International Civil Aviation Organization

Annual Safety Report Group

Fifth Meeting (ASRG/5)
(Virtual Meeting, 5 October 2023)

Agenda Item 2: Regional Performance Framework for Safety

REVIEW OF THE TWEVENTH MID ANNUAL SAFETY REPORT

(Presented by the Secretariat)

SUMMARY

This paper presents the 12th Draft Edition of the MID Annual Safety Report with the analysis of the accidents and incidents data, and safety priorities in the MID Region, for review by the ASRG/5 virtual meeting.

Action by the meeting is at paragraph 3.

REFERENCES

- Draft Edition of 12th Annual Safety Report

1. INTRODUCTION

1.1 The MID Annual Safety Report Team (MID-ASRT) was established through Decision 1/3 of the Regional Aviation Safety Group (RASG-MID/1) meeting, which was held in Cairo, Egypt, 18-19 September 2011.

1.2 The RASG-MID/7 supported the establishment of the ASRG, ASPIG, SEIG and AIIG and endorsed the revised RASG-MID Organizational Structure. However, the Annual Safety Report Group (ASRG) should resume the responsibilities according to the established Terms of Reference of the MID-ASRT.

1.3 The objective of the RASG-MID Annual Safety Report is to gather safety information from different stakeholders and to identify the main aviation safety risks in the Middle East Region in order to deploy mitigation actions for enhancing aviation safety in a coordinated manner.

2. DISCUSSION

2.1 The safety information presented in the 12th Edition of the MID Annual Safety Report is based on the compilation and analysis of data provided by: The International Air Transport Association (IATA) and the International Civil Aviation Organization (ICAO), airline operators, and States.

2.2 The Annual Safety Report will be covered in the **PPT/1**.

MID Region Safety Priorities

2.3 Following the analysis of the reactive and proactive/predictive safety information provided by ICAO, IATA, and the MID Region States for the period 2018 - 2022, it was concluded that the safety priorities defined for the MID Region are:

Regional Operational Safety Risks

1. Loss of Control Inflight - (LOC-I);
2. Runway Excursion (RE) and Abnormal Runway Contact (ARC) during landing
3. Mid Air Collision- (MAC);
4. Controlled Flight Into Terrain- (CFIT); and
5. Runway Incursion-(RI).

In addition to this, main safety issues have been identified and mapped to their respective potential outcomes.

Organizational issues:

States' Safety Oversight Capabilities

2.4 USOAP-CMA audits had identified that State's inability to effectively oversee aviation operations 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 approx. 74, 07 %, which is above the world average 68.81% % (as of 20 July 2023). Three (3) States are currently below EI 60.

2.5 All eight areas have an EI above 60%. However, the areas of AIG and ANS still need more improvement. With respect to the Critical Elements (CEs), CE4 (Qualified technical personnel) is below 60% (58.8%) EI, whereas CE8 (resolution of safety issues) is also below EI 60% (54. 32%) EI. 4 areas and 4 critical elements are above the target of 75% EI.

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

Safety Management

2.7 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 average EI for SSP foundation PQs for States in the MID Region is 76, 18%.

2.8 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 MID Region Safety Management Implementation Roadmap and the establishment of the Safety Management Implementation Team (SMIT) to support MID States with the implementation of the SSP in an effective and efficient way. The SMIT handbook endorsed by the RASG-MID/9.

2.9 In addition, the development of National Aviation Safety plan (NASP) is one of the MID region safety priorities and seven (4) States had developed and published their NASPs in ICAO website.

2.10 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.

2.11 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).

Human factors and Human Performance

2.12 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 as most important human factors issue in the domain of commercial air transport and safety actions would be identified and developed.

Competence of personnel

2.13 Availability of well-trained and competent aviation personnel is paramount to the safety and resilience of the aviation industry. Some of States in MID Region has a mature and detailed regulatory framework in place to ensure proper training, licensing, adequacy of training devices and oversight. Nevertheless, several factors are challenging this mature framework: new technologies and increasing automation are changing the safety needs for aviation personnel and new training devices are emerging. New aircraft types and technological advancements in virtual reality/artificial intelligence are revolutionizing pilot training altogether.

Manage Risk interdependencies

2.14 The COVID-19 crisis demonstrated that safety, security, health safety and other risks can no longer be managed in isolation. The aviation community has realized that continuing to develop tools and specific guidance for each situation and for each domain affected by transversal risks may delay not only the implementation of mitigation measures, but also the development of an enabling framework to support integrated, collaborative risk management

Cybersecurity Risks

2.15 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.

Security risks with an impact on aviation safety

2.16 The implementation of aviation security measures can have a direct impact on safety aspects of aerodrome or aircraft operations. Airport security, aircraft security or in-flight security are the areas where the interdependencies are highly visible and where any security requirements should also consider potential impacts on aviation safety. States should consider where interdependencies between civil aviation safety and security exist.

2.17 Therefore, an integrated approach to the management of safety and security risks across the spectrum of aviation activities would bring benefits such as a complete overview of risks, a better sharing of security information and the closure of gaps in the security system while focusing on increasing the overall level of safety. Consequently, this would allow ensuring synergies where security measures can have an impact on safety and vice versa; thereby avoiding incompatible actions and strengthening the overall safety and security of civil aviation.

Risks arising from conflict zones

2.18 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. Similar events had occurred in the MID Region on Jan 2020 involving the Ukraine International Airlines flight PS752. The tragic accident with the downing of Ukraine International Airlines Flight 752 highlighted once more the importance of information sharing and risk assessments.

Aviation health safety (AHS) risks

2.19 The COVID-19 pandemic has shown that the harmonization of health policies affecting aviation, and in particular in the CAT domain, has become an important topic to help overcome the pandemic. The objective is to minimize the impact of health safety threats in CAT. Health safety threats should be included in the management of risk interdependencies.

2.20 COVID-19 is unlikely to be the last pandemic we will be faced with. It is crucial to continue supporting the MID Region aviation industry competitiveness by offering the safest aircraft interior environment to reduce the risk of disease transmission between continents and States, restore public trust and facilitate future responses to events of similar nature.

2.21 Satellite navigation signals are weak and can easily be compromised by a range of growing threats, including intentional or unintentional signal interference, jamming, spoofing, and/or the manipulation of position and timing information. The effects of such threats vary greatly. Satellite signal jamming can have a serious effect on the accuracy of navigation systems and, in some cases, results in unusual system behavior.

GNSS Interference Risks

2.22 In a continuous monitoring the regional safety risk of GNSS/GPS Interference, an updated analysis is presented to provide figure from January until December 2022 of GNSS/GPS Interference in MENA and adjacent countries. The analysis utilized two datasets: Incident Data Exchange (IDX), and Flight Data Exchange (FDX), the analysis covers the time period of January 2022 to December 2022.

2.23 The analysis revealed 524 GNSS/GPS jamming or suspected interference reports from 12 operators in the MENA region and adjacent states gathered through the Incident Data Exchange (IDX) from January 2022 to December 2022.

2.24 The analysis utilized data from the Flight Data Exchange (FDX) showed a total of 162,654 'GPS signal loss' events from 54 operators in the MENA region and adjacent states from January 2022 to December 2022. This is 68.5 % of all GPS Signal Loss Events in FDX database in 2022. The Total Event Count around the world was 237,489.

Interference with Radio Altimeter

2.25 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.

Emerging issues

2.26 Emerging issues are risks that might impact Safety in the future, these may include a possible new technology, a potential public policy, a new concept, 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.

1. UAS and manned VTOL-capable aircraft;
2. Artificial intelligence (AI) in Aviation; and
3. Digitalization in the aviation field.

2.27 The meeting may wish to note that the RASG-MID/10 endorsed the following conclusion:

RASG-MID Conclusion 10/14: Safety Data Analysis Collection Related to Civil Helicopter Operations

That States are urged to share their Safety Data Analysis to be included in MID Region Annual Safety Report.

2.28 In this respect, a template at **Appendix C** has been developed for states to share the safety data analysis related to civil helicopter operations.

2.29 In respect of the next MID ASR edition, States are encouraged to provide necessary safety information and safety analysis to the ICAO MID Office, by May 2024 related to each occurrence category in **Appendix A** for the past 5 years (2019– 2023) and using the templates in **Appendix B and Appendix C**. The Draft of the 13th edition of the MID ASR will be presented to the ASRG/6 meeting for review.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) review and update as deemed necessary, the Draft version of the 12th MID-ASR at **Appendix D**, in order to be presented to the RASG-MID/11 meeting for endorsement; and

b) encourage States and all Stakeholders to provide/share necessary safety information to the ASRG for the development of the next Edition of the Annual Safety Report; and

c) endorse the following Draft Conclusion:

DRAFT CONCLUSION 5/1: SHARING OF SAFETY DATA ANALYSIS

*States are urged to provide the ICAO MID Office by **30 May 2024** with the number of accidents, serious incidents and incidents, safety data analysis, and their associated safety recommendations related to each occurrence*

*category in **Appendix A** for the past 5 years (2019 – 2023) and using the template **in Appendix B and Appendix C.***

LIST OF OCCURRENCE CATEGORIES TAXONOMY

Scope: State of Occurrence

The data to be collected be based on scheduled commercial operations involving aircraft having a Maximum Take-off Weight (MTOW) above 5700 kg.

Occurrence Category	ADREP/CICTT taxonomy	Remarks
Runway Excursion (RE)	Veer off or overrun off the runway surface.	
Abnormal Runway Contact (ARC)	Any landing or take-off involving abnormal runway or landing surface contact.	
Loss of Control-Inflight (LOC-I)	Loss of Control while, or deviation from intended flight path, in flight.	
Controlled Flight Into Terrain (CFIT)	Inflight collision or near collision with terrain, water, or obstacles without indication of loss of control.	
MID Air Collision (MAC)/ NMACs	Airprox/TCAS Alerts, Loss of separation as well as NMAC or collisions between aircraft inflight.	
Fire/Smoke (F-NI)	Fire or smoke in or on the aircraft, in flight, or on the ground, which is not the result of impact.	
Runway Incursion (RI)	Any occurrence at aerodrome involving the incorrect presence of an aircraft, vehicle, or person on the protected area of a surface designated for landing and takeoff of aircraft.	
System Component Failure –Non-Power Plant (SCF-NP)	Failure or malfunction of an aircraft system or component other than the power plant.	
Turbulence Encounter (TURB)	In-flight turbulence encounter.	
Birdstrike (BIRD)	Occurrences involving collisions/near collisions with bird(s).	
Navigation Errors (NAV)	Occurrences involving the incorrect navigation of aircraft on the ground or in the air	

System Component Failure- Power Plant (SCF-PP)	Failure or malfunction of an aircraft system or components related to the power plant.	
Security related (SEC)	Criminal/Security acts which result in accidents or incidents (per Annex 13 to the Convention on International Civil Aviation).	
Wind shear	Flight into wind shear or thunderstorm	

NB: States may share any other occurrence category or national safety concern.

APPENDIX B

TEMPLATE FOR THE COLLECTION OF

ACCIDENT, SERIOUS INCIDENT AND INCIDENT DATA AND SAFETY ANALYSIS

Name of State: ……..

1- Occurrences: *The data to be collected be based on scheduled commercial operations involving Aeroplane having a Maximum Take-off Weight (MTOW) above 5700 kg.*

#	Occurrence Category	2019			2020			2021			2022			2023		
		# Accidents	# Serious incidents	# Incidents	# Accidents	# Serious incidents	# Incidents	# Accidents	# Serious incidents	# Incidents	# Accidents	# Serious incidents	# Incidents	# Accidents	# Serious incidents	# Incidents
1	Runway Excursion (RE)															
2	Abnormal Runway Contact (ARC)															
3	Loss of Control-Inflight (LOC-I)															
4	Controlled Flight Into Terrain (CFIT)															
5	Mid Air collision (MAC)/ NMAC															
6	Fire/Smoke (F-NI)															
7	Runway Incursion- (RI)															
8	System Component Failure-Non-Power Plant (SCF-NP)															
9	Turbulence Encounter (TURB)															

10	BIRD															
11	Navigation Errors (NAV)															
12	System Component Failure-Power Plant (SCF-PP)															
13	Security related (SEC)															
14	Wind shear															

States should provide the number of accident, serious incidents, and incidents related to each category mentioned in the template above for the past five years (2017-2021)

Scope: State of Occurrence

2- Brief- Safety data Analysis (Root-cause analysis, Trends, Low probability high consequence (LPHC) events if any, etc.)

3- Identified Top Five safety risks

4- Safety mitigations/Recommendations

APPENDIX C

TEMPLATE FOR THE COLLECTION OF

ACCIDENT, SERIOUS INCIDENT AND INCIDENT DATA AND SAFETY ANALYSIS

Name of State: ……..

1- Occurrences: *The data to be collected involving civil helicopters operations*

#	Occurrence Category	2019			2020			2021			2022			2023		
		# Accidents	# Serious incidents	# Incidents	# Accidents	# Serious incidents	# Incidents	# Accidents	# Serious incidents	# Incidents	# Accidents	# Serious incidents	# Incidents	# Accidents	# Serious incidents	# Incidents
1	Runway Excursion (RE)															
2	Abnormal Runway Contact (ARC)															
3	Loss of Control-Inflight (LOC-I)															
4	Controlled Flight Into Terrain (CFIT)															
5	Mid Air collision (MAC)/ NMAC															
6	Fire/Smoke (F-NI)															
7	Runway Incursion-(RI)															
8	System Component Failure-Non-Power Plant (SCF-NP)															
9	Turbulence Encounter (TURB)															
10	BIRD															

11	Navigation Errors (NAV)															
12	System Component Failure-Power Plant (SCF-PP)															
13	Security related (SEC)															
14	Wind shear															

States should provide the number of accident, serious incidents, and incidents related to each category mentioned in the template above for the past five years (2017-2021)

Scope: State of Occurrence

2- Brief- Safety data Analysis (Root-cause analysis, Trends, Low probability high consequence (LPHC) events if any, etc.)

3- Identified Top Five safety risks

4- Safety mitigations/Recommendations

ICAO

SAFETY

MID Region Annual Safety Report

12th Edition 2023

Reference Period (2018 - 2022)

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Contents

Foreword

The Regional Aviation Safety Group-Middle East (RASG-MID) was established in September 2011 to develop an integrated, data-driven strategy and implement a work program that supports a Regional performance framework for the management of Safety.

RASG-MID supports the implementation of the ICAO Global Aviation Safety Plan (GASP) and the achievement of the Safety Targets in the MID Region Safety Strategy. The RASG-MID membership includes representatives from ICAO, MID States, and international organizations.

RASG-MID consists of four main teams: The Annual Safety Report Group (ASRG), the Aerodrome Safety planning and Implementation Group (ASPIG), the Safety Enhancement Implementation Group (SEIG), the Accident and Incident Investigation Group (AIIG). The Annual Safety Report Group (ASRG) is in charge of collecting and analysing safety information. The Group is also responsible for the identification of the main safety risks, MID Region safety priorties and the production of the RASG-MID Annual Safety Report (ASR).

The RASG-MID Annual Safety Report is a timely, unbiased, and transparent source of safety-related information essential for all aviation stakeholders interested in having a tool to enable sound decision-making on safety-related matters.

Executive Summary

The aviation industry has been under relentless pressure since early 2020, when the outbreak of the COVID pandemic plunged the sector into crisis almost overnight. The recovery from that initial shock has come in waves and proved extremely challenging.
The year 2022, we had hoped that finally the worst impact of COVID was behind us, with only residual safety risks remaining from the severe slowdown in operations.

The global scheduled commercial international operations accounted for approximately 31.2 million departures in 2022, compared to 24.9 million departures in 2021; which showed a high increase after covid-19 pandemic. The MID Region shows a high incraease in traffic volumes during 2022. Total scheduled commercial departures in 2022 accounted for approximately 1.16 million departures compared to 1.4 million departures in 2018. In terms of an aircraft accident, the MID Region had two accidents in 2022. The 5-year average accident rate for 2018-2022 is 2.25, which is slightly below the global average rate (2.34) for the same period.

The MID Region had no fatal accident in 2022. However, the 5-year average fatal accident rate for 2018-2022 is 0.42 is higher than the global average rate (0.19) for the same period. The MID Region had no fatal accidents in 2019, 2021, and 2022. However, two fatal accidents occurred in 2018 and 2020. The 2018 accident caused 66 fatalities and the year 2020 caused 176 fatalities.

MID Region Safety Priorities

The Middle East Regional Aviation Safety Plan (MID-RASP) 2023-2025 Edition 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.

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.

The MID-RASP provides strategy for improving safety within a specified timeframe, through defined SEIs in a coordinated, cooperative and collaborative approach among States, international organizations, and industry to achieve Safety Targets.
Fostering effective risk management capabilities in the MID Region, State and industry level to cope with the systemic and operational safety risks and wide-ranging effects of the crisis and constitute an important enabler for building back a more resilient aviation system

The tenth meeting of the Regional Aviation Safety Group – Middle East (RASG-MID/10) was held in Muscat, Egypt; endorsed the MID-RASP 2023-2025 Edition including the SEIs list and their respective actions through RASG-MID Conclusion 10/7.
Therefore, to address regional operational risks, organizational issues, and emerging risks; 24 Safety Enhancement Initiatives (SEIs) and 61 safety actions have been identified, developed and endosrsed.

The Eighth meeting of the Regional Aviation Safety Group – Middle East (RASG-MID/8) endorsed the MID-RASP 2020-2022 Edition including the SEIs list and their respective actions through RASG-MID Conclusion 8/3. In addition, the RASG-MID/10 noted with appreciation the updated SEIs and their respective safety actions as well as the status of their implementation.

A. 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 air traffic control). Based on the analyses of reactive and proactive safety information, it is concluded that the Regional operational safety risks for the MID Region are:

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

In addition to this, safety issues have been identified and mapped to their respective potential accident outcomes.

B. Organizational issues

Organizational issues are systemic issues which take into consideration the impact of organizational culture, and policies and procedures on the effectiveness of safety risk controls.

1. Strengthen States' Safety Oversight Capabilities

USOAP-CMA audits had identified that State's inability to effectively oversee aviation operations 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 approx. 74,07 %, which is above the world average 68.81% % (as of 20 July 2023). Three (3) States are currently below EI 60%.

All eight areas have an EI above 60%. However, the areas of AIG and ANS still need more improvement. With respect to the Critical Elements (CEs), CE4 (Qualified technical personnel) is below 60% (58.8%) EI, whereas CE8 (resolution of safety issues) is also below EI 60% (54. 32%) EI. 4 areas and 4 critical elements are above the target of 75% EI.
Moreover, the effective implementation in certification, surveillance, and resolution of Safety concerns need to be improved.

2. Improve Safety Management

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 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 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. Moreover, the RASG-MID also supported the establishment and activation of the MENA RSOO, with a primary objective to assist member States to develop and implement SSP; and Several Safety Management Workshops,

training courses, and meetings have been organized to support the implementation of SSP/SMS and address the challenges and difficulties, as well as sharing of experiences and best practices.

