ICAO

Doc 10161

Global Aviation Safety Roadmap

2026–2028

Approved by and published under the authority of the Secretary General

INTERNATIONAL CIVIL AVIATION ORGANIZATION

ICAO

Doc 10161

Global Aviation Safety Roadmap

2026–2028

Approved by and published under the authority of the Secretary General

INTERNATIONAL CIVIL AVIATION ORGANIZATION

Published in separate English, Arabic, Chinese, French, Russian
and Spanish editions by the
INTERNATIONAL CIVIL AVIATION ORGANIZATION
999 Robert-Bourassa Boulevard, Montréal, Quebec, Canada H3C 5H7

For ordering information and for a complete listing of sales agents
and booksellers, please go to the ICAO website at www.icao.int.

Second Edition, 2025

Doc 10161, *Global Aviation Safety Roadmap*
Order Number: 10161
ISBN 978-92-9275-923-0

AMENDMENTS

Amendments are announced in the supplements to the *Products and Services Catalogue;* the Catalogue and its supplements are available on the ICAO website at www.icao.int. The space below is provided to keep a record of such amendments.

RECORD OF AMENDMENTS AND CORRIGENDA

AMENDMENTS		
No.	Date	Entered by

CORRIGENDA			
No.	Language	Date	Entered by

FOREWORD

The *Global Aviation Safety Plan* (GASP, Doc 10004) presents the global strategy for the continuous improvement of aviation safety. The GASP aims to continually reduce fatalities, and the risk of fatalities, through the development and implementation of a global aviation safety strategy. A safe, resilient and sustainable aviation system contributes to the economic development of States across all regions and their industries. The GASP serves as the master planning document upon which regional and national aviation safety plans (RASP and NASP, respectively) are developed and implemented. It provides a collaborative framework for States, regions and industry to manage operational safety risks and organizational challenges, through their respective RASPs and NASPs.

This *Global Aviation Safety Roadmap* (Doc 10161) serves as an action plan to assist the aviation community in developing RASPs and NASPs, in line with the GASP goals, through a structured, common frame of reference for all relevant stakeholders. The global aviation safety roadmap outlines specific safety enhancement initiatives (SEIs) associated with the GASP goals and targets. Each SEI includes a set of actions that stakeholders may use to develop and implement specific action plans. Regions and States, in collaboration with industry, should use the roadmap to support or complement, as applicable, regional and national safety management activities and develop specific SEIs to support the strategy presented in their RASPs and NASPs, respectively. The use of the global aviation safety roadmap as the basis for RASPs and NASPs enhances coordination, thus reducing inconsistencies and duplication of effort.

This edition aligns with the 2026–2028 edition of the GASP. The revision includes an update to the SEIs to ensure that they provide actions in support of each of the GASP targets, based on the global organizational challenges and the global high-risk categories of occurrences (G-HRCs) identified in the plan. New SEIs were included to address the other global risk categories of occurrences listed in the latest edition of the GASP.

This manual should be used in conjunction with the *Global Aviation Safety Plan* (Doc 10004), the *Manual on the Development of Regional and National Aviation Safety Plans* (Doc 10131) and the *Manual on Monitoring Implementation of Regional and National Aviation Safety Plans* (Doc 10162).

The content of this manual was developed with inputs from experts from civil aviation authorities, industry, as well as regional and international organizations, and thereafter submitted for extensive peer review, taking into account feedback from the expert community. The International Civil Aviation Organization (ICAO) gratefully acknowledges the contributions of the ICAO Global Aviation Safety Plan Study Group (GASP-SG) and individual experts who provided support, advice and input for this manual.

CONTENTS

GLOSSARY

Audit. A systematic, independent and documented process for obtaining evidence and evaluating it objectively to determine the extent to which requirements and audit criteria are fulfilled.

Critical elements (CEs). The critical elements of a safety oversight system encompass the whole spectrum of civil aviation activities. They are the building blocks upon which an effective safety oversight system is based. The level of effective implementation of the CEs is an indication of a State's capability for safety oversight.

Effective implementation (EI). A measure of the State's safety oversight capability, calculated for each critical element, each audit area or as an overall measure. The EI is expressed as a percentage.

Hazard. A condition or an object with the potential to cause or contribute to an aircraft incident or accident.

Safety. The state in which risks associated with aviation activities, related to, or in direct support of the operation of aircraft, are reduced and controlled to an acceptable level.

Safety data. A defined set of facts or values collected for reference, processing or analysis, which could be used to maintain or improve safety.

Safety enhancement initiative (SEI). One or more actions to eliminate or mitigate operational safety risks or to address organizational challenges.

Safety information. Safety data processed, organized or analysed in a given context to support safety management and the development of safety intelligence.

Safety management system (SMS). A systematic approach to managing safety, including the necessary organizational structures, accountability, responsibilities, policies and procedures.

Safety oversight. A function performed by a State to ensure that individuals and organizations performing an aviation activity comply with safety-related national laws and regulations.

Safety performance. A State or a service provider's measurable effect on safety achievement.

Safety risk. The predicted probability and severity of the consequences or outcomes of a hazard.

Significant safety concern (SSC). Occurs when the State allows the holder of an authorization or approval to exercise the privileges attached to it, although the minimum requirements established by the State and by the Standards set forth in the Annexes to the Convention are not met, resulting in an immediate safety risk to international civil aviation.

State safety programme (SSP). An integrated set of laws, regulations policies, objectives, processes, procedures and activities aimed at managing safety, at the State level.

ABBREVIATIONS AND ACRONYMS

ACAS	Airborne collision avoidance system
ACI	Airports Council International
AGA	Aerodromes and ground aids
AIP	Aeronautical information publication
AMM	Airport moving map
ANSP	Air navigation services provider
APV	Approach procedure with vertical guidance
ARC	Abnormal runway contact
ARIWS	Autonomous runway incursion warning system
ARS	Special air-report
ASIAP	Aviation Safety Implementation Assistance Partnership
A-SMGCS	Advanced surface movement guidance and control system
ATC	Air traffic control
ATCO	Air traffic control officer
ATM	Air traffic management
ATS	Air traffic service
BARS	Basic aviation risk standard
CANSO	Civil Air Navigation Services Organisation
CAST	Commercial Aviation Safety Team
CBM	Condition-based maintenance
CDFA	Continuous descent final approach
CE	Critical element
CFIT	Controlled flight into terrain
CICTT	CAST/ICAO Common Taxonomy Team
CMA	Continuous monitoring approach
COSCAP	Cooperative Development of Operational Safety and Continuing Airworthiness Programme
EASA	European Union Aviation Safety Agency
EFB	Electronic flight bag
EGPWS	Enhanced ground proximity warning system
EI	Effective implementation
eTOD	electronic terrain and obstacle data
EUROCONTROL	European Organisation for the Safety of Air Navigation
EVS	Enhanced vision system
FAA	Federal Aviation Administration
FDAP	Flight data analysis programme
FDM	Flight data monitoring
FSF	Flight Safety Foundation
GASP	Global Aviation Safety Plan
GASP-SG	Global Aviation Safety Plan Study Group
G-HRC	Global high-risk category of occurrence
GNSS	Global navigation satellite system
GPS	Global positioning system
GPWS	Ground proximity warning system
HRC	High-risk category of occurrence
HUD	Head-up display
IATA	International Air Transport Association

IBAC	International Business Aviation Council
ICM	Investigation Cooperative Mechanism
IOSA	IATA Operational Safety Audit
ISAGO	IATA Safety Audit for Ground Operations
IS-BAO	International Standard for Business Aircraft Operations
IS-BAH	IBAC International Standard for Business Aircraft Handling
LOC-I	Loss of control in-flight
MAC	Mid-air collision
MEL	Minimum equipment list
METAR	Aerodrome routine meteorological report
MOR	Mandatory occurrence report
MSAW	Minimum safe altitude warning
NASP	National aviation safety plan
N-HRC	National high-risk category of occurrence
OJT	On-the-job training
OLF	Online framework
PANS	Procedures for Air Navigation Services
PdM	Predictive maintenance
PIRG	Planning and Implementation Regional Group
PQ	Protocol Question
QA	Quality assurance
RACI	Responsible, accountable, consulted and informed
RAIO	Regional Accident and Incident Investigation Organization
RASG	Regional aviation safety group
RASP	Regional aviation safety plan
R-HRC	Regional high-risk category of occurrence
RE	Runway excursion
RESA	Runway end safety area
RFI	Radio frequency interference
RI	Runway incursion
RSOO	Regional Safety Oversight Organization
SAFE	Safety Fund
SCF-NP	System/component failure or malfunction (non-powerplant)
SDCPS	Safety data collection and processing system
SEI	Safety enhancement initiative
SM ICG	Safety Management International Collaboration Group
SMS	Safety management system
SPECI	Aerodrome special meteorological report
SOP	Standard operating procedure
SSC	Significant Safety Concern
SSP	State safety programme
STCA	Short-term conflict alert
SUP	Suspected unapproved part
TAF	Aerodrome forecast
TEM	Threat and error management
TURB	Turbulence encounter
UPRT	Upset prevention and recovery training
USOAP	Universal Safety Oversight Audit Programme
VOR	Voluntary occurrence reporting system
WAFS	World Area Forecast Systems

Chapter 1

INTRODUCTION

1.1 BACKGROUND

1.1.1 Based on feedback received on the 2023–2025 edition of the *Global Aviation Safety Plan* (GASP), the global aviation safety roadmap was migrated from the GASP to a standalone manual, with an ICAO document number and edition number. This change was made to provide two different documents: the GASP (Doc 10004), as a high-level document containing the global safety strategy, and the *Global Aviation Safety Roadmap* (Doc 10161), as detailed guidance for the development of an action plan, with specific safety enhancement initiatives (SEIs), for inclusion in regional and national aviation safety plans (RASPs and NASPs).

1.1.2 The global aviation safety roadmap has evolved since its inception in 2005 and is now in its fifth iteration. The global aviation safety roadmap has been updated through the efforts of the GASP Study Group (GASP-SG) to amend its content in line with the revised GASP goals and targets. It reflects the content of the 2026–2028 edition of the GASP. The revision included an update to the SEIs to ensure that they provide actions in support of each of the GASP targets, based on the global organizational challenges and the global high-risk categories of occurrences (G-HRCs) identified in the plan. New SEIs were included to address the other global risk categories of occurrences listed in the latest edition of the GASP.

1.2 PURPOSE

1.2.1 The GASP presents the global strategy for the continuous improvement of aviation safety. The global aviation safety roadmap serves as an action plan to assist the aviation community in developing RASPs and NASPs, in line with the GASP goals, through a structured, common frame of reference for all relevant stakeholders.

1.2.2 The global aviation safety roadmap presents an action plan and defines how the goals and targets outlined in the strategy will be achieved. The global aviation safety roadmap outlines specific SEIs associated with the GASP goals and targets. Each SEI includes a set of actions that stakeholders may use to develop and implement specific action plans. Regions and States, in collaboration with industry, should use the roadmap to support or complement, as applicable, regional and national safety management activities and develop specific SEIs to support the strategy presented in their RASPs and NASPs, respectively.

1.2.3 The use of the global aviation safety roadmap, as the basis for regional and national safety action plans, enhances coordination, thus reducing inconsistencies and duplication of effort.

1.2.4 This manual should be used in conjunction with the *Global Aviation Safety Plan* (Doc 10004), the *Manual on the Development of Regional and National Aviation Safety Plans* (Doc 10131) and the *Manual on Monitoring Implementation of Regional and National Aviation Safety Plans* (Doc 10162). The GASP presents a suite of guidance material and tools that complement the plan and support the development and implementation of RASPs and NASPs. More information on GASP-related guidance material and tools can be found on the ICAO website at www.icao.int/gasp.

1.3 APPLICABILITY

The content of this manual is presented as guidance and should not be considered as the sole means to develop and implement SEIs as part of regional and national aviation safety plans. States should consult specific requirements within their region and align their efforts with their respective RASP and regional SEIs, where applicable.

Chapter 2

GLOBAL AVIATION SAFETY ROADMAP

2.1 STRUCTURE OF THE ROADMAP

2.1.1 The global aviation safety roadmap outlines specific SEIs associated with each of the GASP targets. Each SEI is supported by a set of actions. The roadmap includes specific SEIs directed to three different sets of stakeholders: individual States; regions; and industry. Successful implementation of the SEIs found in the roadmap relies upon the close collaboration and cooperation of all key aviation stakeholders. Key aviation stakeholders include, but are not limited to, ICAO, States, regional aviation safety groups (RASGs)[1], regional safety oversight organizations (RSOOs), regional accident and incident investigation organizations (RAIOs), Cooperative Development of Operational Safety and Continuing Airworthiness Programmes (COSCAPs) and industry. The Planning and Implementation Regional Groups (PIRGs) also play a key role, coordinating with the RASGs.

Note 1.— In the context of the GASP and the roadmap, the term "region" refers to a group of States and/or entities working together to enhance safety within a geographic area.

Note 2.— In the context of the GASP and the roadmap, the term "industry" refers to service providers, such as: operators of aeroplanes or helicopters; approved maintenance organizations; organizations responsible for the type design or manufacture of aircraft, engines or propellers; approved training organizations; air traffic services (ATS) providers; and operators of aerodromes, as well as non-governmental organizations (for example, international organizations) and other entities that form part of the aviation industry, as appropriate.

2.1.2 The global aviation safety roadmap is composed of two segments:

a) O*rganizational challenges.* This segment of the roadmap (referred to as the ORG roadmap, presented in Appendix A) provides SEIs to meet GASP targets primarily related to the global organizational challenges and contains two distinct components, in line with the GASP goals, to address safety management responsibilities:

   1) State safety oversight system; and

   2) State safety programme (SSP), including service providers' safety management systems (SMS).

b) *Operational safety risks.* This segment of the roadmap (referred to as the OPS roadmap, presented in Appendix B) provides SEIs to meet the GASP targets primarily related to the global operational safety risks and contains two distinct components, in line with the GASP goals, to continuously reduce operational safety risks:

   1) G-HRCs; and

   2) other global risk categories of occurrences.

1. A RASG may also be referred to as an Aviation System Planning Group or an Aviation System Planning and Implementation Group, depending on the region, when combined with a Planning and Implementation Regional Group.

2.1.3 Each of the components in the roadmap is composed of three parts: Part I contains SEIs Specific to States, those of Part II are aimed at the regions and those for industry in Part III.

2.2 ORGANIZATIONAL (ORG) CHALLENGES ROADMAP

2.2.1 The ORG roadmap addresses the global organizational challenges identified in the GASP. It contains SEIs to address each of these challenges: lack of sufficient financial resources for the safety oversight authority to meet its national and international obligations; lack of qualified technical personnel (primarily aircraft accident investigators and aerodrome inspectors); lack of a regulatory process to address the resolution of safety issues (primarily related to aerodrome operations); low level of SSP implementation at the global level; and deficiencies in safety data and safety information collection, analysis and exchange to support safety management activities. The roadmap also addresses the GASP targets, including those related to: States' safety oversight capabilities; collaboration at the regional and national levels to address safety issues; aviation safety planning; and the use of industry safety assessment and safety data sharing programmes.

2.2.2 Despite the breakdown of the roadmap into components, the SEIs should not be viewed as stand-alone activities. In many cases, they are interrelated and serve to meet several targets simultaneously. Therefore, the SEIs in the ORG roadmap may contribute to the achievement of multiple GASP targets, including those related to the continuous reduction of operational safety risks.

2.3 OPERATIONAL (OPS) SAFETY RISKS ROADMAP

2.3.1 The OPS roadmap addresses operational safety risks and is based primarily on the G-HRCs identified in the GASP. It contains SEIs to address each of the five G-HRCs: controlled flight into terrain; loss of control in-flight; mid-air collision; runway excursion; and runway incursion. The OPS roadmap also addresses the three other global risk categories of occurrences, as identified in the GASP: abnormal runway contact; system/component failure or malfunction (non-powerplant); and turbulence encounter. States, regions and industry should use this part of the OPS roadmap to assist them in developing a plan to mitigate the risks associated with the G-HRCs, when adapting them as national and regional HRCs (N-HRCs and R-HRCs). The same process should be used to address the other global risk categories of occurrences at the national and regional levels. Like the ORG roadmap, the OPS roadmap is divided into two components. SEIs presented in both components may be accomplished in parallel. The State may opt to delegate or seek assistance on portions of the OPS roadmap to regional organizations or to another State or States.

2.3.2 The SEIs presented in the OPS roadmap are considered global safety enhancements, applicable to all States, regions and industry. They should be implemented to mitigate the risks associated with the G-HRCs, as well as the other global risk categories of occurrences. Although the OPS roadmap identifies the SEIs for each G-HRC and each additional category of occurrence, this is not an exhaustive list. Stakeholders should verify the latest version of the RASP for R-HRCs, other operational safety risks and SEIs applicable to their region. Stakeholders should also conduct analyses of data and reports. To develop data collection and analysis capabilities, SSP and SMS should be implemented (refer to the SEIs in the ORG roadmap). Stakeholders can then derive contributing factors through data analysis. The OPS roadmap gives specific examples of potential contributing factors. These are not exhaustive and may not be applicable to all stakeholders or operational contexts. Based on the analysis, stakeholders may need to develop and implement further SEIs to mitigate any additional risks. Stakeholders should assess the effectiveness of the implemented SEIs and may need to refine them in response to changes that may introduce new hazards. SEIs related to the R-HRCs or N-HRCs and other operational safety risks of a region or State should be included in the action plan that forms part of the RASP or NASP.

Note.— The latest versions of the RASPs are available in the GASP library at www.icao.int/RASP.

2.3.3 The OPS roadmap is not a substitute for the safety risk management activities that need to be conducted by individual States as part of their SSP and by service providers through their SMS. A safety management approach to targeting the N-HRCs or R-HRCs, as well as other operational safety risks, can result in successful mitigation strategies. Once the SSP and SMS are implemented in accordance with Annex 19 – *Safety Management* and safety data analysis capabilities are established, stakeholders can refine their SEIs in relation to the G-HRCs and other operational safety risks to best suit the operational context. The OPS roadmap is supported by the ORG roadmap component related to SSP and SMS, which enables safety risk management and safety assurance processes to be implemented.

2.4 ROADMAP TEMPLATE

All the SEIs of the roadmap are presented in a standardized "roadmap template" format, which covers the following points:

a) *SEI.* A description of the specific safety enhancement initiative;

b) *Stakeholder.* The entity to which the SEI is addressed (States, regions or industry);

c) *Related GASP target(s).* The GASP target(s) that the SEI primarily help(s) to achieve;

d) *Actions.* A description of the tasks required for the implementation of an SEI; and

e) *References*. Documents, tools, training courses and other sources of information that may assist stakeholders in implementing the SEIs and associated actions.

Note.— The goals and targets listed in the roadmap are presented in Section 5 of the 2026–2028 edition of the GASP *(Doc 10004).*

2.5 HOW TO USE THE ROADMAP TO DEVELOP AN ACTION PLAN AS PART OF THE RASP OR NASP

2.5.1 Guidance related to the use of the global aviation safety roadmap for the development of an action plan, as part of a RASP or NASP, is provided in the *Manual on the Development of Regional and National Aviation Safety Plans* (Doc 10131). The manual is found on the ICAO website at: www.icao.int/gasp.

