International Civil Aviation Organization

MIDANPIRG/21 and RASG-MID/11 Meeting

(Abu Dhabi, UAE, 4 - 8 March 2024)

Agenda Item 4.2:   **Outcomes of the SEIG/5 Meeting**

OUTCOMES OF THE SEIG/5MEETING

(Presented by the Secretariat)

SUMMARY

This paper presents the outcome of the SEIG/5 meeting, the implementation progress on the Safety Enhancement initiatives' (SEIs) included in the MID-RASP 2023-2025 Edition in line with GASP 2023-2025 Edition. It also covers an update on the NASP and SSP.

Action by the meeting is at paragraph 3.

REFERENCES

- SEIG/5 Report
- MIDANPIRG/20-RASG-MID/10 Report

1.   **INTRODUCTION**

1.1   The Fifth meeting of the Safety Enhancement Implementation Group (SEIG/5) was held in Doha, Qatar, 15-17 October 2023. The meeting was attended by a total of sixty (60) participants from Eleven (11) States (Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Qatar, Saudi Arabia, UAE and Yemen), three (3) Organization (ACAO, Boeing, IATA).

2.   **DISCUSSION**

Update on the implementation Progress of the Safety Enhancement Initiatives (SEIs)

2.1   The Middle East Regional Aviation Safety Plan (MID-RASP) 2023-2025 Edition at *Appendix A* presents the strategic direction for the management of aviation safety in the MID Region, to strengthen Member States Safety Oversight System, and risk-based approach to managing safety and support effective implementation of States' Safety Programmes (SSP) and Safety Management System (SMS) including the development of NASPs.

2.2   The MID-RASP 2023-2025 Edition identifies MID Region Safety Performance Measurement and Monitoring (SPMM) with specific safety targets in line with GASP and the RASG-MID would continuously monitor the implementation of the Safety Enhancement Initiatives (SEIs) and measure safety performance of regional civil aviation, to ensure the intended targets are achieved using the MID Region SPMM.

2.3   The tenth meeting of the Regional Aviation Safety Group – Middle East (RASG-MID/10) was held in Muscat, Oman, 14-17 May 2023; reviewed and endorsed the MID-RASP 2023-2025 Edition including 24 Safety Enhancement Initiatives (SEIs) and 61 safety actions through RASG-MID Conclusion 10/7. 26 safety actions out of 61 have been completed for the year 2023.

2.4   The SEIG/5 meeting reviewed and updated the SEIs and their respective safety actions, as well as the status of implementation of the SEIs and safety actions as at **Appendix B** and agreed to its presentation to the RASG-MID/11 meeting for endorsement.

2.5   The meeting was also apprised with appreciation of the update on the implementation progress of the SEIs conducted by the Secretariat in coordination with all stakeholders.

SEIs Guidance material development

2.6   The SEIG/5 meeting noted with appreciation the guidance material developed by IATA on the carriage of Lithium batteries (LB). To address these regional operational risks IATA developed Guidance Material document. The purpose of the document is to provide guidance for complying with provisions applicable to the transport by air of lithium batteries as set out in the DGR manual.

2.7   The meeting noted that LB are classified as dangerous goods and are subject to regulations that prescribe specific design type, testing, packaging, quantity limits, labelling and documentations requirements for carriage as a cargo by air.

2.8   The meeting also noted that it is designed to outline potential strategies operators which may wish to consider for addressing and mitigating the risks associated with the transport of lithium batteries, in cargo and mail as well as in passenger and crew baggage. Accordingly, the SEIG/5 meeting reviewed the *draft on the carriage of Lithium batteries guidance material* at **Appendix C** and agreed to its presentation to the RASG-MID/11 meeting for endorsement.

MID Region Safety Priorities and Targets

2.9   The SEIG/5 meeting was provided with updated information on the MID Region safety priorities and safety targets.

2.10   The meeting noted with appreciation the MID Region safety priorities.

Regional Operational Safety Risks

a. Runway Excursion (RE) and Abnormal Runway Contact (ARC) during landing;
b. Loss of Control Inflight - (LOC-I);
c. Mid Air Collision- (MAC)
d. Controlled Flight Into Terrain- (CFIT); and
e. Runway Incursion- (RI).

Organizational issues

a. Enhance States' Safety Oversight capabilities;
b. Safety Management;
c. Human Factors & Human Performance;
d. competence of personnel; and
e. Risk interdependencies.

- Cybersecurity risks
- GNSS Interference Risks
- 5G interference with Radio Altimeter

       - Aviation health safety (AHS) risks
       - Risks arising from conflict zones, and
       - Security risks with an impact on aviation safety.

Emerging Risks

    a. UAS and manned VTOL-capable aircraft;
    b. Artificial intelligence (AI) in Aviation; and
    c. Digitalization in the aviation field.

2.11   The meeting was also informed about the MID region safety targets.

2.12   The meeting may wish to note that the SEIG/5 meeting agreed that IATA to present "the Center of excellence of independent evaluator" during the upcoming SEIG/6 meeting.

MID States Progress on NASPs Development

2.13   In line with the Safety Strategic Objective of the International Civil Aviation Organization (ICAO), the 2023-2025 edition of the Global Aviation Safety Plan (GASP, Doc 10004) presents the global strategy for the continuous improvement of aviation safety. It also provides a framework in which regional and national aviation safety plans (RASPs and NASPs) are developed and implemented.

2.14   The States NASP should be developed in alignment with the GASP and the MID-RASP. However, priority should be given to national safety issues. Moreover, the NASP should be also aligned and coordinated with the MID-RASP (as appropriate).

2.15   The SEIG/5 meeting also recalled that the GASP 2023-2025 Target 3.2 calls for all States to publish a NASP by 2024.

2.16   The SEIG/5 meeting noted that States of Iraq, Kuwait, Lebanon, Oman, Saudi Arabia, completed and shared their NASPs with ICAO MID office. Four out of five states NASPs have been published in ICAO NASP website.

2.17   The meeting was apprised and thanked Iran, Kuwait, Qatar, Saudi Arabia, and UAE for sharing their experiences and challenges related to the development of NASP.

2.18   The meeting noted with appreciation the NASP workshop delivered by ICAO MID Office including the GASP and MID-RASP, the Global Aviation Safety Roadmap and the Use of Roadmap to develop NASP, and the process for developing NASP.

2.19   The meeting may wish to note the challenges faced by States in developing their NASPs.

       ▪ Capacity building and training;
       ▪ Senior management commitment
       ▪ Limited resources including financial
       ▪ Limited qualified personnel;
       ▪ Safety data and safety information collection and analysis;
       ▪ Emerging of new technologies;
       ▪ Limited collaboration, coordination, and communication amongst stakeholders; and
       ▪ Limited guidance to develop a robust safety risk management framework and processes.

2.20   The SEIG/5 meeting recognized the challenges facing the Sates on the development of NASP. In this respect, the meeting was apprised about MID Regional Office to conduct dedicated

Assistance Missions to support States with NASP development and implementation. Accordingly, the meeting agreed to its presentation to the RASG-MID/11 meeting for endorsement.

State Safety Programme (SSP)

2.21   The SEIG/5 meeting recalled the Regional Roadmap for Safety Management Implementation and the Safety Management Implementation Team (SMIT) Handbook endorsed by through RSC Conclusion 7/10 and Conclusion RASG-MID 9/4 respectively. States should build upon fundamental safety oversight systems to implement effective SSPs. As per Annex 19, States shall require that applicable service providers under their authority implement an SMS. The SMS enables service providers to capture and transmit safety information, which contributes to safety risk management. An SSP requires the implementation of a risk-based approach to measure and monitor the safety performance of the State's civil aviation system and the progress towards achieving the State's safety objectives. In this context, the role of the State evolves to include the establishment and achievement of safety performance targets, as well as effective oversight of its service providers' SMS.

2.22   The SEIG/5 meeting recalled that the GASP 2023-2025 Edition Goal 3 Target 3.1 calls for all States to implement the foundation of an SSP by 2023.

2.23   The meeting also recalled that once States have implemented the foundation of an SSP, they can then progress into GASP Target 3.3, which calls for work towards an effective SSP through a phased approach, with target dates leading up to 2028.

2.24   The SEIG/5 meeting noted that the template on the development of State Safety Programme (SSP) in MID States was sent to States through State Letter Ref.: ME 4/1.7 &FS 7/3- 22/252 dated 9th November 2022. As a result, ten (10) states replied to the SL namely Bahrain, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Sudan, and UAE.

Proposals for the amendment of Annex 19

2.25   The SEIG/5 meeting noted and thanked MID office for sharing the proposals for the amendment of Annex 19 including and consequential amendments to Annexes 1; 6 Parts I and III; and 13.

2.26   The meeting was also informed about the proposals which included the enhancement of State safety Programmes (SSPs) and safety management system (SMS) provisions, extension of an SMS to certified remotely piloted aircraft systems (RPAS) operators authorized to conduct international operations and approved maintenance organizations providing services to them as well as certified heliports, and provisions related to the development of safety intelligence to support aviation decision-making.

2.27   The SEIG/5 meeting was apprised and thanked states of Iran, Kuwait, Libya, Qatar, Saudi Arabia, and UAE for sharing their experiences and challenges related to the development of SSP.

2.28   The meeting noted the challenges faced by States in developing their SSP.

- Legislation amendments;
- Capacity building and training;
- Limited qualified personnel;
- Limited guidance to establish and develop a Safety data and safety information collection and analysis;
- Limited collaboration, coordination, and communication amongst SSP stakeholders;
- Limited guidance to develop a robust safety risk management framework and processes; and

- Transition from a prescriptive approach to a more risk-based and performance-based approach.

2.29   The SEIG/5 meeting recognized the challenges facing the Sates on the development of SSP. In this respect, the meeting was apprised about the MID Regional Office to conduct dedicated Assistance Missions to support States with SSP development and implementation. Accordingly, the meeting agreed to its presentation to the RASG-MID/11 meeting for endorsement.

IATA PPT (GNSS Interference/Spoofing)

2.30   The SEIG/5 meeting was informed that IATA shared the updated information on GNSS/GPS spoofing. The meeting also noted with concern the issue of GNSS/GPS spoofing and its safety impact on flight operations.

2.31   The SEIG/5 meeting was also informed that the safety data analysis related to Runway Excursion (RE) has been shared by IATA including the identified recommendations and actions to reduce the risk of Runway Excursion.

3.   ACTION BY THE MEETING

3.1   The meeting is invited to:

a) review and endorse the implementation progress of SEIs at **Appendix B** and agree to the following Draft Conclusion:

Why	To update the implementation the SEIs.
What	To endorse the implementation progress of SEIs
Who	RASG-MID/11
When	March 2024

DRAFT RASG-MID CONCLUSION 11/XX: IMPLEMENTATION PROGRESS ON THE SAFETY ENHANCEMENT INITIATIVES (SEIS)

That,

a. *The implementation progress of the Safety Enhancement Initiatives (SEIs) and safety actions included in the MID-RASP 2023-2025 Edition at* **Appendix B** *is endorsed; and*

b. *States, international organizations and industry are urged to support the MID-RASP 2023-2025 Edition activities including SEIs and safety actions.*

b) review and endorse the carriage of Lithium batteries guidance material document at **Appendices C & D** and agree to the following Draft Conclusion:

Why	To use the guidance material for complying with provisions applicable to the transport by air of lithium batteries as set out in the DGR manual.
What	To endorse the carriage of Lithium batteries guidance material

Who	RASG-MID/11
When	March 2024

DRAFT RASG-MID CONCLUSION 11/XX: CARRIAGE AND TRANSPORT OF LITHIUM BATTERIES GUIDANCE MATERIAL

*That, the guidance material document on the carriage and transport of lithium batteries at **Appendices C & D** is endorsed.*

c) agree to the following Draft Conclusion related to the National Aviation Safety Plans (NASPs):

WHY	To establish NASPs in the MID States
What	Development of NASPs
Who	RASG-MID/11
When	March 2024

DRAFT RASG-MID CONCLUSION 11/XX: DEVELOPMENT OF NATIONAL AVIATION SAFETY PLAN (NASP) IN MID STATES

That, States be:

a. *urged to develop and implement the NASP in line with the GASP and MID-RASP, if not yet done so;*

b. *encouraged to share the latest version of their NASPs with ICAO HQ and ICAO Regional MID office for posting on the GASP public website;*

c. *encouraged to continue to use existing ICAO guidance material and tools to implement their NASPs;*

d. *encouraged to request assistance from the ICAO MID Regional Office related to the development of their NASPs including the conduct of assistance missions and/or customized NASP Workshop for each State; and*

e. *encouraged to share their experiences related to the development of their NASPs during the SEIG meetings and/or Regional NASP Workshop to be organized by the ICAO MID Regional Office in 2025.*

d) agree to the following Draft Conclusion related to the State Safety Programme (SSP):

WHY	To support MID States with SSP development and implementation.
What	Development of SSP
Who	RASG-MID/11
When	March 2024

DRAFT RASG-MID CONCLUSION 11/XX: DEVELOPMENT OF SSP IN MID STATES

That, States be:

a. *encouraged to effectively implement their State Safety Programme in a timely manner, and to strengthen the implementation of safety management systems in their aviation industry;*
b. *encouraged to request assistance from the ICAO MID Regional Office related to the development and implementation of their SSPs including the conduct of assistance missions and/or customized SSP implementation and Safety Risk Management Workshops for each State;*
c. *encouraged to support the SMIT activities;*
d. *share their experiences on the development of their SSPs during the SEIG meetings; and*
e. *encouraged to share their latest version of SSP manuals with ICAO MID Office.*

ICAO MID

SAFETY

MID-RASP

MIDDLE EAST REGIONAL AVIATION SAFETY PLAN

Second Edition   2023-2025

MIDDLE EAST REGIONAL AVIATION SAFETY PLAN (MID-RASP)

SECOND EDITION 2023–2025

Executive Summary

The Global Aviation Safety Plan (GASP) presents the global strategy for the continuous improvement of aviation safety. The purpose of the GASP is to continually reduce fatalities, and the risk of fatalities, by guiding the development of a harmonized aviation safety strategy.

The GASP promotes the effective implementation of a State safety Programme (SSP) including National Aviation Safety Plan (NASP), a State's safety oversight system, and a risk-based approach to managing safety as well as a coordinated approach to collaboration between States, international organizations, and industry.

The vision of the GASP is to achieve and maintain the aspirational safety goal of zero fatalities in commercial operations by 2030 and beyond, which is consistent with the United Nations' *2030 Agenda for Sustainable Development*. The plan's mission is to continually enhance international aviation safety performance and resilience by providing a collaborative framework for States, regions and industry.

The Middle East Regional Aviation Safety Plan (MID-RASP) 2023-2025 Edition considers and supports the objectives and priorities of GASP 2023-2025 Edition. MID-RASP also emphasizes the importance of identifying and mitigating risks at MID region level. In addition, MID-RASP is to create a common focus on regional aviation safety issues as a continuation of the MID region work to improve aviation safety and to comply with ICAO standards and supports MID States and industry in implementing the GASP 2023-2025 Edition.

Furthermore, the States national aviation safety plan (NASPs) should be developed in alignment with the GASP and the MID-RASP. However, priority should be given to national safety concerns. Moreover, the NASP should be also aligned and coordinated with the MID-RASP (as appropriate) and with other efforts aimed at enhancing aviation safety.

MID-RASP provides a three-year plan for States in MID Region to strengthen its safety oversight capability and implement an effective safety management. This relates to the continuous reduction of regional operational risks and improvement in States' safety oversight and safety management capabilities. It adopts a risk-based approach to managing safety at regional-level through a coordinated approach and collaboration between States in the region, regional organizations and industry.

The RASG-MD is the governing body responsible for the development, implementation and monitoring of the MID-RASP, in collaboration with the ICAO MID Office, international and regional organizations and with the aviation industry. The MID-RASP is to be reviewed by the Safety Enhancement Implementation Group (SEIG) every year mainly to include new identified Safety Enhancement initiatives' (SEIs), review the existing SEIs, as well as their respective actions.

The MID Region's strategic approach to managing safety at the regional level is to address the region's operational risks and other safety issues in a timely manner. Therefore, the MID-RASP strategic approach would focus on organizational challenges/issues, regional operational safety risks, and emerging risks as indicated below.

     a. Organizational challenges/issues including the States 'safety oversight, safety management, aircraft accident and incident investigation, human factors and competence of personnel, and Cybersecurity.
     b. Regional operational safety risks, the focus would be on Regional high risks categories (R-HRC) identified in the GASP 2023-2025 Edition mainly the LOCI-I, CFIT, RE, RI, and MAC; and
     c. Emerging risks, the focus would be on COVID-19 pandemic outbreak, Civil drones (Unmanned Aircraft Systems), GNSS outages, impact of security on safety, and 5G interference with Radar Altimeter frequency band.

MID Region safety indicators and targets were aligned with the 2023-2025 GASP goals and regional specific objectives and priorities. The RASG-MID would use the indicators listed in the MID Region Safety Performance Measurement & Monitoring (SPMM) to measure safety performance and monitor each regional safety target. Moreover, the RASG-MID would continuously monitor the implementation of the SEIs listed in the MID-RASP and measure safety performance of the regional civil aviation system, to ensure the intended results are achieved, using the MID Region SPMM.

The MID Region SPMM includes six (6) Goals in line with GASP 2023-2025 Edition. For each Goal established in the MID Region SPMM, identified SEI(s) be mapped to it including their respective actions. Thus, to address regional operational risks, organizational issues, and emerging risks; 24 SEIs and 61 safety actions have been identified, developed and proposed.

The MID-RASP provides guidance on how States should identify which top risks and key safety issues mentioned in the GASP and MID-RASP apply to their national context and then to be included in their NASPs. States should also add other safety issues which are unique to their operational context. Several MID-RASP SEIs which are intended for implementation by States at the national level are recommended for inclusion in their NASPs.

TABLE OF CONTENTS

Executive Summary

Appendices:

Appendix A: SEIG Term of References

Appendix B: Identified safety issues as indicated in the 11ᵗʰ ASR

Appendix C: MID Region-Safety Performance Measurement &Monitoring (SPMM)

Appendix D: Safety Actions- List of consolidated SEIs for follow up

Appendix E: SEIs identified in MID-RASP and recommended to States for inclusion in their NASPs

Appendix F: Definitions

Appendix G: Abbreviations and acronyms

*****

PART-I. PLANNING

1. INTRODUCTION

1.1 Objectives and Principles

The MID Regional Aviation Safety Plan (MID-RASP) presents the **strategic direction** for the **management of aviation safety** at the regional level. It constitutes the regional safety plan for MID Region, setting out the strategic priorities, main risks affecting the regional aviation system and the necessary actions to mitigate those risks to further improve aviation safety.

The purpose of this MID-RASP is to continually reduce fatalities, and the risk of accidents, through the development and implementation of regional SEIs. A safe aviation system contributes to the economic development of MID Region, the States which comprise it, and their industries. In addition, MID-RASP is to create a common focus on regional aviation safety issues as a continuation of the MID Region work to improve aviation safety and to comply with ICAO standards. This approach complements the existing system of developing safety regulations, complying with them and investigating accidents and serious incidents when they occur.

The MID-RASP promotes the effective implementation of a State safety Programme (SSP) and Safety Management System (SMS) including National Aviation Safety plan (NASP), State's safety oversight system, and a risk-based approach to managing safety as well as a coordinated approach to collaboration between States, international organization, and industry. All stakeholders are encouraged to support and implement the MID-RASP as the regional strategy for the continuous improvement of aviation safety.

The MID RASP allows the region to define the strategy for improving safety within a specified timeframe, through defined Safety Enhancement Initiatives (SEIs).

The MID-RASP establishes the first layer of priorities which is further complemented at national level by national safety plans and Programmes. It builds a network for action; thus, coordination and close collaboration are key to keeping it up to date and effective.

The MID-RASP Edition 2023-2025 covers the three-year period between 2023 and 2025 and will be updated on a yearly basis, as required, to cover subsequent three years' periods. It is a rolling 3-year plan.

The planning activity would be followed up by a reporting activity, in which progress on the actions is evaluated and also documented. This feedback loop ensures that the process to manage risks continuously improves and may contribute to the identification of new safety issues.

MID Region is committed to enhancing aviation safety, to the resourcing of supporting activities and to increasing collaboration at the regional level.

1.2 Relationship between MID-RASP and GASP and other Plans

Aviation's contribution towards the United Nations 2030 Agenda for Sustainable Development and in order to maximize the benefits of aviation, the priorities of the aviation sector should be integrated and reflected in State's economic and social development planning with an appropriately balanced development of transport modes, including multi-modal and urban planning initiatives. In addition, recognizing that air transport is a catalyst for sustainable development and that it represents an essential lifeline for Least Developed Countries (LDCs), and especially for Landlocked Developing Countries (LLDCs).

ICAO Business Plan takes into consideration all of the work mandated to be undertaken by ICAO, regardless of source of funding. The Business Plan sets out the Strategic Objectives and priorities to guide the activities of the Organization to support Members States in their attainment of a safe, secure, efficient, economically viable and environmentally responsible air transport network.

ICAO's global plans are essential in supporting safe, secure, efficient, economically viable and environmentally responsible air transportation. They provide a means to advance ICAO's Strategic Objectives. The ICAO global plans include: the GASP, the GANP and the Global Aviation Security Plan (GASeP).

The GASP presents the global strategy for the continuous improvement of aviation safety. The purpose of the GASP is to continually reduce fatalities, and the risk of fatalities, by guiding the development of a harmonized aviation safety.

The purpose of the Global Air Navigation Plan (GANP) is to drive the evolution of the global air navigation system to meet the ever-growing expectations of all sectors in the aviation community by equitably accommodating all airspace user operations in a safe, secure and cost-effective manner while reducing the aviation environmental impact. To this end, the GANP provides a series of operational improvements to increase capacity, efficiency, predictability and flexibility, while ensuring interoperability of systems and harmonization of procedures. The implementation of the GANP is enabled by promoting the effective implementation of safety oversight and a safety management approach to oversight, including SRM to permit innovation in a managed way.

The GASP complements the GANP by providing States and industry with the tools to implement a safety management approach through their SSP and SMS. The GANP, through the evolution of the system described in the conceptual roadmap and the operational improvements detailed in the technical frameworks, supports the goals within the GASP and the GASeP by enhancing safety and security of the air navigation system as reflected in the performance ambitions.

The GASP goals and targets support the GASeP by providing best practices and models that can be as effective in managing security as they are in safety management. These include effective oversight, organizational culture, risk management and assurance processes. The GASeP in turn supports the GASP's vision of zero fatalities.

MID-RASP considers and supports the objectives and priorities of GASP. The purpose of GASP is to continually reduce fatalities, and the risk of accidents, by guiding the development of a harmonized aviation safety strategy and the development and implementation of regional and national aviation safety plans. A safe aviation system contributes to the economic development of States and their industries. The GASP promotes the effective implementation of SSP and SMS including NASP, a State's safety oversight system, and a risk-based approach to managing safety as well as a coordinated approach to collaboration between States, international organizations, and industry. One of the GASP goals is for States to improve their effective safety oversight capabilities and to progress in the implementation of SSPs including NASPs. Thus, GASP calls for States to put in place robust and sustainable safety oversight systems that should progressively evolve into more sophisticated means of managing safety.

Assembly Resolution A40-1 also calls for each State to develop and implement a national aviation safety plan (NASP), in line with the GASP goals, targets and the global high-risk categories of occurrences (G-HRCs). The NASP should also be developed having close regard for the RASP, while acknowledging that each State may have its own, specific safety issues and priorities, including addressing significant safety concerns (SSCs).

In addition, to addressing systemic safety, GASP addresses Global high-risk categories (G-HRC) of occurrences, which are deemed global safety priorities. These categories were determined based on actual fatalities from past accidents, high fatality risk per accident or the number of accidents and incidents. The following G-HRCs have been identified for the 2023-2025 edition of the GASP: controlled flight into terrain (CFIT); Loss of control in flight (LOC-I); Mid-air collision (MAC); runway excursion (RE); and runway incursion (RI). The GASP G-HRCs are addressed in MID-RASP.

The MID-RASP considers the objectives and priorities of the GASP to enhance the level of safety in aviation and to better prepare the Member States for the ICAO Universal Safety Oversight Audit Programme (USOAP) audits and State Safety Programme Implementation Assessment (SSPIA) of their SSPs.

This MID-RASP edition 2023-2025 provides references to corresponding GASP 2023-2025 Safety Enhancement Initiatives (SEIs); covering organizational challenges, Regional operational risks, and emerging risks.

The 2023-2025 Edition of the GASP would set forth ICAO's Safety Strategy in support of the prioritization and continuous improvement of aviation. The plan guides the implementation of regional and national aviation safety plans.

The 2023-2025 Edition of the GASP includes a new set of goals, targets and indicators, in line with the United Nations' 2030 Agenda for Sustainable Development.

In respect of MID Region SPMM, the GASP provides the global strategic direction while the MID Region SPMM provides regional specific goals and support the region's strategic approach to managing safety at the regional level. Consequently, MID region safety indicators and targets were aligned with the 2023-2025 GASP goals and targets as relevant in the MID Region. Furthermore, the RASG-MID would continuously monitor the implementation of the identified SEIs in the MID-RASP and measure safety performance of the regional civil aviation system, to ensure the intended targets are achieved, using the MID Region safety performance measurement & monitoring to this plan. Moreover, MID safety performance measurement & monitoring Goals support the region's strategic approach to managing safety at the regional level. Therefore, for each Goal established in the MID Region SPMM identified SEI(s) is mapped to it including their respective actions.

The MID Region SPMM is included as an appendix and became an integral part of MID-RASP.
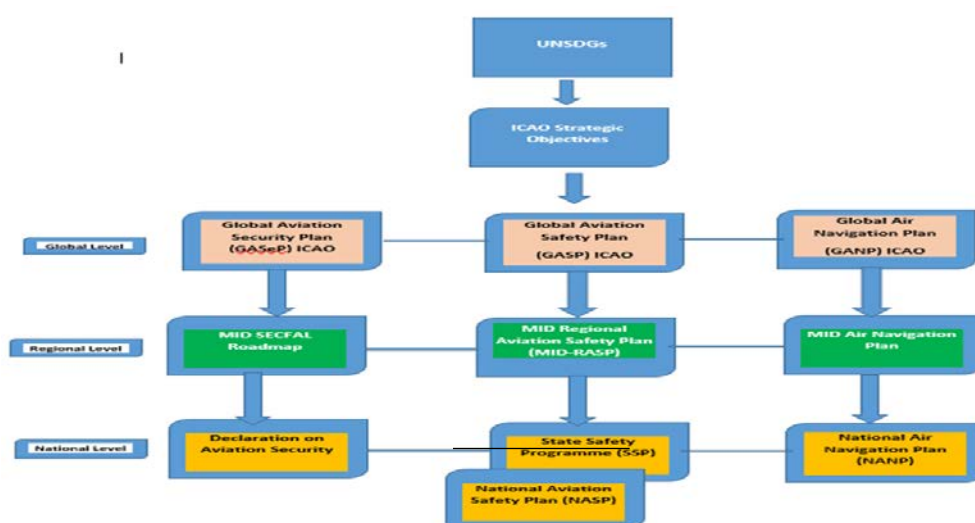
Graph 1: Relationship between MID-RASP and other Plans

2.   HOW MID-RASP IS STRUCTURED

This MID-RASP presents the regional strategy for enhancing aviation safety for a period of three years. It is comprised of two parts and 7 chapters. The 2023-2025 MID- RASP Edition comprises two distinct parts:

- **Part I. Planning** provides an introduction, describes how the MID-RASP is developed and monitored and includes the safety priorities. It consists of **Chapters 1 to 5**.

- **Part II. Implementation** contains the safety performance measurement & monitoring and the detailed list of MID-RASP safety actions. It consists of **Chapters 6 and 7**.

- Both parts are supported by a number of appendices providing further details or assisting the reader.

Part-I. Planning

Part I provides an introductory explaining the main objective of this MID-RASP. Chapter 2, 3, and 4 explain how MID-RASP is structured, developed, monitored and presents the structure of the document. Chapter 5 presents safety priorities and the key actions taken as indicated below:

- 5.1 Organizational Challenges/issues
- 5.2 Regional operational safety risks
- 5.3 Emerging risks

Part-II. Implementation

Part II contains the safety performance measurement and monitoring and the detailed list of MID-RASP safety actions. It consists of Chapters 6 and 7.

Chapter **6** presents the MID Region safety indicators and targets.

In respect of **chapter 7**, it facilitates the identification of SEIs and their respective actions relevant for each Goal identified in the MID Region Safety performance measurement and monitoring as follows:

- Goal 1: Achieve a continuous reduction of operational safety risks;
- Goal 2: Strengthen States' safety oversight capabilities;
- Goal 3: Implement effective State safety Programmes (SSPs);
- Goal 4: Increase collaboration at the regional level;
- Goal 5: Expand the use of industry Programmes and safety information sharing networks ; and
- Goal 6: Ensure the appropriate infrastructure is available to support safe operations.

The MID Region SPMM includes six (6) Goals in line with GASP 2023-2025 Edition. For each Goal established in the MID Region SPMM, identified SEI(s) is mapped to it including their respective actions and the following information is provided:

Goal: Goal supports the region's strategic approach to managing safety at the regional level.

- **Name:** Goal #Number - SEI# Number: Description of the SEI
- **Target(s)/Metrics.** Targets which serve to fulfil their respective Regional Goal
- **Rationale** behind the safety issue (why it has been identified as an issue)
- **What it is to be achieved** (objective)
- **How we intend to monitor improvement** in the future
- **How we intend to achieve** the objective; here, the various actions contributing to mitigate

the identified risk in that area are described
- **Actions**: The tasks required for the implementation of the SEI. The actions support the SEI and Targets of the Regional Goal
- **References:**
  - Indicates key existing global documents from which the SEI is adopted, if applicable.

Stakeholders: **The entities/ stakeholders in the MID region, to which the Actions are addressed**
Example Action 1: Description of the Action to be taken
Subtask(s) if needed to be added
Owner(s): Appointed Group/State(s)/Organization(s) to further develop details for implementation of the respective Action.
Priority: Low, Medium, High
Completion Date: The date in which the respective Action is expected to be implemented.
Status: new, ongoing, on hold, completed. (Provide also updated progress if any)
Example Action 2: Description of the Action to be taken
Subtask(s) if needed to be added
Owner(s): Appointed Group/State(s)/Organization(s) to further develop details for implementation of the respective Action
Priority: Low, Medium, High
Completion Date: The year(s) in which the respective Action is expected to be implemented
Status: new, ongoing, on hold, completed. (**Provide also updated progress if any**)

EXPECTED OUTPUT	
Deliverable(s)	**TIMELINE**
Description of the Result to be achieved	The year in which the respective Target is expected to be achieved

3.   HOW MID-RASP IS DEVELOPED AND MONITORED

The RASG-MD is the governing body responsible for the development, implementation and monitoring of the MID-RASP, in collaboration with the ICAO MID Office, international and regional organizations and with the aviation industry. The MID-RASP was developed in consultation with States, regional organizations, and other stakeholders in the region, and in alignment with the 2023-2025 of the GASP. If required, RASG-MID would seek the support of MIDANPIRG and RASFG-MID, other sub-groups, States, regional organizations, and industry to ensure the timely implementation of SEIs to address safety deficiencies and mitigate risks. Through close monitoring of the SEIs, SEIG would make adjustments to the MID-RASP and its initiatives, if needed, and update the MID-RASP document accordingly.

Furthermore, the MID-RASP is to be reviewed by SEIG every year mainly to include new identified SEIs, review the existing SEIs, and their respective actions. In addition, the MID-RASP is to be updated/endorsed by RASG-MID at least every three years and as deemed necessary.

The SEIG is established to assist RASG-MID to develop and monitor the implementation of SEIs as at **Appendix A** related to identified regional operational risks, organizational challenges, and emerged risks. In addition, the SEIG takes the lead and ensures that SEIs are implemented in a timely, effective and efficient manner in coordination with RASG-MID, MIDANPIRG, and RASFG-MID groups and sub-groups (ASRG, ASPIG, AIIG, ATM-SG,..etc), States, regional organizations, and industry.

As a first step towards establishing this system and to facilitate MID-RASP implementation, it is necessary to enhance the communication and flow of safety data and information, as well as coordination processes, among RASG-MID and its subsidies, States, and regional organizations. There is also the need to continue to enhance collaboration with MIDANPIRG through coordinated processes to sustain the collection and sharing of regional air traffic management (ATM) data and the sharing and resolution of safety issues. This, in turn, would support the implementation of Aviation System Block Upgrade (ASBUs) and ensure that their implementation accounts for and properly manages existing and emerging risks, e.g. approaches with vertical guidance (APV) to mitigate risks associated with CFIT and runway excursions.

The MID-RASP was developed with the aim of addressing the MID region's operational and other safety issues in a timely manner, and as applicable. It is expected that this approach would facilitate MID States' support and participation in the implementation of these SEIs and their respective actions at both the regional and national levels. The three-year period of the MID-RASP, i.e. 2023 to 2025, was selected to coincide with the GASP review period of the same duration, to ensure continued alignment with the latest global plans.

States should ensure that a NASP is maintained and regularly reviewed. The MID-RASP provides the identified safety priorities in the region and States should identify which top risks and key issues mentioned in the GASP and MID-RASP which apply to their national context and identify suitable mitigations actions within their NASP. States should also add/consider other safety issues which are unique to their operational context. Furthermore, States to establish a NASP taking into account the GASP and MID-RASP; and based on their operational safety needs.

The key contents of the MID-RASP were developed using an eight-step process recommended by the GASP to develop RASPs and NASPs, similar to the Plan-Do-Check-Act (PDCA) continuous improvement cycle, as follows:

> Step 1: Conduct self-evaluation;
> Step 2: Identify hazards and safety deficiencies;
> Step 3: Develop list of prioritized regional safety issues;
> Step 4 – Define goals, indicators, and targets
> Step 5: Perform gap analysis to identify SEIs;
> Step 6: Develop a list of prioritized SEIs;
> Step 7: Develop a Regional aviation safety plan; and
> Step 8: Monitor implementation

The MID-RASP has been developed in congruence with the GASP, and supports the GASP aspirational goal of zero fatalities by 2030 and its objectives, goals, targets and indicators.

a. The MID-RASP structure adheres closely to GASP;
b. A comprehensive gap analysis was undertaken to identify the existing gaps between the existing work by RASG-MID, and subsequently also compared with ICAO Manual: Doc 10131, 'Manual on the Development of Regional and National Aviation Safety Plans;
c. The MID Region SPMM is aligned with GASP 2023-2025 Edition, retained and included as an Appendix in the MID-RASP; and
d. MID-RASP SEIs were selected taking into consideration relevant SEIs for the region in line with GASP 2023-2025 Edition as well as relevant work plan items of DCGA, RASG-MID, MIDANPIRG, and RASFG-MID meetings. Moreover, GASP SEIs for States and Industry (domestic) were not considered as these are more suitable to be included in the NASPs of the MID States.

The MID-RASP supersedes the previous work of the RASG-MID subsidy bodies (RAST and SST) initiatives to elevate the commitment of the MID Region to improve its safety oversight capability, which relates to the continuous reduction of regional operational risks and improvement in safety

oversight capabilities and safety management of States. In particular, the MID-RASP serves to raise awareness of safety risks and consequences, to States, industry and relevant stakeholders to commit and provide resources including financial, staffing and technical expertise, to making improvements in safety management, oversight capability and operational safety performance. It also provides a basis to facilitate information sharing between relevant stakeholders who can take actions or provide support to address issues.

At the regional level, the MID-RASP commits RASG-MID to continue the following efforts as indicated below:

a. Focus on the update and the development of the new regional SEIs to address the Regional High-Risk Categories (R-HRCs) of LOC-I, CFIT, MAC, RI and RE, and other priorities;
b. Support States to strengthen safety oversight capabilities
c. Assist States in the development and implementation of SSP and SMS including the development of NASPs;
d. Promote regional government and industry collaboration for sharing safety information and best practices in safety management;
e. Promote the effective implementation of AGA, with a focus on implementation of Aerodrome Certification including the SMS, runway safety Programmes including the establishment of Runway Safety Teams (RSTs) and Global reporting Format methodology (GRF);
f. Support States in the development of Unmanned aircraft system (UAS) national regulations;
g. Support States on COVID-19 pandemic activities to enable a safe and secure return to operations, the GNSS interference, the impact of security on safety, manage Cybersecurity risks; and 5G interference with Radar Altimeter frequency band.
h. Support States to establish and activate the MENA RSOO;
i. Provide continuous support for the MENA ARCM activities.
j. Continue implementation support to States and industry, including the development of improved guidance materials as well as the organization of workshops and training to provide assistance and guidance to MID States; and
k. Put in place a structure for the collection, analysis and sharing of safety and operational data in the region to support a comprehensive approach to risk management, and facilitate initiatives to develop regional data collection, and analysis.

States and industry are committed to the following efforts:

a. Implement, as appropriate, the GASP SEIs and MID-RASP SEIs and their respective actions in strategic and timely manner;
b. (For any States with SSCs), accord priority to the resolution of any SSCs identified by the ICAO USOAP CMA Programme. These should draw on the necessary resources available, including technical assistance from other States and Regional Programmes to resolve the SSCs promptly;
c. Accord priority to the implementation of SSP and SMS;
d. Use data-driven methodologies to identify R-HRCs and their safety issues, and implement collaborative solutions to reduce accident rates and fatalities in the Region, and likewise accord priority to the implementation of respective SEIs; and
e. Consider various options to leverage ICAO-recognized industry assessment Programmes such as the IATA Operational Safety Audit (IOSA), IATA Safety Audit for Ground Operations (ISAGO), IATA Standard Safety Assessment Programme (ISSA), and ACI APEX Programme. These options range from recognition of such Programmes to encouraging registration by all applicable operators as a means to strengthen their safety management and compliance.

4.   OPERATIONAL CONTEXT

4.1   Worldwide Perspective

After the year 2020 when the global economy experienced the worst crisis since the Great Depression as a consequence of the COVID-19 pandemic, the activity in 2021 rapidly recovered and the prospects for the following years are that this trend will continue. However, it is too soon to draw firm conclusions, considering the uncertainties on the evolution of certain threats (not only the pandemic, but also climate change, increasing public debts and geopolitical changes).

According to the last general IMF forecast available at *(https://www.imf.org/en/Publications/WEO/Issues/2021/10/12/world-economic-outlook-october-2021)*, GDP fell by 3.3 % in 2020 and is expected to rebound by 5.9 % in 2021, to continue with a growth rate of 4.9 % in 2022. Behind these global figures quite diverse situations are found in national economies due to differences in the pace of vaccine roll-out and the capability of States to offer financial support. The pandemic also affected the job market, the employment conditions and other socio-economic factors. From a worldwide perspective, according to the International Labour Office, the unemployment rate grew by 1.1 point to 6.5 % in 2020, compared to 5.4 % in 2019, and will only slowly decrease to an expected 6.3 % in 2021 and 5.7 % in 2022. *(https://www.ilo.org/wcmsp5/groups/public/- - -dgreports/- - -dcomm/- - -publ/documents/publication/wcms_795453.pdf)*. *Table 1.2 Employment-to-population ratio, unemployment rate.*

From a worldwide aviation perspective, large aeroplane commercial passenger flights, constituting the bulk of the aviation activity, showed an unprecedented drop in 2020 and started to recover in 2021. The closure of borders fundamentally contributed to this drop in traffic, hitting airline international traffic far more than domestic traffic. If the current positive trend of pandemic recovery continues, the domestic traffic in terms of number of airlines' commercial passengers would recover in 2022 in comparison with the 2019 level. International traffic would only recover in 2024.