In addition, the development of National Aviation Safety plan (NASP) is one of the MID region safety priorities and 7 States had developed their NASPs.

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.

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).

Recognizing the challenges facing the States in the development of their NASPs, the ICAO MID Office conducted NASP workshops and assistance Missions dedicated to NASP in order to support States with NASP development.

3. Human Factors and Human Perforamance

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 as most important human factors issue in the domain of commercial air transport and safety actions would be identified and developed.

4. Competence of Personnel

Availability of well-trained and competent aviation personnel is paramount to the safety and resilience of the aviation industry. Some of States in MID Region has a mature and detailed regulatory framework in place to ensure proper training, licensing, adequacy of training devices and oversight. Nevertheless, several factors are challenging this mature framework: new technologies and increasing automation are changing the safety needs for aviation personnel and new training devices are emerging. New aircraft types and technological advancements in virtual reality/artificial intelligence are revolutionising pilot training altogether

5. Manage Risk Interdependencies

The COVID-19 crisis demonstrated that safety, security, health safety and other risks can no longer be managed in isolation. The aviation community has realised that continuing to develop tools and specific guidance for each situation and for each domain affected by transversal risks may delay not only the implementation of mitigation measures, but also the development of an enabling framework to support integrated, collaborative risk management.

5.1 Cybersecurity Risks

The global civil aviation ecosystem is accelerating towards more digitalisation. 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 standardised 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/organisations with malicious intent.

5.2 Security Risks with an Impact on Aviation Safety

The implementation of aviation security measures can have a direct impact on safety aspects of aerodrome or aircraft operations. Airport security, aircraft security or in-flight security are the areas where the interdependencies are highly visible and where any security requirements should also consider potential impacts on aviation safety. States should consider where interdependencies between civil aviation safety and security exist.

Therefore, an integrated approach to the management of safety and security risks across the spectrum of aviation activities would bring benefits such as a complete overview of risks, a better sharing of security information and the closure of gaps in the security system while focusing on increasing the overall level of safety. Consequently, this would allow ensuring synergies where security measures can have an impact on safety and vice versa; thereby avoiding incompatible actions and strengthening the overall safety and security of civil aviation.

5.3 Risks Arising from Conflict Zones

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. Similar events had occurred in the MID Region on Jan 2020 involving the Ukraine International Airlines flight PS752. The tragic accident with the downing of Ukraine International Airlines Flight 752 highlighted once more the importance of information sharing and risk assessments.

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The COVID-19 pandemic has shown that the harmonisation of health policies affecting aviation, and in particular in the CAT domain, has become an important topic to help overcome the pandemic. The objective is to minimise the impact of health safety threats in CAT. Health safety threats should be included in the management of risk interdependencies.

COVID-19 is unlikely to be the last pandemic we will be faced with. It is crucial to continue supporting the MID Region aviation industry competitiveness by offering the safest aircraft interior environment to reduce the risk of disease transmission between continents and States, restore public trust and facilitate future responses to events of similar nature.

5.5 GNSS Interference Risks

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5.6 5G Interference with Radio Altimeter

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C. Emerging Issues

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, 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, it is important that the international aviation community remain vigilant to identify emerging safety issues and develop mitigations to address them. Failure to address emerging safety issues can affect a State, Region or industry's ability to mitigate the safety risks.

1. UAS and Manned VTOL-Capable Aircraft

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.
The safe integration on the basis of granting fair access to airspace of all new entrants into the airspace network will be one of the main challenges in relation to the integration of UAS technologies and related concepts of operation.

Enabling the safe integration of UAS (also commonly called 'drones'), being a fast evolving and emerging market segment, as well as of (initially manned) VTOL-capable aircraft, also intended for urban air mobility (UAM) operations, continue to be priority activities.

Vertiports: VTOL-capable aircraft will use aerodromes, heliports and the so-called vertiports. 'Vertiport' means an area of land, water or structure used or intended to be used for the landing and take-off of VTOL-capable aircraft. Vertiports are classified as aerodromes for the purpose of aerodrome and vertiport regulations.

2. Artificial Intelligence (AI) in Aviation

The next generation of automation in aviation systems is enabled and accelerated by the use of AI technologies. Whilst the trend towards increasing automation has resulted overall in improved safety, the introduction AI will likely be modifying the paradigm of interaction between the Human and the AI-based systems (reduced crew operations), and in parallel even open the path towards more autonomous types of operations urban air mobility (UAM).

3. Digitalisation in the Aviation Field

Aviation is moving fast to digitalise all areas, as there are demonstrated tangible benefits in safety, economics, operations, traffic management and control, manufacturing, training and maintenance.
Automation, remote control, machine-to-machine communication, robotics: 3D printing, virtual and augmented reality, blockchain, AI/cognitive computing, and sensors are among the technologies that

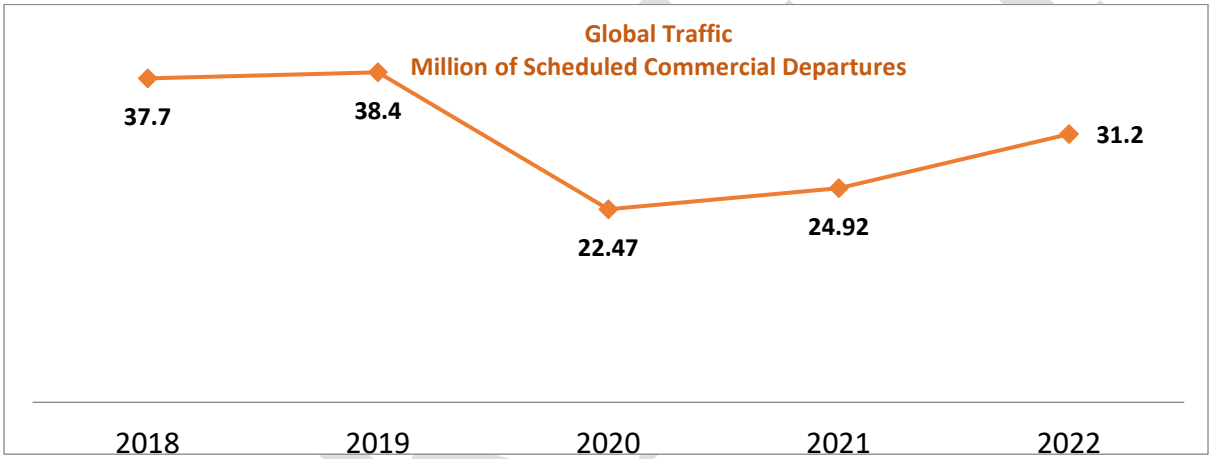
will increasingly be used in aviation and that will impact the activity of regulators and aviation authorities.

In order to exploit the full digitalisation potential, the aviation sector needs to progress in the 'information management' dimension. Today, the fragmentation of data in terms of both taxonomy and storage does not allow a significant progress for the analysis according to the latest methodologies. These developments are increasingly challenging traditional aviation regulations and calling for an evolution towards more performance based, technology-neutral requirements, which will enable the novel business models that emerge from the digital transformation, increasing at the same time safety and efficiency.

1. Traffic Volumes

1.1 Global Traffic

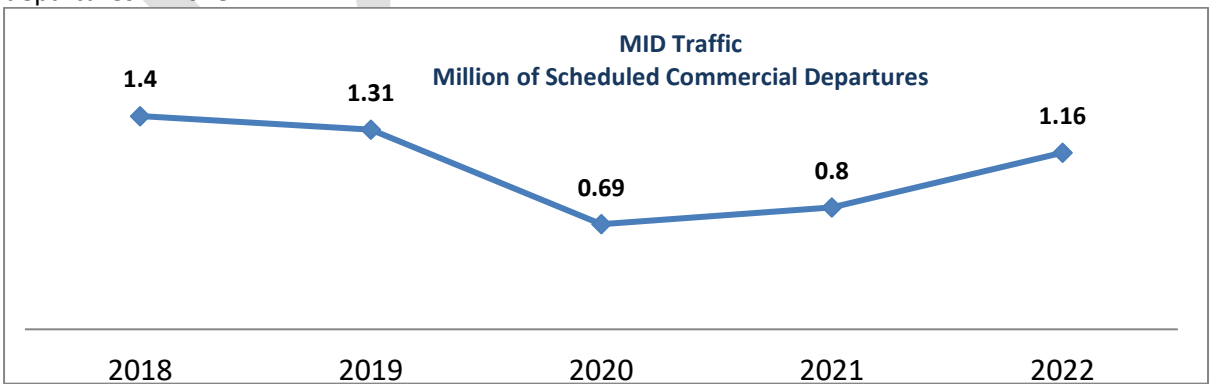
The global scheduled commercial international operations accounted for approximately 31.2 million departures in 2022, compared to 24.92 million departures in 2021; which showed a high increase after covid-19 pandemic.



Graph 1: Global Traffic Volume (Source ICAO Safety Report 2023)

1.2 MID Traffic

The MID Region shows a high incraease in traffic volumes during 2022. Total scheduled commercial departures in 2022 accounted for approximately 1.16 million departures compared to 1.4 million departures in 2018.



Graph 2: MID Traffic Growth (Source ICAO Safety Report 2023)

2. Reactive Safety Information

2.1 Safety Risk Assessment Methodology

To facilitate the identification and prioritization of the main Regional Safety Operational Risks, accidents are categorized in terms of frequency and severity and the serious incidents in terms of frequency. The severity assessment is based on fatalities, injuries, and damage to aircraft, property, and equipment. (For Frequency rating: 1 is the most frequent, and six is the least frequent. For Severity: 1 is the most severe and four is the least severe)

The MID ASRT/2 meeting (Cairo, Egypt, 4-5 February 2018) agreed to the following improvements to the methodology used for risk assessment:

a) improvement of the current risk matrix used for the identification of Regional operational risks (four (4) levels of severity instead of three (3)), as follows:

improvement of the current risk matrix used for the identification of focus areas (four (4) levels of severity instead of three (3)), The level of severity is categorized as follows:

1) Catastrophic: multiple deaths; serious damage to aircraft/equipment (destroyed)
2) Major: serious injury/fatalities; major aircraft/equipment damage
3) Minor: little consequences (minor injuries, minor damage to aircraft);
4) No potential damage or injury

Frequency / Severity	1	2	3	4	5	6
1	1	2	3	4	5	6
2	2	4	6	8	10	12
3	3	6	9	12	15	18
4	4	8	12	16	20	24

Table 1 Risk matrix

b) Adoption of the "feared consequences" of the risk portfolio of DGAC France:

Table 2 below shows that each identified Undesirable event/safety issue is linked to the potential accident outcome.

NB	Identification of Undesirable Event	Potential Accident outcome						
		CFIT	LOC-I	MAC	Ground Collision	RE	Damage to aircraft or injury inflight	Damage to aircraft or /injury on ground
UE.1	Unstabilised or non-compliant approach	X	X			X		X
UE.2	Abnormal airplane attitude (Roll, pitch, speed…)		X				X	

UE.3	Events relating to aerodrome conditions (Runway surface condition and aerological parameters)		X			X	X	X
UE.4	En-route encounter of dangerous weather phenomena (Thunderstorm, turbulence, Icing)		X	#			X	X
UE.5	Misuse of aircraft system (Weight and Balance, speed track, aircraft config)	X	X	X	X	X	X	X
UE.6	Event pertaining to works/maintenance operations on or close to a runway		#		X	X		X
UE.7	Bad coordination/execution of ground operations (deicing, loading, stowing, line maintenance, etc)	X	X		X		X	X
UE.8	Runway/taxiway incursion				X	X		X
UE.9	Loss of separation in flight/ and/or airspace infringement /level bust		X			X	X	X
UE.10	Wildlife hazard, including bird strike		X		X	X	X	
UE.11	Ground-onboard interface failure (Misunderstanding, unsuitability of transmitted information,etc)	X	X	X	X	X	X	X
UE.12	Aircraft maintenance event	X	X		#	X	X	X
UE-13	Fire/Smoke inflight	#	X				X	X
UE-14	Aircraft system failure resulting in flight management disturbance	X	X			X	X	X
UE-15	Loss of cabin pressure		X	#			X	
UE-16	Aircraft damage due to FOD		X			X	X	X

Table:2 identified Undesirable event/safety issue

2.2 ICAO Data

ICAO's primary indicator of Safety in the global air transport sector is the accident rate based on scheduled commercial operations involving aircraft having a Maximum Take-off Weight (MTOW) above 5700 kg. Exposure data is comprised of scheduled commercial operations that involve the transportation of passengers, cargo, and mail for remuneration or hire and is a preliminary estimate solely for the calculation of the accident rates.

ICAO iSTARS applications used for the development of the ICAO Safety Reports. In addition, Occurrence Validation Study Group (OVSG) final validation accidents data is also used as source of the data analysis.

Note: *The accident data presented here is the official ICAO accident statistics, used for the development of the ICAO safety reports. The data is based on scheduled commercial operations involving aircraft having a Maximum Take-off Weight (MTOW) above 5700 kg (validated or under validation by ICAO). Serious incidents presented here are safety information shared by the MID States.*

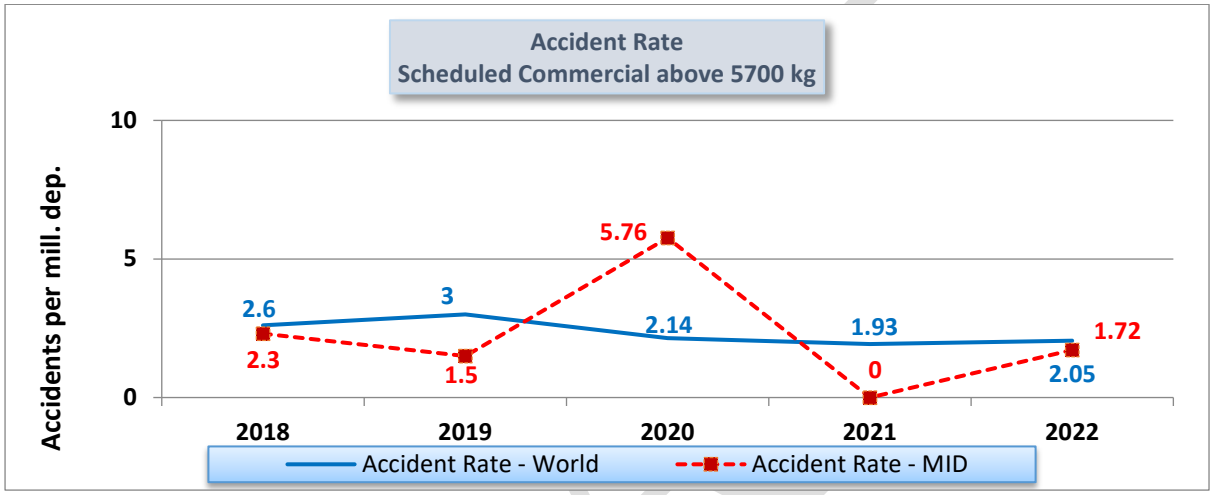
The main part of this section provides an analysis of the accidents that occurred in the MID Region (State of Occurrence) for the period (2018-2022), which is used for monitoring the progress of achieving the Safety Targets in the MID-RASP 2023-2025 Edition (MID Region Safety performance measurement and monitoring).

Besides, it provides data analysis regarding accidents aircraft registered in the MID Region (State of Registry) as well as for the MID-air operators (State of the Operator) using the same criteria mentioned above. It is to be highlighted that the State of registry and State of the operator Section focuses mainly on counts and percent distribution (no rates).

2.2.1 MID State of Occurrence

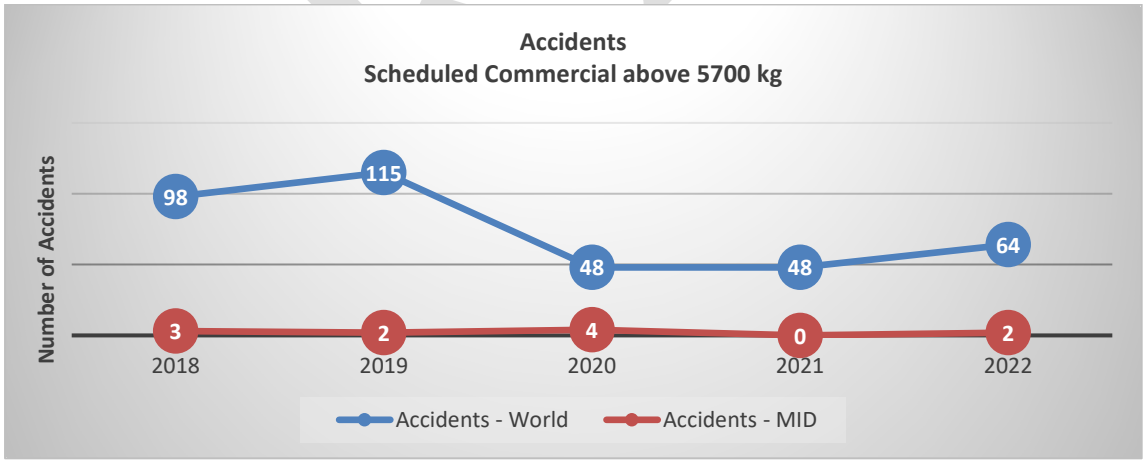
2.2.1.1 Accidents Rates and Fatalities

Graph 3 shows that the MID Region had two accidents in 2022. The 5-year average accident rate for 2018-2022 is 2.25, which is slightly below the global average rate (2.34) for the same period.



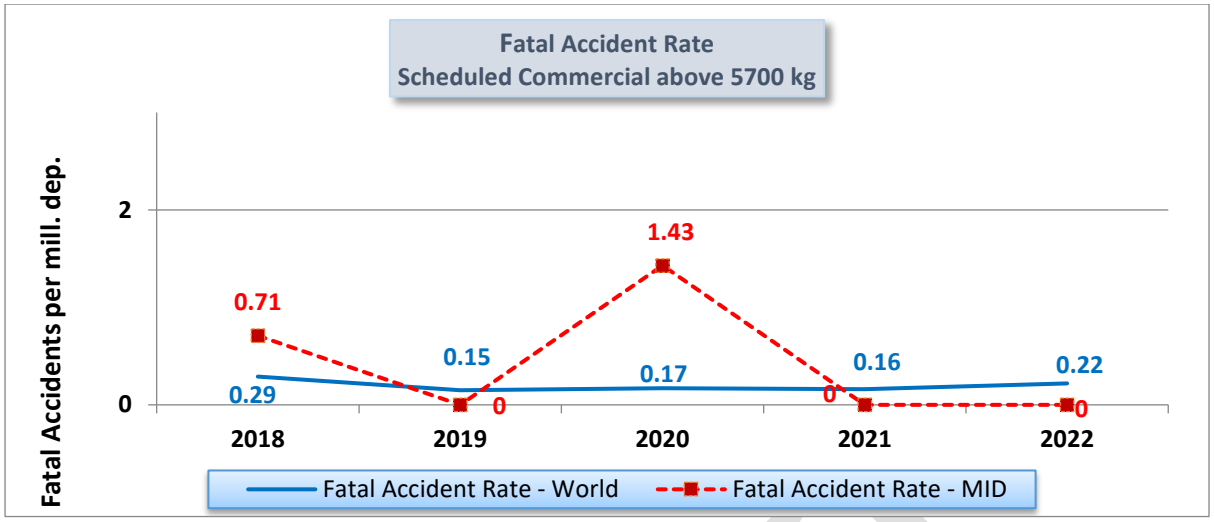
Graph 3: Global Accident Rate Vs. MID Accident Rate (Source OVSG Data& ICAO ASR 2023)

Graph 4 shows that 11 accidents occurred in the MID Region during the period (2018-2022), whereas (373) accidents occurred globally.