2.5.2 Steps 6 and 7 of the NASP development process (see Doc 10131, Chapter 2) describe the conduct of a gap analysis to identify SEIs derived from the global aviation safety roadmap and the development of a prioritized list of SEIs, which will form the action plan to achieve the regional or national safety goals (and associated targets) of the RASP or NASP. It is recommended to review that chapter prior to using the roadmap.

Appendix A

ORGANIZATIONAL (ORG) CHALLENGES ROADMAP

COMPONENT 1 – STATE SAFETY OVERSIGHT SYSTEM

PART 1. STATES

Safety enhancement initiative	SEI-1 – Strategic allocation of resources to enable effective safety oversight
Stakeholder	States
Related GASP target(s)	2.1
Actions	1A – Establish (or confirm, if existing) executive or legislative mandate for each competent safety oversight authority to receive financial resources from government or other external sources and expend them 1B – Establish and document a process for the ongoing resource planning and allocation in in support of the organizational structure of a competent authority, which is required to conduct effective safety oversight. Use SEI-2, SEI-3, SEI-4, SEI-7, SEI-8 and SEI-9 to identify resource requirements 1C – Obtain a sustainable and stable source of financing (for example, State budget, fees and charges) through commitments from the national executive or legislative body (as applicable) and the organization's leadership and other stakeholders 1D – For small scope short-term improvements: a) Utilize the ICAO Safety Fund, the ICAO Capacity Development and Implementation Bureau or other means to acquire technical and financial assistance in coordination with the regional aviation safety group (RASG), regional safety oversight organization (RSOO) and/or ICAO Regional Office b) Seek assistance from more experienced States and other stakeholders in coordination with RASG/RSOO/ICAO Regional Office c) Seek assistance from sources of financing (for example, World Bank, African Development Bank) in coordination with RASG/RSOO/ICAO Regional Office 1E – Establish and document a process for assessing changing resource requirements (for example, regulating new entrants, new design organizations) and sustain necessary coordination with resource stakeholders for safety

	oversight improvements, in line with the national aviation safety plan (may be included in the process described in Action 1B)
References	– ICAO Safety Fund (SAFE) – ICAO Capacity Development and Implementation Bureau – RASGs – RSOO Cooperative Platform – COSCAPs and Other Cooperation Mechanisms

Safety enhancement initiative	SEI-2 – Implementation of a mechanism so that each safety oversight authority has sufficient financial resources to meet its national and international obligations
Stakeholder	States
Related GASP target(s)	2.1
Actions	2A – Establish, implement and regularly review mechanisms to fund the authorities, as per the actions listed in SEI-1, for: a) the development of regulations, procedures and other guidance material; b) training; c) surveillance activities; and d) the resolution of safety deficiencies
References	– Annex 19 – *Safety Management* – Doc 9734, *Safety Oversight Manual*, Part A – *The Establishment and Management of a State Safety Oversight System*

Safety enhancement initiative	SEI-3 – Implementation of a mechanism to ensure that each safety oversight authority has sufficient qualified technical personnel to meet its national and international obligations
Stakeholder	States
Related GASP target(s)	2.1; 2.2
Actions	3A – Define and document a methodology to identify staffing needs for all specialities in safety oversight related activities, including those related to the development of regulations, procedures and other guidance material; training; surveillance activities; and the resolution of safety deficiencies 3B – Establish and document required qualifications for technical personnel, including knowledge and practical experience in civil aviation required (as pilot, engineer, air traffic controller or other areas of expertise), appropriate for the assigned duties and responsibilities 3C – Establish and implement a remuneration scheme for the attraction, recruitment and retention of qualified technical personnel (in other words, the ability to offer competitive terms of employment and compensation packages) 3D – Establish and implement a system, including supporting human resource plans, to attract, recruit and retain the appropriate number of qualified technical personnel 3E – Establish and implement a documented process to establish and fill the required posts initially and on an ongoing basis 3F – Make use of RSOOs or equivalent means to secure qualified technical personnel to perform those functions which cannot be performed by the State acting on its own 3G – Implement a process to verify that the established minimum qualifications and experience requirements are met by all recruited technical staff and key management personnel 3H – Establish and implement a process for assessing changing needs for qualified technical personnel requirements and develop and implement procedures to update recruitment and retention of personnel needs 3I – Regularly review the actual number of staff and ensure that sufficient personnel are available to accomplish all required activities, including: the development of regulations, procedures and other guidance material; training; and reporting and analyses of safety deficiencies
References	– Annex 19 – *Safety Management* – Doc 9734, *Safety Oversight Manual*, Part A – *The Establishment and Management of a State Safety Oversight System*

Safety enhancement initiative	SEI-4 – Training for technical personnel to support effective safety oversight
Stakeholder	States
Related GASP target(s)	2.1; 2.2
Actions	☐ 4A – Establish and implement training policies and programmes for qualified technical personnel (as per SEI-3), ensuring that the type and frequency of training successfully completed (in other words, initial, recurrent, specialized and on-the-job training (OJT)) are sufficient to acquire and maintain the required qualifications and level of competence corresponding to the assigned duties and responsibilities of technical personnel ☐ 4B – Identify the training necessary to accomplish all required activities, on an ongoing basis ☐ 4C – Establish and implement a process for assessing changing needs for technical training and develop and implement procedures to regularly update training requirements and plans ☐ 4D – Develop written instructions, procedures and/or requirements for the systematic establishment, maintenance and retention of training records (comprising certificates of attendance/participation, information on the course content, performance of tasks under supervision, OJT and the outcomes)
References	– Annex 19 – *Safety Management* – Doc 8335, *Manual of Procedures for Operations Inspection, Certification and Continued Surveillance* – Doc 9734, *Safety Oversight Manual*, Part A – *The Establishment and Management of a State Safety Oversight System* – ICAO-Endorsed Government Safety Inspector Training Programme – ICAO Global Aviation Training – ICAO iPACK – Supporting Civil Aviation Entities in Conducting a Training Needs Analysis (TNA)

Safety enhancement initiative	SEI-5 – Corrective actions to resolve safety issues identified during surveillance activities
Stakeholder	States
Related GASP target(s)	2.3
Actions	5A – Establish and implement procedures to deal with deficiencies found during surveillance activities, including notifying regulated entities or services providers of identified deficiencies; the categorization of seriousness of the deficiency; and a deadline for corrective action 5B – Establish and implement a process to take corrective actions, including enforcement, if deficiencies found during surveillance activities are not rectified within a reasonable time by the regulated entities or services providers 5C – Establish and implement a process for the resolution of deficiencies or concerns identified during surveillance activities delegated to other entities or individuals
References	– Doc 9734*, Safety Oversight Manual*, Part A – *The Establishment and Management of a State Safety Oversight System*

Safety enhancement initiative	SEI-6 – Establishment of an independent accident and incident investigation authority, consistent with Annex 13 – *Aircraft Accident and Incident Investigation*
Stakeholder	States
Related GASP target(s)	1.1; 1.2; 1.3; 2.2
Actions	6A – Promulgate legislation in compliance with the provisions of Annex 13 – *Aircraft Accident and Incident Investigation*, that include*:* a) Establishing an independent accident investigation authority with the authority to access information, evidence and recordings and to conduct interviews b) Requiring immediate reporting of aircraft accidents and serious incidents within the State to the accident investigation authority c) Requiring the notification and investigation of aircraft accidents and serious incidents 6B – Develop and document a plan to ensure the State provides its investigators with all necessary investigation and protective equipment, appropriate facilities and office equipment, as well as the necessary means of communication and transportation to enable the conduct of investigations 6C – Develop a system to promulgate technical guidance for technical personnel to effectively conduct accident and incident investigations
References	– Annex 13 – *Aircraft Accident and Incident Investigation* – Doc 9734, *Safety Oversight Manual*, Part A – *The Establishment and Management of a State Safety Oversight System* – Doc 9756, *Manual of Aircraft Accident and Incident Investigation*, Part I – *Organization and Planning* – Doc 9962, *Manual on Accident and Incident Investigation Policies and Procedures* – Doc 10205, *Manual on Hazards at Aircraft Accident Sites*

Safety enhancement initiative	SEI-7 – Implementation of a process to ensure that the accident investigation authority has sufficient financial resources to investigate accidents and serious incidents
Stakeholder	States
Related GASP target(s)	2.1; 2.2
Actions	7A – Define and implement a process, which should be independent from State aviation authorities and other entities that could interfere with the conduct or objectivity of an investigation, to ensure that the accident investigation authority has sufficient financial resources to investigate accidents and serious incidents 7B – Include in the process supplementary funding of accident investigations when required (in the event of a large-scale accident) 7C – Determine whether to delegate some or all investigations (for example, to other States or to regional organizations), if the process cannot be implemented in full
References	– Annex 13 – *Aircraft Accident and Incident Investigation*, Attachment F – *Investigation delegation agreements* – Doc 9756, *Manual of Aircraft Accident and Incident Investigation*, Part I – *Organization and Planning*

Safety enhancement initiative	SEI-8 – Establishment of minimum qualifications and experience requirements for investigators
Stakeholder	States
Related GASP target(s)	2.2
Actions	8A – Establish and document required qualifications for investigators (who may be full-time, part-time and/or seconded), including knowledge, practical experience in civil aviation required (as pilot, engineer, air traffic controller or other areas of expertise) and training appropriate for the assigned duties and responsibilities 8B – Establish and document required qualifications and practical experience for the "investigator-in-charge" role (the person charged, on a qualification basis, with the responsibility for the organization, conduct and control of an investigation) 8C – Implement a process to verify that the established minimum qualifications and experience requirements are met by all investigators (as per actions 8A and B)
References	– Doc 9734, *Safety Oversight Manual*, Part A – *The Establishment and Management of a State Safety Oversight System* – Doc 9756, *Manual of Aircraft Accident and Incident Investigation*, Part I – *Organization and Planning* – Doc 9962, *Manual on Accident and Incident Investigation Policies and Procedures* – Doc 10062, *Manual on the Investigation of Cabin Safety Aspects in Accidents and Incidents* – Doc 10206, *Manual on Aircraft Accident and Incident Investigation Training*

Safety enhancement initiative	SEI-9 – Implementation of a mechanism to ensure that the accident investigation authority has sufficient personnel to meet its national and international obligations related to aircraft accident investigations
Stakeholder	States
Related GASP target(s)	2.1
Actions	9A – Define and document a methodology to identify staffing needs for all specialities in accident investigation, including those related to notifications; first actions after an accident or serious incident; organization and conduct of the investigation; and report development 9B – Establish and document required qualifications for investigators, including knowledge and practical experience in civil aviation required (as pilot, engineer, air traffic controller or other areas of expertise), appropriate for the assigned duties and responsibilities 9C – Establish and implement a remuneration scheme for the attraction, recruitment and retention of qualified investigators (in other words, the ability to offer competitive terms of employment and compensation packages) 9D – Establish and implement a documented process to establish and fill the required posts initially and on an ongoing basis 9E – If there is a lack or shortage of appropriately qualified technical personnel, consider establishing and documenting (for example, by Memoranda of Understanding) alternate arrangements with other States or with regional organizations to ensure that the State would obtain the necessary personnel in an expeditious manner in the event of an accident or serious incident 9F – Regularly review the actual composition (for example, number and/or specialties) of staff and ensure that sufficient personnel are available to accomplish all required activities including: the development of regulations, procedures and other guidance material; training; and reporting and analyses of safety deficiencies
References	– Doc 9734, *Safety Oversight Manual*, Part A – *The Establishment and Management of a State Safety Oversight System* – Doc 9756, *Manual of Aircraft Accident and Incident Investigation*, Part I – *Organization and Planning* – Doc 9962, *Manual on Accident and Incident Investigation Policies and Procedures*

Safety enhancement initiative	SEI-10 – Development and implementation of training plans and a formal training programme for investigators
Stakeholder	States
Related GASP target(s)	2.2
Actions	10A – Establish and implement training policies and programmes defining the type and frequency of training (for example, initial, recurrent, specialized and OJT) to be provided to investigators so they can acquire and maintain the required level of knowledge, skills, competence and qualifications in accordance with their assigned duties and responsibilities 10B – Provide training plans detailing and prioritizing the types of training to be provided to investigators, commensurate with their responsibilities (for example, as investigator, group or team leader, investigator-in-charge, accredited representative, adviser, expert or specialist) 10C – Develop and/or validate (if provided by another entity such as universities, manufacturers, military establishments or other educational institutions), the content of the training, to ensure that it complies with the authority's accident investigation training programme and contains content related to safety at the accident site (hazards at aircraft accident sites) 10D – Establish and implement a process for assessing changing needs for technical training and develop and implement procedures to regularly update training requirements and plans 10E – Develop written instructions, procedures and/or requirements for the systematic establishment, maintenance and retention of training records (comprising certificates of attendance/participation, information on the course content, performance of tasks under supervision, OJT and the outcomes)
References	– Doc 9734, *Safety Oversight Manual*, Part A – *The Establishment and Management of a State Safety Oversight System* – Doc 9756, *Manual of Aircraft Accident and Incident Investigation*, Part I – *Organization and Planning* – Doc 9962, *Manual on Accident and Incident Investigation Policies and Procedures* – Doc 10062, *Manual on the Investigation of Cabin Safety Aspects in Accidents and Incidents* – Doc 10205, *Manual on Hazards at Aircraft Accident Sites* – Doc 10206, *Manual on Aircraft Accident and Incident Investigation Training*

Safety enhancement initiative	SEI-11 – Establishment and implementation of processes and procedures for the investigation of aircraft accidents and serious incidents
Stakeholder	States
Related GASP target(s)	1.1; 1.2; 1.3
Actions	11A – Establish and implement policies and procedures to ensure that accident and serious incident investigations include the access, gathering, recording and analysis of all relevant information (for example, safety data collection and processing systems (SDCPS)) to enable the determination of causes and/or contributing factors and the issuance of safety recommendations 11B – Verify that the policies, procedures and guidance material established are sufficiently detailed, are customized to the system in place and help determine the extent of an accident investigation (including the scope of the investigation and whether investigators will be deployed on site) 11C – Establish and implement a process, based on risk analysis, to help determine which types of incidents will be investigated by the investigation authority, in conformance with Annex 13
References	– Annex 13 – *Aircraft Accident and Incident Investigation* – Doc 9756, *Manual of Aircraft Accident and Incident Investigation*, Part I – *Organization and Planning* – Doc 9756, *Manual of Aircraft Accident and Incident Investigation*, Part II – *Procedures and Checklists*

Safety enhancement initiative	SEI-12 – Establishment and use of an accident and incident investigation database
Stakeholder	States
Related GASP target(s)	1.1; 1.2; 1.3
Actions	12A – Establish an accident and incident investigation database, in a standardized format, to facilitate the effective analysis of information on actual or potential safety deficiencies and to determine any preventive actions required 12B – Use a taxonomy, in the accident and incident database, that is compatible with the Accident/Incident Data Reporting (ADREP) system and theEuropean Co-ordination Centre for Aviation Incident Reporting Systems (ECCAIRS) 12C – Establish and utilize a process to analyse the information contained in the database accident and incident to determine any required preventive action
References	– Annex 13 – *Aircraft Accident and Incident Investigation* – Doc 9962, *Manual on Accident and Incident Investigation Policies and Procedures* – ICAO Accident/Incident Data Reporting (ADREP) Taxonomy – European Coordination Centre for Accident and Incident Reporting Systems (ECCAIRS)

Safety enhancement initiative	SEI-13 – Development and issuance of safety recommendations from accident and incident investigations
Stakeholder	States
Related GASP target(s)	1.1; 1.2; 1.3
Actions	13A – Establish guidelines regarding the development and issuance of safety recommendations, at any stage of an accident or incident investigation, to the appropriate stakeholders (including to ICAO, when applicable) 13B – Establish procedures, as the State receiving safety recommendations from other States, to provide a timely response to the issuing State and monitor the progress of any action taken in response to the recommendations 13C – Establish procedures to ensure that intended safety recommendations are included in the draft final report (forwarded to the States and organizations concerned), as well as to record responses to the safety recommendations it has issued
References	– Annex 13 – *Aircraft Accident and Incident Investigation* – Doc 9756, *Manual of Aircraft Accident and Incident Investigation*, Part II – *Procedures and Checklists* – Doc 9756, *Manual of Aircraft Accident and Incident Investigation*, Part IV – *Reporting* – Doc 9962, *Manual on Accident and Incident Investigation Policies and Procedures*

Safety enhancement initiative	SEI-14 – Timely publication of final reports from aircraft accident and serious incident investigations, consistent with Annex 13 – *Aircraft Accident and Incident Investigation*
Stakeholder	States
Related GASP target(s)	1.1; 1.2; 1.3
Actions	☐ 14A – Promulgate legislation requiring that all final reports from aircraft accidents and serious incidents investigations be completed and made publicly available ☐ 14B – Establish and implement guidelines regarding the development, content, format and distribution of the interim and final reports ☐ 14C – Establish and implement procedures that address the following: consultation on the draft final report; transmission of a copy of the draft final report to appropriate stakeholders; amendment of the draft final report based on comments received; and prevention of public disclosure of the draft final report ☐ 14D – Establish and implement procedures to ensure the final report is sent to ICAO, as applicable, and to all States involved ☐ 14E – Establish and implement procedures to ensure the transmission of ADREP data reports to ICAO with the complete information required for accident prevention and in a format compatible with the ADREP taxonomy
References	– Annex 13 – *Aircraft Accident and Incident Investigation* – Doc 9756, *Manual of Aircraft Accident and Incident Investigation*, Part II – *Procedures and Checklists* – Doc 9756, *Manual of Aircraft Accident and Incident Investigation*, Part IV – *Reporting* – Doc 9962, *Manual on Accident and Incident Investigation Policies and Procedures* – ICAO Accident/Incident Data Reporting (ADREP) Taxonomy

Safety enhancement initiative	SEI-15 – Qualified technical personnel with safety oversight responsibilities for aerodromes and ground aids (AGA)
Stakeholder	States
Related GASP target(s)	2.2
Actions	15A – Use SEI-3 to ensure qualified technical personnel with safety oversight responsibilities for AGA, including: a) aerodrome inspectors b) key management personnel in the aerodrome regulatory authority c) personnel responsible for the acceptance and continuous surveillance of aerodrome operators' safety management systems (SMS) (this responsibility may be assigned to aerodrome inspectors) d) delegated entities or individuals, if the duties of the aerodrome regulatory authority have been delegated to other entities or individuals
References	– Annex 19 – *Safety Management* – Doc 9734, *Safety Oversight Manual*, Part A – *The Establishment and Management of a State Safety Oversight System* – Doc 9859, *Safety Management Manual*

Safety enhancement initiative	SEI-16 – Training for aerodrome regulatory and inspectorate staff to support effective safety oversight
Stakeholder	States
Related GASP target(s)	2.2
Actions	16A – Use SEI-4 to ensure training for technical personnel with safety oversight responsibilities for AGA, including: a) all the AGA specialist areas b) training content specifically for personnel responsible for the acceptance and continuous surveillance of aerodrome operators' SMS, in accordance with Annex 19 c) specialized training: aerodrome operations; rescue and firefighting; wildlife management; assessment of physical characteristics and electrical systems; obstacle control; assessment and reporting of runway surface conditions; aeronautical studies and risk assessments; enforcement; and signs, markings and lighting
References	– Annex 19 – *Safety Management* – Doc 9734, *Safety Oversight Manual*, Part A – *The Establishment and Management of a State Safety Oversight System* – Doc 9774, *Manual on Certification of Aerodromes* – Doc 9859, *Safety Management Manual*