4.2   Middle East Perspective

The Middle East Region has been, for years, at the forefront of aviation growth and reshaping the global long-haul markets by elevating its hub position for connecting Europe and Asia-Pacific, in line with the west to east shift of the geographical centre of gravity of air transport operations. Growth of the Region started to undergo a significant transition and slow down recently. Air transport supports 2.4 million jobs and USD 130 billion in GDP in the Middle East.

With the further movement of the air transport centre of gravity from West to East, the geographic position of the Gulf hubs will continue to offer a strategic advantage to several airlines in the Region. According to ICAO long-term traffic forecasts, total passenger traffic of the Middle East Region is expected to grow by around 4.6 per cent annually up to 2045, the second fastest growth among all Regions after Asia and Pacific. The Middle East is expected to be the fastest growing Region in terms of freight traffic growth, and is projected to grow at 5.4 per cent annually up to 2045. This increase will, in turn, drive growth in the economic output and jobs that are supported by air transport in the next decade. By 2036, it is forecasted that the impact of air transport and the tourism it facilitates in the Middle East will have grown to support 4.3 million jobs (78 per cent more than in 2016) and a USD 345 billion contribution to GDP (an increase of 166 per cent).

The Middle East has to contend with situations unique to the Region such as fluctuating oil revenues, regional conflict and overcrowded air space. In addition, airlines in this Region are now facing challenges to their business models.

The growth of air transport requires a high-performing aviation system including airlines, airports and ATM. The overall efficiency of the ATM system commensurate with the level of predicted traffic growth should be increased through improved airspace design and organization. Furthermore, this

Region is in need of political commitment to market liberalization. Although the Middle East is home to some of the world's largest hub airports, the relations between States are still mostly bound by bilateral air services agreements that limit market access to each other. *(Source: Aviation Benefits Report-2019).*

The economic and social situation in the Middle East is similar to the world outlook provided above. The COVID-19 pandemic has battered world-wide aviation in a way that could never have been imagined and we are still trying to assess the full extent of the impact that it will have on civil aviation in the longer term. While the pandemic is not yet over, there are signs at last that vaccination offers a viable way to reduce levels of infection and a basis to realistically plan for a full reopening. Throughout the pandemic, the ICAO MID Office has continued to work collaboratively with all stakeholders to ensure that the industry is equipped to resume the flight operations.
In addition, the MID-RPTF mechanisms continued to serve as a platform for coordination and cooperation amongst all stakeholders to support States with the implementation of the CART and HLCC recommendations as well as the recovery of aviation industry in the MID Region during the COVID-19 pandemic outbreak.

During 2021 the reduction in airline passenger flights due to COVID-19 continued, subsequently resulting also in lack of capacity to transport cargo in that aircraft The same can be stated for the complexity of operations, ranging from quarantine measures imposed on flight crews, disruption in training and scheduling, and the need to transport cargo in the cabin.

Airlines continued to have a large portion of their aircraft grounded, leaving flight and cabin crew members with uncertainty about the return to normal operations.

However, the recovery during the summer of 2021 was faster than expected. This was a positive development but led to difficulties for operators to cope with the increased demand, adding complexity in the return to service of aircraft and flight crews.

Over the last five years, the global scheduled commercial international operations accounted for approximately 24.96 million departures in 2021, compared to 36.3 million departures in 2017. The MID Region shows a decrease in traffic volumes during 2021. Total scheduled commercial departures in 2021 accounted for approximately 806,274 estimated departures compared to 1.37 million departures in 2017. In terms of aircraft accidents, the MID Region had no accident during the year 2021. The 5-year average accident rate for 2017-2021 is 2.21, which is slightly below the global average rate (2.41) for the same period. The MID Region accident rate in 2020 is higher than the global accident rate, which is 2.14 accidents per million departures.

The MID Region had no fatal accident in 2021. However, the 5-year average fatal accident rate for 2017-2021 is 0.42, which is almost similar to the global average rate (0.41) for the same period. The MID Region had no fatal accidents in 2017, 2019, and 2021. However, two fatal accidents occurred in 2018 and 2020. The 2018 accident caused 66 fatalities and the year 2020 caused 176 fatalities.

In terms of Safety Management, the average EI for SSP foundation PQs for States in the MID Region is 76, 1%. Implementation of SSP is one of the main challenges faced by the State in the MID Region. The RASG-MID addresses the improvement of SSP implementation in the MID Region as one of the top SEIs. In connection with this, the RASG-MID/9 endorsed the Safety Management Implementation Team (SMIT) handbook to support MID States in the implementation of the SSP in an effective and efficient way.

Common challenges in MID Region include:

   a. The political/security situation in some States, the cross-national variation in Aviation development as well as the relatively small accreditation area, impede the provision of Technical assistance, implementation of Regional projects and the achievement of the Regional safety, air navigation and Security targets;

b. The drastic reduction in traffic volumes due to the COVID-19 crisis and the new risks induced by its impacts;

c. The lack of financial and human resources in some States, combined with the complexity of administrative arrangements for the approval of duty travel, political sensitivities, etc., affected the level of attendance to the activities organized by the ICAO MID Office as well as States' support to the MIDANPIRG, RASG-MID and the MID-RASFG Work Programmes and their subsidiary bodies;

d. Low level of reporting by States (inputs to the MID-Air Navigation Report and MID Annual Safety Report, incidents, national plans, success stories, replies to State Letters, etc; and

e. Resources constraints (financial and technical personnel) in the Regional Office, combined with a high rotation rate vs. necessary time for new staff/comers to cope with the way of doing business in ICAO considering the MID Region-specific challenges.

5.   STRATEGIC PRIORITIES

The MID-RASP presents the safety priorities that were developed based on the ICAO GASP's including organizational challenges, operational safety risks, and emerging risks as well as region-specific issues identified by a safety risk assessment and published in MID Region Annual Safety Reports and RASG-MID activities. Additionally, the MID region's strategic approach to managing safety at the regional level is to address the region's operational issues and other safety issues in a timely manner. Therefore, the MID-RASP strategic approach would focus on organizational challenges/issues, regional operational safety risks, and emerging risks as indicated in graph 2 below.

a. Organizational challenges/issues including the States 'safety oversight, safety management, aircraft accident and incident investigation, Human factors and competence of personnel, and Cybersecurity. In terms of human factors and competence of personnel, as new technologies emerge on the market and the complexity of the system continues increasing, it is of key importance to have the right competencies and adapt training methods to cope with new challenges. It is equally important for aviation personnel to take advantage of the safety opportunities presented by new technologies;

b. In respect of regional operational safety risks, the focus would be on R-HRC identified in the GASP 2023-2025 Edition mainly the LOC-I, CFIT, RE, RI, and MAC; and

c. Regarding the emerging risks, the focus would be on the COVID-19 crisis and the new risks induced by its impacts, Civil drones (Unmanned Aircraft Systems), Management of security risks with safety impact, and GNSS interference, and 5G interference with Radar altimeter band frequency.

Graph 2: Safety Priorities

Therefore, the MID-RASP adopts three focus areas approach:

First focus area involves enhancing existing regional mechanisms to strengthen effective safety oversight capabilities and improve the implementation of effective safety management, in particular to:

a. Draft the MID-RASP 2023-20225 Edition and consider inputs from MID Annual Safety Report (MID ASR), MID Region safety management Roadmap, Runway Safety Go-Team; RASG-MID, MIDANPIRG, and RASFG-MID.
b. enhance coordination and communication with regional organizations including ACAO, ACI, CANSO, IATA, and other regional mechanisms, MENA ARCM, especially MENA RSOO once activated;
c. improve the scheduling and streamline the number of regional safety-related events including workshops, trainings, seminars; and
d. improve communication and sharing of safety information between States, international organizations, and industry.

In addition to the varying levels of safety oversight capabilities in the MID Region, other regional safety issues and activities have been identified and selected for inclusion in the MID-RASP. These were derived from the RASG-MID reports, analysis of USOAP data, accident and incident investigation reports, safety oversight activities over recent years from MID States, as indicated below:

a. Improve Regional Cooperation for the provision of Accident & Incident Investigation;
b. Improve implementation of ELP requirements;
c. Sharing of Safety Recommendations related to Accidents and Serious Incidents;
d. Enhance State Oversight on Dangerous Goods;
e. Need to manage the cybersecurity risks; and
f. 5G interference with Radio altimeter frequency band.

Second focus area involves addressing effectively regional operational safety risks including specific operational risks stemming from the crisis as the vision of the GASP is to achieve and maintain the goal

of zero fatalities in commercial operations by 2030 and beyond.

Third focus area involves addressing the emerging safety risks that might impact safety in the future including recovering from the COVID-19 crisis without adversely affecting the high level of safety performance GNSS outages/vulnerability, civil drones to ensure safe operation of unmanned aircraft system (UAS), impact of security on safety, and 5G interference with Radar Altimeter frequency band. Additionally, for emerging risks, SEIs/safety actions would be developed and covered under the focus areas (organizational challenges and Regional operational safety risks).

5.1   Organizational Challenges/Issues

Organizational challenges are systemic issues which take into consideration the impact of organizational culture, and policies and procedures on the effectiveness of safety risk controls. Organizations include entities in a State, such as the civil aviation authorities (CAAs) and service providers, such as operators of aeroplanes, ATS providers and operators of aerodromes. Organizations should identify hazards in systemic issues and mitigate the associated risks to manage safety. A State's responsibilities for the management of safety comprise both safety oversight and safety management, collectively implemented through an SSP.

It is crucial that States' safety oversight capabilities and safety management, and aviation infrastructure should keep pace with these regional safety issues.

Therefore, for the triennium of 2023-2025, the MID Region should continue to focus its efforts in addressing the following top Regional organizational issues:

- a. Lower USOAP EI scores, especially States with EI below 60% as well as AIG, ANS, AGA, and OPS areas;
- b. Slow pace of SSP development & implementation including the NASP development, as well as understanding of newer safety management and performance based concepts;
- c. Slow pace of SMS acceptance and surveillance;
- d. Slow pace of developing Risk Management framework to support decision-making and deploy the resources needed to mitigate risks effectively;
- e. Improve Regional Cooperation for the Provision of Accident & Incident Investigation;
- f. Enhance State Oversight on Dangerous Goods;
- g. Support States related to Human factors and Competence of Personnel
- h. Support States to manage the cybersecurity risks;
- i. Management of security risks with safety impact;
- j. Slow pace of implementation of RASG-MID conclusion/ MID-RASP SEIs/safety actions and tools to mitigate identified safety risks and safety deficiencies;
- k. Insufficient resources and expertise to manage and collect safety data and safety information on a State level, and no formal mechanisms in place that allow for the sharing and benchmarking of information at the Regional level; and
- l. Increasing risks associated with airspace structure including ATS networks and associated airspaces to accommodate the traffic flow in safe and efficient manner.

5.1.1   Strengthening of States' Safety Oversight Capabilities

Safety oversight is defined as a function by means of which States ensure effective implementation of the safety-related SARPs and associated procedures contained in the Annexes to the Convention on International Civil Aviation and related ICAO documents. States have overall safety oversight responsibilities, which emphasize a State's commitment to safety in respect of the State's aviation activity. An individual State's responsibility for safety oversight is the foundation upon which a safe global air transport system is built. States that experience difficulties in carrying out safety oversight functions can impact the state of International Civil Aviation.

USOAP-CMA audits had identified that States inability to effectively oversee aviation operations which remains a global concern. In respect of MID Region, the regional average overall Effective Implementation (EI) (13 out of 15 States have been audited) is 74, 67 %, which is above the world average 68.68 % (as of 29 May 2022). Three (3) States are currently below EI 60%.

All eight areas have an EI above 60%. However, the areas of AIG, AGA and ANS still need more improvement. Regarding the Critical Elements (CEs), CE4 (Qualified technical personnel) improved and is above 60% (62.39%) EI, whereas CE8 (resolution of safety issues) is the only one below EI 60% (58. 89%) EI.

Moreover, the effective implementation in certification, surveillance, and resolution of safety concerns need to be improved.

Key Actions completed/planned
a. Conducted technical assistance and NCLB mission activities to States
b. Capacity building activities
c. Developed and implemented a specific NCLB plan of actions for prioritized States according to established criteria
d. Established MENA RSOO to assist States and start operations

5.1.2   Improve Regional Cooperation for the Provision of Accident & Incident Investigation

In respect of MID Region, the regional average overall Effective Implementation (EI) (13 out of 15 States have been audited) is 74.67 %, which is above the world average 68.68 % (as of29May 2022). Three (3) States are currently below EI 60%. Regarding the Critical Elements (CEs), CE4 (Qualified technical personnel) improved and is above 60% (60.08%) EI, whereas CE8 (resolution of safety issues) is the only one below EI 60% (59. 47%) EI. All eight areas have an EI above 60%. However, the area of AIG still need more improvement.

Key Actions completed/planned
a. AIG Strategy in the Provision of AIG Functions endorsed by the DGCA-MID/4
b. MENA AIG Regional Cooperation Mechanism (ARCM) endorsed by the DGCA meeting in Kuwait
c. Organized AIG capacity building activities
d. Draft MENA ARCM implementation action plan endorsed by the RSC/7
e. MENA ARCM Establishment and Activation

5.1.3   Sharing of Safety Recommendations related to Accidents and Serious Incidents

a. The Safety recommendations are the utmost results of investigation or safety studies conducted by States. In accordance with the provisions of Annex 13, a State shall send to ICAO a copy of the Final Report on its investigations into accidents and serious incidents involving aircraft of a maximum mass of over 5,700 kgs.

b. A safety recommendation is defined as a proposal by an accident investigation authority, based on information derived from an investigation. The intended purpose of a safety recommendation is the prevention of accidents or incidents, and the reduction of the consequences of such occurrences.

Key Actions completed/planned
a. Establishment of an Ad-hoc Action Group championed by Saudi Arabia and UAE
b. The Questionnaire on establishing safety recommendations platform developed and circulated to MENA ARCM Member States. The questionnaire analysis has been shared with MENA ARCM/2 meeting

5.1.4 Improve Implementation of ELP Requirements

The decision to address language proficiency requirements (LPRs) for pilots and air traffic controllers was first made by the 32nd Session of the ICAO Assembly in September 1998 as a direct response to several fatal accidents, including one that cost the lives of 349 persons, as well as to previous fatal accidents in which the lack of proficiency in English was identified as a contributing factor. The intent was to improve the level of language proficiency in aviation worldwide and reduce the communication breakdowns caused by a lack of language skills. LPRs have now moved beyond implementation (Assembly Resolution A38-8 refers), entering a phase of post implementation.

Key Actions completed/planned
a. Development and dissemination the Questionnaire on ELP
b. Analysis of the survey results and was reviewed by the RSC/7

5.1.5 Enhance State Oversight on Dangerous Goods

The data analysis results of the USOAP-CMA OPS area showed that Dangerous Goods is one of the unsatisfactory PQs in operations for some states in the region. The identified issues highlighted in the analysis report as indicated below:

a. States have not implemented an effective system for safety oversight of the various entities involved in the transport of dangerous goods, including shippers, packers, cargo handling companies and air operators. Regarding the latter, some States, the authorities have not effectively reviewed the dangerous goods procedures of air operators, contained in the operations and ground handling manuals, mostly due to a lack of qualified dangerous goods inspectors.
b. Some States have not kept records relating to dangerous goods-related approvals; and
c. In addition, in some States, dangerous goods inspector procedures have not been established and implemented.

Safety actions have been planned to be taken during the year 2020 and 2021. However, due to the COVID-19 pandemic some of the ICAO MID Office work Programme activities have been postponed for 2022 including Dangerous Goods workshop.

Key Actions completed/planned
a. Dangerous Goods webinar
b. Dangerous Goods Capacity building activities

5.1.6 Improve the Safety Management

Despite the fact that the last years have clearly brought continued improvements in safety across every operational domain, the latest accidents and serious incidents and the massive worldwide impact of the COVID-19 pandemic on the aviation system underline the complex nature of aviation safety and the significance of addressing human and organizational factor aspects.

Effective safety management including robust risk management policies and processes are essential in dealing with the multiple impacts of the pandemic on the aviation system, both at authority and organization level. This is supported by ICAO Annex 19 on the reporting, analysis and follow-up of occurrences in civil aviation and when applicable, by flight data monitoring (FDM) requirements.

Therefore, States should build upon fundamental safety oversight systems to fully implement SSPs according to Annex 19, States shall require that applicable service providers under their authority implement an SMS. The SMS enables service providers to capture and transmit safety information which contributes to safety risk management. In this context, the role of the State evolves to include the establishment and achievement of safety performance targets as well as effective oversight of its service providers' SMS. Individual States should provide safety information derived from their SSPs to their respective RASGs to contribute to Regional safety risk management activities. The average EI for SSP foundation PQs for States in the MID Region is 76, 18%.

An SSP requires increased collaboration across operational domains to identify hazards and manage risks. Aviation authorities and organizations should anticipate new emerging threats and associated challenges by developing SRM principles.

Implementation of SSP is one of the main challenges faced by the State in the MID Region. The RASG-MID addresses the improvement of SSP implementation in the MID Region as one of the top Safety Enhancement Initiatives (SEIs). In connection with this, the RSC/7 endorsed the safety management Roadmap and established the Safety Management Implementation Team (SMIT). Furthermore, the RASG-MID/9 endorsed the SMIT handbook to support MID States in the implementation of the SSP in an effective and efficient way

ICAO launched SSP Implementation Assessments (SSPIAs) phase 2 under the USOAP CMA. The assessments are based on a qualitative assessment of a State's progress in implementing a State Safety Programme (SSP), using SSP-related PQs.
The PQs are reflective of Annex 19- Safety Management and the Safety Management Manual (Doc 9859).

Unlike the USOAP CMA's audit activities, SSPIAs are linked to applicable SSP components rather than critical elements (CEs). The SSP components are:

1. State safety policy, objectives and resources;
2. State safety risk management;
3. State safety assurance; and
4. State safety promotion

The SSP assessment covers 8 areas as indicated below:
1. SSP general aspects (GEN);
2. safety data analysis general aspects (SDA);
3. personnel licensing and training (PEL);
4. aircraft operations (OPS);
5. airworthiness of aircraft (AIR), approved maintenance organization (AMO) aspects only;
6. air navigation services(ANS), air traffic services provider (ATSP) aspects only;
7. aerodromes and ground aids (AGA); and
8. aircraft accident and incident investigation (AIG).

In 2020, ICAO developed guidance supporting the determination of maturity levels for each SSP-related PQ. The SSP-related PQs, complemented by the maturity level matrices for each of the SSP audit areas, are available in the CMA Library of the USOAP CMA Online Framework (OLF) at www.soa.icao.int (restricted access). These matrices describe the level of progress for each element of the SSP, which can be described as:

- Not present and not planned;
- Not present but being worked on;
- Present; or
- Present and effective.

ICAO will use the SSP maturity level matrices for the scheduled SSPIAs under Phase 2, which will begin in 2021. This phase of assessments will utilize the maturity level matrices to provide a more detailed, quantitative measurement of a State's progress in the implementation and maintenance of its SSP. Two assessment missions have been planned for the year 2022.

Key Actions completed/planned
a. Conducted continuously SSP/SMS capacity building activities
b. Development of the MID Region Safety Management Implementation Roadmap
c. Establishment of the Safety Management Implementation Team (SMIT) and SMIT Handbook endorsed by RASG-MID/9
d. Establishment the MENA RSOO to support States in the expeditious implementation of SSP
e. Guidance material development
f. Technical Assistance missions

5.1.7 Certification of International Aerodromes

All eight areas have an EI above 60%. In respect of the Critical Elements (CEs), CE4 (Qualified technical personnel) improved and is above 60% (60.08%) EI, whereas CE8 (resolution of safety issues) is the only one below EI 60% (59. 47%) EI. However, the areas of AGA still need more improvement.

Key Actions completed/ planned
a. Conducted Aerodrome Safety Management Workshops
b. Wildlife hazard Management and Control Workshop
c. RSA on Wildlife Management and Control Regulatory Framework & Guidance Material.
d. Certification of Annex 14 training courses
e. GRF training courses

5.1.8 Establishment of Runway Safety Teams at International Airports

All eight areas have an EI above 60%. In terms of the Critical Elements (CEs), CE4 (Qualified technical personnel) improved and is above 60% (60.08%) EI, whereas CE8 (resolution of safety issues) is the only one below EI 60% (59. 47%) EI. However, the areas of AGA still need more improvement

Key Actions completed/planned
a. Runway Safety Go-Team Missions
b. Support States to implement the Global Reporting Format Methodology through capacity building activities

5.1.9 Human Factors and Competence of Personnel

As the aviation system changes, it is imperative to ensure that human factors and the impact on human performance are taken into account, both at service provider and regulatory levels.

Human factors and human performance are terms that are sometimes used interchangeably. While both human factors and human performance examine the capabilities, limitations and tendencies of human beings, they have different emphases:

- Human Factors (HF) – this term focusses on why human beings function in the way that they do. The term incorporates both mental processes and physical ones, and the

       interdependency between the two.
- Human Performance (HP) – the output of human factors is human performance. This term focusses on how people do the things that they do.

As new technologies emerge on the market and the complexity of the system continues increasing, it is of key importance to have the right competencies and adapt training methods to cope with new challenges. CRM has been identified in the MID ASR as most important human factors issue in the domain of commercial air transport and safety actions would be identified and developed. In addition, Team Resource Management (TRM) was introduced into ATC following the   success achieved with Crew Resource Management (CRM) in the airline community enhancing teamwork practices. The practice is applied within virtually every airline with training given to pilots and other operational staff Within the last decade in ATM there have been numerous advances in widespread acceptance of SMS under the guidance of ICAO. ICAO has now mandated the use of SMS Manual Doc 9859 to standardize the approach to safety. TRM as defined by ICAO is an integral component of SMS under human factor

Key Actions completed/planned
a.   CRM and TRM workshops/webinars
b.   FRMS workshops/webinars

5.1.10   Cybersecurity Resilience

The global civil aviation ecosystem is accelerating towards more digitalization. This implies that any exchange of information within any digital workflow of the aviation community needs to be resilient to information security threats which have consequences on the safety of flight or the availability of airspace and beyond. Aware of the complexity of the aviation system and of the need to manage the cybersecurity risk the MID Region needs to consider and address information security risks in a comprehensive and standardized manner across all aviation domains. In addition, it is essential that the aviation industry and civil aviation authorities share knowledge and learn from experience to ensure systems are secure from individuals/organizations with malicious intent.

Key Actions completed/planned
a.   Cybersecurity symposium/workshops
b.   Development of MID Region Cybersecurity Action Plan

5.2   Regional Operational Safety Risks

Operational safety risks arise during the delivery of a service or the conduct of an activity (e.g. operation of an aircraft, airports or of air traffic control). Operational interactions between people and technology, as well as the operational context in which aviation activities are carried out are taken into consideration to identify expected performance limitations and hazards. The RASG-MID utilizes available safety data and information to determine the region's operational safety risks which include G-HRCs and additional regional operational safety risks.

5.2.1   Address Operational Safety Risks in Commercial Air Transport (CAT) Aeroplane Operations above 5,700 kgs

In terms of an aircraft accident, the MID Region had no accident during the year 2021. The 5-year average accident rate for 2017-2021 is 2.21, which is slightly below the global average rate (2.41) for the same period The MID Region accident rate in 2020 is higher than the global accident rate, which is 2.14 accidents per million departures.

The MID Region had no fatal accident in 2021. However, the 5-year average fatal accident rate for 2017-2021 is 0.42, which is almost similar to the global average rate (0.41) for the same period. The MID Region had no fatal accidents in 2017, 2019, and 2021. However, two fatal accidents occurred in 2018 and 2020. The 2018 accident caused 66 fatalities and the year 2020 caused 176 fatalities.

The GASP 2023-2025 Edition identifies the G-HRCs as LOC-I, CFIT, MAC, RE and RI. In the MID Region in 2017-2021 the topmost frequent accidents related to the loss of control-inflight and runway safety, which includes RE and ARC during Landing. In terms of fatality risk, the fatal accidents for the period 2017- 2021 were attributed to LOC-I.

Therefore, for the triennium of 2023-2025, the MID Region should continue to focus its efforts on mitigating and minimizing occurrences related to the R-HRCs for this time period, namely:

1. Loss of Control-In Flight (LOC-I);
2. Runway Safety (RS); mainly (RE and ARC during landing);
3. Runway Incursion (RI);
4. Controlled Flight into Terrain (CFIT); and
5. Mid-Air Collision (MAC).

MAC is established as a top risk for the MID region based on the existing data driven approach used to determine the R-HRCs though there is no fatal accident during the last five years. Therefore, there is a need for the MID region to build up its capability to collect and analyze safety data pertaining to MAC.

In addition, safety issues have been identified in the MID ASR and need to be considered by the States while developing their NASP as well as the industry as indicated at **Appendix B.**

5.2.2   Aircraft Upset in Flight (Loss of Control-Inflight)

Aircraft upset or loss of control inflight is the most common accident outcome for fatal accidents in CAT aero plane operations. It includes uncontrolled collisions with terrain, but also occurrences where the aircraft deviated from the intended flight path or intended aircraft flight parameters, regardless of whether the flight crew realized the deviation and whether it was possible to recover or not. It also includes the triggering of stall warning and envelope protections. During 2017-2021 aircraft upset, or loss of control contributed to one fatal accident involving MID Region aeroplane.

Key Actions completed/Planned
a. Organized and promoted training provisions on recovery from upset scenarios (UPRT workshops)
b. Assistance to States to implement the SSP/SMS through workshops/trainings

c. Development and publication of RSAs related to the LOC-I
        Airplane States Awareness (ASA) – Low Speed Alerting
        Standard Operating Procedures Effectiveness and Adherence
        Airplane States Awareness (ASA) –Training –Flight Crew training (Approach to stall & Up set recovery) Verification and Validation

d. Construction, approval and implementation of RNAV(GNSS) / RNP-AR procedures to all runways not currently served by precision approach procedure
e. Develop guidance material/share best practices on Ground Handling Service Provider Certification Process
f. Guidance material on flight crew proficiency
g. Advisory Circular: Mode Awareness and Energy State Management Aspects of Flight Deck Automation

5.2.3   Runway Excursion

Runway excursion covers materialized runway excursions, both at high and low speed, and occurrences where the flight crew had difficulties in maintaining the directional control of the aircraft or of the braking action during landing, where the landing occurred long, fast, off-centred or hard, or where the aircraft had technical problems with the landing gear (not locked, not extended or collapsed) during

landing. During the period 2017-2021, Runway Excursions and abnormal runway contact accidents and serious incidents mainly occurred in the landing phase of flight.

Key Actions completed/planned	
a.	Conduct of assistance missions by the Runway Safety Go-Team (RST)
b.	Establishment of a MID-FPP to support states on the effective implementation of the PBN procedures
c.	Promoted operational improvements and safety enhancements associated with the implementation of ASBU modules, e.g. PBN, CDO. Implementation of Performance-Based Navigation (PBN); particularly Approaches with Vertical Guidance (APV)
d.	Assistance to States to implement the SSP/SMS
e.	RSA on Wildlife Management and Control Regulatory Framework & Guidance Material
f.	Support States to implement the Global Reporting Format (GRF) Methodology through Webinar/ Workshops/Training
g.	Guidance material on un-Stabilized Approach
h.	MID Region Action Plan/Milestones on the Global Reporting Format (GRF) Implementation.

5.2.4   Runway Incursion (RI)

A Runway Incursions refers to the incorrect presence of an aircraft, vehicle or person on an active runway or in its areas of protection. Their accident outcome is runway collisions. While there were no fatal accidents or accidents involving MID States operators in the last years involving runway collision, the risk of the reported occurrence demonstrated to be very real. In addition to this, MID States should provide further data analysis regarding runway incursion to identify the root causes and associated safety issues.

Key Actions completed/planned	
a.	Conduct of assistance missions by the Runway Safety Go-Team (RST)
b.	Assistance to States to implement the SSP/SMS

5.2.5   Controlled Flight into Terrain (CFIT)

It comprises those situations where the aircraft collides or nearly collides with terrain while the flight crew has control of the aircraft. It also includes occurrences, which are the direct precursors of a fatal outcome, such as descending below weather minima, undue clearance below radar minima, etc. There was no fatal accident involving MID States operators during this period. This key risk area has been raised by some MID States and in other parts of the world that make it an area of concern. However, additional data is needed for further analysis to identify the underlying safety issues.

Key Actions completed/planned	
a.	Establishment of MID-FPP to support states on the effective implementation of the PBN procedures
b.	Promoted operational improvements and safety enhancements associated with the implementation of ASBU modules; e.g., PBN, CDO, CCO. Implementation of Performance-Based Navigation (PBN); particularly Approaches with Vertical Guidance (APV)
c.	Assistance to States to implement PBN routes for en-route and terminal airspace through meeting and workshops/seminars
d.	Assistance to States to implement the SSP/SMS

e.	Development and publication of RSAs
f.	Construction, approval and implementation of RNAV (GNSS) / RNP-AR procedures to all runways not currently served by precision approach procedure
g.	Guidance for designing RNP Approach

5.2.6   Mid-Air Collision (MAC)

Refers to the potential collision of two aircraft in the air. It includes direct precursors such as separation minima infringements, genuine TCAS resolution advisories or airspace infringements. Although there have been no aero-plane mid-air collision accidents in recent years within the MID States. This key risk area has been raised by some MID States specifically in the context of the collision risk posed by military aircraft operating in Gulf area over the high seas which are not subject to any coordination with related FIRs for airborne operation. This is one specific safety issue that is a main priority in this key risk area. However, additional data is needed for further analysis to identify the underlying safety issues.

Key Actions completed/planned	
a.	Assistance to States to implement the SSP/SMS
b.	Establishment of Near Mid-Air Collision (NMAC) Group to carry out further analyses of the reported NMAC incidents and provide feedback to the ATM SG and ASRG.
c.	Conduct workshop to implement Civil-Military cooperation
d.	Conduct seminar on raising awareness among stakeholders related to the potential risk of MAC over high seas

5.3   Emerging Risks

Emerging safety issues are risks that might impact Safety in the future. These may include a possible new technology, a potential public policy, a new concept, a business model or idea that, while perhaps an outlier today, could mature and develop into a critical mainstream issue in the future or become a major trend in its own right. Therefore, for the triennium of 2023-2025, the MID Region should continue to focus its efforts on mitigating and minimizing the safety impact of emerging risks for this time period, namely:

a. Support States on establishing the UAS regulatory framework.
b. Decrease the GNSS interference impact.
c. support on maintaining collectively the pre-pandemic high aviation safety level throughout the recovery phase and improving safety post-recovery due to the drastic reduction in traffic volumes due to the COVID-19 crisis and the new risks induced by its impacts.
d. Management of security risks with safety impact.
e. 5G interference with Radio Altimeter frequency band.

The emerging risks SEIs and safety actions will be covered under organizational issues and operational safety risk SEIs.

5.3.1   GNSS interference

GNSS interference, including intentional and unintentional signal interference, has been identified as a major safety issue.

Flight Data Exchange analysis showed that the majority of GPS Signal Lost was detected within or in vicinity of Turkish airspace (Ankara FIR and Istanbul FIR), and in Eastern Mediterranean area. Compared to previous analysis, the identified hot spots have been expanded into entire Anatolian peninsula, including Istanbul FIR.

The GNSS interference SEI /safety actions covered under CFIT SEI.

Key Actions completed/t planned
a. RSA on GNSS vulnerability has been developed and published
b. Safety data analysis shared by IATA
c. Raise awareness on the potential impact of GNSS interference on the aviation during the Civil-Mil Workshop
d. Urge States to follow the reporting procedure agreed by MIDANPIRG Conclusion 19/4 when needed

5.3.2 COVID-19 Pandemic Outbreak- Safe return to operations

It was noted that the rapidly evolving COVID-19 crisis heavily affected all aspects of civil aviation. The urgent need to coordinate all efforts to reduce the risks of the spread of COVID-19 by air transport and to protect the health of air travellers and aviation personnel, while maintaining essential aviation transport operations and ensuring an orderly return to normal operations in due course was underlined. The COVID-19 pandemic resulted in an extreme reduction in operations that began in late March 2020. Recovering from this crisis without adversely affecting the high level of safety performance is proposed as a strategic priority.

In addition to the specific operational risks stemming from the crisis, there are currently a substantial number of exemptions and extensions granted; however, the use of flexibility provisions is diminishing. The aviation safety issues arising as a result of the pandemic have been identified and those safety issues that were considered to constitute the highest risk to the aviation system were assessed and resulted in a number of safety interventions and the publication of guidance material including ICAO CART documents to support stakeholders with the management of the specific risks posed by the crisis. The UAS SEIs /safety actions covered under MAC SEI.

Key Actions completed/planned
a. Establishment of MID Region Recovery Plan Task Force (MID-RPTF) to assist in developing regional restart and recovery planning
b. MID-RPTF activities
c. Conduct of teleconferences with DGCAs and Regional international organization
d. Development of MID CART Regional Implementation Roadmap
e. Continuous communication and coordination with MID States;
f. Development of a COVID-19 web page to communicate to States and all stakeholders the guidance material issued by ICAO, WHO, international organizations, States best practices and
g. Deployment of iPacks
h. Capacity building activities

5.3.3 Ensure the safe operations of UAS (drones)

The number of drones at the global level has increased. Available evidence demonstrates an increase of drones coming into close proximity with manned aviation (both aeroplanes and helicopters) and the need to mitigate the associated risk. The civil aviation authority is responsible for, inter alia, ensuring aviation safety and protecting the public from aviation hazards. Operators of aircraft, whether manned or unmanned, are likewise responsible for operating safely. The rapid rise of UAS raises new challenges that were not considered in historic aviation regulatory frameworks. Before devising any regulatory framework for UAS operations, the regulator should understand and assess the UAS situation in its State.

UA operations will involve stakeholders' familiar with aviation as well as many who are not. It is important to include these stakeholders from the beginning when developing the UAS regulations. Their early involvement will ensure that the regulations appropriately address the needs of these groups while also serving to educate them on expectations and what is feasible.

Therefore, safety actions would be developed to support States to develop their national regulations in order to ensure safe operation of UAS.

Key Actions completed/planned
a. UAS iPack deployment
b. Drones symposium
c. Conduct survey on States UAS regulatory framework

5.3.4 Management of security risks with safety impact

The crash of flight MH17 immediately raised the question why the aero plane was flying over an area where there was an ongoing armed conflict. Similar events had occurred in the MID region. Thus, military or terrorist conflicts may occur in any State at any time and pose risks to civil aviation. This is why it's important for governments, aircraft operators, and other airspace users such as air navigation service providers (ANSPs), to work together to share the most up-to-date conflict zone risk-based information possible to assure the safety of civilian flights.

Furthermore, flying over or nearby conflict zones is related to both security and safety management and requires an integrated risk management process, as proposed by ICAO in the second edition of the Risk Assessment Manual for Civil Aircraft Operations Over or Near Conflict Zones (Doc 10084) as an activity for further development. Several steps have to be taken, as part of the continuous risk assessment cycle including: the collection of information and intelligence; the subsequent threat analysis; the security risk assessment; the hazard identification; the safety risk assessment; the determination of the acceptable risk level and lastly information sharing. Each mitigating action should be accompanied with the identification of (new) hazards as a result of unintended consequences of the risk assessment mitigating actions.

The crash of flight MH17 shows, safety and security are intertwined. To manage the risks related to flying over conflict zones and other risks at the interface of safety and security as good as possible, closer cooperation between both worlds is necessary.

Key Actions taken/planned
a- Circulate ICAO Doc 10084 Risk Assessment Manual for Civil Aircraft Operations Over or Near Conflict Zones
b- Organize seminar/Symposium to exchange experiences and good practices on assessing the risks and sharing of information related to the overflying of conflict zones in coordination with RASFG-MID and MIDANPIRG
c- Encourage States to issue NOTAMs to share threats information emanated from conflict zones within their airspaces.

5.3.5 5G Operation on Radio Altimeter

Radar altimeters (RA), operating at 4.2-4.4 GHz, are the only sensors onboard a civil aircraft which provide a direct measurement of the clearance height of the aircraft over the terrain or other obstacles (i.e. the Above Ground Level - AGL - information).

The RA systems' input is required and used by many aircraft systems when AGL is below 2500 ft. Any failures or interruptions of these sensors can therefore lead to incidents with catastrophic outcome, potentially resulting in multiple fatalities. The radar altimeters also play a crucial role in providing

situational awareness to the flight crew. The measurements from the radar altimeters are also used by Automatic Flight Guidance and Control Systems (AFGCS) during instrument approaches, and to control the display of information from other systems, such as Predictive Wind Shear (PWS), the Engine-Indicating and Crew-Alerting System (EICAS), and Electronic Centralized Aircraft Monitoring (ECAM) systems, to the flight crew.

There is a major risk that 5G telecommunications systems in the 3.7–3.98 GHz band will cause harmful interference to radar altimeters on all types of civil aircraft- including commercial transport airplanes; business, regional, and general aviation airplanes; and both transport and general aviation helicopters. If there is no proper mitigation, this risk has the potential for broad impacts to aviation operations in the United States as well as in other regions where the 5G network is being implemented next to the 4.2-4.4 GHz frequency band.

List of potential equipment failures:
Auto land functions, EICAS/ECAM, False or missing GPWS alert, Unreliable instrument Indications, and Abnormal behaviors in Automatic Flight Systems.

The 5G interference with Radar Altimeter SEIs/safety actions covered under CFIT SEI.

Key Actions taken/planned
a- Develop a guidance material on safeguarding measures to protect Radio Altimeter from potential harmful interference from 5G Operation
b- Conduct a Webinar addressing the matter to raise awareness and promote the guidance material developed by the RADALT AG.

PART-II. IMPLEMENTATION

6.   SAFETY IMPLEMENTATION

6.1   Safety Monitoring and Implementation

This section presents an outline of the safety performance indicators reflecting the MID Region safety strategic priorities in the area of safety. The RASG-MID would use the indicators listed in the MID Region SPMM at **Appendix C** to measure safety performance and monitor each regional safety target. Furthermore, the MID Region SPMM includes six (6) Goals in line with GASP 2023-2025 Edition.

The RASG-MID would continuously monitor the implementation of the identified SEIs in the MID-RASP and measure safety performance of the regional civil aviation system, to ensure the intended targets are achieved, using the MID Region SPMM to this plan. Therefore, for each Goal established in the MID Region SPMM, identified SEI(s) be mapped to it including their respective actions.

MID region safety indicators and targets were aligned with the 2023-2025 GASP goals and targets as relevant in the MID Region. A MID Region Annual safety report would be annually published to provide stakeholders with relevant up-to-date information on the progress made in achieving the regional safety goals and targets, as well as the implementation status/progress of the SEIs.

In the event that the regional safety goals and targets are not met, the causes would be addressed and presented to stakeholders. If RASG-MID identifies critical operational safety risks, reasonable measures would be taken to mitigate them as soon as practicable, possibly leading to an earlier revision of the MID-RASP by SEIG.

The monitoring of safety performance and its enhancement is achieved through identification of relevant Goals and Safety Indicators, taking into consideration the GASP 2023-2025 and regional specific objectives and priorities, as well as the adoption and attainment of Safety Targets with a specific timeframe.

