SAR) PLAN

(Presented by Australia)

SUMMARY
This paper presents the outcomes of work conducted by a small intersessional group tasked by APSAR/WG/9 to review the Asia/Pacific SAR Plan and develop proposed amendments for the update of this Plan.

1.   INTRODUCTION

1.1   As a subsidiary plan of the Asia/Pacific Seamless Air Navigation Service (ANS) Plan, the Asia/Pacific SAR Plan is due to be reviewed and updated in 2025. APSAR/WG/9 agreed to a new task and the formation of a small intersessional group to review the Asia/Pacific SAR Plan Version 4.0 and to prepare proposed updates for discussion by APSAR/WG/10.

1.2   A small intersessional group consisting of Australia, New Zealand, United States and ICAO Regional Office reviewed the ICAO Asia/Pacific SAR Plan and developed proposed amendments for APSAR/WG/10 consideration. **Attachment A** contains a clean Version 5 of the proposed updated Asia/Pacific SAR Plan and **Attachment B** contains the proposed updates to the current Version 4 of the Asia/Pacific SAR Plan with proposed amendments highlighted by use of grey shading for proposed inclusions and proposed deletions struck out.

2.   DISCUSSION

2.1   Attachments A and B contain numerous proposed amendments for the consideration of the APSAR Workgroup, including suggested updates to accommodate developments and changes related to the global SAR system of relevance to the Asia/Pacific and several minor editorial amendments to improve the quality of the plan's content and to clarify some aspects. Below is a summary of the main amendments proposed.

Summary of Main Amendments Proposed

2.2   EXECUTIVE SUMMARY. Updates regarding aviation and maritime industry growth trends.

2.3   ABBREVIATIONS AND ACRONYMS. Several amendments.

2.4   BACKGROUND INFORMATION.

a)   ICAO Global Aeronautical Distress and Safety System (GADSS). Updates regarding

recent developments and to reduce the amount of text noting that more detailed information is now available in the recently published new ICAO GADSS Manual (ICAO Doc 10165). The existing Appendix 1, Flowchart of Actions Following Activation of an ADT Device is also proposed for removal noting that this is now published in the latest edition of the International Aeronautical and Maritime SAR (IAMSAR) Manual (ICAO Doc 9731) Volume II Appendix V.

b) Cospas-Sarsat System. Updates aligned with ELT(DT) implementation.

c) ICAO Annexes and Documents. Addition of relevant document references.

2.5 CURRENT SITUATION.

a) Asia/Pacific SAR Analysis. Updated results from the latest Universal Safety Oversight Audit Programme, Regional SAR Implementation Performance (per the Asia/Pacific SAR Plan), and updates on Global and Regional SAR Issues

2.6 PERFORMANCE IMPROVEMENT PLAN.

a) *Legal Framework and Structure Planning*. Deletion of Convention on the High Seas, 1958 and United Nations Convention on the Law of the Sea 1982 which are not directly applicable for SAR and are not referenced in Annex 12. Also, the Foreward to each volume of the IAMSAR Manual only references the Convention on International Civil Aviation, 1944, International Convention on Maritime Search and Rescue, 1979, and International Convention for the Safety of Life at Sea, 1974.

b) *SAR Standards and Procedures*.

   i. Improved text regarding aerodrome emergency plan arrangements between SAR authorities and aerodrome operators to better reflect Standards and Recommended Practices of Annex 12, 4.2.5, Annex 14, 9.1.4 and 17.1.2, and ICAO Airport services manual Part 1 (Doc 9137), 13.1.2.

   ii. Improved text regarding pre-arranged procedures for cross-border SAR responses for entry into the territory of another State.

   iii. Deletion of program for regular SAREX because there is a separate SAREX section in the later SAR Improvement section.

   iv. Improved text regarding SAR Operations Plans to include air, maritime, land or other SAR support capability beyond only overwater rotary wing or sea plane capability.

c) *SAR Facilities and Resources*.

   i. Some additions and qualifying text regarding RCC facilities.

   ii. Improved text regarding Search and Rescue Units and where to find guidance material on SRU capability needs.

   iii. Additions regarding distress beacons including coordination of alerts near SAR Region boundaries, addition of ELT(DT)s into the SAR environment, and education programmes including better detail on promotion of correct distress beacon use, handling, storage, registration and disposal, as well as the need to focus on minimization of false alerts.

d) *Search and Rescue Exercises (SAREX)*. Addition of text duplicated in 7.2 e) of the current plan version plus expansion on SAREX types which should be developed for added flexibility and which is more practicable to achieve for States.

e) *SAR Quality Assurance*. Update to *Note 2* to include the link between Annex 19 and the ICAO Safety Oversight Manual (Doc 9734) and the amendment to Doc 9734 which removed the previous reference to SAR services provided under the authority of an ATS provider.

f) *SAR Management Review*. Addition to *Note 1* to add reference to the ICAO Electronic Filing of Differences module in the ICAO Online Framework application that States use to indicate compliance with ICAO Annex 12.

2.7 EMERGING ISSUES AND FUTURE DEVELOPMENTS.

a) Planning for the Future. Some other suggested emerging matters added.

2.8 MILESTONES, TIMELINES, PRIORITIES AND ACTIONS.

a) Actions. Amendment to clearly state the requirement for States to submit their implementation status (self-assessment) pertaining to the Asia/Pacific SAR Plan to the ICAO Asia/Pacific Regional Office by February 28 every year.

2.9 APPENDIX 1: FLOWCHART OF ACTIONS FOLLOWING ACTIVATION OF AN ADT DEVICE.

a) Deletion recommended per suggestion in paragraph 2.4 a) above.

2.10 APPENDIX 2: BENEFITS TO THE SAR SYSTEM OF STATES ASSISTING OTHER STATES.

a) Consequential change made to the appendix number, now designated as APPENDIX 1 [refer paragraph 2.9 a) above].

2.11 APPENDIX 3: SAMPLE MOU BETWEEN THE SAR SERVICE AND THE ACCIDENT INVESTIGATION AUTHORITY.

a) Deletion recommended as this is now published in IAMSAR Manual Volume I Appendix P.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper;

b) consider and discuss the proposed amendments to the current Version 4 of the ICAO Asia/Pacific SAR Plan as outlined in **Attachments A** and **B**;

c) suggest and discuss any additional amendments or any modifications to the proposed amendments;

d) agree to the proposed amendments, modified as appropriate with any additional proposed amendments, to enable the ICAO Asia/Pacific SAR Plan to be finalized as Version 5;

e) agree to **Draft Conclusion APSAR/WG/10-X: Revised Asia/Pacific SAR Plan**; and

f) Discuss any other matters as appropriate.

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Draft Conclusion APSAR/WG/10-X: Revised Asia/Pacific SAR Plan	
What: That, 1. the revised Asia/Pacific SAR Plan at **Appendix X** to the Report be adopted, and uploaded to the ICAO Asia/Pacific Regional Office eDocuments webpage to replace the existing version; and 2. States are urged to update their national SAR Plans to align with the revised Asia/Pacific SAR Plan.	Expected impact: ☐ Political / Global ☐ Inter-regional ☐ Economic ☐ Environmental ☒ Ops/Technical
Why: To conduct the triennial review of the Asia/Pacific SAR Plan.	Follow-up: ☒Required from States
When: 30-May-25	Status: Draft to be adopted by Subgroup
Who: ☒Sub groups ☐APAC States ☐ICAO APAC RO ☐ICAO HQ ☐Other:	

INTERNATIONAL CIVIL AVIATION ORGANIZATION

ASIA/PACIFIC SEARCH AND RESCUE (SAR) PLAN

Version 5.0 May 2025

This Plan was developed by the Asia/Pacific Search and Rescue Task Force (APSAR/TF) and updated by Asia/Pacific Search and Rescue Work Group (APSAR/WG)

Approved by ATM/SG/13 and published by the
ICAO Asia and Pacific Office, Bangkok

CONTENTS

SCOPE OF THE PLAN

Plan Structure

1.1   The Asia/Pacific Search and Rescue (SAR) Plan (hereinafter referred to as the 'Plan') references different levels. At the higher level are global requirements established by the ICAO Annex 12 to the ICAO Convention on International Civil Aviation (ICAO Doc 7300). Global guidance material is provided by the International Maritime Organization (IMO) and ICAO's joint publication, the International Aeronautical and Maritime Search and Rescue (IAMSAR) Manual. Beneath this is regional planning guidance primarily provided by this Plan and other regional guidance material, in order to enable States to define the goals and means of meeting objectives for State planning towards improving State SAR System capability, such as the performance objectives of Asia/Pacific Regional Air Navigation Plan (ANP) and Asia/Pacific Seamless Air Navigation Services (ANS) Plan.

1.2   The global air navigation perspective is guided mainly by the *Global Air Navigation Plan* (GANP, ICAO Doc 9750), the *Global ATM Operational Concept* (ICAO Doc 9854) and the *Global Aviation Safety Plan* (GASP).

1.3   The scope of the Plan is the identification of:

- the current status of SAR preparedness of Asia/Pacific States and State SAR arrangements; and

- recommendations for SAR planning and preparedness enhancements, in terms of compliance with Annex 12 of the ICAO Convention, IAMSAR Manual guidance, and accepted best international practice.

1.4   References in the Plan to 'States' are intended to include Special Administrative Regions and territories.

Plan Review

1.5   As an iterative process, the Plan requires regular updating to keep current with changes in ICAO Annexes and guidance material, outcomes from the ICAO/IMO Joint Working Group on the Harmonisation of Aeronautical and Maritime Search and Rescue (JWG-SAR), the IAMSAR Manual, regional aviation activity, developments in the Air Traffic Management (ATM) system, new technology, political considerations, human performance and lessons learned from actual SAR responses. Plan updates should also focus on the SAR system being an important component of an integrated regional and global air navigation system. It is intended that Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG), and its contributory bodies conduct a complete review every three years from 2019 (or a shorter period determined by APANPIRG) of the Plan to align with the review cycle of the GANP and the IAMSAR Manual. The review should be guided by a consultative process involving States and relevant International Organizations and technical bodies.

Asia/Pacific SAR Plan V5.0

OBJECTIVES

Introduction

2.1   Asia/Pacific States that are signatories to the Chicago Convention accept the responsibility for the provision of SAR services per the requirements of ICAO Annex 12 – *Search and Rescue*. Increases in both aviation and maritime traffic throughout the Asia/Pacific Region places additional importance on the ability for States to be adequately prepared for potentially increased demand for aeronautical and maritime SAR services.

2.2   The world's citizens, who frequently fly over or sail through the Asia/Pacific, expect a timely and adequate SAR response to be provided should it be required. States in the region need to be adequately prepared for the provision of efficient and effective SAR services. To assist in achieving this, it is essential for States to cooperate, collaborate and in some cases assist with resources to neighbouring and sub-regional RCCs.

2.3   ICAO Regional Office maintains a record, as reported to ICAO by the States themselves, of the status of individual State SAR compliance against ICAO Annex 12 requirements. There are significant variations in the level of State SAR capability across the region with significant gaps requiring urgent action, especially in oceanic areas. The ICAO Universal Safety Oversight Audit Programme – Continuous Monitoring Approach (USOAP-CMA) also provides a useful tool to States to self-assess their individual SAR system status. Since the establishment of this Plan, there had already been commendable improvements to the SAR systems of some States which have contributed to building better regional SAR capability. However, there was still considerable work required to address capability gaps.

2.4   There is a high risk of negative consequences to a State which does not provide an adequate SAR response to an aircraft or vessel in distress. The primary concern is the higher probability for loss of lives which may have been saved. The ability for news to spread rapidly in today's technologically connected world also provides the opportunity for a poor or ineffective SAR response to quickly reach a global audience resulting in damage to that State's reputation internationally and potential economic loss to sensitive State industries such as tourism and transport. However, the benefits of an effective and reliable SAR service to States offers many advantages. Besides reduction of loss of life and human suffering, other advantages include the following aspects:

   a)   safer and more secure environment for aviation and maritime related industries, commerce, recreation and travel. Increased safety may promote use and enjoyment of aviation and maritime environments, tourism and economic development. This is especially true when the SAR system utilised programmes aimed at preventing or reducing the effects of mishaps, sometimes referred to as 'Preventative SAR'.

   b)   availability of SAR resources often provides the initial response and relief capabilities critical to saving lives in the early stages of natural and man-made disasters. SAR services offer an integral part of local, national and regional emergency management systems.

   c)   well performed SAR operations can provide positive publicity about situations which may otherwise be viewed negatively. This can lead to improved public confidence in that State's reputation and commitment to providing a safe environment, leading to increased confidence to conduct activities beneficial to that State's economy; and

    d)   as SAR is a relatively non-controversial and humanitarian mission, it provides an excellent opportunity to enhance cooperation and communication in general between States and organisations, not only for SAR. It can also foster better working relationships between States and organisations at the local, national and international levels, including civil/military cooperation.

2.5   In 2014 Malaysia Airlines flight MH370, a Boeing 777 with 239 persons on board, disappeared when flying from Kuala Lumpur, Malaysia to Beijing, China, and AirAsia QZ8501 was lost on a flight from Surabaya, Indonesia to Singapore. The MH370 event resulted in probably the largest and most expensive search response for a missing aircraft in human history. Together with Air France flight AF447, which crashed into the Atlantic Ocean in 2009, these tragedies highlighted vulnerabilities in the air navigation system including the SAR system, which have hampered timely identification and localization of aircraft in distress, hindering effective response efforts. ICAO is addressing these vulnerabilities through implementation of functions of the Global Aeronautical Distress and Safety System (GADSS) concept of operations; however, this new system is also dependent on improvements in global SAR capability, especially for remote and oceanic SAR response.

2.6   The Plan is designed to address both civil and military SAR authorities and has been developed in consultation with Asia/Pacific States, SAR administrations and relevant International Organizations. States should consult with stakeholders nationally, regionally and internationally as appropriate and determine actions in order to commit to achieving the objectives of this Plan in order to meet at least the minimum SAR service requirements in accordance with ICAO Annex 12. It is noted that where a State is unable to meet minimum SAR Standards and Recommended Practices (SARPs) of ICAO Annex 12, Article 38 to the ICAO Convention requires notification to ICAO of the differences between its own practice and that established by the international standards.

2.7   It is a common practice for the military to conduct or have a major role in SAR operations to fulfil or assist in fulfilling the State's obligation to provide SAR services. From the perspective of providing SAR services, civil-military coordination takes on many forms. This includes coordination during an actual SAR response, national coordination with other agencies to determine the military role, part of an international agreement or set of procedures with a neighbouring State to assist in SAR response, or other types of coordination. The *Manual on Civil-Military Cooperation in Air Traffic Management* (ICAO Doc 10088) is focused on airspace management and includes SAR matters relevant to civil-military coordination in airspace management.

2.8   The IAMSAR Manual Volume II has guidance on multiple aircraft operations and establishing areas of SAR action to assist with the safe coordination and management of aircraft operations during SAR operations. SAR authorities should have procedures in place to rapidly notify airspace users of SAR operations and the establishment of any temporary airspace operation such as danger areas or restricted areas through appropriate State authorities. The combination of guidance in the IAMSAR Manual and ICAO Doc 10088 should enable a State to have an appropriate plan in place for civil-military coordination and cooperation in readiness for efficient and effective SAR response.

2.9   States should aim to meet their obligations progressively in a strategically structured and planned manner with improvement goals set for short-, medium- and long-term implementation. It may be more productive to make gains in small steps commencing with measures that are more easily achievable in the short term and have a minimal cost, progressing to measures which will take longer to implement over the medium to long term. Short term measures that may be implemented relatively easily include the establishment of a national SAR Committee and ensuring SAR agreements are in place with neighbouring States allowing for seamless cross-border transit of search assets engaged in SAR activity. A SAR agreement can be in the form of 'Letter of Agreement' (LOA) or a Memorandum of Understanding (MOU) or other acceptable term indicating a lower form of arrangement for operational matters between SAR service providers [such as Rescue Coordination Centres (RCCs) and/or Rescue Sub-Centres (RSCs)] or a more formal agreement for arrangements between governments concerned.

2.10   All States are encouraged to use the guidance provided within this Plan as a way forward, thus ensuring a timely, well-coordinated response to any SAR incident within their area of responsibility, or during cooperative responses involving more than one Search and Rescue Region (SRR) including overlapping aeronautical and maritime SRRs which may be the responsibility of different RCCs.

Plan Objective

2.11   The objective of this Plan is to provide a framework to assist Asia/Pacific States to meet their SAR needs and obligations accepted under the Convention on International Civil Aviation and for the harmonised and interoperable delivery of both aeronautical and maritime SAR services within the region, and across other ICAO regional boundaries, where practicable.

2.12   The Plan is to be consistent with the SARPs of ICAO Annex 12, and aligned where appropriate with the SAR technical and operational standards and guidance of the IMO.

2.13   The Plan recognizes that ICAO serves as the forum for the implementation of practical and achievable measures to improve SAR services for international civil aviation. The Plan also recognizes that the IMO provides a similar forum for SAR services to maritime shipping.

2.14   Both ICAO and IMO share the same goal of ensuring that SAR services are available globally wherever people sail or fly. The SAR services that ICAO and IMO promote are complementary and offer tangible opportunities to derive mutually beneficial efficiencies for both the aviation and maritime transportation SAR systems globally, regionally and nationally. The objective of this Plan includes encouraging States to take advantage of such efficiencies. States should, where practicable, align their SAR systems with the guidance provided by the IAMSAR Manual, which also provides the benefit for standardised SAR coordination between RCCs and across SRR lines of delineation.

2.15   State SAR plans describe how SAR services will be provided, organized and supported in order for States to meet their obligations under the relevant Conventions. Search and Rescue Coordinators (SC) and SAR managers oversee and implement these plans. National SAR plans should be signed by all Government agencies which can provide or support SAR services. These agencies should all be represented on the State's Search and Rescue Coordinating Committee (SCC), which oversees these plans.

> *Note: the SC should not be confused with the operational nature of the SAR Mission Coordinator (SMC). The primary purpose of the national SC is to enable a whole-of-government approach to make efficient and effective use of a State's capabilities for SAR.*

Asia/Pacific SAR Plan V5.0

Plan Development

2.16   The Plan was developed as part of a suite of Asia/Pacific air navigation plans, including the *Asia/Pacific Seamless ANS Plan*, the *Asia/Pacific Plan for Collaborative Aeronautical Information Management* (AIM), the *Asia/Pacific Regional Framework for Collaborative Air Traffic Flow Management* (ATFM), and the *Regional ATM Contingency Plan*, so the Plan should not be considered in isolation.

2.17   The Plan is expected to provide guidelines and recommendations for Asia/Pacific States to consider for the enhancement and improvement of national, sub-regional and regional SAR capability including:

a)   compliance with ICAO Annex 12 SARPs;

b)   identification and addressing of deficiencies in SAR capability;

c)   continuous and coherent development of SAR capability;

d)   harmonisation of aeronautical and maritime SAR services;

e)   civil/military cooperation and coordination (including SAR response, information sharing and use of airspace);

f)   remote oceanic SAR response capability [including provision for Mass Rescue Operations (MRO)];

g)   establishment and review of arrangements between neighbouring States to expeditiously facilitate SAR coordination, operations and cooperation across regional boundaries including sharing SAR resources and contingency procedures;

h)   facilitation of the implementation of SAR systems and services including the establishment of JRCCs where suitable and practicable;

i)   supporting the sharing of SAR information, data and expertise;

j)   integration with ATM systems and future ATS developments, where appropriate;

k)   monitoring of outcomes from APANPIRG Sub-Groups, other ICAO Region SAR groups, ICAO/IMO JWG-SAR and related forums for issues that may affect the Plan;

l)   facilitation of a continuous reporting mechanism of State SAR capability, ICAO Annex 12 compliance and SAR performance data to the ICAO Asia/Pacific Regional Office through the APANPIRG Air Traffic Management Sub-Group (ATM/SG);

m)   implementation of a SAR System Improvement and Assessment measures, including Safety Management System, Quality Assurance programme and risk assessment, and programs to reduce the number of SAR incidents;

n)   coordinating the introduction of new technology affecting the regional SAR system;

o)   sharing future research and development concepts;

p)   seeking efficiencies, through the coordination and facilitation of concurrent regional SAR meetings, seminars, workshops and exercises, including joint ICAO and IMO, and sub-regional forums where practicable; and

q)   conducting efficient SAR Exercises (SAREXs) that identify improvements and latent problems.

2.18   The Plan elements should be periodically reviewed by APANPIRG to ensure that they remain relevant to the SAR system, particularly for new technology developments and alignment with other relevant global and regional SAR plans and the Global Air Navigation Plan.

Asia/Pacific SAR Plan V5.0

EXECUTIVE SUMMARY

3.1   Aviation is a significant driver of economic growth and contributes strongly to the economic wellbeing of the diverse cultures and people in the Asia/Pacific Region. According to ICAO data, the global passenger traffic continued to increase in 2023 with around 4.2 billion passengers transported worldwide, up from 3.2 billion passengers in 2022. Although still slightly below pre-pandemic (2019) levels with 4.5 billion passengers having been transported worldwide, passenger traffic in 2023 increased 30 per cent from 2022. The number of flight departures for scheduled commercial operations continued to increase by approximately 13 per cent with over 35 million departures in 2023, compared to around 31 million in 2022.

3.2   For the maritime industry, the United Nations Conference on Trade and Development (UNCTAD) Review of Maritime Transport 2024 reported that a record of almost 250,000 port calls by container ships in the second half of 2023 were driven by growing trade and longer routes with Asia handling 63% of global container trade. In 2019, the region accounted for 41% of goods unloaded, and had strengthened its position as a maritime hub that brings together more than 50% of global maritime trade volumes. Before the COVID-19 pandemic, growth in the cruise ship industry together with the many other forms of maritime transport such as fishing vessels and passenger ferries created added potential demand for regional SAR services. Whilst IMO assists the Parties to the Maritime SAR Convention, particularly their implementation related to the provision of maritime SAR services, the demand for aeronautical SAR services which frequently support responses to maritime SAR incidents is also likely to rise.

3.3   Asia/Pacific States that are signatories to the Chicago Convention accept the responsibility for the provision of SAR services per the requirements of ICAO Annex 12. Increases in both aviation and maritime traffic throughout the Asia/Pacific Region places additional importance on the ability for States to be adequately prepared for potentially increased demand for aeronautical and maritime SAR services.

3.4   Considering that many of the Asia/Pacific States have the challenging responsibility for providing a SAR service over vast and remote areas, including three of the world's five oceans, the importance for States with oceanic SAR responsibility to cooperate, collaborate and share resources with their neighbouring and regional/sub-regional RCCs is essential.

3.5   High-level support might be necessary from regional bodies that can effectively support the Plan's implementation, such as the:

- Association of Southeast Asian Nations (ASEAN) and ASEAN Regional Forum (ARF);

- Asia Pacific Economic Cooperation (APEC);

- South Asian Association for Regional Cooperation (SAARC);

- Pacific Community (SPC); and

- Indian Ocean Rim Association (IORA).