Safety enhancement initiative	SEI-17 – Development and implementation of processes to manage risks related to aerodrome operations
Stakeholder	States
Related GASP target(s)	2.3
Actions	17A – Establish and implement a process to collect and forward wildlife strike reports to ICAO, including a national procedure for recording wildlife strikes, reporting requirements and a mechanism to ensure the effective implementation of the reporting and rectification action 17B – Establish and implement a process to mitigate against an increase, or potential increase, in the wildlife strike hazard due to land use development likely to attract wildlife around an aerodrome (the process should give priority to safety) 17C – Establish and implement a process to ensure that the outcomes of risk assessments or aeronautical studies, in the form of exceptions, are published in a document which is publicly accessible, such as the State's aeronautical information publication (AIP) 17D – Establish and implement mechanisms to enable the exchange of safety information across the aerodrome industry, including the analysis of aerodrome and State databases; the dissemination of safety information, bulletins and publications; and the convocation of industry meetings, seminars or workshops 17E – Establish and implement a process for the management of conflicts between land use or environmental requirements and aviation authorities to ensure that safety is not compromised
References	17A, 17B and 17E – Annex 14 – *Aerodromes*, Volume I – *Aerodrome Design and Operations* 17C, 17D and 17E – Doc 9734, *Safety Oversight Manual*, Part A – *The Establishment and Management of a State Safety Oversight System* 17C and 17D – Doc 9981, *Procedures for Air Navigation Services – Aerodromes* 17E – Annex 16 – *Environmental Protection*, Volume I – *Aircraft Noise*

Safety enhancement initiative	SEI-18 – Corrective actions to resolve safety deficiencies or concerns identified during surveillance activities related to aerodrome operations
Stakeholder	States
Related GASP target(s)	2.3
Actions	18A – Use SEI-5 to ensure resolution of safety deficiencies or concerns identified during surveillance activities related to aerodrome operations, including: – Establish and implement a graduated enforcement system to ensure that the renewal or continuing validity of aerodrome certificates is dependent on the satisfactory outcome of regulatory surveillance activities
References	– Doc 9981, *Procedures for Air Navigation Services – Aerodromes* – Doc 9734*, Safety Oversight Manual*, Part A – *The Establishment and Management of a State Safety Oversight System* – Doc 9774, *Manual on Certification of Aerodromes*

Safety enhancement initiative	SEI-19 – Provision of the safety information to ICAO
Stakeholder	States
Related GASP target(s)	2.1; 2.2; 2.3; 3.1; 3.2; 5.2
Actions	☐ 19A – Update Universal Safety Oversight Audit Programme (USOAP) corrective action plan items ☐ 19B – Complete and submit the self-assessment checklist based on USOAP Continuous Monitoring Approach (CMA) Protocol Questions ☐ 19C – Complete and submit the State aviation activity questionnaire ☐ 19D – Complete and submit the compliance checklists on electronic filing of differences system ☐ 19E – Update documents and records, as required and in a timely manner, paying particular attention to the Global Organizational Challenges listed in the GASP
References	– Doc 9735, *Universal Safety Oversight Audit Programme Continuous Monitoring Manual* – Doc 10004, *Global Aviation Safety Plan* – ICAO USOAP CMA Online Framework – USOAP CMA Computer-based Training – USOAP CMA Workshops – ICAO iPACK – Preparing for ICAO USOAP CMA Activities – GASP Library – National Aviation Safety Plans

COMPONENT 1 – STATE SAFETY OVERSIGHT SYSTEM

PART 2. REGIONS

Safety enhancement initiative	SEI-20 – Provision of assistance to States, to address safety issues and enhance safety in a coordinated manner
Stakeholder	Regions
Related GASP target(s)	4.1; 4.2
Actions	20A – Work together at the regional level to assist States with low EI and/or Significant Safety Concerns (SSC), or that need assistance to address safety issues: a) provide support towards shortfalls in SEIs found in multiple States to increase cost effectiveness; b) adopt best practices for identifying cost-effective types of support that lead to sustained safety oversight improvements and adjust regional resource priorities; c) make use of existing, or create new, contributory bodies of the RASGs to address regional safety issues; d) coordinate assistance to States that have taken temporary measures to address potential SSCs; and e) promote State-to-State collaboration to address safety issues and enhance safety in a coordinated manner. 20B – Support the development of model regulations, technical guidance and tools for promulgation by States and establish a process for the provision of safety-critical information in the region, consistent with ICAO Standards and Recommended Practices 20C – Develop and support training plans and activities to harmonize competencies of technical personnel needed to support effective safety oversight at the regional level 20D – Work regionally through the RASG, RSOO and ICAO Regional Office, as well as through available capacity-building programmes provided by regional organizations and States in the region, to enhance safety in a sustainable manner
References	– Doc 9734, *Safety Oversight Manual*, Part B – *The Establishment and Management of a Regional Safety Oversight Organization* – Doc 9868, *Procedures for Air Navigation Services – Training* (PANS-TRG) – GASP Library – Regional Aviation Safety Plans

Safety enhancement initiative	SEI-21 – Establishment of an independent regional accident and incident investigation process, consistent with Annex 13 – *Aircraft Accident and Incident Investigation*
Stakeholder	Regions
Related GASP target(s)	1.1; 1.2; 1.3 ;4.1; 4.2
Actions	□ 21A – Establish a new, or utilize the existing, RAIO or an investigation cooperative mechanism (ICM), to be more effective and efficient in supporting States in the region □ 21B – Work to strengthen the existing RAIO or ICM, to best support States in the region □ 21C – Identify champion States, via the RASGs, to assist in building the accident and incident investigation capabilities of States that require assistance □ 21D – Provide resources for accident and incident investigation (including, but not limited to, personnel and technical support) to perform those functions which cannot be performed by the State acting on its own
References	21A and 21B – Doc 9946, *Manual on Regional Accident and Incident Investigation Organization* – ICAO RAIO Cooperative Platform 21D – Annex 13 – *Aircraft Accident and Incident Investigation* – Doc 9734, *Safety Oversight Manual,* Part A – *The Establishment and Management of a State Safety Oversight System* and Part B – *The Establishment and Management of a Regional Safety Oversight Organization* – Doc 9756, *Manual of Aircraft Accident and Incident Investigation* – Doc 9962, *Manual on Accident and Incident Investigation Policies and Procedures* – Doc 9973, *Manual on Assistance to Aircraft Accident Victims and their Families* – Doc 9998, *ICAO Policy on Assistance to Aircraft Accident Victims and their Families* – Doc 10205, *Manual on Hazards at Aircraft Accident Sites* – Doc 10206, *Manual on Aircraft Accident and Incident Investigation Training*

Safety enhancement initiative	SEI-22 – Consistent coordination of regional programmes in establishing effective safety oversight capabilities
Stakeholder	Regions
Related GASP target(s)	2.1; 4.1; 4.2
Actions	22A – Use analyses of relevant safety information from the GASP, the corresponding RASP, the RASG and/or RSOO to determine regional safety issues and resources that can be used to assist States. Due to limited human and financial resources, any planned actions should be targeted at those safety risks that can be sustainably addressed and have the highest impact in terms of improving safety 22B – Identify and prioritize available resources to support effective safety oversight capabilities of States in the region through the implementation of SEIs 22C – Facilitate the provision of financial and technical assistance among regional resourced entities (RASG, RSOO, ICAO Regional Office, champion States, development banks, regional economic communities and other regional aid programmes) and give priority to States requiring assistance 22D – Establish a new, or utilize the existing RSOO or equivalent means, to perform those functions that cannot be performed by the State acting on its own 22E – Work to strengthen the existing RSOO to best support States in the region 22F – Commend, promote and encourage States' bilateral and multilateral cooperation plans and activities by highlighting the outcomes of such collaboration in the regional meetings and build on the processes to sustain continual technical collaboration endeavours
References	– Doc 9734, *Safety Oversight Manual,* Part B – *The Establishment and Management of a Regional Safety Oversight Organization* – Aviation Safety Implementation Assistance Partnership (ASIAP) – RSOO Cooperative Platform – GASP Library – Regional Aviation Safety Plans

Safety enhancement initiative	SEI-23 – Strategic collaboration with key aviation stakeholders to establish effective safety oversight systems
Stakeholder	Regions
Related GASP target(s)	1.1; 1.2; 1.3; 4.1 ;4.2
Actions	23A – Based on the identified hazards and safety deficiencies, establish a mechanism to identify key aviation stakeholders and develop and execute an action plan for the resolution of regional safety issues (as part of the RASP) 23B – Provide assistance to States, via established mechanisms, for primary aviation legislation development 23C – Provide assistance to States, via established mechanisms, for the development of national regulations 23D – Establish a process via RASG for a mentoring and collaboration system with the proper utilization of RSOOs (if available), including providing State and industry assistance, as well as sharing of best practices and internal follow-up actions 23E – Facilitate the collaboration between RASG, RSOO, States, ICAO, industry joint programmes and/or educational institutions partnerships to attract, recruit and train qualified and sufficient technical personnel, and develop a strategy for their retention 23F – Establish a process for the development and promulgation of technical guidance, tools and the provision of safety-critical information, in collaboration with States, RSOO, ICAO and/or other stakeholders, and promote these materials be tailored to the national regulations and operational context of each State
References	– Doc 9734, *Safety Oversight Manual* – ICAO Capacity Development and Implementation Bureau – RSOO Cooperative Platform

Safety enhancement initiative	SEI-24 – Strategic collaboration with key aviation stakeholders to implement effective safety oversight systems
Stakeholder	Regions
Related GASP target(s)	1.1; 1.2; 1.3; 4.1 ;4.2
Actions	24A – Based on the identified hazards and safety deficiencies, establish a mechanism to identify key aviation stakeholders and develop and execute an action plan for the resolution of regional safety issues (as part of the RASP) 24B – Provide assistance to States, via RASG and/or RSOO (if available), for the conduct of certification and surveillance activities 24C – Promote the use of technical guidance, tools and safety-critical information, developed in collaboration with States, RSOO, ICAO and/or other stakeholders, to assist in safety oversight functions 24D – Work with States' competent authorities and their enforcement oversight processes to address safety issues in a timely manner 24E – Work with stakeholders to resolve safety issues identified via accident and incident investigations, safety reports and other means (that may require protection of safety information, when working collaboratively with industry)
References	24A to 24C – Doc 9734, *Safety Oversight Manual* 24D – Doc 8335, *Manual of Procedures for Operations Inspection, Certification and Continued Surveillance* – Doc 9735, *Universal Safety Oversight Audit Programme Continuous Monitoring Manual* 24E – Doc 9756, *Manual of Aircraft Accident and Incident Investigation*

Safety enhancement initiative	SEI-25 – Provision of the safety information at the regional level
Stakeholder	Regions
Related GASP target(s)	4.1; 4.3; 5.1
Actions	☐ 25A – Urge States in the region to complete and submit their: a) USOAP corrective action plan items; b) self-assessment checklist based on USOAP CMA Protocol Questions; c) State aviation activity questionnaire; and d) compliance checklists on electronic filing of differences system ☐ 25B – Utilize the RASGs, regional organizations or other regional fora to collect and share safety information and assess the level of implementation of ICAO Standards and Recommended Practices at the regional level ☐ 25C – Implement a regional mechanism (for example, via the RASG) to make use of the information on operational safety risks and emerging issues for the purpose of aviation safety planning
References	– Doc 9735, *Universal Safety Oversight Audit Programme Continuous Monitoring Manual* – ICAO USOAP CMA Online Framework – USOAP CMA Computer-based Training – USOAP CMA Workshops – GASP Library – National Aviation Safety Plans

COMPONENT 1 – STATE SAFETY OVERSIGHT SYSTEM

PART 3. INDUSTRY

Safety enhancement initiative	SEI-26 – Strategic collaboration with key aviation stakeholders to contribute to an effective safety oversight system
Stakeholder	Industry
Related GASP target(s)	1.1; 1.2; 1.3; 5.1 ;5.2
Actions	26A – Based on the identified hazards and safety deficiencies, establish a mechanism to identify key aviation stakeholders (for example, with an RACI (responsible, accountable, consulted and informed) matrix) and develop and execute an action plan for the resolution of safety issues (may be integrated in RASP and NASP) 26B – Provide input to States, as applicable, for the development of national regulations 26C – Participate in regional and national activities for sharing of best practices, mentoring and conducting follow-up actions 26D – Assist in resolving safety issues identified via accident and incident investigations, safety reports and other means (which may require protection of safety information)
References	26A to 26C – Doc 9859, *Safety Management Manual* 26D – Doc 9756, *Manual of Aircraft Accident and Incident Investigation*

Safety enhancement initiative	SEI-27 – Provision of safety information by industry to assist in the development of regional and national aviation safety plans
Stakeholder	Industry
Related GASP target(s)	5.1; 5.2
Actions	☐ 27A – Actively support the achievement of the GASP goals, by being involved in the development of regional and national aviation safety plans (RASPs and NASPs) ☐ 27B – Assist in the implementation of SEIs that support RASPs and NASPs, through specific action plans ☐ 27C – Provide safety information to States, RASGs and ICAO (including on operational safety risks) that may benefit the development and revision of aviation safety plans ☐ 27D – Actively participate in, and contribute to, the RASGs to assist with the implementation of SEIs and enhance safety in a coordinated manner
References	– Doc 10131, *Manual on the Development of Regional and National Aviation Safety Plans* – GASP Library – Regional Aviation Safety Plans – GASP Library – National Aviation Safety Plans

Safety enhancement initiative	SEI-28 – Improvement of industry compliance with applicable regulations
Stakeholder	Industry
Related GASP target(s)	6.1
Actions	□ 28A – Work across industry to maintain compliance with applicable regulations □ 28B – Participate in the corresponding, ICAO-recognized industry evaluation programmes (for service providers) □ 28C – Participate in industry safety data sharing programmes (for service providers) – with examples listed in the references for this action
References	28B – Airports Council International (ACI) Airport Excellence (APEX) in Safety – Civil Air Navigation Services Organisation (CANSO) and European Organisation for the Safety of Air Navigation (EUROCONTROL) Standard of Excellence in Safety Management Systems measurement – FSF Basic Aviation Risk Standard (BARS) – International Air Transportation Association (IATA) Operational Safety Audit (IOSA) – IATA Safety Audit for Ground Operations (ISAGO) – International Business Aviation Council (IBAC) International Standard for Business Aircraft Operations (IS-BAO). – IBAC International Standard for Business Aircraft Handling (IS-BAH) 28C – Cirium Airline Analytics – IATA Flight Data eXchange (FDX) – IATA Incident Data eXchange (IDX) – US Aviation Safety Information Analysis and Sharing (ASIAS) – Data4Safety (D4S) Programme – FSF Aviation Safety Network

Safety enhancement initiative	SEI-29 – Allocation of industry resources to support effective safety oversight
Stakeholder	Industry
Related GASP target(s)	2.1
Actions	29A – Identify resources that are available to support SEIs for States and regions 29B – Participate in regional and international government or industry collaborative safety enhancement initiatives
References	– Aviation Safety Implementation Assistance Partnership (ASIAP)

COMPONENT 2 – STATE SAFETY PROGRAMME

PART 1. STATES

Safety enhancement initiative	SEI-30 – Start the establishment of an SSP at the national level
Stakeholder	States
Related GASP target(s)	3.1; 3.2
Actions	☐ 30A – Secure State-level commitment to improve safety ☐ 30B – Complete the SSP PQ self-assessment, using the ICAO USOAP CMA Online Framework (OLF) ☐ 30C – Designate the authority in charge of coordinating the establishment and maintenance of the SSP; and define and document its responsibilities and roles ☐ 30D – Identify and define the roles and responsibilities of each State authority (for example, civil aviation authority, accident investigation authority, military aviation authority and other authorities, as applicable) involved in the SSP establishment and maintenance (including a mechanism for the coordination of SSP-related aspects at the State level) ☐ 30E – Establish an SSP implementation team and plan ☐ 30F – Identify safety management best practices to aid in the establishment of an SSP
References	– Annex 19 – *Safety Management* – Doc 9859, *Safety Management Manual* – Safety Management Implementation Website – ICAO USOAP CMA Online Framework

Safety enhancement initiative	SEI-31 – Strategic allocation of resources to start the establishment of an SSP
Stakeholder	States
Related GASP target(s)	2.1; 3.2
Actions	31A – Establish a plan for the allocation of resources to enable the establishment of the SSP 31B – Identify and obtain resources from national and appropriate authorities' leadership and stakeholders within the State to support the establishment of the SSP (this may be done through the NASP) 31C – Work with the ICAO Regional Office and/or any other regional organization(s) to make use of available means (for example, the Capacity Development and Implementation Bureau) to acquire assistance needed for the establishment of the SSP 31D – Train qualified technical personnel to fulfil their duties and responsibilities regarding the establishment and maintenance of the SSP (potentially working with other entities such as RSOO, other States and other organizations, as appropriate)
References	31A and 31B – Annex 19 – *Safety Management* – Doc 9859, *Safety Management Manual* – ICAO iPACK – Supporting Civil Aviation Entities in Conducting a Training Needs Analysis (TNA) 31C – ICAO Capacity Development and Implementation Bureau 31D – Safety Management International Collaboration Group (SM ICG), *10 Things You Should Know About SMS* – SM ICG, *SMS Inspector Competency Guidance* – SM ICG, *SMS Evaluation Tool*

Safety enhancement initiative	SEI-32 – Strategic collaboration with key aviation stakeholders to start the establishment of SSP
Stakeholder	States
Related GASP target(s)	3.1; 3.2
Actions	☐ 32A – Identify areas where collaboration or support is needed as part of the SSP implementation plan (see SEI-30) ☐ 32B – Identify relevant key aviation stakeholders, including other States that are establishing or have established an SSP ☐ 32C – Plan to address the elements identified as missing or deficient during the SSP PQ self-assessment ☐ 32D – Initiate the development of the State safety policy (to support SEI-32E) ☐ 32E – Establish a process, via RASG and/or RSOO, for a mentoring system to receive assistance and share best practices to support the establishment of the SSP ☐ 32F – Establish a process to provide training on the SSP to relevant staff, in collaboration with RSOO and/or other States (see SEI-30D) ☐ 32G – Establish a process for sharing technical guidance, tools and safety-critical information related to an SSP (for example, advisory circulars, staff instructions, safety performance indicators), in collaboration with other States, RASG, RSOO, ICAO and/or other stakeholders
References	32A to 32C – Annex 19 – *Safety Management* – Doc 9859, *Safety Management Manual* – ICAO USOAP CMA Online Framework – SM ICG, SSP Assessment Tool 32E to 32G – Aviation Safety Implementation Assistance Partnership (ASIAP) – ICAO Capacity Development and Implementation Bureau 32G – Safety Management Implementation Website