The MID Region Safety performance measurement and monitoring includes the following Goals:

Aspirational Goal: Zero fatality by 2030, the GASP aspirational goal of 'zero fatalities in commercial operations by 2030 and beyond'.

Goal 1: Achieve a Continuous Reduction of Operational Safety Risks: This is related to2023-2025 GASP Goal 1. This is aligned with the high-level ICAO safety metrics, thereby facilitating comparison of MID Region performance with global averages. Indicators related to risk areas are identified through the MID Region risk assessment methodology and described in the MID Region ASR. These 'operational' safety indicators would continue to be monitored through the MID Region ASR.

Goal 2: Strengthen States' safety oversight capabilities: This is related to 2023-2025 GASP Goal 2. The Monitoring will be based on the available data published through USOAP-CMA (OLF) and iSTARS. The Regional average overall Effective Implementation (EI) in the MID Region (13 out of 15 States have been audited) is 74.67 %, which is above the world average 68.68% (as of 29 May 2022). Three (3) States are currently below EI 60%. The objective is aligned with the 2023-2025 GASP requiring all States to improve their score for the effective implementation (EI) of the critical elements (CEs) of the State's safety oversight system (with focus on priority PQs) as follows: a) by 2024 -75 per cent; b) by 2026 – 85 per cent EI score; c) by 2030 EI Score – 95 per cent EI score.

Goal 3: Implement effective State safety Programmes (SSPs): This is related to 2023-2025 GASP. Related indicators will mainly be based on data available through ICAO iSTARS and USOAP-CMA (OLF). Feedback provided by Member States and Regional organizations would also be considered.

MID Office will in addition collect relevant documentation and information from States (SSP and NASP). The objective is aligned with the 2023-2025 GASP requiring all States to implement the foundation of an SSP by 2023, all States to publish a national aviation safety plan (NASP) by 2024, all States to work towards an effective SSP with maturity levels – Present by 2025, and Present and Effective by 2028.

Goal 4: Increase Collaboration at the Regional Level: This is related to 2023-2025 GASP. Related indicators will mainly be based on data available through ICAO iSTARS and USOAP-CMA (OLF). Feedback provided by Member States would be also considered. The objective is aligned with the 2023-2025 GASP requiring all States to achieve a positive safety oversight margin, and an effective SSP, to actively lead RASGs' safety risk management activities, by 2025.

Goal 5: Expand the use of Industry Programmes and safety information sharing networks: This is related to 2023-2025 GASP. Related indicators will mainly be collected from IATA and other international and regional organizations. Feedback provided by Member States would also be considered. The objective is aligned with the 2023-2025 GASP requiring all States that do not expect to meet GASP Goals 2 and 3 to seek assistance to strengthen their safety oversight capabilities or facilitate SSP implementation, all States to contribute information on operational safety risks, including SSP safety performance indicators regional aviation safety group (RASG) by 2025, and all regions to publish an updated regional aviation safety plan
(RASP), in line with the 2023–2025 edition of GASP by 2023.

Goal 6: Ensure the appropriate infrastructure is available to support safe operations: This is related to 2023-2025 GASP Goal 6. Related indicators will mainly be based on data available through ICAO iSTARS. Feedback provided by Member States would also be considered. The objective is aligned with the 2023-2025 GASP requiring all States to implement the air navigation and airport core infrastructure including aerodrome safety by 2025.

6.2   Communication of Progress to RASG-MID and Regional Stakeholders

A MID Region Annual safety report would be annually published to provide stakeholders with relevant up-to-date information on the progress made in achieving the regional safety goals and targets, as well as the implementation status of the SEIs. In addition, the abovementioned information would culminate in a report on progress of implementation of the MID-RASP SEIs and their respective actions as well as in achieving the regional safety goals and targets; would be presented at every SEIG and RASG-MID meetings as well as safety seminars. The progress report should cover at least the following aspects:

   a. Brief overview of the overall implementation of the MID-RASP;
   b. Analysis on delay/ challenges encountered in implementation of SEIs and their respective actions; and
   c. If regional safety goals and targets are not met, causes would be addressed and presented to relevant stakeholders.

7   SAFETY ACTIONS

This chapter addresses system-wide problems that affect aviation as a whole including the SEIs and their respective actions. In most scenarios, these problems are related to organizational processes and procedures, regional operational safety risks, and emerging risks. The safety actions in this chapter are driven principally by the need to maintain or increase the current level of safety in the aviation sector for the region.

This chapter also facilitates the identification of SEIs and their respective actions relevant for each Goal established in the MID Region Safety performance measurement and monitoring as follows:

- **Goal 1:** Achieve a continuous reduction of operational safety risks.
- **Goal 2:** strengthen States safety oversight capabilities.
- **Goal 3:** Implementation of effective State safety Programmes.
- **Goal 4:** Increase collaboration at the regional level.
- **Goal 5:** Expand the use of industry Programmes and safety information sharing networks.
- **Goal 6:** Ensure the appropriate infrastructure is available to support safe operations.

7.1   Organizational Challenges/issues

7.1.1   Goal 2: Strengthen States' Safety Oversight Capabilities

The States safety oversight capabilities remains an issue mainly for AIG, AGA, ANS, and OPS areas. The lack of effective oversight remains an issue and the difficulties experienced by some authorities in properly discharging their oversight responsibilities is a concern also in the light of the size, scope and complexity of the aviation industry that some of them oversee.
Furthermore, while a number of CAAs have reached a suitable and stable level of maturity, certain continue to underperform and/or struggle in achieving sustainable improvements. Most notably, while progress has been noted in the implementation of Authorities' management systems, effective oversight of undertakings' safety management systems continues to be an area of concern in several domains.

7.1.1.1   G2-SEI-01: Strengthening States' Safety Oversight Capabilities

Target: The safety targets of this goal are indicated in the MID Region SPMM at **Appendix C.**

Rationale:
The CEs are essentially the safety defense tools of the State Safety Oversight system needed for the effective and sustainable implementation of a safety-related policy and associated procedures. The effective implementation of the CEs is an indication of a State's capability for safety oversight. States must establish CE-1 through CE-5 prior to the implementation of CE-6 through CE-8 in order to provide effective safety oversight and safety management. An individual State's responsibility for safety oversight is the foundation upon which a safe global air transport system is built. States that experience difficulties in carrying out safety oversight functions can impact the state of International Civil Aviation.

States should work to continually improve their effective implementation of the eight CEs of the State's safety oversight system in all relevant areas, as appropriate to their aviation system complexity. Through collaborative efforts, the level of effective implementation of the CEs of a State's safety oversight system can increase, particularly in those States where a State faces shortages of human, financial or technical resources.

The below elements are considered enablers of a robust safety oversight system, expected to be in place according to the requirements in force:

1. ability and determination to conduct effective oversight;
2. ability to identify risks through a process to collect and analyze data;
3. ability to mitigate the identified risks in an effective way, implying measurement of performance and leading to continuous improvement;
4. willingness and possibility to exchange information and cooperate with other CAAs;
5. ability to ensure the availability of adequate personnel, where 'adequate' includes the notion of sufficient training and proper qualification; and
6. focus on the implementation of effective management systems in industry, wherever required by the regulations in force.

What we want to achieve:
A robust oversight system across MID Region, where each CAA is able to properly discharge its oversight responsibilities, with particular care to exchange of information and cooperation with other

CAAs and to the implementation of management systems in all organizations, as well as to ensure the availability of adequate personnel in CAAs. In addition, to Support MID Region States' civil aviation authorities to Strengthen States' Safety Oversight Capabilities and increase progressively the USOAP-CMA EI results.

How we monitor improvement:
Significant increase of the number of States with an EI above 60% and implementing risk-based oversight.

How we want to achieve it: This SEI should be considered by States for inclusion in their NASPs.

Actions: A1-A2-A3-A4-A5-A6-A7
A1- Conduct Capacity Building Activities to promote effective implementation of SARPs,
A2- Conduct technical assistance activities and NCLB missions to States with a focus on ANS, AGA, AIG, and OPS areas.
A3- Develop and implement a specific NCLB plan of actions for prioritized States
A4- Conduct a Capacity Building Activity for Aerodrome Inspectors (Training Course on Aerodrome Inspection) (Action addressed under **G6-SEI-01 A5)**
A5- Develop guidance material to assist MID Region States in the issuance of exemptions related to temporary deviations from standards
A6- Develop guidance material to support States for the conduct of remote surveillance
A7- Develop guidance material on the enhancement of understanding the concept of judicial enforcement for aviation inspectors

References: ICAO SARPs and guidance documents and 2023-2025 GASP Goal 2 "Strengthen States' safety oversight capabilities"

Component 1 — State Safety Oversight (SSO) System

Phase 1 — Establishment of a Safety Oversight Framework

- GASP SEI-1: Consistent implementation of ICAO SARPs at the national level.
- GASP SEI-3: Regional safety enhancement initiatives to support consistent coordination of Regional Programmes in establishing adequate safety oversight capabilities.
- GASP SEI-4 & GASP SEI-10: Strategic collaboration with key aviation stakeholders to enhance safety in a coordinated manner.
- GASP SEI-5: Provision of the Regional safety information to ICAO by asking States to complete, submit and update all relevant documents and records.

Phase 2 — Implementation of a Safety Oversight System

- GASP SEI-6: Continued implementation of and compliance with ICAO SARPs at the Regional level.
- GASP SEI-8: Strategic collaboration with key aviation stakeholders to enhance safety in a coordinated manner.
- GASP SEI-9: Continued provision of the primary source of Regional safety information to ICAO by asking States to update all relevant documents and records as progress is made.

Stakeholders: RASG-MID, MIDANPIRG, States, international organizations, and industry

Action 1: Conduct Capacity Building Activities to promote effective implementation of SARPs

Owner:	ICAO, States, international organizations, and industry
Priority:	Medium
Completion date:	2025
Status:	Ongoing

Action 2: Conduct technical assistance and NCLB missions to States with focus on ANS, AGA, AIG, and OPS areas

Owner:	ICAO
Priority:	High
Completion date:	2025
Status:	Ongoing

Action 3: Develop and implement a specific NCLB plan of actions for prioritized States

Owner:	ICAO and concerned States
Priority:	High
Completion date:	2025
Status:	Ongoing

Action 4: Conduct a Capacity Building Activity for Aerodrome Inspectors (Training Course on Aerodrome Inspection) (Action addressed under G6-SEI-01 A5)

Owner:	Qatar and ICAO
Priority:	Medium
Completion date:	2025
Status:	New

A5- Develop guidance material to assist MID Region States in the issuance of exemptions related to temporary deviations from standards

Owner:	Qatar supported by Iran, Sudan, UAE, and IATA
Priority:	Medium
Completion date:	2025
Status:	New

A6- Develop guidance material to support States for the conduct of remote surveillance

Owner:	Qatar supported by Iran, Jordan, Saudi Arabia, Sudan, UAE, and ACAO
Priority:	Medium
Completion date:	2025
Status:	New

A7- Develop guidance material on the enhancement of understanding the concept of judicial enforcement for aviation inspectors

Owner:	Qatar supported by Saudi Arabia and UAE
Priority:	Medium

Completion date:	2025	
Status:	New	
EXPECTED OUTPUT		
Deliverable(s)		**Timeline**
MID States to improve their score for the effective implementation (EI)		2025

7.1.1.2   G2-SEI-02: Improve Regional Cooperation for the Provision of Accident & Incident Investigation

Target/Metrics: The safety targets of this goal are indicated in the MID Region SPMM at **Appendix C**.

Rationale:
States should work to continually improve their effective implementation of the CEs of the State's safety oversight system in the area of AIG. Through collaborative efforts and joining the MENA ARCM, the level of effective implementation of the CEs of a State's AIG can increase, particularly in those States where a State faces shortages of human, financial or technical resources.

What we want to achieve:
 MID Region States to Strengthen States' Safety Oversight Capabilities and increase progressively the USOAP-CMA EI results in the area of AIG.

How we monitor improvement:
Increase of the number of States with an EI above 60% for AIG area and then establishing an independent aircraft accident and incident investigation authority.

How we want to achieve it:

Actions: A1-A2
A1- Support of MENA ARCM activities
A2- Conduct AIG Capacity Building Activities.

References: ICAO SARPs and guidance documents and 2023-2025 GASP Goal 2 "Strengthen States' safety oversight capabilities"

Component 1 — State Safety Oversight (SSO) System

Phase 1 — Establishment of a Safety Oversight Framework

- GASP SEI-2: Establishment of an independent regional accident and incident investigation process, consistent with Annex 13.
- GASP SEI-3: Regional safety enhancement initiatives to support consistent coordination of Regional Programmes in establishing adequate safety oversight capabilities.
- GASP SEI-4: Strategic collaboration with key aviation stakeholders to enhance safety in a coordinated manner.

Stakeholders: RASG-MID, States, international organization, and industry

Action 1: Support of MENA ARCM activities

Owner:	ICAO, ACAO, and MENA ARCM Member States
Priority:	High

Completion date:	2025
Status:	Ongoing

Action 2: Conduct AIG Capacity Building Activities

Owner:	ICAO, States, international organizations, and industry
Priority:	Medium
Completion date:	2025
Status:	Ongoing

EXPECTED OUTPUT	
Deliverable(s)	**Timeline**
MID States to improve their score for the effective implementation (EI) especially the area of AIG	2025

7.1.1.3 G2-SEI-03: Sharing of Safety Recommendations related to Accidents and Serious Incidents

Target/Metrics: The safety targets of this goal are indicated in the MID Region SPMM at **Appendix C**.

Rationale:
States should work to continually improve their effective implementation of the CEs of the State's safety oversight system in the area of AIG. Through collaborative efforts, the level of effective implementation of the CEs of a State's AIG can increase, particularly in those States where a State faces shortages of human, financial or technical resources.

What we want to achieve:
MID Region States' civil aviation authorities to Strengthen States' Safety Oversight Capabilities and increase progressively the USOAP-CMA EI results in the area of AIG. In addition, the prevention of accidents or incidents, and the reduction of the consequences of such occurrences.

How we monitor improvement:
Increase of the number of States with an EI above 60% for AIG area and establishing an independent aircraft accident and incident investigation authority.

How we want to achieve it:

Action: A1
A1- Establishing a Platform for Sharing Safety Recommendations for MENA ARCM Member States

References: ICAO SARPs and guidance documents and 2023-2025 GASP Goal 2 "Strengthen States' safety oversight capabilities"

Component 1 — State Safety Oversight (SSO) System

Phase 1 — Establishment of a Safety Oversight Framework

- GASP SEI-3: Regional safety enhancement initiatives to support consistent coordination of Regional Programmes in establishing adequate safety oversight capabilities

- GASP SEI-4: Strategic collaboration with key aviation stakeholders to enhance safety in a coordinated manner

Stakeholders: RASG-MID, States, and international organization	
Action 1: Development of platform on sharing safety recommendations	
Owner: ICAO, ACAO, and MENA ARCM Member	
Priority: Low	
Completion date: 2025	
Status: On-hold	

EXPECTED OUTPUT	
Deliverable(s)	**Timeline**
Improve MID States the effective implementation (EI) in the area of AIG	2025

7.1.1.4 G2-SEI-04: Enhance State Oversight on Dangerous Goods

Target/Metrics: The safety targets of this goal are indicated in the MID Region SPMM at **Appendix C**.

Rationale:
States should work to continually improve their effective implementation of the eight CEs of the State's safety oversight system in the area of OPS.

What we want to achieve:
States to implement an effective system for safety oversight of the various entities involved in the transport of dangerous goods. In addition, MID Region States' to Strengthen States' Safety Oversight Capabilities and increase progressively the USOAP-CMA EI results in the area of OPS and enhance the state oversight on Dangerous Goods

How we monitor improvement:
Increase of the number of States with an EI above 60% for OPS area and then to Strengthen States' Safety Oversight Capabilities.

How we want to achieve it: This SEI should be considered by States for inclusion in their NASPs.

Actions: A1
A1- Conduct Dangerous Goods (DG) capacity building activities including Lithium batteries fires/smoke risks in cabin
A2- Develop guidance material on carriage and transport of Lithium batteries

References: ICAO SARPs and guidance documents and 2023-2025 GASP Goal 2 "Strengthen States' safety oversight capabilities" and ICAO Annex 18 "Safe Transport of Dangerous Goods by Air".

Component 1 — State Safety Oversight (SSO) System

Phase 1 — Establishment of a Safety Oversight Framework

GASP SEI-1: Consistent implementation of ICAO SARPs at the national level

Phase 2 — Implementation of a Safety Oversight System

GASP SEI-6: Continued implementation of and compliance with ICAO SARPs at the Regional level

Stakeholders: RASG-MID, States, international organizations, and industry

Action 1- Conduct Dangerous Goods (DG) capacity building activities including Lithium batteries fires/smoke risks in cabin

Owner:	ICAO, States, international organizations, and industry.
Priority:	Medium
Completion date:	2025
Status:	Ongoing

Action 2: Develop guidance material on carriage and transport of Lithium batteries

Owner:	IATA
Priority:	Medium
Completion Date:	2025
Status:	Ongoing

EXPECTED OUTPUT	
Deliverable(s)	**Timeline**
MID States to improve their score for the effective implementation (EI) especially the area of OPS	2025

7.1.1.5   G2-SEI-05: Human factors and Competence of Personnel

Target/Metrics: The safety targets of this goal are indicated in the MID Region SPMM at **Appendix C**.

Rationale:
Human factors and competence of personnel are strategic priorities in the region. Human factors and the impact on human performance, as well as medical fitness are strategic priorities. As new technologies and/or operating concepts emerge on the market and the complexity of the system continues increasing, it is of key importance to properly address human factors and human performance, in terms of both limitations and its contribution to delivering safety, as part of the safety management implementation. CRM has been identified in the MID ASR as most important human factors issue in the domain of commercial air transport Aeroplanes above 5700 kgs. The safety actions related to competence of personnel mainly English language proficiency would be further developed in the future.

The main objectives of TRM for operational staff are the development of attitudes and behaviour, which will contribute to enhanced teamwork skills and performance in order to reduce teamwork failures as contributory factors in ATM related incidents and accidents. The benefits of TRM are considered to be enhanced Threat and Error Management capabilities, continuity and stability of teamwork, task efficiency, sense of working as a part of a larger and more efficient team, increased job satisfaction; and improved use of staff resources.

In addition, the safety action identified currently related to aviation personnel is also focusing on fatigue risk management (FRMS) by COVID-19 to mitigate safety issues in all domains such as personal readiness, flight crew perception or crew resource management (CRM) and communication, which play a role in improving safety across all aviation domains.

What we want to achieve:
Ensure continuous improvement in safety management activities as related to human factors and human performance.

How we monitor improvement:
Improvement in aviation personnel competence at all levels and then to Strengthen States' Safety Oversight Capabilities.

How we want to achieve it: This SEI should be considered by States for inclusion in their NASPs.

Actions: A1-A2-A3-A4
A1- Advisory Circular: Crew Resource Management Training Programme (CRM). **(Action addressed under G1-SEI-04:CFIT)**
A2- Conduct Crew Resource Management capacity building activities
A3- Organize Team Resource Management capacity building activities.
A4- FRMS capacity building activities

References: ICAO SARPs and guidance documents and 2023-2025 GASP Goal 2 "Strengthen States' safety oversight capabilities". ICAO Human Performance Manual (ICAO Doc 10151) and ICAO Safety Management Manual (ICAO Doc 9859).

Component 1 — State Safety Oversight (SSO) System

Phase 1 — Establishment of a Safety Oversight Framework

GASP SEI-1: Consistent implementation of ICAO SARPs at the national level

Stakeholders: RASG-MID, States, industry, international organizations	
Action 2: Organize Crew Resource Management capacity building activities	
Owner:	ICAO, States, international organizations, and industry.
Priority:	Medium
Completion date:	2023
Status:	ongoing
Action 3: Organize Team Resource Management capacity building activities	
Owner:	ICAO, States, international organizations, and industry
Priority:	Medium
Completion Date:	2023
Status:	ongoing
Action 4: FRMS capacity building activities	
Owner:	ICAO, States, international organizations, and industry
Priority:	Medium
Completion Date:	2025
Status:	ongoing
EXPECTED OUTPUT	
Deliverable(s)	**Timeline**
MID States to improve their score for the effective implementation (EI) and mitigate contributing factors to accidents and incidents	2025

7.1.1.6   G2-SEI-06: Management of security risks with safety impact

Target/Metrics: The safety targets of this goal are indicated in the MID Region SPMM at **Appendix C**.

Rationale:
The safety action in this area is aimed at mitigating the security related safety risks. The safety action in this area also include the mitigation of the risks posed by flying over zones where an armed conflict exists. Managing the impact of security on safety is a strategic priority in MID region.

What we want to achieve:
Increase safety by managing the impact of security on safety and mitigating related safety risks.

How we monitor improvement:
Continuous assessment and mitigation of security threats.

How we want to achieve it: This SEI should be considered by States for inclusion in their NASPs.

Actions: A1
Action 1- Organize seminar/Symposium/workshop to exchange experiences and good practices on assessing the risks and sharing of information related to the overflying of conflict zones in coordination with RASFG-MID and MIDANPIRG

References: ICAO SARPs and guidance documents and 2023-2025 GASP Goal 2 "Strengthen States' safety oversight capabilities". ICAO Annex 17.

Component 1 — State Safety Oversight (SSO) System

Phase 1 — Establishment of a Safety Oversight Framework

- GASP SEI-1: Consistent implementation of ICAO SARPs at the national level

Stakeholders: RASG-MID, RASFG-MID, MIDANPIRG, States, international organizations, industry

Action 1- Organize seminar/Symposium/workshop to exchange experiences and good practices on assessing risks and sharing of information related to the overflying of conflict zones in coordination with RASFG-MID and MIDANPIRG

Owner:	ICAO
Priority:	High
Completion date:	2023
Status:	Ongoing

EXPECTED OUTPUT	
Deliverable(s)	**Timeline**
mitigate contributing factors to accidents and incidents	2025

7.1.1.7   G2-SEI-07: Managing cybersecurity risks

Target/Metrics: The safety targets of this goal are indicated in the MID Region SPMM at **Appendix C**.

Rationale:

The safety action in this area is aimed at mitigating the cybersecurity related safety risks. Assess the safety impact of cybersecurity threats to aviation users, support the development of mitigations and specific Training actions, identify and mitigate the vulnerabilities of aviation products and identify the required changes to aviation standards.

What we want to achieve:

Increase safety by managing the impact of cybersecurity on safety and mitigating related safety risks.

How we monitor improvement:

Continuous assessment and mitigation of cybersecurity threats.

How we want to achieve it: This SEI should be considered by States for inclusion in their NASPs.

Actions: A1-A2-A3
A1- Develop a Regional Action Plan to bridge the gap between ICAO Cyber Security Action plan and the implementation level of Cyber Resilience in the MID Region
A2- Conduct activities on Cyber Security and Resilience- (Jointly ANS and AVSEC)
A3- Develop a MID Region Cybersecurity Action Plan**.**

References: ICAO SARPs and guidance documents and 2023-2025 GASP Goal 2 "Strengthen States' safety oversight capabilities". ICAO Annex 17.

Component 1 — State Safety Oversight (SSO) System

Phase 1 — Establishment of a Safety Oversight Framework

- GASP SEI-1: Consistent implementation of ICAO SARPs at the national level

Stakeholders: RASG-MID, RASFG-MID, MIDANPIRG, States, international organizations, industry
Action 1- Develop a Regional Action Plan to bridge the gap between ICAO Cyber Security Action plan and the implementation level of Cyber Resilience in the MID Region

Owner:	ANS Cyber SeC Action group
Priority:	Medium
Completion date:	2025
Status:	New

Action 2- Conduct activities on Cyber Security and Resilience	
Owner:	ICAO
Priority:	Medium
Completion date:	2025
Status:	New

Action 3: Develop a MID Region Cybersecurity Action Plan	
Owner:	Cybersecurity Security Ad-hoc Group
Priority:	Medium
Completion date:	2025
Status:	New

EXPECTED OUTPUT

Deliverable(s)	Timeline
mitigate contributing factors to accidents and incidents	2025

7.1.1.8   G2-SEI-08: Impact of COVID-19 pandemic- Safe return to operations

Target/Metrics: The safety targets of this goal are indicated in the MID Region SPMM at **Appendix C**.

Rationale:
States should manage a dedicated safety promotion campaign in support of safe return to operations. The safety action in this area is aimed at mitigating the COVID-19 pandemic related safety risks. The safety action in this area would focus on continuous support to the MID-RPTF and sharing of guidance material/best practices to mitigate the risks stemmed from the pandemic.

What we want to achieve:
Increase safety by managing the impact of COVID-19 pandemic on safety and mitigating related safety risks.

How we monitor improvement:
Continuous assessment and mitigation of COVID-19 pandemic induced safety risks.
 .
How we want to achieve it: This SEI should be considered by States for inclusion in their NASPs.

Actions: A1-A2
A1- Continued support to the aviation industry through MID-RPTF meetings/Activities, as needed
A2- Sharing of guidance material/best practices

References: ICAO SARPs and guidance documents and 2023-2025 GASP Goal 2 "Strengthen States' safety oversight capabilities".

Component 1 — State Safety Oversight (SSO) System

Phase 1 — Establishment of a Safety Oversight Framework

- GASP SEI-1: Consistent implementation of ICAO SARPs at the national level

Stakeholders: RASG-MID, RASFG-MID, MIDANPIRG, States, international organizations, industry	
Action 1- Continued support to the aviation industry through MID-RPTF Activities, as needed	
Owner:	States, international organizations, and industry
Priority:	High
Completion date:	2025
Status:	Ongoing
Action 2: Sharing of guidance material/best practices	
Owner:	States, international organizations, and industry
Priority:	High
Completion date:	2025

Status:	Ongoing

EXPECTED OUTPUT

Deliverable(s)	Timeline
mitigate contributing factors/safety issues to accidents and incidents 2025	

7.1.2   Goal 3: Implementation of Effective States Safety Programme (SSP)

7.1.2.1   G3-SEI-01: Implement an effective Safety Management

Target: The safety targets of this goal are indicated in the MID Region SPMM **at Appendix C.**

Rationale:
Management of safety in a systematic and proactive way enables authorities and organizations to set up management systems that take into consideration potential hazards and associated risks before aviation accidents occur. This global move is at the core of ICAO Annex 19. This safety area would enable further work to improve reporting processes, occurrence investigation at organizational level, and also the continued development of integrated data collection taxonomies.

What we want to achieve:
MID Region States to implement SSP and consequently their services providers to implement SMS. In addition, work with authorities and organizations to implement safety management.

How we monitor improvement:
 ICAO Annex 19 framework requiring safety management is in place across all aviation domains, and organizations and authorities are able to demonstrate compliance.

How we want to achieve it: This SEI should be considered by States for inclusion in their NASPs.

States to give priority to the work on SSPs
In the implementation and maintenance of the SSP, States should in particular:

- ensure effective implementation of the Annex 19 Requirements and address deficiencies in oversight capabilities, as a prerequisite for effective SSP implementation;
- ensure effective coordination between State authorities having a role in safety management;
- ensure that inspectors have the right competencies to support the evolution towards risk- and performance based oversight;
- ensure that policies and procedures are in place for risk- and performance based oversight, including a description of how an SMS is accepted and regularly monitored;
- establish policies and procedures for safety data collection, analysis, exchange and protection;
- establish a process to determine safety performance indicators at State level addressing outcomes and processes;
- ensure that an approved SSP document is made available and shared with other States; and
- ensure that the SSP is regularly reviewed and that SSP effectiveness is regularly assessed;
- ensure that the specific safety risks induced by COVID-19 be assessed and be included in the State risk picture.

SMS Assessment
States should make use of the available tools to support risk- and performance-based oversight. States also should regularly monitor status of compliance with SMS requirements of their industry.

SMS international cooperation
States should promote the common understanding of safety management and human factors principles and requirements in different countries, share lessons learned and encourage progress and harmonization, through active participation in the RASG-MID and other safety groups and fora.

FDM precursors of main operational safety risks
States in partnership with industry, other regional and international organizations should complete the good practice documentation which supports the inclusion of main operational safety risks such as RE, RI, LOC-I, CFIT and MAC into operators' FDM Programmes.

States to set up a regular dialogue with their national aircraft operators on flight data monitoring (FDM) Programmes
States to set up a regular dialogue with their national aircraft operators on flight data monitoring (FDM) Programmes, with the objectives of:
- promoting the operational safety benefits of FDM,
- fostering an open dialogue on FDM Programmes that takes place in the framework of just culture,
- encouraging operators to include and further develop FDM events relevant for the prevention of REs, MACs, CFIT and LOC-I, or other issues identified by the SSP

Actions: A1-A2
A1- Conduct SSP/SMS capacity building activities
A2- Conduct technical assistance missions by SMIT

References: ICAO Annex 19 and GASP 2023-2025 Goal 3 "Implement effective State Safety Programmes"

Component 2 — State Safety Programme

- GASP SEI-10: Start of promotion of SSP implementation at the regional level.
- GASP SEI-11: Regional safety enhancement initiatives to support consistent coordination of Regional Programmes for SSP implementation.
- GASP SEI-12: Strategic collaboration with key aviation stakeholders to support SSP implementation.
- GASP SEI-13: Start of SSP implementation at the national level.
- GASP SEI-14: Regional allocation of resources to support continued development of the proactive use of risk modelling capabilities.
- GASP SEI-15: Regional collaboration with key aviation stakeholders to support the proactive use of risk modelling.
- GASP SEI-16: Advancement of safety risk management at the regional level.

Component 2 — State Safety Programme

GASP SEI-7: Strategic collaboration with key aviation stakeholders to complete SSP implementation

Stakeholders: RASG-MID, States, industry, international organizations	
Action 1- Conduct SSP/SMS training courses and workshops	
Owner:	ICAO, supported by organizations, and industry
Priority:	High
Completion Date:	2025
Status:	ongoing

Action 2- Conduct technical assistance missions by SMIT	
Owner:	ICAO and SMIT Team
Priority:	High
Completion Date:	2025
Status:	New

EXPECTED OUTPUT	
Deliverable(s)	Timeline
MID States to implement the foundation of an SSP	**2023**
MID States to implement an effective SSP	**2025**

7.1.2.2 G3-SEI-02: NASP Development & Implementation

Target: The safety targets of this goal are indicated in the MID Region SPMM **at Appendix C.**
Rationale:
States should ensure that a NASP is maintained and regularly reviewed. The MID-RASP provides the identified safety priorities in the Region and States should identify which top risks and key issues mentioned in the GASP and MID-RASP; which apply to their national context, and identify suitable mitigation actions within their NASP. States should also add/consider others which are unique to their operational context.
.

What we want to achieve:
MID Region States to develop NASP. Successful implementation of the NASP actions would require the commitment of resources from stakeholders within State, availability of data to effectively monitor the achievement of NASP Targets, and proper project governance. In addition to the actions, NASP shall also consider how to measure their effectiveness.

How we monitor improvement:
 ICAO GASP requiring States to develop NASP and region to develop RASP.

How we want to achieve it: This SEI should be considered by States for inclusion in their NASPs.

States to establish and maintain a National Aviation Safety Plan (NASP)
States should ensure that a NASP is maintained and regularly reviewed. NASP should:

- describe how the plan is developed and endorsed, including collaboration with different entities within the State, with industry and other stakeholders;
- include safety objectives, goals, indicators and targets in line with in line with GASP as well as regional safety plan;
- identify the main safety risks at national level in addition to the ones identified in MID-RASP as applicable to the State;
- include series of SEIs to address safety issues; and
- Reflect the GASP and MID-RASP SEIs as applicable to the State.

Actions: A1-A2
A1- Conduct NASPs workshops & technical assistance missions
A2- NASP iPacks deployment

References: ICAO Annex 19 and GASP 2023-2025 Goal 3 "Implement effective State Safety Programmes"

Component 2 — State Safety Programme

- GASP SEI-10: Start of promotion of SSP implementation at the Regional level.
- GASP SEI-11: Regional safety enhancement initiatives to support consistent coordination of Regional Programmes for SSP implementation.
- GASP SEI-12: Strategic collaboration with key aviation stakeholders to support SSP implementation.
- GASP SEI-13: Start of SSP implementation at the national level.
- GASP SEI-14: Regional allocation of resources to support continued development of the proactive use of risk modelling capabilities.
- GASP SEI-15: Regional collaboration with key aviation stakeholders to support the proactive use of risk modelling.
- GASP SEI-16: Advancement of safety risk management at the Regional level.

Component 2 — State Safety Programme

GASP SEI-7: Strategic collaboration with key aviation stakeholders to complete SSP implementation

Stakeholders: RASG-MID, States, industry, international organizations	
Action 1- Conduct NASPs workshops & technical assistance missions	
Owner:	ICAO
Priority:	High
Completion Date:	2025
Status:	Ongoing
Action 2- NASP iPacks deployment	
Owner:	ICAO and States
Priority:	High
Completion Date:	2025
Status:	New

EXPECTED OUTPUT	
Deliverable(s)	Timeline
MID States to develop and implement NASP	2025

7.1.3 Goal 4: Increase Collaboration at the Regional Level

7.1.3.1 G4-SEI-01: Development and Implementation of MID-RASP

Target: The safety targets of this goal are indicated in the MID Region SPMM **at Appendix C.**

Rationale: The RASG-MD is the governing body responsible for the development, implementation and monitoring of the MID-RASP, in collaboration with the ICAO MID Office, international and regional organizations and with the aviation industry. The MID-RASP is to be reviewed by the Safety Enhancement Implementation Group (SEIG) every year mainly to include new identified Safety Enhancement initiatives' (SEIs), review the existing SEIs, as well as their respective actions.

What we want to achieve:
States, international organization, and industry to increase collaboration at the regional level so that to enhance safety.

How we monitor improvement:
MID region to publish an updated regional aviation safety plan (MID-RASP), in line with the 2023–2025 edition of GASP.

How we want to achieve it: This SEIs included in MID-RASP to be considered by States for inclusion in their NASPs.

References: GASP 2023-2025Goal 4 "Increase collaboration at the Regional level"

Action: A1
A1- Development and Implementation of MID-RASP 2023-2025 Edition

Component 1 — State Safety Oversight (SSO) System

Phase 1 — Establishment of a Safety Oversight Framework

- GASP SEI- SEI-1: Consistent implementation of ICAO SARPs at the Regional level.
- GASP SEI-3: Regional safety enhancement initiatives to support consistent coordination of Regional Programmes in establishing adequate safety oversight capabilities.
- GASP SEI-5: Provision of the Regional safety information to ICAO by asking States to complete, submit and update all relevant documents and records.

Phase 2 — Implementation of a Safety Oversight System

GASP SEI-9: Continued provision of the primary source of Regional safety information to ICAO by asking States to update all relevant documents and records as progress is made.

Stakeholders: RASG-MID, MIDANPIRG, RASFG-MID, States, International organizations, and industry.

Action 1: Development and Implementation of MID-RASP 2023-2025 Edition	
Owner:	SEIG
Priority:	High
Completion date:	2025
Status:	Ongoing
EXPECTED OUTPUT	
Deliverable(s)	**Timeline**
To manage and enhance safety at the regional	2025

7.1.3.2   G4-SEI-02: Enhance collaboration between States, international organizations, and industry

Target: The safety targets of this goal are indicated in the MID Region SPMM **at Appendix C.**

Rationale: cooperation and collaboration among all stakeholders through conducting MID RCM meetings and agreeing on joint activities to avoid duplication of effort.

What we want to achieve:
States, international organizations, and industry to increase collaboration at the regional level so that to enhance safety.

How we monitor improvement: Reinforce efficient and effective cooperation and collaboration with all stakeholders, avoiding duplication and optimizing the allocation of resources at the regional level.

How we want to achieve it: Joint Programme activities

References: GASP 2023-2025 Goal 4 "Increase collaboration at the Regional level"

Actions: A1-A2
A1- Develop and agree on joint work activities through MID-RCM meetings
A2- Support the establishment of MENA RSOO and its activities

Component 1 — State Safety Oversight (SSO) System

Phase 1 — Establishment of a Safety Oversight Framework

- GASP SEI- SEI-1: Consistent implementation of ICAO SARPs at the Regional level.
- GASP SEI-3: Regional safety enhancement initiatives to support consistent coordination of Regional Programmes in establishing adequate safety oversight capabilities.
- GASP SEI-5: Provision of the Regional safety information to ICAO by asking States to complete, submit and update all relevant documents and records.

Phase 2 — Implementation of a Safety Oversight System

GASP SEI-9: Continued provision of the primary source of Regional safety information to ICAO by asking States to update all relevant documents and records as progress is made.

Stakeholders: RASG-MID. MIDANPIRG, RASFG-MID, States, international organizations, and industry.

Action 1: Develop and agree on joint work activities through MID RCMs	
Owner:	ICAO, States, international organizations, industry
Priority:	High
Completion date:	2025
Status:	New
Action 2: Support the establishment of MENA RSOO and its activities	
Owner:	ICAO and States
Priority:	Medium
Completion date:	2025
Status:	New

EXPECTED OUTPUT	
Deliverable(s)	**Timeline**
To increase States USOAP EI and SSP level of maturity.	2025

7.2.1 Goal 5: Expand the Use of Industry Programmes and safety information sharing networks

7.1.4.1 G5-SEI-01: Promote the Use of industry Programmes

Target: The safety targets of this goal are indicated in the MID Region SPMM at **Appendix C.**

Rationale:

What we want to achieve:
Work with authorities and organizations to increase the number of service providers participating in the corresponding ICAO recognized industry assessment Programmes.

How we monitor improvement:
Increase the number of service providers participating in the corresponding ICAO recognized industry assessment Programmes. The RASG-MID, IATA, and ACI will give feedback on the effectiveness of the activities.

How we want to achieve it:

Actions: A1-A2
A1- Encourage IATA's IOSA and ISAGO registrations through safety promotion
A2- Encourage the implementation of ACI Airport Excellence (APEX) in Safety Programme

References: This is related to 2023-2025 GASP Goal 5 "Expand the use of industry Programmes and safety information sharing networks"

Component 1 — State Safety Oversight (SSO) System

GASP SEI-1 — Strategic collaboration with key aviation stakeholders to enhance safety in a coordinated manner.

Stakeholders: RASG-MID, States, industry, international organizations	
Action 1: Encourage IATA's IOSA and ISAGO registrations through safety promotion	
Owner:	IATA
Priority:	Medium
Completion Date:	2025
Status:	Ongoing
Action 2: Encourage the implementation of ACI Airport Excellence (APEX) in Safety Programme	
Owner:	ICAO and ACI
Priority:	medium
Completion Date:	2025
Status:	ongoing
EXPECTED OUTPUT	
Deliverable(s)	**Timeline**
Increase the number of service providers participating in ICAO recognized industry assessment Programmes and maintain recurrent APEX Missions in the region:	2025

7.2.1 Goal 6: Ensure the Appropriate Infrastructure is available to Support Safe Operations

7.1.1.1 G6-SEI-01: Certification of International Aerodromes

Target/Metrics: The safety targets of this goal are indicated in the MID Region safety strategy at **Appendix C**.

Rationale:
Many International Airports are yet to be fully certified and many that are certified are facing challenges to apply the Standards and Recommended Practices (SARPs) as laid out in ICAO Annex 14-Aerodromes and the ICAO Manual on Certification of Aerodromes (Doc 9774).

What we want to achieve:
MID Region States to improve international aerodromes infrastructures and ensure continuous improvement.