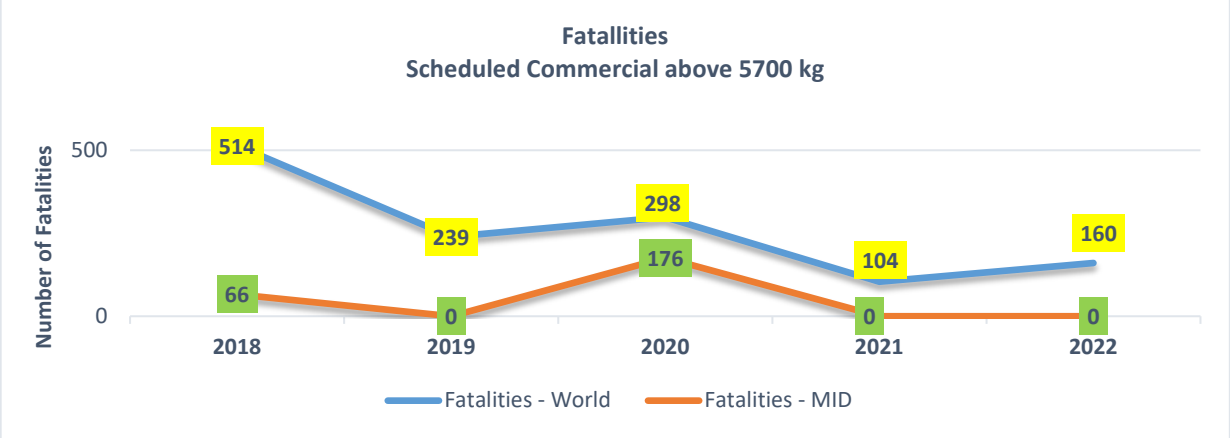


Graph 4: Number of MID Accidents Vs. Number of Global Accidents Per Year (Source OVSG Data& ICAO ASR 2023)

Graph 5 shows that the MID Region had no fatal accident in 2022. However, the 5-year average fatal accident rate for 2018-2022 is 0.42 is higher than the global average rate (0.19) for the same period. The MID Region had no fatal accidents in 2019, 2021, and 2022. However, two fatal accidents occurred in 2018 and 2020. The 2018 accident caused 66 fatalities and the year 2020 caused 176 fatalities, as shown in Graph 6.

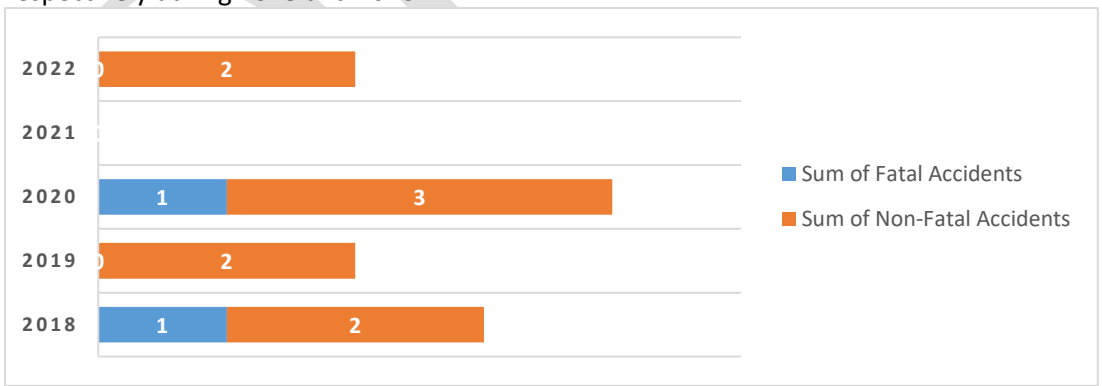


Graph 5: Global Fatal Accident Rate Vs. MID Fatal Accident Rate (Source OVSG Data& ICAO ASR 2023)



Graph 6: Number of MID Fatalities Vs. Global Fatalities (Source OVSG Data& ICAO ASR 2023)

Graph 7 shows that 11 accidents occurred between 2018 and 2022. Two fatal accidents occurred respectively during 2018 and 2020.

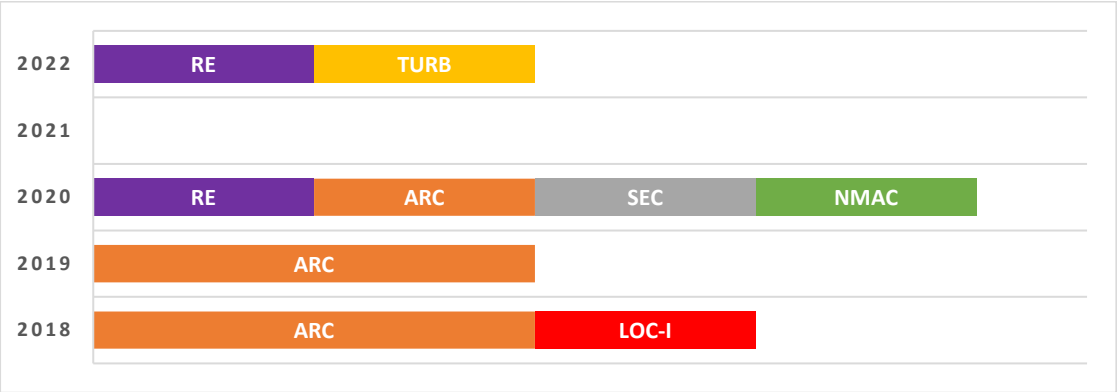


Graph 7: Number of Fatal Accidents Vs. Non-Fatal Accidents Per Year (2018-2022) (Source OVSG Data& ICAO ASR 2023)

2.2.1.2 Occurrence Category

Graph 8 indicates that during the period (2018-2022), CFIT and MAC accidents have not been reported. However, the loss of control-inflight (LOC-I), runway excursion (RE), and abnormal runway contact (ARC) events represent the main areas of concern. In respect of the occurrence category Abrupt Manoeuver (AMAN), the flightcrew received TCAS RA and applied high rate of climb according

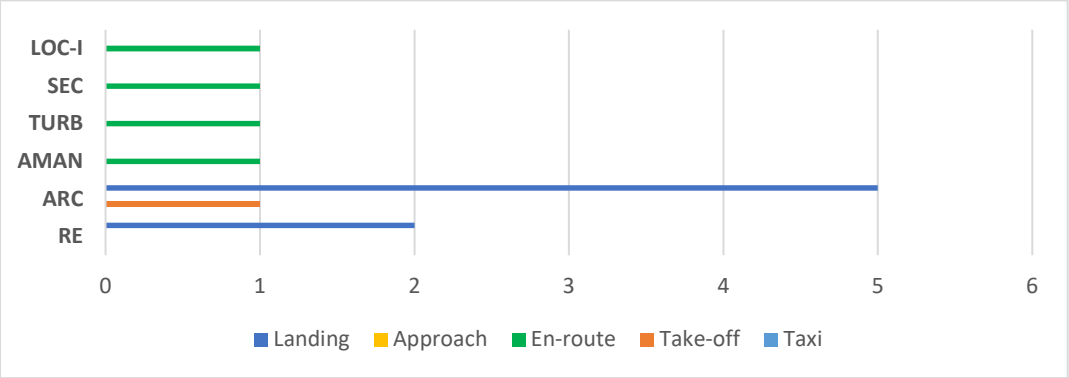
to the TCAS display to prevent Mid air collision with military aircraft which caused injuries to some persons on board.



Graph 8: Distribution of Occurrence Category Per Year (2018-2022) ((Source OVSG Data& ICAO ASR 2023)

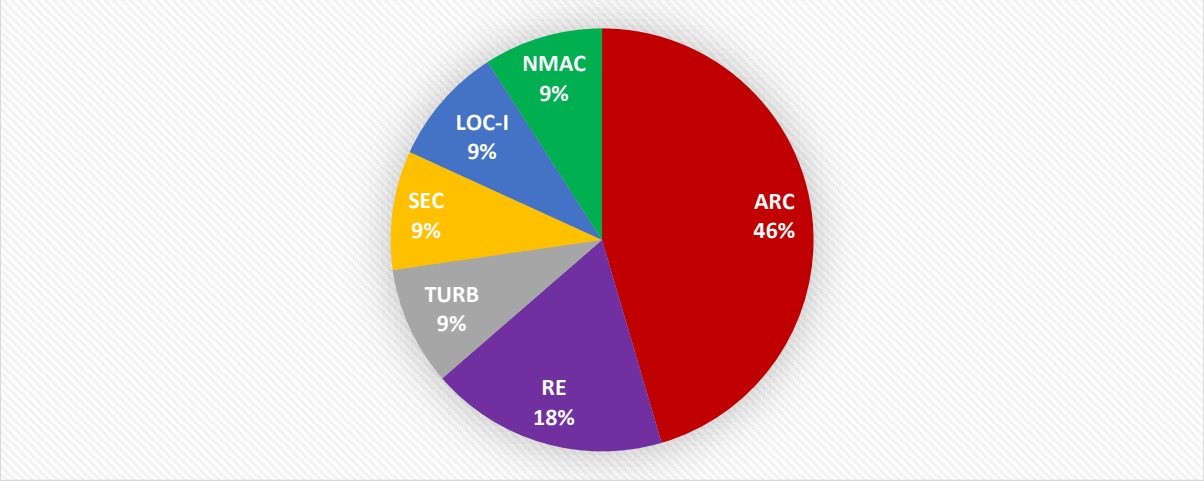
2.2.1.3 Phase of Flight

Graph 9 shows that most accidents occurred during landing phase of flight. The majority of Abnormal Runway Contact (ARC) and Runway Excursion (RE) events took place during landing flight phase. The Loss of Control-Inflight (LOC-I) occurred during En-route flight phase.



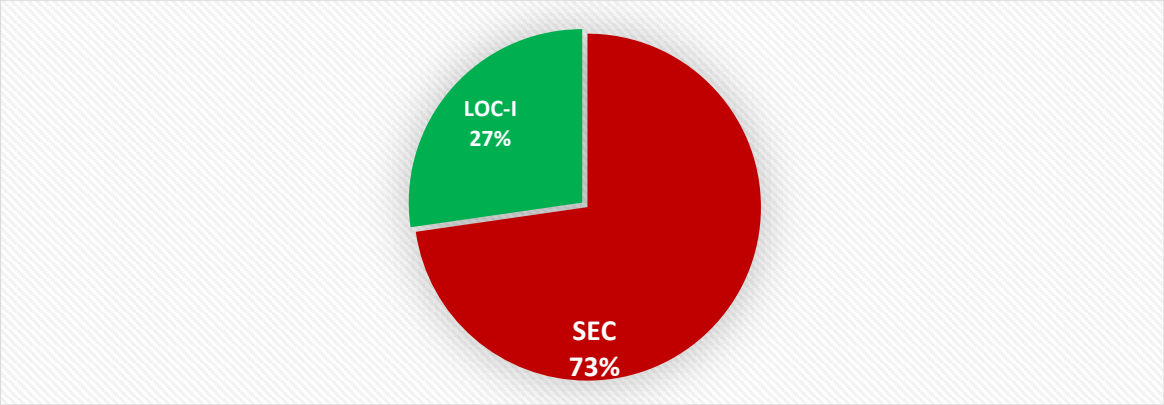
Graph 9: Distribution of Occurrence Category Per Phase of Flight (2018-2022) (Source OVSG Data& ICAO ASR 2023)

Graph 10 shows that most of the Regional high risk (R-HRCs)category accidents experienced during the 2018-2022 were RE/ARC, LOC-I, and MAC. It is to be noted that for the Abrupt Manoeuver (AMAN) occurrence category, the flightcrew received TCAS RA and applied high rate of climb according to the TCAS display to prevent Mid air collision with military aircraft which caused injuries to some persons on board. Therefore, the MAC occurrence category was also considered as R-HRC.



Graph 10: Occurrence Category Distribution as Percentage Per Accident (Source OVSG Data& ICAO ASR 2023)

Graph 11 shows that the fatalities for the period 2018-2022 were mainly associated to the following Occurrence Categories: Security related (SEC) and Loss of Control-Inflight (LOC-I).



Graph 11: Fatalities Distribution as Percentage by Occurrence Category (2018-2022) (Source OVSG Data& ICAO ASR 2023

Taking a more in-depth look at the fatal accidents and accidents for the MID Region (State of occurrence) for the period 2018-2022, the following observations are made:

A. In terms of fatality, the top three fatal accidents categories in the MID Region are:

1. Security related (SEC);
2. Loss of Control-Inflight (LOC-I);

B. In terms of frequency, the most frequent accidents categories in the MID Region (State of occurrence) are:

1. Runway Safety (RS) including (RE and ARC);
2. Near Mid Air Collision (NMAC);
3. System Component Failure – Non-Power Plant (SCF-NP); and
4. Turbulenace (TURB).

Identification of the Key Risk Areas based on the analysis of accident data related to the State of Occurrence (2018-2022)

To facilitate the identification of the safety priority areas; the safety risk assessment methodology is applied.

Main Risk Area	Frequency	Severity	Risk Level
Loss of Control-Inflight (LOC-I)	3	1	3
Runway Safety (RS)-(RE/ARC)	1	3	3
Security (SEC)	3	1	3
Near Mid Air Collision (NMAC)	4	1	4
System Component Failure – Non-Power Plant (SCF-NP)	4	3	12
TURB	4	4	16

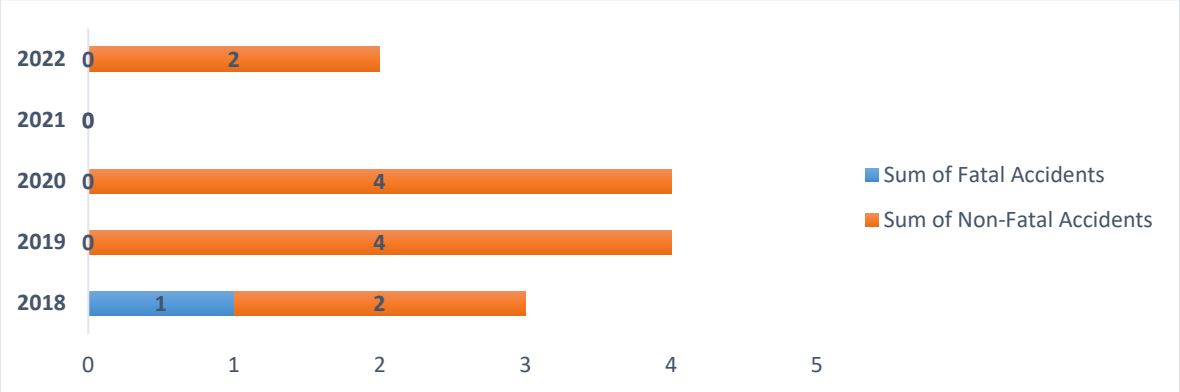
Table 3: Key Risk Area

Therefore, the key risk areas according to the State of occurrence's accidents data are

1. Loss of Control -Inflight (LOC-I)
2. Runway Safety (RS): Runway Excursion (RE) and Abnormal Runway Contact (ARC) during landing;
3. MID Air Collision (MAC); and
4. Security related (SEC).

2.2.2 MID State of Registry and OperatorAccident Data Analysis

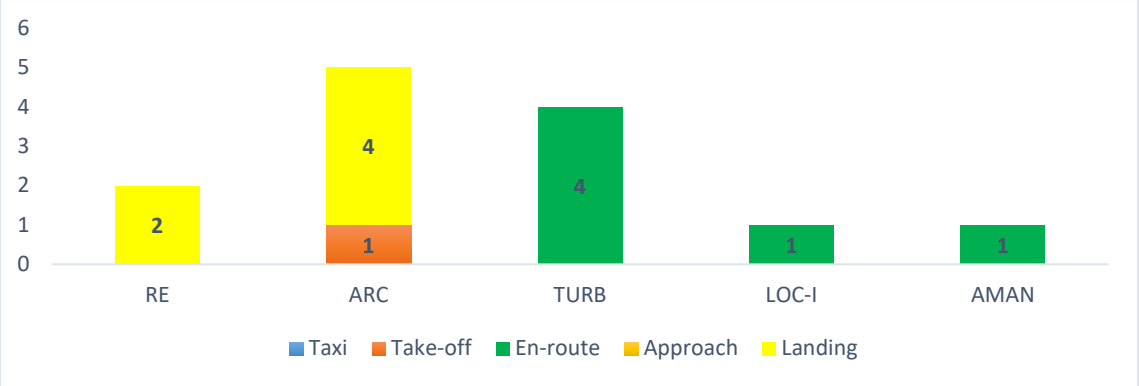
Graph 12 shows the change in the number of Fatal Accidents and non-Fatal Accidents over the last five years involving MID State of registry and State of operator airplanes. The Graph 12 also indicates that one fatal accident was recorded during 2018 and resulted in 66 fatalities.



Graph 12: Number of Fatal and Non-Fatal Accidents per Year (2018-2022) Source OVSG Data& ICAO ASR 2023)

2.2.2.2 Phase of Flight

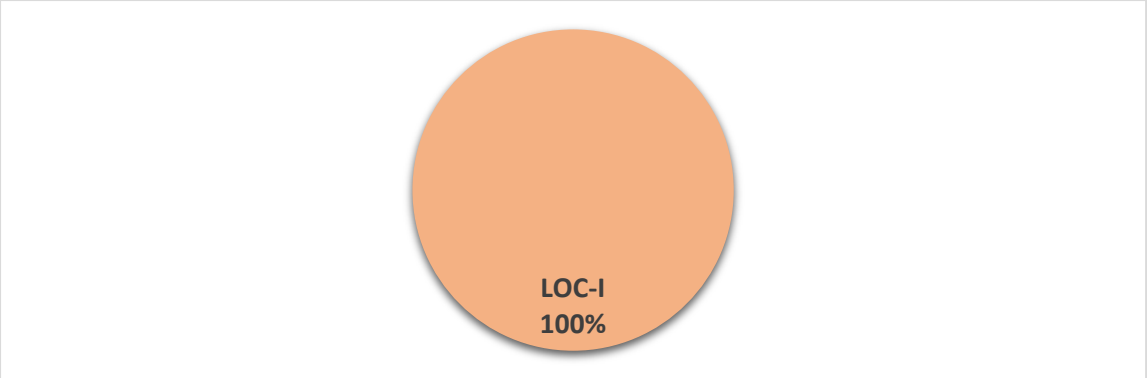
The Graph 13 shows that the majority of accidents related to Runway Excursion (RE) and Abnormal Runway Contact (ARC) occurrence categories took place during landing flight phase. It was also noted that the Turbulence related accident occurred during en-route phases of flight. Regarding, Loss of Control Inflight (LOC-I), it took place during en-route.