Safety enhancement initiative	SEI-33 – Strategic collaboration with key aviation stakeholders to work towards the completion of the establishment of the SSP
Stakeholder	States
Related GASP target(s)	3.2
Actions	☐ 33A – Work with key aviation stakeholders to execute the SSP implementation plan ☐ 33B – Finalise the documentation of the functions and activities of the establishment of the SSP ☐ 33C – Publish the State's safety policy ☐ 33D – Create a mechanism to develop, document and take appropriate safety risk mitigation/control actions as required, at the State level (see SEI-34C) ☐ 33E – Create a mechanism to evaluate the effectiveness of actions taken to manage safety risks ☐ 33F – Promote SMS implementation for service providers ☐ 33G – Serve as a champion State to promote best practices among other States
References	33B to 33F – Doc 9859, *Safety Management Manual* 33C to 33E – Safety Management Implementation Website 33G – Aviation Safety Implementation Assistance Partnership (ASIAP) – SM ICG, *How to Support a Successful SSP and SMS Implementation – Recommendations for Regulators*

Safety enhancement initiative	SEI-34 – Availability of safety data and safety information to support safety management activities at the national level (step 1)
Stakeholder	States
Related GASP target(s)	3.2
Actions	☐ 34A – Establish national laws, regulations and policies protecting safety data, safety information and related sources, in accordance with Annex 19: a) Ensure that the protection of safety data, safety information and related sources does not interfere with the proper administration of justice or with maintaining or improving safety b) Ensure that safety data, safety information and related sources are protected c) Specify the conditions under which safety data, safety information and related sources qualify for protection, including principles of exception and authoritative safeguards, such as de-identification of data d) Ensure that safety data and safety information remain available for the purpose of maintaining or improving aviation safety ☐ 34B – Establish an SDCPS to capture, store, aggregate and enable the analysis of safety data and safety information to support safety performance management activities ☐ 34C – Establish and maintain a process to identify hazards and safety risks from safety data, which includes the use of a risk assessment
References	– Annex 19 – *Safety Management* – Doc 9859, *Safety Management Manual* – Doc 10159, *Safety Intelligence Manual* – Safety Management Implementation Website – Commercial Aviation Safety Team (CAST)/ICAO Common Taxonomy Team – ICAO Accident/Incident Data Reporting (ADREP) Taxonomy – SM ICG, *Development of a Common Hazard Taxonomy* – SM ICG, *Hazard Taxonomy Examples* – SM ICG, *Risk-based decision-making principles*

Safety enhancement initiative	SEI-35 – Availability of safety data and safety information to support safety management activities at the national level (step 2)
Stakeholder	States
Related GASP target(s)	3.2; 4.3
Actions	35A – Establish the safety objectives to be achieved through the SSP 35B – Develop safety performance measurement methodologies, aligned with the regional safety metrics (see SEI-33E) 35C – Develop State-specific safety performance indicators and safety performance targets 35D – Promote the use of safety reporting systems by service providers 35E – Promote safety awareness and the two-way communication, sharing and exchange of safety-relevant information within the aviation organizations of the State and encourage sharing of safety information with industry within the State 35F – Contribute information on operational safety risks and emerging issues to the RASG
References	35A to 35E – Doc 9859, *Safety Management Manual* – Safety Management Implementation Website 35A to 35D – SM ICG, *A Systems Approach to Measuring Safety Performance – The Regulator Perspective* – SM ICG, *Measuring Safety Performance Guidelines for Service Providers* 35E – RASG regional safety reports 35F – Secure Portal on Operational Safety Risks and Emerging Issues

Safety enhancement initiative	SEI-36 – Allocation of resources to support safety performance measurement and monitoring and safety risk management capabilities
Stakeholder	States
Related GASP target(s)	3.2; 4.3
Actions	36A – Identify resources needed to support safety intelligence development, advanced data analysis, safety risk management methodologies and information-sharing capabilities 36B – Attract, recruit, train and retain qualified technical personnel to specialize in safety risk management methodologies 36C – Ensure that the civil aviation safety inspector workforce is trained to perform safety oversight of service providers SMS and to assess the application of safety risk management methodologies
References	36A – Doc 10159, *Safety Intelligence Manual* 36B and 36C – ICAO iPACK – Supporting Civil Aviation Entities in Conducting a Training Needs Analysis (TNA)

Safety enhancement initiative	SEI-37 – Strategic collaboration with key aviation stakeholders to support and enhance safety management activities
Stakeholder	States
Related GASP target(s)	3.2; 4.3
Actions	37A – Identify areas where collaboration or support is needed to ensure that stakeholders understand and foster a positive safety culture that creates a high degree of trust and respect between personnel and management and promotes safety reporting 37B – Establish a process, via RASG and/or RSOO (or other regional bodies), for a mentoring system to provide assistance to States and industry and share best practices to support positive safety culture development and the use of safety risk methodologies 37C – Foster and participate in collaborative partnerships similar to the commercial and general aviation safety teams' concept (commonly referred to as collaborative safety teams) to identify and implement safety enhancements 37D – Collaborate with key aviation stakeholders to establish a mechanism for the regular sharing and exchange of safety information, analyses, safety risk discoveries, lessons learned and best practices within a confidential and non punitive environment
References	37A – CANSO Safety Culture Definition and Enhancement Process – SKYbrary Safety Culture in Aviation 37C – Doc 10159, *Safety Intelligence Manual* – Commercial Aviation Safety Team – General Aviation Joint Safety Committee – International Helicopter Safety Team – RASGs – RASG-PA *Guidance Material for Implementing a Collaborative Safety Team (CST)* 37D – ICAO Safety Information Monitoring System

Safety enhancement initiative	SEI-38 – Advancement of safety risk management at the national level
Stakeholder	States
Related GASP target(s)	3.2; 4.3
Actions	38A – Integrate the aviation safety databases of the State, including the mandatory occurrences reporting system, voluntary safety reporting systems, safety audit reports and aviation system statistics (traffic volume, weather information, etc.) 38B – Develop capabilities to support the monitoring of safety issues as well as accident and incident prevention 38C – Encourage information-sharing with industry
References	38A to 38C – Doc 10159, *Safety Intelligence Manual* – EUROCONTROL Voluntary ATM Incident Reporting – European Operators Flight Data Monitoring forum (EOFDM) – Federal Aviation Administration (FAA) Aviation Safety Information Analysis and Sharing Program – FAA Aviation Voluntary Reporting Programs – IATA Flight Data eXchange

COMPONENT 2 – STATE SAFETY PROGRAMME

PART 2. REGIONS

Safety enhancement initiative	SEI-39 – Start of promotion of the establishment of SSPs at the regional level
Stakeholder	Regions
Related GASP target(s)	1.2; 1.3; 3.1; 3.2; 4.1; 4.2
Actions	39A – Identify an entity in the region who will guide and support the establishment of SSPs at the regional level (such as RASG, RSOO, ICAO Regional Office) 39B – Guide and support establishment of SSPs by States: a) collect results of the SSP PQ self-assessments (completed via the ICAO USOAP CMA Online Framework); b) identify common deficiencies; c) develop regional strategies, including collaboration and resources, to assist States with the establishment of SSPs; d) identify and promote safety management best practices in coordination with States and/or other regions; and e) follow up on progress and attain updated SSP PQ self-assessments
References	– Safety Management Implementation Website – ICAO USOAP CMA Online Framework – SM ICG, *How to Support a Successful SSP and SMS Implementation – Recommendations for Regulators*

Safety enhancement initiative	SEI-40 – Regional safety enhancement initiatives to support consistent coordination of regional programmes for the establishment of SSPs
Stakeholder	Regions
Related GASP target(s)	3.2; 4.1; 4.2
Actions	□ 40A – Identify resources that are available to support the establishment of SSP by States in the region □ 40B – Use updates provided by States on the level of implementation of their SSP to determine regional priorities and resources that can be used to assist individual States in the region □ 40C – Utilize the ICAO Regional Office and/or any other regional organization(s) to facilitate the provision of technical assistance needed for the establishment of SSP □ 40D – Monitor the progress of the establishment of SSPs (via the ICAO USOAP CMA Online Framework) and adjust regional resource priorities continuously
References	40B to 40D – Annex 19 – *Safety Management* – Doc 9859, *Safety Management Manual* – Doc 10159, *Safety Intelligence Manual* – Safety Management Implementation Website 40C – Doc 9734, *Safety Oversight Manual,* Part B – *The Establishment and Management of a Regional Safety Oversight Organization* – Aviation Safety Implementation Assistance Partnership (ASIAP) – ICAO Capacity Development and Implementation Bureau 40D – ICAO USOAP CMA Online Framework

Safety enhancement initiative	SEI-41 – Strategic collaboration with key aviation stakeholders to support the establishment of SSPs
Stakeholder	Regions
Related GASP target(s)	3.2; 4.1; 4.2
Actions	☐ 41A – Identify areas where collaboration or support is needed as part of States' SSP implementation plans (see SEI-30) ☐ 41B – Identify relevant key aviation stakeholders, including States establishing or having established an SSP ☐ 41C – Develop a strategy to address the common elements identified as missing or deficient during the SSP PQ self-assessment of States in the region (as part of the RASP) ☐ 41D – Establish a process, via RASG and/or RSOO, for a mentoring system to provide assistance to States and industry and to share best practices to support the establishment of SSPs ☐ 41E – Develop a process to provide training on SSP to relevant staff, in collaboration with RSOO and/or other States ☐ 41F – Establish a process for sharing technical guidance, tools and safety-critical information related to SSP (for example, advisory circulars, staff instructions, safety performance indicators), in collaboration with States, RASG, RSOO, ICAO and/or other stakeholders ☐ 41G – Work with States in the region to ensure that all elements of their SSPs are established and maintained
References	41A to 41C – Doc 9859, *Safety Management Manual* – Doc 10159, *Safety Intelligence Manual* – ICAO USOAP CMA Online Framework 41D to 41G – ICAO Capacity Development and Implementation Bureau 41F – Safety Management Implementation Website – SM ICG, SSP Assessment Tool

	41G – SM ICG, *How to Support a Successful SSP and SMS Implementation – Recommendations for Regulators*

Safety enhancement initiative	SEI-42 – Availability of safety data and safety information to support safety management activities at the regional level
Stakeholder	Regions
Related GASP target(s)	3.2; 4.1; 4.2; 4.3
Actions	42A – Encourage States to actively provide updates on the level of implementation of their SSP (via the ICAO USOAP CMA Online Framework) and to provide safety information to enable the identification of hazards and safety deficiencies and management of safety risks in the region 42B – Develop and adopt harmonized safety reporting systems, as part of service providers' SMS within the region (for example, voluntary reporting systems) 42C – Encourage States and industry within the region to share safety information and contribute to regional reporting and monitoring mechanisms 42D – Conduct safety risk analysis, via the RASG in coordination with RSOO or RAIO 42E – Encourage all States to contribute information on operational safety risks and emerging issues to the RASG 42F – Encourage all States to report safety issues via the Secure Portal on Operational Safety Risks and Emerging Issues 42G – Use harmonized metrics for the development and monitoring of safety performance indicators at the regional level (within the RASG) 42H – Establish a regional safety risk registry
References	42A – ICAO USOAP CMA Online Framework 42B to 42H – Doc 9734, *Safety Oversight Manual*, Part B – *The Establishment and Management of a Regional Safety Oversight Organization* – Doc 9859, *Safety Management Manual* – Doc 10159, *Safety Intelligence Manual* – Secure Portal on Operational Safety Risks and Emerging Issues – RASG regional safety reports

	– SM ICG, *A Systems Approach to Measuring Safety Performance – The Regulator Perspective* – SM ICG, *Measuring Safety Performance Guidelines for Service Providers*

Safety enhancement initiative	SEI-43 – Regional allocation of resources to support safety performance measurement and monitoring and safety risk management capabilities
Stakeholder	Regions
Related GASP target(s)	4.3
Actions	43A – Work with States and organizations to leverage available technologies and expertise within the region to enhance safety data analysis and safety performance monitoring to support risk analysis and mitigation strategies 43B – Identify and pool qualified auditor candidates from within the region with experience in safety oversight of service providers that have a mature SMS 43C – Work with the ICAO Regional Office and donor organizations to make use of available means (for example, the Capacity Development and Implementation Bureau) to provide assistance to States and industry in developing of risk management capabilities/methodologies
References	– Safety Management Implementation Website – ICAO Capacity Development and Implementation Bureau – ICAO iPACK – Supporting Civil Aviation Entities in Conducting a Training Needs Analysis (TNA)

Safety enhancement initiative	SEI-44 – Regional collaboration with key aviation stakeholders to support safety performance measurement and monitoring, and safety risk management capabilities and methodologies
Stakeholder	Regions
Related GASP target(s)	3.2; 4.2; 4.3
Actions	☐ 44A – Support States in understanding and implementing positive safety culture by sharing best practices and facilitating mentoring programmes to support safety culture development and the use of safety risk methodologies ☐ 44B – Promote the sharing and exchange of safety information and best practices that support a positive safety culture among States and stakeholders ☐ 44C – Encourage and support collaborative partnerships, such as the collaborative safety teams' concept, to identify and implement safety enhancements ☐ 44D – Encourage and support States' efforts to establish mechanisms for the regular sharing and exchange of safety information, analyses, mitigations, lessons learned and best practices that support a positive safety culture
References	44A and 44B – CANSO Safety Culture Definition and Enhancement Process – SKYbrary Safety Culture in Aviation 44C – Commercial Aviation Safety Team – General Aviation Joint Safety Committee – International Helicopter Safety Team – RASG-PA *Guidance Material for Implementing a Collaborative Safety Team (CST)* 44D – ICAO Safety Information Monitoring System – RASGs

Safety enhancement initiative	SEI-45 – Advancement of safety risk management at the regional level
Stakeholder	Regions
Related GASP target(s)	4.3
Actions	45A – Establish data sharing and exchange mechanisms for integration among States and stakeholders to enable high-level regional monitoring and analysis activities 45B – Identify requirements for establishing interregional and global data sharing
References	– Doc 9859, *Safety Management Manual* – Doc 10159, *Safety Intelligence Manual* – European Union Aviation Safety Agency (EASA) Data4Safety Programme – EUROCONTROL Voluntary ATM Incident Reporting – European Operators Flight Data Monitoring forum (EOFDM) – European Coordination Centre for Accident and Incident Reporting Systems – FAA Aviation Safety Information Analysis and Sharing Program – IATA Flight Data eXchange

COMPONENT 2 – STATE SAFETY PROGRAMME

PART 3. INDUSTRY

Safety enhancement initiative	SEI-46 – Improvement of industry compliance with applicable SMS requirements
Stakeholder	Industry
Related GASP target(s)	3.2; 6.1
Actions	46A – Implement an SMS in accordance with national regulations and the framework elements contained in Annex 19 46B – Utilize available guidance material (for example, from States or international organizations) to assist with SMS implementation
References	46A and 46B – Annex 19 – *Safety Management* – Doc 9859, *Safety Management Manual* – Doc 10159, *Safety Intelligence Manual* 46A – Annex 19 – *Safety Management* – National SMS requirements of the State 46B – Safety Management Implementation Website – SM ICG, *SMS for Small Organizations* – SM ICG, *The Frontline Manager's Role in SMS* – SM ICG, *The Senior Manager's Role in SMS* – CANSO Standard of Excellence in Safety Management Systems

Safety enhancement initiative	SEI-47 – Resources for service providers to effectively implement SMS
Stakeholder	Industry
Related GASP target(s)	3.2
Actions	47A – Work in collaboration with the State and industry associations to advance SMS implementation 47B – Identify areas where resources are needed as part of the SMS implementation plan developed, following the SMS gap analysis 47C – Establish a process for resource planning and allocation to enable SMS implementation, including resources which may be obtained from industry organizations 47D – Encourage other service providers to implement SMS within their operation by providing resources, such as qualified technical personnel, to assist them
References	– Annex 19 – *Safety Management* – Doc 9859, *Safety Management Manual* – Safety Management Implementation Website – ICAO Safety Management Training Programme – CANSO Standard of Excellence in Safety Management Systems – IATA Safety Management for Airlines Diploma

Safety enhancement initiative	SEI-48 – Strategic collaboration with key aviation stakeholders to complete SMS implementation at the regional and national levels
Stakeholder	Industry
Related GASP target(s)	1.2; 1.3; 3.2
Actions	48A – Help identify key aviation stakeholders involved in SMS implementation 48B – Work with key aviation stakeholders to support an action plan for the implementation of SMS across services providers in the State and the region 48C – Support efforts to establish a mentoring system, to provide assistance to States and industry and to share best practices to support SMS implementation 48D – Provide input to the process for sharing technical guidance, tools and safety-critical information related to SSP and SMS (for example, advisory circulars, staff instructions, safety performance indicators), in collaboration with States, RASG, RSOO, ICAO and/or other stakeholders 48E – Support continuous improvement of SMS, in collaboration with States, RASG, RSOO, ICAO and/or other stakeholders
References	48A to 48E – Annex 19 – *Safety Management* – Doc 9859, *Safety Management Manual* – National SMS requirements of the State 48D – Safety Management Implementation Website

Safety enhancement initiative	SEI-49 – Availability of safety data and safety information to support safety management activities at the service provider level (step 1)
Stakeholder	Industry
Related GASP target(s)	3.2; 5.1; 5.2
Actions	□ 49A – Maintain compliance with national laws, regulations and policies protecting safety data, safety information and related sources, in accordance with Annex 19 □ 49B – Maintain mandatory safety reporting systems □ 49C – Provide information (from the service provider) to the State SDCPS or safety information sharing networks, including the mandatory safety reporting system, as required □ 49D – Establish internal mechanisms related to the protection of safety data, safety information and related sources for the purpose of safety improvement □ 49E – Establish voluntary and confidential hazard and occurrence reporting systems as part of the SMS □ 49F – Establish and maintain capabilities for monitoring safety issues within the service providers □ 49G – Establish and utilize a safety risk management process
References	49A – Annex 19 – *Safety Management* 49B – Commercial Aviation Safety Team (CAST)/ICAO Common Taxonomy Team – ICAO Accident/Incident Data Reporting (ADREP) Taxonomy – SM ICG, *Development of a Common Hazard Taxonomy* – SM ICG, *Hazard Taxonomy Examples* 49B to 49G – Annex 19 – *Safety Management* – Doc 9859, *Safety Management Manual* – National SMS requirements of the State

Safety enhancement initiative	SEI-50 – Availability of safety data and safety information to support safety management activities at the service provider level (step 2)
Stakeholder	Industry
Related GASP target(s)	3.2; 5.1; 5.2
Actions	50A – Develop safety performance measurement and monitoring methodologies 50B – Develop service provider-specific safety performance indicators and safety performance targets 50C – Encourage the use of globally harmonized metrics for the proactive management of risks, beyond compliance, as well as the development and monitoring of safety performance indicators, as part of the service providers' SMS 50D – Encourage sharing and use of information from within industry to identify hazards and safety deficiencies and mitigate safety risks 50E – Encourage sharing of information from industry to the State and region to assist in the development of national and regional aviation safety plans
References	– Annex 19 – *Safety Management* – Doc 9859, *Safety Management Manual* – Doc 10159, *Safety Intelligence Manual* – SM ICG, *A Systems Approach to Measuring Safety Performance – The Regulator Perspective* – SM ICG, *Measuring Safety Performance Guidelines for Service Providers* – ICAO iPACK – Developing a National Aviation Safety Plan (NASP)

Safety enhancement initiative	SEI-51 – Allocation of industry resources to support the maintenance of SSP and the continuous improvement of SMS
Stakeholder	Industry
Related GASP target(s)	3.2
Actions	51A – Ensure competent technical personnel are allocated, at the service provider level, to support the requirements of the SMS and its interaction with the SSP 51B – Provide safety analysis results (from the service provider) to support the maintenance of the SSP
References	51A – ICAO iPACK – Supporting Civil Aviation Entities in Conducting a Training Needs Analysis (TNA) 51B – Safety Management Implementation Website

Safety enhancement initiative	SEI-52 – Strategic collaboration with key aviation stakeholders to support the safety performance measurement and monitoring and safety risk management capabilities
Stakeholder	Industry
Related GASP target(s)	3.2; 4.3
Actions	52A – Work with key aviation stakeholders to leverage best practices with safety information analysis 52B – Share safety risk identification with stakeholders for mitigation and monitoring strategies 52C – Actively participate with States and organizations engaged in safety risk mitigation and monitoring strategies 52D – Participate in collaborative partnerships similar to the commercial and general aviation safety teams' concept (commonly referred to as collaborative safety teams) to identify and implement safety enhancements
References	– Commercial Aviation Safety Team – General Aviation Joint Safety Committee – International Helicopter Safety Team – RASGs – RASG-PA *Guidance Material for Implementing a Collaborative Safety Team (CST)*

Safety enhancement initiative	SEI-53 – Advancement of safety risk management at the service provider level
Stakeholder	Industry
Related GASP target(s)	3.2; 4.3
Actions	53A – Verify that a legal framework related to the protection of safety data, safety information and other related sources is implemented and effective 53B – Develop capabilities to support the monitoring of safety issues as well as accident and incident prevention 53C – Monitor safety information exchange networks for continuous improvements
References	53A – FAA Aviation Safety Information Analysis and Sharing Program – IATA Flight Data eXchange 53B and 53C – Doc 10159, *Safety Intelligence Manual*

Appendix B

OPERATIONAL (OPS) SAFETY RISKS ROADMAP

Note.— The actions presented in the roadmap are not an exhaustive list. Stakeholders should verify the latest version of the regional aviation safety plan (RASP) for regional high-risk categories of occurrences (R-HRCs) applicable to their region. Stakeholders should also conduct analyses of data and reports to validate the effectiveness of the implemented safety enhancement initiatives (SEIs) and consider references included in the roadmap in the process of identifying SEI actions appropriate to their State, region or industry.