How we monitor improvement:
The number of certified international airports. The RASG-MID, members States, and partners would provide feedback on the effectiveness of the activities.

How we want to achieve it: This SEI should be considered by States for inclusion in their NASPs.

Actions:	A1-A2-A3-A4-A5-A6
A1- Support States on the implementation of the ICAO Annex 14 requirements to achieve compliance with regards to Aerodrome Design and Operations, through Workshops/Trainings	
A2- Enhance capacity building for States CAAs and Airport operators related to aerodromes certification through Workshops/Training	
A3 – Deployment of iPack on Aerodrome Re-Start	
A4 - Support States in implementing aerodrome oversight/inspection mechanism through capacity building activities on Aerodrome Oversight	
A5 – Conduct a Capacity Building Activity for Aerodrome Inspectors (Training Course + OJT)	
A6 – Conduct a Wildlife Hazard Management Control capacity building Activities	

References: ICAO SARPs and guidance documents and 2023-2025 GASP. This is related to 2023-2025 GASP Goal 6 "Ensure the appropriate infrastructure is available to support safe operations"

Component 1 — State Safety Oversight (SSO) System

- GASP SEI-1: Consistent implementation of ICAO SARPs at the Regional level.
- GASP SEI-3: Regional safety enhancement initiatives to support consistent coordination of Regional Programmes in establishing adequate safety oversight capabilities.
- GASP SEI-4: Strategic collaboration with key aviation stakeholders to enhance safety in a coordinated manner.

Stakeholders: RASG-MID, States, industry, International organizations	
Action 1: Support States on the implementation of the ICAO Annex 14 requirements to achieve compliance with regards to Aerodrome Design and Operations, through capacity building activities	
Owner:	ICAO and ACI.
Priority:	High
Completion Date:	2025
Status:	Ongoing
Action 2: Enhance capacity building for States CAAs and Airport operators related to aerodromes certification through capacity building activities	
Owner:	ICAO and ACI

Priority:	High
Completion date:	2025
Status	ongoing

Action 3: Deployment of iPack on Aerodrome Re-Start

Owner:	ICAO
Priority:	Medium
Completion Date:	2025
Status:	Ongoing

A4: Support States in implementing aerodrome oversight/inspection mechanism through capacity building activities on Aerodrome Oversight

Owner:	ICAO and FAA
Priority:	Medium
Completion Date:	2025
Status:	New

A5: Conduct a Capacity Building Activity for Aerodrome Inspectors (Training Course + OJT)

Owner:	TBD
Priority:	Medium
Completion Date:	2025
Status:	New

A6: Conduct a Wildlife Hazard Management Control capacity building Activities

Owner:	ICAO, ACAO, WBA
Priority:	Medium
Completion Date:	2025
Status:	New

EXPECTED OUTPUT	
Deliverable(s)	**Timeline**
Increase the number of Certificated International Aerodromes	2025

7.1.5.2   G6-SEI-02: Establish Runway Safety Team (RST) at International Aerodromes

Target: The safety targets of this goal are indicated in the MID Region SPMM **at Appendix C.**

Rationale:
Many States have difficulties on the development of the Runway Safety Programme and the establishment of Runway Safety Teams (RSTs) at airports as an effective means to reduce runway related accidents and incidents.

What we want to achieve:
MID Region States' civil aviation authorities to establish an effective RSTs at their aerodromes which would significantly reduce the runway safety related risks.

How we monitor improvement:
Number of the RSTs established at international aerodromes and number of the RST missions

conducted. The RASG-MID, members States, and partners will give feedback on the effectiveness of the activities.

How we want to achieve it: This SEI should be considered by States for inclusion in their NASPs.

Actions:	A1-A2
A1- Conduct of assistance missions by the Runway Safety Go-Team (RST)	
A2- Support States to implement the Global Reporting Format Methodology through capacity building activities: (**Action addressed under G1-SEI-02: Runway Excursion**)	

References: ICAO SARPs and guidance documents and 2023-2025 GASP. This is related to 2023-2025 GASP Goal 6 "Ensure the appropriate infrastructure is available to support safe operations".

Component 1 — State Safety Oversight (SSO) System

- GASP SEI-1: Consistent implementation of ICAO SARPs at the Regional level.
- GASP SEI-3: Regional safety enhancement initiatives to support consistent coordination of Regional Programmes in establishing adequate safety oversight capabilities.
- GASP SEI-4: Strategic collaboration with key aviation stakeholders to enhance safety in a coordinated manner.

Stakeholders: RASG-MID, States, industry, international organizations

Action 1: Conduct of assistance missions by the Runway Safety Go-Team (RST)

Owner:	ICAO, RSP (Runway Safety Programme Partners)
Priority:	High
Completion date:	2025
Status:	Ongoing

Action 2: Support States to implement the Global Reporting Format Methodology through capacity building. (Action addressed under G1-SEI-02: Runway Excursion)

Owner:	ICAO, ACI and Aircraft Manufactures
Priority:	High
Completion Date:	2025
Status:	Ongoing

EXPECTED OUTPUT

Deliverable(s)	Timeline
Increase the number of establishment RST at international aerodromes	2025

7.2 Regional Operational Safety Risks

7.2.1 Goal 1: Achieve a continuous reduction in Operational Risks

7.2.1.1 G1-SEI-01: Aircraft upset in flight (LOC-I)

Target: The safety targets of this goal are indicated in the MID Region safety strategy at **Appendix C.**

Rationale:
Loss of control usually occurs because the aircraft enters a flight regime which is outside its normal

envelope, usually, but not always, at a high rate, thereby introducing an element of surprise for the flight crew involved. Prevention of loss of control is a strategic priority. In addition, Aircraft upset or loss of control is the key risk area with the highest risk related to fatal accidents in CAT aeroplane operations having a maximum take-off weight above 5700 kg. It includes uncontrolled collisions with terrain, but also occurrences where the aircraft deviated from the intended flight path or intended aircraft flight parameters, regardless of whether the flight crew realized the deviation and whether it was possible to recover or not. It also includes the triggering of stall warning and envelope protections.

During 2017-2021 Aircraft upset or Loss of control contributed to one accident and counted for around 27% of fatalities. During the year 2018, the LOC-I occurred during En-route phase of flight.

What we want to achieve:
Increase safety by continuously assessing and improving risk controls to mitigate the risk of loss of control.

How we monitor improvement:
Continuous monitoring of safety issues identified in the MID Region annual safety report for CAT aeroplane above 5,700 kgs.

How we want to achieve it:
States should set up a regular dialogue with their national aircraft operators on flight data monitoring (FDM) Programmes, with the objectives of: promoting the operational safety benefits of FDM, fostering an open dialogue on FDM Programmes that takes place in the framework of just culture, encouraging operators to include and further develop FDM events relevant for the prevention of LOC-I, or other issues identified by the SSP.

States to include LOC-I in national SSPs: LOC-I should be addressed by the States on their SSPs and included in NASPs. This should include as a minimum agreeing a set of actions and measuring their effectiveness.

Actions: A1-A2-A3
A1- Guidance material on flight crew proficiency
A2- Advisory Circular: Mode Awareness and Energy State Management Aspects of Flight Deck Automation
A3- Conduct Upset Recovery Workshops/Webinars
A4- Develop guidancematreial on the air cargo safety

References:

- GASP 2023-2025 Goal 1 "Achieve a Continuous Reduction of Operational Safety Risks".
- GASP SEIs (States, Region, and industry) – Mitigate contributing factors to LOC-I accidents and incidents.

Stakeholders: RASG-MID, States, industry, international organizations/associations	
Action 1: Guidance material on flight crew proficiency	
Owner	IATA and Aircraft manufacturers
Priority:	Medium
Completion Date:	2025
Status:	Ongoing
Action 2: Advisory Circular: Mode Awareness and Energy State Management Aspects of Flight Deck Automation	

Owner:	IATA and Aircraft manufacturers. Supported by KSA
Priority:	High
Completion Date:	2025
Status:	ongoing
Action 3: Conduct Upset Recovery workshop/Webinar	
Owner:	ICAO, IATA, Industry.
Priority:	High
Completion Date:	2025
Status:	Ongoing
A4- Develop guidance material on the air cargo safety	
Owner:	Oman
Priority:	Medium
Completion Date:	2025
Status:	New
EXPECTED OUTPUT	
Deliverable(s)	**Timeline**
Mitigate contributing factors to LOC-I accidents and incidents	2025

7.2.1.2   G1-SEI-02: Runway Safety- Runway Excursion

Target: The safety targets of this goal are indicated in the MID Region SPMM at **Appendix C**.

Rationale:
Runway excursion covers materialized runway excursions, both at high and low speed, and occurrences where the flight crew had difficulties in maintaining the directional control of the aircraft or of the braking action during landing, where the landing occurred long, fast, off-centred or hard, or where the aircraft had technical problems with the landing gear (not locked, not extended or collapsed) during landing. During 2017-2020, Runway Excursions and abnormal runway contact accidents and serious incidents mainly occurred in the landing phase of flights.

What we want to achieve:
Increase safety by continuously assessing and improving risk controls to mitigate the risk of RE.

How we monitor improvement:
Continuous monitoring of safety issues identified in the MID Region annual safety report for CAT aeroplane above 5,700 kgs.

How we want to achieve it:
States to set up a regular dialogue with their national aircraft operators on flight data monitoring (FDM) Programmes, with the objectives of: promoting the operational safety benefits of FDM, fostering an open dialogue on FDM Programmes that takes place in the framework of just culture, encouraging operators to include and further develop FDM events relevant for the prevention of REs.

States to include Runway Excursions in national SSPs: REs should be addressed by the States on their SSPs and included in NASPs in close cooperation with the aircraft operators, air traffic control,

and airport operators. This should include as a minimum agreeing a set of actions and measuring their effectiveness.

Actions:	A1-A2
A1- Support States to implement the Global Reporting Format (GRF) Methodology through capacity building activities	
A2- MID Region Action Plan/Milestones on the Global Reporting Format (GRF) Implementation	

References:

- GASP 2023-2025 Goal 1 "Achieve a Continuous Reduction of Operational Safety Risks".
- GASP SEIs (States, Region, and industry) – Mitigate contributing factors to RE accidents and incidents.

Stakeholders: RASG-MID, MIDANPIRG, States, industry, international organizations/associations

Action 1: Support States to implement the Global Reporting Format (GRF) Methodology through capacity building activities (Reference: G3-SEI-02)

Owner:	ICAO, ACI, and Aircraft Manufactures
Priority:	Medium
Completion Date:	2025
Status:	Ongoing

Action 2: MID Region Action Plan/Milestones on the Global Reporting Format (GRF) Implementation

Owner:	ICAO
Priority:	High
Completion Date:	2025
Status:	ongoing

EXPECTED OUTPUT	
Deliverable(s)	**Timeline**
Mitigate contributing factors to RE accidents and incidents	2025

7.2.1.3   G1-SEI-03: Runway Safety- Runway Incursion

Target: The safety targets of this goal are indicated in the MID Region SPMM at **Appendix C**.

Rationale:
Collision on runway covers collisions between an aircraft and another object (other aircraft, vehicles, etc.) or person that occur on a runway of an aerodrome or other predesignated landing area; it does not include collisions with birds or wildlife. While there were no fatal accident or accident involving MID States operators in the last years involving runway collision, the risk of the reported occurrence demonstrated to be very real.

What we want to achieve:
Increase safety by continuously assessing and improving risk controls to mitigate the risk of RI.

How we monitor improvement:
Continuous monitoring of safety issues identified in the MID Region annual safety report for CAT aeroplane above 5,700 kgs.

How we want to achieve it:

States to include Runway Incursions in national SSPs: RIs should be addressed by the States on their SSPs and included in NASPs in close cooperation with the aircraft operators, air traffic control, and airport operators. This should include as a minimum agreeing a set of actions and measuring their effectiveness.

Action:	A1
A1- Conduct Capacity Building Activities on the Advanced Surface Movement Guidance and Control System (A-SMGCS) Implementation	

References:

- GASP 20232025 Goal 1 "Achieve a Continuous Reduction of Operational Safety Risks".
- GASP SEIs (States, Region, and industry) – Mitigate contributing factors to RI accidents and incidents.

Stakeholders: RASG-MID, MIDANPIRG, States, industry, international organizations		
Action 1: Conduct Capacity Building Activities on the Advanced Surface Movement Guidance and Control System (A-SMGCS) Implementation		
Owner:	ICAO	
Priority:	High	
Completion Date:	2025	
Status:	New	
EXPECTED OUTPUT		
Deliverable(s)		**Timeline**
Mitigate contributing factors to RI accidents and incidents		2025

7.2.1.4   G1-SEI-4: Controlled Flight into Terrain (CFIT)

7.2.1.4.1   G1-SEI-4A1- Controlled Flight into Terrain (CFIT)

Target: The safety targets of this goal are indicated in the MID Region SPMM at **Appendix C.**

Rationale:
It comprises those situations where the aircraft collides or nearly collides with terrain while the flight crew has control of the aircraft. It also includes occurrences, which are the direct precursors of a fatal outcome, such as descending below weather minima, undue clearance below radar minima, etc. There was no fatal accident involving MID States operators during this period. This key risk area has been raised by some MID States and in other parts of the world that make it an area of concern.

What we want to achieve:
Increase safety by continuously assessing and improving risk controls to mitigate the risk of CFIT.

How we monitor improvement:
Continuous monitoring of safety issues identified in the MID Region annual safety report for CAT aeroplane above 5,700 kgs.

How we want to achieve it:
States to set up a regular dialogue with their national aircraft operators on flight data monitoring (FDM) Programmes, with the objectives of: promoting the operational safety benefits of FDM, fostering an open dialogue on FDM Programmes that takes place in the framework of just culture,

encouraging operators to include and further develop FDM events relevant for the prevention of CFIT or other issues identified by the SSP.

States to include CFITs in national SSPs: CFIT should be addressed by the States on their SSPs and included in NASPs. This should include as a minimum agreeing a set of actions and measuring their effectiveness.

Actions: A1-A2-A3
A1- Advisory Circular: Instrument Approach Procedures Using Continuous Descent Final Approach Techniques
A2- Guidance for designing RNP Approach
A3- Advisory Circular: Crew Resource Management Training Programme (CRM)

References:

- GASP 2023-2025 Goal 1 "Achieve a Continuous Reduction of Operational Safety Risks".
- GASP SEIs (States, Region, and industry) – Mitigate contributing factors to CFIT accidents and incidents.
-

Stakeholders: ICAO, RASG-MID, MIDANPIRG States, industry, international organizations	
Action 1: Advisory Circular: Guidance for Operators on Training Programme on the use of GPWS	
Owner:	IATA and Aircraft manufacturers
Priority:	Medium
Completion Date:	2025
Status:	ongoing
Action 2- Guidance for designing RNP Approach	
Owner:	ICAO AND MID-FPP
Priority:	Medium
Completion Date:	2025
Status:	New
Action 3: Advisory Circular: Crew Resource Management Training Programme (CRM)	
Owner:	IATA and Aircraft manufacturers
Priority:	High
Completion Date:	2025
Status:	ongoing
EXPECTED OUTPUT	
Deliverable(s)	**Timeline**
Mitigate contributing factors to CFIT accidents and incidents	2025

7.2.1.4.2   G1-SEI-4A2- 5G Operation on Radio Altimeter

-

Stakeholders: ICAO, RASG-MID, MIDANPIRG, RASFG-MID States, industry, international organizations	
Action 1: Develop a guidance material on safeguarding measures to protect Radio Altimeter from potential harmful interference from 5G Operation	
Owner:	Radio Altimeter action group (RADALT AG)

Priority:	Medium
Completion Date:	2025
Status:	New

Action 2: Conduct a Webinar addressing the matter to raise awareness and promote the guidance material developed by the RADALT AG

Owner:	ICAO and RADALT AG
Priority:	Medium
Completion Date:	2025
Status:	New

EXPECTED OUTPUT	
Deliverable(s)	Timeline
Mitigate contributing factors to CFIT accidents and incidents including LOC-I	2025

7.2.1.5   G1-SEI-05: Airborne Conflict (Mid-Air Collisions)

7.2.1.5.1   G1-SEI-05A1: Loss of separation/TCAS RA

Target: The safety targets of this goal are indicated in the MID Region SPMM **at Appendix C.**

Rationale:
Airborne collision includes all occurrences involving actual or potential airborne collisions between aircraft, while both aircraft are airborne, and between aircraft and other airborne objects. This also includes all separation-related occurrences caused by either air traffic control (ATC) or cockpit crew, AIRPROX reports and genuine ACAS alerts. It includes direct precursors such as separation minima infringements, genuine TCAS resolution advisories or airspace infringements.

Although there have been no aeroplane mid-air collision accident in recent years within the MID States, this risk area has been raised by some MID States specifically in the context of the collision risk posed by military aircraft operating in Gulf area over the high seas which are not subject to any coordination with related FIRs for airborne operation. This is one specific safety issue that is a main priority in this key risk area.

States must have due regard for the safety of civil aircraft and must have established respective regulations for national State aircraft.
Some States had reported an increase in incidents involving close encounters between civil and military aircraft and more particularly an increase in non-cooperative international military traffic over the high-sea waters. The States could consider the following recommendations:

1. Fully apply the ICAO Manual on Civil-Military Cooperation in Air Traffic Management (Doc 10088);
2. Closely coordinate to develop, harmonize and publish operational requirements and instructions for State aircraft to ensure that 'due regard' for civil aircraft is always maintained;
3. Support the development and harmonization of civil/military coordination procedures for ATM at MID Region level and beyond if possible; and
4. Report relevant occurrences.

What we want to achieve:
Increase safety by continuously assessing and improving risk controls to mitigate the risk of MAC.

How we monitor improvement:
Continuous monitoring of safety issues identified in the MID Region Annual Safety Report for CAT aeroplane above 5,700 kgs.

How we want to achieve it:

States to include MACs in national SSPs: MACs should be addressed by the States on their SSPs and included NASPs. This should include as a minimum agreeing a set of actions and measuring their effectiveness.
Sates to reinforce the appropriate reactions of flight crew in response to an airborne collision avoidance system (ACAS) resolution advisories (RA), which would help to mitigate the risk of mid-air collisions by providing safety promotion material and clear messages to pilots on the need to follow the instructions of the ACAS in high-risk situations.

Actions: A1-A2
A1- Conduct workshop to implement Civil-Military cooperation
A2- Conduct seminar on raising awareness among stakeholders related to the potential risk of MAC over high seas

References:

- GASP 2023-2025 Goal 1 "Achieve a Continuous Reduction of Operational Safety Risks".
- GASP SEIs (States, Region, and industry) – Mitigate contributing factors to MAC accidents and incidents.
- ICAO Doc 10088 'Manual on Civil/Military Cooperation in Air Traffic Management'

Stakeholders: RASG-MID, MIDANPIRG, States, industry, international organizations

Action 1: Conduct workshop to implement Civil-Military cooperation	
Owner:	ICAO, IATA, and States
Priority:	High
Completion Date:	2025
Status:	Ongoing

Action 2: Conduct seminar on raising awareness among stakeholders related to the potential risk of MAC over high seas	
Owner:	ICAO and States
Priority:	High
Completion Date:	2025
Status:	Ongoing

EXPECTED OUTPUT	
Deliverable(s)	**Timeline**
Mitigate contributing factors to MAC accidents and NMAC incidents	2025

7.2.1.5.2   G1-SEI-05A2: GNSS Interference

Stakeholders: RASG-MID, MIDANPIRG, States, industry, international organizations

Action 1: Raise awareness on the potential impact of GNSS interference on the aviation during the Civil-Mil Workshop.

Owner:	ICAO and IATA
Priority:	Medium
Completion Date:	2025
Status:	New

Action 2: Urge States to follow the reporting procedure agreed by MIDANPIRG Conclusion 19/4 when needed.

Owner:	ICAO
Priority:	Medium
Completion Date:	2025
Status:	New

EXPECTED OUTPUT

Deliverable(s)	Timeline
Mitigate contributing factors to MAC accidents and NMAC incidents	2025

7.2.1.5.3　　　　　G1-SEI-05A3: Ensure the Safe Operations of UAS (drones)

Target: The safety targets of this goal are indicated in the MID Region SPMM at **Appendix C.**

Rationale:
The civilian use of UAS has markedly increased in recent years. Research and development into the civilian applications of unmanned aircraft (UA) is a dynamic and rapidly evolving area. Control and guidance systems are now available that enable these aircraft to perform a variety of tasks that were previously unachievable, unreasonably expensive, or involved too much personal risk. As a result, UA have an increasing presence in controlled and uncontrolled airspace. In addition, available evidence demonstrates an increase of drones coming into close proximity with manned aviation (both aeroplanes and helicopters) and the need to mitigate the associated risk. In connection with this, some States in the region developed their national regulations to ensure safe operations of UAS. However, there are currently some States in the region are unable to develop their national regulations to ensure safe operations of UAS. Therefore, guidance material to be developed to assist states' CAA personnel in the implementation and oversight of UAS operations and to mitigate the risk of the MAC.
When available, the guidance material would serve as an example for consideration by MID States to create, add, or amend, future or existing national UAS guidance material by the respective CAA.

What we want to achieve:
MID Region States' civil aviation authorities to develop national regulations to ensure safe operations of UAS and to create growth while maintaining a high and uniform level of safety.

How we monitor improvement:
Increase of number of states established national regulations to ensure safe operations of UAS. The RASG-MID, members States, and partners would give feedback on the effectiveness of the activities.

How we want to achieve it: This SEI should be considered by States for inclusion in their NASPs

Actions:　　　　　　**A1-A2-A3**
A1- UAS iPack deployment

A2- Organize symposium
A3- Conduct survey on States UAS regulatory framework

References: ICAO SARPs and guidance documents and 2023-2025 GASP. This is related to 2023-2025 GASP Goal 1. "Achieve a Continuous Reduction of Operational Safety Risks"

Component 1 — State Safety Oversight (SSO) System

- GASP SEI-1: Consistent implementation of ICAO SARPs at the Regional level.
- GASP SEI-3: Regional safety enhancement initiatives to support consistent coordination of Regional Programmes in establishing adequate safety oversight capabilities.

Stakeholders: RASG-MID, MIDANPIRG, States, industry, international organizations

Action 1: UAS iPack Deployment	
Owner:	ICAO
Priority:	High
Completion date:	2025
Status:	New
Action 2: Organize symposium related to drones (UAS)	
Owner:	ICAO, ACAO. Supported by FAA
Priority:	Medium
Completion date:	2023
Status:	Ongoing
Action 3- Conduct survey on States UAS regulatory framework	
Owner:	ICAO and States
Priority:	Medium
Completion date:	2023
Status:	New

EXPECTED OUTPUT

Deliverable(s)	Timeline
Ensure the safe operations of UAS to mitigate the risk of MID-Air Collision (MAC).	2025

7.2.1.5.2   G1-SEI-05A2: GNSS Interference

Stakeholders: RASG-MID, MIDANPIRG, States, industry, international organizations

Action 1: Raise awareness on the potential impact of GNSS interference on the aviation during the Civil-Mil Workshop.	
Owner:	ICAO and IATA
Priority:	Medium
Completion Date:	2025

Status:	New
Action 2: Urge States to follow the reporting procedure agreed by MIDANPIRG Conclusion 19/4 when needed.	
Owner:	ICAO
Priority:	Medium
Completion Date:	2025
Status:	New
EXPECTED OUTPUT	

Deliverable(s)	Timeline
Mitigate contributing factors to MAC accidents and NMAC incidents	2025

7.2.1.5.3-   G1-SEI-05A3: Ensure the Safe Operations of UAS (drones)

Target: The safety targets of this goal are indicated in the MID Region SPMM at Appendix C.

Rationale:
The civilian use of UAS has markedly increased in recent years. Research and development into the civilian applications of unmanned aircraft (UA) is a dynamic and rapidly evolving area. Control and guidance systems are now available that enable these aircraft to perform a variety of tasks that were previously unachievable, unreasonably expensive, or involved too much personal risk. As a result, UA have an increasing presence in controlled and uncontrolled airspace. In addition, available evidence demonstrates an increase of drones coming into close proximity with manned aviation (both aeroplanes and helicopters) and the need to mitigate the associated risk. In connection with this, some States in the region developed their national regulations to ensure safe operations of UAS. However, there are currently some States in the region are unable to develop their national regulations to ensure safe operations of UAS. Therefore, guidance material to be developed to assist states' CAA personnel in the implementation and oversight of UAS operations and to mitigate the risk of the MAC.
When available, the guidance material would serve as an example for consideration by MID States to create, add, or amend, future or existing national UAS guidance material by the respective CAA.

What we want to achieve:
MID Region States' civil aviation authorities to develop national regulations to ensure safe operations of UAS and to create growth while maintaining a high and uniform level of safety.

How we monitor improvement:
Increase of number of states established national regulations to ensure safe operations of UAS. The RASG-MID, members States, and partners would give feedback on the effectiveness of the activities.

How we want to achieve it: This SEI should be considered by States for inclusion in their NASPs

Actions: **A1-A2-A3**	
A1- UAS iPack deployment	
A2- Organize symposium	
A3- Conduct survey on States UAS regulatory framework	

References: ICAO SARPs and guidance documents and 2023-2025 GASP. This is related to 2023-2025 GASP Goal 1. "Achieve a Continuous Reduction of Operational Safety Risks"

Component 1 — State Safety Oversight (SSO) System

- GASP SEI-1: Consistent implementation of ICAO SARPs at the Regional level.
- GASP SEI-3: Regional safety enhancement initiatives to support consistent coordination of Regional Programmes in establishing adequate safety oversight capabilities.

Stakeholders: RASG-MID, MIDANPIRG, States, industry, international organizations

Action 1: UAS iPack Deployment	
Owner:	ICAO
Priority:	High
Completion date:	2025
Status:	New

Action 2: Organize symposium related to drones (UAS)	
Owner:	ICAO, ACAO. Supported by FAA
Priority:	Medium
Completion date:	2023
Status:	Ongoing

Action 3- Conduct survey on States UAS regulatory framework	
Owner:	ICAO and States
Priority:	Medium
Completion date:	2023
Status:	New

EXPECTED OUTPUT

Deliverable(s)	**Timeline**
Ensure the safe operations of UAS to mitigate the risk of MID Air Collision (MAC)	2025

7.2.1.5.4   G1-SEI-05A4: Expansion of ATS route Networks

Stakeholders: RASG-MID, MIDANPIRG, States, industry, international organizations

Action 1: Conduct gap analysis to identify current ATS route networks gaps	
Owner:	ICAO and States
Priority:	Medium
Completion Date:	2025
Status:	New

Action 2: Establishment of parallel unidirectional ATS routes (De-confliction)	
Owner:	ICAO and States
Priority:	Medium
Completion Date:	2025
Status:	New

EXPECTED OUTPUT

Deliverable(s)	Timeline
Mitigate contributing factors to MAC accidents and NMAC incidents	2025

Appendix A- SEIG TORs

SAFETY ENHANCEMENT INITIATIVE GROUP

(SEIG)

TERMS OF REFERENCE

1.   PURPOSE OF THE SEIG TO:

1.1   Support the RASG-MID in the development/update of the MID Regional Aviation Safety Plan (MID-RASP) and the monitoring of the implementation of Safety Enhancement Initiatives (SEIs) related to identified safety issues.

1.2   Assist in the development, implementation and review of SEIs to reduce aviation safety risks. These SEIs could be established based on the analysis of regional data, based on ICAO initiatives or the initiatives of other relevant organizations or based on the risks and issues identified through the USOAP audits process.

1.3   Recommend safety mitigations to the RASG-MID related to identified safety issues which would reduce aviation risks.

1.4 In order to meet its Terms of Reference, the SEIG shall:

a.   follow-up the updates of the Global Aviation Safety Plan (GASP) and support the development, update and implementation of the MID Regional Aviation Safety Plan (MID-RASP) at the regional level and provide feedback to the RASG-MID;

b.   identify and develop the SEIs, which are aligned with the regional priorities and targets, for implementation within the MID Region. The focus of these SEIs is to effectively and economically mitigate the safety risks identified by the ASRG;

c.   identify difficulties, challenges and deficiencies related to the implementation of each SEI and propose mitigation measures;

d.   identify assistance Programmes such as, but not limited to, workshops, seminars and capacity building activities to improve the level of implementation of the approved SEIs by the RASG-MID;

e.   share expertise and experience and provide recommended actions for each SEI, in a prioritized manner based on best practices;

f.   monitor the status of achieving related safety objectives and targets included in the MID Region Safety Strategy;

g.   identify areas of concern to aviation safety that may be unique to the region, and develop data and mitigations to address those concerns;

h.   work closely with States and stakeholders to ensure that SEIs and mitigation measures are implemented through a coordinated effort;

i.   propose input to the RASG-MID for the development of the RASG-MID Annual Work Programme; and

j.   Coordinate with relevant RASG-MID, MIDANPIRG and MID-RASFG subsidiary bodies issues with common interest.

2. COMPOSITION

The SEIG is composed of Members designated by the MID States and Partners.

3. ROLES AND RESPONSIBILITIES

- SEIG Chairpersons: – Coordinate SEIG activities and provide overall guidance and leadership;

- ICAO: Support; and

- Partners: collaborate in the development of materials as requested by the SEIG, and provide technical expertise and support, as required.

4. MEETINGS ARRANGEMENTS

- The Chairperson, in close co-operation with the Secretary, shall make all necessary arrangements for the most efficient working of the SEIG. The SEIG shall at all times conduct its activities in the most efficient manner possible with a minimum of formality and paper work (paperless meetings). Permanent contact shall be maintained between the Chairperson, Secretary and Members of the SEIG to advance the work. Best advantage should be taken of modern communications facilities, particularly video-conferencing (Virtual Meetings) and e-mails.

- Face-to-face meetings will be conducted when it is necessary to do so.

Appendix B- Identified safety issues as indicated in the 11ᵗʰ MID ASR

Potential Accident Outcome							
Safety Issues	CFIT	LOC-I	MAC	GCOL	RE/ARC	Injury Damage inflight	Injury Damage on Ground
Monitoring of flight paremeters and automation modes	x	x			x		
Adverse Convective weather	x	x			x	x	
Un-stabilized Approach		x			x		x
Flight planning and preparation	x	x	x	x	x		
Crew Resource Management	x	x	x	x	x		
Handling of technical failure	x	x		x	x		x
Handling and execution of GOA	x	x			x		
Loss of separation in flight/ and/or airspace/TCAS RA			x			x	
Experience, training and competence of Flight Crews	x	x	x		x		
Deconfliction between IFR and VFR traffic			x				
Inappropriate flight control inputs		x			x		
Fatigue	x	x					
Entry of aircraft performance data		x					
Contained engine Failure/Power Plant Malfunctions		x			x	x	
Birdstrike/Engine Bird ingestion		x			x		
Fire/Smoke-non impact		x				x	
Wake Vortex		x				x	
Deviation from pitch or roll attitude	x	x			x		
Security Risks with impact on Safety		x					
Tail/Cross wind/Winds hear		x			x		x

Potential Accident Outcome						
Safety Issues	CFIT	LOC-I	MAC	GCOL	RE/ARC	Injury Damage inflight	Injury Damage on Ground
Runway Incursion				x	x		x
Maintenance events	x	x				x	
Contaminated runway/Poor braking action					x		x
Clear Air Turbulence (CAT) and Montain Waves		x				x	

Appendix C-MID Region-Safety Performance Measurement &Monitoring (SPMM)

Aspirational Goal: Zero Fatality by 2030

Goal 1:   Achieve a Continuous Reduction of Operational Safety Risks

Safety Indicator	Safety Target	Timeline
Number of accidents per million departures	Regional average rate of accidents to be in line with the global average rate	2025
Number of fatal accidents per million departures	Regional average rate of fatal accidents to be in line with the global average rate	2025
Number of fatalities per million departures	Number of fatalities per billion passengers carried (fatality rate) to be in line with the global average rate	2025
Number of Runway Excursion accidents per million departures	Regional average rate of Runway Excursion accidents to be below the global average rate	2025
Number of Runway Incursion accidents per million departures	Regional average rate of Runway Incursion accidents to be below the global average rate	2025
Number of LOC-I related accidents per million departures	Regional average rate of LOC-I related accidents to be below the global rate	2025
Number of CFIT related accidents per million departures	Regional average rate of CFIT related accidents to be below the global rate	2025
Number of Mid Air Collision (accidents)	Regional average Mid Air Collision accident	2025

Goal 2:   Strengthen States' Safety Oversight Capabilities

Safety Indicator	Safety Target	Timeline
USOAP-CMA Effective Implementation (EI) results: a. Regional average EI b. Number of audited States with an overall EI over 60% c. Regional average EI by area d. Regional average EI by CE e. Regional average EI of PPQs	a. Regional average EI to be above 80% : b. All MID audited States to be above 60% EI c. Regional average EI for each area to be above 70% d. Regional average EI for each CE to be above 70% e. Regional average EI PPQs above 75% :	a. 2023-2025 b. 2023-2025 c. 2023-2025 d. 2023-2025 e. 2023-2025

Goal 3:   Implement effective State safety Programmes (SSPs)

Safety Indicator	Safety Target	Timeline
Regional Average SSP Foundation	85%	2023- 2025
Number of States having an SSP that is present*	At least 4 States	2023- 2025
Number of States that have developed and published a national aviation safety plan (NASP)	All States	2023- 2025
Number of States that require applicable service providers under their authority to implement an SMS	All States	2023- 2025

*: The term "present" is based on the maturity levels established in the ICAO SSP Implementation Assessment (SSPIA).

Goal 4:   Increase Collaboration at the Regional Level

Safety Indicator	Safety Target	Timeline
Percentage of safety enhancement initiatives (SEIs)/Safety Actions completed	80%	2023-2025
Number of States seeking/receiving assistance, to strengthen their Safety Oversight capabilities through NCLB MID Strategy/Technical assistance	States with SSC as a first priority All States as a second priority having EI below 80%	2023-2025
Number of States seeking assistance to facilitate SSP & NASP implementation through NCLB MID Strategy/Technical assistance	All States	2023-2025
Number of States sharing safety information including operational safety risks and emerging issues to support the development of MID ASR	All States	2023-2025

Goal 5:   **Expand the use of Industry Programmes and safety information sharing networks**

Safety Indicator	Safety Target	Timeline
Use of the IATA Operational Safety Audit (IOSA), to complement safety oversight activities.	a. Maintain at least 60% of eligible MID airlines to be certified IATA-IOSA at all times. b. All MID States with an EI of at least 60% use the IATA Operational Safety Audit (IOSA) to complement their safety oversight activities.	a. 2023-2025 b. 2023- 2025
Use of the IATA Safety Audit for Ground Operations (ISAGO) certification, as a percentage of all Ground Handling service providers	The IATA Ground Handling Manual (IGOM) endorsed as a reference for ground handling safety standards by all MID States. Pursue at least 25% increase in ISAGO registration	2023-2025
Coordinate the ACI Airport Excellence (APEX) in Safety Programme	At least 2 ACI APEX in Safety to be conducted for 2 Airports of the Region per year	2023-2025
Number of States that have established Safety data collection and processing system (SDCPS)	At least 12 States	2023-2025
Number of MID RASP developed in consultation with industry	MID-RASP 2023-2025	2023

Goal 6:   Ensure Appropriate Infrastructure is available to Support Safe Operations

Safety Indicator	Safety Target	Timeline
Percentage of Certified International Aerodromes*	65%	2023-2025
Percentage of Runway Safety Team (RST) effectively implemented at International Aerodromes*	80%	2023-2025
Percentage of Global reporting Format (GRF) Plans implemented for International Aerodromes*	75%	2023-2025

*: International Aerodromes included in the MID ANP (Aerodromes Operations: AOP Table I-I)

Appendix D: Safety Actions- Consolidated List of SEIs with their respective Actions for follow up- Draft

SEI Code	SEI Name	Actions	Owner(s)	Status/Progress	Completion Date
		Regional Operational Safety Risks			
		Goal 1: Achieve a Continuous Reduction in Operational Risks			
G1-SEI-01:	Aircraft Upset in Flight (LOC-I)	**A1-** Guidance material on flight crew proficiency	IATA and Aircraft manufacturers/industry	To be supported by Airbus	2025
		A2- Advisory Circular: Mode Awareness and Energy State Management Aspects of Flight Deck Automation	IATA and Aircraft manufacturers/industry.	To be supported by Airbus	2025
		A3- Conduct Upset Recovery capacity building activities	UPRT Workshop. Airbus, ICAO, Kuwait		2025
		A4- Develop guidance material on the air cargo safety	Oman		2025
G1-SEI-02:	Runway Safety- Runway Excursion	**A1-** Support States to implement the Global Reporting Format (GRF) Methodology through capacity building activities.	ICAO and ACI		2025
		A2- MID Region Action Plan/Milestones on the Global Reporting Format (GRF) Implementation.	ICAO		2025

SEI Code	SEI Name	Actions	Owner(s)	Status/Progress	Completion Date
G1-SEI-03:	Runway Safety- Runway Incursion	**A1-** Conduct Capacity Building Activities on the Advanced Surface Movement Guidance and Control System (A-SMGCS) Implementation	ICAO	To be supported by Euro-Control, FAA	2023
G1-SEI-04A1:	Controlled Flight into Terrain (CFIT)	**A1-** Advisory Circular: Instrument Approach Procedures Using Continuous Descent Final Approach Techniques.	IATA and Aircraft manufacturers		2025
		A2- Guidance for designing RNP Approach	ICAO and MID FPP		2025
		A3- Advisory Circular: Crew Resource Management Training Programme (CRM)	IATA and Aircraft manufacturers		2025
G1-SEI-04A2	5G Operations on Radar Altimeter	**A1-** Develop a guidance material on safeguarding measures to protect Radio Altimeter from potential harmful interference from 5G Operation	Radio Altimeter Action Group (RADALT AG)	To be supported by Boeing	2025
		A2- Conduct a Webinar addressing the matter to raise awareness and promote the guidance material developed by the RADALT AG	ICAO and RADALT AG	To be supported by Airbus & Boeing	2025
G1-SEI-05B1:	MAC- Loss of Separation	**A1-** Conduct workshop to implement Civil-Military cooperation	ICAO, States, and International Organizations		2025
		A2- Conduct seminar on raising awareness among stakeholders related to the potential risk of MAC over high seas	ICAO, States, and international organizations		2025
G1-SEI-05B2:	GNSS Interference	**A1**: Raise awareness on the potential impact of GNSS interference on the aviation during the Civil-Mil Workshop	ICAO and IATA		2025

SEI Code	SEI Name	Actions	Owner(s)	Status/Progress	Completion Date
		A2- Urge States to follow the reporting procedure agreed by MIDANPIRG Conclusion 19/4 when needed	ICAO		2025
G1-SEI-05B3:	Ensure the Safe Operations of UAS (Drones)	**A1-** UAS iPack deployment	ICAO and States		2025
		A2- Organize symposium on Drones related subjects	ICAO and ACAO	Supported FAA and Boeing	2023
		A3- Conduct survey on States UAS regulatory framework	ICAO and States		2025
G1-SEI-05B4:	Expansion of ATS route Networks	**A1-** Conduct gap analysis to identify current ATS route networks gaps	ICAO and States		2025
		A2- Establishment of parallel unidirectional ATS routes (De-confliction)	ICAO and States		2025
		Organizational Challenges/issues			
		Goal 2: Strengthen States' Safety Oversight Capabilities			
G2-SEI-01:	Strengthening of States' Safety Oversight Capabilities	**A1-** Conduct Capacity Building Activities to promote effective implementation of SARPs	ICAO, States, International Organizations, and Industry	"Inspectors training" to be Supported by Airbus.	2025
		A2- Conduct technical assistance and NCLB missions to States , with focus on states with EI<80% as well as ANS, AIG, AGA, and OPS areas	ICAO and States		2025
		A3- Develop and implement a specific NCLB plan of actions.	ICAO, States, International Organizations, and Industry		2025