Graph 13: Distribution of the Number of Accidents Category per Phase of Flight (2018-2022) (Source OVSG Data& ICAO ASR 2023

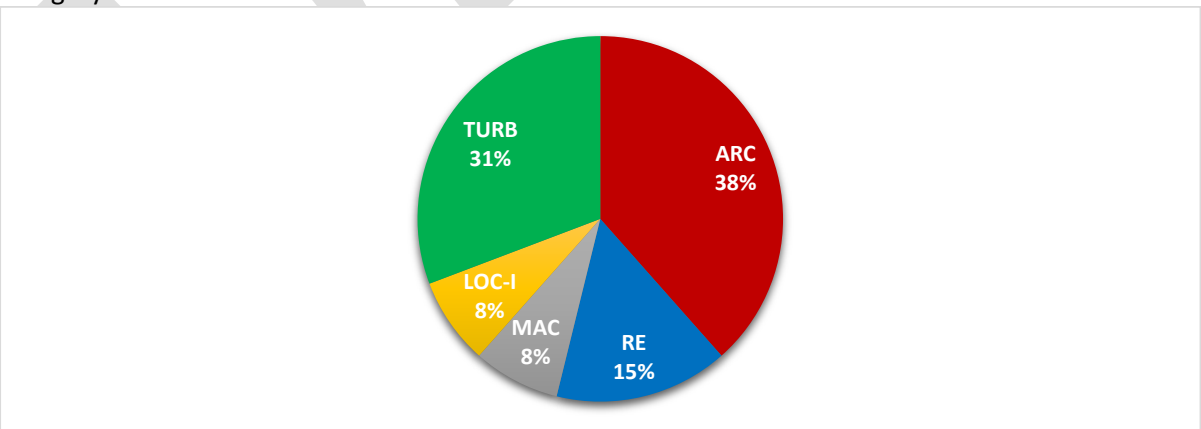
2.2.2.3 Occurrence Category

Graph 14 shows the percentage of fatalities associated with the accident Categories for the period 2018-2022: Loss of Control in flight (LOC-I).



Graph 14: Fatalities Distribution as Percentage by Occurrence Category (2018-2022) (Source OVSG Data& ICAO ASR 2023)

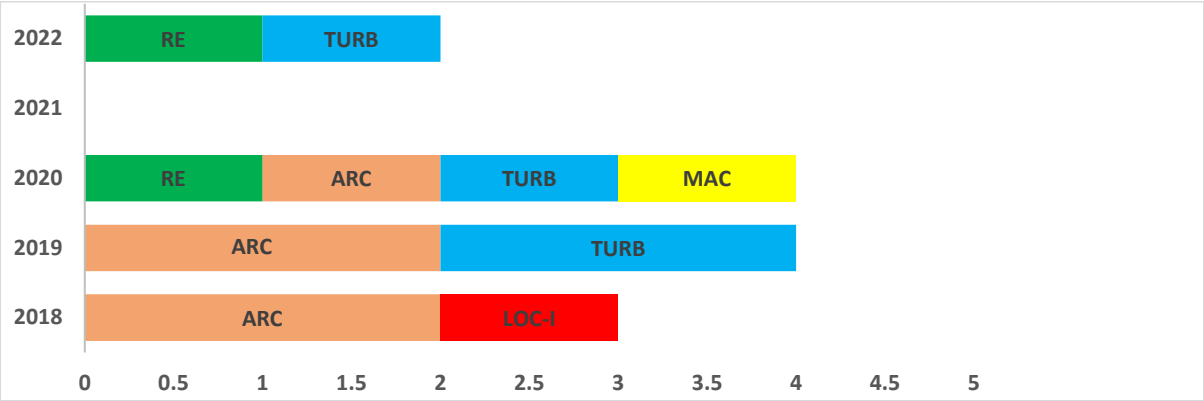
Graph 15 shows that the high risk categories (HRC) identified are LOC-I, RE/ARC, and MAC. However, the RE and ARC are still the most frequent. One LOC-I occurrence had also resulted in fatalities. It is to be noted that for the Abrupt Manoeuver (AMAN) occurrence category, the flightcrew received TCAS RA and applied high rate of climb according to the TCAS display to prevent Mid air collision with military aircraft which caused injuries to some persons on board. Therefore, the MAC occurrence category was also considered as HRC.



Graph 15: Accident Distribution as Percentage per Occurrence Category (2018-2022) (Source OVSG Data& ICAO ASR 2023)

During 2018-2022, no CFIT accident occurred. However, One LOC-I fatal accident had taken place during the year 2018 involving aircraft from the Region. Runway Excursion (RE) and Abnormal Runway Contact (ARC) are also a serious concern in the Region. In respect of the occurrence category Abrupt

Manoeuver (AMAN), the flightcrew received TCAS RA and applied high rate of climb according to the TCAS display to prevent Mid air collision with military aircraft which caused injuries to some persons on board. Turbulence (TURB) events were registered and are still prevailing as shown in Graph16.



Graph 16: Accident Category Distribution per Year (Source OVSG Data& ICAO ASR 2023)

Taking a more in-depth look at the fatal and non-fatal accidents for the MID Region (State of registry and State of operator) for the period 2018-2022, the following is to be highlighted:

A. In terms of fatality, the fatal accidents categories in the MID Region for the period 2018 – 2022 are:
   1. Loss of Control- In-flight (LOC-I).

B. In terms of frequency, the most frequent accidents categories in the MID Region (State of registry and State of occurrence) for the period 2018 – 2022 are:
   1. Runway Safety (RS) (REand ARC);
   2. Turbulence encounter (TURB); and
   3. Near Mid Air Collision (NMAC).

Identification of the key risk Areas based on the analysis of safety data related to the State of registry and State of operator (2018-20222)

To facilitate the identification of the safety priority areas; the safety risk assessment methodology is applied.

Main Risk Area	Frequency	Severity	Risk Level
Loss of Control-Inflight (LOC-I)	2	1	2
Runway Safety (RS). (RE/ARC)	1	3	3
Mid Air Collision (MAC)	3	1	3
Turbulence (TURB)	2	6	12

Table 4: key Risk Area

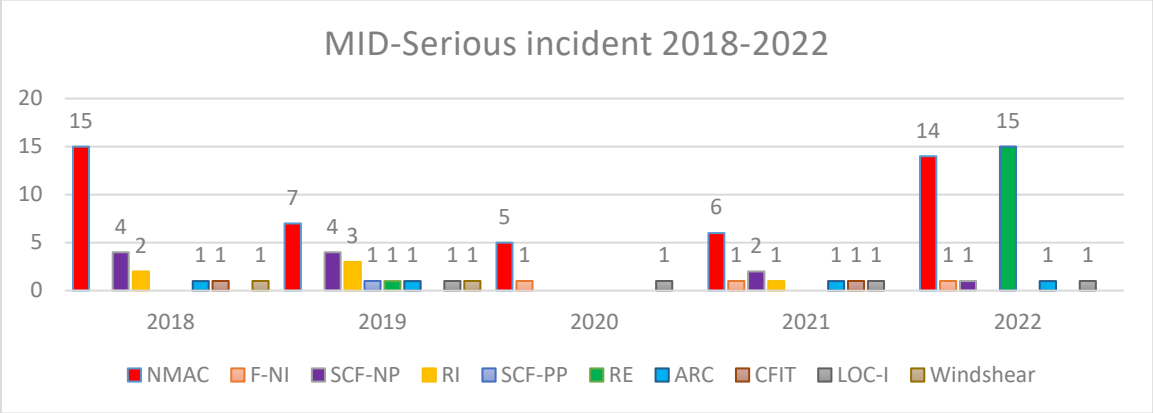
Therefore, the key risk areas according to the State of registry and operator accidents data are:

1. Loss of Control-Inflight (LOC-I);
2. Runway Safety (RS): Runway Excursion (RE) and Abnormal Runway Contact (ARC) during landing; and
3. Mid Air Collision (MAC).

2.2.2.4 Serious Incidents Data Analysis

Occurrence Category

Graph 17 shows the total number of serious incidents provided by the MID States for the period 2018-2022



Graph 17: Number of Serious Incidents Distribution Per Year (2018-2022)

The data shows that there was a significant increase on the number of NMAC Occurrences. The number of serious incidents data shared by the MID States have been considered and included in the analysis to shed light and identify the potential safety concerns in the MID Region. However further data analysis should be provided by the MID States for an in-depth analysis.
Taking a more in-depth look at the serious incidents reported by the MID Region for the period 2018-2022, the following is to be highlighted:

A. In terms of frequency, the most frequent serious incidents categories in the MID Region are:
   1. Near Mid Air Collision (NMAC);
   2. System Component Failure-power Plant (SCF-PP); and
   3. System Component Failure- Non Power Plant (SCF-NP).

With respect to the Mid Air collision (MAC)/NMAC: The most common root causes for MAC occurrences are Human performance errors and Ineffective training for ATCs. In addition, 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.

For the System Component Failure-Non-Power Plant (SCF-NP): Unexpected technical failure, lack of maintenance, not complying with the ICAO standards for Air Operator Certificates (AOC) & Operations Specifications, flying with Minimum equipment limitations
The main safety issues indentified and shared by the States as follows:

- Regulatory oversight
- Human factors and Human Performance
- competence of personnel
- EGPWS warning (GPS Jamming)
- TCAS/RA
- Runway Incursion
- Low level wind shear
- System Component Failure-Power Plant (SCF-PP)
- Technical failures
- Birdstrike
- Navigation Errors (NAV)

2.2.3 ICAO In-depth Analysis of Accident

2.2.3.1 Runway Excursions and Abnormal Runway Contact:

During 2018-2022, Runway Excursions and abnormal runway contact accidents and serious incidents mainly occurred in the landing phase of flight. This focus area covers the risk of runway excursions, including the direct precursors such as hard landings, high speed landing, landings following an un-stabilized approach. The MID Region continued improvement in runway safety, which is one of the industry's principal risk areas. Table 5 indicted the root cause.

Root Cause Analysis		
Latent Conditions	**1**	Ineffective safety management system
	2	Incomplete/inefficient operator SOP
	3	Deficient flight crew training
	4	Regulatory oversight
Threat	**1**	Decision to make a landing on short runway with tailwind
	2	Poor judgment and continued landing after an un-stabilized approach
	3	Improper calculating of landing speed without focusing on the tailwind component
	4	Technical failures Pilot information
	5	Ineffective reporting of runway surface condition/Contaminated runways
	6	Airport facilities including poor runway paintings/markings/signage lighting
	7	Meteorology
Errors	**1**	Timely crew decisions (very low-level go-arounds)
	2	Failed to go around after un-stabilized approach
	3	SOP Manual not updated and maximum tailwind not mentioned
	4	Manual handling/flight controls
	5	Contaminated runways
Contributing factors	**1**	High Airspeed and Low Engine Thrust. Anti-skid failures of landing gear causing prolong landing distance.
	2	Instantaneous variable wind condition on aerodrome traffic pattern.
	3	Late activation of airbrakes and spoilers (especially airbrakes) with tailwind cause to increase the landing roll distance.

Table 5: RE and ARC Root Cause

Some of the Precursors, which could Lead to Runway Excursion:

A. Precursors for aircraft overrunning the end of the runway on landing (landing overrun) could include:
    1. Long landing / high across threshold / extended flare / floating,
    2. incorrect performance calculation,
    3. ineffective use of stopping devices / time to apply reverse thrust or braking / inappropriate use of auto brake setting,
    4. weather related / runway condition / aquaplaning, unsterilized approach, tailwind landing.

B. Precursors for aircraft veering off the side of the runway during landing (landing veer-off) could include:
    1. Crosswind and wet /contaminated runway,
    2. hard landing / inappropriate use of stopping devices / asymmetric braking or reverse thrust,
    3. inappropriate use of nose wheel steering.

2.2.3.2 Loss of Control-Inflight

During 2018-2022 Aircraft upset or Loss of control contributed to one fatal accident. During the year 2018, the LOC-I occurred during En-route phase of flight. Table 6 below the root-cause analysis is based mainly on industry's analysis of the LOC-I accidents:

Root Cause Analysis		
Latent Conditions	**1**	Inadequate safety management system including the use of the FDM data
	2	Incomplete/Inefficient Flight operations
	3	Regulatory oversight
Threat	**1**	Inappropriate Flight Crew Automation training
	2	Type-rating related issues on complex and highly automated aircraft
	3	Contained engine/power plant malfunction
	4	Severe turbulence, Thunderstorms, wind shear/Gusty wind
	5	Poor visibility/IMC conditions
	6	Spatial disorientation/Somatogravic illusion
	7	Flt Crew misdiagnose the problem leading to the application of an incorrect recovery procedure
	8	Lack of exposure to the required maneuvers during normal line flying operations
	9	Limitations in simulator fidelity could lead to pilots not having the manual flying skills required to recover from some loss of control scenarios.

Errors	**1**	Inappropriate/Incorrect use of Automation by flight crew
	2	Inadequate flight crew monitoring skills/awareness or communication
	3	Flt Crew mishandling of manual flight path and/or speed control
	4	Abnormal checklist
	5	Incorrect recovery technique by flight crew when their aircraft has become fully stalled
Contributing factors	**1**	Unnecessary weather penetration
	2	Operation outside aircraft limitations
	3	Unstable approach
	4	Vertical/lateral speed deviation

Table 6: LOC-I Root Cause

A. Direct Precursors to a Loss of Control Event:

1. Deviation from flight path
2. Abnormal airspeed or triggering of stall protections

2.3 MID Region Safety Performance - Safety Indicators-Reactive

2.3.1 Goal 1: Achieve a Continuous Reduction of Operational Safety Risks

		Average 2018-2022		2022	
Safety Indicator	**Safety Target**	**MID**	**Global**	**MID**	**Global**
Number of accidents per million departures	Reduce/Maintain the Regional average rate of accidents to be in line with the global	2.25	2.34	1.72	2.05
Number of fatal accidents per million departures	Reduce/Maintain the Regional average rate of fatal accidents to be in line with the global	0.42	0.19	0	0.22
Number of Runway Excursion related accidents per million departures	Reduce/Maintain the Regional average rate of Runway Excursion related accidents to be below the global	0.85	0.29	0.45	0.28
Number of Runway Incursion accidents per million departures	Regional average rate of Runway Incursion accidents to be below the global	**0**	**0.02**	0	0.09

Number of LOC-I related accidents per million departures	Reduce/Maintain the Regional average rate of LOC-I related accidents to be below the global average	0.14	0.07	**0**	0.06
Number of CFIT related accidents per million departures	Reduce/Maintain the Regional average rate of CFIT related accidents to be below the global rate	0	0.02	0	0.03
Number of Mid Air Collision (accidents)	Zero Mid Air Collision accident	0	0	0	0

Table7: Goal 1-Safety indicators-Reactive

3. Proactive Safety Information

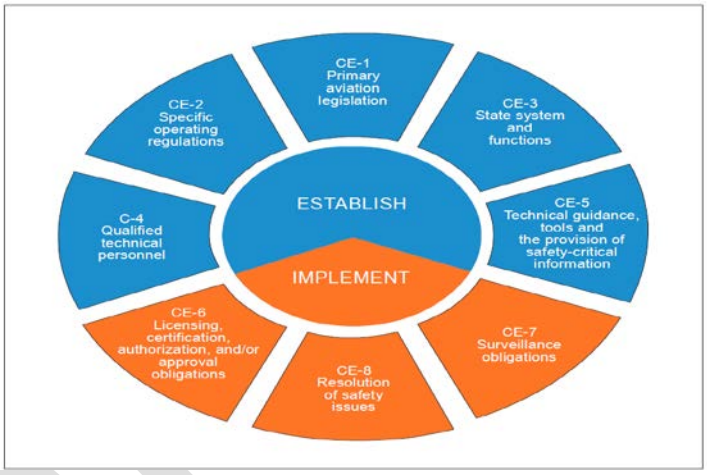
This section of the Annual Safety Report focuses on proactive safety data analysis to identify organizational issues that forms the basis for the development of SEIs.

3.1 ICAO USOAP-CMA

3.1.1 USOAP-CMA Review

Each ICAO Member State is expected to establish and maintain an effective safety oversight system that addresses all safety-related areas of aviation activities. The Universal Safety Oversight Audit Programme Continuous Monitoring Approach (USOAP-CMA) measures the effective implementation (EI) of a State's safety oversight system.

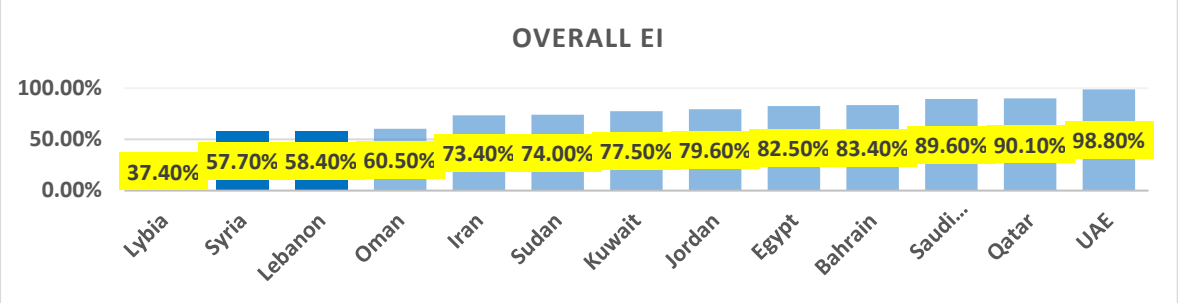
In order to standardise the audits conducted under the USOAP CMA, ICAO established protocol questions (PQs) based on safety-related ICAO Standards and Recommended Practices (SARPs) established in the Annexes to the Chicago Convention, the Procedures for Air Navigation Services (PANS), and supporting ICAO guidance material. The PQs contribute to assessing the eight critical elements (CEs) of a State's safety oversight system.