COMPONENT 1 – GLOBAL HIGH-RISK CATEGORIES OF OCCURRENCES

PART 1. STATES

1. CONTROLLED FLIGHT INTO TERRAIN (CFIT)

Safety enhancement initiative	SEI-1 – Mitigate contributing factors to the risk of CFIT at the national level
Stakeholder	States
Related GASP target(s)	1.1; 1.2
Actions	1A – Implement the following CFIT safety actions: a) Ensure aircraft are equipped with ground proximity warning system (GPWS) which has a forward-looking terrain avoidance function, in accordance with Annex 6 – *Operation of Aircraft* b) Promote the wider use of GPWS beyond the requirements of Annex 6 c) Issue guidance to industry to increase adherence to GPWS warning procedures d) Determine and implement methods to promote greater awareness of approach risks e) Consider the implementation of continuous descent final approaches (CDFA) f) Consider the implementation of minimum safe altitude warning (MSAW) systems

	g) Promote the use of global positioning system (GPS)-derived position data to feed GPWS (through the global navigation satellite system (GNSS)) h) Ensure the implementation of World Geodetics System (WGS)-84 i) Ensure that the terrain and obstacle data that is published in the AIP is accurate and updated in a timely manner j) Promote the use of threat and error management (TEM) methodology k) Ensure the implementation of effective GNSS radio frequency interference (RFI) mitigation measures that ensure accuracy and reliability of service or effective adapted responses l) Provide guidance to manufacturers and operators regarding operations in a GNSS disrupted environment ☐ 1B – Validate the effectiveness of the SEIs in the State through the analysis of mandatory occurrence reporting (MOR) and voluntary occurrence reporting systems (VOR) and accident/incident investigations (apply safety management methodologies) ☐ 1C – Identify additional contributing factors, for example: a) Flight in adverse environmental conditions b) Inaccurate approach design and inadequate documentation (for approaches with vertical guidance (APV) or localizer performance with vertical guidance (LPV) approaches) c) Phraseology used (standard vs. non-standard) d) Pilot fatigue, sensory illusion and loss of situational awareness e) GNSS RFI ☐ 1D – Develop and implement further SEIs to mitigate the risk of the identified contributing factors, if any, for CFIT ☐ 1E – Continuously evaluate the effectiveness of the SEIs
References	– Annex 6 – *Operation of Aircraft* – Doc 9849 - *Global Navigation Satellite System (GNSS) Manual* – ICAO Safety Report – Commercial Aviation Safety Team – Safety enhancements for CFIT – FSF ALAR Toolkit

	– IATA CFIT – IATA Safety Report

2. LOSS OF CONTROL IN-FLIGHT (LOC-I)

Safety enhancement initiative	SEI-2 – Mitigate contributing factors to LOC-I accidents and incidents at the national level
Stakeholder	States
Related GASP target(s)	1.1; 1.2
Actions	□ 2A – Implement the following LOC-I safety actions: a) Develop regulations and guidance material on upset prevention and recovery training (UPRT), require UPRT in all full flight simulator type conversion and recurrent training programmes, and verify implementation b) Require more time devoted to training multi-crew pilots on the pilot monitoring role (to ensure effective crew coordination) c) Implement measures to reduce potential laser interference with aircraft, which can distract or temporarily blind pilots d) Implement provisions in Annex 19, focusing on measures to identify and mitigate risks associated with LOC-I and to promote a proactive safety culture e) Require air operators to conduct extensive pilot training that incorporates human factors such as distraction, complacency, and situational awareness (and verify that crew members have the required training and qualifications before performing flight duties) f) Develop guidance on flight data analysis programmes (FDAP) to encourage operators to consider LOC-I precursors as part of FDAP g) Promote the use of TEM methodology h) Ensure the implementation of effective GNSS RFI mitigation measures that ensure accuracy and reliability of service or effective adapted responses □ 2B – Validate the effectiveness of the SEIs in the State through MOR and VOR systems and accident/incident investigations (apply safety management methodologies) □ 2C – Identify additional contributing factors, for example: a) Distraction b) Adverse weather c) Complacency

	d) Inadequate standard operating procedures (SOPs) for effective flight management e) Insufficient height above terrain for recovery f) Automation dependency leading to degraded pilot proficiency in manual flying, lack of awareness or competence in procedures for recovery from unusual aircraft attitudes g) Startle effect, inappropriate flight control inputs in response to sudden awareness of an abnormal aircraft state (for example, bank angle, angle of attack or stall) h) GNSS RFI □ 2D – Develop and implement further SEIs to mitigate the risk of the identified contributing factors, if any, for LOC-I, for example: a) Increase the effectiveness of regulatory oversight b) Assess the effectiveness and applicability of regulations □ 2E – Continuously evaluate the effectiveness of the SEIs
References	– Annex 1 – *Personnel Licensing* – Doc 10000, *Manual on Flight Data Analysis Programmes (FDAP)* – Doc 10011, *Manual on Aeroplane Upset Prevention and Recovery Training* – ICAO Safety Report – ICAO LOC-I – Commercial Aviation Safety Team – Safety enhancements for LOC-I – EASA Upset Prevention and Recovery Training – FAA AC 120-111 Upset Prevention and Recovery Training – FSF Toolkits and Resources – IATA Environmental Factors Affecting Loss of Control In-Flight: Best Practice for Threat Recognition and Management (1st Edition) – IATA Guidance Material and Best Practices for the Implementation of Upset Prevention and Recovery Training (2nd Edition) – IATA LOC-I

	– IATA Safety Report – IATA, IFALPA, IFATCA, CANSO, Unstable Approaches: Risk Mitigation Policies, Procedures and Best Practices (3rd Edition)

3. MID-AIR COLLISION (MAC)

Safety enhancement initiative	SEI-3 – Mitigate contributing factors to MAC accidents and incidents at the national level
Stakeholder	States
Related GASP target(s)	1.1; 1.2
Actions	3A – Implement the following MAC safety actions: a) Establish regulations and guidance to ensure aircraft are equipped with airborne collision avoidance system (ACAS), in accordance with Annex 6 b) Verify adherence to ACAS warning procedures c) Promote the improvement of ATC systems, procedures and tools to enhance conflict management d) Promote the improvement of communications systems and procedures, such as controller-pilot datalink e) Promote the use of TEM methodology f) Ensure the implementation of effective GNSS RFI mitigation measures that ensure accuracy and reliability of service or effective adapted responses 3B – Validate the effectiveness of the SEIs in the State through the analysis of MOR and VOR and accident/incident investigations (apply safety management methodologies) 3C – Identify additional contributing factors, for example: a) Traffic conditions: considerations include traffic density, complexity and the mixture of aircraft types and capabilities b) Air traffic control (ATC) performance: factors such as workload, competence, teamwork and adherence to procedures. Additionally, the influence of the air navigation services provider's (ANSP) SMS c) Flight crew training and organizational (corporate) culture: aspects such as workload management, competence, teamwork, adherence to procedures and the impact of the operator's SMS d) ATC systems: elements such as flight data processing, communication systems, short-term conflict alert (STCA) systems, as well as the interaction between the human operators and the aircraft systems, and the procurement policies of ANSPs

	e) Aircraft equipment: considerations include autopilot systems, transponders and ACAS, as well as aircraft performance characteristics (such as rate-of-climb) and their physical dimension f) Surveillance systems: coverage and quality of surveillance technologies used to monitor aircraft positions and movements g) Flight plan processing: the efficiency and reliability of processes related to flight plan submission, approval and distribution h) Airspace design: the complexity of airspace structure, route layouts and the extent of controlled or uncontrolled airspace, and proximity of military operational or training areas i) Flight in adverse environmental conditions that may influence conflict management and collision avoidance j) GNSS RFI □ 3D – Develop and implement further SEIs to mitigate the risk of the identified contributing factors, if any, for MAC □ 3E – Continuously evaluate the effectiveness of the SEIs
References	– Annex 6 – *Operation of Aircraft* – Annex 8 – *Airworthiness of Aircraft* – Annex 19 – *Safety Management* – Doc 8168, *Procedures for Air Navigation Services – Aircraft Operations* (PANS-OPS) – Doc 9868*, Procedures for Air Navigation Services – Training* (PANS-TRG) – Doc 9859, *Safety Management Manual* – ICAO Safety Report – CAST/ICAO Common Taxonomy Team – Commercial Aviation Safety Team – Safety enhancements for MAC – FSF Toolkits and Resources – IATA Safety Report

4. RUNWAY EXCURSION (RE)

Safety enhancement initiative	SEI-4 – Mitigate contributing factors to RE accidents and incidents at the national level
Stakeholder	States
Related GASP target(s)	1.1; 1.2
Actions	4A – Implement the following RE safety actions: a) Ensure the establishment and implementation of a State runway safety programme and runway safety teams b) Promote the establishment of policy and training on rejected landings, go-arounds, crosswind and tailwind landings (up to the maximum manufacturer-demonstrated winds) c) Promote equipage of runway overrun awareness and alerting systems on aircraft d) Ensure effective and timely reporting of meteorological and aerodrome conditions (for example, runway surface condition in accordance with the ICAO global reporting format (GRF) in Annex 14 – *Aerodromes*, Volume I – *Aerodrome Design and Operations*, braking action and revised declared distances) e) Certify aerodromes in accordance with Annex 14, Volume I, as well as Doc 9981, *Procedures for Air Navigation Services – Aerodromes* (PANS-Aerodromes) f) Promote the installation of arresting systems, if runway end safety area (RESA) requirements cannot be met g) Ensure that procedures to systematically reduce the rate of unstabilized approaches to runways are developed and used h) Promote the establishment of local runway safety teams i) Audit the effectiveness of the local runway safety teams, including the effectiveness of SMS in reducing Runway Safety Precursor events j) Include runway safety precursors in the operator's FDAP k) Conduct risk modelling, risk assessment and safety analysis of runway safety based on occurrences reports in the air traffic management (ATM)/air navigation services (ANS) domain, including low visibility runway operations l) Establish an effective and timely reporting system for meteorological and aerodrome conditions

	m) Certify aerodromes in accordance with Annex 14, Volume I as well as PANS-Aerodromes n) Ensure that the operator's aerodrome manual contains a requirement for reporting runway surface conditions in the GRF by enabling a harmonized assessment and reporting of runway surface conditions and an improved flight crew assessment of take-off and landing performance o) Implement an action plan for assessing and reporting runway surface conditions □ 4B – Validate the effectiveness of the SEIs in the State through the analysis of MOR, VOR and accident/incident investigations (apply safety management methodologies) □ 4C – Identify additional contributing factors, for example: a) Ineffective SOPs b) Lack of adherence to SOPs c) Long/floated/bounced/firm/off-centre/crabbed landing d) Unstabilized approach e) Inadequate reporting of runway surface conditions f) Inadequate approach procedures design g) Inadequate regulatory oversight □ 4D – Develop and implement further SEIs to mitigate the risk of the identified contributing factors, if any, for RE □ 4E – Continuously evaluate the effectiveness of the SEIs
References	– Annex 14 – *Aerodromes*, Volume I – *Aerodrome Design and Operations* – Doc 8168, *Procedures for Air Navigation Services – Aircraft Operations* (PANS-OPS) – Doc 9981, *Procedures for Air Navigation Services – Aerodromes* (PANS-Aerodromes) – Doc 9859, *Safety Management Manual* – Doc 10000, *Manual on Flight Data Analysis Programmes (FDAP)* – Doc 10064, *Aeroplane Performance Manual* – Cir 355, *Assessment, Measurement and Reporting of Runway Surface Conditions*

	– ICAO Global Reporting Format for runway surface conditions (GRF) – ICAO Global Runway Safety Action Plan – ICAO Runway Safety Documents and Toolkits – ICAO EUR Doc 041, Guidance on the Issuance of SNOWTAM – ACI-ICAO Airport Safety Professional (ASP) Designation Programme – ACI-ICAO Global Reporting Format (GRF) for Airport Operators: Online Course – Commercial Aviation Safety Team – Safety enhancements for RE – European Action Plan for the Prevention of Runway Excursions (EAPPRE) – Flight Safety Foundation ALAR Toolkit – Global Action Plan for the Prevention of Runway Excursions (GAPPRE) – IATA Examining Unstable Approaches - Risk Mitigating Efforts – IATA / Honeywell guidance on Performance assessment of pilot response to Enhanced Ground Proximity Warning System – NBAA Reducing Runway Excursions in Business Aviation

5. RUNWAY INCURSION (RI)

Safety Enhancement Initiative	SEI-5 – Mitigate contributing factors to RI accidents and incidents at the national level
Stakeholder	States
Related GASP target(s)	1.1; 1.2
Actions	□ 5A – Implement the following RI safety actions: a) Ensure the establishment and implementation of a State runway safety programme and runway safety teams b) Develop requirements, policies, procedures and training materials that can support situational awareness of air traffic control officers (ATCOs), pilots and airside vehicle drivers c) Ensure effective use of suitable technologies to assist the improvement of situational awareness, such as improved resolution airport moving maps (AMM), electronic flight bags (EFB), enhanced vision systems (EVS) and head-up displays (HUD), advanced-surface movement guidance and control systems (A-SMGCS), stop bars and autonomous runway incursion warning systems (ARIWS) d) Certify aerodrome in accordance with Annex 14, Volume I, as well as PANS-Aerodromes e) Ensure the use of standard phraseologies in accordance with applicable State regulations and ICAO provisions (for example, *Manual of Radiotelephony* (Doc 9432)) f) Ensure the identification and publication in the AIP of hotspots at aerodromes g) Ensure that suitable strategies to remove hazards or mitigate risks associated with identified hotspots are developed and executed h) Develop and distribute advisory circular for runway incursion prevention and pilot training i) Ensure aerodromes chart manoeuvring area during construction projects (PANS-Aerodromes) □ 5B – Validate the effectiveness of the SEIs in the State through the analysis of MOR, VOR and accident/incident investigations (apply safety management methodologies) □ 5C – Identify additional contributing factors, for example: a) Operations in low visibility conditions

	b) Complex or inadequate aerodrome design, equipment and signage c) Diversity and complexity of traffic (such as multiple simultaneous line-ups) d) Conditional clearances e) Simultaneous use of intersecting runways f) Late issue of or late changes to departure clearances g) Unintentional deviations from ATC clearances by flight and ground crew h) Phraseology use (such as non-standard versus standard; call-sign confusion) i) Concurrent use of more than one language for ATC communications j) English language proficiency k) Inadequate manoeuvring area driver training and assessment programme ☐ 5D – Develop and implement further SEIs to mitigate the risk of the identified contributing factors, if any, for RI ☐ 5E – Continuously evaluate the effectiveness of the SEIs
References	– Annex 14 – *Aerodromes*, Volume I – *Aerodrome Design and Operations* – Doc 8168, *Procedures for Air Navigation Services – Aircraft Operations* (PANS-OPS) – Doc 9981, *Procedures for Air Navigation Services – Aerodromes* (PANS-Aerodromes) – Doc 9137, *Airport Services Manual*, Part 3 – *Wildlife Hazard Management* – Doc 9432, *Manual of Radiotelephony* – Doc 9870, *Manual on the Prevention of Runway Incursions* – ICAO Global Runway Safety Action Plan – ICAO Runway Safety Documents and Toolkits – ICAO Safety Report – Global Action Plan for the Prevention of Runway Incursions (GAPPRI) – FAA Airport Construction Advisory Council (ACAC) – ACI Aerodrome Certification Guide (1st Edition)

	– ACI Airfield Maintenance Handbook (1st Edition) – ACI Managing Operations During Construction Handbook (1st Edition) – ACI Runway Safety Handbook (2nd Edition) – ACI APEX Programme – 2011 to Present – CANSO Runway Safety Maturity Checklist – EASA Safety Promotion – Commercial Aviation Safety Team – Safety enhancements for RI – CAST/ICAO Common Taxonomy Team – IATA Safety Report – IATA Runway Safety

COMPONENT 1 – HIGH-RISK CATEGORIES OF OCCURRENCES

PART 2. REGIONS

1. CONTROLLED FLIGHT INTO TERRAIN (CFIT)

Safety enhancement initiative	SEI-6 – Mitigate contributing factors to CFIT accidents and incidents at the regional level
Stakeholder	Regions
Related GASP target(s)	1.1; 1.2
Actions	6A – Implement the following CFIT safety actions: a) Support the adoption of GPWS in accordance with Annex 6 b) Promote the wider use of GPWS beyond the requirements of Annex 6 c) Promote the adherence to GPWS warning procedures d) Promote greater awareness of approach risks and risks associated with inaccurate barometric reference settings e) Promote the implementation of CDFA f) Promote the implementation of MSAW systems g) Promote the timeliness of updates and accuracy of electronic terrain and obstacle data (eTOD) h) Promote the use of GPS-derived position data to update GPWS (through GNSS) i) Promote the use of TEM methodology j) Promote the implementation of effective GNSS RFI mitigation measures that ensure accuracy and reliability of service or effective adapted responses k) Implement regional reporting procedure for GNSS RFI 6B – Validate the effectiveness of the SEIs in the region using data provided by States and industry (apply safety management methodologies) 6C – Identify additional contributing factors, for example: a) Flight in adverse environmental conditions b) Inaccurate approach design and inadequate documentation (for APV or LPV approaches)

	c) Phraseology used (standard vs. non-standard) d) Pilot fatigue, sensory illusion and loss of situational awareness e) GNSS RFI ☐ 6D – Develop and implement further SEIs to mitigate the risk of the identified contributing factors, if any, for CFIT ☐ 6E – Continuously evaluate the effectiveness of the SEIs
References	– Annex 6 – *Operation of Aircraft* – ICAO Safety Report – Commercial Aviation Safety Team – Safety enhancements for CFIT – FSF ALAR Toolkit – IATA CFIT – IATA Safety Report