  SAR System Funding

3.6   The level of funding provided for effective SAR systems is a matter of concern for all senior decision-makers. An effective SAR system helps prevent lives being lost that may have been saved which provides a persuasive argument for proper funding. The resources should be sufficient to develop and/or maintain the required SAR service per their obligations as signatories to the relevant aeronautical and maritime SAR conventions. This may require the development of business cases to governments outlining where additional funding is required.

3.7 Such business cases should include consideration of amendments to existing State SAR arrangements which may provide more efficient delivery of the SAR service by better utilisation of existing resources [for example by establishing Joint RCCs (JRCCs)], or additional funding sources where required (for example charging a levy to aircraft operators for providing the SAR service or seeking company sponsorship for SRUs). The economic value of a life saved when compared against the economic value of a life lost can also be a significant persuasive factor in any business case.

<u>Joint Rescue Coordination Centres (JRCCs)</u>

3.8 Where practicable, States are encouraged to examine the potential benefits that may be derived by the establishment of JRCCs to incorporate the aeronautical and maritime SAR activities and/or facilities of Aeronautical RCCs (ARCCs)/Aeronautical RSCs (ARSCs) and Maritime RCCs (MRCC)/Maritime RSCs (MRSCs). JRCCs have the potential to not only provide a more effective SAR service to both the aeronautical and maritime industries, but also offer potential financial efficiencies by releasing funds for improvements in other SAR areas.

> *Note 1: where JRCCs are not practicable, facilities and procedures should be developed which provide and/or enhance effective SAR coordination and collaboration between the ARCCs and MRCCs in support of each other, to provide an efficient and integrated State SAR system for both aeronautical and maritime SAR incident response.*

> *Note 2: a JRCC may be established either physically or by virtual means using the integration of communications, information and computer technology between an ARCC and an MRCC to achieve full search and rescue coordination functionality.*

3.9 Where practicable, the JRCC evaluation may consider consolidation of two or more different State RCCs into single sub-regional JRCCs.

> *Note: a single sub-regional JRCC may be established in partnership with a group of States and serve as a 24-hour nodal JRCC supported by Joint RSCs (JRSCs) of the other partner States which may not necessarily need to be staffed 24 hours but could be activated when required.*

ABBREVIATIONS AND ACRONYMS

AAM	Advanced Air Mobility
ADS-B	Automatic Dependent Surveillance-Broadcast
ADT	Autonomous Distress Tracking
AIS	Automatic Identification System
AIP	Aeronautical Information Publication
ANP	(Regional) Air Navigation Plan
ANSP	Air Navigation Service Provider
APANPIRG	Asia/Pacific Air Navigation Planning and Implementation Regional Group
APEC	Asia Pacific Economic Cooperation
APSAR/TF	Asia/Pacific SAR Task Force
APSAR/WG	Asia/Pacific SAR Workgroup
ARCC	Aeronautical Rescue Coordination Centre
ARF	ASEAN Regional Forum
ARSC	Aeronautical Rescue Sub-Centre
A/SMC	Assistant SMC
ASEAN	Association of Southeast Asian Nations
ASPOCS	Administrative Single Point of Contact for SAR
ATC	Air Traffic Control
ATFM	Air Traffic Flow Management
ATM	Air Traffic Management
ATS	Air Traffic Service
CONOPS	Concept of Operations
COSPAS-SARSAT	Cosmicheskaya Sistema Poiska Avariynyh Sudov-Search and Rescue Satellite-Aided Tracking
EI	Effective Implementation
ELT	Emergency Locator Transmitter
ELT(DT)	Emergency Locator Transmitter (Distress Tracking)
EPIRB	Emergency Position Indicating Radio Beacon
FIR	Flight Information Region
GADSS	Global Aeronautical Distress and Safety System
GANP	Global Air Navigation Plan
GASP	Global Aviation Safety Plan
GLONASS	Global Navigation Satellite System
GPS	Global Positioning System
IAMSAR	International Aeronautical and Maritime SAR (Manual)
ICAO	International Civil Aviation Organization
IMO	International Maritime Organization
IORA	Indian Ocean Rim Association
JRCC	Joint (aeronautical and maritime) Rescue Coordination Centre
JRSC	Joint Rescue Sub-Centre
JWG-SAR	ICAO/IMO Joint Working Group on the Harmonisation of Aeronautical and Maritime Search and Rescue
LADR	Location of an Aircraft in Distress Repository
LOA	Letter of Agreement
LRIT	Long Range Identification and Tracking of Ships
MCC	Mission Control Centres
MEOSAR	Medium-altitude Earth Orbit Search and Rescue
MOU	Memorandum of Understanding
MRCC	Maritime Rescue Coordination Centre
MRO	Mass Rescue Operations
MRSC	Maritime Rescue Sub-Centre
PFL	Post Flight Localization

Asia/Pacific SAR Plan V5.0

PLB	Personal Locator Beacon
PQs	Protocol Questions
PSCS	Preferred SAR Capability Specifications
RCC	Rescue Coordination Centre
SAR	Search and Rescue
SARPs	Standards and Recommended Practices
SAARC	South Asian Association for Regional Cooperation
SAREX	SAR Exercises
SC	Search and Rescue Coordinator
SCC	Search and Rescue Coordinating Committee
SMC	Search and Rescue Mission Coordinator
SMS	Safety Management System
SOLAS	International Convention for the Safety of Life at Sea
SPC	Pacific Community
SPOC	SAR Point of Contact
SRR	Search and Rescue Region
SRU	Search and Rescue Unit
SWIM	System Wide Information Management
UAS	Unmanned Aircraft System
ULB	Underwater Locating Device
UNCLOS	United Nations Convention on the Law of the Sea
USOAP-CMA	Universal Safety Oversight Audit Programme – Continuous Monitoring Approach

Asia/Pacific SAR Plan V5.0

BACKGROUND INFORMATION

Improvement Drivers

5.1   The ICAO USOAP-CMA focuses on a State's capability in providing safety oversight by assessing whether the State has effectively and consistently implemented the critical elements of a safety oversight system and determining the State's level of implementation of ICAO's safety-related SARPs, including ICAO Annex 12, and associated procedures and guidance material.

5.2   ICAO Asia/Pacific Regional Office maintains the APANPIRG Air Navigation Deficiencies Lists, including the ATM and Airspace Safety Deficiencies List where SAR-related deficiencies are recorded. This list is based on the uniform methodology for identification, assessment and reporting of such deficiencies as described in Part V of the APANPIRG Procedural Handbook. By identifying and addressing specific deficiencies, APANPIRG and its Sub-groups facilitate the development and implementation of action plans by States to resolve identified deficiencies, where necessary.

5.3   The APANPIRG Air Navigation Deficiencies information is accessible through the ICAO Secure Portal.

Asia/Pacific SAR System Monitoring

5.4   Significant ICAO Annex 12 compliance weaknesses had been identified within the Asia/Pacific Region based upon information provided by States to the ICAO Asia/Pacific Regional Office. This regional status of the SAR capability and SAR agreements as reported by States is recorded in tables made available to APANPIRG.

ICAO Global Aeronautical Distress and Safety System (GADSS)

5.5   In response to the tragedies of Malaysia Airlines flight MH370 in 2014 and Air France flight AF447 in 2009, the GADSS has been developed with the primary objective of addressing vulnerabilities in the air navigation system which had hampered the timely identification and location of aircraft in distress, particularly in remote oceanic areas, and which significantly hindered effective SAR efforts and recovery operations.

5.6   The four main functions of the GADSS are aircraft tracking, location of an aircraft in distress, Post Flight Localization (PFL) and flight recorder data recovery. These functions are enabled through GADSS information management [such as the ICAO OPS Control Directory and the Location of an Aircraft in Distress Repository (LADR)] which allows for the sharing of information and efficient communication between stakeholders.

5.7   The aircraft tracking function provides an automated position report every 15 minutes or less, which can help reduce the time to resolve the status of an aircraft or, if necessary, help locate an aircraft.

5.8   The location of aircraft in distress function uses an Autonomous Distress Tracking (ADT) system which has the capability to automatically determine and transmit the position of an aircraft with an in-flight distress condition, at least every minute, in a manner which is resilient to failures of the aircraft's electrical power, navigation and communication systems. This function is expected to significantly improve the ability for SAR services to locate such aircraft in distress and rescue survivors.

5.9   Following an aircraft accident, PFL provides accurate aircraft position information by means of an ELT and/or homing signals. To assist with localization of wreckage, this function specifies a number of requirements for ELTs and Underwater Locating Devices (ULDs). To ensure accident investigation authorities obtain timely access to flight recorder information, new types of large aircraft will be equipped with a means to recover the flight recorder data in a timely manner.

5.10   RCCs need to implement updated SAR practices and procedures for the GADSS. RCCs need to be able to respond to ADT activations, including that the aircraft could remain in flight across multiple SAR regions. RCC staff also need to be provided with training to ensure understanding of the ADT system and processes. The GADSS relies on implementation by SAR services of:

- accurate delimitation of SAR regions to ensure proper transfer of the SAR operation to the next responsible RCC;

- effective and efficient coordination, and procedures between the ATS unit and responsible RCC;

- harmonized operations between aeronautical and maritime SAR services.

5.11   ICAO has not prescribed a specific technology for ADT. One ADT technology solution now in operational use is a new Cospas-Sarsat 406 MHz beacon type, the Emergency Locator Transmitter for Distress Tracking, or ELT(DT). The Cospas-Sarsat System section below has further information on ELT(DT)s.

5.12   ADT notifications from the ELT(DT) will be delivered to RCCs by both the existing Cospas-Sarsat Data Distribution System and the ICAO LADR. RCCs and ATS units need to implement procedures that take these two delivery methods into account to ensure effective coordination aligned with ICAO Annexes 11 and 12 provisions on alerting and SAR services.

5.13   The IAMSAR Manual provides a comprehensive overview of ADT. The IAMSAR Manual Volume II Appendix V *Autonomous distress tracking of aircraft in flight* includes anticipated *flow of events arising from an ADT device activation* that serves as a flowchart of actions. Per the requirements of ICAO Annex 12, each RCC, and as appropriate, RSC is to:

- maintain up-to-date contact details in the OPS Control Directory; and

- subscribe and maintain access to the location of an aircraft in distress repository.

5.14   The *Manual on Global Aeronautical Distress and Safety System* (ICAO Doc 10165) provides guidance and information on the implementation and operation of the GADSS and is intended to facilitate the uniform application of SARPs in ICAO Annex 6 – *Operation of Aircraft*, Part I – *International Commercial Air Transport – Aeroplanes* and provisions in the *Procedures for Air Navigation Services - Aircraft Operations* (PANS-OPS, ICAO Doc 8168). Additional practical guidance is provided in the *LADR and OPS Control User Manual* developed by ICAO and EUROCONTROL which is available within the LADR application Help menu.

        Cospas-Sarsat System

5.15   The International Cospas-Sarsat System is available to maritime and aviation users and to persons in distress situations who activate a 406 MHz distress beacon. Access is provided to all States on a non-discriminatory basis and is free of charge for the end-user in distress. On average, about 7 persons are rescued every day with the assistance of Cospas-Sarsat alert and location data. The system is composed of:

- distress beacons operating at 406 MHz, with a homing signal transmitting on 121.5 MHz and/or 243.0 MHz [except ELT(DT)s which do not transmit a homing signal in-flight];

- SAR payloads on satellites in low- and mid-altitude Earth orbit, and in geostationary orbit;

- ground receiving stations (LUTs) spread around the world; and

- a network of Mission Control Centres (MCCs) to distribute distress alert and location information to SAR authorities, worldwide.

5.16   Cospas-Sarsat has been developing two major enhancements to its distress-alerting System of value to all System users, including the aviation industry. One is the introduction of in 2020, of a new space-segment architecture based primarily on Medium-altitude Earth Orbit Search and Rescue (MEOSAR) payloads aboard the European Commission's Galileo system, the Russian Federation's Global Navigation Satellite System (GLONASS) and the United States' Global Positioning System (GPS) satellites. Another potential satellite system from China, the Beidou Navigation Satellite System, could become part of the Cospas-Sarsat Space Segment.

5.17   This architecture permits determination of distress incident location (independent of any location data transmitted in the beacon message) beginning with the first burst from the distress beacon. This could mean near real-time and very frequent delivery of distress alerts.

5.18   The SAR/Galileo space segment also provides a Return Link Service (RLS) that, among other possible future uses, provides an acknowledgment from the MCC back to the beacon to confirm that the distress message has been received.

5.19   The technical specifications for the second generation 406 MHz distress beacon have been approved, including for ELTs. This new generation of beacons based on wideband spectrum technology improves speed and accuracy in locating an activated distress beacon. The period from beacon activation to first transmission is reduced from 50 seconds to three seconds. The specification considers in-flight activation of ELTs when certain flight parameters are exceeded. Consequently, false alerts will affect real SAR events significantly.

5.20   Cospas-Sarsat has introduced a new beacon type, the ELT(DT) which will activate autonomously when an aircraft exceeds certain predetermined flight parameters which, unless corrected, may result in an imminent crash. ELT(DT)s allows an aircraft in distress to be tracked in-flight, prior to any crash, without human intervention. ELT(DT)s use both the existing beacon transmission method (first-generation) and the second-generation (spread-spectrum) modulation schemes. Distress data from activated ELT(DT)s will be delivered directly to distress authorities as well as the ICAO LADR. A growing number of aeroplanes are now operating globally with ELT(DT)s fitted.

5.21   States also need to ensure the critical requirement to provide for a suitable, clear and simple means for aircraft owners to register and keep updated their 406 MHz distress beacon details.

> *Note: information regarding beacon registration can be found at: https://www.cospas-sarsat.int/en/beacons-pro/beacon-regulations-pro/ibrd-user-information-for-professionals).*

5.22   Entries in the beacon register should be available to both aeronautical and maritime RCCs on a 24-hour basis (ICAO Annex 12 refers, although ICAO Annex 10 establishes the registration requirement).

5.23   Further information for distress authorities can be found in the RCC Handbook, document C/S G.007 (https://www.cospas-sarsat.int/en/documents-pro/system-documents).

Asia/Pacific SAR Plan V5.0

ICAO Annexes and Documents

5.24   States should note that ICAO Annex 12 should be read in conjunction with elements of the following ICAO Annexes and Documents:

Annex 6 – *Operation of Aircraft*;

Annex 10 – *Aeronautical Telecommunications*;

Annex 11 – *Air Traffic Services* (particularly Chapter 5 Alerting Service)*;*

Annex 14 – *Aerodromes* (particularly aerodrome emergency planning with the RCC);

Annex 15 – *Aeronautical Information Services* (particularly Section 6.3.2 *NOTAM*);

Annex 19 – *Safety Management*;

Doc 4444 – *PANS-ATM*;

Doc 8168 – *PANS-OPS Volume III* (particularly Section 10 Flight Tracking);

Doc 9731 – *IAMSAR Manual*;

Doc 9734 – *Safety Oversight Manual*;

Doc 10066 – *PANS-AIM* (particularly Appendix 2 GEN 3.6 Search and rescue);

Doc 10088 – *Manual on Civil-Military Cooperation in Air Traffic Management*;

Doc 10165 – *Manual on Global Aeronautical Distress and Safety System*; and

Doc 10205 – *Manual on Hazards at Aircraft Accident Sites.*

Asia/Pacific SAR Plan V5.0

CURRENT SITUATION

Asia/Pacific SAR Analysis

Universal Safety Oversight Audit Programme – SAR-Related Protocol Questions

6.1 An analysis of the 16 Universal Safety Oversight Audit Programme (USOAP) SAR-related Protocol Questions (PQs) indicated that the overall Effective Implementation (EI) in the Asia/Pacific Region for SAR had risen from 52% in October 2022 to 55% in April 2025.

6.2 **Figure 1** provides the overall Asia/Pacific Region EI for individual SAR-related PQs in October 2022.
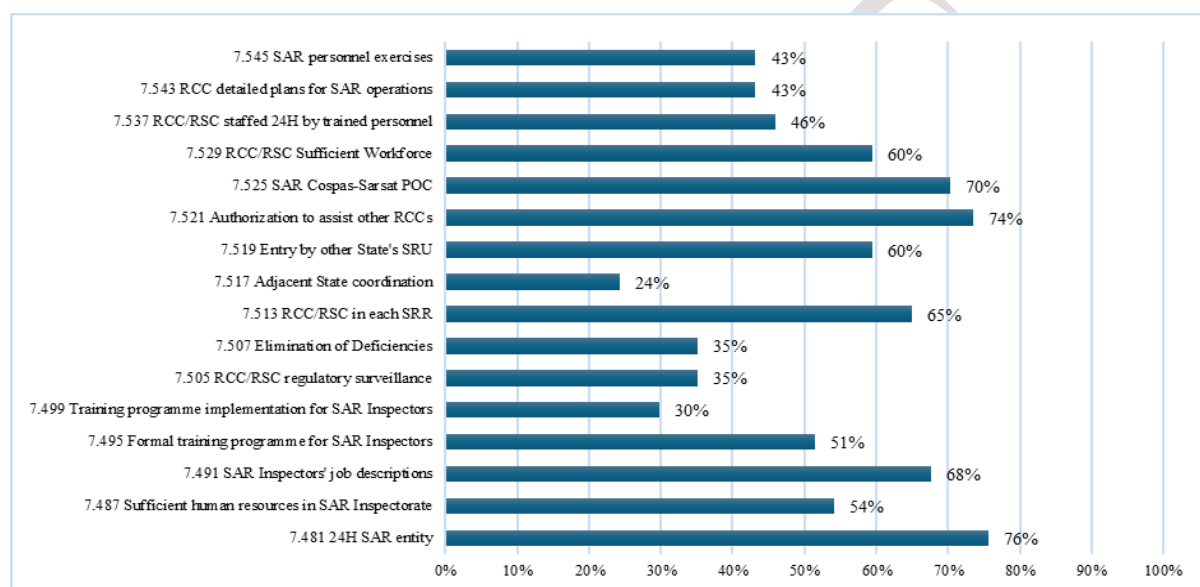

Figure 1: Asia/Pacific USOAP CMA SAR-related PQ Compliance (October 2022)

6.3 **Figure 2** provides the overall Asia/Pacific Region EI for individual SAR-related PQs in April 2025.
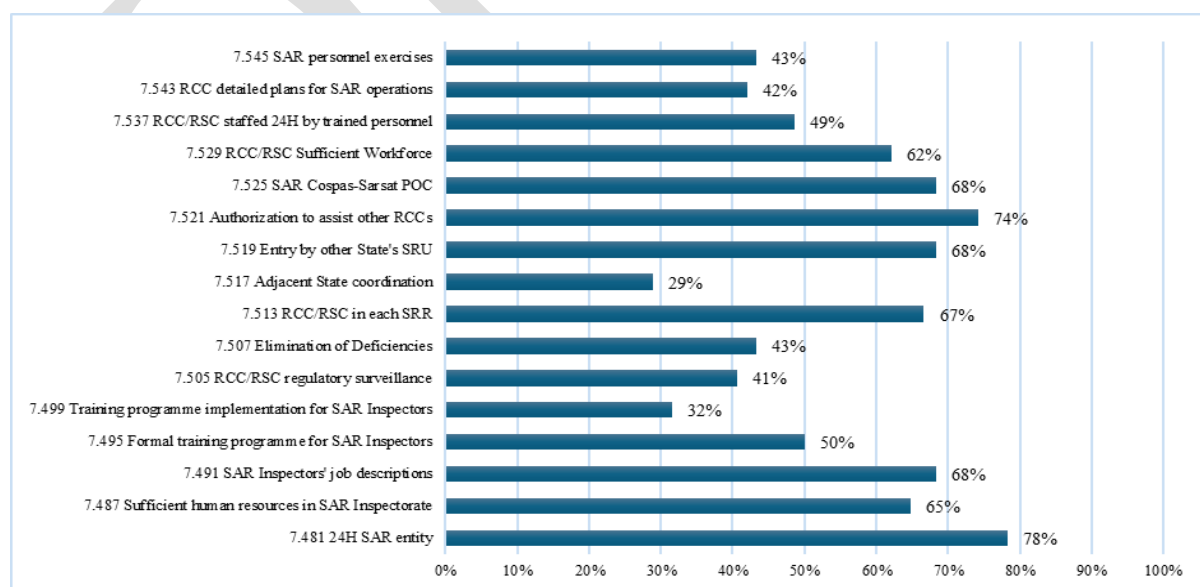

Figure 2: Asia/Pacific USOAP CMA SAR-related PQ Compliance (April 2025)

6.4   From these analyses it appeared that the major areas of weakness were in effective SAR oversight, coordination with adjacent States, elimination of deficiencies. Therefore, a focus on the minimisation of barriers associated with the efficient cross-border coordination of SRU (such as pre-arranged approval) and other coordination mechanisms, including updates of SAR agreements (whatever their form) was vital.

6.5   The analyses also revealed the need for improved systemic approaches to training for both SAR inspectors and personnel responsible for the provision of SAR services, including the regular organisation of effective SAR exercises that test systems and personnel. It should be noted that the training of SAR inspectors does not necessarily require SAR-specific technical training, but was more focused on effective audit and inspection techniques, etc.

Regional SAR Implementation Performance – the Asia/Pacific SAR Plan

6.6   With the advent of the Asia/Pacific SAR Plan and its more comprehensive expectations, an accurate assessment of capability aligned with the Plan was developed. This assessment could be used by States as a means of internal gap analysis, in addition to providing a more accurate metric of the Asia/Pacific SAR Plan implementation. **Figure 3** summarizes the reported implementation of the performance expectations of the Asia/Pacific SAR Plan (see Section 7).
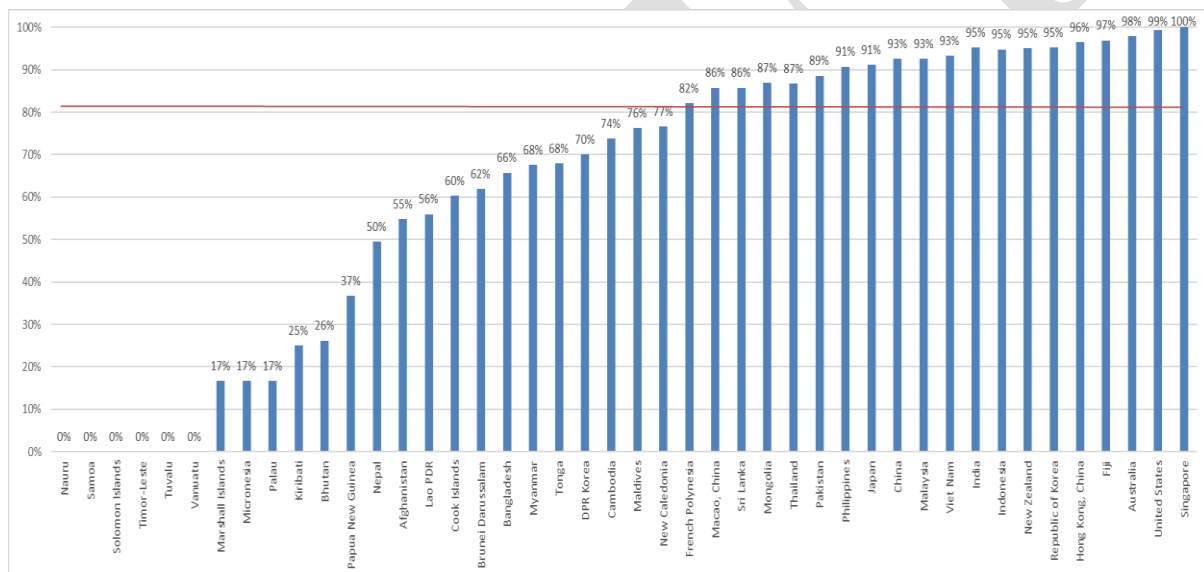
Figure 3: Implementation Status of the Performance Expectations of the Asia/Pacific SAR Plan – April 2025 (Average 63%)

6.7   The Asia/Pacific Region Air Navigation Plan Volume II Section 3 *Specific Regional Requirements* states, in respect of State reporting of implementation regional air navigation planning elements:

> a 'robust status plan that is not subject to consideration as an APANPIRG Deficiency is one that is evaluated as achieving 90% or more implementation of the planning elements.