Graph 18. Critical elements of a State's safety oversight system

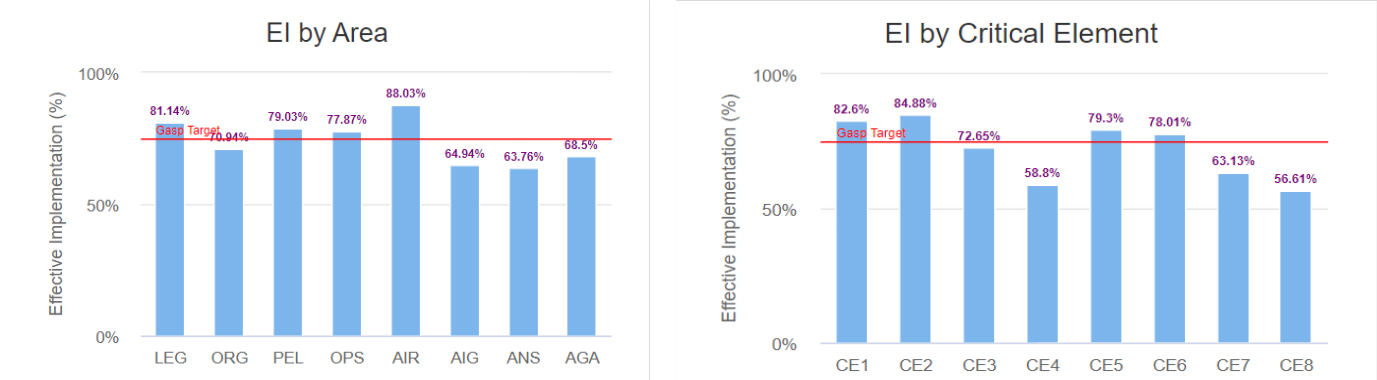
USOAP-CMA audits had identified that State's inability to effectively oversee aviation operations remains a global concern. In respect of MID Region, the Regional average overall Effective Implementation (EI) (13 out of 15 States have been audited) is approx. 74,07 %, which is above the world average 68.81% % (as of 20 July 2023). Three (3) States are currently below EI 60%.

Currently, 77% of the audited States achieved the target of 60% EI.



Graph 19: Source: ICAO USOAP CMA Online Framework (OLF), as of 11 June 2023

All eight areas have an EI above 60%. However, the areas of AIG and ANS still need more improvement. With respect to the Critical Elements (CEs), CE4 (Qualified technical personnel) is below 60% (58.8%) EI, whereas CE8 (resolution of safety issues) is also below EI 60% (54. 32%) EI. 5 areas and 5 critical elements are above the target of 70% EI.
Moreover, the effective implementation in certification, surveillance, and resolution of Safety concerns need to be improved.



Graph 20: Source: ICAO iSTARS, as of 11 June 2023

3.1.2 ICAO USOAP CMA Activities — MID States Status for 2022

The main activities under USOAP-CMA are:

- **Audit:** This activity is performed on-site to conduct a systematic and objective assessment of State's safety oversight system. It can be full or limited.
- **ICAO Coordinated Validated Mission (ICVM)**: This activity is performed to assess a State's effective corrective actions addressing previously identified findings related to PQs requiring an on-site activity.
- **Off-site Validation activity**: This activity is performed to assess a State's effective corrective actions addressing previously identified findings related to PQs not requiring an on-site activity.
- **State Safety Programme Implementation Assessment (SSPIA):** This activity is to perform a qualitative (non-quantitative) assessment of the progress made by State in implementing SSP. Broken down into 8 areas: GEN (SSP general aspects), SDA (safety data analysis), PEL, OPS, AIR (AMO aspects only), ANS (ATS aspects only), AGA, and AIG.

State/organization	Type of activity	Date	Status
Iran (Islamic Republic of)	Audit	29 Aug to 10 Sep 2022	**Completed**
Lebanon	ICVM	19 to 26 Oct 2022	Postponed at the request of the State.

Table 8: ICAO USOAP CMA Activities — MID States Status for 2022

3.2 MID Region State Safety Programme (SSP)

3.2.1 SSP Implementation Assessments (SSPIAs)

ICAO launched SSP Implementation Assessments (SSPIAs) 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

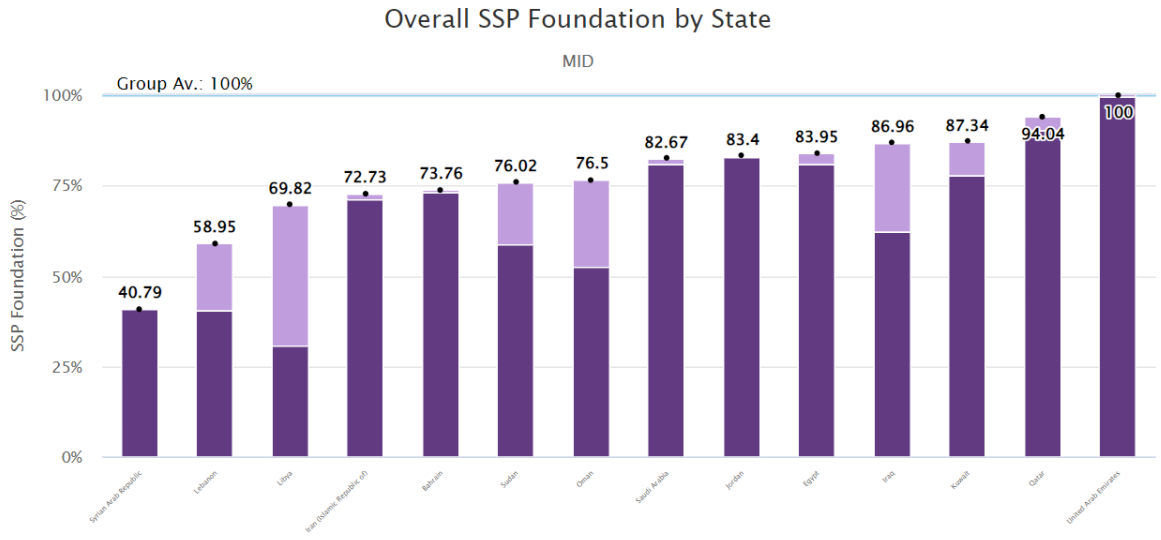
The SSP assessment covers 8 areas as indicated below:

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).

3.2.2 SSP Foundation

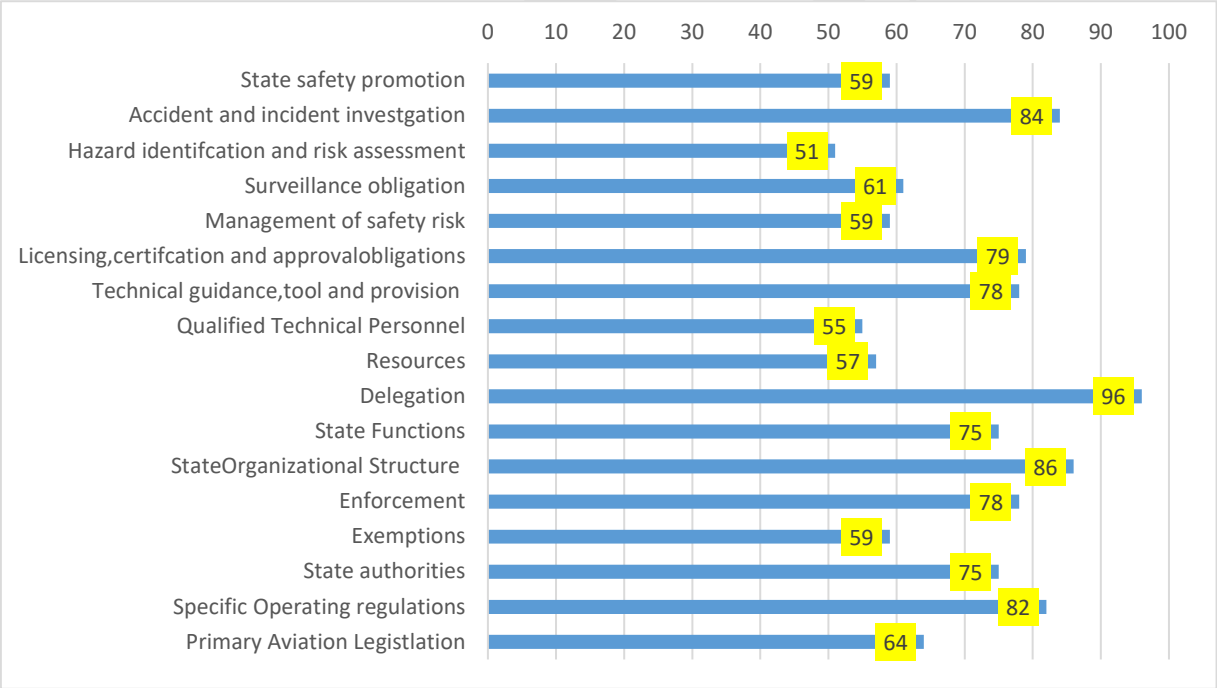
Safety Management Tools: The full list of SSP Foundation PQs can be found on the SSP Foundation tool, available on iSTARS since 2017.

A sub-set of 299 Protocol Questions (PQs) out of the 943 PQs used to calculate the USOAP Effective Implementation (EI). This sub-set of questions are considered as the foundation for a State Safety Programme (SSP) implementation. A SSP Foundation indicator is calculated, as the percentage of PQs which are either validated by USOAP or submitted as completed through the corrective action plans (CAP) on the USOAP CMA Online Framework.The average EI for SSP foundation PQs for States in the MID Region is **76, 18%.** The SSP foundation EI for MID Region States is shown in the graph 21 below.



Graph 21: Overall SSP foundation for MID Region States (Source: iSTARS as of 18 June 2023)

The sub-set of PQs are grouped by 17 subjects based on the Annex 19 amendment 1 and the 4th edition of the Safety Management Manual (forthcoming). States with EI above 60% may still have PQs to address which are fundamental for their SSP. Hazard identification and risk assessment is the lowest one with 51%, followed by qualified technical personnel with 55%.



Graph 21: Average EI by Safety Management subjects for States in MID Region (Source: iSTARS as of 18 June 2023)

3.2.3 SSP Gap Analysis

Safety Management Tools: The application was updated in 2019 to reflect Amendment 1 to Annex 19 and the 4th edition of the SMM. It now comprises 62 questions, which cover all the requirements of an SSP and provides project owners the opportunity to develop an implementation plan to address the gaps identified.

SSP Gap Analysis - SMM 4th Ed.

State Safety Programmes

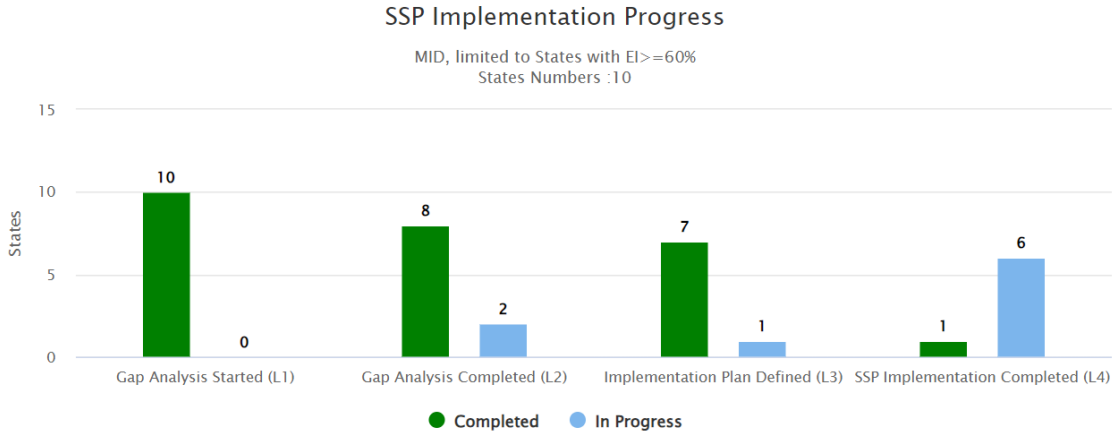
These PQs can be prioritised and addressed when conducting the SSP gap analysis or while defining the SSP implementation/action plan. States can use the ICAO iSTARS online to perform an SSP Gap Analysis-SMM 4th Edition. This provides an indication of the broad scope of gaps and hence overall workload to be expected. This initial information can be useful to senior management in anticipating the scale of the SSP implementation effort and hence the resources to be allocated/provided.
The SSP statistics shown in the graph 26 are high-level information about each Gap analysis project performed by States themselves (Self-reported by the State and not validated by ICAO). SSP implementation progress has been measured for each State using simple milestones as per the entered data.

State Safety Programme (SSP) Implementation

ICAO measures SSP implementation in levels as follows:

- Level 1: States having started a GAP analysis
- Level 2: States having reviewed all the GAP analysis questions
- Level 3: States having defined an implementation plan to address the gaps
- Level 4: States having closed all actions and fully implemented their SSPs

The completion percentage of GAQs in each level is given in graph 22 for States in the MID Region.

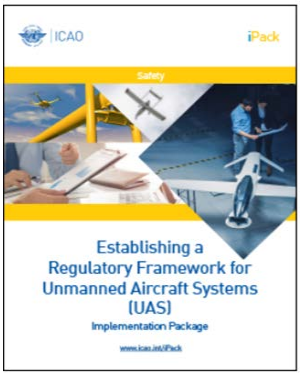


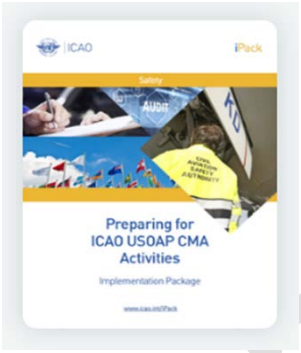
Graph 22: SSP Implementation Progress for States in MID Region: (Source: iSTARS as of 18 June 2023)

3.2.4 Implementation Packages

On 17 July 2020, ICAO issued Electronic Bulletin 2020/40 informing States of the availability of implementation packages (iPacks) to support States in their response, recovery and resilience efforts following the COVID-19 outbreak. An iPack is a new ICAO initiative, which bundles standardized guidance material, training, tools, checklists and subject matter expert support to facilitate and guide the implementation of ICAO provisions for State entities (e.g. governments, civil aviation authorities (CAAs), national air transport facilitation committees), aviation service providers, supply chain stakeholders and their personnel.

iPacks are developed and implemented in full alignment with the measures and recommendations contained in the Council Aviation Recovery Task Force (CART) Report.





The National Aviation Safety Plan (NASP), Aerdrome Restart, preparing for ICAO USOAP CMA activities, and Unmanned Aircrfat Systems (UAS) iPacks have been deployed and completed to support States in the MID Region.

MID Region State Safety Programme (SSP) Implementation challenges

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 priorities. Common challenges have been identified based on the States' feedback, as follows:

1. Establishment of a safety performance measurment, which necessitates effective reporting system to support collection/analysis of safety data
2. Allocation of resources to enable SSP implementation
3. Identification of a designated entity (SSP Accountable Executive and SSP coordination group); and
4. Lack of qualified and competent technical personnel to fulfil their duties and responsibilities regarding SSP implementation.

The following actions were recommended to support the SSP implementation:

- Continuous update of the SSP Gap Analysis available on iSTARS
- Participate in the new ICAO Safety Management Training Programme (SMTP), with the CBT part and the Safety Management for Practitioners Course;
- Work with the ICAO Regional Office to make use of available means (e.g. Technical Co-operation Bureau) to provide assistance needed for SSP implementation;
- Identify safety management best practices in coordination with States (champion State to promote best practices among other States) including sharing of technical guidance and tools related to SSP (e.g. advisory circulars, staff instructions);
- Establishment of voluntary and mandatory safety reporting systems.
- The RASG-MID also supported the establishment of the MENA RSOO, with a primary objective to assist member States to develop and implement SSP. The MENA RSOO is still in the establishment and activation process.
- Several Safety Management Workshops, training courses, webinars, and meetings have been organized to support the implementation of SSP/SMS and address the challenges and difficulties, as well as sharing of experiences and best practices.

- In addition, the MID Region safety management implementation Roadmap has been endorsed by the RSC/7 to assist MID Region States to comply with the requirement for the implementation of the SSPs by States and the SMS by service providers as established in the Annex 19, Safety Management, GASP 2023-2025 Edition, and MID-RASP 2023-2025 Edition. The Roadmap will be linked to the MID NCLB Strategy in order to support the States in a prioritized manner and will be implemented within the RASG-MID framework.
- Moreover, the Safety Management Implementation Team (SMIT) is established as the main Regional Framework for the provision of assistance to States through Safety Management Assistance Missions. Its handbook endorsed by the RASG-MID/9 to support States with SSP implementation in an effective and efficient manner.

National Aviation Safety Plan (NASP)

In line with the ICAO Safety Strategic Objective, 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.

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).

Recognizing the challenges facing the States in the development of their NASPs, the ICAO MID Office conducted NASP workshops and assistance Missions dedicated to NASP in order to support States with NASP development.

The main challenges faced by States in developing their NASPs.

- Coordination and communication with stakeholders
- Senior management commitment
- New technologies (UAS and eVTOL)
- Lack of safety data and safety information
- Insuffucient NASP workshops/trainings
- Lack of resources including financial

3.3 Human Factors and Human Perforamance

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.

The performance of the aviation system, including its safety performance, depends on humans and on the effective integration of the human factors into the management systems in place. Accordingly, focus on human factors and human performance should form an integral part of any safety management approach, be it at regional, State or industry level.

ICAO emphasised the importance of addressing human factors and human performance issues by publishing ICAO Doc 10151 'Manual on Human Performance (HP) for Regulators (first edition 2021).

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. Crew Resource Management (CRM) has been identified in the MID ASR as a safety issue in the domain of commercial air transport. In addition, Team Resource Management (TRM) was

introduced into ATC following the success achieved with 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.

3.4 Competence of Personnel

Availability of well-trained and competent aviation personnel is paramount to the safety and resilience of the aviation industry. Some of States in MID Region has a mature and detailed regulatory framework in place to ensure proper training, licensing, adequacy of training devices and oversight. Nevertheless, several factors are challenging this mature framework: new technologies and increasing automation are changing the safety needs for aviation personnel and new training devices are emerging. New aircraft types and technological advancements in virtual reality/artificial intelligence are revolutionising pilot training altogether.

3.5 Manage Risk Interdependencies

The COVID-19 crisis demonstrated that safety, security, health safety and other risks can no longer be managed in isolation. The aviation community has realised that continuing to develop tools and specific guidance for each situation and for each domain affected by transversal risks may delay not only the implementation of mitigation measures, but also the development of an enabling framework to support integrated, collaborative risk management.

Some initial integration steps have already been taken in the safety and security domains-in accordance with ICAO Annex 17 and Annex 19 Standards and Recommended Practices (SARPs), the Contracting States are required to establish reporting systems for the analysis of security and safety information. States have been advised by ICAO to consider aligning their security reporting mechanisms with existing aviation safety reporting systems, in order to allow for an integrated approach to the management of risks. This should also enable the use of existing safety tools and concepts especially in relation to the appropriate protection of data and of those reporting for the benefit of aviation security, as well as foster the implementation of a safety and security culture amongst States and stakeholders.

3.5.1 *Cybersecurity Risks*

The global civil aviation ecosystem is accelerating towards more digitalisation. 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 standardised 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/organisations with malicious intent.