SEI Code	SEI Name	Actions	Owner(s)	Status/Progress	Completion Date
		A4 - Conduct a Capacity Building Activity for Aerodrome Inspectors (Training Course on Aerodrome Inspection) **(Action addressed under G6-SEI-01 A5)**	States (Qatar) and ICAO		2025
		A5- Develop guidance material to assist MID Region States in the issuance of exemptions related to temporary deviations from standards	Qatar	supported by Iran, Sudan, UAE, ACAO, and IATA	2025
		A6- Develop guidance material to support States for the conduct of remote surveillance	Qatar	supported by Iran, Jordan, Saudi Arabia, Sudan, UAE, and ACAO	2025
		A7- Develop guidance material on the enhancement of understanding the concept of judicial enforcement for aviation inspectors	Qatar	supported by Saudi Arabia and UAE	2025
G2-SEI-03:	Sharing of Safety Recommendations related to Accidents and Serious Incidents	**A1-** Establishing a Platform for Sharing Safety Recommendations for MENA ARCM Member States	ICAO, ACAO, and MENA ARCM Member States	On-hold	2025
G2-SEI-04:	Enhance State Oversight on Dangerous Goods	**A1-** Dangerous Goods (DG) capacity building activities including Lithium batteries fire/smoke risk in cabin	ICAO, States, International Organizations, And Industry		2025
		A2- Develop guidance material on carriage and transport of Lithium batteries	IATA, States, International Organizations, And Industry		2025
G2-SEI-05:	Human factors and Competence of Personnel	**A1-** Advisory Circular: Crew Resource Management Training Programme (CRM). **(Action addressed under G1-SEI-04: CFIT).**	IATA and Industry		2025

SEI Code	SEI Name	Actions	Owner(s)	Status/Progress	Completion Date
		A2- Organize Crew Resource Management Capacity building activities	ICAO &Jordan, States, International Organizations, and Industry	CBTA and EBT to be supported by Airbus and FAA	2025
		A3- Organize Team Resource Management Capacity building activities	ICAO & Jordan States, International Organizations, and Industry	FAA	2025
		A4- Conduct Fatigue Risk Management and Mental Health Best Practices Capacity building activities	ICAO & Jordan States, International Organizations, and Industry	To be supported by Airbus	20225
G2-SEI-06:	Impact of security on safety	**A1-** Organize seminar/Symposium/Workshop to exchange experiences and good practices on assessing the risks and sharing of information related to the overflying of conflict zones in coordination with RASFG-MID and MIDANPIRG.	ICAO		2025
		A2- Risk management on conflict zone workshop	ICAO/ACAO		2023
G2-SEI-07:	Managing cybersecurity risks	**A1-** Develop a Regional Action Plan to bridge the gap between ICAO Cyber Security Action plan and the implementation level of Cyber Resilience in the MID Region	ANS Cyber SeC Action Group		2025
		A2- Conduct activities on Cyber Security and Resilience- (Jointly ANS and AVSEC)	ICAO	To be supported by Boeing	2025

SEI Code	SEI Name	Actions	Owner(s)	Status/Progress	Completion Date
		A3- Develop a MID Region Cybersecurity Action Plan	Cybersecurity Security Ad-hoc Group		2025
G2-SEI-08:	Impact of COVID-19 pandemic- Safe return to operations	**A1-** Continued support to the aviation industry through MID-RPTF meetings/Activities, as needed	ICAO, States, International Organizations, and Industry		2025
		A2- Sharing of guidance material/best practices	ICAO, States, International Organizations, and Industry	To be support by Airbus	2025

Goal 3: Implementation of Effective States Safety Programme (SSP)

SEI Code	SEI Name	Actions	Owner(s)	Status/Progress	Completion Date
G3-SEI-01:	Implement an effective Safety Management	**A1-** Conduct ICAO SSP/SMS Capacity building activities	SSP workshops for States. SMS & Flight Data analysis workshop for airlines. Airbus, ACAO and ICAO. 2023		2025
		A2- Conduct Technical Assistance missions by SMIT	ICAO and States		2025
G3-SEI-02:	NASP Development & Implementation	**A1-** Conduct NASPs workshops & technical assistance missions	ICAO		2025
		A2- NASP iPacks deployment	ICAO		2025

Goal 4: Increase Collaboration at the Regional Level

SEI Code	SEI Name	Actions	Owner(s)	Status/Progress	Completion Date
G4-SEI-01:	Development and Implementation of	**A1-** Development and Implementation of MID-RASP 2023-2025 Edition	ICAO & SEIG		2023

	MID-RASP						2025
G4-SEI-02:	Enhance collaboration between States, international organizations, and industry	**A1-**	Develop and agree on joint work activities through MID-RCM meetings	ICAO, States, Regional Groups, International Organizations, and Industry			2025
		A2-	Support the establishment of MENA RSOO and its activities	ICAO and States			2025

<table>
<tr><td colspan="8" align="center">Goal 5: Expand the Use of Industry Programmes and Safety Information Sharing Networks</td></tr>
<tr><td>G5-SEI-01:</td><td>Promote the Use of industry Programmes</td><td>A1-</td><td>Encourage IATA's IOSA and ISAGO registrations through safety promotion</td><td align="center">IATA</td><td></td><td></td><td>2025</td></tr>
<tr><td></td><td></td><td>A2-</td><td>Encourage the implementation of ACI Airport Excellence (APEX) in Safety Programme</td><td align="center">ICAO and ACI</td><td></td><td></td><td>2025</td></tr>
</table>

<table>
<tr><td colspan="8" align="center">Goal 6: Ensure the Appropriate Infrastructure is available to Support Safe Operations</td></tr>
<tr><td>G6-SEI-01:</td><td>Certification of International Aerodromes</td><td>A1-</td><td>Support States on the implementation of the ICAO Annex 14 requirements to achieve compliance with regards to Aerodrome Design and Operations, through capacity building activities.</td><td align="center">ICAO and ACI</td><td></td><td></td><td>2025</td></tr>
<tr><td></td><td></td><td>A2-</td><td>Enhance capacity building for States CAAs and Airport operators related to Aerodromes Certification through capacity building activities.</td><td align="center">ICAO and ACI</td><td></td><td></td><td>2025</td></tr>
<tr><td></td><td></td><td>A3 -</td><td>Deployment of iPack on Aerodrome Re-Start</td><td align="center">ICAO and States</td><td></td><td></td><td>2025</td></tr>
<tr><td></td><td></td><td>A4 -</td><td>Support States in implementing aerodrome oversight/inspection mechanism through capacity building activities on Aerodrome Oversight</td><td align="center">ICAO</td><td>Supported by FAA</td><td></td><td>2025</td></tr>
<tr><td></td><td></td><td>A5 –</td><td>Conduct a Capacity Building Activity for Aerodrome Inspectors</td><td align="center">States (Qatar) and ICAO</td><td></td><td></td><td>2025</td></tr>
</table>

		(Training Course on Aerodrome Inspection)			
		A6 – Conduct a Wildlife Hazard Management Control capacity building Activities	ICAO, ACAO, WBA	Supported by International Organizations	2025
G6-SEI-02:	Establish Runway Safety Team (RST) at International Aerodromes	**A1-** Conduct Runway Safety Go-Team (RST) assistance missions	ICAO	Supported RSP (Runway Safety Programme Partners)	2025
		A2: Support States to implement the Global Reporting Format Methodology through capacity building activities**: (Action addressed under G1-SEI-02: Runway Excursion).**	ICAO and ACI		2025

Appendix E:

SEIs identified in MID-RASP may be considered by States for inclusion in their NASPs, as appropriate

SEI Code	SEI name
Organizational Challenges	
Goal 2: Strengthen States' Safety Oversight Capabilities	
G2-SEI-01:	Strengthening of States' Safety Oversight Capabilities
G2-SEI-04:	Enhance State Oversight on Dangerous Goods
G2-SEI-05:	Human factors and Competence of Personnel
G2-SEI-06:	Impact of security on safety
G2-SEI-07:	Managing cybersecurity risks
G2-SEI-08:	Impact of COVID-19 pandemic- Safe return to operations
Goal 3: Implementation of Effective States Safety Programme (SSP)	
G3-SEI-01:	Implement safety management
G3-SEI-02:	NASP Development & Implementation
Goal 6: Ensure the Appropriate Infrastructure is available to Support Safe Operations	
G6-SEI-01:	Certification of International Aerodromes
G6-SEI-02:	Establish Runway Safety Team (RST) at International Aerodromes
Regional Operational Safety Risks	
Goal 1: Achieve a continuous reduction in Operational Risks	
G1-SEI-01:	Aircraft upset in flight (LOC-I)
G1-SEI-02:	Runway Excursion (RE)
G1-SEI-03:	Runway Incursion (RI)
G1-SEI-4A1:	Controlled Flight Into Terrain (CFIT)
G1-SEI-04A2:	5G operations on Radar Altimeter
G1-SEI-05A1:	MAC- Loss of separation/TCAS RA
G1-SEI-05A2:	GNSS Interference
G1-SEI-05A3:	Ensure the Safe Operations of UAS (drones)

Appendix F: Definitions

Accident Investigation Authority. The authority designated by a State as responsible for aircraft accident and incident investigations within the context of Annex 13.

Audit Area. One of eight audit areas pertaining to the Universal Safety Oversight Audit Programme (USOAP), i.e. primary aviation legislation and civil aviation regulations (LEG), civil aviation organization (ORG); personnel licensing and training (PEL); aircraft operations (OPS); airworthiness of aircraft (AIR); aircraft accident and incident investigation (AIG); air navigation services (ANS); and aerodromes and ground aids (AGA).

Contributing Factors. Actions, omissions, events, conditions, or a combination thereof, which, if eliminated, avoided or absent, would have reduced the probability of the accident or incident occurring, or mitigated the severity of the consequences of the accident or incident. the identification of contributing factors does not imply the assignment of fault or the determination of administrative, civil or criminal liability.

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.

Operator. The person, organization or enterprise engaged in or offering to engage in an aircraft operation.

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 Audit. A USOAP CMA audit that a State requests and pays for (on a cost recovery basis). The State determines the scope and date of a safety audit. Also see definition of audit.

Safety Data. A defined set of facts or set of safety values collected from various aviation related sources, which is used to maintain or improve safety.

Note: such safety data is collected from proactive or reactive safety-related activities, including but not limited to:

   a. accident or incident investigations;
   b. safety reporting;
   c. continuing airworthiness reporting;
   d. operational performance monitoring;
   e. inspections, audits, surveys; or
   f. safety studies and reviews.

Safety Enhancement: initiative (SEI). One or more actions to eliminate or mitigate risks associated with contributing factors to a safety occurrence or to address an identified safety deficiency. There are two main types of SEIs to address safety risks and issues at the Regional level.

Safety Information. Safety data processed, organized or analyzed in a given context so as to make it useful for safety management purposes.

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 safety achievement as defined by its safety performance targets and safety performance indicators.

Safety Performance Indicator. A data-based parameter used for monitoring and assessing safety performance.

Safety Performance Target. The State or service provider's planned or intended target for a safety performance indicator over a given period that aligns with the safety objectives.

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 regulations and activities aimed at improving safety.

Appendix G: Abbreviations and Acronyms

AIIA: Accident and Incident Investigation Authority
ACI: Airports Council International
ADRM: Aerodrome
AGA: Aerodrome and Ground Aids
AIG: Aircraft Accident and Incident Investigation
ALAR: Approach and Landing Reduction
ANS: Air Navigation Services
ANSP: Air Navigation Service Provider
APV: Approaches with Vertical Guidance
ARC: Abnormal Runway Contact
ASBU: Aviation System Block Upgrade
ASR: Annual Safety Report
ATM: Air Traffic Management
ATS: Air Traffic Services
BIRD: Bird Strike
CAA: Civil Aviation Authority
CASI: Civil Aviation Safety Inspectors
CAST: Commercial Aviation Safety Team
CE: Critical Element
CFIT: Controlled Flight into Terrain
CICTT: CAST/ICAO Common Taxonomy Team
CMA: Continuous Monitoring Approach
CRM: Crew Resource Management
CAST: US Commercial Aviation Safety Team
DGCA: Conference of Directors General of Civil Aviation
EI: Effective Implementation
FDAP: Flight Data Analysis Programme
FIR: Flight Information Region
F-NI: Fire/ Smoke (Non-Impact)
GADSS: Global Aeronautical Distress and Safety System
GANP: Global Air Navigation Plan
GASeP: Global Aviation Security Plan
GASOS: Global Aviation Safety Oversight System
GASP: Global Aviation Safety Plan
GASP-SG: Global Aviation Safety Plan Study Group
GEN: General Aspects
GPWS: Ground Proximity Warning System
G- HRC: Global-High Risk Categories of Occurrences
IATA: International Air Transport Association
ICAO: International Civil Aviation Organization
IFALPA: International Federation of Airline Pilots' Associations
IOSA: IATA Operational Safety Audit
ISAGO: IATA Safety Audit for Ground Operations
iSTARS: Integrated Safety Trend Analysis and Reporting System
LOC-I: Loss of Control In-flight
MAC: AIRPROX/ TCAS alert/ loss of separation/ near miss collisions/ mid-air collisions
MTOW: Maximum Take-Off Weight

NASP:	National Aviation Safety Plan
NCLB:	No Country Left Behind
NDP:	National Development Plan
OAG:	Official Airline Guide
OPS:	Flight Operations (USOAP Audit Area)
ORG:	Civil Aviation Organization (USOAP Audit Area)
PDCA:	Plan-Do-Check-Act methodology
RAMP:	Ground Handling
RASG:	Regional Aviation Safety Group
RASP:	Regional Aviation Safety Plan
RE:	Runway Excursion (departure or landing)
RI:	Runway Incursion
RS:	Runway Safety
RSOO:	Regional Safety Oversight Organization
RST:	Runway Safety Team
RTC:	ICAO Regional Training Centre of Excellence
SAFE:	ICAO Safety Fund
SARPs:	Standards and Recommended Practices
SCF-NP:	System/Component Failure or Malfunction – Non-power plant
SCF-PP:	System/Component Failure or Malfunction - Power plant
SDCPS:	Safety Data Collection and Processing System
SEI:	Safety Enhancement Initiatives
SISG:	ICAO's Safety Indicator Study Group
SMS:	Safety Management Systems
SPI:	Safety Performance Indicator
SSC:	Significant Safety Concern
SSO:	State Safety Oversight
SSP:	State Safety Programme
SRP:	Safety Reporting and Programme
TCAS:	Traffic Collision and Avoidance System
TOR:	Terms of Reference
UAS:	Unmanned Aircraft Systems
UNK:	Unknown or Undetermined
UPRT:	Upset Prevention and Recovery Training
USOAP:	Universal Safety Oversight Audit Programme
USOS:	Undershoot/ Overshoot

-END-

CREDITS

The RASG-MID thanks **Mr. Mohamed Chakib** for developing the MID-RASP 2023-2025 Edition.

International Civil Aviation Organization
Middle East Office
Cairo International Airport
Cairo 11776, EGYPT

Tel.: +20 2 22674840/41/45/46
Fax: +20 2 22674843
Email: icaomid@icao.int

www.icao.int/mid

Consolidated List of SEIs with their respective Safety Actions

SEI Code	SEI Name	Actions	Owner(s)	Status/Progress	Completion Date
		Regional Operational Safety Risks			
		Goal 1: Achieve a Continuous Reduction in Operational Risks			
G1-SEI-01:	Aircraft Upset in Flight (LOC-I)	**A1-** Guidance material on flight crew proficiency	IATA to be supported by Airbus		2023- 2025
		A2- Advisory Circular: Mode Awareness and Energy State Management Aspects of Flight Deck Automation	IATA to be supported by Airbus		2023- 2025
		A3- Conduct Upset Recovery capacity building activities	UPRT Workshop. Airbus, ICAO, Kuwait	Regional ICAO UPRT Workshop (jointly involving Airbus, ICAO, Kuwait) conducted in Kuwait 7-11 May 2023. **Completed for 2023/**Continuous for 2024	2023-2025
		A4- Develop guidance material on the air cargo safety	Oman	Planned for 2024	2023-2025
G1-SEI-02:	Runway Safety- Runway Excursion	**A1-** Support States to implement the Global Reporting Format (GRF) Methodology through capacity building activities.	ICAO and ACI	**Completed for 2023/** continuous for 2024/2025	2023-2025
		A2- MID Region Action Plan/Milestones on the Global Reporting Format (GRF) Implementation.	ICAO	**Completed for 2023/** continuous for 2024/2025	2023-2025
G1-SEI-03:	Runway Safety- Runway Incursion	**A1-** Conduct Capacity Building Activities on the Advanced Surface Movement Guidance and Control System (A-SMGCS) Implementation	ICAO To be supported by Euro-Control, FAA	**Completed** Conducted February 2023	2023-2025

SEI Code	SEI Name	Actions	Owner(s)	Status/Progress	Completion Date
G1-SEI-04A1:	Controlled Flight into Terrain (CFIT)	**A1-** Advisory Circular: Instrument Approach Procedures Using Continuous Descent Final Approach Techniques.	IATA supported by aircraft manufacturers		2023-2025
		A2- Guidance for designing RNP Approach	ICAO and MID FPP	Planned for 2024	2023-2025
		A3- Advisory Circular: Crew Resource Management Training Programme (CRM)	IATA supported by Aircraft manufacturers		2023-2025
		A4- Awareness Material on the vulnerabilities of BARO-VNAV approaches and mitigation actions	ICAO	Planned for 2024	2023-2025
G1-SEI-04A2	5G Operations on Radar Altimeter	**A1-** Develop a guidance material on safeguarding measures to protect Radio Altimeter from potential harmful interference from 5G Operation	Radio Altimeter Action Group (RADALT AG) To be supported by Boeing	**Completed** Publication of the guidance material: MID DOC 15 edition 1.0 in May 2023.	2023-2025
		A2- Conduct a Webinar addressing the matter to raise awareness and promote the guidance material developed by the RADALT AG	ICAO and RADALT AG To be supported by Airbus & Boeing	**Completed** The webinar has been conducted.	2023-2025
G1-SEI-05B1:	MAC- Loss of Separation	**A1-** Conduct workshop to implement Civil-Military cooperation.	ICAO supported by States, and International Organizations	At national level, workshop has been conducted in Iran in 2022 and follow up meeting was conducted in Aug 2023. In this respect the action plan has been developed and agreed. **Completed** In addition, this issue has been raised by Iran during MIDANPIRG 20 meeting. As agreed in the side meeting with participation of Bahrain, Iran, Oman, Qatar, Saudi Arabia and UAE, states are going to report safety issues regarding the operation of due regard specifically	2023-2025

SEI Code	SEI Name	Actions	Owner(s)	Status/Progress	Completion Date
				over the high seas to ICAO MID for further study and actions. At regional level, the plan was postponed to 2024. The ATM SG developed a draft reporting form, will be presented to the MIDANPIRG/21 for endorsement	
		A2- Conduct seminar on raising awareness among stakeholders related to the potential risk of MAC over high seas	ICAO supported by States, and international organizations		2023-2025
G1-SEI-05B2:	GNSS Interference	**A1:** Raise awareness on the potential impact of GNSS interference on the aviation during the Civil-Mil Workshop	ICAO and IATA	The CMC Workshop is planned during 2024.	2023-2025
		A2- Urge States to follow the reporting procedure agreed by MIDANPIRG Conclusion 19/4 when needed	ICAO	SL has been issued. **Completed**	2023-2025
		A3- Capacity Building on GNSS operations and GNSS RFI	ICAO and ACAO	Regional GNSS Workshop is planned for 2024	2023-2025
G1-SEI-05B3:	Ensure the Safe Operations of UAS (Drones)	**A1-** UAS iPack deployment	ICAO and States		2023-2025
		A2- Organize symposium on Drones related subjects	ICAO and ACAO supported by FAA and Boeing	ACAO organized Drones symposium in Morocco during the period 4-5 October 2023. **Completed/**Continuous for 2024**.**	2023-2025
		A3- Conduct survey on States UAS regulatory framework	ICAO and States	To be circulated during 2024	2023-2025
G1-SEI-05B4:	Expansion of ATS route Networks	**A1-** Conduct gap analysis to identify current ATS route networks gaps	ICAO and States	Required data and information have been gathered and dashboard was deployed. **Completed**.	2023-2025

SEI Code	SEI Name	Actions	Owner(s)	Status/Progress	Completion Date
		A2- Establishment of parallel unidirectional ATS routes (De-confliction)	ICAO and States	Establishment of the parallel airway at interface of Kuwait and Iraq is on process. In addition Iran requested to establish new parallel ATS route between Iran and Iraq to accommodate regional traffic in the most safe and efficient manner. **Completed.** In addition, During last MIDANPIRG proposed to enhance the structure of the ATS route at interface of MID and APAC regions by establishment of required parallel airways. This WP was supported by UAE and Saudi Arabia and endorsed by MIDANPIRG 20. **Ongoing.**	2023-2025
Organizational Challenges/issues					
Goal 2: Strengthen States' Safety Oversight Capabilities					
G2-SEI-01:	Strengthening of States' Safety Oversight Capabilities	**A1-** Conduct Capacity Building Activities to promote effective implementation of SARPs	ICAO, States, International Organizations, and Industry.	USOAP workshops conducted. ACAO and Singapore CAA: an AOC certification & Flight Inspectors course conducted in Amman the 29 -2 Jun 2023. **Completed/**continuous for 2024.	2023-2025
		A2- Conduct technical assistance and NCLB missions to States , with focus on states with EI<80% as well as ANS, AIG, AGA, and OPS areas	ICAO and States	TAs conducted 2023 (Kuwait, Lebanon, Oman, Sudan, Libya). ANS Technical assistance to Kuwait, Sudan, Jordan and Lebanon conducted.	2023-2025

SEI Code	SEI Name	Actions	Owner(s)	Status/Progress	Completion Date
				Completed.	
		A3- Develop and implement a specific NCLB plan of actions.	ICAO, States, International Organizations, and Industry		2023-2025
		A4 - Conduct a Capacity Building Activity for Aerodrome Inspectors (Training Course on Aerodrome Inspection) **(Action addressed under G6-SEI-01 A5)**	States (Qatar) and ICAO	Conducted February 2023. **Completed.**	2023-2025
		A5- Develop guidance material to assist MID Region States in the issuance of exemptions related to temporary deviations from standards	Qatar supported by Iran, Sudan, UAE, ACAO, and IATA	Planned for 2024	2023-2025
		A6- Develop guidance material to support States for the conduct of remote surveillance	Qatar supported by Iran, Jordan, Saudi Arabia, Sudan, UAE, and ACAO	Planned for 2024	2023-2025
		A7- Develop guidance material on the enhancement of understanding the concept of judicial enforcement for aviation inspectors	Qatar supported by Saudi Arabia and UAE	Planned for 2024	2023-2025
G2-SEI-03:	Establishment of MENA ARCM Database	**A1-** Establishing a Platform for Sharing data for MENA ARCM Member States	ICAO, ACAO, and MENA ARCM Member States	ACAO has established a share folder as an initial step for sharing information. Online platform establishment is on going	2023-2025
G2-SEI-04:	Enhance State Oversight on Dangerous Goods	**A1-** Dangerous Goods (DG) capacity building activities including Lithium batteries fire/smoke risk in cabin	ICAO, States, International Organizations, IATA, And Industry		2023-2025
		A2- Develop guidance material on carriage and transport of Lithium batteries	IATA supported by States, International Organizations, And Industry	Guidance material to be endorsed by RASG-MID/11	2023-2025

SEI Code	SEI Name	Actions	Owner(s)	Status/Progress	Completion Date
G2-SEI-05:	Human factors and Competence of Personnel	**A1**- Advisory Circular: Crew Resource Management Training Programme (CRM). **(Action addressed under G1-SEI-04: CFIT).**	IATA		2023-2025
		A2- Organize Crew Resource Management Capacity building activities	ACAO, ICAO &Airbus,	Planned for 2024	2023-2025
		A3- Organize Team Resource Management Capacity building activities	ACAO, ICAO &Airbus	Planned for 2024	2023-2025
		A4- Conduct Fatigue Risk Management and Mental Health Best Practices Capacity building activities	ACAO, ICAO &Airbus	Planned for 2024	2023-2025
G2-SEI-06:	Impact of security on safety	**A1-** Organize seminar/Symposium/Workshop to exchange experiences and good practices on assessing the risks and sharing of information related to the overflying of conflict zones in coordination with RASFG-MID and MIDANPIRG.	ICAO		2023-2025
		A2- Risk management on conflict zone workshop	ICAO/ACAO	Planned for 2024	2023-2025
G2-SEI-07:	Managing cybersecurity risks	**A1-** Develop a Regional Action Plan to bridge the gap between ICAO Cyber Security Action plan and the implementation level of Cyber Resilience in the MID Region	ANS Cyber SeC Action Group	**Completed.**	2023-2025
		A2- Conduct activities on Cyber Security and Resilience- (Jointly ANS and AVSEC)	ICAO supported by Boeing	**Completed** conducted Nov 2023	2023-2025

SEI Code	SEI Name	Actions	Owner(s)	Status/Progress	Completion Date
		A3- Develop a MID Region Cybersecurity Action Plan	Cybersecurity Security Ad-hoc Group	**Completed**	2023-2025
G2-SEI-08:	Impact of COVID-19 pandemic- Safe return to operations	**A1-** Continued support to the aviation industry through MID-RPTF meetings/Activities, as needed	ICAO, States, International Organizations, and Industry	**Completed** Aviation medicine workshop conducted Feb 2023	2023-2025
		A2- Sharing of guidance material/best practices	ICAO, States, International Organizations, and Industry	**Completed.**	2023-2025
Goal 3: Implementation of Effective States Safety Programme (SSP)					
G3-SEI-01:	Implement an effective Safety Management	**A1-** Conduct ICAO SSP/SMS Capacity building activities	SSP workshops for States. 2023 SMS & Flight Data analysis workshop for airlines. ACAO, Airbus and ICAO.	SSP training course and SSP workshop conducted. (Kuwait & Oman) 2023 SRM Workshop conducted 2024. SMS & Flight Data analysis workshop for airlines Conducted Nov 2023. **Completed/**Continuous for 2024.	2023-2025
		A2- Conduct Technical Assistance missions by SMIT	ICAO and States		2023-2025
G3-SEI-02:	NASP Development & Implementation	**A1- Conduct** NASPs workshops & technical assistance missions	ICAO. 2023	Workshop conducted in Kuwait and Qatar 2023. **Completed/**Continuous for 2024	2023-2025

		A2- NASP iPacks deployment	ICAO	If requested by states	2023-2025
Goal 4: Increase Collaboration at the Regional Level
G4-SEI-01:	Development and Implementation of MID-RASP	**A1-** Development and Implementation of MID-RASP 2023-2025 Edition	SEIG	Published May 2023. **Completed**	2023-2025
G4-SEI-02:	Enhance collaboration between States, international organizations, and industry	**A1-** Develop and agree on joint work activities through MID-RCM meetings	ICAO, States, Regional Groups, International Organizations, and Industry	**Completed** Conducted Oct 2023	2023-2025
		A2- Support the establishment of MENA RSOO and its activities	ICAO and States	States Signed the RSOO MoU on Dec 2023 and RSOO started its operations. **Completed.**	2023-2025
Goal 5: Expand the Use of Industry Programmes and Safety Information Sharing Networks
G5-SEI-01:	Promote the Use of industry Programmes	**A1-** Encourage IATA's IOSA and ISAGO registrations through safety promotion	IATA	**Completed**/ Continuous action for 2024/2025	2023-2025
		A2- Encourage the implementation of ACI Airport Excellence (APEX) in Safety Programme	ICAO and ACI	**Completed**/ Continuous action for 2024/2025	2023-2025
Goal 6: Ensure the Appropriate Infrastructure is available to Support Safe Operations
G6-SEI-01:	Certification of International Aerodromes	**A1-** Support States on the implementation of the ICAO Annex 14 requirements to achieve compliance with regards to Aerodrome Design and Operations, through capacity building activities.	ICAO and ACI	Planned activity for 2025	2023-2025

		A2- Enhance capacity building for States CAAs and Airport operators related to Aerodromes Certification through capacity building activities.	ICAO and ACI	Planned activity for 2025	2023-2025
		A3 - Deployment of iPack on Aerodrome Re-Start	ICAO and States		2023-2025
		A4 - Support States in implementing aerodrome oversight/inspection mechanism through capacity building activities on Aerodrome Oversight	ICAO Supported by FAA	Planned activity for 2024/2025	2023-2025
		A5 – Conduct a Capacity Building Activity for Aerodrome Inspectors (Training Course on Aerodrome Inspection)	States (Qatar) and ICAO	Conducted February 2023. **Completed.**	2023-2025
		A6 – Conduct a Wildlife Hazard Management Control capacity building Activities	ICAO, ACAO, WBA	Regional Symposium planned for 2024	2023-2025
G6-SEI-02:	Establish Runway Safety Team (RST) at International Aerodromes	**A1-** Conduct Runway Safety Go-Team (RST) assistance missions	ICAO. Supported RSP (Runway Safety Programme Partners)	Planned for 2024	2023-2025
		A2: Support States to implement the Global Reporting Format Methodology through capacity building activities**: (Action addressed under G1-SEI-02: Runway Excursion).**	ICAO and ACI	**Completed for 2023**/ continuous for 2024/2025	2023-2025

Lithium Battery Risk Assessment Guidance for Operators – 3rd Edition

Introduction

This document is based on the International Civil Aviation Organization (ICAO) Annex 6 – *Operation of Aircraft, Part I – International Commercial Air Transport – Aeroplanes* and the associated *Guidance for Safe Operations Involving Aeroplane Cargo Compartments* Doc (10102), the ICAO *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Technical Instructions) (Doc 9284) and the 61st Edition of the IATA Dangerous Goods Regulations (DGR). It is designed to outline potential strategies operators may wish to consider for addressing and mitigating the risks associated with the transport of lithium batteries, in cargo and mail as well as in passenger and crew baggage.

Following the published position by the aircraft manufacturers in 2015 that the original equipment manufacturer's fire suppression systems in aircraft cargo compartments were not designed to contain the hazards associated with the carriage of dangerous goods, including lithium batteries, various actions have been taken to mitigate the risk through a multi-layer approach, such as forbidding the carriage of lithium ion batteries (UN 3480) as cargo on passenger aircraft, limiting the state of charge of lithium ion batteries to not exceeding 30% of their rated capacity for air transport, establishing the SAE Aerospace G-27 Committee to develop a performance-based standard for lithium battery packaging and from recommending to mandating operators to conduct safety risk assessments for the transport of items cargo compartments.

The strategies outlined in this guidance document are primarily directed at an operator's internal processes and procedures, although there are strategies for engaging with other entities in the supply chain, such as manufacturers of lithium batteries, shippers, freight forwarders and the travelling public.

This guidance document is divided into cargo operations, focussing on cargo and mail transported in aircraft cargo compartments, and passenger operations, paying particular attention to both carry-on and checked baggage that are carried by passengers and crew.

Background

Lithium batteries power many portable electronic devices (PEDs) as well as heavy duty machinery and vehicles; they have become the battery of choice due to their high energy density, which allows them to operate for a long duration, and the availability of various types with different chemistries makes them suitable for a wide range of electronic products. These batteries and the products that are operated by them are also very often transported by air because of the tight timeframe to assemble the products and consequentially to launch the products in a timely manner, the short product shelf-life and sometimes need to be delivered at short notice in the case of life-saving medical devices.

There are well-established and stringent international requirements applicable to the manufacture, testing and transport of lithium batteries, and the legitimate lithium battery industry has an outstanding safety record since these batteries started to be transported by air in the mid-1970s; however, they can possibly go into a thermal runaway if the design type has not been subjected to mandatory safety tests or they are not handled properly and subsequently lead to deformation. In addition, with the reported occurrences of undeclared dangerous goods around the world, consideration must always be given to the potential of undeclared dangerous goods, which may also present a significant risk.

Overview of Lithium Batteries

A battery is defined as two or more cells which are electrically connected together and fitted with devices necessary for use, for example, a case, terminals, marking and protective devices. The term "lithium battery" refers to a family of different chemistries, comprising many types of cathodes and electrolytes. Units that are commonly referred to as "battery packs", "modules", "battery assemblies", "power banks", or "power generators" having the primary function of providing a source of power to another piece of equipment are for the purposes of this guidance document and the IATA Dangerous Goods Regulations, to be classified as batteries.

Lithium batteries are separated into two main categories, lithium metal batteries and lithium-ion batteries:

Lithium metal batteries are generally primary (non-rechargeable) batteries that have lithium metal or lithium compounds as an anode. Also included in this category are lithium alloy batteries. Lithium metal batteries are generally used to power devices such as watches, calculators, cameras, temperature data loggers, car key fobs and defibrillators.

NOTE:

Lithium metal batteries packed by themselves (not contained in or packed with equipment) (Packing Instruction 968) are forbidden for transport as cargo on passenger aircraft, unless shipped under the conditions of an exemption issued by all States concerned, or as permitted under an approval in accordance with Special Provision A201.

Figure 1 – Example of lithium metal cells and batteries

Lithium-ion batteries (sometimes abbreviated to Li-ion batteries) are secondary (rechargeable) batteries where the lithium is only present in an ionic form in the electrolyte. Also included within the category of lithium-ion batteries are lithium polymer batteries. Lithium-ion batteries are generally used to power devices such as mobile telephones, laptop computers, tablets, power tools and e-bikes.

Figure 2 – Example of lithium ion cells and batteries

Note:

Lithium ion batteries packed by themselves (Packing Instruction 965) (not contained in or packed with equipment):

(a) *must be shipped at a state of charge (SoC) not exceeding 30% of their rated capacity. Cells and/or batteries at a SoC of greater than 30% may only be shipped with the approval of the State of Origin and the State of the Operator under the written conditions established by those authorities, see Special Provision A331; and*

(b) *are forbidden for transport as cargo on passenger aircraft, unless shipped under the conditions of an exemption issued by all States concerned, or as permitted under an approval in accordance with Special Provision A201.*

More information about the safe transport of lithium batteries by air can be found in the IATA Lithium Battery Guidance Document (www.iata.org/lithiumbatteries).

Cargo Operations

Challenges

Because of the huge, worldwide demand for lithium batteries, billions of them are shipped annually as air cargo. Volumes are expected to increase substantially over the coming years, with batteries becoming smaller, more powerful and even more longer lasting. The IATA Dangerous Goods Board previously estimated that, on some routes, lithium batteries were present in some 25% of cargo shipments. This estimate only takes into account those lithium batteries that are known to be transported (i.e. those that have been declared to the operator). It does not include undeclared shipments, the exact amount of which is unknown.

Counterfeit & Substandard Lithium Batteries

According to the international air transport regulations, each cell or battery type must be proven to have met the requirements of each test of the UN Manual of Tests and Criteria, Part III, subsection 38.3 (i.e. UN 38.3 test). However, many lithium batteries that do not meet the UN 38.3 test requirements are available for sale on the Internet and in some parts of the world. These batteries are sometimes manufactured to look alike to the genuine branded products and are very often sold at a price that is far cheaper than the genuine products. As these batteries have not been tested to the UN 38.3 test standards, they are less safe to transport, with higher potential risk and may fail or catch fire when subjected to the shocks and loadings encountered under the normal conditions of transport.

Problems when Using Counterfeit Batteries

Not only is there a risk of counterfeit batteries unexpectedly overheating or catching fire when being charged, damage to the camera may also occur.

Compared with genuine batteries, counterfeit batteries have significantly less charge capacities. Counterfeit batteries may also deteriorate quickly after frequent use, inaccurately show battery power levels, expand and become stuck into the camera slot, cause sudden power loss, or damage camera data.

In addition, even genuine batteries can deteriorate quickly and lose charge capacity when charged with counterfeit chargers.

Sony cannot guarantee against accidents, battery or camera damage, data destruction or other problems caused by counterfeit batteries or chargers. Furthermore, Sony cannot repair counterfeit batteries or chargers.

This information is to help ensure the safety of our customers and prevent unexpected problems while using your Sony products.

Is one of your accessories counterfeit?

Below is a list of the most commonly found counterfeited Sony accessories. Please note that in addition to batteries and chargers, battery grips and other power accessories are also counterfeited frequently.

If you have already purchased any of the products listed here, please carefully check whether it is counterfeited or not.
The most frequently counterfeited Sony batteries and chargers:

Batteries	Chargers
NP-BN1	BC-TRN
NP-BX1	BC-TRV
NP-FG1	BC-TRX
NP-FW50	BC-TRW
NP-FV50	BC-VW1
NP-FV70	
NP-FV100	
NP-FZ100	

Figure 3 – Information on counterfeit batteries released by Sony (https://www.sony.co.uk/electronics/support/articles/00200938)

Undeclared Lithium Batteries

Lithium batteries have become such a common, everyday commodity that they have been taken for granted by consumers, with little thought given to the precautions that need to be taken to ensure lithium batteries do not pose a risk in air transport. This is an issue for passenger baggage as well as air cargo. Experience has shown that there are shippers who, either deliberately or through ignorance, do not follow the requirements set out in the DGR. Consequently, incidents involving lithium batteries catching fire on board aircraft have occurred. It is not always possible to determine the cause of such incidents, but where a cause has been determined, they would appear to be almost invariably due to non-compliance with the requirements.

Figure 4 – Fire damage to a package of incorrectly packed lithium metal button cells, which occurred after unloading

There was a great deal of publicity surrounding the loss of three cargo aircraft due to on board cargo fires:

- 7 February 2006: DC-8 Philadelphia – aircraft landed safely but was destroyed by fire which had started in the descent.
- 3 September 2010: Boeing 747, Dubai – the aircraft crashed during an attempt to return to Dubai due to a severe in-flight fire; both crew members were killed.
- 27 July 2011: Boeing 747, 130 km west of Jeju Airport, South Korea – the aircraft crashed into the sea following a severe in-flight fire; both crew members were killed.

It is known that all three aircraft were carrying lithium batteries as cargo, some of which on the Boeing 747 that crashed in Dubai were subsequently determined to have not complied with the regulatory requirements. However, the degree to which the lithium batteries were involved in these incidents (i.e. whether they were the cause of or aggravated the fire) could not be concluded.

Airmail

Safety concerns are not restricted to baggage and cargo. Mail is carried extensively on board passenger and cargo aircraft, both internationally and on relatively short domestic flights. Lithium batteries, whether shipped on their own or packed with equipment, are not permitted in airmail. Nevertheless, numerous websites advertise lithium batteries for sale with delivery by airmail as an option. Couple this with the fact that a number of such batteries may not comply with the regulatory requirements, with the batteries not meeting the UN 38.3 testing requirements, incorrectly packaged or exceeding 30% state of charge, it is not surprising that there have been a number of incidents involving lithium batteries in airmail.