2. LOSS OF CONTROL IN-FLIGHT (LOC-I)

Safety enhancement initiative	SEI-7 – Mitigate contributing factors to LOC-I accidents and incidents at the regional level
Stakeholder	Regions
Related GASP target(s)	1.1; 1.2
Actions	□ 7A – Implement the following LOC-I safety actions: a) Promote UPRT in all full flight simulator type conversion and recurrent training programmes b) Promote more time devoted to training multi-crew pilots on the pilot monitoring role (to ensure effective crew coordination) c) Promote and organize UPRT workshops and seminars □ 7B – Validate the effectiveness of the SEIs in the region using data provided by States and industry (apply safety management methodologies) □ 7C – Identify additional contributing factors, for example: a) Distraction b) Adverse weather c) Complacency d) Inadequate SOPs for effective flight management e) Insufficient height above terrain for recovery f) Automation dependency leading to degraded pilot proficiency in manual flying, lack of awareness or competence in procedures for recovery from unusual aircraft attitudes g) Startle effect, inappropriate flight control inputs in response to sudden awareness of an abnormal aircraft state (for example, bank angle, angle of attack or stall) h) GNSS Radio frequency interference □ 7D – Develop and promote further SEIs to mitigate the risk of the identified contributing factors, if any, for LOC-I, for example: a) Organize safety seminars or workshops b) Facilitate regional technical assistance projects

	7E – Continuously evaluate the effectiveness of the SEIs
References	– Annex 1 – *Personnel Licensing* – Doc 10000, *Manual on Flight Data Analysis Programmes (FDAP)* – Doc 10011, *Manual on Aeroplane Upset Prevention and Recovery Training* – ICAO Safety Report – ICAO LOC-I – Commercial Aviation Safety Team – Safety enhancements for LOC-I – EASA Upset Prevention and Recovery Training – EUROCONTROL – FAA AC 120-111 Upset Prevention and Recovery Training – FSF Toolkits and Resources – IATA Environmental Factors Affecting Loss of Control In-Flight: Best Practice for Threat Recognition and Management (1st Edition) – IATA Guidance Material and Best Practices for the Implementation of Upset Prevention and Recovery Training (2nd Edition) – IATA LOC-I – IATA Safety Report – IATA, IFALPA, IFATCA, CANSO, Unstable Approaches: Risk Mitigation Policies, Procedures and Best Practices (3rd Edition)

3. MID-AIR COLLISION (MAC)

Safety enhancement initiative	SEI-8 – Mitigate contributing factors to MAC accidents and incidents at the regional level
Stakeholder	Regions
Related GASP target(s)	1.1; 1.2
Actions	□ 8A – Implement the following MAC safety actions: a) Promote regulations and guidance to ensure aircraft are equipped with ACAS, in accordance with Annex 6 b) Promote adherence to ACAS warning procedures c) Promote the improvement of ATC systems, procedures and tools to enhance conflict management d) Promote the improvement of communications systems and procedures, such as controller-pilot datalink □ 8B – Validate the effectiveness of the SEIs in the region using data provided by States and industry (apply safety management methodologies) □ 8C – Identify additional regional contributing factors, for example: a) Traffic conditions: considerations include traffic density, complexity and the mixture of aircraft types and capabilities b) ATC performance: factors such as workload, competence, teamwork and adherence to procedures. Additionally, the influence of the ANSP's SMS c) Flight crew training and organizational (corporate) culture: aspects such as workload management, competence, teamwork, adherence to procedures and the impact of the operator's SMS d) ATC systems: elements such as flight data processing, communication systems, STCA systems, as well as the interaction between the human operators and the aircraft systems, and the procurement policies of ANSPs e) Aircraft equipment: considerations include autopilot systems, transponders and ACAS, as well as aircraft performance characteristics (such as rate-of-climb) and their physical dimension f) Surveillance systems: coverage and quality of surveillance technologies used to monitor aircraft positions and movements g) Flight plan processing: the efficiency and reliability of processes related to flight plan submission, approval and distribution

	h) Airspace design: the complexity of airspace structure, route layouts and the extent of controlled or uncontrolled airspace and proximity of military operational or training areas i) Flight in adverse environmental conditions that may influence conflict management and collision avoidance j) GNSS RFI ☐ 8D – Develop and implement further SEIs to mitigate the risk of the identified contributing factors, if any, for MAC ☐ 8E – Continuously evaluate the effectiveness of the SEIs
References	– Annex 6 – *Operation of Aircraft* – Annex 8 – *Airworthiness of Aircraft* – Annex 19 – *Safety Management* – Doc 8168, *Procedures for Air Navigation Services – Aircraft Operations* (PANS-OPS) – Doc 9868*, Procedures for Air Navigation Services – Training (PANS-TRG)* – Doc 9859, *Safety Management Manual* – ICAO Safety Report – CAST/ICAO Common Taxonomy Team – Commercial Aviation Safety Team – Safety enhancements for MAC – FSF Toolkits and Resources – IATA Safety Report

4. RUNWAY EXCURSION (RE)

Safety enhancement initiative	SEI-9 – Mitigate contributing factors to RE accidents and incidents at the regional level
Stakeholder	Regions
Related GASP target(s)	1.1; 1.2
Actions	□ 9A – Implement the following RE safety actions: a) Promote the establishment and implementation of a State runway safety programme and runway safety teams b) Promote the establishment of policy and training on rejected landings, go-arounds, crosswind and tailwind landings (up to the maximum manufacturer-demonstrated winds) c) Promote equipage of runway overrun awareness and alerting systems on aircraft d) Promote effective and timely reporting of meteorological and aerodrome conditions (for example, runway surface condition in accordance with the ICAO GRF in Annex 14, Volume I braking action and revised declared distances) e) Promote the certification of aerodromes in accordance with Annex 14, Volume I as well as PANS – Aerodromes f) Promote the installation of arresting systems, if RESA requirements cannot be met g) Promote the establishment of procedures to systematically reduce the rate of unstabilized approaches to runways □ 9B – Validate the effectiveness of the SEIs in the region using data provided by States and industry (apply safety management methodologies) □ 9C – Identify additional contributing factors, for example: a) Ineffective SOPs b) Lack of adherence to SOPs c) Long/floated/bounced/firm/off-centre/crabbed landing d) Unstabilized approach e) Inadequate reporting of runway surface conditions f) Inadequate approach procedures design

	g) Inadequate regulatory oversight □ 9D – Develop and implement further SEIs to mitigate the risk of the identified contributing factors, if any, for RE □ 9E– Continuously evaluate the performance of the SEIs
References	– Annex 14 – *Aerodromes*, Volume I – *Aerodrome Design and Operations* – Doc 8168, *Procedures for Air Navigation Services – Aircraft Operations* (PANS-OPS) – Doc 9981, *Procedures for Air Navigation Services – Aerodromes* (PANS-Aerodromes) – Doc 10000, *Manual on Flight Data Analysis Programmes (FDAP)* – Doc 10064, *Aeroplane Performance Manual* – Cir 355, *Assessment, Measurement and Reporting of Runway Surface Conditions* – ICAO Global Reporting Format for runway surface conditions (GRF) – ICAO Global Runway Safety Action Plan – ICAO Runway Safety Documents and Toolkits – ICAO EUR Doc 041, Guidance on the Issuance of SNOWTAM – ACI-ICAO Airport Safety Professional (ASP) Designation Programme – ACI-ICAO Global Reporting Format (GRF) for Airport Operators: Online Course – Commercial Aviation Safety Team – Safety enhancements for RE – European Action Plan for the Prevention of Runway Excursions (EAPPRE) – Flight Safety Foundation ALAR Toolkit – Global Action Plan for the Prevention of Runway Excursions (GAPPRE) – IATA Examining Unstable Approaches - Risk Mitigating Efforts – IATA / Honeywell guidance on Performance assessment of pilot response to Enhanced Ground Proximity Warning System – NBAA Reducing Runway Excursions in Business Aviation

5. RUNWAY INCURSION (RI)

Safety Enhancement Initiative	SEI-10 – Mitigate contributing factors to RI accidents and incidents at the regional level
Stakeholder	Regions
Related GASP target(s)	1.1; 1.2
Actions	10A – Implement the following RI safety actions: a) Promote the establishment and implementation of States' runway safety programmes and runway safety teams b) Promote the establishment of policies, procedures and training that supports situational awareness for ATCOs, pilots and airside vehicle drivers c) Promote the effective use of suitable technologies to assist the improvement of situational awareness, such as improved resolution AMM, EFB, EVS and HUD, A-SMGCS, stop bars and ARIWS d) Promote the certification of aerodromes in accordance with Annex 14, Volume I, as well as PANS-Aerodromes e) Promote the use of standard phraseologies in accordance with applicable State regulations and ICAO provisions (for example, *Manual of Radiotelephony* (Doc 9432)) f) Promote the identification and publication in the AIP of hotspots at aerodromes g) Promote suitable strategies to remove hazards or mitigate risks associated with identified hotspots h) Promote the use of aerodrome manoeuvring area charts during construction projects (PANS-Aerodromes) 10B – Validate the effectiveness of the SEIs in the region using data provided by States and industry (apply safety management methodologies) 10C – Identify additional contributing factors, for example: a) Operations in low visibility conditions b) Complex or inadequate aerodrome design, equipment and signage c) Diversity and complexity of traffic (such as multiple simultaneous line-ups) d) Conditional clearances e) Simultaneous use of intersecting runways

	f) Late issue of or late changes to departure clearances g) Unintentional deviations from ATC clearances by flight and ground crew h) Phraseology use (such as non-standard versus standard; call-sign confusion) i) Concurrent use of more than one language for ATC communications j) English language proficiency k) Inadequate manoeuvring area driver training and assessment programme ☐ 10D – Develop and implement further SEIs to mitigate the risk of the identified contributing factors, if any, for RI ☐ 10E – Continuously evaluate the effectiveness of the SEIs
References	– Annex 14 – *Aerodromes*, Volume I – *Aerodrome Design and Operations* – Doc 8168, *Procedures for Air Navigation Services – Aircraft Operations* (PANS-OPS) – Doc 9981, *Procedures for Air Navigation Services – Aerodromes* (PANS-Aerodromes) – Doc 9137, *Airport Services Manual*, Part 3 – *Wildlife Hazard Management* – Doc 9432, *Manual of Radiotelephony* – Doc 9870, *Manual on the Prevention of Runway Incursions* – ICAO Global Runway Safety Action Plan – ICAO Runway Safety Documents and Toolkits – ICAO Safety Report – Global Action Plan for the Prevention of Runway Incursions (GAPPRI) – ACI Aerodrome Certification Guide (1st Edition) – ACI Airfield Maintenance Handbook (1st Edition) – ACI Managing Operations During Construction Handbook (1st Edition) – ACI Runway Safety Handbook (2nd Edition) – ACI APEX Programme – 2011 to Present – CANSO Runway Safety Maturity Checklist

	– EASA Safety Promotion – Commercial Aviation Safety Team – Safety enhancements for RI – CAST/ICAO Common Taxonomy Team – IATA Safety Report – IATA Runway Safety

COMPONENT 1 – HIGH-RISK CATEGORIES OF OCCURRENCES

PART 3. INDUSTRY

1. CONTROLLED FLIGHT INTO TERRAIN (CFIT)

Safety enhancement initiative	SEI-11 – Mitigate contributing factors to CFIT accidents and incidents at the service provider level
Stakeholder	Industry
Related GASP target(s)	1.1; 1.2
Actions	11A – Implement the following CFIT safety actions: a) Equip aircraft with GPWS which has a forward-looking terrain avoidance function b) Increase adherence to GPWS warning procedures c) Develop greater awareness of approach risks d) Promote CDFA e) Utilize MSAW systems f) Utilize up-to-date eTOD (ensure the timeliness of updates and accuracy) g) Utilize GPS-derived position data to feed GPWS (through GNSS) h) Equip aircraft with real time terrain information (enhanced ground proximity warning system (EGPWS)/terrain awareness warning Class B systems), to improve pilot awareness and provide timely warnings in CFIT risk scenarios i) Address inflight decision-making in training (design line-oriented flight training with identified critical approaches in adverse weather and instances of failure of navigational aids; enable crew members to develop effective strategies to manage threats to safety during flight and execute well-informed contingency plans to avoid CFIT) j) Promote flight path monitoring (enable crew members to practice active monitoring and cross-checking of flight path, aircraft performance, systems and other crew members to maintain accurate situational awareness) k) Foster a positive safety culture to encourage reporting and proactive risk mitigation and exchange safety information with other service providers, to share key risk factors that are identified through hazard and incident reporting l) Analyse flight data (including flight crew responses to EGPWS events) and provide corrective training, where necessary (share events with all operational personnel, including dispatch)

	m) Ensure timely updates of software and terrain databases to reflect accurate terrain information and adhere to recommended maintenance practices n) Technical Operations: Maintenance departments should maintain up-to-date EGPWS software and terrain databases, utilize GPS/GNSS for position source to EGPWS, and adhere to recommended maintenance practices o) Improve resilience of GNSS systems to RFI events, as well as to provide guidance on detecting GNSS jamming or spoofing, and maintaining safe and efficient aircraft operation in case of GNSS anomalies p) Report in-service events for the evolution of system design and procedures ☐ 11B – Validate the effectiveness of the SEIs in industry through the analysis of flight data monitoring (FDM)[1] and pilot reports[2] (apply safety management methodologies) ☐ 11C – Identify additional contributing factors, for example: a) Flight in adverse environmental conditions b) Inaccurate approach design and inadequate documentation (for APV or LPV approaches) c) Phraseology used (standard vs. non-standard) d) Pilot fatigue, sensory illusion and loss of situational awareness e) Deficiencies in crew resource management (for example, cross-check, communication, coordination, leadership) f) Adverse weather conditions: poor visibility, wind, gusts, wind shear and thunderstorms can significantly affect aircraft performance during critical phases of flight g) Ground navigation aid malfunctions h) Aircraft handling errors i) GNSS RFI ☐ 11D – Develop and implement further SEIs to mitigate the risk of the identified contributing factors, if any, for CFIT ☐ 11E – Continuously evaluate the effectiveness of the SEIs

1. GPWS cautions and warnings, and pilot responses to GPWS warnings
2. Flight planning – failure to comply with minimum safe altitude or military operations area restrictions

References	– Annex 6 – *Operation of Aircraft* – ICAO Safety Report – Airbus GNSS Interference – Commercial Aviation Safety Team – Safety enhancements for CFIT – FSF ALAR Toolkit – IATA CFIT – IATA Controlled Flight Into Terrain Accident Analysis Report (2018 Edition) – IATA CFIT, A Study of Terrain Awareness Warning System Capability and Human Factors in CFIT Accidents 2005-2014 (1st Edition) – IATA CFIT Detailed Implementation Plan – IATA Safety Report – IATA / Honeywell guidance on Performance assessment of pilot response to Enhanced Ground Proximity Warning System

2. LOSS OF CONTROL IN-FLIGHT (LOC-I)

Safety enhancement initiative	SEI-12 – Mitigate contributing factors to LOC-I accidents and incidents at the service provider level
Stakeholder	Industry
Related GASP target(s)	1.1; 1.2
Actions	☐ 12A – Implement the following LOC-I safety actions: a) Establish UPRT in all full flight simulator type conversion and recurrent training programmes b) Devote more time to training multi-crew pilots on the pilot monitoring role (to ensure effective crew coordination) c) Promote bank angle alerting systems into all multi-engine aircraft d) Train pilots on manual aircraft handling of approach to stall and stall recovery (including at high altitude) e) Include the topic of flight mechanics into recurrent pilot training f) Comply with simulator fidelity requirements for UPRT g) Conduct extensive pilot training that incorporates human factors, such as distraction, complacency and situational awareness (and verify that crew members have the required training and qualifications before performing flight duties) h) Evaluate existing SOPs to ensure effective flight management during adverse weather and recovery of unusual aircraft attitudes i) Establish SOPs to deal with wind shear during take-off and landing j) Include LOC-I precursors in operator's FDAP k) Improve resilience of GNSS systems to RFI events, as well as to provide guidance on detecting GNSS jamming or spoofing, and maintaining safe and efficient aircraft operation in case of GNSS anomalies l) Report in-service events for the evolution of system design and procedures ☐ 12B – Validate the effectiveness of the SEIs in industry through the analysis of FDM and pilot reports (apply safety management methodologies) ☐ 12C – Identify additional contributing factors, for example: a) Distraction

	b) Adverse weather c) Complacency d) Inadequate SOPs for effective flight management e) Insufficient height above terrain for recovery f) Automation dependency leading to degraded pilot proficiency in manual flying, lack of awareness or competence in procedures for recovery from unusual aircraft attitudes g) Startle effect, inappropriate flight control inputs in response to sudden awareness of an abnormal aircraft state (for example, bank angle, angle of attack or stall) g) GNSS RFI □ 12D – Develop and implement further SEIs to mitigate the risk of the identified contributing factors, if any, for LOC-I □ 12E – Continuously evaluate the effectiveness of the SEIs
References	– Annex 1 – *Personnel Licensing* – Doc 10000, *Manual on Flight Data Analysis Programmes (FDAP)* – Doc 10011, *Manual on Aeroplane Upset Prevention and Recovery Training* – ICAO Safety Report – ICAO LOC-I – Commercial Aviation Safety Team – Safety enhancements for LOC-I – EASA Upset Prevention and Recovery Training – EUROCONTROL – FAA AC 120-111 Upset Prevention and Recovery Training – FSF Toolkits and Resources – IATA Environmental Factors Affecting Loss of Control In-Flight: Best Practice for Threat Recognition and Management (1st Edition) – IATA Guidance Material and Best Practices for the Implementation of Upset Prevention and Recovery Training (2nd Edition) – IATA LOC-I

	– IATA Safety Report – IATA, IFALPA, IFATCA, CANSO, Unstable Approaches: Risk Mitigation Policies, Procedures and Best Practices (3rd Edition)