6.8   Accordingly, and noting that SAR services were a safety of life matter. APANPIRG ATM and Airspace Safety Deficiencies were recorded for 30 Administrations in the Asia/Pacific Region, for failure to reach 90% or more implementation of the performance expectations of the Asia/Pacific SAR Plan (APANPIRG/35, November 2024).

Asia/Pacific SAR Plan V5.0

Asia/Pacific SAR Coordination Forums

6.9 The Asia/Pacific Region will benefit from the cooperation and coordination of States and International Organizations involved in the APSAR Workgroup. The establishment of permanent joint ICAO/IMO Regional SAR Forums to enable collaboration and cooperation on oceanic SAR matters across the specific oceanic regions and including adjacent ICAO regions should be considered.

6.10 There were several regional initiatives for cooperative support and development already being undertaken in the Asia/Pacific Region to assist with SAR capability enhancement.

6.11 Such improvement programmes could result from a request by a State needing assistance, ICAO/IMO oversight, the users of the SAR system itself, an audit or following a SAR 'Go-Team' visit that identifies weaknesses in the State's SAR capability (a 'Go Team' normally consists of external SAR experts from ICAO/IMO, more advanced 'champion' States or external agencies such as Cospas-Sarsat). The programs can be conducted by experts from a 'champion' State, or through a cooperative effort by several States or a regional body.

> Note: **Appendix 1** provides a summary of benefits to the SAR System of States assisting other States.

Barriers

6.12 The following potential issues should be considered to ensure they do not become barriers to the achievement of the expected SAR capability:

a) absence of established appropriate legal framework designating, recognizing, supporting and giving authority to national SAR authorities, RCCs and SMCs;

b) inadequate funding and equipping of SAR authorities and in particular, resourcing of RCCs;

c) absence of an appropriate SAR organizational framework;

d) absence of a national SAR committee;

e) lack of clarity of responsibilities for each component of the SAR system;

f) inadequate collaboration and cooperation between aeronautical and maritime SAR agencies;

g) absence of bilateral/multi-lateral/international SAR agreements;

h) inadequate civil/military cooperation; and

i) complacency about, or lack of recognition of, the importance or priority given to SAR.

Global and Regional SAR Issues

6.13 States should monitor outcomes from global and regional ICAO and IMO SAR forums to ensure their State SAR authorities are updated on relevant SAR developments, otherwise State planning may not be synchronized with external international expectations, including users. Such forums may include APANPIRG and its Sub-Groups, other ICAO Region SAR groups, the ICAO/IMO JWG-SAR, ICAO High Level Safety Conferences, etc.

6.14   The provision of sufficient resources is critical in a number of areas, including:

a) Financial –

   - funding for 24-hour RCC facility and staff;

   - funding arrangements/agreements for hiring/payment/sharing of SRUs to permit rapid deployment;

   - provision of a suitable administrative process enabling financial support including the ability for SAR authorities to quickly authorise payments required for emergency response aircraft, vessels and supporting logistics such as fuel.

b) RCC personnel – a suitable number of trained and skilled staff, supplemented by a pool of trained RCC support staff where appropriate;

c) RCC facilities –

   - appropriate RCC facility space;

   - minimum RCC tools (such as current charts, plotting equipment, documentation, etc.);

   - ability to identify and task available SRUs;

   - aircraft and vessel tracking information including ATS surveillance, Automatic Identification System (AIS), ADS-B and other satellite tracking systems, etc.;

   - reliable and rapid H24 communications, and a suitable means to –

     o   receive, communicate and acknowledge distress alerts;

     o   communicate with ATS units, other RCCs/RSCs, Coastal Radio Stations, COSPAS-SARSAT Mission Control Centres (MCCs), military units, medical services, meteorological offices, aircraft and vessel operators, etc.;

   - information technology –

     o   RCC workstation computers;

     o   software including basic databases, drift modelling, incident management, etc.;

     o   reliable internet access;

d) Contingency – back-up RCC facility, or arrangement with another RCC as a contingency against inability to operate from the primary RCC due to the need to evacuate or loss of systems, etc.;

e) Search and Rescue Units (SRUs) –

   - available and suitably equipped SRUs with SAR trained crews and SAR capability –

     o   aircraft units;

     o   maritime units;

     o   land units;

     o   specialised units (paramedical, divers, etc.);

   - available and suitable SAR survival equipment for delivery by aircraft to survivors and to assist SAR coordination efforts (e.g. SAR Datum Buoys, droppable life rafts and survival supplies, etc.);

Asia/Pacific SAR Plan V5.0

    f)   Training support –

- RCC staff – basic and ongoing;

- SRU crews – pilots, air crew, air observers, vessel crew, land crews;

- RCC support staff – basic and refresher; and

- SAR inspectorate staff – basic and on-going.

Asia/Pacific SAR Plan V5.0

PERFORMANCE IMPROVEMENT PLAN

Preferred SAR Capability Specifications (PSCS)

Note 1: PSCS are the non-mandatory expectations on all Asia/Pacific States to enhance SAR systems in order to meet a minimum level of SAR capability, with a high degree of interoperability and harmonisation, and interoperability with other ATM components such as Air Navigation Service Providers (ANSPs) and aerodrome operators, and between aeronautical and maritime SAR services. PSCS were not expected to contravene existing ICAO Annex 12 standards.

Note 2: Asia/Pacific SAR Plan Version 1.0, published in September 2015, included the expectation that all PSCS would be implemented by 07 November 2019. Noting that, at the time of publication of this fifth version of the Plan, the implementation is several years in the past, and also noting that further changes to PSCS are expected to be incremental and relatively minor in scope, dates for future implementation are not included. All States should note that APANPIRG ATM and Airspace Safety Deficiencies for non-implementation of 90% of the elements of this Plan will continue to be raised and maintained by the ICAO Asia/Pacific Regional Office.

7.1   *Legal Framework and Structure Planning*: All States should develop statutes and related provisions that establish or enhance the legal foundation for a State SAR organization and its framework, resources, policies and procedures, where appropriate, to:

a) ensure that it is party to, and/or aligned with the following Conventions, as applicable –

     i. Convention on International Civil Aviation, 1944;

     ii. International Convention on Maritime Search and Rescue, 1979; and

     iii. International Convention for the Safety of Life at Sea (SOLAS), 1974;

b) unless delegated by written agreement, establish an entity that provides, on a 24-hour basis, SAR services within its territories and designated area of responsibility/SRR;

c) establish a national SAR committee consisting of civil and, where appropriate, military members to enable a whole-of-government approach;

d) empower SMC with the authority to adequately carry out their responsibilities to ensure no delay to timely SAR response actions;

e) conduct studies to check the feasibility for, and develop an implementation plan if practicable, the integration of aviation and maritime SAR services, and as far as practicable, civil and military SAR activities, including joint training, exercises and familiarization of staff and review of documentation to ensure harmonization of procedures;

f) conduct studies to align, as far as practicable, aeronautical and maritime SRRs; and SRRs with Flight Information Regions (FIRs);

g) establish a single State SAR Plan that –

    i.   designates the responsible RCC(s), RSC(s) and 24-hour SPOC;

    ii.   describes the relevant aeronautical and maritime SRRs, including the coordinates and geographical chart depiction of the aeronautical and maritime SRR and neighbouring aeronautical and maritime SRRs;

    iii. establishes an Administrative Single Point of Contact for SAR (ASPOCS) for non-urgent, administrative matters, such details to be submitted to the ICAO Asia/Pacific Regional Office;

    iv. details the National SAR Committee;

    v.   details the governmental and non-governmental agencies with authority and responsibility for SAR coordination and supporting of SAR response operations within its territories and designated area of responsibility;

    vi. details required and available SAR facilities, personnel, and equipment;

    vii. describes the SAR manuals, plans and procedures used for national and regional cooperative SAR response arrangements;

    viii. details the SAR personnel training and competency programme, qualification standards, SAR certification if applicable and SAR cooperation training;

    ix. lists the SAR agreements required;

    x.   is electronic and accessible on the Internet, such details to be submitted to the ICAO Asia/Pacific Regional Office, if possible; and

    xi. is monitored by quality assurance processes.

7.2   *SAR Standards and Procedures*: All States should:

a) establish aerodrome emergency plans that provide for cooperation and coordination between the aerodrome operator and RCCs. The plans should include clear responsibilities for response to emergencies in proximity to, but outside, the aerodrome boundaries including adjacent waterways;

b) establish SAR agreements with States having adjoining SRRs or FIRs, including trans-regional neighbours (the agreements should include clear responsibilities for overlapping or non-adjoining aeronautical and maritime SRRs);

c) provide up to date cross-border information on SAR capability (this should be included in bilateral SAR agreements);

d) pre-arrange procedures for cross-border SAR responses to allow entry of another State's SRUs into State territory (this should be included in bilateral SAR agreements);

e) establish RCC plans for response to MROs integrated with national disaster plans;

f) establish SAR Operations Plans between the State's SAR authorities and Government, military and commercial operators, including those with a capability to assist with an air, maritime or land SAR capability, or other support capability (e.g. communications, meteorology, logistics, etc), including:

    i.   procedures for cooperation and deployment of foreign SRUs;

    ii.   provision for translators/liaison Officers/Embassy Officers for the daily tasking of the SRUs at the RCC;

    iii. provision of information for logistic and administrative support (hotels, fuel, security passes, food, medicine, etc.);

iv. instructions on communication (ops normal reports, sightings, etc.) for search planning, command and control to foreign SRUs;

v. planning and arrangements that ensure the availability of State and other SRU assets, especially over-water rotary wing capability where applicable, to support a timely and effective SAR response; and

vi. daily end of day report by SRUs to the RCC (via mobile/satellite telephone, email, web-based application, fax, etc.);

vii. provision of meteorology information;

g) establish SAR Alerting procedures which:

i. are tested and fully integrated with RCC procedures so that RCCs are rapidly notified of any SAR event 24 hours a day;

ii. include procedures for joint aeronautical and maritime distress alert notification, including reliable delivery and acknowledgement of Cospas-Sarsat distress alerts, support and response to both aviation and maritime SAR incidents;

iii. where applicable, include protocols for civil and military support and sharing of information; and

h) establish arrangements for situations where RCCs need to conduct SAR operations (in accordance with ICAO Annex 12) at the same time as the accident investigation authority needs to conduct search and recovery operations (in accordance with ICAO Annex 13).

Note: a sample MOU between the SAR service and the accident investigation authority is provided in the IAMSAR Manual Volume I Appendix P.

SAR Facilities and Resources

7.3 *RCC Facility*: All States should ensure that RCCs are of sufficient size with adequate provision for operational positions designed in accordance with human factors principles (such as human machine interface) for all SAR incidents from small scale to major searches involving civil and military assets where applicable, and facilities such as:

a) workstations, telephones (with international access), plotting tables, wall notice/status boards, computer, and communications equipment and systems, briefing/debriefing areas, room for storage including incident records and recorders, RCC staff break and rest facilities;

b) computer resources which may provide support to RCCs with incident management, plotting, search planning, mapping, contact databases, web-based information, etc.;

c) charts, electronic or paper, which:

i. apply to SAR (aeronautical, nautical, topographic and hydrographic);

ii. depict aeronautical and maritime SRR(s), neighbouring aeronautical and maritime SRRs;

iii. depict SAR resources and SRU locations, including in neighbouring SRRs where available;

iv. depict aeronautical navigation information including terrain and obstacles (vertical structures, powerlines, etc with elevation data), FIR(s), ATS units and airspace boundaries including military and Prohibited, Restricted and Danger Areas, Air Defence Identification Zones (ADIZ), and environmentally sensitive areas;

v.   depict maritime navigation information including hazardous and environmentally sensitive areas÷;

vi. provide a means of plotting;

d) ability to reliably receive, acknowledge and action distress alerts 24 hours in a timely manner;

e) a means of recording, timely retrieval and playback, and archiving of communications and SAR incident data;

f) shipping/vessel communications and maritime broadcast facilities such as Coastal Radio Stations, RCC radio and satellite communications, marine radio networks;

g) aircraft communications – via ATS units, aircraft operators, satellite communications or direct between RCC and aircraft;

h) access to aircraft and ship tracking data, e.g. ATS surveillance data, GADSS ADT and LADR data, commercial satellite tracking data, AIS and Long Range Identification and Tracking of Ships (LRIT) allowing rapid identification of potential aircraft and vessels that may divert to assist;

i) a means of obtaining timely meteorological information – forecast, present and historical data;

j) if applicable, drift modelling software;

k) if applicable, ocean data including sea temperature, currents, winds, tides, etc.;

l) if applicable, SAR Datum Buoys, preferably with satellite tracking capability;

m) RCC documentation and reference material such as plans of operation, procedures manuals, guidance material, ICAO and IMO reference documents, SAR agreements;

n) Cospas-Sarsat equipment and reference material; and

o) when developed and available, System Wide Information Management (SWIM)-enabled systems that can evolve the sharing of flight data, aeronautical information and meteorological data in alignment with contemporary practices being implemented under global and regional planning.

7.4   *Personnel and Training*: All States should, where applicable to maintain a 24-hour service:

a) provide adequate ATS resources (either an ATS supervisor or other staff) that can provide relief within ATS units to allow timely response to SAR alerts and information to RCCs;

b) provide sufficient RCC staffing, including a sufficient number of trained specialist RCC officers including SMCs and Assistant SMCs (A/SMCs);

c) provide availability of a pool of RCC support staff who are familiar with RCC operations, but not trained as coordinators, that can assist with the functioning of the RCC to supplement a SAR incident response;

d) develop SAR personnel position descriptions that detail responsibilities and eligibility criteria for recruitment of operational staff;

e) develop a comprehensive training programme that includes SAR training for:

i.   RCC Coordinators based on a competency-based assessment approach to ensure technical proficiency, cyclical (periodic) instruction that provides continuous training to ensure competency is maintained, and a system for maintaining training records;

        ii.   SRU staff, including military personnel.

    f)   facilitate RCC staff to be proficient in the English language; and

    g)   facilitate a programme of regular liaison between relevant RCCs, ATS units and airline operating centres in order to understand those organizations, facilities and capabilities (reference ICAO Annex 12.

7.5   *Oceanic Capability*: Where applicable, States should establish additional oceanic SAR capability as far as practicable to ensure a timely and adequate SAR response is available to all oceanic areas of their SRRs. This may be met through cooperative arrangements with neighbouring States or other RCCs.

7.6   *Search and Rescue Units (SRUs)*: All States should establish capabilities enabling:

    a)   availability and deployment of suitably crewed, trained and equipped SRUs (including, for SAR aircraft a pool of air search observers trained in visual search techniques), public and/or private, civil and military, for rapid SAR response;

    b)   availability and deployment of SRU craft that may be in use for another primary purpose but made available to RCCs for SAR purposes on an as needed emergency basis (vessels, aircraft and land units);

    c)   protocols for civil SAR authorities to request the assistance of military assets, and similarly military SAR authorities to request civil assets;

    d)   a communication means and information protocols between the State's aeronautical and maritime SAR authorities;

    e)   cooperative use and/or sharing of SAR assets with protocols incorporated within National SAR Plans and bilateral SAR agreements;

    f)   pre-arranged government authority for funding of costs associated with hiring of SRUs, and payment for critical supporting logistics such as fuel, to avoid any delays in response availability;

    g)   pre-approval of specified SRU assets that may be utilised in the territory of another State or cross-SRR boundary (which may not require diplomatic approval if operating within international airspace or seas);

    Note: IAMSAR Manual Volume I Appendix Q provides a sample expeditious process to allow SAR units from an assisting State to enter into the territory of the State of the RCC.

    h)   aircraft with the ability and regulatory approval to safely conduct SAR missions, including international operations where applicable.

    Note: guidance material on SAR aircraft capability can be found in the IAMSAR Manual Volume II Appendix G Facilities and equipment selection.

7.7   *Distress Beacons*: All States should:

    a)   where separate ARCCs and MRCCs exist with responsibility for coincident aviation and maritime SRRs, coordinate distress beacon alert procedures to ensure both RCCs are aware of any distress beacon activations within their areas to avoid duplication of response. For example, MRCCs should ensure their procedures alert ARCCs and ATS units to any EPIRB activations. For distress beacon alerts near SRR boundaries, coordination should also occur with neighbouring State RCCs;

b) have a reliable distress beacon registration system that:

    i. provides a readily accessible mechanism (preferably one that is available by Internet as well as other conventional means) to enable distress beacon owners to fulfil their obligation to register ELTs [including ELT(DTs)], EPIRBs and PLBs, and update the registration data as information changes (e.g. change in ownership or disposal);

    ii. is available to RCCs 24 hours a day and includes up-to-date registration details for all national civil and military ELTs, ELT(DTs), EPIRBs and PLBs;

c) take steps (including education) required to prepare for, and to implement changes related to, the introduction of second generation beacons, the transition to the MEOSAR satellite architecture, ELT(DTs), and the pending Return Link Service provided by the Galileo constellation;

d) establish an appropriate nationwide means of disposal for old distress beacons; and

e) conduct education programmes promoting correct use, handling, storage, registration and disposal of distress beacons, including, where appropriate, with airworthiness agencies, and civil aviation and maritime authorities, and aviation, maritime and land-based beacon user stakeholder groups. A focus should include awareness to minimize false alerts.

Note 1: information on beacon registration can be found at: http://www.cospas-sarsat.int/en/beacons-pro/beacon-regulations-pro/ibrd-user-information-for-professionals.)

Note 2: incorrect disposal of distress beacons often causes the deployment of scarce and often expensive SAR resources only to have the beacon located as a non-distress event in a rubbish dump or similar location. This also creates the risk of SAR resources being diverted away from a real emergency should it arise at the time. Beacon batteries are hazardous items which should be disposed of in an environmentally friendly manner.

Note 3: education should include matters such as an update on beacon registration systems to be compatible with new beacon hexadecimal identifications, the transition to the MEOSAR satellite architecture (e.g. update local user terminals and mission control centres to properly receive and manage MEOSAR data), in accordance with Cospas-Sarsat specification documents (http://www.cospas-sarsat.int/en/documents-pro/system-documents).

7.8   *Contingency Facilities*: All States should ensure there are established contingency facilities, or for when a SAR service is not able to be provided,. This may include procedures in place for the temporary delegation of the SAR responsibility to another appropriate national body or State. All States should test their contingency arrangements periodically, but not less than once every six months.

SAR Information

7.9   *Provision of Information*: All States should ensure the:

a) establishment of a centralised information source publishing all Asia/Pacific State Aeronautical Information Publication (AIP) information (refer PANS-AIM Appendix 2 GEN 3.6 *Search and rescue*):

    i. The agency responsible for providing SAR services;

    ii. The area of SAR responsibility where SAR services are provided;

    iii. The type of SAR services and facilities provided including indications where SAR aerial coverage is dependent upon significant deployment of aircraft;

        iv.   SAR agreements;

        v.   The conditions of SAR facility and service availability; and

        vi.   SAR procedures and signals used;

b)   establishment of an Internet-based SAR information sharing system (with security protocols as required and in accordance with the emerging SWIM concept as applicable) to share SAR activity with States and key stakeholders participating in a SAR activity (the information sharing system should include a means of handling media and next of kin enquiries, and recognise the need to avoid premature media statements); and

c)   maximum practicable cooperation between State entities in the provision of accurate and timely information when required, including from military sources, except where national security could be adversely affected.

7.10   *SAR Facilities and Equipment Lists*: All States should develop and maintain a current, comprehensive electronic list of State SAR Facilities, SAR Equipment, and SAR Units (SRUs), including joint or shared facilities and equipment.

7.11   *SAR Library*: All States should:

a)   establish a web-based SAR Library, or cooperate by contributing to an Internet-based Asia/Pacific resource (such as https://www.dco.uscg.mil/Our-Organization/Assistant-Commandant-for-Response-Policy-CG-5R/Office-of-Incident-Management-Preparedness-CG-5RI/US-Coast-Guard-Office-of-Search-and-Rescue-CG-SAR/SAR-Publications/);

b)   ensure that each RCC and SAR authority has ready access to a current copy (either electronic or hard copy) of the following reference documents at a minimum:

        i.   ICAO Annex 12;

        ii.   IAMSAR Manual Volumes I, II and III;

        iii.   International Convention on Maritime SAR (SAR Convention);

        iv.   *Asia/Pacific Region ANP*;

        v.   *Asia/Pacific SAR Plan*; and

        vi.   relevant regional, national and agency SAR documents.

Note: the Asia/Pacific SAR Library hosted by the US Coast Guard contains a list of documents that may be held by RCCs and JRCCs as appropriate. In addition, a list of documents (SAR.7/Circ.12) would be available on the IMO website at: (http://www.imo.org/en/OurWork/Safety/RadioCommunicationsAndSearchAndRescue/SearchAndRescue/Pages/Default.aspx).

SAR Improvement

7.12   *Search and Rescue Exercises (SAREX)*: All States should conduct regular SAREX (at least once every two years) to test and evaluate existing coordination procedures, data and information sharing and SAR response arrangements involving:

a)   both aeronautical and maritime SAR authorities including both civil and military agencies as applicable, and related bodies such as ANSPs and Airline Operations Centres (AOCs);

b)   where appropriate, cross-aeronautical SRR boundary coordination (SAREX should routinely involve SAR authorities of adjacent SRRs);

c) improvement of SAREX effectiveness through a post-SAREX review and written report, completed to ensure that deficient areas or latent problems are identified and remedied;

d) SAREX type may be a desktop communications, coordination or full-scale exercise or field exercise;

e) a SAREX program should be developed that includes, as appropriate, exercises held:

    i.   within RCCs;

    ii. depending on the number and type of RCCs within a State, between JRCCs, aeronautical and maritime RCCs and RSCs;

    iii. with local SAR support agencies;

    iv. with SRUs; and

    v.   with neighbouring States.