Figure 5 – A non-compliant laptop battery ordered online and sent by airmail, which caught fire shortly after being unloaded from a passenger aircraft at London Heathrow Airport

There are provisions that allow for lithium batteries, when contained in equipment only, to be sent by airmail providing the Civil Aviation Authority (CAA) has approved the Designated Postal Operator (DPO) of the State (country) in which the airmail is offered for carriage. However, in many parts of the world, there is a lack of communication between the DPO and CAA and so the approval system may not be in place in some countries. There may also be other problems, such as:

- the CAA may not have authority over airmail or the DPO, and is therefore unable to exercise the necessary oversight; and
- the postal authority may not be subject to the civil aviation regulations.

Consequently, it is recommended that operators carrying airmail should liaise closely with the CAA and DPO in their State.

The Universal Postal Union (UPU) provides a list of designated postal operators that have received approval to accept equipment containing lithium batteries in airmail. The dates from which these DPOs have been authorised to accept these mail packages and other related information can be found on the UPU website at the following link:

http://www.upu.int/fileadmin/documentsFiles/activities/postalSecurity/listAuthorizedDOsLithiumBatteriesEn.pdf

It is important to note that the approval for the DPO is only valid for international airmail offered in that State. Some of the approved DPOs may have satellite branches established in States outside of their own for which they have received the approval. This practice is commonly known as Extraterritorial Office of Exchange (ETOE), which is a facility belonging to a postal operator outside its national territory in another country. However, ETOE without an approval granted by their operating state is not permitted to accept equipment containing lithium batteries in airmail.

E-commerce

E-commerce is growing at an unprecedented rate in recent years and is expected to grow by 20% by 2022 globally with some regions having even more significant growth. The rapid growth of e-commerce is mainly because of the maturity of technology, special offers from online shops, change of purchase behaviour and the wide availability of products.

The growth of e-commerce not only offers a business opportunity for small start-up companies and retailers, but also logistics players in the supply chain, such as air operators as well as freight forwarders. E-commerce is slightly different from the mail business, which primarily handles letters and small parcels, and have limitations on the types of lithium batteries (contained in equipment only) that can be accepted. E-commerce packages are very often transported as traditional air cargo, containing various products (including lithium batteries shipped alone and packed with equipment), consolidated from different sources and sometimes might also be transported in a comparably less rigid and robust packaging. From experience, some of these shipments are initially consigned as a shipper-built unit (BUP), and on arrival at the destination, the units will be broken down by freight forwarders and the individual packages will be re-consigned as domestic postal parcels through local mail service.

The combination of the complexity of e-commerce implies that these packages might have a potentially higher risk level than traditional cargo.

Safety Risk Assessment

Introduction

With the entry into effect from 5 November 2020 of Chapter 15 – Cargo Compartment Safety to ICAO Annex 6 – *Operation of Aircraft*, it will be mandatory for operators to conduct safety risk assessments when transporting items in aircraft cargo compartments. This requirement will be applicable to all operators that transport items in the aircraft cargo compartments, namely cargo, baggage and mail. The safety risk assessments shall include at least the:

- hazards associated with the properties of the items to be transported;
- capabilities of the operator;
- operational considerations;
- capabilities of the aeroplane and its systems;
- containment characteristics of unit load devices;
- packing and packaging;
- safety of the supply chain for items to be transported; and
- quantity and distribution of dangerous goods items to be transported.

The ICAO *Safety Management Manual* (Doc 9859) and ICAO *Guidance for Safe Operations Involving Aeroplane Cargo Compartments* (Doc 10102) contain comprehensive guidance for both industry and regulators on safety risk assessments. This guidance will not reproduce large parts of these documents, but it is useful to consider the basic elements of safety risk assessment as it applies to lithium batteries.

Identify the hazards

The first step to conduct a safety risk assessment is to identify potential hazards. In the case of carriage of lithium batteries as cargo, here are some examples of potential hazards that can be found:

- poor quality of the lithium batteries manufactured in the surrounding areas of the operator's hub and network (e.g. counterfeit or substandard lithium batteries);
- the acceptance policy of other operators in the market as well as different local regulatory requirements in the nearby States (e.g. if some operators are imposing more requirements / restrictions on accepting lithium batteries, some shippers might channel some poor quality shipments to other operators or might even not declare the shipments);
- lack of competence / training of employees, including those of contracted ground handling agents, resulting in the acceptance of non-compliant shipments;
- lack of monitoring of ground handling agents (including cargo terminal operators and ramp handling agents), leading to mis-handling of shipments and consequently potential damage to lithium batteries that could result in cell failure leading to thermal runaway;
- low credibility of shippers / freight forwarders and in some cases, co-loaders (i.e. consolidating through multiple layers of shippers / freight forwarders before handing over to the operator's appointed cargo agent);
- DPOs that do not have an approval from the Civil Aviation Authority of the State might be accepting lithium battery shipments in mail, send by air as cargo and subsequently after the breakdown of the cargo, the shipment turns into mail again at the destination sorting facility; and
- large volume of e-commerce parcels containing high capacity lithium batteries that are packed in plastic bags or simply undeclared.

Assess the likelihood of occurrence

After identifying the potential hazards, assess the likelihood of the hazards to occur. There can be five levels of occurrence probability:

Likelihood	Description	Value
Frequent	Likely to occur many times (has occurred frequently)	5
Occasional	Likely to occur sometimes (has occurred infrequently)	4
Remote	Unlikely to occur, but possible (has occurred rarely)	3
Improbable	Very unlikely to occur (not known to have occurred)	2
Extremely improbable	Almost inconceivable that the event will occur	1

Table 1 – Possible risk probability

Evaluate the severity of the occurrence

Once the likelihood of occurrence is determined, move forward to evaluate the severity of the hazards in conjunction with the potential consequences caused by the hazards. Similar to occurrence probability, there are generally five levels of risk severity:

Severity	Description	Value
Catastrophic	▪ Aircraft / equipment destroyed ▪ Multiple deaths	A
Hazardous	▪ A large reduction in safety margins, physical distresses or a workload such that operational personnel cannot be relied upon to perform their tasks accurately or completely ▪ Serious injury ▪ Major equipment damage	B
Major	▪ A significant reduction in safety margins, a reduction in the ability of operational personnel to cope with adverse operating conditions as a result of an increase in workload or as a result of conditions impairing their efficiency ▪ Serious incident ▪ Injury to persons	C
Minor	▪ Nuisance ▪ Operating limitations ▪ Use of emergency procedures ▪ Minor incident	D
Negligible	▪ Few consequences	E

Table 2 – Possible safety risk severity

Risk index rating

By combining the occurrence probability and the severity of the risk (i.e. likelihood x severity), a risk index rating can be assigned. This risk index rating will give an indication on how tolerable the risk is, and can assist and guide an operator to put more focus and investment on risk mitigation measures for the high risk areas.

Safety Risk		Severity				
Probability		Catastrophic A	Hazardous B	Major C	Minor D	Negligible E
Frequent	5	5A	5B	5C	5D	5E
Occasional	4	4A	4B	4C	4D	4E
Remote	3	3A	3B	3C	3D	3E
Improbable	2	2A	2B	2C	2D	2E
Extremely improbable	1	1A	1B	1C	1D	1E

Table 3 – Example of a safety risk matrix

Safety Risk Index Range	Safety Risk Description	Recommended Action
5A, 5B, 5C, 4A, 4B, 3A	INTOLERABLE	Take immediate action to mitigate the risk or stop the activity. Perform priority safety risk mitigation to ensure additional or enhanced preventative controls are in place to bring down the safety risk index to tolerable.
5D, 5E, 4C, 4D, 4E, 3B, 3C, 3D, 2A, 2B, 2C, 1A	TOLERABLE	Can be tolerated based on the safety risk mitigation. It may require management decision to accept the risk.
3E, 2D, 2E, 1B, 1C, 1D, 1E	ACCEPTABLE	Acceptable as is. No further safety risk mitigation required.

Table 4 – Possible safety risk tolerability

Example

Below is an example on conducting safety risk assessments with respect to lithium batteries consigned as cargo.

An operator of all-cargo aircraft wishes to assess the risk associated with the carriage of cargo from Hong Kong.

Likelihood – Experience has shown that a few previous incidents were related to some undeclared or non-compliant lithium battery shipments accepted for air transport in Hong Kong. Consequently, a fire in cargo is possible and likelihood should be Level 3.

Severity level – If the cargo catches fire on the main deck of a cargo aircraft, this may become uncontrollable, resulting in a catastrophic situation. Therefore, the severity level should be catastrophic (A).

Therefore, the risk index would be likelihood (3) x severity (A) = 3A Intolerable.

In this case, the operator will need to implement additional mitigations to reduce the safety risk into at least the tolerable range although it is preferable to try to achieve a level of risk that is acceptable. Given that the safety risk level is intolerable, all risk mitigations in place should be reviewed. This process may involve senior representatives from cargo, engineering, flight operations and safety departments. In considering the review, the following factors should be taken into account:

Preventative controls – lithium batteries must comply with very stringent regulatory requirements before being offered for carriage by air.

Escalation factors – shippers' inadvert or wilful non-compliance with the requirements.

Escalation controls – operator considers a system whereby lithium batteries will only be accepted from freight forwarders or shippers who have been vetted by the operator.

Despite preventive controls being in place, there is always the possibility that an unsafe event (in this case a lithium battery thermal event) can occur. Consequently, "recovery measures" must be considered (i.e. what can be done to prevent the unsafe event developing into the ultimate consequence, the loss of life or the aircraft). However, as with preventive controls, recovery measures can also be weakened by escalation factors that need to be controlled.

The following may apply for the example:

Recovery measure – fire containment covers on all pallets or use of fire-resistant containers.

Escalation factor – covers incorrectly applied, reducing their effectiveness.

Escalation control – covers are only applied by trained personnel and the deployment of covers will be verified by another qualified staff member.

The above elements can be more easily demonstrated with a bowtie risk analysis model, which has been adopted by some operators and regulators. The strength of a bowtie model is that it allows users to easily visualise the assessment and identify the safety barriers that are in place, or lack of, to minimise the likelihood of the occurrence of an unsafe event.
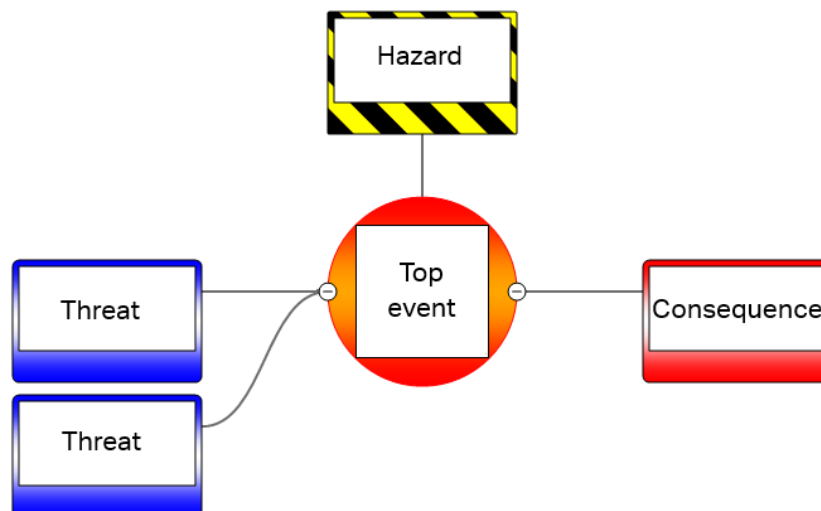
Figure 6 – An example of a bowtie risk analysis model

The bowtie risk analysis model puts the focus around the hazard that can potentially cause damage to the organisation and the top event that will be led by the identified hazard. The threats that can contribute to the top event as well as the ultimate consequence that is to be caused by the top event shall be laid out to the left and right respectively.

This process can stimulate to the identification of preventative measures which can elimiate the threat or prevent the threat from triggering the occurrence of the top event, and explore potential measures that reduce the likelihood of an event or mitigate the severity of the consequence should the top event occur.
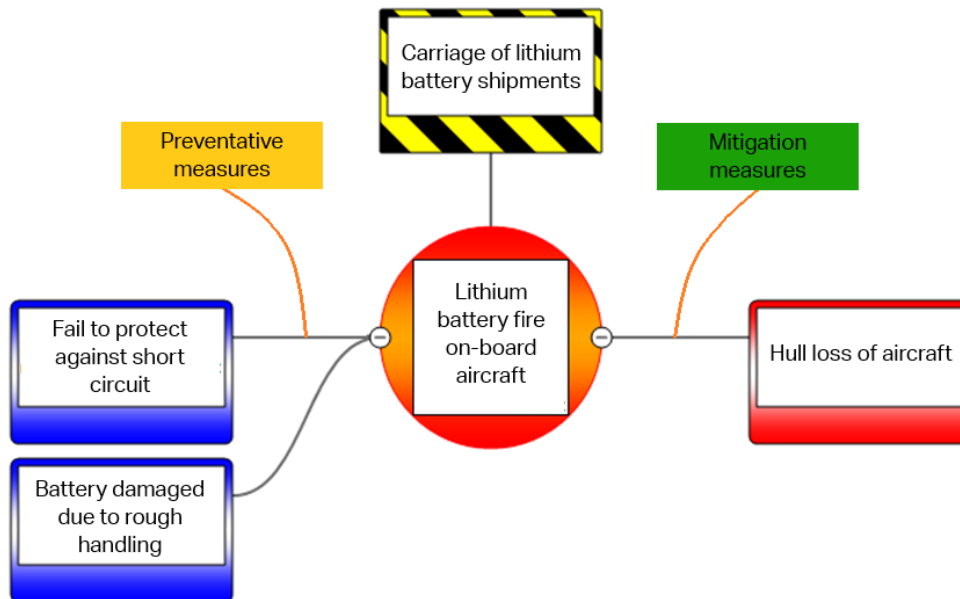
Figure 7 – An example of a bowtie risk analysis model for the carriage of lithium battery shipments

A sample of a complete bowtie risk model compiled by the UK Civil Aviation Authority can be downloaded for reference.

Determination of severity levels and likelihood can be subjective but it is always important that the safety culture of an operator embraces the concept that many activities associated with air transport, including the carriage of lithium batteries, involve risks that must be identified and mitigated to achieve an acceptable level of safety.

It is essential that each operator conducts and documents their own safety risk assessments based on their own operational realities. The risks and their severity, the effectiveness of mitigations and controls, as well as the overall risk tolerance will be unique to each operation. As such, it is important to stress that this document is just a guidance and should not be considered as an actual assessment of an operation. In keeping with safety management system (SMS) requirements, it is important to note that any safety risk assessment completed should be regularly reviewed and updated accordingly. This is to ensure that any operational or regulatory changes as well as advances in industry technology are reflected in the final outcome.

Risk Mitigation Measures

Operators should be mindful that threats may arise due to some external factors that are beyond their control. Not all safety risks can be eliminated entirely but operators can consider various approaches to mitigate the risks to as low as practicable and acceptable.

Below are some risk mitigation areas that operators can consider:

- training and competency;
- acceptance and handling procedures;
- outreach and awareness; and
- future asset investment.

Training & Competency

Because of the prevalence of lithium batteries and their inherent properties, incidents may occur in baggage, cargo and mail whether through non-compliance with the air transport requirements, or through subsequent damage. Possibly the greatest mitigation measure is the appropriate training of all staff to be able to intervene in an incident or, better still, prevent an incident from occurring.

Staff are required to be trained to carry out the functions for which they are responsible and it is important for operators to consider the extent to which staff need to be trained.

With respect to lithium batteries, training can be:

Preventative (i.e. to stop an incident from occurring) and is generally relevant to staff handling cargo, mail and baggage before flight (e.g. dangerous goods and cargo acceptance staff, and loaders). Other staff (e.g. sales and reservation staff) can also have a preventative role. Training should concentrate on detection of:

- undeclared hidden lithium battery shipments;
- damaged packages; and
- declared shipments containing lithium batteries but not in compliance with the regulations (e.g. declaring a power bank shipment as lithium batteries contained in equipment).

Reactive (i.e. respond to an incident involving fire, smoke or fumes) and is relevant to flight and cabin crew. It is essential that, in addition to general familiarisation training, flight and cabin crew receive comprehensive safety training to cover the hazards presented by lithium batteries, including safe handling and emergency procedures.

Incidents also provide an indication of the effectiveness of the preventative barriers. For this reason, it is critical that operators implement a "just culture" approach to reporting of dangerous goods incidents. All staff should be encouraged to report all dangerous goods incidents, even when the incident may have occurred as a result of an error or mistake by the staff member, e.g. a Unit Load Device (ULD) falling off a dolly due to the locks not being properly deployed / raised.

The incident report and subsequent investigation allow the operator to revise policies, procedures or work instructions to strengthen the preventative barriers, which act to reduce the exposure to risk.

For operators that have their operational functions outsourced to ground handling agents, they should ensure that their suppliers are following the same principle and their employees are trained and competent. In order to achieve this, operators can implement periodic audit programmes and carry out random checks on shipments which have been accepted on their behalf.

Safety Training for Flight Crew

As with any cargo fire, the options available to flight crew are severely limited. During the flight, it is impossible for flight crew to determine whether lithium batteries are involved, or indeed, whether the smoke / fire warning is genuine. It must be appreciated that the notification to captain (NOTOC) will only detail the fully regulated dangerous goods being carried as cargo. It shall never be assumed that, if lithium batteries are stated on the NOTOC, they are the source of the fire. Similarly, the absence of lithium batteries on the NOTOC does not necessarily mean that none are being carried; there is always the possibility of undeclared lithium batteries in cargo.

Flight crew should be trained to respond to an emergency suspected of involving lithium batteries carried as cargo by following the standard operating procedure for smoke or fire events, the most important aspect of which is: **LAND AS SOON AS POSSIBLE**.

Flight crew of cargo aircraft have options not available to those of passenger aircraft. Experience has shown that once a fire has become uncontrollable, a catastrophic situation can quickly develop, and it may not be possible to reach a suitable airport in time to land. Should a suitable airport not be within reach, it may be necessary to verify that the smoke / fire warning on the main cargo deck is genuine by visual inspection. Flight crew can also establish the extent and severity of the fire at this time. If this cannot be achieved from the flight deck (e.g. through a porthole), it may be necessary to investigate further. Ideally, someone other than a member of the operating crew should do this, but this may not always be possible (i.e. the operating crew may be the only occupants). If a closer visual inspection is required, this should be done with extreme caution. Flight crew may achieve this by opening the flight deck door as little as possible to obtain a view of the cargo compartment. However, if this is not possible, it may be necessary to access the cargo compartment using appropriate personal protective equipment (PPE) such as fire gloves and portable breathing equipment (PBE). The following are the objectives of visual inspection:

- determine whether smoke or fire is present. Even if there are no signs of smoke or fire, it must not be assumed that the warning was false, and the appropriate procedures, including landing as soon as possible, should still be followed. The situation should be monitored regularly for the remainder of the flight;
- if smoke is present, and a small fire is the obvious source, it may be possible to extinguish the fire using a portable on board fire extinguisher. After the fire is extinguished, if it is apparent that lithium batteries were involved, they should be doused with copious amounts of water to cool them and prevent reignition. After this has been done, the crew member should return to the flight deck and the appropriate procedures for smoke / fire on the main deck should be followed, with the affected cargo being regularly monitored for the remainder of the flight for any signs of smoke or fire;
- if it is apparent that a large fire is present, no attempt should be made to enter the main deck cargo compartment. In this instance, as well as following the appropriate procedures, consideration should be given to the possibility that continued flight may not be possible and other options (e.g. ditching, forced landing) may need to be considered.

Clearly, the presence of fire on board an aircraft is an extremely stressful situation for flight crew, which can be made worse should smoke penetrate the flight deck. Consequently, practical emergency training should address the difficulties that will be encountered in continuing to control an aircraft if there is smoke on the flight deck.

Acceptance & Handling Procedures

Acceptance

In addition to a comprehensive acceptance check, which seeks to verify as far as possible that all applicable requirements for packages (and documentation) have been met for fully regulated dangerous goods, ICAO and IATA require measures to be taken to ensure packages are not damaged during handling or transport and these are particularly relevant to lithium batteries. For example, packages must be:

- secured in an aircraft in a manner that will prevent movement;
- protected against damage:
    - during flight, for example by the movement of baggage, mail, stores or other cargo;
    - during their preparation for transport, for example during handling after acceptance and prior to loading.

Whilst an acceptance check is only required when fully regulated dangerous goods are first accepted for carriage by air, when packages are transshipped, operators should verify packages are free from damage or leakage and the marks and labels are still intact (labels must be replaced by the operator if they have become lost, detached or illegible).

Loading

Specifically for (standalone) lithium batteries (UN 3090 or UN 3480), they must be segregated from other dangerous goods classified in Class 1 (explosives) other than Division 1.4S, Division 2.1 (flammable gases), Class 3 (flammable liquids), Division 4.1 (flammable solids) and Division 5.1 (oxidizers).

There are no specific regulatory requirements addressing where lithium batteries should be loaded on an aircraft, operators may wish to consider loading them in a "Class C" cargo compartment and avoid the critical avionic systems. A Class C cargo compartment is one, where:

- there is a separate approved smoke detector or fire detector to give a warning to the flight crew;
- there is an approved built-in fire extinguishing system controllable from the flight deck;
- there are means of excluding hazardous quantities of smoke, flames or extinguishing agent from any compartment occupied by the crew or passengers;
- there are means of controlling ventilation and draughts within the compartment so that the extinguishing agent used can control any fire that may start within the compartment.

In order to identify how the declared shipments shall be segregated and loaded, operators can differentiate the shipments by way of an IATA Shipper's Declaration for Dangerous Goods and an air waybill (AWB), (if applicable).

For lithium batteries packed with equipment or contained in equipment, there are no specific regulatory requirements on segregation and loading. Operators may also choose to adopt the same restrictions mentioned above for these shipments if it fits the operational needs.

Operator Approval

The incidents that have occurred have usually been caused by non-compliance, but not all have been undeclared. They may have been accompanied by an IATA Shipper's Declaration for Dangerous Goods but may not have been adequately protected against short-circuit by the shipper / packer. Consequently, operators may wish to consider, as one of the available risk mitigation measures, accepting lithium batteries, especially batteries shipped alone (without the equipment) only from pre-approved shippers and freight forwarders. When establishing the approval process, operators can consider the following factors:

- whether or not the lithium batteries are of a type that have successfully passed the UN 38.3 tests*;

- if the lithium batteries are individually protected or not and how these are then packed inside the outer packaging;
- the credibility of the battery manufacturers, shippers and freight forwarders; and
- the dangerous goods qualification of shippers and freight forwarders.

Such approval process could then provide better visibility to the operator on what is being accepted.

*From 1 January 2020, manufacturers and subsequent distributors of cells or batteries manufactured after 30 June 2003 must make available the test summary as specified in the UN Manual of Tests and Criteria, Part III, sub-section 38.3, paragraph 38.3.5. This test summary can be made available electronically or in printed format, and is also applicable to cells and batteries that are contained in equipment. It is not required to accompany every shipment, but it can be one of the documents to be considered when approving the carriage of certain battery types.

General Cargo

Clearly, the above measures are not possible for lithium batteries that have not been declared to the operator. Therefore, efforts must be made to detect these undeclared batteries. These could include implementing:

- enhanced cargo acceptance processes and training to better detect non-compliant shipments. This could include greater scrutiny of the descriptions of goods on accompanying paperwork. For example, items described on an air waybill as "electrical / electronic equipment" or "film crew and media equipment" or "no battery" when the product described is an electronic device, may contain lithium batteries;
- establish a database to screen the description of goods shown on both the master air waybill data (FWB) and house manifest data (FHL), if applicable;
- additional training for ground handling agents and cargo terminal personnel to better detect undeclared shipments, raise awareness of the need to detect and remove damaged packages from the transport stream;
- carry out risk-based target or random screening, by means of x-ray technology or even physical hand searching of cargo, if applicable. Coordinate with the appointed security screening companies on the screening requirement for lithium battery shipments and jointly establish a seamless communication procedure;
- in cases where lithium battery related shipments are not accepted (for either regulatory or operators' policy), operators may want to consider other more restrictive measures, such as not allowing shipper-built units (BUP) and prohibiting the use of opaque plastic sheets covering cargo (at package level and skid level);
- coordinate closely with competent authorities, ensure that occasions of undeclared dangerous goods, including lithium batteries, are reported to the appropriate authority of the State of the operator and the State in which it occurred in accordance with DGR 9.6.5.

Outreach & Awareness

Engagement with Shippers

As the originators of cargo, shippers offering compliant shipments are first and foremost, they are the key entities for safety compliance. For most operators, they seldom have direct contact with shippers; however, should there be opportunities to interact with shippers, particularly on the shipping of lithium batteries, it is appropriate to ensure they have the relevant training and always only offer compliant shipments.

Engagement with Freight Forwarders

Freight forwarders are an important interface between shippers and operators but are largely unregulated. Engagement with freight forwarders, including advising them of the consequences of failure to comply with the requirements, can be very beneficial. Additionally, operators may also consider vetting freight forwarders on a regular basis to ensure that they also have a stringent acceptance procedure and processes aimed at detecting non-compliant shipments.

Engagement with Designated Postal Operators

Experience has shown that there is a great deal of ignorance among the general public about what dangerous goods can and, more importantly, cannot be sent in the mail. ICAO requires that the appropriate civil aviation authority of the State to review and approve the procedures of the Designated Postal Operator (DPO) to control the introduction of permitted dangerous goods into the mail.

For DPOs that have not been approved to accept any lithium batteries contained in equipment in mail, operators can consider visiting and understanding how the DPOs are isolating mail that potentially contains such unapproved items.

It is always beneficial for operators and DPOs to work together in developing awareness strategies.

Warning Notices

Sufficient notices must be prominently displayed at visible locations at cargo acceptance points to alert shippers and freight forwarders about any dangerous goods that may be contained in their shipments. As shippers do not tend to tender shipments to operators directly in traditional cargo operations, it is also worth of displaying similar notices in the premises of freight forwarders and integrators' drop-off counters or service points.
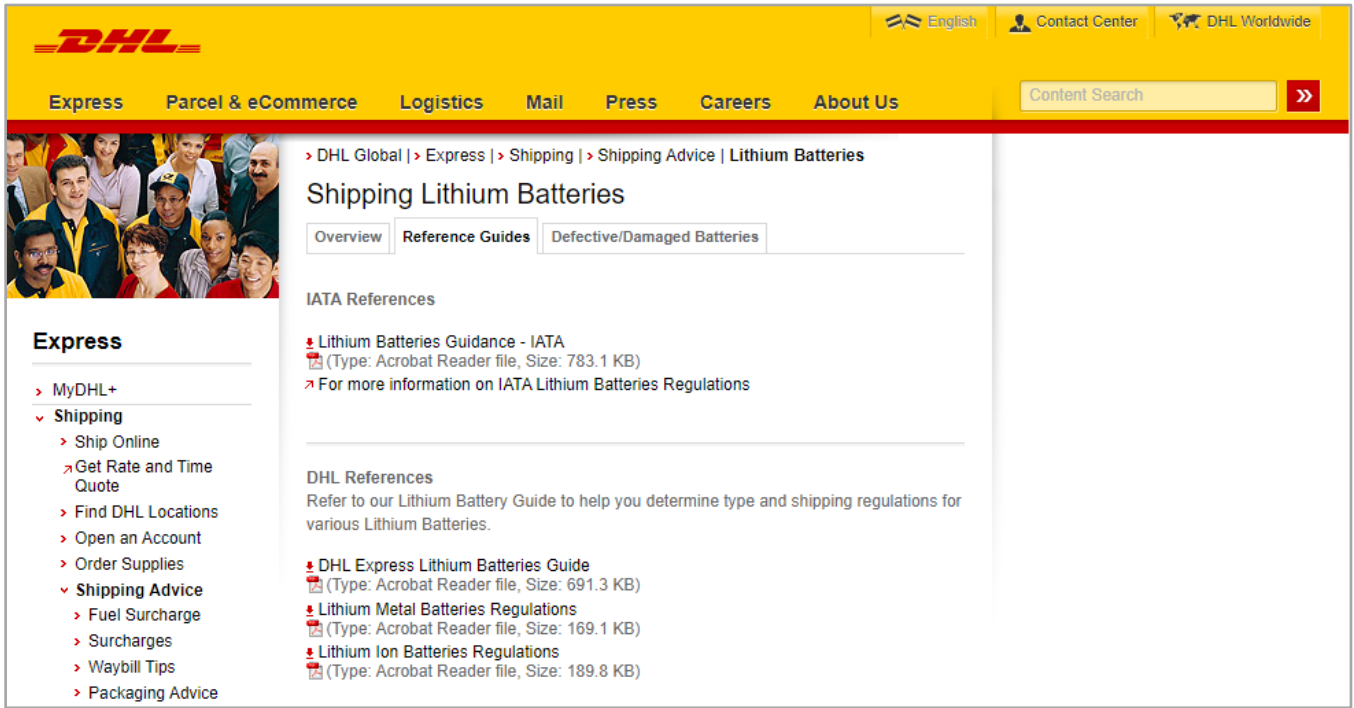
Figure 8 – Lithium battery warning notice

Websites

Operators can also remind shippers about their policy and develop their own guidance documents to assist their shippers in understanding regulatory requirements related to shipping lithium batteries as well as their own handling procedures.

Figure 9 – Website showing additional lithium battery shipment related guidelines
(https://www.dhl.com/en/express/shipping/shipping_advice/lithium_batteries.html#guides_materials)

Seminars

Lithium battery transport requirements can be a subject that is very helpful to the industry, to be covered in seminars. Apart from the benefit of providing learning opportunities, seminars can bring together many interested parties who may not normally encounter one another, and therefore, facilitate an understanding of each other's perspectives.

Future Asset Investment

The incidents and accidents that have occurred where lithium batteries are known to have been a factor (or were present on board) have highlighted the vulnerability of cargo aircraft to main deck cargo compartment fires and, in particular, how quickly a situation can become catastrophic. Consequently, a number of technologies are being studied and developed by industry and regulators to enhance fire protection, particularly on cargo aircraft as these may not have the same level of fire suppression as passenger aircraft. However, it would be wrong to believe that such measures are necessary only when it is known that lithium batteries are being carried. Undeclared shipments are commonplace; therefore, such provisions should be applied even when no consignments of lithium batteries have been declared to an operator.

At a recent lithium battery workshop, several new and developing technologies were showcased. Some examples of these are shown in the following section.

Fire-Resistant Containers

Fire-resistant containers (FRC) can be made and used in the same way as certified aircraft containers. They are constructed of fire-resistant material, similar to that used in body armour. There are multiple suppliers on the market, and some FRCs have been demonstrated to be able to contain an internal fire of up to 650°C for at least four hours. Depending on the materials, some have the advantage of being lighter than conventional aluminium containers, offering a weight savings of as much as 30 kg per container. In terms of use, loading and tie-down, they are the same as the traditional certified aircraft containers.

Figure 10 – Main deck fire-resistant containers

Fire Containment Covers

Many shipments containing lithium batteries are loaded on open aircraft pallets, and consequently, fire resistant containers might not be appropriate for use, but rather, fire containment covers (FCC) that are deployed over the cargo but under the net may be used. There are different suppliers on the market and some operators have been deploying FCCs on palletised cargo for many years whilst others are considering their use. Some FCCs currently in production can contain a fire of up to 815°C for four hours or even more, which can potentially offer more time for flight crew to find the closest airport to land should an emergency situation arise.

In terms of deployment, FCCs can be more complex than FRCs. Depending on the design and make, they can weigh approximately 40 kg to 50 kg, and require at least two trained staff to deploy and remove the cover.

Figure 11 – Fire containment cover for lower deck and main deck deployment

Fire Containment Bags

The same materials used for the manufacture of fire containment covers are used to produce smaller size fire containment bags (FCB). Due to their smaller size, the deployment process of these bags is comparably simpler than that of fire containment covers, and can also be used over small packages. Once the FCBs are deployed, they can either be loaded on the aircraft pallets or in the aircraft containers or even loaded into non-containerised aircraft (bulk loaded).

Figure 12 – Fire containment bags loaded on a certified aircraft pallet and in a certified lower deck aircraft container

Smoke Displacement Systems

A smoke-filled cockpit can restrict or completely block a pilot's view of the outside world and essential cockpit instrumentation. Vision can be restored by smoke displacement systems, which use self-inflating transparent plastic envelopes to provide a clear space through which a pilot can see flight instruments and the outside world.

Figure 13 – Smoke displacement system (EVAS – Enhanced vision assurance system)

In February of 2015, the VisionSafe Corporation received Supplemental Type Certification (STC) for the Emergency Vision System (EVAS) Cockpit Smoke Displacement equipment applicable to the Boeing 777. The Boeing 777 is the latest aircraft to get FAA certified equipment and includes models 777-200, -200LR, -300, -300LR and the 777F. The company now has EVAS STC's for over 80 aircraft types.

The FAA recommends that aircraft meet higher standards for continuous cockpit smoke protection (FAA AC25.109). The U.S. Air Line Pilots Association's (ALPA) in-flight fire project reported more than 1,100 in-flight smoke and fire incidents over a period of 10 months, resulting in 360 emergency landings.

The FAA's concern about smoke events continues, and remains a serious problem with the statistics are essentially unchanged. The Flight Safety Foundation ranks smoke / fire emergencies as the 3rd highest cause of fatalities. Smoke is also a leading cause of diversions of ETOPS aircraft.

Quick-Donning Full-Face Oxygen Masks

Unlike traditional flight crew oxygen masks, which require two hands to don, new face masks can be donned with only one hand and in a couple of seconds. These new masks can be used in conjunction with smoke displacement systems.

Figure 14 – Quick-donning full-face oxygen mask

Performance-Based Packaging Standard

The SAE G-27 committee, consisting of battery manufacturers, regulators, operators and packaging manufacturers, was established at the request of ICAO to develop a performance-based packaging standard for standalone lithium batteries (AS 6413). The intent is to develop a test standard for designing a packaging for specific types of batteries prepared as for transport, so that when a lithium battery fails and goes into thermal runaway, the consequence of the event can be contained inside the packaging, so as to prevent hazardous flame, fragments or flammable gases from exiting the package and consequently causing damage to the aircraft or other cargo.   While this will make compliant shipments even safer, it will have no effect on the arguably biggest risk (i.e. non-compliant or undeclared lithium battery shipments).

As of today, this standard is still under development.

Enhanced Security Screening

X-ray machines can also be an effective tool in identifying lithium batteries contained inside a shipment. However. the algorithms used by x-ray machines in security screening are traditionally set to detect explosives automatically. Furthermore, lithium batteries in small packages are more identifiable through visual x-ray compared to those in large consignments. For many years, the United Kingdom Civil Aviation Authority has been exploring the feasibility of detecting lithium batteries in cargo using existing x-ray technology, and in recent years, due to the rising demand to detect undeclared lithium battery shipments by using x-ray machines, some manufacturers are starting to review their technology to offer automated lithium battery detection.

Figure 15 – X-ray images of different battery types

However, it is important to note that although the technology is available, authorised airport security companies traditionally and primarily focus on identifying security related items, such as an improvised explosive device (IED), rather than dangerous goods or lithium batteries. Therefore, if operators have expectations to detect undeclared lithium batteries in packages, they are encouraged to liaise with the security companies locally so as to ensure that expectations are well defined, communicated and executed.

Passenger Operations

Challenges

Very similar to one of the many challenges encountered by cargo operations, many counterfeit and substandard lithium batteries can also be found in passengers' baggage. With the rapid evolvement of technology and massive number of air travellers every day, the challenges in passenger operations can be even more onerous than those in cargo operations.

Safety Risk Assessment

Details on safety risk assessments and how a safety risk assessment should be carried out can be found under Cargo Operations in the previous section.

Identify the hazards

Below are some examples of potential hazards that can be found in passenger operations:

- PEDs powered by a damaged / defective lithium battery is brought on board the aircraft (e.g. the user has been finding the lithium battery of the mobile phone is overheating);
- PEDs that are not switched off or in hibernation mode, and stowed in checked baggage;
- passengers not complying with the regulations and carry a large number of spare batteries and PEDs in their carry-on and checked baggage that are also not for personal use;
- spare batteries, e-cigarettes or power banks are placed in carry-on baggage but later on due to insufficient space in the overhead locker of the passenger cabin, the bag is moved to the cargo compartment without removing the spare batteries, e-cigarettes or power banks;
- power banks containing substandard lithium batteries and are being recharged during flight; and
- PEDs slipping into the seat and being crushed, resulting in a fire, when the passenger attempts to retrieve the device by adjusting the seat.

Example

Here is an example on conducting safety risk assessments with respect to lithium batteries carried by passengers.

An operator of passenger aircraft within Europe wishes to risk assess the carriage of portable electronic devices (PED) in the cabin of their aircraft.

Likelihood – Given the propensity for portable electronic devices (PED) to be carried by passengers, it would be reasonable to assume that such an incident might occur at some time, and so the likelihood would be Level 3.

Severity level – If a PED catches fire in the cabin, fire extinguishers will be readily available to cabin crew, who will have been trained in their use. Additionally, water, which is necessary to cool lithium batteries involved in an incident, will be on hand. Therefore, on the basis that an abnormal flight operations incident procedure would be applied (firefighting by cabin crew), with few other consequences, it may be appropriate to assign a severity level of major (C).

Therefore, the risk index would be likelihood (3) x severity (C) = 3C "Tolerable"

The following factors should be taken into account:

Preventative control – prohibition of spare lithium batteries in checked baggage.

Escalation factor – passenger's ignorance of the requirement.

Escalation control – operator has a robust process to ensure that all passengers are made aware of the requirement (e.g. by questioning at check-in kiosks and / or counters).

Despite preventive controls being in place, there is always the possibility that an unsafe event (in this case a lithium battery fire / event) can occur. Consequently, recovery measures must be considered (i.e. what can be done to prevent the unsafe event developing into the ultimate negative consequence, the loss of life or the aircraft). However, as with preventive controls, recovery measures can also be weakened by escalation factors that need to be controlled.

In the example above, the following may apply:

Recovery measure – Halon fire extinguishers and water available to cabin crew;

Escalation factor – fire extinguishers out of date, insufficient water carried;

Escalation control – robust process in place to ensure an aircraft cannot depart with expired extinguisher or less than certain volume of water.

Risk Mitigation Measures

Whether for cargo or passenger operations, operators should always be mindful that threats may arise due to some external factors that are beyond their control. Not all safety risks can be eliminated entirely but operators can consider various approaches to mitigate the risks to as low as practicable and acceptable.

Below are some risk mitigation areas that operators can consider:

- training and competency;
- acceptance and handling procedures; and
- outreach and awareness.

Training & Competency

Due to the common use of lithium batteries for powering electronic devices, such as mobile phones, tablets, laptops and mobility aids, and the possibility of having substandard batteries on board, incidents may occur in both the cabin and baggage. The best mitigation measure may be appropriate training of all staff to be able to intervene and control an incident or even to prevent an incident from occurring.

According to the regulations, staff are required to be trained to carry out the functions for which they are responsible and it is important for operators to consider the extent to which staff need to be trained.

With respect to lithium batteries, training can be:

Preventative (i.e. to stop an incident from occurring) and is relevant to frontline passenger facing staff, especially before flight (e.g. ticketing staff, check-in counter staff and boarding gate agents). Training should concentrate on detection of:

- (any kinds of) spare batteries (including power banks) in checked baggage, and this should include questioning passengers when carry-on baggage is surrendered for carriage in the cargo compartment;
- excessive number of portable electronic devices and spare batteries in baggage;
- large capacity lithium batteries (e.g. more than 100 Wh but not exceeding 160 Wh) carried without an operator approval.