3. MID-AIR COLLISION (MAC)

Safety enhancement initiative	SEI-13 – Mitigate contributing factors to MAC accidents and incidents at the service provider level
Stakeholder	Industry
Related GASP target(s)	1.1; 1.2
Actions	□ 13A – Implement the following MAC safety actions: a) Equip aircraft with ACAS b) Consider equipping aircraft with autopilot/flight director ACAS response c) Increase adherence to ACAS warning procedures d) Consider the implementation of STCA, including STCA suitable for terminal areas e) Improve reliability and consistency of safety nets to provide early and dependable warning and to reduce nuisance alerts f) Improve aircraft systems to alert pilots to any non-availability of transponders and ACAS g) Improve ATC systems, procedures and tools to enhance conflict management (this can include predictability of aircraft trajectories, so that conflicts can be predicted and resolved at an earlier stage, using medium-term conflict detection and similar systems) h) Improve communications systems and procedures, such as controller-pilot datalink i) Improve resilience of GNSS systems to RFI events, as well as to provide guidance on detecting GNSS jamming or spoofing, and maintaining safe and efficient aircraft operation in case of GNSS anomalies j) Report in-service events for the evolution of system design and procedures □ 13B – Validate the effectiveness of the SEIs in industry through the analysis of FDM[3], pilot and ATC reports[4] (apply safety management methodologies) □ 13C – Identify additional contributing factors, for example: a) Traffic conditions: considerations include traffic density, complexity and the mixture of aircraft types and capabilities

3. Traffic alert and collision avoidance system resolution advisories (TCAS-RA), TCAS traffic advisories (TCAS-TA)
4. Separation and airspace infringement, level busts, aircraft proximity, gross navigation errors and large height deviations

	b) ATC performance: factors such as workload, competence, teamwork and adherence to procedures. Additionally, the influence of the ANSP's SMS c) Flight crew training and organizational (corporate) culture: aspects such as workload management, competence, teamwork, adherence to procedures and the impact of the operator's SMS d) ATC systems: elements such as flight data processing, communication systems, STCA systems, as well as the interaction between the human operators and the aircraft systems, and the procurement policies of ANSPs e) Aircraft equipment: considerations include autopilot systems, transponders and ACAS, as well as aircraft performance characteristics (such as rate-of-climb) and their physical dimension f) Surveillance systems: coverage and quality of surveillance technologies used to monitor aircraft positions and movements g) Flight plan processing: the efficiency and reliability of processes related to flight plan submission, approval and distribution h) Airspace design: the complexity of airspace structure, route layouts and the extent of controlled or uncontrolled airspace and proximity of military operational or training areas i) Flight in adverse environmental conditions that may influence conflict management and collision avoidance j) GNSS RFI □ 13D – Develop and implement further SEIs to mitigate the risk of the identified contributing factors, if any, for MAC □ 13E – Continuously evaluate the effectiveness of the SEIs
References	– Annex 6 – *Operation of Aircraft* – Annex 8 – *Airworthiness of Aircraft* – Annex 19 – *Safety Management* – Doc 8168, *Procedures for Air Navigation Services – Aircraft Operations* (PANS-OPS) – Doc 9868*, Procedures for Air Navigation Services – Training* (PANS-TRG) – Doc 9859, *Safety Management Manual* – ICAO Safety Report – CAST/ICAO Common Taxonomy Team

	– Commercial Aviation Safety Team – Safety enhancements for MAC – FSF Toolkits and Resources – IATA Safety Report

4. RUNWAY EXCURSION (RE)

Safety Enhancement Initiative	SEI-14 – Mitigate contributing factors to RE accidents and incidents at the service provider level
Stakeholder	Industry
Related GASP target(s)	1.1; 1.2
Actions	□ 14A – Implement the following RE safety actions: a) Actively participate in runway safety programmes and runway safety teams b) Establish a policy and training on rejected landings, go-arounds, crosswind and tailwind landings (up to the maximum manufacturer-demonstrated winds) c) Equip aircraft with runway overrun awareness and alerting systems d) Ensure effective and timely reporting of meteorological and aerodrome conditions (for example, runway surface condition in accordance with the GRF in Annex 14, Volume I, braking action and revised declared distances) e) Comply with runway-related provisions in Annex 14, Volume I, as well as PANS-Aerodromes f) Consider the installation of an arresting system, if RESA requirements cannot be met g) Establish procedures to systematically reduce the rate of unstabilized approaches to runways h) Focus on providing accurate and timely meteorological and aerodrome condition reports (for ANSPs) i) Prioritize proper aerodrome maintenance, friction characteristics and removal of contaminants (for aerodrome operators) j) Use the GRF implementation checklist (for aerodrome operators) k) Include comprehensive training on stabilized approaches, go around procedures and runway awareness and alerting systems (for air operators) □ 14B – Validate the effectiveness of the SEIs in industry through the analysis of FDM[5] and pilot reports[6] (apply safety management methodologies) □ 14C – Identify additional contributing factors, for example:

5. For example, long landings, excessive height and speed at threshold, aircraft configuration at 1 000 ft above aerodrome level (AAL), speed at 1 000 ft AAL, tailwind, heading deviation during final approach, use of retardation devices (spoilers, reverse thrust, autobrakes)
6. Braking action, adverse weather, navigational aid malfunctions

	a) Ineffective SOPs b) Lack of adherence to SOPs c) Long/floated/bounced/firm/off-centre/crabbed landing d) Unstabilized approach e) Inadequate reporting of runway surface conditions f) Inadequate approach procedures design g) Inadequate regulatory oversight ☐ 14D – Develop and implement further SEIs to mitigate the risk of the identified contributing factors, if any, for RE ☐ 14E – Continuously evaluate the effectiveness of the SEIs
References	– Annex 14 – *Aerodromes*, Volume I – *Aerodrome Design and Operations* – Doc 8168, *Procedures for Air Navigation Services – Aircraft Operations* (PANS-OPS) – Doc 9981, *Procedures for Air Navigation Services – Aerodromes* (PANS-Aerodromes) – Doc 10000, *Manual on Flight Data Analysis Programmes (FDAP)* – Doc 10064, *Aeroplane Performance Manual* – Cir 355, *Assessment, Measurement and Reporting of Runway Surface Conditions* – ICAO Global Reporting Format for runway surface conditions (GRF) – ICAO Global Runway Safety Action Plan – ICAO Runway Safety Documents and Toolkits – ICAO EUR Doc 041, Guidance on the Issuance of SNOWTAM – ACI-ICAO Airport Safety Professional (ASP) Designation Programme – ACI-ICAO Global Reporting Format (GRF) for Airport Operators: Online Course – Commercial Aviation Safety Team – Safety enhancements for RE – European Action Plan for the Prevention of Runway Excursions (EAPPRE) – Flight Safety Foundation ALAR Toolkit

	– Global Action Plan for the Prevention of Runway Excursions (GAPPRE) – IATA Examining Unstable Approaches - Risk Mitigating Efforts – IATA / Honeywell guidance on Performance assessment of pilot response to Enhanced Ground Proximity Warning System – NBAA Reducing Runway Excursions in Business Aviation

5. RUNWAY INCURSION (RI)

Safety Enhancement Initiative	SEI-15 – Mitigate contributing factors to RI accidents and incidents at the service provider level
Stakeholder	Industry
Related GASP target(s)	1.1; 1.2
Actions	15A – Implement the following RI safety actions: a) Establish, or actively participate in a runway safety programme and runway safety teams b) Establish policy, procedures and training that support situational awareness for ATCOs, pilots and airside vehicle drivers c) Effectively use suitable technologies to assist the improvement of situational awareness, such as improved resolution AMM, EFB, EVS and HUD, A-SMGCS, stop bars and ARIWS d) Comply with runway-related provisions in Annex 14, Volume I, as well as PANS-Aerodromes e) Use standard phraseologies in accordance with applicable State regulations and ICAO provisions (for example, *Manual of Radiotelephony* (Doc 9432)) f) Identify and publish hotspots at aerodromes in the AIP g) Develop suitable strategies to remove or mitigate hazards associated with identified hotspots h) Verify that training of vehicle drivers addresses following speed control and knowledge of the sensitive areas (for air operators and aerodrome operators) i) Introduce and ensure the effective utilization of ATC ground surveillance at all high-density airports (for aerodrome operators) j) Introduce training to ATCOs on prevention of runway incursions k) Improved aerodrome signage in accordance with Annex 14, Volume I l) Use a runway safety maturity checklist m) Use chart manoeuvring area during construction projects (PANS-Aerodromes)

	☐ 15B – Validate the effectiveness of the SEIs in industry through the analysis of ATC data*[7] and reports from stakeholders (apply safety management methodologies) ☐ 15C – Identify additional contributing factors, for example: a) Operations in low visibility conditions b) Complex or inadequate aerodrome design, equipment and signage c) Diversity and complexity of traffic (such as multiple simultaneous line-ups) d) Conditional clearances e) Simultaneous use of intersecting runways f) Late issue of or late changes to departure clearances g) Unintentional deviations from ATC clearances by flight and ground crew h) Phraseology use (such as non-standard versus standard; call-sign confusion) i) Concurrent use of more than one language for ATC communications j) English language proficiency k) Inadequate manoeuvring area driver training and assessment programme ☐ 15D – Develop and implement further SEIs to mitigate the risk of the identified contributing factors, if any, for RI ☐ 15E – Continuously evaluate the effectiveness of the SEIs
References	– Annex 14 – *Aerodromes*, Volume I – *Aerodrome Design and Operations* – Doc 8168, *Procedures for Air Navigation Services – Aircraft Operations* (PANS-OPS) – Doc 9981, *Procedures for Air Navigation Services – Aerodromes* (PANS-Aerodromes) – Doc 9137, *Airport Services Manual*, Part 3 – *Wildlife Hazard Management* – Doc 9432, *Manual of Radiotelephony* – Doc 9870, *Manual on the Prevention of Runway Incursions* – ICAO Global Runway Safety Action Plan

7. Transcripts, number of conflicts detected by SMGCS

	– ICAO Runway Safety Documents and Toolkits – ICAO Safety Report – Global Action Plan for the Prevention of Runway Incursions (GAPPRI) – ACI Aerodrome Certification Guide (1st Edition) – ACI Airfield Maintenance Handbook (1st Edition) – ACI Managing Operations During Construction Handbook (1st Edition) – ACI Runway Safety Handbook (2nd Edition) – ACI APEX Programme – 2011 to Present – CANSO Runway Safety Maturity Checklist – EASA Safety Promotion – Commercial Aviation Safety Team – Safety enhancements for RI – CAST/ICAO Common Taxonomy Team – IATA Safety Report – IATA Runway Safety

COMPONENT 2 – OTHER GLOBAL RISK CATEGORIES OF OCCURRENCES

PART 1. STATES

1. ABNORMAL RUNWAY CONTACT (ARC)

Safety enhancement initiative	SEI-16 – Mitigate contributing factors to ARC accidents and incidents at the national level
Stakeholder	States
Related GASP target(s)	1.1; 1.3
Actions	□ 16A – Implement the following ARC safety actions: a) Develop guidance material on unstabilized approaches b) Promote the establishment of policy and training on rejected landings, go-arounds, crosswind and tailwind landings (up to the maximum manufacturer-demonstrated wind) c) Ensure effective and timely reporting of meteorological and aerodrome conditions (for example, runway surface condition in accordance with the GRF in Annex 14, Volume I, braking action and revised declared distances) d) Develop guidance material and a training programme for runway pavement, maintenance and operations from aerodrome operator's perspective e) Use a runway safety maturity checklist □ 16B – Validate the effectiveness of the SEIs in the State through the analysis of MOR and VOR and accident/incident investigations (apply safety management methodologies) □ 16C – Identify additional contributing factors, for example: a) Adverse weather conditions (such as tailwind, crosswind, turbulence or wind shear) b) An unstabilized approach continued to land c) Inappropriate aircraft configuration (weight and balance, trim setting/CG position and flap setting) d) Mishandling of crosswind e) Mistrimmed stabilizer, rotation at improper speed, excessive rotation rate f) Holding off in the flare g) Over-rotation during go-around

	h) Improper use of the flight director i) Under-inflated oleo-pneumatic shock absorber j) Slow or late rotation k) Performance calculation errors l) Tail strikes, tip strikes, pod strikes and nose wheel first touch down m) Illuminated touchdown zones could be a contributing factor to hard landings and tail strikes due to the black hole effect at night n) The absence of centre runway lights could be a contributing factor to off-centre landings o) Non-standard approach profiles, improperly calibrated visual approach aids ☐ 16D – Develop and implement further SEIs to mitigate the risk of the identified contributing factors, if any, for ARC ☐ 16E – Continuously evaluate the effectiveness of the SEIs
References	– Airbus Preventing Tailstrike at Landing – Airbus Preventing Tailstrike at Takeoff – Airbus Prevention of Unstable Approaches – Boeing Tail Strikes: Prevention – Embraer And Boeing Production Video *No Landing Is Routine – Brake for Safety, Not for Comfort!* – FSF ALAR Toolkit – IATA, IFALPA, IFATCA, CANSO, Unstable Approaches: Risk Mitigation Policies, Procedures and Best Practices (3rd Edition) – Skybrary Landing Flare – Skybrary Rejected Landings

2. SYSTEM/COMPONENT FAILURE OR MALFUNCTION (NON-POWERPLANT) (SCF-NP)

Safety enhancement initiative	SEI-17 – Mitigate contributing factors to SCF-NP accidents and incidents at the national level
Stakeholder	States
Related GASP target(s)	1.1; 1.3
Actions	17A – Implement the following SCF-NP safety actions: a) Approve operator maintenance programmes, taking into consideration changes to the maintenance programme to reflect operator experience, environment of operation and utilization rate b) Approve operator maintenance programmes to include, when applicable, condition monitoring or condition-based maintenance (CBM), based on predictive maintenance (PdM) c) Establish the requirements for, and ensure oversight of, defect control and deviations from the approved minimum equipment list (MEL) d) Establish the requirements for training of operator and maintenance personnel on human factors, environmental protections, root cause analysis, software and firmware updates, and supplier quality assurance (QA) (training should encompass proper procedures, handling and troubleshooting techniques) e) Perform thorough root cause analysis to understand the underlying reasons and implement corrective actions f) Facilitate the sharing of continuing airworthiness information between State of Design, State of Manufacture and State of Registry – complete the necessary information on Cir 95, *The Continuing Airworthiness of Aircraft in Service* g) Conduct oversight of the supplier's QA programme h) Establish a programme for the traceability of aviation parts and preventing the installation of parts unsuitable for operations 17B – Validate the effectiveness of the SEIs in the State using data provided by States and industry (apply safety management methodologies) 17C – Identify additional contributing factors, for example: a) Inadequate maintenance practices b) Material defects and quality issues c) Environmental conditions

	d) Deterioration due to ageing components e) Design issues f) Manufacturing deficiencies g) Repair issues h) Repair interval extensions i) Mechanical overload and stress j) Human performance, including human factors issues k) Improper handling and shipping of parts l) Deficiencies in maintenance programmes m) Inadequate oversight n) Improper implementation of reliability programmes and condition monitoring o) Damage (accidental or environment) p) Failure to adhere to the appropriate SOPs q) Suspected unapproved parts (SUPs) ☐ 17D – Develop and implement further SEIs to mitigate the risk of the identified contributing factors, if any, for SCF-NP ☐ 17E – Continuously evaluate the effectiveness of the SEIs
References	– Annex 6 – *Operation of Aircraft* – Annex 8 – *Airworthiness of Aircraft* – Doc 9760, *Airworthiness Manual* – Cir 95, *The Continuing Airworthiness of Aircraft in Service* – EASA Part-ORO.MLR.105(f) – EASA Certification Specifications and Guidance Material for MMEL – TCCA MMEL/MEL Policy and Procedures Manual – CASA No. 2022-02

	– Airbus A Recall on the Correct Use of the MEL – Airbus Closing MEL Items: Why Sooner is Better – Airbus System Reset: Use with Caution

3. TURBULENCE ENCOUNTER (TURB)

Safety enhancement initiative	SEI-18 – Mitigate contributing factors to TURB accidents and incidents at the national level
Stakeholder	States
Related GASP target(s)	1.1; 1.3
Actions	☐ 18A – Implement the following TURB safety actions: a) Establish a requirement for the provision of real time information related to turbulence b) Establish a programme for enhancing the appropriate provision and distribution of SIGMET c) Establish a programme for enhancing the appropriate provision and distribution of meteorological reports (aerodrome routine meteorological reports (METAR), aerodrome special meteorological reports (SPECI)) and forecasts (aerodrome forecasts (TAF), trend forecasts) at aerodromes d) Establish routine availability of the World Aeronautical Forecast Systems (WAFS) forecasts for inclusion in in-flight briefings and documentation e) Consider the implementation of wake turbulence recategorization, only if it improves the existing safety criteria f) Consider the application of time or distance-based separation minima, as per Doc 4444, *Procedures for Air Navigation Services – Air Traffic Management* (PANS-ATM) g) Promote the sharing of research, experiences, data and best practices relating to the forecasting and management of turbulence encounters h) Improve the availability of air-reports, including special air-report (ARS), especially those made routinely and containing quantitative turbulence information (in other words, eddy dissipation rate) ☐ 18B – Validate the effectiveness of the SEIs in the State using data provided by States and industry (apply safety management methodologies) ☐ 18C – Identify additional contributing factors, for example: a) Seasonality, rough terrain and location b) Weather and convective activity c) Jet stream/clear air turbulence d) Wake vortex

	e) availability of timely weather reporting □ 18D – Develop and implement further SEIs to mitigate the risk of the identified contributing factors, if any, for TURB □ 18E – Continuously evaluate the effectiveness of the SEIs
References	– Annex 3 – *Meteorological Service for International Air Navigation* – Doc 4444, *Procedures for Air Navigation Services – Air Traffic Management* (PANS-ATM) – Doc 8643, *Aircraft Type Designators* (lists the wake turbulence category for each fixed wing aircraft type) – Doc 8896, *Manual of Aeronautical Meteorological Practice* – Doc 9426, *Air Traffic Services Planning Manual* (provides detailed characteristics of wake vortices and their effect on aircraft) – Doc 10002, *Cabin Crew Safety Training Manual* – Doc 10157, *Procedures for Air Navigation Services – Meteorology* – ICAO, Airbus, ATR, Boeing, Bombardier, Embraer, Airplane Upset Prevention and Recovery Training Aid for Transport Category Airplanes – ICAO RASG-PA Turbulence Toolkit – CASA AC 91-28v1.1, Crew Safety during Turbulence – Commission Regulations (EU) No 965/2012 and No 923/2012 – FAA AC 120-88A – Preventing Injuries Caused by Turbulence – NTSB Safety Research Report (NTSB/SS-21/01 PB2021-100927), Preventing Turbulence-Related Injuries in Air Carrier Operations Conducted Under Title 14 Code of Federal Regulations Part 121 – UK CAA AIC: P 056/2010, The Effect of Thunderstorms and Associated Turbulence on Aircraft Operations – UK CAA CAP 493, Manual of Air Traffic Services – Part 1, Section 1, Chapter 6: "Weather Avoidance" – EUROCONTROL and Delft University of Technology An Improved Understanding of En-route Wake Vortex Encounters – EUROCONTROL SMART Wx Regulation Task Force WP1: Collaborative Best Practices for Handling of Adverse Weather at European Aerodromes

	– EUROCONTROL Green Paper on the Gains for the European ATM Network of Aligned Weather Impact Management – EUROCONTROL Severe Weather Risk Management Survey – Final Report – Airbus Managing Severe Turbulence, Airbus – IATA Cabin Operations Safety Best Practices Guide – IATA Turbulence Aware – Lincoln Laboratory Journal Vol. 16, Number 2, Air Traffic Management Decision Support During Convective Weather – MIT Modeling Convective Weather Avoidance in Enroute Airspace – Skybrary SE078: Turbulence Procedures for Reducing Cabin Injuries