Note 1: a SAREX template is provided in the IAMSAR Manual Volume I Appendix O Sample template for a joint SAREX.

Note 2: SAREX should test the SAR system, including unannounced alerts that allow an actual search (whether it is a desktop or a physical operation) to be conducted which will indicate weaknesses in the system. SAREX should not be confused with, or take the form of, simulated crash fire exercises such as for aerodrome emergency procedures that do not have a search component.

Note 3: real SAR incident responses which include an <u>adequate</u> post-response review and evaluation with lessons learned may replace the need for a SAREX.

Note 4: this expectation may be fulfilled by participating in a sub-regional SAREX that tests the State's SAR system.

7.13   *SAR Quality Assurance*: All States should implement SAR System Improvement and Assessment measures, including Safety Management and Quality Assurance systems, that:

a) provide performance and safety indicators, including post-incident/accident lessons learned and management reviews (RCC and SAR System Continuous Improvement process), and feedback from RCC staff, SAR system users or SAR stakeholders;

b) identifies risk and corrective and preventive actions that prevent or minimise risk and the possibility of substandard SAR performance;

c) establishes an internal quality assurance programme, which includes regular internal audits of the RCC, SAR operations, SAR facilities and procedures that are conducted by trained auditors;

d) ensures the person responsible for internal quality assurance within the entity responsible for SAR services has direct access to report independently to the Head of the entity responsible for SAR services on matters of quality assurance; and

e) where appropriate, provides submissions to the ICAO/IMO JWG-SAR to share lessons learned and experiences with other global States for the continuous improvement of the worldwide SAR system.

Note 1: resourcing of SAR system audit arrangements could be mitigated by States entering cooperative arrangements, including sub-regional regulation, between States for auditing of each other's SAR systems to share expertise and costs.

Note 2: refer to related provisions of ICAO Annex 19 for a Safety Management System (SMS) and ICAO Doc 9734 for a Safety Oversight Manual.

Note 3: Peer review, either external or internal, may provide a useful internal quality assurance tool.

7.14   *SAR Management Review*: All States should conduct an annual or more frequent analysis of their current State SAR system to identify specific gaps in capability against the minimum requirements of ICAO Annex 12 and the guidelines of the IAMSAR Manual to:

    a)   enable the ICAO Asia/Pacific SAR data to be updated to accurately reflect the State's capability;

    b)   be informed regarding the availability and capability of SAR services in neighbouring States;

    c)   identify SAR research and development programmes, especially those which could be conducted if possible in cooperation with other States;

    d)   establish a common set of basic SAR system statistics, which include:

        i.   number of SAR incidents per year;

        ii.   number of lives at risk versus number of lives saved;

        iii.   records of time from first alert to tasking the SRU;

        iv.   records of time from first alert to arrival on scene of first SRU; and

        v.   records of time from first alert to rescue.

        vi.   records of false alerts or unnecessary activation of SAR services.

    e)   plan for any necessary improvements to gradually build and improve capability over time, which would be detailed in the State SAR Plan; and

    f)   regularly review and update SAR agreements as appropriate.

Note 1: the National self-assessment on SAR found in IAMSAR Manual Volume I Appendix H, the ICAO USOAP-CMA Protocol Questions for SAR and ICAO Electronic Filing of Differences for ICAO Annex 12 compliance may assist States with their reviews.

Note 2: for SAR system statistics, the number of incidents should identify the type (e.g. Cospas-Sarsat alert, ATS alerts, etc.) and outcome of SAR incidents.

7.15   *SAR Promotion*: All States should conduct SAR promotional programs (e.g. Seminars, Workshops and public safety campaigns) to:

    a)   encourage higher SAR preparedness by persons that may require SAR services through education aimed at preventing persons getting into distress situations (i.e. 'preventative SAR');

    b)   foster a reduction in false alerts to avoid wasting valuable SAR resources and risk to SAR crews responding unnecessarily;

    a)   ensure the support of government decision-makers for SAR facilities and improvements, in particular adequate funding availability;

    b)   assist media to understand SAR operations to minimise the need for explanations during SAR responses;

    c)   recognise improvement in State SAR systems;

    d)   enhance cooperation between SAR services and supporting bodies including:

        i.   civil, military and police agencies;

        ii.   ANSPs;

        iii.   aerodrome and port operators;

Asia/Pacific SAR Plan V5.0

    iv.   aircraft and shipping operators;

    v.   meteorological agencies;

    vi.   accident investigation authorities;

    vii.   government and non-government agencies affected by SAR operations, in particular large scale national and international responses involving whole of government agencies;

    viii.   aviation and maritime regulators; and

    ix.   other States.

Note: social media may be an effective means of SAR promotion, and that may help reduce the workload of SAR staff during major SAR responses.

EMERGING ISSUES AND FUTURE DEVELOPMENTS

Planning for the Future

8.1   States should monitor developments such as improvements to existing and new technologies and other emerging matters which may impact on the SAR system of the future as part of State, regional and global aviation strategic direction and planning. This may include matters such as:

- the need to cater for increased growth or changes in air and maritime traffic through SRRs which may increase the demand, or present changed capability requirements, for SAR services. This may include, for example, new air routes using longer range aircraft into more remote areas or increased numbers of, and/or larger, cruise ships;

- new technology such as:

  o Unmanned Aircraft System (UAS) and Advanced Air Mobility (AAM);

  o autonomous vessels;

  o commercial space vehicles carrying people;

  o new distress alerting devices and systems;

  o new tracking systems;

  o new electronic search equipment (such as optical radar systems);

  o online virtual conferencing platforms;

  o smartphone apps;

  o artificial intelligence; and

  o data driven decision making tools.

- SAR intervention in and around offshore wind turbine farms; and

  Note: IAMSAR Manual Volume II provides further guidance on wind farms.

- impacts of climate change.

Research and Development

8.2   To develop the tools and systems required to meet foreseeable long-term requirements, there is a need for States to undertake planning and co-operation on SAR matters. This includes major efforts to define concepts, to extend knowledge and invent new solutions to future SAR challenges so these new concepts are selected and applied in an appropriate timely manner. Such efforts could be forged through collaborative partnerships between, States, ANSPs, International Organizations, institutes of higher learning and specialised technical agencies. This concept is consistent with *Asia/Pacific Seamless ANS Plan* Principle 36 [*Inter-regional cooperation ('clustering') for the research, development and implementation of ATM projects*], and may manifest itself in joint projects such as:

- ICAO and/or IMO regional SAR training opportunities, where provided, to assist States that are unable to provide their own SAR training;

- Joint Sub-regional RCCs (ASEAN States in particular may be candidates for a single centre of excellence that brings together civil and military SAR experts from all ASEAN States and provides a single SAR facility that is cost-effective and has a level of resources and facilities that would be difficult for all States to maintain by themselves); and

- Regional online eLearning packages.

Asia/Pacific SAR Plan V5.0

8.3   With the end goal of a globally interoperable SAR system in mind, the region will have to consider planning for a long-term supporting concept and infrastructure, including possible integration of the new technologies listed in paragraph 8.1 for SAR application. The following are possible areas that should be considered for future SAR research and development to promote the maximum possible harmonization and interoperability of SAR systems:

  a)   data sharing such as aircraft and ship tracking information;

  b)   automated data link communication to RCCs when an aircraft or ship exceeds a Variable Set Parameter (VSP) in terms of its operating envelope, or activation of an emergency status (could be displayed as a symbol, and the data could include certain operating parameters such as acceleration and altitude for an aircraft);

  Note: the ICAO GADSS includes this concept.

  c)   regional UAS and autonomous vessels for use in SAR and their safe operation alongside crewed aircraft and vessels;

  d)   inclusion of the SAR system and RCC access as a component of the ICAO SWIM concept of operation and implementation;

  e)   on-going development of standardised SAR training objectives and advanced training systems, including the use of high fidelity simulators;

  f)   enhanced technology oriented systems to improve SAR system effectiveness such as use of virtual conferencing platforms to enhance real-time SAR incident coordination between RCCs and other stakeholders, and live imagery and video streaming from SAR units to RCCs; and

  g)   transition to MEOSAR System and second generation beacons.

MILESTONES, TIMELINES, PRIORITIES AND ACTIONS

Milestones

9.1   Section 7 (*Performance Improvement Plan*) provides a scheme for the implementation of a collective set of enhancements for a number of elements in the PSCS.

9.2   States should implement the various PSCS elements of this Plan without delay, and should include consideration of issues such as:

- safety/operational analysis and assessment;

- cost-effectiveness;

- budgetary issues;

- development of operational procedures; and

- training.

9.3   Section 8 (*Emerging Issues and Future Development*) provides, subject to future agreement by concerned parties, possible SAR improvements over the next 10 years.

Priorities

9.4   It is a matter for each State to determine priorities in accordance with its own economic, environmental, safety and administrative drivers.

Actions

9.5   This Plan necessitates a number of implementation actions. It is expected that each Asia/Pacific State report progress on each applicable element to APANPIRG through the ATM Sub-Group. All States should note the importance of SAR status monitoring, and are required to submit their implementation status pertaining to the *Asia/Pacific SAR Plan* to the ICAO Asia/Pacific Regional Officer, by February 28 of each year.

9.6   Section 6 (*Current Situation*) provides analysis and major concerns in the region, which should be considered in the formulation of specific State plans.

9.7   SAR Coordination Forums, which are likely to be based on sub-regional development (such as a Pacific Ocean SAR Forum and Indian Ocean SAR Forum) need to be promoted, established and supported to ensure the on-going implementation work and future review of SAR expectations linked to this Plan are conducted.

SAREX

9.8   A program is expected to be established for an annual SAREX in each sub-region (South Asia, Southeast Asia, East Asia and the Pacific), with every second year being a desktop communications exercise, and alternate years being a full exercise. The SAREX outcomes and lessons learned should be reported to APANPIRG through the ATM Sub-Group.

9.9   The ICAO Asia/Pacific Regional Office is responsible for taking actions that assist the implementation of SAR within its accredited States, in cooperation with the IMO. In addition, the ICAO Asia/Pacific Regional Office is responsible for coordinating with adjacent ICAO regional offices on an ad hoc basis or at relevant trans-regional meetings.

Asia/Pacific SAR Plan V5.0

APPENDIX 1: BENEFITS TO THE SAR SYSTEM OF STATES ASSISTING OTHER STATES

Asia/Pacific States Face Demanding SAR Responsibilities with Few Resources

1.1.   Many Asia/Pacific States have the challenging responsibility of providing SAR services over vast and remote land and oceanic areas, and several have few resources available to meet ICAO Annex 12 requirements.

Taking a Regional Approach Improves Effectiveness and Efficiency

1.2.   To provide an effective and efficient SAR service in the region, it is important that States focus not only on meeting their own national obligations, but also take the broader view that their State SAR system is only one part of the wider regional SAR system. States therefore need to cooperate, collaborate and share resources and technical expertise with their neighbouring and regional RCCs, with the more developed SAR States in particular looking for opportunities to assist their lesser developed State neighbours.

When Developed SAR States Support Less Developed Neighbours, Everyone Wins

1.3.   Sometimes simple measures can reduce the incidence of SAR operations in a State's Area of Responsibility.

1.4.   An example of this is where New Zealand has been regularly requested to send resources to Kiribati, which is not in New Zealand's SRR, to conduct aerial searches for people missing in small vessels at sea. New Zealand recognised that with the provision of basic aids, the number of people going missing at sea could be reduced. The work was completed through an aid program and the benefit was immediate and twofold. There has been a large reduction in the number of people going missing at sea and New Zealand has reduced costs through less aerial searches being required.

1.5.   Another example is where Australia has recognized that increasing aircraft and vessel traffic in the north and western areas of its SRR in the Indian Ocean region comes with increased likelihood of more frequent SAR responses in that region. As a result, Australia worked in partnership with the Maldives, Mauritius and Sri Lanka to fund and provide technical assistance to improve the SAR capabilities of those countries that will also assist Australia's SAR response obligations in that area of its SRR. Similarly, since 2008 Australia has been providing funding and development assistance to Indonesia to improve SAR capability and cooperation.

1.6.   States that aren't compliant with ICAO Annex 12 SARPs and are unable to meet the minimum SAR service requirements could consult and seek assistance from 'champion' States that are compliant and have well developed SAR systems in place.

1.7.   Examples of assistance that could be provided by States, International Organizations (such as IMO and ICAO) or multi-lateral initiatives include:

      a)   conducting of a SAR gap analysis;

      b)   advice on the establishment of a SAR organisational framework;

      c)   advice for the establishment of a National SAR Committee;

      d)   technical assistance in the development of a National SAR Plan;

      e)   providing copies of relevant SAR documents to be used as templates;

      f)   technical assistance on the establishment of SAR agreements;

      g)   technical assistance in the development of RCC position descriptions;

      h)   training of SAR personnel;

Asia/Pacific SAR Plan V5.0

i)   provision of SRU where appropriate and training of SRU crews;

j)   provision/sharing of computerised SAR tools including incident management systems, databases, maritime drift modelling software, etc.;

k)   establishing data and information sharing agreements between RCCs;

l)   provision of operational search plan data;

m)   providing advice on how to conduct a SAREX and post-SAREX analysis; and

n)   set up of SAR system publicity and safety awareness campaigns.

…………………………………………………

INTERNATIONAL CIVIL AVIATION ORGANIZATION

ASIA/PACIFIC SEARCH AND RESCUE (SAR) PLAN

~~Version 4.0 October 2022~~ Version 5.0 May 2025

This Plan was developed by the Asia/Pacific Search and Rescue Task Force
(APSAR/TF) and ~~the~~ updated by Asia/Pacific Search and Rescue Work
Group (APSAR/WG)

Approved by ~~ATM/SG/10~~ ATM/SG/13 and published by the
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Asia/Pacific SAR Plan ~~V4.0~~ V5.0

CONTENTS

SCOPE OF THE PLAN

<u>Plan Structure</u>

1.1   The Asia/Pacific Search and Rescue (SAR) Plan (hereinafter referred to as the 'Plan') references different levels. At the higher level are global requirements established by the ICAO Annex 12 to the ICAO Convention on International Civil Aviation (ICAO Doc 7300). Global guidance material is provided by the International Maritime Organization (IMO) and ICAO's joint publication, the International Aeronautical and Maritime Search and Rescue (IAMSAR) Manual. Beneath this is regional planning guidance primarily provided by this Plan and other regional guidance material, in order to enable States to define the goals and means of meeting objectives for State planning towards improving State SAR System capability, such as the performance objectives of Asia/Pacific ~~(APAC)~~ Regional Air Navigation Plan (ANP) and Asia/Pacific Seamless Air Navigation Services (ANS) Plan.

1.2   The global air navigation perspective is guided mainly by the *Global Air Navigation Plan* (GANP, ICAO Doc 9750), the *Global ATM Operational Concept* (ICAO Doc 9854) and the *Global Aviation Safety Plan* (GASP).

1.3   The scope of the Plan is the identification of:

- the current status of SAR preparedness of Asia/Pacific ~~Region~~ States and State SAR arrangements; and

- recommendations for SAR planning and preparedness enhancements, in terms of compliance with Annex 12 of the ICAO Convention, IAMSAR Manual guidance, and accepted best international practice.

1.4   References in the Plan to 'States' are intended to include Special Administrative Regions and territories.

<u>Plan Review</u>

1.5   As an iterative process, the Plan requires regular updating to keep current with changes in ICAO Annexes and guidance material, outcomes from the ~~ICAO IMO JWG SAR~~ ICAO/IMO Joint Working Group on the Harmonisation of Aeronautical and Maritime Search and Rescue (JWG-SAR), the IAMSAR ~~manual~~ Manual, regional aviation activity, developments in the Air Traffic Management (ATM) system, new technology, political considerations, human performance and lessons learned from actual SAR responses. Plan updates should also focus on the SAR system being an important component of an integrated regional and global air navigation system. It is intended that ~~APANPIRG~~ Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG), and its contributory bodies conduct a complete review every three years from 2019 (or a shorter period determined by ~~Asia/Pacific Air Navigation Planning and Implementation Regional Group~~ APANPIRG) of the Plan to align with the review cycle of the GANP and the IAMSAR Manual. The review should be guided by a consultative process involving States and relevant International ~~Organisations~~ Organizations and technical bodies.

Asia/Pacific SAR Plan ~~V4.0~~ V5.0

OBJECTIVES

Introduction

2.1   Asia/Pacific States that are signatories to the Chicago Convention accept the responsibility for the provision of SAR services per the requirements of ICAO Annex 12 – *Search and Rescue*.   Increases in both aviation and maritime traffic throughout the Asia/Pacific ~~region~~ Region places additional importance on the ability for States to be adequately prepared for potentially increased demand for aeronautical and maritime SAR services.

2.2   The world's citizens, who frequently fly over or sail through the Asia/Pacific, expect a timely and adequate SAR response to be provided should it be required. States in the region need to be adequately prepared for the provision of efficient and effective SAR services. To assist in achieving this, it is essential for States to cooperate, collaborate and in some cases assist with resources to neighbouring and sub-regional RCCs.

2.3   ICAO Regional Office maintains a record, as reported to ICAO by the States themselves, of the status of individual State SAR compliance against ICAO Annex 12 requirements. There are significant variations in the level of State SAR capability across the region with significant gaps requiring urgent action, especially in oceanic areas. ~~A number of States have not reported their status at all to ICAO.~~ The ICAO Universal Safety Oversight Audit Programme – Continuous Monitoring Approach (USOAP-CMA) also provides a useful tool to States to self-assess their individual SAR system status. Since the establishment of this Plan, there had already been commendable improvements to the SAR systems of some States which have contributed to building better regional SAR capability. However, there was still considerable work required to address capability gaps.

2.4   There is a high risk of negative consequences to a State which does not provide an adequate SAR response to an aircraft or vessel in distress. The primary concern is the higher probability for loss of lives which may have been saved. The ability for news to spread rapidly in today's technologically connected world also provides the opportunity for a poor or ineffective SAR response to quickly reach a global audience resulting in damage to that State's reputation internationally and potential economic loss to sensitive State industries such as tourism and transport. However, the benefits of an effective and reliable SAR service to States offers many advantages. Besides reduction of loss of life and human suffering, other advantages include the following aspects~~.~~:

a)   ~~Safer~~ safer and more secure environment for aviation and maritime related industries, commerce, recreation and travel. Increased safety may promote use and enjoyment of aviation and maritime environments, tourism and economic development. This is especially true when the SAR system utilised programmes aimed at preventing or reducing the effects of mishaps, sometimes referred to as 'Preventative SAR'.

b)   ~~Availability~~ availability of SAR resources often provides the initial response and relief capabilities critical to saving lives in the early stages of natural and man-made disasters. SAR services offer an integral part of local, national and regional emergency management systems.

c)   ~~Well~~ well performed SAR operations can provide positive publicity about situations which may otherwise be viewed negatively. This can lead to improved public confidence in that State's reputation and commitment to providing a safe environment, leading to increased confidence to conduct activities beneficial to that State's economy~~.~~ ; and

d)   ~~As~~ as SAR is a relatively non-controversial and humanitarian mission, it provides an excellent opportunity to enhance cooperation and communication in general

between States and organisations, not only for SAR. It can also foster better working relationships between States and organisations at the local, national and international levels, including civil/military cooperation.

2.5   In 2014 Malaysia Airlines flight MH370, a Boeing 777 with 239 persons on board, disappeared when flying from Kuala Lumpur, Malaysia to Beijing, China, and AirAsia QZ8501 was lost on a flight from Surabaya, Indonesia to Singapore. The MH370 event resulted in probably the largest and most expensive search response for a missing aircraft in human history. Together with Air France flight AF447, which crashed into the Atlantic Ocean in 2009, these tragedies highlighted vulnerabilities in the air navigation system including the SAR system, which have hampered timely identification and ~~localisation~~ localization of aircraft in distress, hindering effective response efforts. ICAO is addressing these vulnerabilities through implementation of functions of the Global Aeronautical Distress and Safety System (GADSS) concept of operations; however, this new system is also dependent on improvements in global SAR capability, especially for remote and oceanic SAR response.

2.6   The Plan is designed to address both civil and military SAR authorities and has been developed in consultation with Asia/Pacific States, SAR administrations and relevant International ~~Organisations~~ Organizations. States should consult with stakeholders nationally, regionally and internationally as appropriate and determine actions in order to commit to achieving the objectives of this Plan in order to meet at least the minimum SAR service requirements in accordance with ICAO Annex 12. It is noted that where a State is unable to meet minimum SAR Standards and Recommended Practices (SARPs) of ICAO Annex 12, Article 38 to the ICAO Convention requires notification to ICAO of the differences between its own practice and that established by the international standards.

2.7   It is a common practice for the military to conduct or have a major role in SAR operations to fulfil or assist in fulfilling the State's obligation to provide SAR services. From the perspective of providing SAR services, civil-military coordination takes on many forms. This includes coordination during an actual SAR response, national coordination with other agencies to determine the military role, part of an international agreement or set of procedures with a neighbouring State to assist in SAR response, or other types of coordination. ~~ICAO Document 10088 – Civil/Military Cooperation~~ The *Manual on Civil-Military Cooperation in Air Traffic Management* (ICAO Doc 10088) is focused on airspace management and includes SAR matters relevant to civil-military coordination in airspace management.

2.8   The IAMSAR Manual~~,~~ Volume II~~,~~ has guidance on ~~multiple aircraft operations~~ multiple aircraft operations and establishing areas of SAR action to assist with the safe coordination and management of aircraft operations during SAR operations. SAR authorities should have procedures in place to rapidly notify airspace users of SAR operations and the establishment of any temporary airspace operation such as danger areas or restricted areas through appropriate State authorities. The combination of guidance in the IAMSAR Manual and ICAO ~~Document~~ Doc 10088 should enable a State to have an appropriate plan in place for civil-military coordination and cooperation in readiness for efficient and effective SAR response.

2.9   States should aim to meet their obligations progressively in a strategically structured and planned manner with improvement goals set for short~~-~~ ~~term,~~ medium- ~~term~~ and long-term implementation. It may be more productive to make gains in small steps commencing with measures that are more easily achievable in the short term and have a minimal cost, progressing to measures which will take longer to implement over the medium to long term. Short term measures that may be implemented relatively easily include the establishment of a national SAR Committee and ensuring SAR ~~Agreements~~ agreements are in place with neighbouring States allowing for seamless cross-border transit of search assets engaged in SAR activity. A SAR agreement can be in the form of 'Letter of Agreement' (LOA) or a Memorandum of Understanding (MOU) or other acceptable term indicating a lower form of arrangement for operational matters between SAR service providers ([such

Asia/Pacific SAR Plan ~~V4.0~~ V5.0

as Rescue Coordination Centres (RCCs) and/or Rescue Sub-Centres (RSCs)] or a more formal agreement for arrangements between governments concerned.

2.10   All States are encouraged to use the guidance provided within this Plan as a way forward, thus ensuring a timely, well-coordinated response to any SAR incident within their area of responsibility, or during cooperative responses involving more than one Search and Rescue Region (SRR) including overlapping aeronautical and maritime SRRs which may be the responsibility of different RCCs.