Reactive (i.e. respond to an incident involving fire, smoke or fumes) and is relevant to flight and cabin crew. It is essential that, in addition to general familiarisation training, flight and cabin crew receive comprehensive safety training to cover the hazards presented by lithium batteries, including safe handling and emergency procedures.

Safety Training for Cabin Crew

In addition to the items carried by passengers and crew members, there are many devices on the flight deck or in the passenger cabin that are powered by lithium batteries, such as electronic flight bags, emergency torches, or even the offline credit card machines. In the event of one of these items failing and causing a fire, it is understandable that there may be reluctance to introduce liquid onto the flight deck; however, if the battery is not cooled with water (or other non-flammable liquid), the fire may continue to propagate and worsen.

Cabin crew members are most likely to have to deal with an in-flight lithium battery fire and have a vital role to play in dealing with incidents. Because a fire in the cabin can quickly become uncontrollable, with potentially disastrous consequences, it is vital that cabin crew are trained to respond quickly, using the procedures and checklists published in the ICAO *Emergency Response Guidance for Aircraft Incidents Involving Dangerous Goods* (Doc 9481), (The "Red Book") and IATA's *Cabin Operations Safety Best*

Practices Guide. These procedures have been developed by the IATA Cabin Safety Task Force in conjunction with ICAO and have been incorporated into the "Red Book".

In order to ensure that all crew members are competent to deal with a lithium battery event from a damaged / defective portable electronic device, their competency should be verified by practical demonstration of dealing with a lithium battery incident in the cabin.

Below are some scenarios to be considered in the safety training programme for cabin crew:

Overheat Event

If an electrical burning smell from a portable electronic device (PED) is detected, or a PED is suspected of overheating, the passenger should be asked to turn off the device immediately. If the PED is plugged into the aircraft power supply, the power supply must be disconnected if safe to do so and the in-seat power should also be turned off. Although a PED may be "switched off," unstable / damaged batteries can still ignite and so the PED must remain off and be monitored closely for the remainder of the flight.

Fire Event

Figure 16 – A burning laptop

As with any fire occurring in the cabin, the use of personal protective equipment (PPE) such as fire gloves and portable breathing equipment should be considered, but it is important to note that this does not delay the response to the incident. Although following recommended procedures present a sequence of tasks, some of these actions occur simultaneously when carried out by multiple crew members.

1. Identify the item
    It may not be possible to identify the item (source of fire) immediately, especially if the fire has started in a seat pocket or the device is not readily accessible. In this case, fire-fighting procedures should be applied as a first step. Once it is possible to do so, identify the item after the fire is under control. If the item is contained in baggage, the crew's actions would be similar to the actions for a device that is visible or readily accessible.

    Caution: In order to avoid injury from a flash fire, it is not recommended to open the affected baggage when there is any indication of smoke or flames. However, in certain situations, cabin crew members may assess and deem it necessary to slightly open baggage to allow entry of the extinguishant and non-

flammable liquid. This should be done with extreme caution and only after donning appropriate protective equipment, available on the aircraft.

2. Apply fire-fighting procedure
Any occurrence concerning a fire in the cabin should be notified immediately to the pilot-in-command who should be kept informed of all actions taken and their effects. It is essential that the cabin crew and the flight crew coordinate their actions and that each are kept fully informed of the other's actions and intentions.

Appropriate fire-fighting and emergency procedures must be used to deal with any fire. In a multi-cabin crew operation, the actions detailed in the fire-fighting procedure should be coordinated and conducted simultaneously. On aircraft operated with only one cabin crew member, the aid of a passenger should be sought in dealing with the situation.

Halon, halon replacement or water extinguishers should be used to extinguish the fire and prevent its spread to other flammable materials. It is important to wear available protective equipment (e.g. protective breathing equipment, fire gloves) when fighting a fire.

If fire develops, cabin crew should take prompt action to move passengers away from the area involved and, if necessary, provide wet towels or cloths and give instructions for passengers to breathe through them. Minimising the spreading of smoke and fumes into the flight deck is critical for the continued safe operation of the aircraft. Therefore, it is always essential to keep the flight deck door closed. Crew communication and coordination is of utmost importance. The use of the interphone should be the primary means of communication unless the interphone system fails.

If fire or smoke is seen coming from a baggage compartment, such as a wardrobe or overhead locker, passengers should be moved and asked if they are carrying anything that could be the cause. The exact location of the fire should be determined carefully by checking for heat with the back of an un-gloved hand.

Figure 17 – Determining the location of a fire in an overhead locker

After first considering the use of PPE, a fire extinguisher should be discharged into the locker.

Figure 18 – Discharging a fire extinguisher into an overhead locker

The compartment should be closed for a few seconds to allow for the extinguishant to take effect. Further extinguishant should be discharged until it is safe to fully open the compartment, when the cause of the fire will be located.

3. Remove power
It is important to instruct the passenger to disconnect the device from any power supply, if it is deemed safe to do so. A battery has a higher likelihood of catching fire due to overheating during or immediately following a recharging cycle even though the effects may be delayed for a period of time. By removing the external power supply from the device, it will ensure that additional energy is not being fed to the battery to promote a fire.

Turn off the in-seat power to all the remaining electrical outlets until it can be established that a malfunctioning aircraft system does not result in additional failures of the passengers' portable electronic devices.

If the device was previously plugged in to in-seat power, visually check that power to the remaining electrical outlets remains off until the aircraft's system can be determined to be free of faults.

The removal of power may occur simultaneously to other cabin crew actions (e.g. obtaining water to immerse the device). Depending on the aircraft type, the in-seat power supply may have to be turned-off by the flight crew physically than remotely.

4. Immerse the device in water (or other non-flammable liquid)

If the incident device is not inside a bag or it is in a bag that is not intact, the device should not be moved but left in place and be flooded with water to prevent the spread of heat to other cells in the battery. Should water not be available, any non-flammable liquid may be used to cool the device.

If the incident device is contained in an intact bag and no flames can be seen, the bag should be removed and placed in a watertight container (or one made watertight by using a bin liner) and flooded with water.

Figure 19 – A laptop being doused with water from the galley

Figure 20 – Applying water to a burning device without removing it from the overhead locker. It is important to note that liquid may turn to steam when it is applied to heated batteries

Caution:

- do not attempt to pick-up or move the device; batteries may explode or burst into flames without warning. The device must not be moved if any of the following exist: flames / flaring, smoke, unusual sounds (such as crackling), debris or shards of material separating from the device;
- do not cover or enclose the device as it could cause the device to get hotter and overheat; and
- do not use ice or dry ice to cool the device. Ice or other materials will insulate the device, increasing the likelihood that additional battery cells will heat-up and reach thermal runaway.

Figure 21 – A demonstration of the effect of applying ice to a burning laptop

5. Leave the device in place and monitor for any reignition
   A battery involved in a fire can reignite and emit flames multiple times when heat is transferred to other cells in the battery. Therefore, the device must be monitored regularly to identify if there is any indication that a fire risk may still exist. If there is any smoke or indication of fire, the device must be immersed in water (or other non-flammable liquid).

6. When the device has cooled, after approximately 10 – 15 minutes
   The device can be moved with caution once it has cooled down and if there is no evidence of smoke, heat, or if there is a reduction in the crackling or hissing sound usually associated with a lithium battery fire (after approximately 10 – 15 minutes). The waiting period may vary, based on the device and its size. The different circumstances (e.g. types of devices and phase of flight) should be addressed in the operator's training programme.

   A suitable empty container, such as a pot, jug, galley unit or waste bin (with a water-tight liner if needed), must be filled with sufficient water or non-flammable liquid to completely immerse the device. It is important to wear available protective equipment (e.g. protective breathing equipment and fire gloves), when moving any device involved in a fire. Once the device is completely submerged, the container used must be stowed (e.g. in a toilet or wardrobe), monitored and, if possible, secured to prevent spillage.

Figure 22 – A laptop in a bag being immersed in water inside a toilet waste bin

Figure 23 – The toilet waste bin with water holding the damaged device should be stowed and isolated in a toilet

As not all containers are watertight, so plastic bin liners should be used.

Figure 24 – A bar box made watertight by using a plastic bin liner

Lithium Battery Fire Prevention

There have been reported incidents on board by operators as a result of the inadvertent crushing or damage of a portable electronic device, and some of these crushed devices had even caught fire.

Figure 25 – A mobile phone crushed in an electrically adjustable seat

Figure 26 – The charred remains of a mobile phone

Due to the design of some electrically adjustable passenger seats, it is possible for small electronic devices, such as mobile phones, tables, e-readers or MP3 players to slip under a seat covering and / or cushion, behind an armrest or down the side of a seat, and becoming a potential fire hazard. These types of seats are primarily installed in premium class cabins.

Passenger awareness on how to use and stow their devices while in flight can help mitigate these incidents.

To prevent crushing of the PED and reduce the potential fire hazard to the device and the surrounding area, cabin crew and / or passengers must not use the electrical or mechanical seat functions in an attempt to retrieve a lost PED. The seat movement may crush / damage the PED's lithium battery and potentially result in a lithium battery fire. Cabin crew should always advise the flight deck of such a situation. Ask the passenger concerned to identify the item, and where they suspect it may have dropped or slipped into, and if they have moved the seat since misplacing the PED. Arrange the passenger to leave the area temporarily, and, if applicable, also arrange the passenger seated next to the affected seat to be moved. If available, don fire gloves before trying to retrieve the item. Do not move the seat! If it is not possible to retrieve the item, it may be necessary to move the passenger to another seat and block the affected seat to be used.

In the event that the situation develops into a lithium battery fire, cabin crew should apply the following as per their respective operator procedures:

- lithium battery fire-fighting procedures;
- post-event procedures (on board);
- first point of landing offloading procedures.

After landing, the crew must inform ground staff where the device is stowed and make an appropriate entry in the aircraft technical log. The PED must be removed from the aircraft before it operates the forthcoming sector, as lithium batteries that are damaged are forbidden for carriage. Devices involved in a fire should be retained on the ground to enable investigation by competent authorities.

Small Aircraft Operations

The operational environment for small aircraft (e.g. narrow body aircraft) can be very different, with only one or two cabin crew on board the aircraft, and on some occasions, might even require assistance from passengers. Additionally, considerations will need to be given as to what items are available to use in the event of an incident. It is suggested that all aircraft, as a minimum, should carry the following equipment on top of that usually on board:

- fire / heat resistant gloves;
- heavy duty plastic bin liners; if the aircraft has no suitable container that something the size of a laptop can fit into, these can be filled with water before placing the damaged device in the bin liner;
- fire containment bags, which can be used to contain a damaged PED while it is being cooled off and isolated, and can be stowed conveniently;
- suitable receptacles, e.g. jugs to transfer water from the galley or toilet to the incident area should insufficient bottled water be carried.

Figure 27 – Fire containment bag for damaged device in passenger cabin

Check-in & Handling Procedures

The wide use of portable electronic devices means that all passenger aircraft will be carrying lithium batteries in both carry-on and checked baggage. On a typical wide-body aircraft, the number of these devices on board could be in the hundreds. Although they are dangerous goods, certain types and quantities of these devices are permitted to be carried by passengers and crew.

Check-in

All spare batteries, not only lithium batteries but also dry batteries, are not permitted in checked baggage and must only be carried in the passenger cabin. Consequently, if there is a need for carry-on baggage to be loaded in the cargo compartment (e.g. due to shortage of overhead lockers for baggage), ground staff or cabin crew must alert the affected passengers to remove spare lithium batteries, including power banks and e-cigarettes, from the baggage before transferring it to the cargo compartment. Batteries removed from the baggage must only be carried in the passenger cabin.

Details of the check-in and handling procedures for mobility aids powered by lithium batteries can be found in Battery Powered Wheelchair and Mobility Air Guidance Document (www.iata.org/dgr-guidance).

On Board the Aircraft

There have been a number of incidents where mobile phones have been dropped by passengers into the workings of their seat and were crushed when the seat was moved. This scenario is most likely to occur in electrically powered seats found in premium cabins. To reduce the likelihood of this happening, it is suggested that operators incorporate advice into the passenger pre-flight briefing, such as:

> "If you are intending to sleep during the flight, please make sure any small electronic devices such as mobile phones, mp3 players and tablets are stowed safely either in seat pocket, a bag or in an overhead locker so that they don't fall into the seat mechanism where they may be damaged. If you do lose your electronic device in your seat, do not move the seat and inform a member of the crew."

Another occasion when lithium batteries could potentially cause an incident is when they are being replaced in on board equipment such as credit card readers. When this is being done, care must be taken to ensure that neither the old nor the new batteries are dropped into inaccessible locations, where if damaged, short-circuiting could occur and lead to a fire.

Outreach & Awareness

Warning Notices

Warning notices must be displayed at check-in counters at airports, warning passengers of the type of dangerous goods they must not carry. It should be noted that these warning notices are often generic in nature and some passengers may simply ignore them. However, it is essential to remind and raise the awareness of passengers to remove any of the prohibited items from their baggage, especially before they are checked in for carriage.

Operators should consider specific warnings at airports where there are known problems, such as the prevalence of counterfeit and substandard lithium batteries widely available for purchase in street markets. At those airports, displaying warning notices at the baggage reclaim areas to warn passengers can also be effective.

Figure 28 – Warning notice aimed at passengers (http://www.casa.gov.au/wcmswr/_assets/main/dg/luggage/lithium_battery_poster.pdf)

In addition to the general warning notices, operators should also consider displaying topical warning notices based on the rising trend of certain items being carried by passengers.

Figure 29 – Warning notice on e-cigarettes and spare lithium batteries
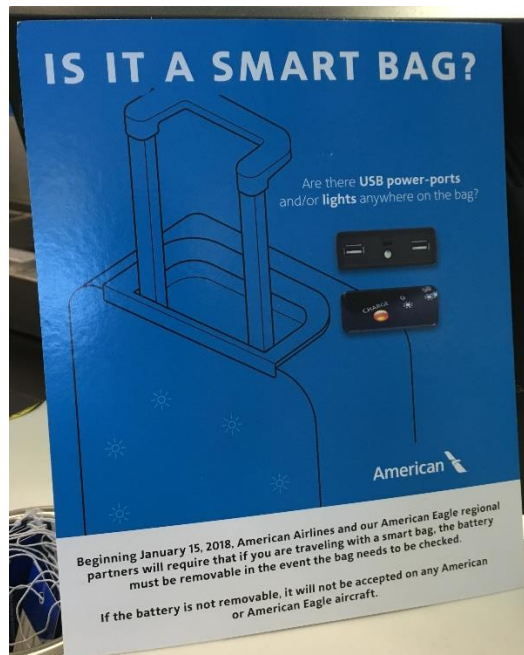
Figure 30 – Warning notice on smart bags at check-in counters

Websites

It is important to warn passengers about the restrictions that apply to baggage at the earliest opportunity, ideally before they leave home. There are regulatory requirements that online ticket purchases can only be completed once information about dangerous goods has been displayed and an acknowledgement by passengers made that this information has been read and understood. Similar requirements apply to online check-in. These requirements are not fool-proof, as the person purchasing the ticket or checking in may not necessarily be the person travelling or may click that they have read the information without actually reading it. Nevertheless, this information should include specific information about the carriage of lithium batteries.

Beyond these requirements, websites present other excellent opportunities to educate passengers on the limitations regarding dangerous goods in baggage.

It is very common for operators having alliances and code share flights, the general public can be ignorant about the baggage restrictions of different operators, especially if one is imposing a more restrictive policy based on their operational needs. Hence, it is valuable for customers that member operators in an alliance to include information of each other's policies and requirements.
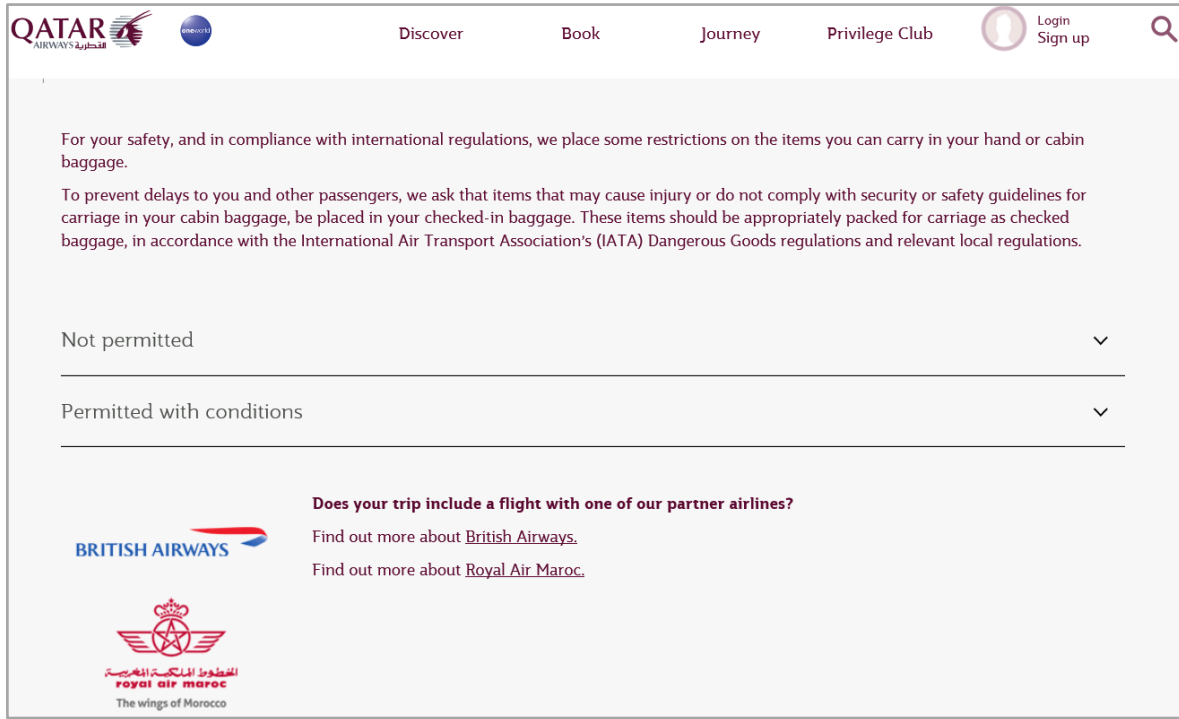

Figure 31 – A website including other operators' baggage restrictions (https://www.qatarairways.com/en-gb/baggage.html)

In-flight Magazines

Although it is too late to prevent batteries from being carried in a manner that does not comply with the regulatory requirements, an article in an in-flight magazine may help passengers pay more attention when packing their baggage for a subsequent flight.

Arrival Videos

At the end of a flight, passengers may be shown an information video about the city they are visiting. This provides a unique opportunity to inform a "captive" audience about the perils of purchasing cheap, possibly counterfeit and substandard lithium batteries from market stalls, and highlight the potential safety risks that these batteries can pose.

Recreational Press

Magazines produced for specific recreational activities involving lithium batteries (e.g. radio-controlled models) may publish articles provided by operators. Such magazines are guaranteed to reach the relevant audience.

Newspapers, Television and Radio Advertisements

Advertising in newspapers can be expensive; yet, potentially effective due to their reach to a very wide audience. Broadcasting on television and radio can also be an option for reaching out to the general public.

Schools

In some parts of the world, it is possible to cooperate with education authorities or individual institutes to conduct a brief session for students on what can and cannot be carried in baggage. Through this channel, it is not only that the students will be educated, the information is also likely to be passed on to their parents and friends.

Social Media

Operators can make use of social media, such as Facebook, Twitter and LinkedIn, to show tips and video clips about various items that can and cannot be brought in baggage.

Figure 32 – A Tweet on lithium batteries in cargo while promoting an exhibition booth

Tourism Conferences

There are many tourism conferences held around the world every year. Even if operators find it cost prohibitive to participate as an exhibitor to have a booth, partnering with the organisers or advertising in the conference magazine with information about the carriage of lithium batteries in baggage is also an option.

Figure 33 – An exhibition booth to promote the safe transport of dangerous goods, including lithium battery cargo

Collaborate with Regulators and Airport Authorities

There are different types of communication channels available at the airport, such as display cabinets, transit vehicles and airport magazines. However, in some locations, it may not be possible for operators to broadcast the information individually but rather collectively. Thus, it may be necessary to work closely with local regulators and airport authorities to deliver a collaborative message.

Other Publicity Materials

Small gadgets or giveaways, such as drinks coasters and baggage tags, can also be designed to promote flight safety information.

Figure 34 – Baggage tag and t-shirt to promote lithium battery safety

Conclusion

Experience has shown that compliant shipments of lithium batteries offered for air transport pose a very low risk. However, experience has also shown that there are many shippers that lack the requisite knowledge, and offer counterfeit and substandard batteries for transport as well as some that will deliberately mis-declare shipments of lithium batteries in an attempt to avoid complying with the regulations.

To ensure that the potential risks do not result in a dangerous goods accident, operators must develop and implement a comprehensive and robust safety risk assessment and risk mitigation process. There is no "one size fits all" for this. Each operator is unique based on the airports to which they operate, the aircraft types, passenger flights or freighters, and the operator's "risk appetite".

Therefore, it is essential for operators to conduct their own safety risk assessment based on their operational needs and environment, to identify various risk mitigation measures that will reduce the risks to as low as practicable to achieve an acceptable level of safety.

Supplementary Information

Cargo

Organisation	Subject	URL
Federal Aviation Administration	Lithium battery safety resources	https://www.faa.gov/hazmat/resources/lithium_batteries/
	Lithium battery basics	https://www.faa.gov/tv/?mediaId=1951
	SafeCargo for Shippers & Startups	https://www.faa.gov/hazmat/safecargo/
IATA	Lithium batteries	https://www.iata.org/lithiumbatteries
Transport Canada	Shipping and importing devices containing lithium batteries	https://www.tc.gc.ca/eng/tdg/shipping-importing-devices-containing-lithium-batteries.html
	Safety alerts: transportation of lithium ion or lithium metal batteries as cargo on aircraft	https://www.tc.gc.ca/en/services/aviation/reference-centre/safety-alerts/transportation-lithium-ion-lithium-metal-batteries-cargo-aircraft.html
UK Royal Mail	Prohibited and restricted items	https://personal.help.royalmail.com/app/answers/detail/a_id/96
UK Civil Aviation Authority & Federal Aviation Administration	Posting lithium batteries in the mail	https://www.youtube.com/watch?v=nGhLA7brx44&list=PLig80S1opAEK_Ys1ImbatqCxNwEUUc0cB&index=4&t=0s
	Lithium batteries: guidance for cargo and ramp personnel	https://www.youtube.com/watch?v=UmESPM3U5T4&list=PLig80S1opAEK_Ys1ImbatqCxNwEUUc0cB&index=6

Passenger

Organisation	Subject	URL
Australian Civil Aviation Safety Authority	Least wanted dangerous goods	https://www.casa.gov.au/safety-management/dangerous-goods/least-wanted-dangerous-goods
	Travelling safely with batteries and portable power banks	https://www.casa.gov.au/standard-page/travelling-safely-batteries
	Before you pack your bags	https://www.casa.gov.au/safety-management/dangerous-goods/you-pack-your-bags
Federal Aviation Administration	Pack Safe	https://www.faa.gov/hazmat/packsafe/
IATA	Travelling with portable electronic devices (PEDs)	https://www.iata.org/ped
Transport Canada	Safety alerts: the possibility of smoke or fire from electronic flight bags (EFBs) or their lithium ion batteries	https://www.tc.gc.ca/en/services/aviation/reference-centre/safety-alerts/possibility-smoke-fire-electronic-flight-bags-lithium-ion-batteries.html
UK Civil Aviation Authority	One team one goal – guidance on the safe loading and transport of electric mobility aids	https://www.youtube.com/watch?v=IFyEVckQEjc
UK Civil Aviation Authority & Federal Aviation Administration	Lithium batteries: guidance for crew	https://www.youtube.com/watch?v=pOiwEW54xL8&list=PLig80S1opAEK_Ys1ImbatqCxNwEUUc0cB&index=4
	Lithium batteries: guidance for passenger handling staff	https://www.youtube.com/watch?v=cJ7r91IZYOc&list=PLig80S1opAEK_Ys1ImbatqCxNwEUUc0cB&index=5

2023 Lithium Battery Guidance Document

Transport of Lithium Metal and Lithium Ion Batteries

Revised for the 2023 Regulations

Introduction

△ This document is based on the provisions set out in the 2023-2024 Edition of the ICAO *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Technical Instructions) and the 64th Edition of the IATA Dangerous Goods Regulations (DGR).

The provisions of the DGR with respect to lithium batteries may also be found in the IATA lithium Battery Shipping Regulations (LBSR) 10th Edition. In addition to the content from the DGR, the LBSR also has additional classification flowcharts and detailed packing and documentation examples for lithium batteries.

Information on the DGR and LBSR can be found here:

http://www.iata.org/dgr

http://www.iata.org/lbsr

The purpose of this document is to provide guidance for complying with provisions applicable to the transport by air of lithium batteries as set out in the DGR. Specifically, the document provides information on:

- Definitions;
- Classification (including classification flowcharts);
- Prohibitions;
- Restrictions;
- Frequently Asked Questions
- Additional Information
- Abbreviations, Acronyms, Symbols

Definitions

Lithium Battery – The term "lithium battery" refers to a family of batteries with different chemistries, comprising many types of cathodes and electrolytes. For the purposes of the DGR they are separated into:

Lithium metal batteries. Are generally primary (non-rechargeable) batteries that have lithium metal or lithium compounds as an anode. Also included within lithium metal are lithium alloy batteries. Lithium metal batteries are generally used to power devices such as watches, calculators, cameras, temperature data loggers, car key fobs and defibrillators.

Note:

Lithium metal batteries packed by themselves (not contained in or packed with equipment) (Packing Instruction 968) are forbidden for transport as cargo on passenger aircraft). In accordance with Special Provision A201, lithium metal cells or batteries that meet the specified quantity limits may be shipped on a passenger aircraft under an approval issued by the authority of the State of Origin, State of Destination and State of the Operator. Or in the case of urgent medical need, one consignment of lithium batteries may be transported as Class 9 (UN 3090) on passenger aircraft with the prior approval of the authority of the State of Origin and with the approval of the operator, see Special Provision A201. All other lithium metal cells and batteries can only be shipped on a passenger aircraft under exemption issued by all States concerned.

Figure 1 - Example of Lithium Metal Cells and Batteries

Lithium-ion batteries (sometimes abbreviated Li-ion batteries) are a secondary (rechargeable) battery where the lithium is only present in an ionic form in the electrolyte. Also included within the category of lithium-ion batteries are lithium polymer batteries. Lithium-ion batteries are generally used to power devices such as mobile telephones, laptop computers, tablets, power tools and e-bikes.

Figure 2 - Example of Lithium Ion Cells and Batteries

Note:

Lithium ion batteries packed by themselves (Packing Instruction 965) (not contained in or packed with equipment):

(a) must be shipped at a state of charge (SoC) not exceeding 30% of their rated capacity. Cells and/or batteries at a SoC of greater than 30% may only be shipped with the approval of the State

of Origin and the State of the Operator under the written conditions established by those authorities, see Special Provision A331; and

(b) in accordance with Special Provision A201, lithium ion cells or batteries that meet the specified quantity limits may be shipped as cargo on a passenger aircraft under an approval issued by the authority of the State of Origin, State of Destination and State of the Operator. Or in the case of urgent medical need, one consignment of lithium batteries may be transported as Class 9 (UN 3480) on passenger aircraft with the prior approval of the authority of the State of Origin and with the approval of the operator, see Special Provision A201. All other lithium ion cells and batteries can only be shipped as cargo on a passenger aircraft under exemption issued by all States concerned.

Aggregate lithium content means the sum of the grams of lithium content contained by the cells comprising a battery.

The technical definition of a battery and cell, as indicated in the UN *Manual of Tests and Criteria*, is as follows:

Battery means two or more cells or batteries which are electrically connected together and fitted with devices necessary for use, for example, case, terminals, marking and protective devices. Units which have two or more cells that are commonly referred to as "battery packs", "modules" or "battery assemblies" having the primary function of providing a source of power to another piece of equipment are for the purposes of the UN Model Regulations and this guidance document treated as batteries. See definitions for "cell" and "single cell battery". (See also "Power Banks")

Button cell or battery means a round small cell or battery when the overall height is less than the diameter.

Cell means a single encased electrochemical unit (one positive and one negative electrode) which exhibits a voltage differential across its two terminals. Under the UN Model Regulations, UN *Manual of Tests and Criteria* and this guidance, to the extent the encased electrochemical unit meets the definition of "cell" herein, it is a "cell", not a "battery", regardless of whether the unit is termed a "battery" or a "single cell battery" outside of the UN Model Regulations, the UN *Manual of Tests and Criteria* and this guidance*.*

Consignment, one or more packages of dangerous goods accepted by an operator (airline) from one shipper at one time and at one address, receipted for in one lot and moving to one consignee at one destination address.

Net quantity, either:

(a) the weight or volume of the dangerous goods contained in a package excluding the weight or volume of any packaging material; or

(b) the weight of an unpackaged article of dangerous goods (e.g. UN 3166).

For the purposes of this definition "dangerous goods" means the substance or article as described by the proper shipping name shown in Table 4.2, e.g. for "Fire extinguishers", the net quantity is the weight of the fire extinguisher. For articles packed with equipment or contained in equipment, the net quantity is the net weight of the article, e.g. for "Lithium ion batteries contained in equipment", the net quantity is the net weight of the lithium ion batteries in the package.

Overpack means an enclosure used by a single shipper to contain one or more packages and to form one handling unit for convenience of handling and stowage. Dangerous goods packages contained in the overpack must be properly packed, marked, labelled and in proper condition as required by the IATA Dangerous Goods Regulations.

The overpack must not contain packages enclosing different substances which might react dangerously with each other or packages of dangerous goods which require segregation according

to Table 9.3.A. In addition, packages containing UN 3090, lithium metal batteries prepared in accordance with Section IA or Section IB of PI968 or UN 3480, lithium ion batteries prepared in accordance with Section IA or Section IB of PI 965 are not permitted in an overpack with packages containing dangerous goods classified in Class 1 other than Division 1.4S, Division 2.1, Class 3, Division 4.1 or Division 5.1.

Power bank (power pack, mobile battery, etc.), these are portable devices designed to be able to charge consumer devices such as mobile phones and tablets. For the purposes of this guidance document and the IATA Dangerous Goods Regulations, power banks are to be classified as batteries and must be assigned to UN 3480, lithium ion batteries, or UN 3090, lithium metal batteries, as applicable. For carriage by passengers, power banks are considered spare batteries and must be individually protected from short-circuit and carried in carry-on baggage only.

Rated capacity means the capacity, in ampere-hours or milliampere-hours, of a cell or battery as measured by subjecting it to a load, temperature and voltage cut-off point specified by the manufacturer.

Note:

The following IEC standards provide guidance and methodology for determining the rated capacity:

(1) *IEC 61960 (First Edition 2003-12): Secondary cells and batteries containing alkaline or other non-acid electrolytes -Secondary lithium cells and batteries for portable applications;*

(2) *IEC 62133 (First Edition 2002-10): Secondary cells and batteries containing alkaline or other non-acid electrolytes — Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications;*

(3) *IEC 62660-1 (First Edition 2011-01): Secondary lithium-ion cells for the propulsion of electric road vehicles-Part 1: Performance testing.*

State of Origin, the country (State) in the territory of which the consignment is to first be loaded on an aircraft.

State of the Operator, the country (State) in which the operator's principal place of business is located or, if there is no such place of business, the operator's permanent residence.

Watt-hour rating, expressed in Watt-hours (Wh), the Watt-hour rating of a lithium cell or battery is calculated by multiplying the rated capacity in ampere-hours by the nominal voltage.

Classification (DGR 3.9.2.6)

Lithium batteries are classified in Class 9 – Miscellaneous dangerous goods as:

- UN 3090, **Lithium metal batteries**; or
- UN 3480, **Lithium ion batteries**

or, if inside a piece of equipment or packed separately with a piece of equipment to power that equipment as:

- UN 3091, **Lithium metal batteries contained in equipment**; or
- UN 3091, **Lithium metal batteries packed with equipment**; and
- UN 3481, **Lithium ion batteries contained in equipment**; or
- UN 3481, **Lithium ion batteries packed with equipment**.

△ Lithium battery test summary – except for button cells installed in equipment (including circuit boards), manufacturers and subsequent distributors of cells or batteries and equipment powered by cells and batteries manufactured after 30 June 2003 must make available the test summary as

specified in the UN *Manual of Tests and Criteria*, Revision 7. 1, Part III, sub-section 38.3, paragraph 38.3.5.

Note:

The requirement is for the manufacturer and subsequent distributors to make this test summary available. There are numerous ways this can be achieved, such as by listing the applicable summary document on the company website. There is no expectation for the shipper/distributor to provide paper copies with each consignment containing lithium batteries. The supply chain are encouraged to make use of technology to facilitate the availability of the test summary.

△ The following table provides details of the information required in the test summary:

Lithium cell or battery test summary in accordance with sub-section 38.3 of Manual of Tests and Criteria
The following information shall be provided in this test summary:
(a) Name of cell, battery, or product manufacturer, as applicable;
(b) Cell, battery, or product manufacturer's contact information to include address, phone number, email address and website for more information;
(c) Name of the test laboratory to include address, phone number, email address and website for more information;
(d) A unique test report identification number;
(e) Date of test report;
(f) Description of cell or battery to include at a minimum:
(i) Lithium ion or lithium metal cell or battery;
(ii) Mass;
(iii) Watt-hour rating, or lithium content;
(iv) Physical description of the cell/battery; and
(v) Model numbers.
(g) List of tests conducted and results (i.e., pass/fail);
(h) Reference to assembled battery testing requirements, if applicable (i.e. 38.3.3 (f) and 38.3.3 (g));
(i) Reference to the revised edition of the Manual of Tests and Criteria used and to amendments thereto, if any; and
(j) Name and title of responsible person as an indication of the validity of information provided.

Further information on the test summary and FAQ's is available in Part 4 of this guidance document.

△ **Classification Flowcharts**

The following (2) classification flowcharts are intended to provide guidance on the classification for lithium ion and lithium metal batteries.

Classification Flowchart – Lithium Ion Batteries

All cells and batteries must be tested in accordance with the UN Manual of Tests and Criteria Part III Subsection 38.3 (DGR 3.9.2.6)

Passed UN? → No → Redesign

↓ Yes

Lithium Ion Batteries Contained in Equipment

Cells >20 Wh;
Batteries > 100 Wh

UN3481
PI 967 Section I
IMP: RLI

Limit per package:
Pax A/C = 5 kg
CAO = 35 kg

Cells ≤20 Wh;
Batteries ≤100 Wh

UN3481

PI 967 Section II *
IMP: ELI

Limit per package:
Pax A/C = 5 kg
CAO = 5 kg

Lithium Ion Batteries (limited to a maximum of 30% SoC)

Cells > 20 Wh;
Batteries > 100 Wh

UN3480
PI 965
Section IA
IMP: RBI

Limit per package:
Pax A/C = Forbidden
CAO = 35 kg

Cells ≤ 20 Wh;
Batteries ≤100 Wh

UN3480
PI 965
Section IB
IMP: RBI

Limit per package:
Pax A/C = Forbidden
CAO = 10 kg

Lithium Ion Batteries Packed with Equipment

Cells > 20 Wh;

Batteries > 100 Wh

UN3481
PI 966
Section I
IMP: RLI

Limit per package:
Pax A/C = 5 kg
CAO = 35 kg

Cells ≤ 20 Wh;
Batteries ≤100 Wh

UN3481
PI 966
Section II
IMP: ELI

Limit per package:
Pax A/C = 5 kg
CAO = 5 kg

* exceptions exist to the marking requirements
– see PI 967 Section II

Classification Flowchart – Lithium Metal Batteries

All cells and batteries must be tested in accordance with the UN Manual of Tests and Criteria Part III Subsection 38.3 (DGR 3.9.2.6)

Passed UN? → No → Redesign

Yes

Lithium Metal Batteries Contained in Equipment

Cells >1 g; **Batteries** > 2 g

UN3091
PI 970
Section I
IMP: RLM

Limit per package:
Pax A/C = 5 kg
CAO = 35 kg

Cells ≤ 1 g; **Batteries** ≤ 2 g

UN3091
PI 970
Section II *
IMP: ELM

Limit per package:
Pax A/C = 5 kg
CAO = 5 kg

Lithium Metal Batteries

Cells >1 g; **Batteries** > 2 g

UN3090
PI 968
Section IA
IMP: RBM

Limit per package:
Pax A/C = Forbidden
CAO = 35 kg

Cells ≤ 1 g; **Batteries** ≤ 2 g

UN3090
PI 968
Section IB
IMP: RBM

Limit per package:
Pax A/C = Forbidden
CAO = 2.5 kg

Lithium Metal Batteries Packed with Equipment

Cells >1 g; **Batteries** > 2 g

UN3091
PI 969
Section I
IMP: RLM

Limit per package:
Pax A/C = 5 kg
CAO = 35 kg

Cells ≤ 1 g; **Batteries** ≤ 2 g

UN3091
PI 969
Section II
IMP: ELM

Limit per package:
Pax A/C = 5 kg
CAO = 5 kg

* exceptions exist to the marking requirements
– see PI 970 Section II

Prohibitions

Lithium ion batteries

All lithium ion cells and batteries shipped by themselves (UN 3480) are forbidden for transport as cargo on passenger aircraft. All packages prepared in accordance with Packing Instruction 965, Section IA and IB, must bear a Cargo Aircraft Only label, in addition to other required marks and/or labels.

Lithium metal batteries

All lithium metal cells and batteries shipped by themselves (UN 3090) are forbidden for transport as cargo on passenger aircraft. All packages prepared in accordance with Packing Instruction 968, Section IA and IB, must bear a Cargo Aircraft Only label, in addition to other required marks and/or labels.

Restrictions

Lithium ion batteries

All lithium ion cells and batteries (UN 3480 only) must be shipped at a state of charge (SoC) not exceeding 30% of their rated capacity. Cells and/or batteries at a SoC of greater than 30% may only be shipped with the approval of the State of Origin and the State of the Operator under the written conditions established by those authorities, see Special Provision A331.

Packing Restrictions

PI 965 & PI 968 Section IA & IB

UN 3090, lithium metal batteries prepared in accordance with Section IA or Section IB of PI 968 and UN 3480, lithium ion batteries prepared in accordance with Section IA or Section IB of PI 965 must not be packed in the same outer packaging with dangerous goods classified in Class 1 (explosives) other than Division 1.4S, Division 2.1 (flammable gases), Class 3 (flammable liquids), Division 4.1 (flammable solids) or Division 5.1 (oxidizers). Packages containing cells or batteries must not be placed in an overpack with packages containing dangerous goods classified in Class 1 other than Division 1.4S, Division 2.1, Class 3, Division 4.1 or Division 5.1.

Frequently Asked Questions

Part 1 – Questions Related to Definitions

A. What are the various types of lithium batteries?

Lithium batteries fall into two broad classifications; lithium metal batteries and lithium ion batteries. Lithium metal batteries are generally non-rechargeable and contain metallic lithium. Lithium ion batteries contain lithium which is only present in an ionic form in the electrolyte and are rechargeable.

Within these two broad classifications there are many different chemistries. For example within lithium ion batteries there are lithium polymer, lithium iron phosphate ($LiFePO_4$), lithium air to name a few.