3.5.2 *GNSS Interfence Risks*

GNSS/GPS Interference Reported in MENA Region 2022

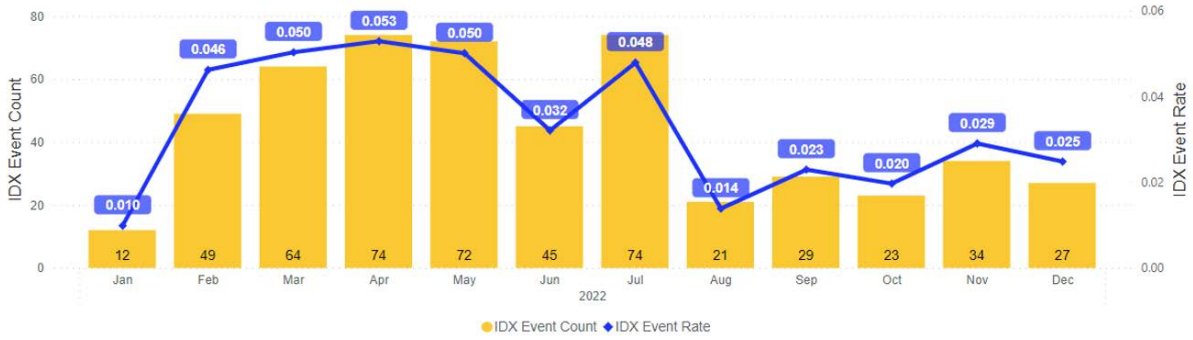
Global Navigation Satellite System (GNSS), which involves systems such as Global Positioning System (GPS), Russia's GLONASS, China's, BeiDou, Europe's Galileo includes navigation satellite infrastructures and constellations which provide position, navigation, and timing (PNT) information supporting aircraft and air traffic management operations and support navigation applications in all phases of flight as well as surveillance application like ADS-B. GNSS is also used in safety nets like the EGPWS (Enhanced Ground Proximity Warning Systems) and provides the time reference that is used to synchronize systems and operations in ATM.

Satellite navigation signals are weak and can easily be compromised by a range of growing threats, including intentional or unintentional signal interference, jamming, spoofing, and/or the manipulation of position and timing information. The effects of such threats vary greatly. Satellite signal jamming can have a serious effect on the accuracy of navigation systems and, in some cases, results in unusual system behavior.

In a continuous monitoring the regional safety risk of GNSS/GPS Interference, an updated analysis is presented to provide figure from January until December 2022 of GNSS/GPS Interference in MENA and adjacent countries. The analysis utilized two datasets: Incident Data Exchange (IDX), and Flight Data Exchange (FDX),The analysis covers the time period of January 2022 to December 2022.

Incident Data Exchange (IDX):

The analysis revealed 524 GNSS/GPS jamming or suspected interference reports from 12 operators in the MENA region and adjacent states gathered through the Incident Data Exchange (IDX) from January 2022 to December 2022.

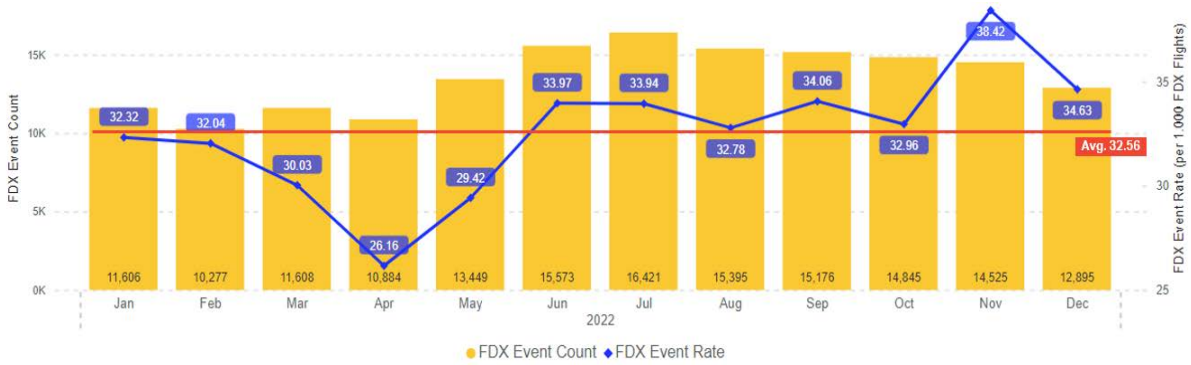


Graph 23: Reported GNSS/GPS Interference

The number of GNSS/GPS interference reports has increased during 2022 compared to reports in 2021.

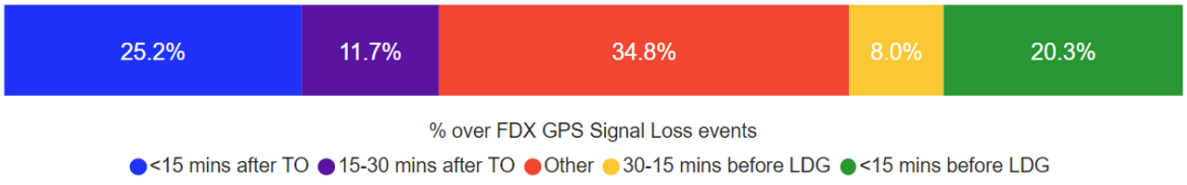
Flight Data Exchange (FDX):

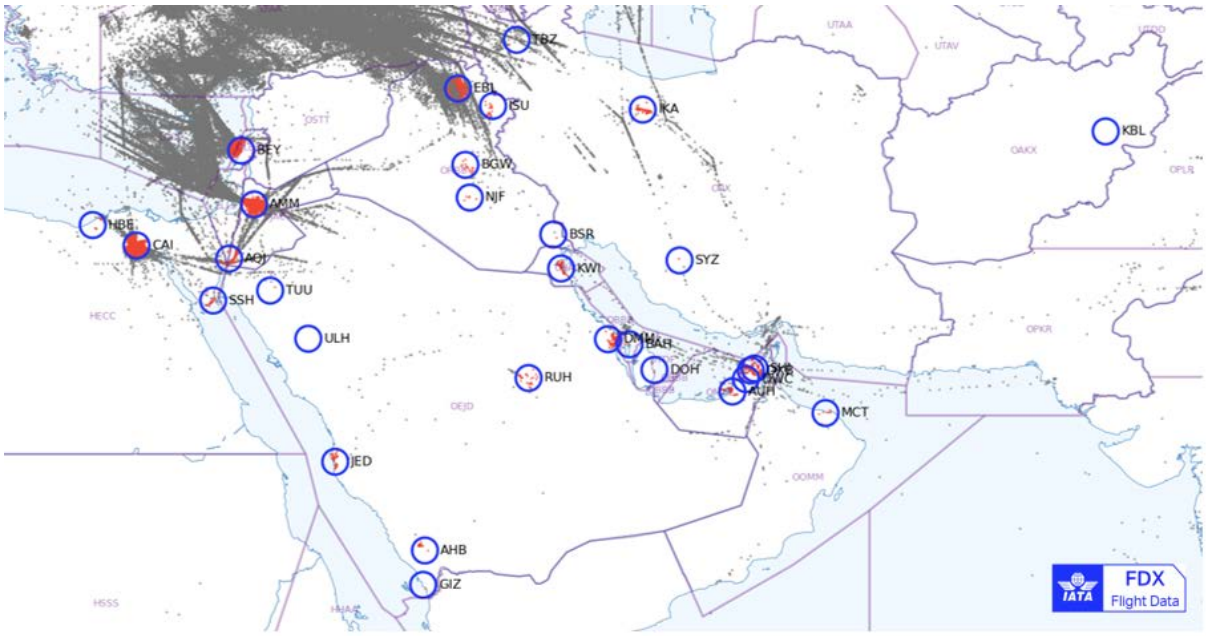
The analysis utilized data from the Flight Data Exchange (FDX) showed a total of 162,654 'GPS signal loss' events from 54 operators in the MENA region and adjacent states from January 2022 to December 2022. This is 68.5 % of all GPS Signal Loss Events in FDX database in 2022. The Total Event Count around the world was 237,489.



Graph 24: FDX GPS Signal Loss Event

Percentage of 'GPS Signal Loss' Events per Flight Segments





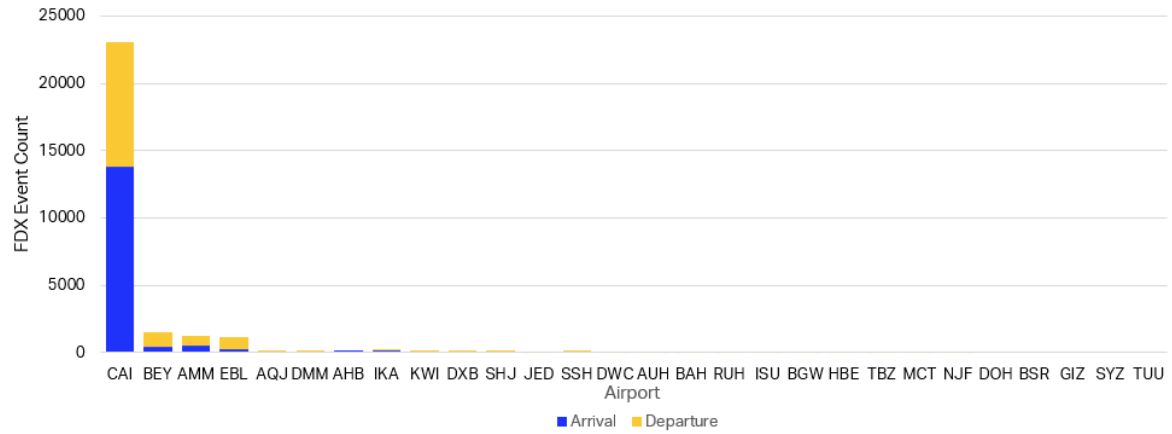
Graph 25: FDX GPS Signal Loss Event During DEP or arrival near airports

Above chart depicts flights in the MENA region that have experienced 'GPS Signal Loss' during departure or arrival near airports.

The 30 NM radius circle around the airport was used to determine the vicinity of the airport. The Red dots within the airport area indicate where the interference occurred, while grey dots represent events that occurred outside the airport area or during the cruise phase. The intensity of the red color reflects the frequency of the events.

GPS Signal Loss Near Airports (30 NML radius)

The bar chart and table below display the frequency of 'GPS Signal Loss' events during departure or arrival at airports in the MENA region.



	CAI	BEY	AMM	EBL	AQJ	DMM	AHB	IKA	KWI	DXB	SHJ	JED	SSH	DWC	AUH	BAH	RUH	ISU	BGW	HBE	TBZ	MCT	NJF	DOH	BSR	GIZ	SYZ	TUU
Arrival	13803	439	498	262	30	95	151	132	60	66	74	18	44	31	16	29	16	9	10	4	1	6	4	3	1	1	0	1
Departure	9295	1119	789	866	140	64	0	19	30	23	13	34	7	19	25	8	13	11	8	7	10	2	3	0	0	0	1	0

Graph 26: GPS Signal Loss Duration (Seconds)

3.5.3 *5G interference with Radio Altimeter Risks*

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.

3.5.4 *Security Risks with an Impact on Aviation Safety*

The implementation of aviation security measures can have a direct impact on safety aspects of aerodrome or aircraft operations. Airport security, aircraft security or in-flight security are the areas where the interdependencies are highly visible and where any security requirements should also consider potential impacts on aviation safety. States should onsider where interdependencies between civil aviation safety and security exist.
Therefore, an integrated approach to the management of safety and security risks across the spectrum of aviation activities would bring benefits such as a complete overview of risks, a better sharing of security information and the closure of gaps in the security system while focusing on increasing the overall level of safety. Consequently, this would allow ensuring synergies where security measures can have an impact on safety and vice versa; thereby avoiding incompatible actions and strengthening the overall safety and security of civil aviation.

3.5.5 *Risks Arising from Conflict Zones*

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. Similar events had occurred in the MID Region on Jan 2020 involving the Ukraine International Airlines flight PS752. The tragic accident with the downing of Ukraine International Airlines Flight 752 highlighted once more the importance of information sharing and risk assessments.

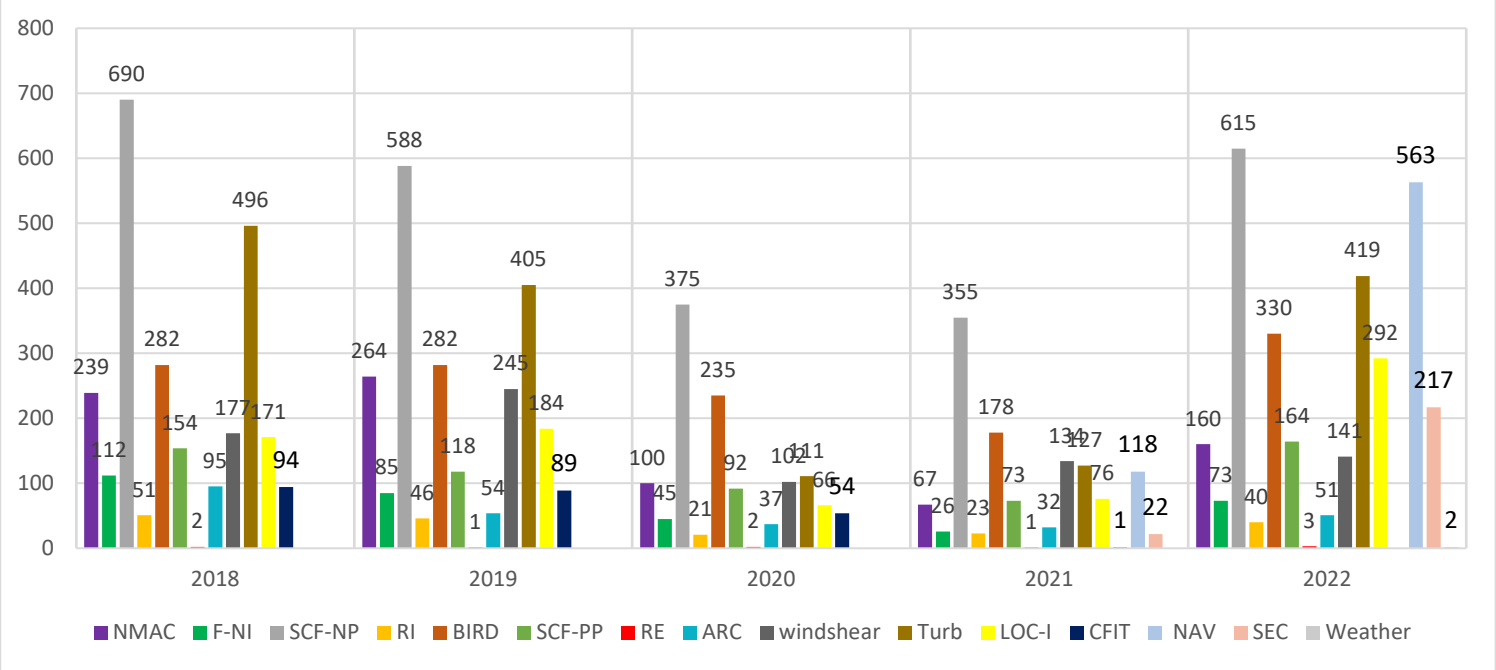
3.5.6 *Aviation Health Safety (AHS) Risks*

The COVID-19 pandemic has shown that the harmonisation of health policies affecting aviation, and in particular in the CAT domain, has become an important topic to help overcome the pandemic. The objective is to minimise the impact of health safety threats in CAT. Health safety threats should be included in the management of risk interdependencies.
COVID-19 is unlikely to be the last pandemic we will be faced with. It is crucial to continue supporting the MID Region aviation industry competitiveness by offering the safest aircraft interior environment to reduce the risk of disease transmission between continents and States, restore public trust and facilitate future responses to events of similar nature.
A number of actions were initiated following the onset the COVID-19 pandemic including the establishment of the MID-RPTF 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. The development of ICAO CART CART I, CART II, CART III, and CART IV Reports and the associated "Take-Off Guidance Document" (TOGD).

3.6 Incidents Data

3.6.1 Incident Data shared by States for the Period 2018-2022

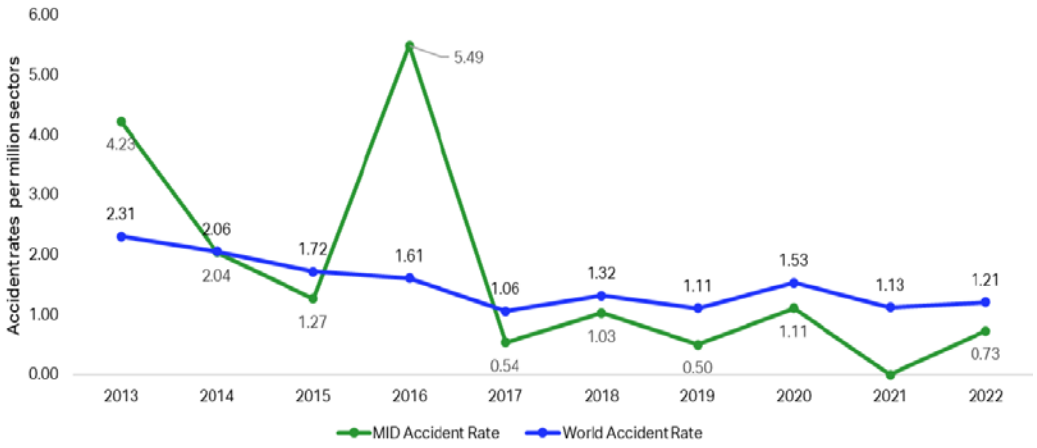
Graph 24 below shows that the number of system component system-non-power plant (SCF-NP) incidents reported is the highest one, followed by Navigation (NAV), Wake Turbulence, airborne conflict incidents (near mid-air collision) and birds. For an in-depth analysis and to identify the underlying safety issues, MID States should provide further safety information and safety analysis in order to come out with strategic initiatives and mitigations.