Plan Objective

2.11   The objective of this ~~SAR~~ Plan is to provide a framework to assist Asia/Pacific States to meet their SAR needs and obligations accepted under the Convention on International Civil Aviation and for the harmonised and interoperable delivery of both aeronautical and maritime SAR services within the region, and across other ICAO regional boundaries, where practicable.

2.12   The Plan is to be consistent with the SARPs of ICAO Annex 12 *~~Search and Rescue~~*, and aligned where appropriate with the SAR technical and operational standards and guidance of the IMO.

2.13   The Plan recognizes that ICAO serves as the forum for the implementation of practical and achievable measures to improve SAR services for international civil aviation. The Plan also recognizes that the IMO provides a similar forum for SAR services to maritime shipping.

2.14   Both ICAO and IMO share the same goal of ensuring that SAR services are available globally wherever people sail or fly. The SAR services that ICAO and IMO promote are complementary and offer tangible opportunities to derive mutually beneficial efficiencies for both the aviation and maritime transportation SAR systems globally, regionally and nationally. The objective of this Plan includes encouraging States to take advantage of such efficiencies. States should, where practicable, align their SAR systems with the guidance provided by the IAMSAR Manual, which also provides the benefit for standardised SAR coordination between RCCs and across SRR lines of delineation.

2.15   State SAR plans describe how SAR services will be provided, organized and supported in order for States to meet their obligations under the relevant Conventions. Search and Rescue Coordinators (SC) and SAR managers oversee and implement these plans. National SAR plans should be signed by all Government agencies which can provide or support SAR services. These agencies should all be represented on the State's Search and Rescue Coordinating Committee (SCC), which oversees these plans.

> *Note: ~~The~~ the SC should not be confused with the operational nature of the SAR Mission Coordinator (SMC). The primary purpose of the national SC is to enable a whole-of-government approach to make efficient and effective use of a State's capabilities for SAR.*

Plan Development

2.16   The Plan was developed as part of a suite of Asia/Pacific air navigation plans, including the *Asia/Pacific Seamless ~~ATM~~ ANS Plan*, the *Asia/Pacific Plan for Collaborative Aeronautical Information Management* (AIM), the *Asia/Pacific Regional Framework for Collaborative Air Traffic Flow Management* (ATFM), and the *Regional ATM Contingency Plan*, so the Plan should not be considered in isolation.

2.17   The Plan is expected to provide guidelines and recommendations for Asia/Pacific States to consider for the enhancement and improvement of national, sub-regional and regional SAR capability including:

    a)   compliance with ICAO Annex 12 SARPs;

Asia/Pacific SAR Plan ~~V4.0~~ V5.0

b)   identification and addressing of deficiencies in SAR capability;

c)   continuous and coherent development of SAR capability;

d)   harmonisation of aeronautical and maritime SAR services;

e)   civil/military cooperation and coordination (including SAR response, information sharing and use of airspace);

f)   remote oceanic SAR response capability ~~(~~[including provision for Mass Rescue Operations (MRO)];

g)   establishment and review of arrangements between neighbouring States to expeditiously facilitate SAR coordination, operations and cooperation across regional boundaries including sharing SAR resources and contingency procedures;

h)   facilitation of the implementation of SAR systems and services including the establishment of JRCCs where suitable and practicable;

i)   supporting the sharing of SAR information, data and expertise;

j)   integration with ATM systems and future ATS developments, where appropriate;

k)   monitoring of outcomes from APANPIRG Sub-Groups, other ICAO Region SAR groups, ICAO/IMO ~~Joint Working Group on Harmonisation of Aeronautical and Maritime SAR (JWG)~~ JWG-SAR and related forums for issues that may affect the Plan;

l)   facilitation of a continuous reporting mechanism of State SAR capability, ICAO Annex 12 compliance and SAR performance data to the ICAO ~~APAC~~ Asia/Pacific Regional Office through the APANPIRG Air Traffic Management Sub-Group (ATM/SG);

m)   implementation of a SAR System Improvement and Assessment measures, including Safety Management System, Quality Assurance programme and risk assessment, and programs to reduce the number of SAR incidents;

n)   coordinating the introduction of new technology affecting the regional SAR system;

o)   sharing future research and development concepts;

p)   seeking efficiencies, through the coordination and facilitation of concurrent regional SAR meetings, seminars, workshops and exercises, including joint ICAO and IMO, and sub-regional forums where practicable; and

q)   conducting efficient SAR Exercises (SAREXs) that identify improvements and latent problems.

2.18   The Plan elements should be periodically reviewed by APANPIRG to ensure that they remain relevant to the SAR system, particularly for new technology developments and alignment with other relevant global and regional SAR plans and the Global Air Navigation Plan.

Asia/Pacific SAR Plan ~~V4.0~~ V5.0

EXECUTIVE SUMMARY

3.1   ~~Before the COVID-19 pandemic, the Asia/Pacific Region had the largest share of Passenger Kilometres Performed (PKP), accounting for more than one-third of the global total at 34.5% (Europe and North America were the two other key regions, with shares of 26.7% and 22.4% respectively). As the world's major manufacturing and distribution hub, the Asia/Pacific Region also accounted for the largest share of global air freight traffic in 2018, at 35.5%. As the world emerges from the effects of the pandemic, it is likely that the Asia/Pacific Region will return to pre-pandemic levels of aviation activity and potentially grow further.~~ Aviation is a significant driver of economic growth and contributes strongly to the economic wellbeing of the diverse cultures and people in the Asia/Pacific Region. According to ICAO data, the global passenger traffic continued to increase in 2023 with around 4.2 billion passengers transported worldwide, up from 3.2 billion passengers in 2022. Although still slightly below pre-pandemic (2019) levels with 4.5 billion passengers having been transported worldwide, passenger traffic in 2023 increased 30 per cent from 2022. The number of flight departures for scheduled commercial operations continued to increase by approximately 13 per cent with over 35 million departures in 2023, compared to around 31 million in 2022.

3.2   For the maritime industry, the United Nations Conference on Trade and Development (UNCTAD) Review of Maritime Transport ~~2020~~ 2024 reported that ~~Asia continued to dominate the global maritime trade arena.~~ a record of almost 250,000 port calls by container ships in the second half of 2023 were driven by growing trade and longer routes with Asia handling 63% of global container trade. In 2019, the region accounted for 41% of goods unloaded, and had strengthened its position as a maritime hub that brings together more than 50% of global maritime trade volumes. Before the COVID-19 pandemic, growth in the cruise ship industry together with the many other forms of maritime transport such as fishing vessels and passenger ferries created added potential demand for regional SAR services. Whilst IMO assists the Parties to the Maritime SAR Convention, particularly their implementation related to the provision of maritime SAR services, the demand for aeronautical SAR services which frequently support responses to maritime SAR incidents is also likely to rise.

3.3   Asia/Pacific States that are signatories to the Chicago Convention accept the responsibility for the provision of SAR services per the requirements of ICAO Annex 12 ~~*Search and Rescue*~~. Increases in both aviation and maritime traffic throughout the Asia/Pacific ~~region~~ Region places additional importance on the ability for States to be adequately prepared for potentially increased demand for aeronautical and maritime SAR services.

3.4   Considering that many of the Asia/Pacific States have the challenging responsibility for providing a SAR service over vast and remote areas, including three of the world's five oceans, the importance for States with oceanic SAR responsibility to cooperate, collaborate and share resources with their neighbouring and regional/sub-regional RCCs is essential.

3.5   High-level support might be necessary from regional bodies that can effectively support the Plan's implementation, such as the:

- Association of Southeast Asian Nations (ASEAN) and ASEAN Regional Forum (ARF);

- Asia Pacific Economic Cooperation (APEC);

- South Asian Association for Regional Cooperation (SAARC);

- Pacific Community (SPC); and

- Indian Ocean Rim Association (IORA).

SAR System Funding

Asia/Pacific SAR Plan ~~V4.0~~ V5.0

3.6   The level of funding provided for effective SAR systems is a matter of concern for all senior decision-makers. An effective SAR system helps prevent lives being lost that may have been saved which provides a persuasive argument for proper funding. The resources should be sufficient to develop and/or maintain the required SAR service per their obligations as signatories to the relevant aeronautical and maritime SAR conventions. This may require the development of business cases to governments outlining where additional funding is required.

3.7   Such business cases should include consideration of amendments to existing State SAR arrangements which may provide more efficient delivery of the SAR service by better utilisation of existing resources (~~[~~for example by establishing Joint RCCs (JRCCs)~~]~~, or additional funding sources where required (for example charging a levy to aircraft operators for providing the SAR service or seeking company sponsorship for SRUs). The economic value of a life saved when compared against the economic value of a life lost can also be a significant persuasive factor in any business case.

Joint Rescue Coordination Centres (JRCCs)

3.8   Where practicable, States are encouraged to examine the potential benefits that may be derived by the establishment of JRCCs to incorporate the aeronautical and maritime SAR activities and/or facilities of Aeronautical RCCs (ARCCs)/Aeronautical RSCs (ARSCs) and Maritime RCCs (MRCC)/Maritime RSCs (MRSCs). JRCCs have the potential to not only provide a more effective SAR service to both the aeronautical and maritime industries, but also offer potential financial efficiencies by releasing funds for improvements in other SAR areas.

> *Note 1: ~~Where~~ where JRCCs are not practicable, facilities and procedures should be developed which provide and/or enhance effective SAR coordination and collaboration between the ARCCs and MRCCs in support of each other, to provide an efficient and integrated State SAR system for both aeronautical and maritime SAR incident response.*
>
> *Note 2: ~~A~~ a JRCC may be established either physically or by virtual means using the integration of communications, information and computer technology between an ARCC and an MRCC to achieve full search and rescue coordination functionality.*

3.9   Where practicable, the JRCC evaluation may consider consolidation of two or more different State RCCs into single sub-regional JRCCs.

> *Note: a single sub-regional JRCC may be established in partnership with a group of States and serve as a 24-hour nodal JRCC supported by Joint ~~Rescue Sub-Centres~~ RSCs (JRSCs) of the other partner States which may not necessarily need to be staffed 24 hours but could be activated when required.*

Asia/Pacific SAR Plan ~~V4.0~~ V5.0

ABBREVIATIONS AND ACRONYMS

AAM	Advanced Air Mobility
ADS-B	Automatic Dependent Surveillance-Broadcast
~~ADS-C~~	~~Automatic Dependent Surveillance-Contract~~
ADT	Autonomous Distress Tracking
AIS	Automatic Identification System
AIP	Aeronautical Information Publication
ANP	(Regional) Air Navigation Plan
~~ANRF~~	~~Air Navigation Reporting Form~~
ANSP	Air Navigation Service Provider
APANPIRG	Asia/Pacific Air Navigation Planning and Implementation Regional Group
APEC	Asia Pacific Economic Cooperation
APSAR/TF	Asia/Pacific SAR Task Force
APSAR/WG	Asia/Pacific SAR ~~Working Group~~ Workgroup
ARCC	Aeronautical Rescue Coordination Centre
ARF	ASEAN Regional Forum
ARSC	Aeronautical Rescue Sub-Centre
A/SMC	Assistant SMC
ASEAN	Association of Southeast Asian Nations
ASPOCS	Administrative Single Point of Contact for SAR
ATC	Air Traffic Control
ATFM	Air Traffic Flow Management
ATM	Air Traffic Management
ATS~~U~~	Air Traffic Service ~~Unit~~
CONOPS	Concept of Operations
COSPAS-SARSAT	Cosmicheskaya Sistema Poiska Avariynyh Sudov-Search and Rescue Satellite-Aided Tracking
EI	Effective Implementation
ELT	Emergency Locator Transmitter
ELT(DT)	Emergency Locator Transmitter (Distress Tracking)
EPIRB	Emergency Position Indicating Radio Beacon
FIR	Flight Information Region
GADSS	Global Aeronautical Distress and Safety System
GANP	Global Air Navigation Plan
GASP	Global Aviation Safety Plan
GLONASS	Global Navigation Satellite System
GPS	Global Positioning System
IAMSAR	International Aeronautical and Maritime SAR (Manual)
ICAO	International Civil Aviation Organization
IMO	International Maritime Organization
IORA	Indian Ocean Rim Association
~~iSTARS~~	~~Integrated Safety Trend Analysis and Reporting System~~
JRCC	Joint (aeronautical and maritime) Rescue Coordination Centre
JRSC	Joint Rescue Sub-Centre
JWG-SAR	ICAO/IMO Joint Working Group on the Harmonisation of Aeronautical and Maritime Search and Rescue
LADR	Location of an Aircraft in Distress Repository
LOA	Letter of Agreement
LRIT	Long Range Identification and Tracking of Ships
MCC	Mission Control Centres
MEOSAR	Medium-altitude Earth Orbit Search and Rescue
MOU	Memorandum of Understanding
MRCC	Maritime Rescue Coordination Centre

Asia/Pacific SAR Plan ~~V4.0~~ V5.0

MRO	Mass Rescue Operations
MRSC	Maritime Rescue Sub-Centre
~~OJT~~	~~On-the-Job Training~~
PFL	Post Flight Localization
PLB	Personal Locator Beacon
PQs	Protocol Questions
PSCS	Preferred SAR Capability Specifications
RCC	Rescue Coordination Centre
~~RPAS~~	~~Remotely Piloted Aircraft Systems~~
SAR	Search and Rescue
SARPs	Standards and Recommended Practices
SAARC	South Asian Association for Regional Cooperation
SAREX	SAR Exercises
SC	Search and Rescue Coordinator
SCC	Search and Rescue Coordinating Committee
SMC	Search and Rescue Mission Coordinator
SMS	Safety Management System
SOLAS	International Convention for the Safety of Life at Sea
SPC	Pacific Community
SPOC	SAR Point of Contact
SRR	Search and Rescue Region
SRU	Search and Rescue Unit
SWIM	System Wide Information Management
UAS	Unmanned Aircraft System
ULB	Underwater Locating Device
UNCLOS	United Nations Convention on the Law of the Sea
USOAP-CMA	Universal Safety Oversight Audit Programme – Continuous Monitoring Approach

Asia/Pacific SAR Plan V4.0 V5.0

BACKGROUND INFORMATION

Improvement Drivers

5.1   The ICAO USOAP-CMA focuses on a State's capability in providing safety oversight by assessing whether the State has effectively and consistently implemented the critical elements of a safety oversight system and determining the State's level of implementation of ICAO's safety-related SARPs, including ICAO Annex 12 — *Search and Rescue*, and associated procedures and guidance material.

5.2   ICAO APAC Asia/Pacific Regional Office maintains the APANPIRG Air Navigation Deficiencies Lists, including the ATM and Airspace Safety Deficiencies List where SAR-related deficiencies are recorded.   This list is based on the uniform methodology for identification, assessment and reporting of such deficiencies as described in Part V of the APANPIRG Procedural Handbook. By identifying and addressing specific deficiencies, APANPIRG and its Sub-groups facilitate the development and implementation of action plans by States to resolve identified deficiencies, where necessary.

5.3   The APANPIRG Air Navigation Deficiencies information has been populated into the ICAO iSTARS (Integrated Safety Trend Analysis and Reporting System) CHECK database and is accessible through the ICAO Secure Portal. The intention is to merge this data with the CMA Data, and manage the deficiencies using a single web-based process.

Asia/Pacific SAR System Monitoring

5.4   Significant ICAO Annex 12 compliance weaknesses had been identified within the Asia/Pacific Region based upon information provided (and in many cases not provided) by States to the ICAO Asia/Pacific Regional Office. This regional status of the SAR capability and SAR agreements as reported by States is recorded in tables made available to APANPIRG. This process is expected to be enhanced with the integration of SAR elements into the Seamless ATM on-line monitoring system.

ICAO Global Aeronautical Distress and Safety System (GADSS)

5.5   The In response to the tragedies of Malaysia Airlines flight MH370 in 2014 and Air France flight AF447 in 2009, highlighted the GADSS has been developed with the primary objective of addressing vulnerabilities in the air navigation system which had hampered the timely identification and location of aircraft in distress, particularly in remote oceanic areas. This , and which significantly hindered effective SAR efforts and recovery operations.

5.6   As part of the response to the Conclusions and Recommendations from the 2014 ICAO Multi-disciplinary Meeting on Global Tracking, ICAO developed a Concept of Operations (CONOPS) for a GADSS. The implementation of this target concept affects the provision of services such as air traffic control, SAR and accident investigation. It contained a large number of measures targeting improvements in SAR system response integrated within the wider ATM and aircraft/airline operations systems. The four main functions of the GADSS are aircraft tracking, location of an aircraft in distress, Post Flight Localization (PFL) and flight recorder data recovery. These functions are enabled through GADSS information management [such as the ICAO OPS Control Directory and the Location of an Aircraft in Distress Repository (LADR)] which allows for the sharing of information and efficient communication between stakeholders.

5.7   The CONOPs notes that the effectiveness of the current alerting systems and SAR services should be addressed by a number of key improvement areas. The CONOPS also included aspects which potentially involve use of different distress systems, including for example 406 MHz

Asia/Pacific SAR Plan ~~V4.0~~ V5.0

~~Emergency Locator Transmitters (ELTs) and the Cospas-Sarsat system as part of the proposed GADSS solution.~~ The aircraft tracking function provides an automated position report every 15 minutes or less, which can help reduce the time to resolve the status of an aircraft or, if necessary, help locate an aircraft.

5.8   ~~Guidance on the aircraft tracking function is provided in ICAO Circular 347, *Aircraft Tracking Implementation Guidelines*. Chapter 8 outlines procedures to be followed when an operator notifies an ATSU of a missed aircraft 15 minute tracking report. This circular is for aircraft operators and civil aviation authorities, and applies to the aircraft tracking function that commenced on 8 November 2018. Of particular relevance is information from the circular Section 8.2 and Appendix C *Missed 4D/15 Position Report Form for Operator*, which has been updated and is now included in ICAO Doc 8168 *Procedures for Air Navigation Services – Aircraft Operations* (PANS-OPS) Volume III – *Aircraft Operating Procedures* Section 10 – *Flight Tracking*. The operator is required to notify the air traffic services unit (ATSU) of a missed aircraft 4D/15 tracking report (four-dimensional position of individual aircraft in flight at 15-minute intervals). The information that the operator has to provide the ATSU closely aligns with what the ATSU has to provide the RCC (using the ALR message described in ICAO Doc 4444 – *PANS – Air Traffic Management* (PANS ATM) Appendix 3. However, the ATSU to RCC requirement is not automated (machine-to-machine).~~ The location of aircraft in distress function uses an Autonomous Distress Tracking (ADT) system which has the capability to automatically determine and transmit the position of an aircraft with an in-flight distress condition, at least every minute, in a manner which is resilient to failures of the aircraft's electrical power, navigation and communication systems. This function is expected to significantly improve the ability for SAR services to locate such aircraft in distress and rescue survivors.

5.9   ~~The ADT device notifies the aircraft operator (airline, air cargo, business jet or similar) of the last known position of an aircraft that may be in a distress condition in flight. ADT activation is a notification, not a distress alert. This would be as a minimum at one-minute intervals while the aircraft is in flight. The operator is responsible to make the position information available to the ATSUs and RCCs. To facilitate this ICAO is leading the effort to create an ADT Location of Aircraft in Distress Repository (LADR) as a database for storing the ADT information. The LADR would then notify the aircraft operator, and if subscribed, the ATSU and RCC that ADT information relevant to them is in the LADR for those stakeholders to pull the data.~~ Following an aircraft accident, PFL provides accurate aircraft position information by means of an ELT and/or homing signals. To assist with localization of wreckage, this function specifies a number of requirements for ELTs and Underwater Locating Devices (ULDs). To ensure accident investigation authorities obtain timely access to flight recorder information, new types of large aircraft will be equipped with a means to recover the flight recorder data in a timely manner.

5.10   ~~When ADT activates, the ATS unit may already be informed by other means of an emergency situation, such as from the aircrew. For aircraft in-flight, the aeronautical alerting process is based on the ATS unit making the decision about whether or not the aircraft is in distress and, if determined to be a distress situation, must notify the RCC immediately before contacting the operator per Annex 11. ICAO has not prescribed a specific technology for ADT but one of the technologies will be a new beacon type of the aeronautical 406 MHz emergency locator transmitter – the ELT Distress Tracking ELT(DT). The ELT(DT), as an ADT device, does not have a requirement to meet all of the ELT standards such as being crash-survivable or having the 121.5 homing signal.~~

5.11   ~~ADT notifications from the ELT(DT) will be delivered directly to SAR services using the existing Cospas-Sarsat ground segment infrastructure and also via the LADR.~~

5.12   ~~Having the ADT notifications from the ELT(DT) going directly to an RCC in addition to via the LADR was not the original intent of ICAO and is a major change in the aeronautical alerting process envisaged under the GADSS. RCCs need to prepare to be able to respond to ADT activations and that the aircraft could remain in flight across multiple SAR regions. RCC staff also need to be provided with training to ensure understanding of the ADT system and processes.~~

Asia/Pacific SAR Plan ~~V4.0~~ V5.0

5.10   ~~For ADT notifications from the ELT(DT) or other types of ADT systems, RCCs may need to update SAR practices and procedures for concerns such as:~~ RCCs need to implement updated SAR practices and procedures for the GADSS. RCCs need to be able to respond to ADT activations, including that the aircraft could remain in flight across multiple SAR regions. RCC staff also need to be provided with training to ensure understanding of the ADT system and processes. The GADSS relies on implementation by SAR services of:

- accurate delimitation of SAR regions to ensure proper transfer of the SAR operation to the next responsible RCC;

- effective and efficient coordination, and procedures between the ATS unit ~~(or aeronautical RCC) and the maritime RCC~~ and responsible RCC;

- harmonized operations between aeronautical and maritime SAR services.~~; and~~

- ~~initial response to an ADT notification from the ELT(DT), including rapid contact with the ATS unit to notify and confirm if the aircraft is in distress.~~

5.11   ~~It will be necessary to develop common ADT procedures, nationally and regionally, among the three primary stakeholders (aircraft operators, ATS units, and RCCs) for efficient handling of information received from the ADT system. The 2022 edition of the IAMSAR Manual provides a comprehensive overview of ADT. The IAMSAR Manual, Volume II appendix Autonomous distress tracking of aircraft in flight includes a Schematic sequence of events arising from an ADT device activation that serves as a flowchart of actions. The schematic sequence of events together with background notes is provided in **Appendix 1**.~~ ICAO has not prescribed a specific technology for ADT. One ADT technology solution now in operational use is a new Cospas-Sarsat 406 MHz beacon type, the Emergency Locator Transmitter for Distress Tracking, or ELT(DT). The Cospas-Sarsat System section below has further information on ELT(DT)s.