B. What is the difference between a lithium cell and a lithium battery?

A lithium cell is a single encased electrochemical unit consisting of one positive and one negative electrode that exhibits a voltage differential across the two terminals. A lithium battery is two or more cells electrically connected. A single cell battery is considered a cell and not a battery for the purposes of the limitations set out in the DGR.

Note:
Units that are commonly referred to as "battery packs" or "power banks" having the primary function of providing a source of power to another piece of equipment are for the purposes of these Regulations treated as batteries. This includes uninterruptible power supply (UPS) fitted with lithium ion batteries. Refer to the section on Definitions for complete details.

C. How are component cells connected to form a battery?

Cells in batteries may be connected in parallel, in series, or in a combination of the two. When cells are connected in series, the voltage of the battery increases but the capacity in ampere-hours (Ah) does not change. By contrast, when cells are connected in parallel the capacity in ampere-hours of the battery (Ah) increases but the voltage stays the same.

D. How do I determine the watt-hour rating for a particular lithium ion battery?

The Watt-hour (Wh) rating is a measure by which lithium ion batteries are regulated. Lithium ion batteries with a Watt-hour rating in excess of 100 Wh manufactured after 31 December 2011 and lithium ion batteries with a Watt-hour rating not exceeding 100 Wh manufactured after 1 January 2009 are required to be marked with the Watt-hour rating on the outside case.

You can also arrive at the number of Watt-hours your battery provides if you know the battery's nominal voltage (V) and capacity in ampere-hours (Ah):

Ah x V = Wh

Note:
If only the milliampere-hours (mAh) are marked on the battery then divide that number by 1000 to get ampere-hours (Ah) (i.e. 4400 mAh / 1000 = 4.4. Ah).

Most lithium ion batteries marketed to consumers are below 100 Watt-hours. If you are unsure of the Watt-hour rating of your lithium ion battery, contact the manufacturer.

E. What is a button cell battery?

A button cell battery is a small round cell where the overall height is less than the diameter. Button cells are often referred to as "coin" cells.

Part 2 – Questions related to Packaging and Transport Provisions

A. How do I safely package lithium batteries for transport?

One of the major risks associated with the transport of batteries and battery-powered equipment is short-circuit of the battery as a result of the battery terminals coming into contact with other batteries, metal objects, or conductive surfaces. Packaged batteries or cells must be separated in a way to prevent short circuits and damage to terminals. They must be packed in a strong rigid outer packaging unless when contained in equipment, the battery is afforded equivalent protection by the equipment in which it is contained. Sample packaging meeting these requirements is shown below:

Sample Packaging: Lithium Batteries
Blister Pack
Cushioning
Divider
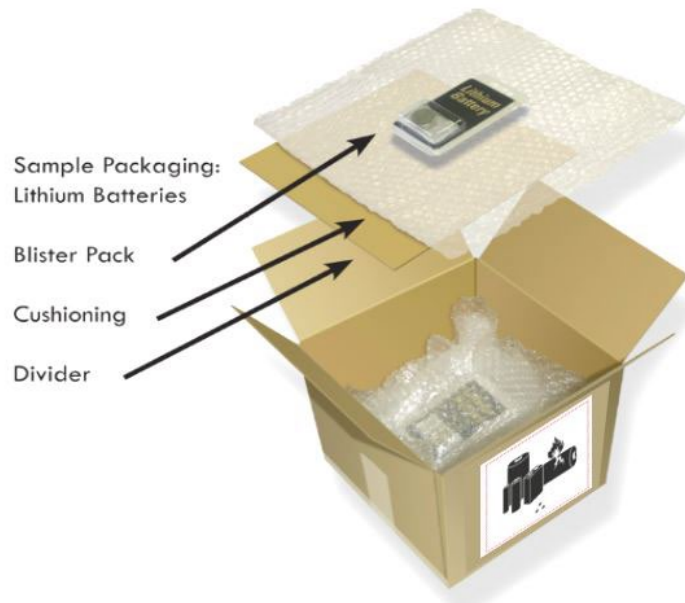
B. How can batteries be effectively protected against short circuit?

Methods to protect against short circuit include, but are not limited to, the following methods:

a. Packing each battery or each battery-powered device when practicable, in fully enclosed inner packagings made of non-conductive material (such as a plastic bag);

b. Separating or packing batteries in a manner to prevent contact with other batteries, devices or conductive materials (e.g. metal) in the packagings; and

c. Ensuring exposed terminals or connectors are protected with non-conductive caps, non-conductive tape, or by other appropriate means.

If not impact resistant, the outer packaging must not be used as the sole means of protecting the battery terminals from damage or short-circuiting. Batteries should be securely cushioned and packed to prevent shifting which could loosen terminal caps or reorient the terminals to produce short circuits.

Terminal protection methods include but are not limited to the following:

a. Securely attaching covers of sufficient strength to protect the terminals;

b. Packaging the battery in a rigid plastic packaging; and

c. Constructing the battery with terminals that are recessed or otherwise protected so that the terminals will not be subjected to damage if the package is dropped.

## C. I'm shipping using Section II of the packing instructions, what constitutes "adequate instruction"?

Shippers of lithium batteries prepared in accordance with Section II of the lithium battery packing instructions are not subject to the formal dangerous goods training requirements set out in DGR 1.5. However, persons preparing such shipments must be provided with "adequate instruction" as described in DGR 1.6.

The following is offered as a starting point for an employer on what could be considered as being adequate instruction:

1. The employer must identify the different configurations of lithium batteries that they ship, i.e. lithium batteries and/or lithium batteries packed with equipment and/or lithium batteries contained in equipment; lithium metal batteries and/or lithium ion batteries.

2. The employer must document the procedures that apply to the configurations and battery types that they ship as determined in 1, above.

3. The procedures should be written up as a clear work instruction or other information that is available to all employees responsible for the preparation of lithium battery shipments.

4. All employees that are involved in the process of preparing lithium battery shipments must be taken through the procedure to ensure that they understand and can demonstrate the correct application of documented procedures for the packing, labelling, marking and documentations requirements, as applicable to their job function.

5. A record must be maintained that identifies each applicable employee and the date(s) that this instruction was provided.

6. Employees should be given periodic refresher, or at least demonstrate that they remain "adequately" instructed on how to perform the task. This should be done at least every two years or whenever the procedure is revised, or regulations are changed, whichever is sooner.

7. Companies that are involved in reverse logistics, i.e. arranging for returns of lithium batteries, lithium batteries packed with equipment or lithium batteries contained in equipment must develop a clear instruction for consumers on the process to be followed for returning products. This instruction must include packaging materials and lithium battery marks, as necessary. The instruction must also include the transport method and mode of transport that must be followed; this must include a clear statement on applicable prohibitions.

△ D. What does the lithium battery mark look like and when is it required?

The lithium battery mark is required as specified in the additional requirements of Section II of Packing Instructions 966, 967, 969 and 970. It is also required as specified in the additional requirements of Section IB of Packing Instructions 965 and 968 in addition to the Class 9 lithium battery hazard label and Cargo Aircraft Only label. The mark (see below) is as shown in Figure 7.1.C of the IATA Dangerous Goods Regulations. The border of the mark must have red diagonal hatchings with a minimum width of 5 mm. The symbol (group of batteries, one damaged and emitting flame, above the UN number for lithium ion or lithium metal batteries or cells) must be black on white or suitable contrasting background. The lithium battery mark may be printed directly on the outer packaging provided that there is sufficient contrast between the elements of the lithium battery mark and the colour of the packaging material. The mark must be in the form of a rectangle or a square with minimum dimensions of 100 mm x 100 mm. If the size of the package so requires, the dimensions may be reduced to not less than 100 mm wide x 70 mm high, and all features must be in approximate proportion to those shown on the full-size mark.
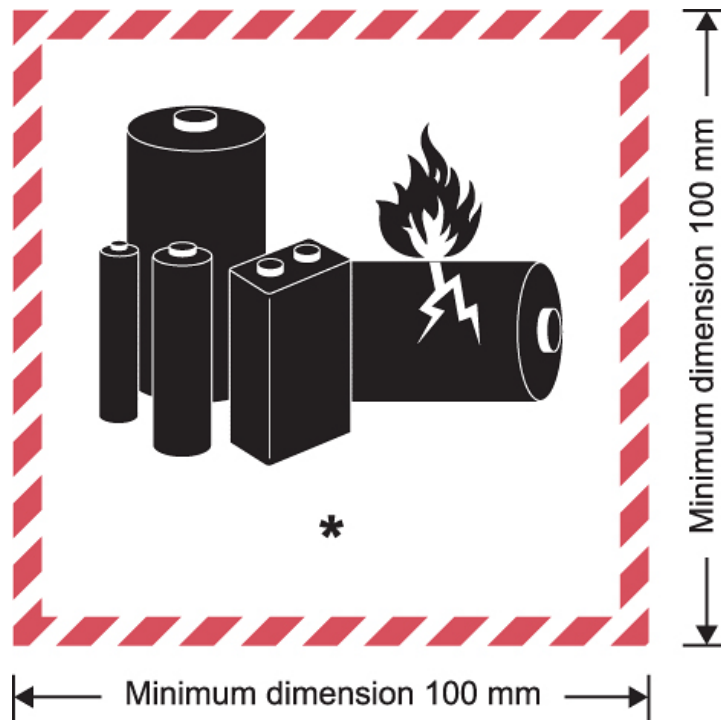
* Place for UN number(s), i.e. UN 3090, UN 3091, UN 3480 and/or UN 3481, as applicable. The UN number(s) indicated on the mark should be at least 12 mm high.

⊗

E. If I have smaller packages, can I use a smaller lithium battery mark?

Where the packages are of dimensions such that they cannot bear the full-size lithium battery mark, the mark dimensions may be reduced to 100 mm wide × 70 mm high. The design specifications remain otherwise the same.

Where any face of a package is large enough to bear the full-size lithium battery mark, the full-size mark must be used.

F. When is a lithium battery mark not required on the package?

A lithium battery mark must not be affixed to packages prepared in accordance with Section IA of Packing Instructions 965 and 968 and Section I of Packing Instructions 966, 967, 969 and 970.

A lithium battery mark is **<u>not required</u>** for packages prepared in accordance with Section II of PI 967 or PI 970 containing only button cell batteries installed in equipment (including circuit boards) or consignments of two packages or less where each package contains no more than four cells, or two batteries installed in equipment.

Note:
The Air Waybill is required to contain the statements "Lithium [ion or metal] batteries in compliance with Section II of PI9XX" when the lithium battery mark is affixed to the package(s).

G. Section II in Packing Instructions 967 and 970 states that "the lithium battery mark is not required on consignments of two packages or less where each package contains no more than four cells, or two batteries installed in equipment." What is the intent of this provision?

This provision is to require, where there are more than two packages in the consignment, that each package bears the lithium battery mark, and therefore the air waybill has the compliance statement e.g. "Lithium [ion or metal] batteries in compliance with Section II of PI 9xx [67 or 70]".

The provision continues to allow for small consignments of one or two packages, containing no more than four cells or two batteries installed in equipment per package, to move without the lithium battery mark and therefore without the compliance statement on the air waybill.

Note:

A consignment is one or more packages of dangerous goods accepted by an operator (airline) from one shipper at one time and at one address, receipted for in one lot and moving to one consignee at one destination address.

H. I have a mobile (cell) phone that contains one single-cell lithium ion battery. Do I have to mark the shipping box that contains each mobile phone? What if I place five mobile phones in a shipping box? Does this require the lithium battery mark?

For packages of a single mobile phone, no lithium battery mark would be required since you can place up to 4 of these single-cell batteries in a box without applying the lithium battery mark on the outer box. In the case where 5 mobile phones are in a shipping package, a lithium battery mark on the shipping package is required.

☐ **I.   If I pack three mobile phones each containing a single cell lithium ion battery, can I also pack a laptop with a lithium ion battery in the same package and not apply the lithium battery mark using the 4 cell, 2 battery exception?**

No, the exception is for 4 cells or 2 batteries. You cannot mix and match.

J. Can a single lithium battery mark be used to identify that both lithium metal and lithium ion batteries are contained inside the package?

Yes. The mark may bear all applicable UN numbers, e.g. UN 3091, UN 3481, to identify that the package contains lithium metal batteries packed with or contained in equipment and lithium ion batteries packed with, or contained in equipment.

⊗

K. Must the lithium battery mark be placed on the same face of the package with the Class 9 hazard label and/or Cargo Aircraft Only label?

No, the lithium battery mark does not have to be on the same face of the package with these labels. It may be placed on a different face. However, if the package is of sufficient size all required marks and labels should be applied to one face of the package.

L.   For the purposes of the lithium battery packing instructions, what is considered the "package"?

The package is the complete product of the packing operation that satisfies the requirements of the packing instruction and in a manner ready to be presented for transport (shipper/consignee information, hazard communication, etc.). The package may contain multiple batteries or pieces of equipment provided the limitations set out in the applicable packing instruction are not exceeded. The package must be marked and labelled as required by the packing instruction. A single package may be offered for transport, or one or more packages may then be placed into an overpack for ease of handling or transport purposes. When an overpack is used, the package marks and labels must be duplicated on the overpack unless the marks and labels required on individual packages are visible or are not required by the packing instruction (i.e. not more than 4 cells or 2 batteries when contained in equipment and no more than two packages in the consignment).

M. Does the IATA DGR require a MSDS or SDS containing the UN test data?

No. The IATA DGR does not require a safety data sheet (SDS) when offering lithium batteries for transport.

Notes:

1. *A SDS is not a transport document. A SDS is only required for the supply and use of a substance or mixture meeting the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) classification criteria. GHS does not include provisions for manufactured articles.*

2. *Except for button cells installed in equipment (including circuit boards), manufacturers and subsequent distributors of lithium cells and batteries and equipment with installed lithium cells or batteries must make available a test summary that identifies that the cell and battery types have passed the applicable UN 38.3 tests, see Part 4 of this document.*

N. Under Packing Instructions 966 and 969, it states that "The maximum number of batteries in each package must not exceed the minimum number required to power the equipment, plus two spare sets. A "set" of cells or batteries is the number of individual cells or batteries that are required to power each piece of equipment". If a package contains 4 power tools (each tool contains 1 lithium ion battery), can 2 extra lithium ion batteries be placed in the package for each piece of equipment for a total of 12 batteries?

Yes, providing you do not exceed the maximum net quantity for the relevant section of the packing instruction and the chosen aircraft type. The 12 batteries reflect two spare sets (8) for each of the 4 power tools in the outer package plus one each to power the device (4).

O. May lithium battery packages be placed in an overpack in accordance with the IATA Dangerous Goods Regulations?

Yes, but there are segregation requirements that need to be considered for certain other classes of dangerous goods. UN 3090, lithium metal batteries prepared in accordance with Section IA or Section IB of PI 968 and UN 3480, lithium ion batteries prepared in accordance with Section IA or Section IB of PI 965 are not permitted in the same outer packaging with dangerous goods classified in Class 1 other than Division 1.4S, Division 2.1, Class 3, Division 4.1 or Division 5.1. The overpack may also contain goods not subject to the Regulations provided there are no packages enclosing different substances which might react dangerously with each other. An overpack must be marked with the word "overpack" and must be labelled with the lithium battery mark (DGR Figure 7.1.C), unless the mark(s) on the package(s) inside the overpack are visible or not required by the Packing Instruction.

P. Do the quantity limits shown in the lithium battery packing instructions apply to overpacks containing lithium batteries?

No. The quantity limits shown in the packing instructions refer to the maximum net weight of the lithium cells or batteries that is permitted in each package. Provided each package remains within the limit specified in the packing instruction, there are no limits specified for an overpack.

☐ **Q. Can I use a nylon bag to contain the individual packages prepared in accordance with Section II of Packing Instruction 967 to form an overpack?**

No, because the packages placed in an overpack must be secured within the overpack and that the intended function of each package must not be impaired by the overpack.

△ **R. Packing Instructions 966 and 969 Section II specify that packages must be capable of withstanding a 1.2 metre drop test. What portion or portions of the package are subject to this test?**

The completed package containing batteries as prepared for transport in accordance with the relevant packing instruction must be capable of withstanding the 1.2 m drop test. This could apply to a package solely containing batteries that is packaged in full compliance with the provisions of the packing instruction (to include the 1.2 m drop test capability requirement) and is then packed with equipment in a strong rigid outer packaging and offered for transport. Or, it could apply to a package that includes batteries properly packed in inner packaging and equipment or other non-dangerous goods that are placed in a strong rigid outer packaging. The package that includes both the inner packaging containing batteries and the equipment must comply with the packing instruction to include meeting the capability to pass the 1.2 m drop test.

☐ **S. Packing Instructions 965 and 968 Section IB specify that packages must be capable of withstanding a 3 metre stack test. Do I have to have my package tested?**

No, but the shipper must, if required, be able to demonstrate to the appropriate authority that they have determined the capability of the package to withstand a 3 m stack test for a period of 24 hours. One method could be that the shipper prepares a package containing batteries as tendered for transport in accordance with the relevant packing instruction and then places a weight equivalent to the weight of similar packages if stacked 3 m high and leaving that for 24 hours. This could be documented as evidence of demonstrating capability.

T. How do I transport prototype lithium cells and batteries that have not passed the UN 38.3 Tests?

Pre-production prototypes of lithium batteries or cells, when these prototypes are transported for testing, or low-production runs (i.e. annual production runs consisting of no more than 100 lithium cells and batteries) of lithium cells or batteries that have not been tested to the requirements in subsection 38.3 of the UN Manual of Tests and Criteria may be transported aboard cargo aircraft, if approved by the appropriate authorities of the State of Origin and the State of the Operator and the requirements in Packing Instruction 910 of the Supplement to the Technical Instructions are met (see Special Provision A88).

The appropriate authority of the State of Origin should provide details of PI 910 as part of the approval process.

U. Can I ship recalled, damaged or non-conforming cells or batteries?

Lithium batteries, identified by the manufacturer as being defective for safety reasons, or that have been damaged, that have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for transport by air (e.g. those being returned to the manufacturer for safety reasons). This applies also to lithium cells or batteries installed inside equipment such as mobile phones, laptops or tablets where the devices are subject to recall due to the safety concerns of the lithium cell or battery installed in the device, see Special Provision A154 in the DGR.

Batteries which have some other defective feature (e.g. LEDs not showing charge, incorrect model number on label, or batteries not holding enough charge) could still be shipped by air. Also, laptops being returned may not have a defective battery, it may not meet the needs of the customer, may be defective itself (but not the battery), etc. In these situations air transport would be permitted. The battery or equipment manufacturer should be contacted to determine the appropriate shipping method.

V. How do I protect against "inadvertent activation"?

When batteries are contained in equipment, the equipment must be packaged in a manner that prevents unintentional activation or must have an independent means of preventing unintentional activation (e.g. packaging restricts access to activation switch, switch caps or locks, recessed switches, trigger locks, temperature sensitive circuit breakers, etc.). This requirement does not apply to devices which are intentionally active in transport (RFID transmitters, watches, sensors, etc.) and which are not capable of generating a quantity of heat sufficient to be dangerous to packaging or personal safety.

W. What is the maximum weight of batteries per package for fully regulated batteries contained in equipment (Section I)?

The maximum weight is 5 kg of lithium batteries per package for passenger and cargo aircraft and 35 kg of lithium batteries per package for cargo aircraft only. The net quantity shown excludes the weight of the equipment:

	Net Quantity per Package Passenger Aircraft	Net Quantity per Package Cargo Aircraft Only
Lithium Ion & Lithium Metal cells and batteries contained in equipment	5 kg	35 kg

X. Do I need to declare a gross weight or a net weight for lithium batteries (Section I)?

All lithium battery shipments, including when packed with or contained in equipment, must be declared by the net weight of lithium cells or batteries contained in the package.

The net weight that must be declared is the weight of the lithium cell or batteries contained in the package. This applies for both lithium ion cells and batteries and lithium metal cell and batteries.

Y. I am shipping Section IB lithium [ion or metal] batteries; do I need dangerous goods training?

Yes. All the applicable provisions of the Dangerous Goods Regulations apply to shipments of Section IB batteries. Therefore, dangerous goods training as indicated in Subsection 1.5 of the Dangerous Goods Regulations is required.

Z. What are the additional marking requirements for a package prepared under Section IB of Packing Instruction 965 and 968?

Because all of the requirements of the dangerous goods regulations apply other than the requirement to use UN specification packaging, each package must be marked with:

- the UN Number preceded by "UN" and the Proper Shipping Name (DGR 7.1.4.1 (a));
- the name and address of the shipper and consignee (DGR 7.1.4.1 (b));
- in addition, the net weight as required by (DGR 7.1.4.1(c)) must be marked on the package; and
- the lithium battery mark (see Part 2, D) in addition to the Class 9 lithium battery hazard label and Cargo Aircraft Only label.

Note:

When using an overpack, each package must be marked in accordance with the Regulations and then, when placed in an overpack, marked as required by DGR 7.1.7.

AA.   I work for a pharmaceutical manufacturer that is shipping vaccines and other pharmaceutical products with lithium battery powered temperature or data loggers; do I need to follow the Dangerous Goods Regulations?

Yes. All the applicable provisions for lithium batteries will need to be followed by the shipper of such devices, including the limitations for devices that are "active" (on) during transport.

However, there are exceptions for packages containing only COVID-19 pharmaceuticals in Special Provision A220 that these packages containing cargo tracking devices containing lithium batteries are not subject to the marking and documentation requirements of Section II of Packing Instruction 967 or 970. This same exception is also applicable to the same package configuration, when consigned without the COVID-19 pharmaceutical for the purposes of use or re-use when prior arrangements have been made with the operator.

Note:

1. *The IATA Temperature Control Regulations (TCR) also apply to such shipments.*

2. *Further information on active devices in the guidance document that is posted on the IATA website – www.iata.org/pharma*

BB. Do I need to include an additional document or statement to certify that my lithium ion batteries are at no more than 30% SoC?

No. For lithium ion batteries shipped in accordance with Section IA or Section IB of PI 965, which must be on a Shipper's Declaration, the Shipper's Declaration includes a certification statement "I declare that all of the applicable air transport requirements have been met."

By signing the Shipper's Declaration the shipper is making a legal statement that all the applicable provisions of the DGR have been complied with, which includes that the lithium ion batteries are at no more than 30% SoC.

CC. I have lithium ion batteries packed with equipment (PI 966, Section I) where the lithium ion batteries are packed in a UN specification fibreboard (4G) box and then that box is packed with the equipment in a fibreboard outer packaging. Is this an overpack?

No, Section I of PI 966 (and also PI 969) allows two methods of having lithium batteries packed with equipment. Either:

(a) the lithium batteries are packed into a UN specification packaging meeting Packing Group II performance standards and then packed with the equipment in a strong rigid outer packaging; or

(b) the lithium batteries are packed into an inner packaging and then packed with the equipment into a UN specification packaging meeting Packing Group II performance standards.

In either case what is presented for transport is a "package" and not an overpack.

DD. Does the definition of "consignment" apply to the house air waybill (HAWB) or to the master air waybill (MAWB)?

The use of HAWB or MAWB has no direct relationship to what a "consignment" is. For example a MAWB may have multiple consignments where each of the consignments are from separate shippers, or are from one shipper but to separate consignees, or the MAWB may be just be a single consignment from one shipper to one consignee.

The following limitation applies to consignments:

1. a shipper is not permitted to consign more than two packages of lithium batteries contained in equipment under Section II of PI 967 and PI 970 where there are no more than 4 cells or 2 batteries in the package without the application of the lithium battery mark on the package.

The objective of this condition is to:

1. require appropriate hazard communication on packages and on the air waybill where a shipper has more than two packages of lithium batteries contained in equipment.

   Notes:

   1. *This does not mean that every retail "package" must bear the lithium battery mark. A shipper may place multiple retail boxes, each containing a lithium battery meeting Section II installed in equipment, into an outer packaging to form the package for air transport. There is no limit on the number of individual retail boxes that can be placed into the outer packaging, except that a "package" must not contain more than 5 kg net weight of lithium batteries. Each such package must bear the lithium battery mark and when an air waybill is used, the air waybill must show the applicable compliance statement, e.g. "lithium ion batteries in compliance with section II of PI 967".*

2. *Shippers or freight forwarders should not try to split a consignment across multiple air waybills to try to avoid the application of the lithium battery mark where there are more than two packages with lithium batteries contained in equipment under Section II in a consignment.*

EE. What is the correct classification where I want to ship 2 mobile phones in the same package with 2 power banks?

The power banks are classified as UN 3480, **Lithium ion batteries** and therefore must be shipped in accordance with Section IB of PI 965 if the power bank has a Watt-hour rating not exceeding 100 Wh or in accordance with Section IA of PI 965 if the Watt-hour rating exceeds 100 Wh. Under the provisions of PI 965 Section IA and IB other lithium battery-powered equipment may be packed in the same outer packaging provided that all applicable parts of the relevant packing instructions are followed, which includes the net weight of lithium batteries contained in the package. Therefore, the package must be classified as UN 3480, Lithium ion batteries. The power banks are also not considered as "spares" for the purposes of PI 966, Lithium ion batteries packed with equipment.

FF. What is the correct classification for hearing aids or Bluetooth® "earbuds" that are shipped in a charging case or with a charging case in the same package?

Bluetooth® earbuds or hearing aids that are shipped in or with a charging case should be classified as "UN3481, Lithium batteries packed with equipment" and packaged in accordance with PI 966. If the charging case is shipped without the earbuds, the case must be classified as "UN3480, Lithium ion batteries" and packaged in accordance with PI 965.

GG. Can a package containing an AC adaptor or charger and lithium ion batteries be classified as UN 3481, Lithium ion batteries packed with equipment?

No, for the purpose of Packing Instruction 966, "equipment" means the device or apparatus for which the lithium ion batteries will provide electrical power for its operation. When a package contains only the AC adaptor or charger and lithium ion batteries, the package must be classified as "UN 3480, Lithium ion batteries" and packaged in accordance with PI 965.

Part 3 – Questions Related to Design Type Testing Provisions

A. Where can I find requirements related to testing of battery design types?

The UN Manual of Tests and Criteria sets out specific tests that must be conducted on each lithium cell or battery design type. Each test is intended to either simulate a common transportation occurrence such as vibration or changes in altitude or to test the integrity of a cell or battery. You may obtain a copy of these testing requirements via the following website: http://www.unece.org/trans/danger/publi/manual/manual_e.html

B. What constitutes a design change requiring renewed design type testing?

The following provisions are taken from the 7th revised edition of the UN Manual of Tests and Criteria, paragraph 38.3.2.2.

A cell or battery that differs from a tested design by:

(a) For primary cells and batteries, a change of more than 0.1 g or 20% by mass, whichever is greater, to the cathode, to the anode, or to the electrolyte;

(b) For rechargeable cells and batteries, a change in Watt-hours of more than 20% or an increase in voltage of more than 20%; or

(c) A change that would materially affect the test results.

shall be considered a new type and shall be subjected to the required tests.

Note: the type of change that might be considered to differ from a tested type, such that it might lead to a failure of any of the test results, may include, but is not limited to:

(a) A change in the material of the anode, the cathode, the separator or the electrolyte;

(b) A change of protective devices, including the hardware and software;

(c) A change of safety design in cells or batteries, such as a venting valve;

(d) A change in the number of component cells;

(e) A change in connection mode of component cells;

(f) For batteries which are to be tested according to T.4 with a peak acceleration less than 150 g_n, a change in the mass which could adversely impact the result of the T.4 test and lead to a failure.

In the event that a cell or battery type does not meet one or more of the test requirements, steps shall be taken to correct the deficiency or deficiencies that caused the failure before such a cell or battery type is retested.

△ **C. Which edition of the UN Manual of Tests and Criteria must be used when testing new lithium cell or battery designs**

If a newly produced lithium cell or battery design is being tested for the first time, then the edition of the UN *Manual of Tests and Criteria* in effect at the time that the cell or battery designs are first tested must be used. For example, a new lithium ion battery design is produced for the first time in March 2023. This battery must be tested in accordance with the provisions of the 7th revised edition, amendment 1 of the UN *Manual of Tests and Criteria* as this is the edition in effect as of 1 January 2023, see Note under DGR 1.1.1 (1.1 of the LBSR).

Part 4 – Questions Related to the Lithium Battery Test Summary[1]

△ **A. Does the test summary apply to equipment containing lithium cells or batteries?**

Except where the equipment, including circuit boards, contains only lithium button cells, the test summary applies to all lithium cells and batteries, irrespective of whether they are shipped alone or contained in equipment.

B. Can multiple batteries/manufacturers/products be listed on one report?

Yes, it is acceptable to have a single document that addresses multiple batteries / manufacturers / products, provided all required information is stated. For example, a tablet manufacturer may purchase lithium ion batteries from three different battery manufacturers. The test summary for the product will therefore list batteries and all related information (e.g. Watt-hours, test labs) from the three battery manufacturers without naming the manufacturer due to confidentiality issues.

C. Is it acceptable to list the various test houses, tests and range of revisions tested to for the UN 38.3 revision and amendments?

Yes, it is acceptable to have multiple test houses and their addresses, email information, etc. listed provided all required information is stated. The test house is not required to be aligned to a specific battery or product on the test summary when the test summary covers multiple batteries/products. It is required to have the test report number and date of test for each cell/battery/product listed on the test summary.

D. What is meant by physical description of cell or battery?

A physical description is intended to provide a check for the person requesting the test summary to know that it applies to the cell/battery/product covered by the test summary, i.e. if a cellular phone is the product being shipped, the invoice description or marketing name of the product as the physical description could be used on the test summary.

E. What does availability of report mean: "When requested?"

The test summary must be made available upon request. Any individual or entity in the supply chain may request the test summary, e.g. regulator, consumer, or transport provider.

F. Can the test summary provider require a requestor to obtain the document from a website?

Yes, it is acceptable for the provider to require the requestor to obtain a document electronically from a provider's website. The provider must ensure that the cell/battery/product has appropriate identifiers to align to the test summary.

G. If a manufacturer considers their suppliers, test house and battery data confidential and competitive information, how would test summary compliance be achieved?

All 10 data elements and listed subsets of information are required to be on the test summary. As indicated above, the test house information may be listed to cover a range of products.

H. If a test summary is requested by a dangerous goods enforcement agency, how quickly must the test summary be made available? For example, would a manufacturer be expected to immediately produce a test summary or provide it within a certain amount of time (e.g. 72 hours)

Due to the large volume of lithium batteries and lithium battery powered products that are shipped daily, manufacturers and distributors should not be expected to immediately provide a test summary for every product they ship. Manufacturers and distributors should be provided a reasonable amount of time to provide the required test summary.

I. Would manufacturers and distributors of battery powered vehicles (UN3171) and hybrid vehicles containing a lithium battery (UN3166) be expected to provide a test summary?

Yes. The test summary requirement applies to manufacturers and distributors of lithium cells and batteries. Therefore, a test summary must be made available for lithium battery-powered vehicles and other vehicles containing lithium batteries.

J. Is there a mandated format for the test summary that manufacturers and distributors must follow?

No. Manufacturers and distributors may compile the information required in the test summary using any format. Below are 3 examples of a test summary:

Example 1 of a Lithium Ion Battery Test Summary

LITHIUM CELLS OR BATTERIES TEST SUMMARY
IN ACCORDANCE WITH SUB-SECTION 38.3
OF UN MANUAL OF TESTS AND CRITERIA

Revision Date: March 27, 2017   Revision Number: 001

Product Manufacturer: Beta Bell Phone Company
                        123 Beta Bell Lane
                        Bellweather, Arizona 99999

Telephone: 800-999-4545
Email: betabell@gmail.com
Web: www.betabell.com

Beta Bell's product lithium ion cells and batteries have been successfully tested and comply with the UN Model Regulations, Manual of Test and Criteria, Part III, subsection 38.3.

	PERFORMED TESTS		RESULTS
38.3.4.1	T1	Altitude Simulation	Pass
38.3.4.2	T2	Thermal Test	Pass
38.3.4.3	T3	Vibration	Pass
38.3.4.4	T4	Shock	Pass
38.3.4.5	T5	External Short Circuit	Pass
38.3.4.6	T6	Impact / Crush	Pass
38.3.4.7	T7	Overcharge	Pass
38.3.4.8	T8	Forced Discharge	Pass

The UN38.3 tests were performed by one of the following test houses and were tested to UN Manual Test and Criteria Revision 3 Amendment 1 or subsequent revisions or amendments.

Test House A 123 Alpha Street Shanghai China E: testhousea@gmail.com T: 086-0310-04566 U: www.testhousea.com	Test House C 123 Chi Street Shanghai China E: testhouseC@gmail.com T: 086-0310-04588 U: www.testhousec.com
Test House B 123 Beta Street Shanghai China E: testhouseb@gmail.com T: 086-0310-04577 U: www.testhouseb.com	Test House D 123 Delta Street Shanghai China E: testhoused@gmail.com T: 086-0310-04599 U: www.testhoused.com

LITHIUM CELLS OR BATTERIES TEST SUMMARY
IN ACCORDANCE WITH SUB-SECTION 38.3
OF UN MANUAL OF TESTS AND CRITERIA

Product Test Information

Model numbers	Physical Description	Battery weight (kg) Mass	Wh rating	Test report number	Test report date
BB12389	Li ion polymer Cell phone Alpha A	0.035	6.25	RTS123, NMD456PO98 N4569-2 BN890A	03.02.2010 03.07.2010 03.10.2010 03.15.2010
BB12450	Li ion polymer Cell Phone Beta B	0.090	6.76	TYh765-KL-09 567-908HGT	08.09.2012 09.01.2012
BB67896	Li ion polymer Cell phone Chi C	0.026	5.25	89065RT-90 NHI-kl09	07.07.2010 07.04.2010
etc					
etc					
etc					
etc					
etc					
etc					

<u>**Signature**</u>

<u>**Name, Title**</u>

Example 2 of a Lithium Ion Battery Test Summary

<table>
<tr><td colspan="2" align="center">UN38.3 Lithium Battery Test Summary for GreenTech
Tablet Model No. T54321</td></tr>
<tr><td>1</td><td>Battery Manufacturer

<i>Confidential and Proprietary GreenTech Information</i></td></tr>
<tr><td>2</td><td>Product Manufacturer

GreenTech
123 Main Street
Annapolis, MD 21012
888.111.2345
contact@greentech.com; www1.greentech.com</td></tr>
<tr><td>3</td><td>UN38.3 Test Lab

Bob's Battery Test Lab
1600 Pennsylvania Avenue
Smithfield, VA 12345
Phone: 211.789.2345
bob@testlab.org; www.testlab.org</td></tr>
<tr><td>4</td><td>Test Report Number

Liion621345</td></tr>
<tr><td>5</td><td>Date of Test Report

April 1, 2017</td></tr>
<tr><td>6</td><td>Description of Cell or Battery

7.4 V, 1800 mAh, 13.32 Wh
Li ion battery, Model No. P1789
Small, rectangular plastic case, 100 grams</td></tr>
<tr><td>7</td><td>UN38.3 Tests Performed and Successfully Passed

T.1, T.2, T.3, T.4, T.5, and T.7. (Note that T.6 and T.8 are not applicable to batteries.)</td></tr>
<tr><td>8</td><td>Assembled Battery Testing Requirements

Not Applicable</td></tr>
<tr><td>9</td><td>Edition of UN Manual of Tests and Criteria Used

Sixth Revised Edition</td></tr>
<tr><td>10</td><td>Name and Title of Signatory

<i>Jason Alexander</i>

Jason Alexander

GreenTech Staff Engineer</td></tr>
</table>

Example 3 of a Lithium Metal Cell Test Summary

<table>
<tr><td colspan="2" align="center">LITHIUM CELLS OR BATTERIES TEST SUMMARY
IN ACCORDANCE WITH SUB-SECTION 38.3
OF MANUAL OF TESTS AND CRITERIA</td></tr>
</table>

BATTERY TRANSPORTION INFORMATION

Name of cell, battery or product manufacturer, as applicable: Item Number : 4A23123 Item Name : Battery Alpha Prime Item Description : Lithium Metal Battery (Primary)	Cell, battery or product manufacturer's contact information to include address, phone number, email address and website for more information: Manufacturer XYZ 3480 Lithium cells Rd Lithiumionville, CA 98765 United States (+1-987) 987-6543 email@xyz.com

Name of the test laboratory to include address, phone number, email address and website for more information: Test Lab A 1919 Alpha St Testcity, IA 55555 USA (+1-333) 555-1122 email@testlab.com	A unique test report identification number: ABC12345	Date of the test report: 03-Apr-2013

	List of tests conducted and results (i.e., pass/fail):
Description of cell or battery to include at a minimum: Lithium ion or Lithium metal cell or battery; Mass; Watt-hour rating, or lithium content; Physical description of the cell/battery; and Model numbers: Battery used in consumer power tools	Test T.1: Altitude Simulation : Pass Test T.2: Thermal Test : Pass Test T.3: Vibration : Pass Test T.4: Shock : Pass Test T.5: External short circuit : Pass Test T.6: Impact/Crush : Pass Test T.7: Overcharge : Not applicable Test T.8: Forced discharge : Pass Testing additional comments:
Cell/battery Type : Lithium metal Cell or Battery : Cell LC or W/h rating : LC (g): >0.3 <= 1 Cell or Battery Weight : 12.00 Grams	

Reference to assembled battery testing requirements, if applicable (i.e., 38.3.3(f) and 38.3.3;(g)): Not applicable	Reference to the revised edition of the Manual of Tests and Criteria used and to amendments thereto, if any: Revision 5	For air transport only: Does the cell or battery comply with the 30% State of Charge? Not Applicable

PRODUCT CLASSIFICATION FOR TRANSPORT (According to UN - DGP)	
UN Classification: **UN 3090**	Proper Shipping Name: **Lithium metal batteries**

Signature with name and title of signatory as an indication of the validity of information provided: Wayne Purple Testing Manager	This document remains valid as long as no changes, modifications, or additions are made to the model(s) described in this document, after being transported from a Manufacturer XYZ facility. The model(s) has (have) been classified according to the applicable transport regulations and the UN Manual of Tests and Criteria as of the date of the certification. The model(s) must be packaged, labeled, and documented according to country and other international regulations for transportation.
Date document was generated: 04-Mar-2017 11:49 am	

Page 1 of 1

¹ Information in Part 4 kindly provided by PRBA – The Rechargeable Battery Association, RECHARGE the Advanced Rechargeable & Lithium Batteries Association and the Medical Device Battery Transport Council

Additional Information

Further information can be found here:

http://www.iata.org/lithiumbatteries

Information for passengers can be found here:

http://www.iata.org/dgr-guidance

www.faa.gov/go/safecargo

You may also contact the airline of your choice or your national civil aviation authority if you have any further concerns about travelling with lithium metal or lithium ion batteries.

You can also contact the IATA Dangerous Goods Support team if you have questions or concerns which may not have been addressed in this document: dangood@iata.org.

Abbreviations, Acronyms, Symbols

The following abbreviations, acronyms and symbols are used throughout the document.

Abbreviation	Meaning
A/C	Aircraft
Li Ion (li-ion)	Lithium ion
Li batt.	Lithium battery
Pax	Passenger
Acronym	**Meaning**
CAO	Cargo Aircraft Only
DGD	Shipper's Declaration for Dangerous Goods
DGR	IATA Dangerous Goods Regulations
LBSR	IATA Lithium Battery Shipping Regulations
Symbol	**Meaning**
≥	Equal to or greater than
≤	Equal to or less than
>	Greater than
<	Less than
□	Addition of an item
△	Change to an item
⊗	Deletion of an item