PART 2. REGIONS

1. ABNORMAL RUNWAY CONTACT (ARC)

Safety enhancement initiative	SEI-19 – Mitigate contributing factors to ARC accidents and incidents at the regional level
Stakeholder	Regions
Related GASP target(s)	1.1; 1.3
Actions	□ 19A – Implement the following ARC safety actions: a) Promote the development of guidance material on unstabilized approaches b) Promote the establishment of policy and training on rejected landings, go-arounds, crosswind and tailwind landings (up to the maximum manufacturer-demonstrated wind) c) Promote effective and timely reporting of meteorological and aerodrome conditions (for example, runway surface condition in accordance with the GRF in Annex 14, Volume I, braking action and revised declared distances) d) Promote the development of guidance material and a training programme for runway pavement, maintenance and operations from the aerodrome operator's perspective e) Promote the use a runway safety maturity checklist □ 19B – Validate the effectiveness of the SEIs in the region using data provided by States and industry (apply safety management methodologies) □ 19C – Identify additional contributing factors, for example: a) Adverse weather conditions (such as tailwind, crosswind, turbulence or wind shear) b) An unstabilized approach continued to land c) Inappropriate aircraft configuration (weight and balance, trim setting/CG position and flap setting) d) Mishandling of crosswind e) Mistrimmed stabilizer, rotation at improper speed, excessive rotation rate f) Holding off in the flare g) Overrotation during go-around h) Improper use of the flight director

	i) Under-inflated oleo-pneumatic shock absorber j) Slow or late rotation k) Performance calculation errors l) Tail strikes, tip strikes, pod strikes and nose wheel first touch down m) Illuminated touchdown zones could be a contributing factor to hard landings and tail strikes due to the black hole effect at night n) The absence of centre runway lights could be a contributing factor to off-centre landings o) Non-standard approach profiles, improperly calibrated visual approach aids ☐ 19D – Develop and implement further SEIs to mitigate the risk of the identified contributing factors, if any, for ARC ☐ 19E – Continuously evaluate the effectiveness of the SEIs
References	– Airbus Preventing Tailstrike at Landing – Airbus Preventing Tailstrike at Takeoff – Airbus Prevention of Unstable Approaches – Boeing Tail Strikes: Prevention – Embraer And Boeing Production Video *No Landing Is Routine – Brake for Safety, Not for Comfort!* – FSF ALAR Toolkit – IATA, IFALPA, IFATCA, CANSO, Unstable Approaches: Risk Mitigation Policies, Procedures and Best Practices (3rd Edition) – Skybrary Landing Flare – Skybrary Rejected Landings

2. SYSTEM/COMPONENT FAILURE OR MALFUNCTION (NON-POWERPLANT) (SCF-NP)

Safety enhancement initiative	SEI-20 – Mitigate contributing factors to SCF-NP accidents and incidents at the regional level
Stakeholder	Regions
Related GASP target(s)	1.1; 1.3
Actions	□ 20A – Implement the following SCF-NP safety actions: a) Promote operator maintenance programmes, taking into consideration changes to the maintenance programme to reflect operator experience, environment of operation and utilization rate b) Promote operator maintenance programmes to include, when applicable, CBM, based on PdM c) Promote the requirements for, and oversight of, defect control and deviations from the approved MEL d) Promote the sharing of continuing airworthiness information between State of Design, State of Manufacture and State of Registry – complete the necessary information on Cir 95, *The Continuing Airworthiness of Aircraft in Service* □ 20B – Validate the effectiveness of the SEIs in the region using data provided by States and industry (apply safety management methodologies) □ 20C – Identify additional contributing factors, for example: a) Inadequate maintenance practices b) Material defects and quality issues c) Environmental conditions d) Deterioration due to ageing components e) Design issues f) Manufacturing deficiencies g) Repair issues h) Repair interval extensions i) Mechanical overload and stress j) Human performance, including human factors issues

	k) Improper handling and shipping of parts l) Deficiencies in maintenance programmes m) Inadequate oversight n) Improper implementation of reliability programmes and condition monitoring o) Damage (accidental or environment) p) Failure to adhere to the appropriate SOPs q) SUPs ☐ 20D – Develop and implement further SEIs to mitigate the risk of the identified contributing factors, if any, for SCF-NP ☐ 20E – Continuously evaluate the effectiveness of the SEIs
References	– Annex 6 – *Operation of Aircraft* – Annex 8 – *Airworthiness of Aircraft* – Doc 9760, *Airworthiness Manual* – Cir 95, *The Continuing Airworthiness of Aircraft in Service* – EASA Part-ORO.MLR.105(f) – EASA Certification Specifications and Guidance Material for MMEL – TCCA MMEL/MEL Policy and Procedures Manual – CASA No. 2022-02 – Airbus A Recall on the Correct Use of the MEL – Airbus Closing MEL Items: Why Sooner is Better – Airbus System Reset: Use with Caution

3. TURBULENCE ENCOUNTER (TURB)

Safety enhancement initiative	SEI-21 – Mitigate contributing factors to TURB accidents and incidents at the regional level
Stakeholder	Regions
Related GASP target(s)	1.1; 1.3
Actions	21A – Implement the following TURB safety actions: a) Promote the provision of real time information related to turbulence with all aircraft b) Promote the establishment of SIGMET services, including the issuance and dissemination of SIGMET c) Encourage the establishment of a Meteorological Watch Office at international airports d) Promote enhancing the appropriate production and use of meteorological reports (METAR, SPECI) and forecasts (TAF, trend forecasts) at aerodromes e) Encourage availability of the WAFS forecasts for inclusion in in-flight briefings and documentation f) Promote the implementation of wake turbulence recategorization, only if it improves the existing safety criteria g) Encourage the application of time- or distance-based separation minima, as per Doc 4444, *Procedures for Air Navigation Services – Air Traffic Management* (PANS-ATM) h) Encourage States to share research, experiences, data and best practices relating to the forecasting and management of turbulence encounters i) Improve the availability of air-reports in the region, including ARS, especially those made routinely and containing quantitative turbulence information j) ensure that State air navigation deficiencies related to MET identified in the region are addressed 21B – Validate the effectiveness of the SEIs in the region using data provided by States and industry (apply safety management methodologies) 21C – Identify additional contributing factors, for example: a) Seasonality, rough terrain and location b) Weather and convective activity

	c) Jetstream and clear air turbulence d) Wake vortex e) Availability of timely weather reporting □ 21D – Develop and implement further SEIs to mitigate the risk of the identified contributing factors, if any, for TURB □ 21E – Continuously evaluate the effectiveness of the SEIs
References	– Annex 3 – *Meteorological Service for International Air Navigation* – Doc 4444, *Procedures for Air Navigation Services – Air Traffic Management* (PANS-ATM) – Doc 8643, *Aircraft Type Designators* (lists the wake turbulence category for each fixed wing aircraft type) – Doc 8896, *Manual of Aeronautical Meteorological Practice* – Doc 9426, *Air Traffic Services Planning Manual* (provides detailed characteristics of wake vortices and their effect on aircraft) – Doc 10002, *Cabin Crew Safety Training Manual* – Doc 10157, *Procedures for Air Navigation Services – Meteorology* – ICAO, Airbus, ATR, Boeing, Bombardier, Embraer, Airplane Upset Prevention and Recovery Training Aid for Transport Category Airplanes – ICAO RASG-PA Turbulence Toolkit – CASA AC 91-28v1.1, Crew Safety during Turbulence – Commission Regulations (EU) No 965/2012 and No 923/2012 – FAA AC 120-88A – Preventing Injuries Caused by Turbulence – NTSB Safety Research Report (NTSB/SS-21/01 PB2021-100927), Preventing Turbulence-Related Injuries in Air Carrier Operations Conducted Under Title 14 Code of Federal Regulations Part 121 – UK CAA AIC: P 056/2010, The Effect of Thunderstorms and Associated Turbulence on Aircraft Operations – UK CAA CAP 493, Manual of Air Traffic Services – Part 1, Section 1, Chapter 6: "Weather Avoidance" – EUROCONTROL and Delft University of Technology An Improved Understanding of En-route Wake Vortex Encounters

	– EUROCONTROL SMART Wx Regulation Task Force WP1: Collaborative Best Practices for Handling of Adverse Weather at European Aerodromes – EUROCONTROL Green Paper on the Gains for the European ATM Network of Aligned Weather Impact Management – EUROCONTROL Severe Weather Risk Management Survey – Final Report – Airbus Managing Severe Turbulence, Airbus – IATA Cabin Operations Safety Best Practices Guide – IATA Turbulence Aware – Lincoln Laboratory Journal Vol. 16, Number 2, Air Traffic Management Decision Support During Convective Weather – MIT Modeling Convective Weather Avoidance in Enroute Airspace – Skybrary SE078: Turbulence Procedures for Reducing Cabin Injuries

PART 3. INDUSTRY

1. ABNORMAL RUNWAY CONTACT (ARC)

Safety enhancement initiative	SEI-22 – Mitigate contributing factors to ARC accidents and incidents at the service provider level
Stakeholder	Industry
Related GASP target(s)	1.1; 1.3
Actions	22A – Implement the following ARC safety actions: a) Define stabilized approach, landing and go-around policies in the operations manual b) Develop comprehensive pilot training on stabilized approaches, go-around procedures and runway awareness and alerting systems c) Establish a policy and training on rejected landings, go-arounds, crosswind and tailwind landings (up to the maximum manufacturer-demonstrated winds) d) Ensure effective and timely reporting of meteorological and aerodrome conditions (for example, runway surface condition in accordance with the GRF in Annex 14, Volume I, braking action and revised declared distances) e) Develop guidance material and a training programme for runway pavement, maintenance and operations from aerodrome operator's perspective f) Use a runway safety maturity checklist g) Include runway safety precursors in operator's FDAP – the flight parameters monitored should include: deep landing, short landing, long flare, monitoring spoiler deployment and late flap settings h) Implement an effective, non punitive flight data analysis programme 22B – Validate the effectiveness of the SEIs in industry using data provided by States and industry (apply safety management methodologies) 22C – Identify additional contributing factors, for example: a) Adverse weather conditions (such as tailwind, crosswind, turbulence or wind shear) b) An unstabilized approach continued to land c) Inappropriate aircraft configuration (weight and balance, trim setting/CG position and flap setting)

	d) Mishandling of crosswind e) Mistrimmed stabilizer, rotation at improper speed, excessive rotation rate f) Holding off in the flare g) Over-rotation during go-around h) Improper use of the flight director i) Under-inflated oleo-pneumatic shock absorber j) Slow or late rotation k) Performance calculation errors l) Tail strikes, tip strikes, pod strikes and nose wheel first touch down m) Illuminated touchdown zones could be a contributing factor to hard landings and tail strikes due to the black hole effect at night n) The absence of centre runway lights could be a contributing factor to off-centre landings o) Non-standard approach profiles, improperly calibrated visual approach aids ☐ 22D – Develop and implement further SEIs to mitigate the risk of the identified contributing factors, if any, for ARC ☐ 22E – Continuously evaluate the effectiveness of the SEIs
References	– Airbus Preventing Tailstrike at Landing – Airbus Preventing Tailstrike at Takeoff – Airbus Prevention of Unstable Approaches – Boeing Tail Strikes: Prevention – Embraer And Boeing Production Video *No Landing Is Routine – Brake for Safety, Not for Comfort!* – FSF ALAR Toolkit – IATA, IFALPA, IFATCA, CANSO, Unstable Approaches: Risk Mitigation Policies, Procedures and Best Practices (3rd Edition) – Skybrary Landing Flare – Skybrary Rejected Landings

2. SYSTEM/COMPONENT FAILURE OR MALFUNCTION (NON-POWERPLANT) (SCF-NP)

Safety enhancement initiative	SEI-23 – Mitigate contributing factors to SCF-NP accidents and incidents at the service level
Stakeholder	Industry
Related GASP target(s)	1.1; 1.3
Actions	23A – Implement the following SCF-NP safety actions: a) Implement an operator maintenance programme, taking into consideration changes to the maintenance programme to reflect operator experience, environment of operation and utilization rate b) Implement an operator maintenance programme to include, when applicable, CBM, based on PdM c) Implement the requirements for defect control and deviations from the approved MEL d) Implement training of operator and maintenance personnel on human factors, environmental protections, root cause analysis, software and firmware updates and supplier QA (training should encompass proper procedures, handling and troubleshooting techniques) e) Perform thorough root cause analysis to understand the underlying reasons and implement corrective actions f) Participate in the sharing of continuing airworthiness information between State of Design, State of Manufacture and State of Registry g) Conduct audits of the supplier's QA programme h) Perform software and firmware updates in a timely manner 23B – Validate the effectiveness of the SEIs in industry using data provided by States and industry (apply safety management methodologies) 23C – Identify additional contributing factors, for example: a) Inadequate maintenance practices b) Material defects and quality issues c) Environmental conditions d) Deterioration due to ageing components e) Design issues

	f) Manufacturing deficiencies g) Repair issues h) Repair interval extensions i) Mechanical overload and stress j) Human performance, including human factors issues k) Improper handling and shipping of parts l) Deficiencies in maintenance programmes m) Inadequate oversight n) Improper implementation of reliability programmes and condition monitoring o) Damage (accidental or environment) p) Failure to adhere to the appropriate SOPs q) SUPs ☐ 23D – Develop and implement further SEIs to mitigate the risk of the identified contributing factors, if any, for SCF-NP ☐ 23E – Continuously evaluate the effectiveness of the SEIs
References	– Annex 6 – *Operation of Aircraft* – Annex 8 – *Airworthiness of Aircraft* – Doc 9760, *Airworthiness Manual* – EASA Part-ORO.MLR.105(f) – EASA Certification Specifications and Guidance Material for MMEL – TCCA MMEL/MEL Policy and Procedures Manual – CASA No. 2022-02 – Airbus A Recall on the Correct Use of the MEL – Airbus Closing MEL Items: Why Sooner is Better – Airbus System Reset: Use with Caution

3. TURBULENCE ENCOUNTER (TURB)

Safety enhancement initiative	SEI-24 – Mitigate contributing factors to TURB accidents and incidents at the service provider level
Stakeholder	Industry
Related GASP target(s)	1.1; 1.3
Actions	24A – Implement the following TURB safety actions: *ANSPs* a) Provide real time information related to turbulence with all aircraft b) Provide a sufficient number of ATCOs during periods with forecasted severe convective weather c) Use of weather radars and weather displays to enhance information provided to controllers d) Use SIGMET and associated weather forecasts to improve prediction of sector loading e) Train controllers to deal with weather during live training; use simulator training to build in more resilience in controller skills f) Help mitigate the impact of severe weather avoidance by air traffic on the ATCO's workload by the operational supervisor taking additional actions to establish possible tactical measures with the help of local flow management position g) Implement wake turbulence recategorization, only if it improves the existing safety criteria h) Implement time or distance-based separation minima, as per Doc 4444, *Procedures for Air Navigation Services – Air Traffic Management* (PANS-ATM) *Meteorological Service Providers* i) Enhance the appropriate production and use of meteorological reports (METAR, SPECI) and forecasts (TAF, trend forecasts) at aerodromes j) Make available the WAFS forecasts for inclusion in in-flight briefings and documentation k) Establish the appropriate issuance and timely dissemination of SIGMET

	Air Operators l) Establish policies and procedures for the completion of air-reports, including ARS, especially those made routinely and containing quantitative turbulence information (in other words, eddy dissipation rate) m) Establish policies, procedures and train flight crew members on weather radar capability, awareness of the flight environment, weather avoidance, managing adverse weather conditions and effective communication with cabin crew members, including timely forecast sharing n) Establish policies, procedures and training for cabin crew members on effective management of the cabin related to turbulence through prompt and effective information-sharing with flight crew, and awareness of their own safety by securing themselves o) Establish policies, procedures and training for aircraft dispatchers and/or flight operations officers to increase the awareness of turbulence avoidance p) Implement existing turbulence information-sharing platforms to share turbulence data and provide real time turbulence information to flight crew q) Enhance the effectiveness of safety briefings to passengers relating to turbulence encounters, to reduce risk (for example, fastening seat belts while seated) □ 24B – Validate the effectiveness of the SEIs in industry using data provided by States and industry (apply safety management methodologies) □ 24C – Identify additional contributing factors, for example: a) Seasonality, rough terrain and location b) Weather and convective activity c) Jetstream and clear air turbulence d) Wake vortex e) Availability of timely weather reporting f) Lack of training on turbulence conditions, prediction and avoidance for ATCO, aircraft dispatchers (flight operations officers) and air crew g) Ineffective SOPs and preflight safety briefings with cabin crew h) Inadequate aircraft separation for aircraft types and prevailing weather conditions

	☐ 24D – Develop and implement further SEIs to mitigate the risk of the identified contributing factors, if any, for TURB ☐ 24E – Continuously evaluate the effectiveness of the SEIs
References	– Annex 3 – *Meteorological Service for International Air Navigation* – Doc 4444, *Procedures for Air Navigation Services – Air Traffic Management* (PANS-ATM) – Doc 8643, *Aircraft Type Designators* (lists the wake turbulence category for each fixed wing aircraft type) – Doc 8896, *Manual of Aeronautical Meteorological Practice* – Doc 9426, *Air Traffic Services Planning Manual* (provides detailed characteristics of wake vortices and their effect on aircraft) – Doc 10002, *Cabin Crew Safety Training Manual* – Doc 10157, *Procedures for Air Navigation Services – Meteorology* – ICAO, Airbus, ATR, Boeing, Bombardier, Embraer, Airplane Upset Prevention and Recovery Training Aid for Transport Category Airplanes – ICAO RASG-PA Turbulence Toolkit – CASA AC 91-28v1.1, Crew Safety during Turbulence – Commission Regulations (EU) No 965/2012 and No 923/2012 – FAA AC 120-88A – Preventing Injuries Caused by Turbulence – NTSB Safety Research Report (NTSB/SS-21/01 PB2021-100927), Preventing Turbulence-Related Injuries in Air Carrier Operations Conducted Under Title 14 Code of Federal Regulations Part 121 – UK CAA AIC: P 056/2010, The Effect of Thunderstorms and Associated Turbulence on Aircraft Operations – UK CAA CAP 493, Manual of Air Traffic Services – Part 1, Section 1, Chapter 6: "Weather Avoidance" – EUROCONTROL and Delft University of Technology An Improved Understanding of En-route Wake Vortex Encounters – EUROCONTROL SMART Wx Regulation Task Force WP1: Collaborative Best Practices for Handling of Adverse Weather at European Aerodromes

	– EUROCONTROL Green Paper on the Gains for the European ATM Network of Aligned Weather Impact Management – EUROCONTROL Severe Weather Risk Management Survey – Final Report – Airbus Managing Severe Turbulence – Airbus Optimum Use of Weather Radar – Airbus Wake Vortices – IATA Cabin Operations Safety Best Practices Guide – IATA Turbulence Aware – Lincoln Laboratory Journal Vol. 16, Number 2, Air Traffic Management Decision Support During Convective Weather – MIT Modeling Convective Weather Avoidance in Enroute Airspace – Skybrary SE078: Turbulence Procedures for Reducing Cabin Injuries

— END —

ISBN 978-92-9275-923-0