Graph 27: Total number of incidents provided by the MID States for the period 2018-2022

3.6.2 IATA Data

3.6.2.1 Global Accidents (2013-2022)



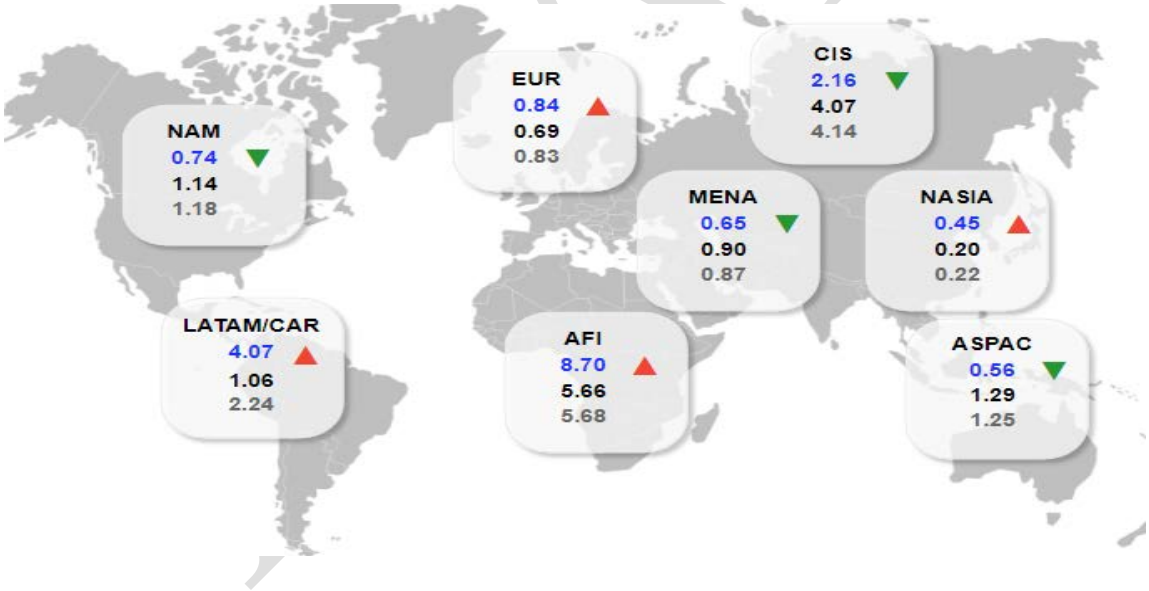
Graph 28: Global Accidents (2013-2022)

2022 Full Year Accident Update

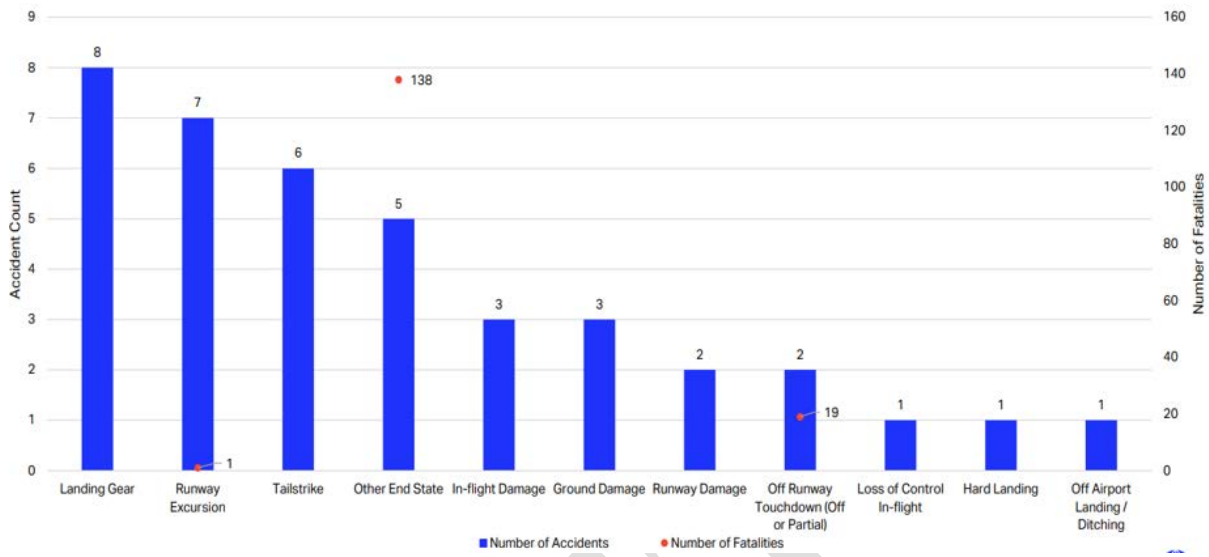
During 2022, there were a total of 39 accidents worldwide, of which 5 caused 158 fatalities compared with seven in 2021. As a result, the fatal accident rate improved from 0.27 per million sectors in 2021 to 0.16 for 2022, which was also ahead of the 5-year fatal accident rate of 0.20. Despite the reduction in the number of fatal accidents, the number of fatalities rose from 121 to 158.

	2021		2022			
	Count	Rate**	Count		Rate**	
Industry	29	1.13	39	↑	1.21	↑
Jet	16	0.70	25	↑	0.87	↑
Turboprop	13	4.59	14	↑	4.10	↓
IATA Members	11	0.61	11	–	0.49	↓
IOSA Members	13	0.66	17	↑	0.70	↑
Non-IOSA Members	16	2.69	22	↑	2.82	↑

The 2022 industry accident rate of 1.21 per million sectors is below the 5-year accident average of 1.23. The jet hull loss rate per million sectors in 2022 was 0.17 vs 0.13 in 2021. Middle East and North African (MENA) operators have not reported a jet hull loss accident since 2015.



Graph 29: 22 industry accident rate



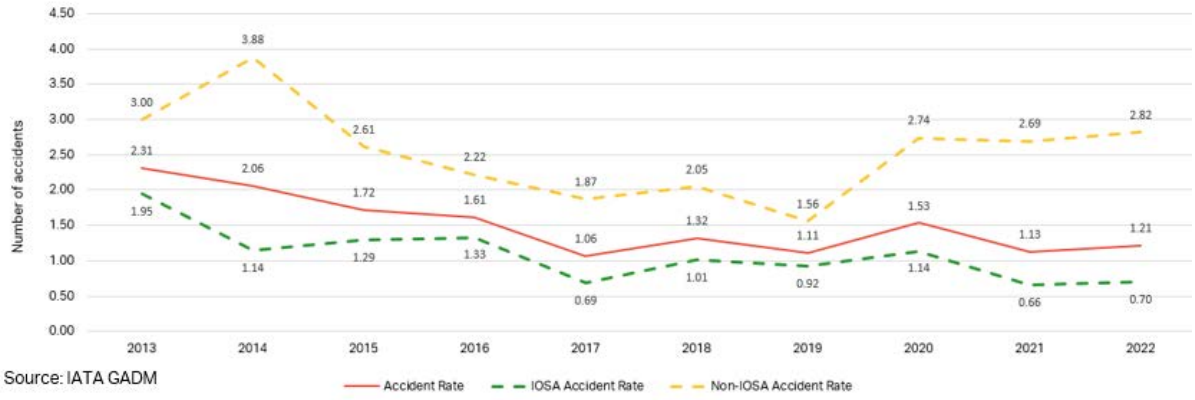
Graph 30: 2022 Accidents Count per accident Category

3.6.3 IATA Data

3.6.3.1 IATA Operational Safety Audit (IOSA)

IOSA is an internationally recognized and accepted evaluation system designed to assess the operational management and control systems of an airline. The program aims to increase global safety performance and reduce the number of redundant auditing activities in the industry.

Currently 409 operators are on the IOSA Registry, including 107 non-IATA Members. The all-accident rate for airlines on the IOSA registry in 2022 was four times better than the rate for non-IOSA airlines (0.70 vs. 2.82).
The five year (2018-2022) accident rate of IOSA airlines versus non-IOSA airlines is declining (0.88 vs. 2.19).



Graph 31: Accident rate 2018-2022 IOSA Airlines Vs non-IOSA Airlines

IOSA continues to be the global standard for operational safety audits. Now celebrating its 20th anniversary, we are transitioning IOSA to a risk-based model. By focusing on pertinent safety risks while maintaining a baseline of safety, IOSA will contribute to raising the safety bar even higher. Additionally, the IATA Standard Safety Assessment (ISSA), for operators of smaller aircraft that are not eligible for the IOSA program, ensures we look to deliver continuous improvement in safety performance across the whole aviation ecosystem.

IOSA Risk-based Audit Approach

In today's dynamic environment, airlines require an IATA Operational Safety Audit (IOSA) that focuses on areas of potential safety risks rather than applying a 'one-size-fits-all' approach. Through the introduction of a risk-based approach in 2022, the audit scope will be tailored for each airline. Furthermore, the new approach introduces a maturity assessment of the airline's safety-critical systems and programs. Audit scoping will be based on a combination of industry standards and operator-specific elements such as operational profile, safety events, and the operator's IOSA audit history. In addition to the introduction of the maturity assessment, IOSA will continue to require a baseline of conformity with IOSA Standards and Recommended Practices.

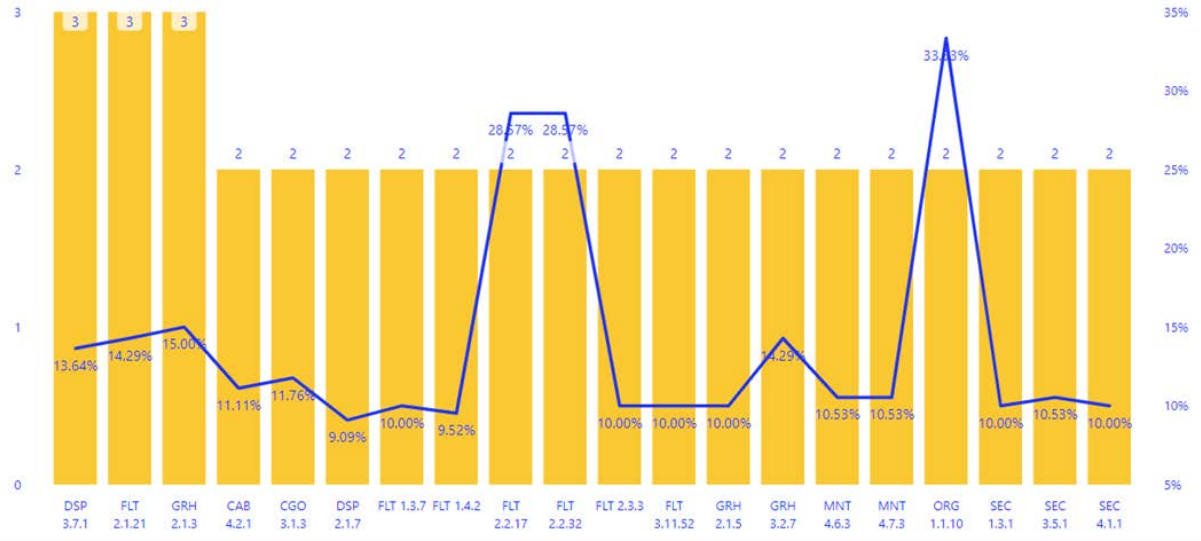
The transition to a risk-based approach is planned to take 3 years with the first risk-based pilots audits occurred in 2022. During the transition period both, traditional and risk-based audits will co-exist in the IOSA program. Following a period of transition, Risk Based IOSA will be the only IOSA audit program from 2025 onwards.

IOSA Audit Results

During 2022, a total of 282 audits were performed under the IOSA Program of which 54 were remote audits.

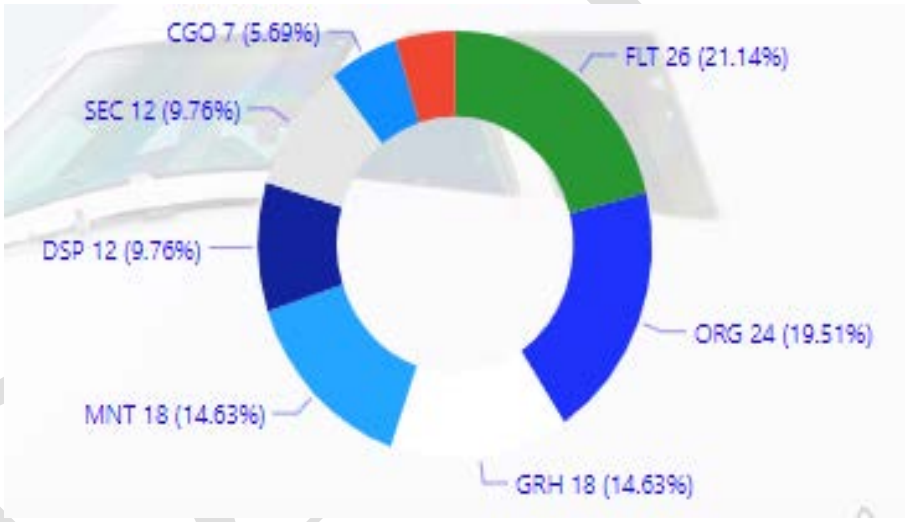
Graph 32: Global Number of Audits

Graph 33: Number of Audits conducted in MENA



Graph 34: IOSA Top Findings MENA Region 2022

Findings were mainly in the areas of Dispatch (DSP), Flight Operations (FLT) ; Ground Handling Operations (GRH) and Organization Management (ORG).



Graph 35: Findings per Discipline MENA 2022

3.6.3.2 IATA Safety Audit for Ground Operations (ISAGO)

The IATA Safety Audit for Ground Operations (ISAGO) is an industry global standard for the oversight and audit of ground service providers (GSPs). The primary objective to improve the safety of ground operations through implementation of standardized operational procedures and management system requirements by GSPs hence increasing the adoption of the harmonized industry best practices (BPs) amongst the ground handling stakeholders. ISAGO contributes towards better GSPs' performance and towards risk reduction in ground operations.

The ISAGO audits are performed by qualified and experienced auditors; members of the Charter of Professional Auditors (CoPA) whose selection, qualification and performance are managed and overseen by IATA.

Safety Audit for Ground Operations (ISAGO) has been advancing aviation safety for the last 15 years. ISAGO is an industry program for the global oversight of ground handling service providers (GHSPs). It is based on the IATA's Ground Operations Manual (IGOM) standards. Since its launch in May 2008, over 3,000 audits have been conducted worldwide, making it the industry global standard for ground handling service providers (GHSPs).

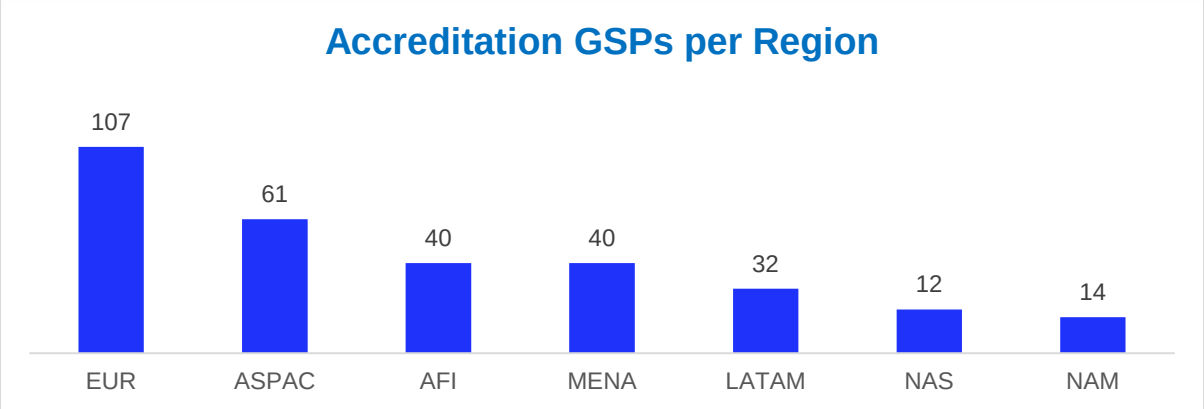
The ISAGO Registry now includes 195 GHSPs that provide services at 324 accredited stations in 206 airports around the world. Over 100 ISAGO airline members have instant access to the ISAGO Registry, where they can access nearly 500 different ISAGO audit reports and drive more efficient oversight of outsourced ground handling services including risk, cost and audit reduction

ISAGO is constantly evolving to reduce duplicate audits and drive greater standardization of ground handling processes worldwide.in addition to drive further simplification of audit processes and to ensure GHSPs' readiness for the ISAGO audit, IATA launched the free Operational Portal to help GHSPs and airlines to perform a gap analysis between their ground operational procedures and IGOM. The tool helps to identify operational variations with the intention to reduce them and standardize procedures according to IGOM.

Audit Result Analysis per region

34 audits conducted in MENA during 2022 with average of 6.88 findings per audit. The Top 5 findings based on analysis of all findings of 2022 audits:

GOSARP Code	Finding (#)	GOSARP Subject
ORM 1.1.3	35	SMS – integrated and implemented throughout organization to manage safety risks
ORM 3.1.1	15	Management and control of internal and external documentation
ORM 2.1.1	14	GSE Maintenance
ORM 4.1.2	23	Training program to ensure personnel complete initial training before being assigned to operational duties
ORM 4.3.1	19	Training program – recurrent training ORM



Graph 36: Accreditation GSP per region

In the MID region there are 40 GSEs are ISAGO-Registered operating at 38 stations in 19 Airports.

3.7 Region Safety Performance - Safety Indicators-Proactive

3.7.1 Goal 2: Strengthen States' Safety Oversight Capabilities

Safety Indicator	Safety Target	MID	Remark
A. Regional average EI	a. Increase the Regional average EI to be above 80 by 2025	**74,07%**	
B. Number of MID States with an overall EI over 60%.	b. All MID audited States to be above 60% EI by 2025	10 States	
C. Regional average EI by area	c. Regional average EI for each area to be above 70% by 2025	5 areas	
D. Regional average EI by CE	d. Regional average EI for each CE to be above 70% by 2025	5 CEs	
E. Regional average EI of PPQs	e. Regional average EI PPQs above 75% by 2025	66%	

Table 9: Goal 2

3.7.2 Goal 3: Implementation of Effective SSP

Safety Indicator	Safety Target	MID	Remark
Regional Average SSP Foundation	85% by 2025	76.18%	
Number of States having an SSP that is present*	At least 4 States	TBD	
Number of States that have developed and published a national aviation safety plan (NASP)	All States by 2025	4	
Number of States that require applicable service providers under their authority to implement an SMS	All States	TBD	

Table 10: Goal 3

3.7.3 Goal 4: Increase Collaboration at the Regional Level

Safety Indicator	Safety Target	MID	Remark
Percentage of safety enhancement initiatives (SEIs) completed	80% by 2025	**TBD**	
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%	7 States	
Number of States seeking assistance to facilitate SSP & NASP implementation through NCLB MID Strategy/Technical assistance	All States	3 States	

Number of States sharing safety information including operational safety risks and emerging issues to support the development of MID ASR	All States	10	

Table 11: Goal 4

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

Safety Indicator	Safety Target	MID	Remark
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.	6 states (40%)	
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 by 2025	6 States (40%)	
MID RASP developed in consultation with industry	MID-RASP 2023-2025 Edition	Completed	Target achieved
Number of States that have established Safety data collection and processing system (SDCPS)	At least 12 States by 2025	TBD	

Table12: Goal 5

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

Safety Indicator	Safety Target	MID	Remark
Percentage of Certified International Aerodromes*	65% by 2025	58,62%	
Percentage of established Runway Safety Team (RST) at MID International Aerodromes.	80% by 2025	**68,97%**	
Percentage of Global reporting Format (GRF) Plans implemented for International Aerodromes*	75% by 2025	To be provided soon	

Table13: Goal 6

4 Safety Priorities for MID Region

One of the GASP goals is for States to improve their effective safety oversight capabilities and to progress in the implementation of SSPs. 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. In addition to addressing organizational/systemic safety issues, GASP addresses high-risk categories 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. Therefore, the Regional operational Safety risks, organizational issues, and the emerging safety risks will be defined and which would support and improve the development of the Safety Enhancement Initiatives (SEIs).