5.12   ~~ICAO is in the final stage of completing a formal, comprehensive manual on GADSS: ICAO Doc 10165 Manual on Global Aeronautical Distress and Safety System (GADSS). Doc 10165 complements the ICAO Concept of Operations, (CONOPS), Global Aeronautical Distress & Safety System, (GADSS), version 6.0, and incorporates all of its pertinent information. Doc 10165 also incorporates the information provided in ICAO Circular 347, and ICAO Document 10054, Manual on Location of Aircraft in Distress and Flight Recorder Data Recovery.~~ ADT notifications from the ELT(DT) will be delivered to RCCs by both the existing Cospas-Sarsat Data Distribution System and the ICAO LADR. RCCs and ATS units need to implement procedures that take these two delivery methods into account to ensure effective coordination aligned with ICAO Annexes 11 and 12 provisions on alerting and SAR services.

5.13   The IAMSAR Manual provides a comprehensive overview of ADT. The IAMSAR Manual Volume II Appendix V *Autonomous distress tracking of aircraft in flight* includes anticipated *flow of events arising from an ADT device activation* that serves as a flowchart of actions. Per the requirements of ICAO Annex 12, each RCC, and as appropriate, RSC is to:

- maintain up-to-date contact details in the OPS Control Directory; and

- subscribe and maintain access to the location of an aircraft in distress repository.

5.14   The *Manual on Global Aeronautical Distress and Safety System* (ICAO Doc 10165) provides guidance and information on the implementation and operation of the GADSS and is intended to facilitate the uniform application of SARPs in ICAO Annex 6 – *Operation of Aircraft*, Part I – *International Commercial Air Transport – Aeroplanes* and provisions in the *Procedures for Air Navigation Services - Aircraft Operations* (PANS-OPS, ICAO Doc 8168). Additional practical guidance is provided in the *LADR and OPS Control User Manual* developed by ICAO and EUROCONTROL which is available within the LADR application Help menu.

Cospas-Sarsat System

Asia/Pacific SAR Plan ~~V4.0~~ V5.0

5.15   The International Cospas-Sarsat System is available to maritime and aviation users and to persons in distress situations who activate a 406 MHz distress beacon. ~~operating at 406 MHz.~~ Access is provided to all States on a non-discriminatory basis and is free of charge for the end-user in distress. On average, about 7 persons are rescued every day with the assistance of Cospas-Sarsat alert and location data. The system is composed of:

- distress beacons operating at 406 MHz, with a homing signal transmitting on 121.5 MHz and/or 243.0 MHz [except ELT(DT)s which do not transmit a homing signal in-flight];

- SAR payloads on satellites in low- and mid-altitude Earth orbit, and in geostationary orbit~~;~~;

- ground receiving stations (LUTs) spread around the world; and

- a network of Mission Control Centres (MCCs) to distribute distress alert and location information to SAR authorities, worldwide.

5.16   Cospas-Sarsat has been developing two major enhancements to its distress-alerting System of value to all System users, including the aviation industry. One is the introduction of in 2020, of a new space-segment architecture based primarily on Medium-altitude Earth Orbit Search and Rescue (MEOSAR) payloads aboard the European Commission's Galileo system, the Russian Federation's Global Navigation Satellite System (GLONASS) and the United States' Global Positioning System (GPS) satellites. Another potential satellite system from China, the Beidou Navigation Satellite System, could ~~be~~ become part of the Cospas-Sarsat Space Segment.

5.17   This architecture permits determination of distress incident location (independent of any location data transmitted in the beacon message) beginning with the first burst from the distress beacon. This could mean near real-time and very frequent delivery of distress alerts.

5.18   The SAR/Galileo space segment also provides a Return Link Service (RLS) that, among other possible future uses, provides an acknowledgment from the MCC back to the beacon to confirm that the distress message has been received.

5.19   The technical specifications for the second generation 406 MHz distress beacon have been approved, including for ELTs. This new generation of beacons based on wideband spectrum technology improves speed and accuracy in locating an activated distress beacon. The period from beacon activation to first transmission is reduced from 50 seconds to three seconds. The specification considers in-flight activation of ELTs when certain flight parameters are exceeded. Consequently, false alerts will affect real SAR events significantly.

5.20   Cospas-Sarsat ~~will~~ has introduced a new beacon type, ~~in 2023, an ELT which for distress tracking.~~ the ELT(DT)~~s~~ which will activate autonomously when an aircraft exceeds certain predetermined flight parameters ~~that have been predetermined by expert agencies to indicate that which,~~ unless corrected, ~~a crash is imminent~~ may result in an imminent crash. ELT(DT)s allows an aircraft in distress to be tracked in-flight, prior to any crash, without human intervention. ELT(DT)s use both the existing beacon transmission method (first-generation) and the second-generation (spread-spectrum) modulation schemes. Distress data from activated ELT(DT)s will be delivered directly to distress authorities as well as the ICAO ~~Location of an Aircraft in Distress Repository (LADR)~~. A growing number of aeroplanes are now operating globally with ELT(DT)s fitted.

5.21   States also need to ensure the critical requirement to provide for a suitable, clear and simple means for aircraft owners to register and keep updated their 406 MHz distress beacon details.

> *Note: information ~~on~~ regarding beacon registration ~~is~~ can be found at:*
> *https://www.cospas-sarsat.int/en/beacons-pro/beacon-regulations-pro/ibrd-user-information-for-professionals).*

5.22   Entries in the beacon register should be available to both aeronautical and maritime RCCs on a 24-hour basis (ICAO Annex 12 ~~– *Search and Rescue*~~ refers, although ICAO Annex 10 establishes the registration requirement).

5.23   Further information for distress authorities can be found in the RCC Handbook, document C/S G.007~~,~~ (https://www.cospas-sarsat.int/en/documents-pro/system-documents).

<u>ICAO Annexes and ~~PANS~~ Documents</u>

5.24   States should note that ICAO Annex 12 should be read in conjunction with elements of the following ICAO Annexes and ~~PANS~~ Documents:

Annex 6 – *Operation of Aircraft*;

Annex 10 – *Aeronautical Telecommunications*;

Annex 11 – *Air Traffic Services* (particularly Chapter 5 Alerting Service)*;*

Annex 14 – *Aerodromes* (particularly aerodrome emergency planning with the RCC);

Annex 15 – *Aeronautical Information Services*~~,~~ (particularly Section 6.3.2 *NOTAM*);

Annex 19 – *Safety Management*;

~~DOC~~ Doc 4444 – *PANS-ATM*;

Doc 8168 – *PANS-OPS Volume III* (particularly Section 10 Flight Tracking); ~~and~~

Doc 9731 – *IAMSAR Manual*;

Doc 9734 – *Safety Oversight Manual*;

Doc 10066 – ~~*PANS – Aeronautical Information Management* (*PANS-AIM*)~~ (particularly Appendix 2 GEN 3.6 Search and rescue);

Doc 10088 – *Manual on Civil-Military Cooperation in Air Traffic Management*;

Doc 10165 – *Manual on Global Aeronautical Distress and Safety System*; and

Doc 10205 – *Manual on Hazards at Aircraft Accident Sites.*

Asia/Pacific SAR Plan ~~V4.0~~ V5.0

CURRENT SITUATION

~~Global Situation~~

~~6.1   The ICAO USOAP Report of audit results, 1 January 2016 until 31 December 2018, revealed that, while the Effective Implementation of SAR among audited States was 78%, more than 50% of audited States did not effectively conduct surveillance over SAR services.~~

Asia/Pacific SAR Analysis

Universal Safety Oversight Audit Programme – SAR-Related Protocol Questions

~~6.2   The last decade prior to the COVID-19 pandemic had seen a steady increase in air traffic in the Asia/Pacific Region. Maritime traffic was also increasing, adding further urgency to ensure that States with oceanic SAR responsibilities in the region met the requirements of both ICAO and IMO for the provision of aviation and maritime SAR services. While the pandemic led to a significant reduction in air traffic, recovery of full seat capacity in the Asia/Pacific Region is expected by 2023 – 2024.~~

6.1   An analysis of the ~~26~~ 16 Universal Safety Oversight Audit Programme (USOAP) SAR-related Protocol Questions (PQs) indicated that the overall Effective Implementation (EI) in the Asia/Pacific Region for SAR had risen from ~~50.7% in July 2015~~ 52% in October 2022 to ~~58.99% in March 2019~~ 55% in April 2025.

6.2   **Figure 1** provides the overall Asia/Pacific Region EI ~~of~~ for individual SAR-related PQs in ~~March 2019~~ October 2022.

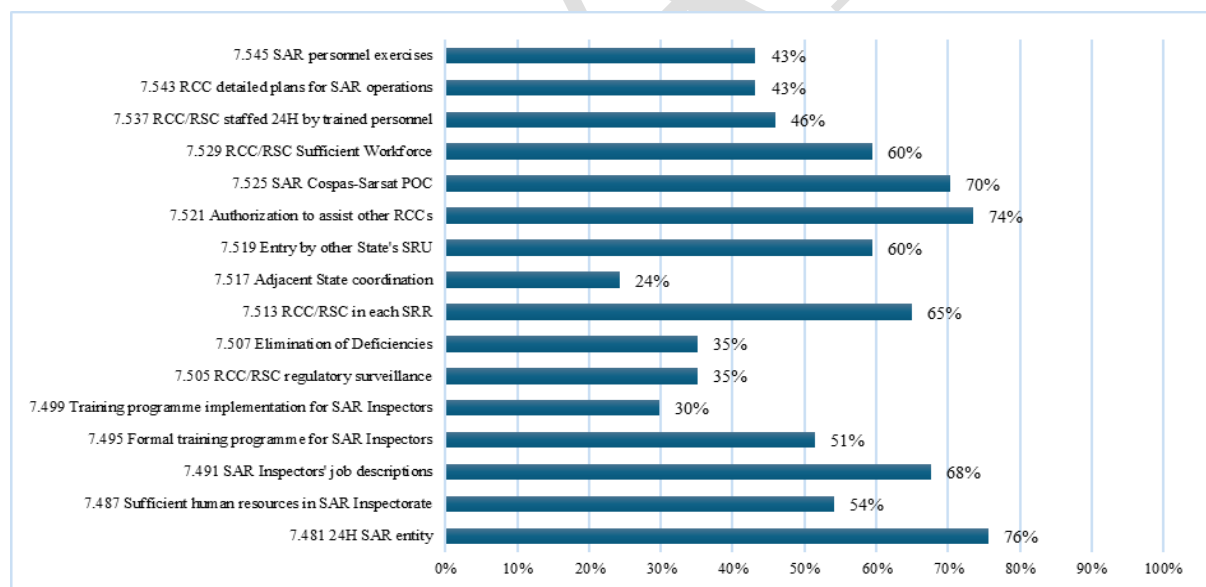**Figure 1**: ~~APAC~~ Asia/Pacific USOAP CMA SAR-related PQ Compliance ~~– March 2019 (average: 59)~~ (October 2022)

~~6.2   Following an update and consolidation of the USOAP CMA PQs in 2020, the number of SAR-related PQs was reduced from 26 to 17.~~

6.3   **Figure 2** provides the overall Asia/Pacific Region EI for individual SAR-related PQs in ~~October 2022~~ April 2025.
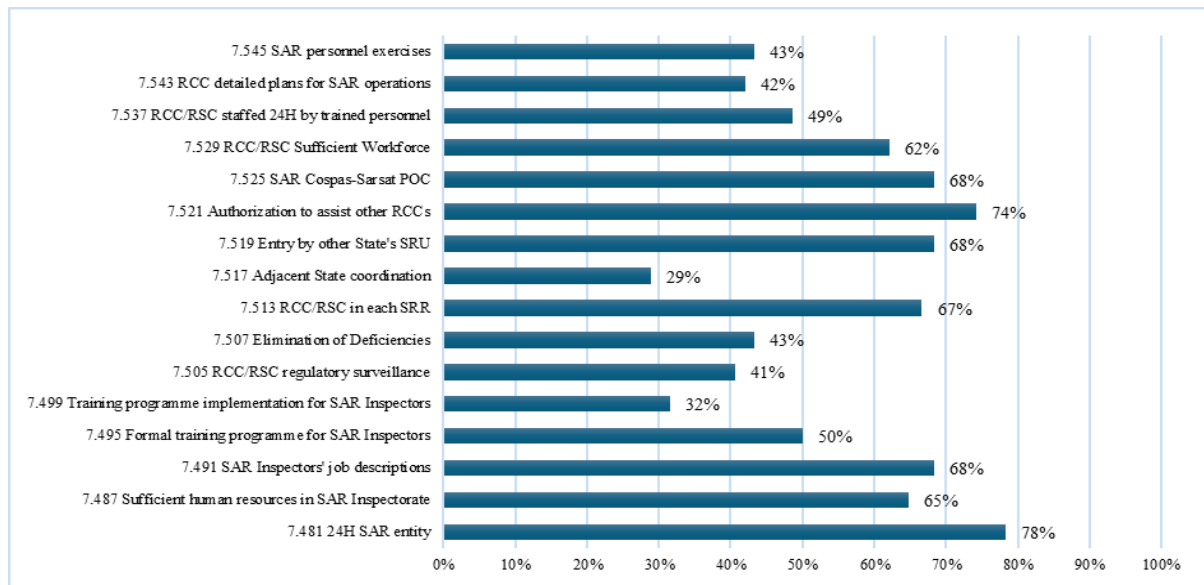
Asia/Pacific SAR Plan ~~V4.0~~ V5.0

Figure 2: ~~APAC~~ Asia/Pacific USOAP CMA SAR-related PQ Compliance ~~October 2022 (average 53.13%)~~ (April 2025)

6.4   From these analyses it appeared that the major areas of weakness were in effective SAR oversight, coordination with adjacent States, elimination of deficiencies. Therefore, a focus on the minimisation of barriers associated with the efficient cross-border coordination of SRU (such as pre-arranged approval) and other coordination mechanisms, including updates of SAR agreements (whatever their form) was vital.

6.5   The analyses also revealed the need for improved systemic approaches to training for both SAR inspectors and personnel responsible for the provision of SAR services, including the regular organisation of effective SAR exercises that test systems and personnel. It should be noted that the training of SAR inspectors does not necessarily require SAR-specific technical training, but was more focused on effective audit and inspection techniques, etc.

Regional SAR Implementation Performance – the Asia/Pacific ~~Regional~~ SAR Plan

6.6   With the advent of the Asia/Pacific SAR Plan and its more comprehensive expectations, an accurate assessment of capability aligned with the ~~SAR~~ Plan was developed. This assessment could be used by States as a means of internal gap analysis, in addition to providing a more accurate metric of the Asia/Pacific SAR Plan implementation~~, noting that implementation was scheduled for 2019~~. **Figure 3** summarizes the reported implementation of the performance expectations of the Asia/Pacific SAR Plan (see Section 7).
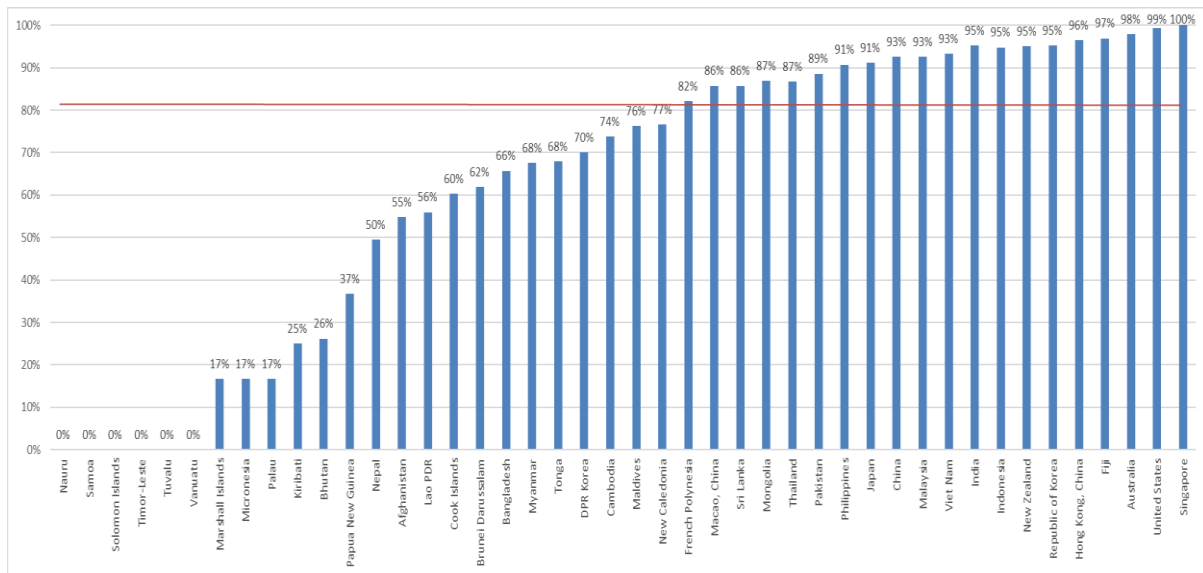
Asia/Pacific SAR Plan ~~V4.0~~ V5.0

Figure 3: Implementation Status of the Performance Expectations of the Asia/Pacific ~~Regional~~ SAR Plan – ~~October 2022~~ April 2025 (Average ~~62~~ 63%)

6.7   The Asia/Pacific ~~Regional~~ Region Air Navigation Plan ~~Vol~~ Volume II Section 3 *Specific Regional Requirements* states, in respect of State reporting of implementation regional air navigation planning elements:

> *a 'robust status plan that is not subject to consideration as an APANPIRG Deficiency is one that is evaluated as achieving 90% or more implementation of the planning elements.*

6.8   Accordingly, and noting that SAR services were a safety of life matter. APANPIRG ATM and Airspace Safety Deficiencies were recorded for ~~32~~ 30 Administrations in the Asia/Pacific Region, for failure to reach 90% or more implementation of the performance expectations of the Asia/Pacific SAR Plan (~~APANPIRG/32, December 2021~~ APANPIRG/35, November 2024).

Asia/Pacific SAR Coordination Forums

6.9   The Asia/Pacific Region will benefit from the cooperation and coordination of States and International Organizations involved in the APSAR ~~Working Group~~ Workgroup. The establishment of permanent joint ICAO/IMO Regional SAR Forums to enable collaboration and cooperation on oceanic SAR matters across the specific oceanic regions and including adjacent ICAO regions should be considered.

6.10   There were several regional initiatives for cooperative support and development already being undertaken in the Asia/Pacific Region to assist with SAR capability enhancement.

6.11   Such improvement programmes could result from a request by a State needing assistance, ICAO/IMO oversight, the users of the SAR system itself, an audit or following a SAR 'Go-Team' visit that identifies weaknesses in the State's SAR capability (a 'Go Team' normally consists of external SAR experts from ICAO/IMO, more advanced 'champion' States or external agencies such as Cospas-Sarsat). The programs can be conducted by experts from a 'champion' State, or through a cooperative effort by several States or a regional body.

> *Note: **Appendix 2** Appendix 1 provides a summary of benefits to the SAR System of States assisting other States.*

Asia/Pacific SAR Plan ~~V4.0~~ V5.0

Barriers

6.12   The following potential issues should be considered to ensure they do not become barriers to the achievement of the expected SAR capability:

a)   absence of established appropriate legal framework designating, recognizing, supporting and giving authority to national SAR authorities, RCCs and SMCs;

b)   inadequate funding and equipping of SAR authorities and in particular, resourcing of RCCs;

c)   absence of an appropriate SAR organizational framework;

d)   absence of a national SAR committee;

e)   lack of clarity of responsibilities for each component of the SAR system;

f)   inadequate collaboration and cooperation between aeronautical and maritime SAR agencies;

g)   absence of bilateral/multi-lateral/international SAR ~~Agreements~~ agreements;

h)   inadequate civil/military cooperation; and

i)   complacency about, or lack of recognition of, the importance or priority given to SAR.

Global and Regional SAR Issues

6.13   States should monitor outcomes from global and regional ICAO and IMO SAR forums to ensure their State SAR authorities are updated on relevant SAR developments, otherwise State planning may not be synchronized with external international expectations, including users. Such forums may include APANPIRG and its Sub-Groups, other ICAO Region SAR groups, the ICAO/IMO JWG-SAR, ICAO High Level Safety Conferences, etc.

6.14   The provision of sufficient resources is critical in a number of areas, including:

a)   Financial –

- funding for 24-hour RCC facility and staff;

- funding ~~for use/hire of search and rescue units~~ arrangements/agreements for hiring/payment/sharing of SRUs to permit rapid deployment; ~~and~~

- provision of a suitable administrative process enabling financial support including the ability for SAR authorities to quickly authorise payments required for emergency response aircraft, vessels and supporting logistics such as fuel.

b)   RCC personnel – a suitable number of trained and skilled staff, supplemented by a pool of trained RCC support staff where appropriate;

c)   RCC facilities –

- appropriate RCC facility space;

- minimum RCC tools (such as current charts, plotting equipment, documentation, etc.);

- ability to identify and task available SRUs;

- aircraft and vessel tracking information including ATS surveillance, Automatic Identification System (AIS), ADS-B and other satellite tracking systems, etc.;

Asia/Pacific SAR Plan ~~V4.0~~ V5.0

- reliable and rapid H24 communications, and a suitable means to ~~–~~

  o receive, communicate and acknowledge distress alerts;

  o communicate with ATS units, other RCCs/RSCs, Coastal Radio Stations, COSPAS-SARSAT Mission Control Centres (MCCs), military units, medical services, meteorological offices, aircraft and vessel operators, etc.;

- information technology ~~–~~

  o RCC workstation computers;

  o ~~Software~~ software including basic databases, drift modelling, incident management, etc.;

  o reliable internet access;

d) Contingency ~~–~~ back-up RCC facility, or arrangement with another RCC as a contingency against inability to operate from the primary RCC due to the need to evacuate or loss of systems, etc.;

e) Search and Rescue Units (SRUs) ~~–~~

- available and ~~suitable SAR aircraft and crews~~ suitably equipped SRUs with SAR trained crews and SAR capability –

  o aircraft units;

  o maritime units;

  o land units;

  o specialised units (paramedical, divers, etc.);

- ~~funding arrangements/agreements for hiring/payment/sharing of SRUs to permit rapid deployment; and~~

- ~~Available~~ available and suitable SAR survival equipment for delivery by aircraft to survivors and to assist SAR coordination efforts (e.g.~~.~~: SAR Datum Buoys, droppable life rafts and survival supplies, etc.);

f) Training support –

- RCC staff – basic and ongoing;

- SRU crews – pilots, air crew, ~~and~~ air observers, vessel crew, land crews;

- RCC support staff – basic and refresher; and

- SAR inspectorate staff ~~–~~ basic and on-going.~~; and~~

- ~~Other SAR Units~~

  o ~~aeronautical units~~

  o ~~maritime units~~

  o ~~land units~~

  o ~~specialised units (paramedical, divers, etc.)~~

Asia/Pacific SAR Plan ~~V4.0~~ V5.0

PERFORMANCE IMPROVEMENT PLAN

Preferred SAR Capability Specifications (PSCS)

Note 1: PSCS are the non-mandatory expectations on all Asia/Pacific ~~Region~~ States to enhance SAR systems in order to meet a minimum level of SAR capability, with a high degree of interoperability and harmonisation, and interoperability with other ATM components such as Air Navigation Service Providers (ANSPs) and aerodrome operators, and between aeronautical and maritime SAR services. PSCS were not expected to contravene existing ICAO Annex 12 standards.

Note 2: Asia/Pacific SAR Plan Version 1.0, published in September 2015, included the expectation that all PSCS would be implemented by 07 November 2019. Noting that, at the time of publication of this fifth version of the Plan, the implementation date is, ~~at the time of publication of this fourth version of the Plan,~~ several years in the past, and also noting that further changes to PSCS are expected to be incremental and relatively minor in scope, dates for future implementation are not included. All States should note that APANPIRG ATM and Airspace Safety Deficiencies for non-implementation of 90% of the elements of this ~~plan~~ Plan will continue to be raised and maintained by the ICAO Asia/Pacific Regional Office.

7.1   *Legal Framework and Structure Planning*: All States should develop statutes and related provisions that establish or enhance the legal foundation for a State SAR organization and its framework, resources, policies and procedures, where appropriate, to:

a)   ensure that it is party to, and/or aligned with the following Conventions, as applicable –

    i.   Convention on International Civil Aviation, 1944;

    ii.   International Convention on Maritime Search and Rescue, 1979; and

    iii.   International Convention for the Safety of Life at Sea (SOLAS), 1974;

    ~~iv.   Convention on the High Seas, 1958; and~~

    ~~v.   United Nations Convention on the Law of the Sea (UNCLOS), 1982;~~

b)   unless delegated by written agreement, establish an entity that provides, on a 24-hour basis, SAR services within its territories and designated area of responsibility/SRR;

c)   establish a national SAR committee consisting of civil and, where appropriate, military members to enable a whole-of-government approach;

d)   empower ~~SAR Mission Coordinators~~ SMC with the authority to adequately carry out their responsibilities to ensure no delay to timely SAR response actions;

e)   conduct studies to check the feasibility for, and develop an implementation plan if practicable, the integration of aviation and maritime SAR ~~activities~~ services, and as far as practicable, civil and military SAR activities, including joint training, exercises and familiarization of staff and review of documentation to ensure harmonization of procedures~~, and joint exercises~~;

f)   conduct studies to align, as far as practicable, aeronautical and maritime ~~Search and Rescue Regions (SRRs)~~; and SRRs ~~and~~ with Flight Information Regions (FIRs); ~~and~~

20

g) establish a single State SAR Plan that –

   i.   designates the responsible RCC(s), RSC(s) and 24-hour SPOC/~~ASPOC~~;

   ii. describes the relevant aeronautical and maritime SRRs, including the coordinates and geographical chart depiction of the aeronautical and maritime SRR and neighbouring aeronautical and maritime SRRs;

   iii. establishes an Administrative Single Point of Contact for SAR (ASPOCS) for non-urgent, administrative matters, such details to be submitted to the ICAO Asia/Pacific Regional Office;

   iv. details the National SAR Committee;

   v.   details the governmental and non-governmental agencies with authority and responsibility for SAR coordination and supporting of SAR response operations within its territories and designated area of responsibility;

   vi. details required and available SAR facilities, personnel, and equipment;

   vii. describes the SAR manuals, plans and procedures used for national and regional cooperative SAR response arrangements;

   viii. details the SAR personnel training and competency programme, qualification standards, SAR certification if applicable and SAR cooperation training;

   ix. lists the SAR agreements required;

   x.   is electronic and accessible on the Internet, such details to be submitted to the ICAO Asia/Pacific Regional Office, if possible; and

   xi. is monitored by quality assurance processes.

7.2   *SAR Standards and Procedures*: All States should:

   a) establish aerodrome emergency plans that provide for ~~co-operation~~ cooperation and ~~co-ordination~~ coordination ~~with~~ between the aerodrome operator and RCCs. ~~(~~ The plans should include clear responsibilities for response to emergencies in proximity to, but outside, the aerodrome boundaries including adjacent waterways~~)~~;

   b) establish SAR agreements with States having adjoining SRRs or FIRs, including trans-regional neighbours (the agreements should include clear responsibilities for overlapping or non-adjoining aeronautical and maritime SRRs);

   c) provide up to date cross-border information on SAR capability (this should be included in bilateral SAR agreements);

   d) pre-arrange procedures for cross-border SAR responses to allow entry of another State's SRUs into State territory (this should be included in bilateral SAR agreements);

   e) ~~establish a program for regular SAREX, which may be a desktop communications exercise, with each alternate SAREX being a full exercise (this expectation may be fulfilled by participating in a sub-regional SAREX that tests the State's SAR system);~~

   f) establish RCC plans for response to ~~Mass Rescue Operations (MROs)~~ integrated with national disaster plans;

   g) establish SAR Operations Plans between the State's SAR ~~Authorities~~ authorities and Government, ~~Military~~ military and ~~Commercial~~ commercial operators, including those with ~~an over-water rotary-wing or sea plane capability, to include~~ a capability to assist with an air, maritime or land SAR capability, or other support capability (e.g. communications, meteorology, logistics, etc), including:

Asia/Pacific SAR Plan ~~V4.0~~ V5.0

    i.   procedures for cooperation and deployment of foreign SRUs;

    ii. provision for translators/liaison Officers/Embassy Officers for the daily tasking of the SRUs at the RCC;

    iii. provision of information for logistic and administrative support (hotels, fuel, security passes, food, medicine, etc.);

    iv. instructions on communication (ops normal reports, sightings, etc.) for search planning, command and control to foreign SRUs;

    v.   planning and arrangements that ensure the availability of State and other SRU assets, especially over-water rotary wing capability where applicable, to support a timely and effective SAR response; and

    vi. daily end of day report by SRUs to the RCC (via mobile/satellite telephone, email, web-based application, fax, etc.); ~~and~~

    vii. provision of meteorology information;

  h) establish SAR Alerting procedures which:

    i.   are tested and fully integrated with RCC procedures so that RCCs are rapidly notified of any SAR event 24 hours a day;

    ii. include procedures for joint aeronautical and maritime distress alert notification, including reliable delivery and acknowledgement of Cospas-Sarsat distress alerts, support and response to both aviation and maritime SAR incidents;

    iii. where applicable, include protocols for civil and military support and sharing of information~~.~~; and

  i) establish arrangements for situations where RCCs need to conduct SAR operations (in accordance with ICAO Annex 12) at the same time as the accident investigation authority needs to conduct search and recovery operations (in accordance with ICAO Annex 13).

    Note: ~~A~~ a sample MOU between the SAR service and the accident investigation authority is provided in ~~Appendix 3~~ the IAMSAR Manual Volume I Appendix P.

SAR Facilities and Resources

7.3   *RCC Facility*: All States should ensure that RCCs are of sufficient size with adequate provision for operational positions designed in accordance with human factors principles (such as human machine interface) for all SAR incidents from small scale to major searches involving civil and military assets where applicable, and facilities such as:

  a) workstations, telephones (with international access), plotting tables, wall notice/status boards, computer~~,~~ and communications equipment and systems, briefing/debriefing areas, room for storage including incident records and recorders, RCC staff break and rest facilities;

  b) computer resources which may provide support to RCCs with incident management, plotting, search planning, mapping, contact databases, web-based information, etc.;

  c) charts, electronic or paper, which:

    i.   apply to SAR (aeronautical, nautical, topographic and hydrographic);

    ii. depict aeronautical and maritime SRR(s), neighbouring aeronautical and maritime SRRs~~, FIR(s),~~;

    iii. depict SAR resources and ~~SAR Units~~ SRU locations, including in neighbouring

Asia/Pacific SAR Plan ~~V4.0~~ V5.0

SRRs where available;

iv. depict aeronautical navigation information including terrain and obstacles (vertical structures, powerlines, etc with elevation data), FIR(s), ATS units and airspace boundaries including military and Prohibited, Restricted and Danger Areas, Air Defence Identification Zones (ADIZ), and environmentally sensitive areas;

v. depict maritime navigation information including hazardous and environmentally sensitive areas~~:~~;

vi. provide a means of plotting;

d) ability to reliably receive, ~~and~~ acknowledge and action distress alerts 24 hours ~~a day~~ in a timely manner;

e) a means of recording, timely retrieval and playback, and archiving of communications and SAR incident data;

f) shipping/vessel communications and maritime broadcast facilities such as Coastal Radio Stations, RCC radio and satellite communications, marine radio networks;

g) aircraft communications – via ATS units, aircraft operators, satellite communications or direct between RCC and aircraft;

h) access to aircraft and ship tracking data, e.g. ATS surveillance data, GADSS ~~Autonomous Distress Tracking~~ ADT and LADR data, commercial satellite tracking data, ~~Automatic Identification System~~ AIS and Long Range Identification and Tracking of Ships (LRIT) allowing rapid identification of potential aircraft and vessels that may divert to assist;

i) a means of obtaining timely meteorological information – forecast, present and historical data;

j) if applicable, drift modelling software;

k) if applicable, ocean data including sea temperature, currents, winds, tides, etc.;

l) if applicable, SAR Datum Buoys, preferably with satellite tracking capability;

m) RCC documentation and reference material such as plans of operation, procedures manuals, guidance material, ICAO and IMO reference documents, SAR agreements;

n) Cospas-Sarsat equipment and reference material; and

o) when developed and available, System Wide Information Management (SWIM)-enabled systems that can evolve the sharing of ~~Flight Data~~ flight data, ~~Aeronautical Information~~ aeronautical information and ~~MET~~ meteorological data in alignment with contemporary practices being implemented under global and regional planning.

7.4 *Personnel and Training* All States should, where applicable to maintain a 24-hour service:

a) provide adequate ATS resources (either an ATS supervisor or other staff) that can provide relief within ~~Area Control Centres (ACCs)~~ ATS units to allow timely response to SAR alerts and information to RCCs;

b) provide sufficient RCC staffing, including a sufficient number of trained specialist RCC officers including SMCs and Assistant SMCs (A/SMCs);

c) ~~provide a sufficient number of trained specialist RCC officers including SMCs and Assistant SMCs (A/SMCs);~~

c) provide availability of a pool of RCC support staff who are familiar with RCC

operations, but not trained as coordinators, that can assist with the functioning of the RCC ~~during~~ to supplement a SAR incident response;

d) develop SAR personnel position descriptions that detail responsibilities and eligibility criteria for recruitment of operational staff;

e) develop a comprehensive training programme that includes SAR training for:

   i. RCC ~~SAR~~ Coordinators ~~(SCs)~~ based on a competency-based assessment approach to ensure technical proficiency, cyclical (periodic) instruction that provides continuous training to ensure competency is maintained, and a system for maintaining training records; ~~and~~

   ii. SRU staff, including military personnel.

f) facilitate RCC staff to be proficient in the English language; and

g) facilitate a programme of regular liaison between relevant RCCs, ATS units and airline operating centres in order to understand those organizations, facilities and capabilities (reference ICAO Annex 12~~, paragraph 3.1.9~~).

7.5　　*Oceanic Capability*: Where applicable, States should establish additional oceanic SAR capability as far as practicable to ensure a timely and adequate SAR response is available to all oceanic areas of their SRRs. This may be met through cooperative arrangements with neighbouring States or other RCCs.

7.6　　*Search and Rescue Units (SRUs)*: All States should establish capabilities enabling:

a) availability and deployment of suitably crewed, trained and equipped SRUs (including, for SAR aircraft a pool of air search observers trained in visual search techniques), public and/or private, civil and military, for rapid SAR response;

b) availability and deployment of SRU craft that may be in use for another primary purpose but made available to RCCs for SAR purposes on an as needed emergency basis (vessels, aircraft and land units);

c) protocols for civil SAR authorities to request the assistance of military assets, and similarly military SAR authorities to request civil assets;

d) a communication means and information protocols between the State's ~~Aeronautical~~ aeronautical and ~~Maritime~~ maritime SAR ~~Authorities~~ authorities;

e) cooperative use and/or sharing of SAR assets with protocols incorporated within National SAR Plans and bilateral SAR ~~Agreements~~ agreements;

f) pre-arranged government authority for funding of costs associated with hiring of SRUs, and payment for critical supporting logistics such as fuel, to avoid any delays in response availability;

g) pre-approval of specified SRU assets that may be utilised ~~cross-border (requiring diplomatic pre-approval)~~ in the territory of another State or cross-SRR boundary (which may not require diplomatic approval if operating within international airspace or seas); ~~and~~

   Note: IAMSAR Manual Volume I Appendix Q provides a sample expeditious process ~~for expeditious~~ to allow SAR units from an assisting State to enter into the territory of the State of the RCC.

h) aircraft with the ability and regulatory approval to safely conduct SAR missions, including international operations where applicable.

   Note: guidance material on SAR aircraft capability ~~is~~ can be found in the IAMSAR ~~manual~~ Manual Volume II Appendix G Facilities and equipment selection.

Asia/Pacific SAR Plan V4.0 V5.0

7.7   *Distress Beacons*: All States should:

a)   where separate ARCCs and MRCCs exist with responsibility for coincident aviation and maritime SRRs, coordinate distress beacon alert procedures to ensure both RCCs are aware of any distress beacon activations within their areas to avoid duplication of response. For example, MRCCs should ensure their procedures alert ARCCs and ATS units to any EPIRB activations. For distress beacon alerts near SRR boundaries, coordination should also occur with neighbouring State RCCs;

b)   have a reliable distress beacon registration system that:

    i.   provides a readily accessible mechanism (preferably one that is available by Internet as well as other conventional means) to enable distress beacon owners to fulfil their obligation to register ELTs [including ELT(DTs)], EPIRBs and PLBs, and update the registration data as information changes (e.g. change in ownership or disposal);

    ii.   is available to RCCs 24 hours a day and includes up-to-date registration details for all national civil and military ELTs, ELT(DTs), EPIRBs and PLBs;

c)   take steps (including education) required to prepare for, and to implement changes related to, the introduction of second generation beacons, the transition to the MEOSAR satellite architecture, ELT(DTs), and the pending Return Link Service provided by the Galileo constellation;

d)   establish an appropriate nationwide means of disposal for old distress beacons; and

e)   conduct ~~promotional~~ education programmes promoting correct use, handling, storage, registration and ~~dis programmes~~ disposal of distress beacons, including, where appropriate, with airworthiness agencies, and civil aviation and maritime authorities, ~~related to the minimization of~~ and aviation, maritime and land-based beacon user stakeholder groups. A focus should include awareness to minimize false alerts.

Note 1: ~~Information~~ information on beacon registration ~~is~~ can be found at: http://www.cospas-sarsat.int/en/beacons-pro/beacon-regulations-pro/ibrd-user-information-for-professionals.)

Note 2: ~~Incorrect~~ incorrect disposal of distress beacons often causes the deployment of scarce and often expensive SAR resources only to have the beacon located as a non-distress event in a rubbish dump or similar location. This also creates the risk of SAR resources being diverted away from a real emergency should it arise at the time. Beacon batteries are hazardous items which should be disposed of in an environmentally friendly manner.

Note 3: ~~Education~~ education should include matters such as an update on beacon registration systems to be compatible with new beacon hexadecimal identifications, the transition to the MEOSAR satellite architecture (e.g. update local user terminals and mission control centres to properly receive and manage MEOSAR data), in accordance with Cospas-Sarsat specification documents (http://www.cospas-sarsat.int/en/documents-pro/system-documents).

7.8   *Contingency Facilities*: All States should ensure there are established contingency facilities~~,~~ or for when a SAR service is not able to be provided~~,~~. This may include procedures ~~in place~~ for the temporary delegation of the SAR responsibility to another appropriate national body or State. All States should test their contingency arrangements periodically, but not less than once every six months.

        SAR Information

7.9   *Provision of Information*: All States should ensure the:

25

Asia/Pacific SAR Plan ~~V4.0~~ V5.0

a) establishment of a centralised information source publishing all Asia/Pacific State Aeronautical Information Publication (AIP) information (refer ~~ICAO Doc 10066~~ PANS-AIM Appendix 2 GEN 3.6 *Search and ~~Rescue~~ rescue*):

   i. The agency responsible for providing SAR services;

   ii. The area of SAR responsibility where SAR services are provided;

   iii. The type of SAR services and facilities provided including indications where SAR aerial coverage is dependent upon significant deployment of aircraft;

   iv. SAR agreements;

   v. The conditions of SAR facility and service availability; and

   vi. SAR procedures and signals used;

b) establishment of an Internet-based SAR information sharing system (with security protocols as required and in accordance with the emerging ~~System Wide Information Management~~ SWIM - concept as applicable) to share SAR activity with States and key stakeholders participating in a SAR activity (the information sharing system should include a means of handling media and next of kin enquiries, and recognise the need to avoid premature media statements); and

c) maximum practicable cooperation between State entities in the provision of accurate and timely information when required, including from military sources, except where national security could be adversely affected.

7.10   *SAR Facilities and Equipment Lists*: All States should develop and maintain a current, comprehensive electronic list of State SAR Facilities, SAR Equipment, and SAR Units (SRUs), including joint or shared facilities and equipment.

7.11   *SAR Library*: All States should:

a) establish a web-based SAR Library, or cooperate by contributing to an Internet-based Asia/Pacific resource (such as https://www.dco.uscg.mil/Our-Organization/Assistant-Commandant-for-Response-Policy-CG-5R/Office-of-Incident-Management-Preparedness-CG-5RI/US-Coast-Guard-Office-of-Search-and-Rescue-CG-SAR/SAR-Publications/); ~~and~~

b) ensure that each RCC and SAR ~~Authority~~ authority has ready access to a current copy (either electronic or hard copy) of the following reference documents at a minimum:

   i. ICAO Annex 12;

   ii. IAMSAR Manual Volumes I, II and III;

   iii. International Convention on Maritime SAR (SAR Convention);

   iv. ~~Asia/Pacific SAR Plan/electronic Air Navigation Plan~~ *Asia/Pacific Region ANP*;

   v. *Asia/Pacific SAR Plan*; and

   vi. relevant regional, national and agency SAR documents.

Note: ~~The~~ the Asia/Pacific SAR Library hosted by the US Coast Guard contains a list of documents that may be held by RCCs and JRCCs as appropriate. In addition, a list of documents (SAR.7/Circ.12) would be available on the IMO website at: (http://www.imo.org/en/OurWork/Safety/RadioCommunicationsAndSearchAndRescue/SearchAndRescue/Pages/Default.aspx).

SAR Improvement

Asia/Pacific SAR Plan ~~V4.0~~ V5.0

7.12   *Search and Rescue Exercises (SAREX)*: All States should conduct regular SAREX (at least once every two years) to test and evaluate existing coordination procedures, data and information sharing and SAR response arrangements involving:

a)   both aeronautical and maritime SAR authorities including both civil and military agencies as applicable, and related bodies such as ~~Air Navigation Service Providers (ANSPs)~~ and Airline Operations Centres (AOCs);

b)   where appropriate, cross-aeronautical SRR boundary coordination (SAREX should routinely involve SAR authorities of adjacent SRRs); ~~and~~

c)   improvement of SAREX effectiveness through a post-SAREX review and written report, completed to ensure that deficient areas or latent problems are identified and remedied~~.~~;

d)   SAREX type may be a desktop communications, coordination or full-scale exercise or field exercise;

e)   a SAREX program should be developed that includes, as appropriate, exercises held:

   i.   within RCCs;

   ii.   depending on the number and type of RCCs within a State, between JRCCs, aeronautical and maritime RCCs and RSCs;

   iii. with local SAR support agencies;

   iv.   with SRUs; and

   v.   with neighbouring States.

Note 1: a SAREX template is provided in the IAMSAR Manual Volume I Appendix O Sample template for a joint SAREX.

Note 2: SAREX should test the SAR system, including unannounced alerts that allow an actual search (whether it is a desktop or a physical operation) to be conducted which will indicate weaknesses in the system. SAREX should not be confused with, or take the form of, simulated crash fire exercises such as for ~~Aerodrome Emergency Procedures~~ for aerodrome emergency procedures that do not have a search component.

Note 3: ~~Real~~ real SAR incident responses which include an <u>*adequate*</u> *post-response review and evaluation with lessons learned may replace the need for a SAREX.*

Note 4: this expectation may be fulfilled by participating in a sub-regional SAREX that tests the State's SAR system.

7.13   *SAR Quality Assurance*: All States should implement SAR System Improvement and Assessment measures, including Safety Management and Quality Assurance systems, that:

a)   provide performance and safety indicators, including post-incident/accident lessons learned and management reviews (RCC and SAR System Continuous Improvement process), and feedback from RCC staff, SAR system users or SAR stakeholders;

b)   identifies risk and corrective and preventive actions that prevent or minimise risk and the possibility of substandard SAR performance;

c)   establishes an internal quality assurance programme, which includes regular internal audits of the RCC, SAR operations, SAR facilities and procedures that are conducted by trained auditors;

d)   ensures the person responsible for internal quality assurance within the entity responsible for SAR services has direct access to report independently to the Head of the entity responsible for SAR services on matters of quality assurance; and

Asia/Pacific SAR Plan ~~V4.0~~ V5.0

e) where appropriate, provides submissions to the ICAO/IMO JWG-SAR to share lessons learned and experiences with other global States for the continuous improvement of the worldwide SAR system.

Note 1: ~~Resourcing~~ resourcing of SAR system audit arrangements could be mitigated by States entering cooperative arrangements, including sub-regional regulation, between States for auditing of each other's SAR systems to share expertise and costs.

Note 2: ~~Provisions~~ refer to related provisions of ICAO Annex 19 for a Safety Management System (SMS) ~~may apply where a SAR service is provided under the authority of an ATS provider)~~ and ICAO Doc 9734 for a Safety Oversight Manual.

Note 3: Peer review, either external or internal, may provide a useful internal quality assurance tool.

7.14   *SAR Management Review*: All States should conduct an annual or more frequent analysis of their current State SAR system to identify specific gaps in capability against the minimum requirements of ICAO Annex 12 and the guidelines of the IAMSAR Manual to:

a) enable the ICAO Asia/Pacific SAR data to be updated to accurately reflect the State's capability;

b) be informed regarding the availability and capability of SAR services in neighbouring States;

c) identify SAR research and development programmes, especially those which could be conducted if possible in cooperation with other States;

d) establish a common set of basic SAR system statistics, which include~~-~~:

    i.   number of SAR incidents per year;

    ii.   number of lives at risk versus number of lives saved;

    iii.   records of time from first alert to tasking the SRU;

    iv.   records of time from first alert to arrival on scene of first SRU; and

    v.   records of time from first alert to rescue.

    vi.   records of false alerts or unnecessary activation of SAR services.

e) plan for any necessary improvements to gradually build and improve capability over time, which would be detailed in the State SAR Plan; and

f) regularly review and update SAR agreements as appropriate.

Note 1: ~~The~~ the National self-assessment on SAR found in IAMSAR Manual ~~Vol~~ Volume I Appendix H, ~~and~~ the ICAO USOAP-CMA Protocol Questions for SAR and ICAO Electronic Filing of Differences for ICAO Annex 12 compliance may assist States with their reviews.

Note 2: ~~The~~ for SAR system statistics, the number of incidents should identify the type (e.g~~.~~. Cospas-Sarsat alert, ATS alerts, etc.) and outcome of SAR incidents.

7.15   *SAR Promotion*: All States should conduct SAR promotional programs (e.g. Seminars, Workshops and public safety campaigns) to:

a) encourage higher SAR preparedness by persons that may require SAR services through ~~public safety campaigns~~ education aimed at preventing persons getting into distress situations (i.e. 'preventative SAR');

b) foster a reduction in false alerts to avoid wasting valuable SAR resources and risk to SAR crews responding unnecessarily;

a) ensure the support of government decision-makers for SAR facilities and

improvements, in particular adequate funding availability;

b)   assist media to understand SAR operations ~~in order~~ to minimise the need for explanations during SAR responses;

c)   recognise improvement in State SAR systems;

d)   enhance cooperation between SAR services and supporting bodies including:

  i.   civil, military and police agencies;

  ii.   ANSPs;

  iii.   aerodrome and port operators;

  iv.   aircraft and shipping operators;

  v.   meteorological agencies;

  vi.   accident investigation authorities;

  vii.   government and non-government agencies affected by SAR operations, in particular large scale national and international responses involving whole of government agencies; ~~and~~

  viii.   aviation and maritime regulators; and

  ix.   other States.

Note: social media may be an effective means of SAR promotion, and that may help ~~reduces~~ reduce the workload of SAR staff during major SAR responses.

Asia/Pacific SAR Plan V4.0 V5.0

EMERGING ISSUES AND FUTURE DEVELOPMENTS

Planning for the Future

8.1   States should monitor developments such as improvements to existing and new technologies and other emerging matters which may impact on the SAR system of the future as part of State, regional and global aviation strategic direction and planning. This may include matters such as:

- the need to cater for increased growth or changes in air and maritime traffic through SAR regions SRRs which may increase the demand, or present changed capability requirements, for SAR services. This may include, for example, new air routes using longer range aircraft into more remote areas or increased numbers of, and/or larger, cruise ships; and

- new technology such as:

  o UAS, Unmanned Aircraft System (UAS) and Advanced Air Mobility (AAM);

  o autonomous vessels;

  o commercial space vehicles carrying people;

  o new distress alerting devices and systems;

  o new tracking systems;

  o new electronic search equipment (such as optical radar systems);

  o online virtual conferencing platforms;

  o smartphone apps;

  o artificial intelligence; and

  o data driven decision making tools.

- SAR intervention in and around offshore wind turbine farms; and

  Note: IAMSAR Manual Volume II provides further guidance on wind farms.

- impacts of climate change.

Research and Development

8.2   To develop the tools and systems required to meet foreseeable long-term requirements, there is a need for States to undertake planning and co-operation on SAR matters. This includes major efforts to define concepts, to extend knowledge and invent new solutions to future SAR challenges so these new concepts are selected and applied in an appropriate timely manner. Such efforts could be forged through collaborative partnerships between, States, ANSPs, International Organizations, institutes of higher learning and specialised technical agencies. This concept is consistent with Seamless ATM *Asia/Pacific Seamless ANS Plan* Principle 36 ([*Inter-regional cooperation ('clustering') for the research, development and implementation of ATM projects*)], and may manifest itself in joint projects such as:

- ICAO and/or IMO regional SAR training opportunities, where provided, to assist States that are unable to provide their own SAR training;

- Joint Sub-regional RCCs (ASEAN States in particular may be candidates for a single centre of excellence that brings together civil and military SAR experts from all ASEAN States and provides a single SAR facility that is cost-effective and has a level of resources and facilities that would be difficult for all States to maintain by themselves); and

- Regional online eLearning packages.

Asia/Pacific SAR Plan ~~V4.0~~ V5.0

*Note: **Appendix 1** provides a summary of benefits to the SAR System of States assisting other States.*

8.3   With the end goal of a globally interoperable SAR system in mind, the region will have to consider planning for a long-term supporting concept and infrastructure, including possible integration of the new technologies listed in paragraph 8.1 for SAR application. The following are possible areas that should be considered for future SAR research and development~~, in order~~ to promote the maximum possible ~~harmonisation~~ harmonization and interoperability of SAR systems:

   a)   data sharing such as aircraft and ship tracking information;

   b)   automated data link communication to RCCs when an aircraft or ship exceeds a Variable Set Parameter (VSP) in terms of its operating envelope, or activation of an emergency status (could be displayed as a symbol, and the data could include certain operating parameters such as acceleration and altitude for an aircraft);

   Note: the ICAO GADSS includes this concept.

   c)   regional UAS and autonomous vessels for use in SAR and their safe operation alongside crewed aircraft and vessels;

   d)   inclusion of the SAR system and RCC access as a component of the ICAO SWIM concept of operation and implementation;

   e)   on-going development of standardised SAR training objectives and advanced training systems, including the use of high fidelity simulators;

   f)   enhanced technology oriented systems to improve SAR system effectiveness such as use of virtual conferencing platforms to enhance real-time SAR incident coordination between RCCs and other stakeholders, and live imagery and video streaming from SAR units to RCCs; and

   g)   transition to MEOSAR System and second generation beacons

Asia/Pacific SAR Plan ~~V4.0~~ V5.0

MILESTONES, TIMELINES, PRIORITIES AND ACTIONS

Milestones

9.1   Section 7 (*Performance Improvement Plan*) provides a scheme for the implementation of a collective set of enhancements for a number of elements in the PSCS.

9.2   States should implement the various PSCS elements of this Plan without delay, and should include consideration of issues such as:

- safety/operational analysis and assessment;

- cost-effectiveness;

- budgetary issues;

- development of operational procedures; and

- training.

9.3   Section 8 (*~~Research~~ Emerging Issues and Future Development*) provides, subject to future agreement by concerned parties, possible SAR improvements over the next 10 years.

Priorities

9.4   It is a matter for each State to determine priorities in accordance with its own economic, environmental, safety and administrative drivers.

Actions

9.5   This Plan necessitates a number of implementation actions. It is expected that each Asia/Pacific State report progress on each applicable element to APANPIRG through the ATM Sub-Group. All States should note the importance of SAR status monitoring, ~~which is expected to be conducted as part of the Seamless ANS on-line monitoring. Reporting of implementation progress of SAR elements from this Plan is expected to be conducted by the on-line Seamless ANS Reporting and Monitoring system, once this system is enabled to include the subsidiary plan such as the~~ *Asia/Pacific SAR Plan* and are required to submit their implementation status pertaining to the *Asia/Pacific SAR Plan* to the ICAO Asia/Pacific Regional Officer, by February 28 of each year.

9.6   Section 6 (*Current Situation*) provides analysis and major concerns in the region, which should be considered in the formulation of specific State plans.

9.7   SAR Coordination Forums, which are likely to be based on sub-regional development (such as a Pacific Ocean SAR Forum and Indian Ocean SAR Forum) need to be promoted, established and supported to ensure the on-going implementation work and future review of SAR expectations linked to this Plan are conducted.
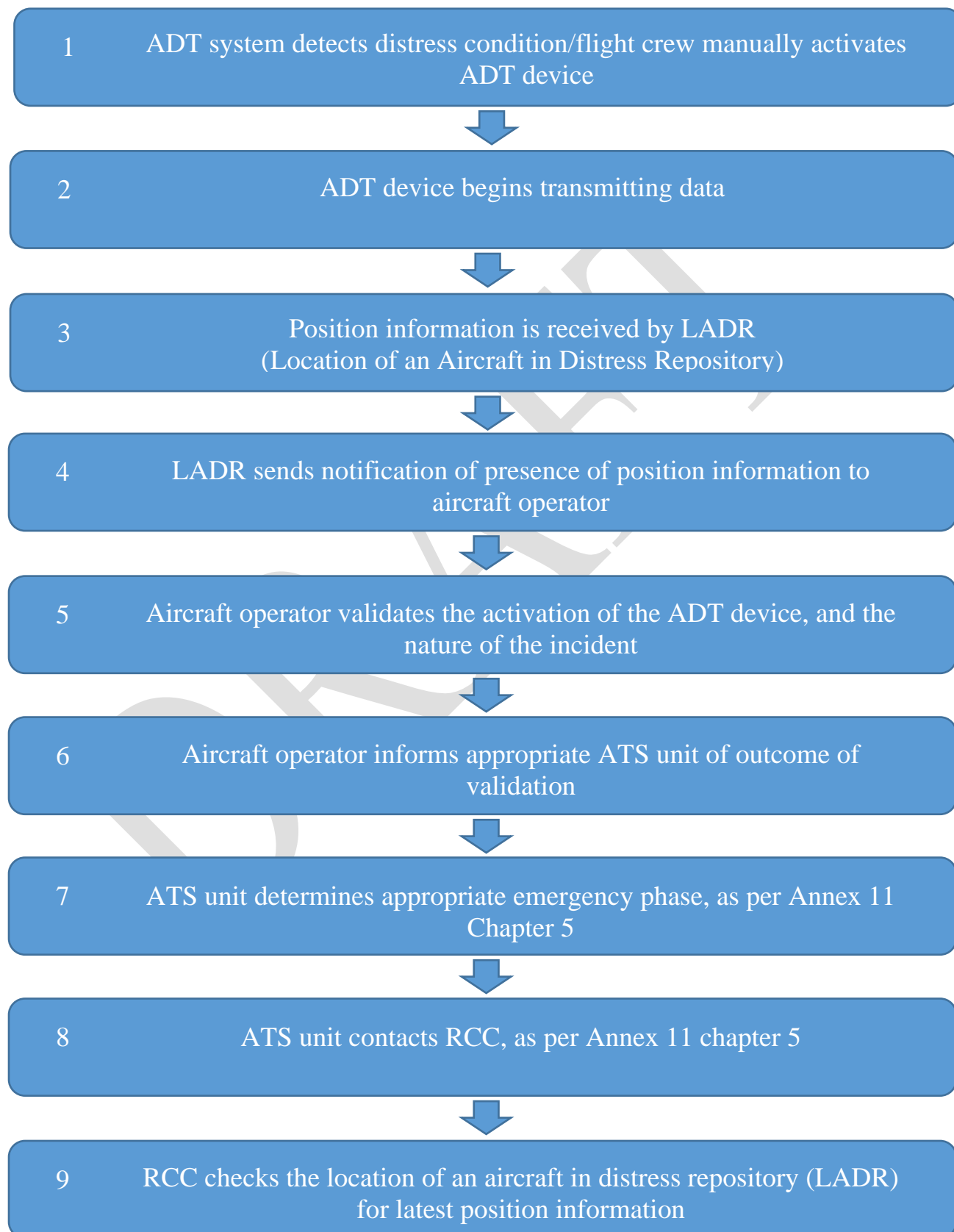
SAREX

9.8   A program is expected to be established for an annual SAREX in each sub-region (South Asia, Southeast Asia, East Asia and the Pacific), with every second year being a desktop communications exercise, and alternate years being a full exercise. The SAREX outcomes and lessons learned should be reported to APANPIRG through the ATM Sub-Group.

9.9   The ICAO ~~Asia and Pacific~~ Asia/Pacific Regional Office is responsible for taking actions that assist the implementation of SAR within its accredited States, in cooperation with the IMO. In addition, the ~~Asia and Pacific~~ ICAO Asia/Pacific Regional Office is responsible for coordinating with adjacent ICAO regional offices on an ad hoc basis or at relevant trans-regional meetings.

Asia/Pacific SAR Plan ~~V4.0~~ V5.0

APPENDIX 1: FLOWCHART OF ACTIONS FOLLOWING ACTIVATION OF AN ADT DEVICE.

Reproduced from IAMSAR Manual Volume II Appendix V Figure 1, with explanatory annotations.

1	ADT system detects distress condition/flight crew manually activates ADT device
2	ADT device begins transmitting data
3	Position information is received by LADR (Location of an Aircraft in Distress Repository)
4	LADR sends notification of presence of position information to aircraft operator
5	Aircraft operator validates the activation of the ADT device, and the nature of the incident
6	Aircraft operator informs appropriate ATS unit of outcome of validation
7	ATS unit determines appropriate emergency phase, as per Annex 11 Chapter 5
8	ATS unit contacts RCC, as per Annex 11 chapter 5
9	RCC checks the location of an aircraft in distress repository (LADR) for latest position information

Asia/Pacific SAR Plan ~~V4.0~~ V5.0

Notes on the nine steps in the Flowchart of Actions:

1. ADT system detects distress condition.

    a. The ADT system activates under certain conditions when the aircraft is in flight, there is no requirement to operate after an accident.

    b. Activated automatically or manually by flight crew. De-activated by the same means it was activated.

2. ADT device begins transmitting data

    a. Aircraft operator (airline) required to obtain information from which a position can be determined at least once every minute, and make the position information available to the appropriate ATS unit and RCC.

3. Position information received by the LADR

    a. All ADT devices send ADT information to the LADR.

    b. The ELT(DT) also sends a Cospas-Sarsat formatted message to the relevant RCC.

    c. The mandatory ADT information to be sent to the LADR is:

        i. Last known position (latitude/longitude, altitude, time stamp, flight track (past position reports)

        ii. Date and time of transmission

        iii. Aircraft operator identifier (3-Letter Designator (3LD)

        iv. Nationality mark and Aircraft registration mark (i.e., tail number)

        v. Contributor, data source (e.g., Cospas-Sarsat).

    d. Optional information may also be in the LADR.

4. LADR sends notifications to subscribers

    a. Subscribers (RCCs, ATS units, aircraft operator)

    b. Subscribers are notified that ADT information is available to view or download

    c. Notification sent from LADR for the first received position and normally not sent for each position report.

    d. New LADR notification sent when an aircraft is distress transits from one FIR to a second (and any subsequent) FIR.

    e. Notification from LADR sent by email, SMS, or ATS message over AFTN/AMHS

    f. ELT(DT) data also automatically sent to relevant RCC in a Cospas-Sarsat SIT 185 message.

    g. Cospas-Sarsat MCC will automatically send all ADT information to the LADR but will not send all ELT(DT) messages to the RCC because of the large number of transmissions.

5. Aircraft operator validates/attempts to validate

    a. Aircraft operator has various methods to validate if its aircraft is in distress or not.

    b. Aircraft operator needs to be aware that the relevant ATS unit and associated RCC have likely been notified.

Asia/Pacific SAR Plan V4.0 V5.0

c. ADT concept envisioned the current alerting process as per Annex 11 chapter 5 would not change.

6. Aircraft operator informs appropriate ATS unit

a. Aircraft operator needs to be aware that the relevant ATS unit and associated RCC have likely been notified.

b. Aircraft operator, ATS unit and RCC need common ADT procedures, nationally and regionally, for efficient handling of information received from the ADT system.

7. ATS unit determines emergency phase

a. As per Annex 11 chapter 5.

b. ATS unit, RCC and aircraft operator need common ADT procedures, nationally and regionally, for efficient handling of information received from the ADT system.

8. ATS unit contacts RCC

a. As per Annex 11 chapter 5.

b. ATS unit, RCC and aircraft operator need common ADT procedures, nationally and regionally, for efficient handling of information received from the ADT system.

9. RCC checks the LADR

a. In addition to the initial notification other information may be available.

b. If aircraft is equipped with an ELT(DT), the RCC will also receive an ELT(DT) message from the Cospas-Sarsat system.

c. RCC, ATS unit and aircraft operator need common ADT procedures, nationally and regionally, for efficient handling of information received from the ADT system.

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Asia/Pacific SAR Plan ~~V4.0~~ V5.0

~~APPENDIX 2~~ APPENDIX 1: BENEFITS TO THE SAR SYSTEM OF STATES ASSISTING OTHER STATES

<u>~~APAC~~ Asia/Pacific States Face Demanding SAR Responsibilities with Few Resources</u>

~~2.1~~ 1.1. Many ~~APAC~~ Asia/Pacific States have the challenging responsibility of providing SAR services over vast and remote land and oceanic areas, and several have few resources available to meet ICAO Annex 12 requirements.

<u>Taking ~~A~~ a Regional Approach Improves Effectiveness and Efficiency</u>

~~2.2~~ 1.2. To provide an effective and efficient SAR service in the region, it is important that States focus not only on meeting their own national obligations, but also take the broader view that their State SAR system is only one part of the wider regional SAR system. States therefore need to cooperate, collaborate and share resources and technical expertise with their neighbouring and regional RCCs, with the more developed SAR States in particular looking for opportunities to assist their lesser developed State neighbours.

<u>When Developed SAR States Support Less Developed Neighbours, Everyone Wins</u>

~~2.3~~ 1.3. Sometimes simple measures can reduce the incidence of SAR operations in a State's Area of Responsibility.

~~2.4~~ 1.4. An example of this is where New Zealand has been regularly requested to send resources to Kiribati, which is not in New Zealand's SRR, to conduct aerial searches for people missing in small vessels at sea. New Zealand recognised that with the provision of basic aids, the number of people going missing at sea could be reduced. The work was completed through an aid program and the benefit was immediate and twofold. There has been a large reduction in the number of people going missing at sea and New Zealand has reduced costs through less aerial searches being required.

~~2.5~~ 1.5. Another example is where Australia has ~~recognised~~ recognized that increasing aircraft and vessel traffic in the north and western areas of its SRR in the Indian Ocean region comes with increased likelihood of more frequent SAR responses in that region. As a result, Australia worked in partnership with the Maldives, Mauritius and Sri Lanka to fund and provide technical assistance to improve the SAR capabilities of those countries that will also assist Australia's SAR response obligations in that area of its SRR. Similarly, since 2008 Australia has been providing funding and development assistance to Indonesia to improve SAR capability and cooperation.

~~2.6~~ 1.6. States that aren't compliant with ICAO Annex 12 SARPs and are unable to meet the minimum SAR service requirements could consult and seek assistance from 'champion' States that are compliant and have well developed SAR systems in place.

~~2.7~~ 1.7. Examples of assistance that could be provided by States, International ~~Organisations~~ Organizations (such as IMO and ICAO) or multi-lateral initiatives include:

      a) conducting of a SAR ~~Gap~~ gap ~~Analysis~~ analysis;

      b) advice on the establishment of a SAR organisational framework;

      c) advice for the establishment of a National SAR Committee;

      d) technical assistance in the development of a National SAR Plan;

      e) providing copies of relevant SAR documents to be used as templates;

      f) technical assistance on the establishment of SAR agreements;

Asia/Pacific SAR Plan ~~V4.0~~ V5.0

g)   technical assistance in the development of RCC position descriptions;

h)   training of SAR personnel;

i)   provision of SRU where appropriate and training of SRU crews;

j)   provision/sharing of computerised SAR tools including incident management systems, databases, maritime drift modelling software, etc.;

k)   establishing data and information sharing agreements between RCCs;

l)   provision of operational search plan data;

m)   providing advice on how to conduct a SAREX and post-SAREX analysis; and

n)   set up of SAR system publicity and safety awareness campaigns.

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Asia/Pacific SAR Plan ~~V4.0~~ V5.0

APPENDIX 3: SAMPLE MOU BETWEEN THE SAR SERVICE AND THE ACCIDENT INVESTIGATION AUTHORITY

Notification and Cooperation during concurrent [Search and rescue service] Search and Rescue (SAR) and [Accident investigation authority] Accident Investigation Operations

1. **Purpose.** This MOU between the [Search and rescue service] and the [Accident investigation authority] is to address the [Search and rescue service's] obligations under the Convention on International Civil Aviation (ICAO), Annex 12 Search and Rescue; and, the [Accident investigation authority's] obligations under ICAO Annex 13 Aircraft Accident and Incident Investigation during concurrent responses to an aircraft accident.

2. **General.** The [Search and rescue service] is the [State name] lead agency with regard to its obligations in support of Annex 12. It establishes and provides SAR services in accordance with the Annex. The [Search and rescue service] is the national SAR Coordinator for aircraft in distress in the [maritime and/or aeronautical] search and rescue region(s). The [Accident investigation authority] leads the investigation of all civil aircraft accidents or incidents.

3. **SAR and Accident Investigation Protocols.** The [Search and rescue service] and [Accident investigation authority] agree that mutual coordination and cooperation between the two agencies promotes efficient and effective SAR and accident investigation operations. The [Accident investigation authority] does not participate in the search and rescue of persons that are involved in an aircraft accident but may assist [SAR authority] with information and expertise that assists the SAR operation. The [SAR authority] may assist the [Accident investigation authority] with information resulting from the SAR operation that assists with accident investigation and may also provide assistance with search and recovery operations.

   a. When a SAR operation involving an aircraft accident occurs in a SAR region in which the [Search and rescue service] is responsible, the [Search and rescue service] will notify the [Accident investigation authority] at the earliest opportunity. The point of contact for the [Accident investigation authority] is: [contact details such as telephone number and email address].

      i. If an [Accident investigation authority] investigator in charge has been named, the [Accident investigation authority] point of contact will inform the Search and rescue service] point of contact.

      ii. The [Accident investigation authority] point of contact may share the investigator in charge's contact information with the [Search and rescue service] point of contact.

      iii. The [Search and rescue service] SAR point of contact is the rescue coordination centre (RCC) or rescue sub-centre (RSC) responsible for the coordination of the SAR operation.

   b. The State of occurrence, i.e. the State in the territory (and territorial sea) of which an accident or incident occurs, is responsible for the conduct of the investigation in accordance with ICAO Annex 13. For accidents and incidents outside the territory and territorial sea of any State, the State of Registry of the aircraft is responsible for the conduct of the investigation.

   c. States nearest the scene of an accident in international waters, particularly the State with the search and rescue region responsibility, are to provide assistance as they are able and respond to requests by the State of Registry. If the State of Registry takes control of the investigation, then the [Accident investigation authority] will coordinate with the State of Registry investigator-in-charge to meet the intent of this MOU.

Asia/Pacific SAR Plan ~~V4.0~~ V5.0

    d. ~~Typically, the [Accident investigation authority's] on-scene investigative work begins after the SAR operation concludes and the recovery phase begins, but it may begin during the SAR operation on the understanding that the SAR operation takes priority whilst there is opportunity to rescue survivors.~~

        i. ~~The [Accident investigation authority] may conduct its investigation of wreckage recovered during a SAR operation. The [Accident investigation authority] investigator-in-charge will coordinate with the RCC or RSC responsible for coordinating the SAR operation to ensure neither agency's work hinders that of the other, and that both coordinate any updates to the media to ensure consistency of facts.~~

    e. ~~The [Search and rescue service] will provide data and information related to the SAR operation requested by the [Accident investigation authority] for its accident investigation. Where appropriate, arrangements should also be mutually agreed for the securing of any debris or wreckage retrieved during the SAR operation as practicable without diverting effort from the SAR operation.~~

    f. ~~The [Search and rescue service] and the [Accident investigation authority] will abide by the terms of this MOU.~~

Note: ~~*This template serves as guidance for States to draft an agreement or amend an existing agreement (which may take the form of an MOU or Arrangement or other instrument title) and the text to be included in this document is for the Parties involved to decide.*~~

~~*Depending on national rules and procedures, this sample MOU may need to be modified for arrangements between one national search and rescue service and one national accident investigation authority.*~~

~~*This template may also assist with the development of separate arrangements for investigation of maritime craft.*~~