4.1 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 reactive and proactive safety information provided by ICAO, IATA, MID Region States and the safety risk portfolio were considered for identifying the Regional operational risks . Table14 shows that each identified safety issue is mapped to its respective potential accident outcome (s), and the safety risk Portfolio for the MID Region as follow:

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				

Potential Accident Outcome							
Safety Issues	**CFIT**	**LOC-I**	**MAC**	**GCOL**	**RE/ARC**	**Injury Damage inflight**	**Injury Damage on Ground**
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
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	

Table 14: Safety Risk Portfolio

First, Considering ICAO reactive safety information, the Regional operational safety risks identified were the Loss of Control-in Flight (LOC-I) and runway safety (RE/ARC). It is also to be noted that for the Abrupt Manoeuver (AMAN) occurrence category, the flightcrew received TCAS RA and applied high rate of climb according to the TCAS display to prevent Mid air collision with military aircraft which caused injuries to some persons on board. Therefore, the MAC occurrence category was also considered as a HRC. Considering also the reactive and proactive safety information, safety issues identified which could lead to the potential accident outcomes of Controlled Flight Into Terrain (CFIT), Mid Air Collision (MAC), and runway incursion (RI) as detailed in the above safety risk portfolio. Therefore, the CFIT, MAC, RI were also considered as Regional operational safety risks due to the potential risk of these type of accidents though the MID States did not experience those accidents during the period 2018-2022.

Based on the analyses of reactive and proactive safety information, it is concluded that the Regional operational safety risks for the MID Region are:

1. Loss of Control-In Flight (LOC-I);
2. Runway Safety (RS); mainly (RE and ARC during landing);
3. Mid-Air Collision (MAC);

3. Controlled Flight into Terrain (CFIT); and
5. Runway incursion (RI).

In addition to this, main safety issues have been identified and mapped to their respective potential outcomes as detailed in the table 14.

1. Loss of control inflight (LOC-I)

Loss of control usually occurs because the aircraft enters a flight regime that 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. During 2018-2022 aircraft upset, or loss of control contributed to one fatal accident.

2. Runway Excursions (RE):

RE is a veer or overrun off the runway surface. RE events can happen during take-off or landing. During the period 2018-2022, Runway Excursions and abnormal runway contact accidents and serious incidents mainly occurred in the landing phase of flight. In addition, High Airspeed and Low Engine Thrust identified as key contributing factors to the Unstable Approaches Events.

3. 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. During 2020, no mid-air collision accident has been recorded. However, the flightcrew received TCAS RA and applied high rate of climb according to the TCAS display to prevent Mid air collision with military aircraft which caused injuries to some persons on board. In addition, 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 the main priority in this key risk area. However, additional safety data and safety information are needed for further analysis to identify the underlying safety issues.

4. 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 safety data and safety information are needed for further analysis to identify the underlying safety issues.

5. 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 safety data and safety information regarding runway incursion to identify the root causes and associated safety issues.

4.2 Organizational Issues

Organizational issues 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 authority (CAA) 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.

4.2.1 Enhance States' Safety Oversight Capabilities

USOAP-CMA audits had identified that State's inability to effectively oversee aviation operations 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 approx. 74,07 %, which is above the world average 68.81% % (as of 20 July 2023). Three (3) States are currently below EI 60%.

All eight areas have an EI above 60%. However, the areas of AIG and ANS still need more improvement. With respect to the Critical Elements (CEs), CE4 (Qualified technical personnel) is below 60% (58.8%) EI, whereas CE8 (resolution of safety issues) is also below EI 60% (54. 32%) EI. 4 areas and 4 critical elements are above the target of 75% EI.
Moreover, the effective implementation in certification, surveillance, and resolution of Safety concerns need to be improved.

4.2.2 Improve Safety Management

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 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 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. Moreover, the RASG-MID also supported the establishment and activation of the MENA RSOO, with a primary objective to assist member States to develop and implement SSP; and Several Safety Management Workshops, training courses, and meetings have been organized to support the implementation of SSP/SMS and address the challenges and difficulties, as well as sharing of experiences and best practices.

In addition, the development of National Aviation Safety plan (NASP) is one of the MID region priorties and 7 States had developed their NASPs.

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.
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).

Recognizing the challenges facing the States in the development of their NASPs. In this respect, the ICAO MID Office conducted NASP workshops and assistance Missions dedicated to NASP in order to support States with NASP development.

4.2.3 Human Factors and Human Performance

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 as most important human factors issue in the domain of commercial air transport and safety actions would be identified and developed.

4.2.4 Competence of Personnel

Availability of well-trained and competent aviation personnel is paramount to the safety and resilience of the aviation industry. Some of States in MID Region has a mature and detailed regulatory framework in place to ensure proper training, licensing, adequacy of training devices and oversight. Nevertheless, several factors are challenging this mature framework: new technologies and increasing automation are changing the safety needs for aviation personnel and new training devices are emerging. New aircraft types and technological advancements in virtual reality/artificial intelligence are revolutionising pilot training altogether

4.2.5 Manage Risk Interdependencies

The COVID-19 crisis demonstrated that safety, security, health safety and other risks can no longer be managed in isolation. The aviation community has realised that continuing to develop tools and specific guidance for each situation and for each domain affected by transversal risks may delay not only the implementation of mitigation measures, but also the development of an enabling framework to support integrated, collaborative risk management.

4.2.5.1 Cybersecurity Risks

The global civil aviation ecosystem is accelerating towards more digitalisation. 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 standardised 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/organisations with malicious intent.

4.2.5.2 Security risks with an impact on aviation safety

The implementation of aviation security measures can have a direct impact on safety aspects of aerodrome or aircraft operations. Airport security, aircraft security or in-flight security are the areas where the interdependencies are highly visible and where any security requirements should also consider potential impacts on aviation safety. States should onsider where interdependencies between civil aviation safety and security exist.

Therefore, an integrated approach to the management of safety and security risks across the spectrum of aviation activities would bring benefits such as a complete overview of risks, a better sharing of security information and the closure of gaps in the security system while focusing on increasing the overall level of safety. Consequently, this would allow ensuring synergies where security measures can have an impact on safety and vice versa; thereby avoiding incompatible actions and strengthening the overall safety and security of civil aviation.

4.2.5.3 Risks arising from conflict zones

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. Similar events had occurred in the MID Region on Jan 2020 involving the Ukraine International Airlines flight PS752. The tragic accident with the downing of Ukraine International Airlines Flight 752 highlighted once more the importance of information sharing and risk assessments.

4.2.5.4 aviation health safety (AHS) risks

The COVID-19 pandemic has shown that the harmonisation of health policies affecting aviation, and in particular in the CAT domain, has become an important topic to help overcome the pandemic. The objective is to minimise the impact of health safety threats in CAT. Health safety threats should be included in the management of risk interdependencies.
COVID-19 is unlikely to be the last pandemic we will be faced with. It is crucial to continue supporting the European aviation industry competitiveness by offering the safest aircraft interior environment to reduce the risk of disease transmission between continents and States, restore public trust and facilitate future responses to events of similar nature.

4.2.5.5 GNSS Interfrence Risks

Satellite navigation signals are weak and can easily be compromised by a range of growing threats, including intentional or unintentional signal interference, jamming, spoofing, and/or the manipulation of position and timing information. The effects of such threats vary greatly. Satellite signal jamming can have a serious effect on the accuracy of navigation systems and, in some cases, results in unusual system behavior.

In a continuous monitoring the regional safety risk of GNSS/GPS Interference, an updated analysis is presented to provide figure from January until December 2022 of GNSS/GPS Interference in MENA and adjacent countries. The analysis utilized two datasets: Incident Data Exchange (IDX), and Flight Data Exchange (FDX),The analysis covers the time period of January 2022 to December 2022.
The analysis revealed 524 GNSS/GPS jamming or suspected interference reports from 12 operators in the MENA region and adjacent states gathered through the Incident Data Exchange (IDX) from January 2022 to December 2022.

The analysis utilized data from the Flight Data Exchange (FDX) showed a total of 162,654 'GPS signal loss' events from 54 operators in the MENA region and adjacent states from January 2022 to December 2022. This is 68.5 % of all GPS Signal Loss Events in FDX database in 2022. The Total Event Count around the world was 237,489.

4.2.5.6 5G interference with Radio Altimeter

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.

4.3 Emerging Issues

Emerging issues are risks that might impact Safety in the future, these may include a possible new technology, a potential public policy, a new concept, 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, it is important that the international aviation community remain vigilant to identify emerging safety issues and develop mitigations to address them. Failure to address emerging safety issues can affect a State, Region or industry's ability to mitigate the safety risks.

4.3.1 UAS and manned VTOL-capable aircraft

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.

The safe integration on the basis of granting fair access to airspace of all new entrants into the airspace network will be one of the main challenges in relation to the integration of UAS technologies and related concepts of operation.

Enabling the safe integration of UAS (also commonly called ‘drones’), being a fast evolving and emerging market segment, as well as of (initially manned) VTOL-capable aircraft, also intended for urban air mobility (UAM) operations, continue to be priority activities.

Vertiports: VTOL-capable aircraft will use aerodromes, heliports and the so-called vertiports. ‘Vertiport’ means an area of land, water or structure used or intended to be used for the landing and take-off of VTOL-capable aircraft. Vertiports are classified as aerodromes for the purpose of aerodrome and vertiport regulations.

4.3.2 Artificial intelligence (AI) in Aviation

The next generation of automation in aviation systems is enabled and accelerated by the use of AI technologies. Whilst the trend towards increasing automation has resulted overall in improved safety, the introduction AI will likely be modifying the paradigm of interaction between the Human and the AI-based systems (reduced crew operations), and in parallel even open the path towards more autonomous types of operations urban air mobility (UAM).

4.3.3 Digitalisation in the aviation field

Aviation is moving fast to digitalise all areas, as there are demonstrated tangible benefits in safety, economics, operations, traffic management and control, manufacturing, training and maintenance.

Automation, remote control, machine-to-machine communication, robotics: 3D printing, virtual and augmented reality, blockchain, AI/cognitive computing, and sensors are among the technologies that will increasingly be used in aviation and that will impact the activity of regulators and aviation authorities.

In order to exploit the full digitalisation potential, the aviation sector needs to progress in the 'information management' dimension. Today, the fragmentation of data in terms of both taxonomy and storage does not allow a significant progress for the analysis according to the latest methodologies. These developments are increasingly challenging traditional aviation regulations and calling for an evolution towards more performance based, technology-neutral requirements, which will enable the novel business models that emerge from the digital transformation, increasing at the same time safety and efficiency.

5. MID-RASP SEIs Implementation Status

The Middle East Regional Aviation Safety Plan (MID-RASP) 2020-2022 Edition considers and supports the objectives and priorities of GASP 2020-2022 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 2020-2022 Edition.

The Eighth meeting of the Regional Aviation Safety Group – Middle East (RASG-MID/8) was held in Cairo, Egypt, Virtual Meeting; endorsed the MID-RASP 2020-2022 Edition including the SEIs list and their respective actions through RASG-MID Conclusion 8/3. In addition, the RASG-MID/10 noted with appreciation the updated SEIs and their respective safety actions as well as the status of their implementation is at **Appendix B.** 34 Safety actions out of 53 have been implemented and completed.

6. Final Conclusions

One of the GASP goals is for States to improve their effective safety oversight capabilities and to progress in the implementation of SSPs. In addition to addressing organizational issues, GASP addresses Global high-risk categories (G-HRCs) 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.

Following the analysis of the reactive and proactive safety information provided by ICAO, IATA, and MID States for the period 2018 - 2022, it was concluded that the safety priorities defined for the MID Region are:

A. Regional operational Safety risks

1. Loss of Control-Inflight (LOC-I);
2. RE and ARC during landing;
3. Mid-Air Collision (MAC)
4. Controlled Flight Into Terrain- (CFIT); and
5. Runway incursion (RI).

B. Organizational issues:

1. Strengthen States' Safety Oversight capabilities;
2. Improve Safety Management;
3. Human factors and human performance;
4. Competence of personnel; and
5. Manage 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.

C. Emerging Issues

1. UAS and manned VTOL-capable aircraft;
2. Artificial intelligence (AI) in Aviation; and
3. Digitalisation in the aviation field.

Appendix A: CICTT Occurrence Categories

Code	Description
ADRM	Aerodrome
AMAN	Abrupt Maneuver
ARC	Abnormal runway contact
BIRD	Bird
CABIN	Cabin safety events
CFIT	Controlled flight into/towards terrain
CTOL	Collision with obstacles during take-off and landing
EVAC	Evacuation
F-NI	Fire/smoke (non-impact)
F-POST	Fire/smoke (post-impact)
GCOL	Ground collision
ICE	Icing
LOC-I	Loss of control in-flight
LOC-G	Loss of control-ground
OTHR	Other
RAMP	Ground handling
RE	Runway excursion
SCF-NP	System/component failure (non-power plant)
SCF-PP	System/component failure (power plant)
TURB	Turbulence encounter
UNK	Unknown or undetermined
USOS	Undershoot/overshoot
WILD	Wildlife
WSTRW	Wind shear or thunderstorm

Appendix B: Safety Actions- Consolidated List of SEIs with their respective Actions

SEI Code	SEI Name	Actions	Owner(s)	Status/Progress	Completion Date
Organizational Challenges and Emerging Risks					
Goal 2: Strengthen States' Safety Oversight Capabilities					
G2-SEI-01:	Strengthening of States' Safety Oversight Capabilities	**A1**- Conduct Capacity Building Activities (Workshops, Training, Webinars, GSI Courses) to promote effective implementation of SARPs, with a focus on the following technical areas: ANS, AGA, AIG and OPS.	ICAO	Workshops/Webinars conducted. *(Completed)*	2022 **Completed** **Included in the Second MID-RASP Edition**
		A2- Conduct technical assistance and NCLB missions to States.	ICAO	Technical assistance missions conducted. *(Completed)*	2022 **Completed** **Included in the Second MID-RASP Edition**
		A3- Develop and implement a specific NCLB plan of actions.	ICAO and concerned States	Postponed for 2023	2022 **Included in the Second MID-RASP Edition**

G2-SEI-02:	Improve Regional Cooperation for the Provision of Accident & Incident Investigation	**A1**- Development and signature of the MOU among MENA ARCM States	ICAO, ACAO, and MENA ARCM Member States	The MENA ARCM MoU has been signed by Fourteen (14) States namely Djibouti, Iraq, Iran, Jordan, Kuwait, Libya, Mauritania, Morocco, Palestine, Oman, Saudi Arabia, Sudan, United Arab Emirates, and Yemen. The kick-off of the MENA ARCM operations has been officially announced during the Future Aviation Forum held in Riyadh, Saudi Arabia (9-11 May 2022). Second MENA ARCM Conducted in Jeddah. *(Completed)*	2022 **Completed**
		A2- Conduct AIG Capacity Building Activities	Joint event KSA AIB/ICAO	Aircraft Accident and Incident investigation Workshop held Jeddah in September 2022 during AIIG/2. *(Completed)*	2022 **Completed** **Included in the Second MID-RASP Edition**
G2-SEI-03:	Sharing of Safety Recommendations related to Accidents and Serious Incidents	**A1**- Development of questionnaire to be circulated to MENA States on sharing safety recommendations on dedicated platform.	ICAO, ACAO, and States (KSA & UAE)	The questionnaire endorsed by the RASG-MID/9. SL has been circulated to the MENA ARCM member States. Analysis presented to MENA ARCM Committee/2 Meeting. *(Completed)*	2022 **Completed** **Included in the Second MID-RASP Edition**

G2-SEI-04:	Enhance State Oversight on Dangerous Goods	**A1-** Dangerous Goods (DG) Workshop for States 'inspectors.	ICAO and ACAO. Supported by FAA	1. Joint ACAO/ICAO Dangerous Good Webinar has been held on 8 November 2021. 2. Joint event ACAO/ICAO Dangerous Goods Workshop back to back with Ground handling Workshop planned to be held in Rabat. 3. ACAO/GCAA Webinar on Regulating The Transport of Dangerous Goods by Air in United Arab Emirates has been conducted the 23 June 2022. *(Completed)*	2022 **Completed** **Included in the Second MID-RASP Edition** Joint Event ACAO/ICAO DG Workshop in Casablanca 12-15 December 2022
		A2- Develop guidance material/share best practices to support States' inspectors for the conduct of the oversight for DG.	States (Bahrain and Oman)	Draft to be presented to SEIG/4 for review. *(Completed)*	**Completed**
		A3- Develop guidance material and providing Webinar high energy devices.	IATA	IATA will provide the tentative dates on Jan 2022 or Q1 2022.	2022 **Included in the Second MID-RASP Edition**
		A4: Organize DG Capacity Building Training	ICAO	Postponed for 2023	2022 **Included in the Second MID-RASP Edition**

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	IATA will provide the tentative dates on January 2022 or Q1 2022.	**Included in the Second MID-RASP Edition**
		A2- Organize Crew Resource Management Training Workshop/webinar to share experience and best practices on CRM practical implementation.	ICAO, ACAO, and IATA	Crew Resource Management (CRM) Webinar planned held 20 June 2022. Joint ACAO/ICAO/IATA. (Completed)	2022 **Completed** **Included in the Second MID-RASP Edition**
		A3- Conduct Workshop/Webinar on Fatigue Risk Management and Mental Health Best Practices.	IATA, ACAO, and CANSO	1. Webinar organized on 9 June 2022 jointly between ACAO/IATA/CANSO. 2. An online Workshop conducted on FRMS jointly by ACAO and CAAS/SAA from 20 to 24 September 2021. (Completed)	2022 **Completed** **Included in the Second MID-RASP Edition**
		A4- Organize Team Resource Management Training Workshop/Webinar to share experience and best practices on TRM practical implementation.	ICAO, ACAO, IATA, CANSO, FAA, and States (TBD	Postponed for 2023	2022 **Included in the Second MID-RASP Edition**

G2-SEI-06:	Impact of security on safety	**A1-** Circulate ICAO Doc 10084 Risk Assessment Manual for Civil Aircraft Operations Over or Near Conflict Zones.	ICAO	SL issued by ICAO July 2021. *(Completed)*	2021 **Completed**
		A2- 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.	ICAO and ACAO. Supported by IATA, CANSO, States (TBD)	To be included with the Civil-Military Cooperation Workshop. Postponed for 2023	2022 **Included in the Second MID-RASP Edition**
		A3- Encourage States to issue NOTAMs to share threats information emanated from conflict zones within their airspaces.	ICAO	*(Completed)*	2021 **Completed**
		A4- AIM forum NOTAM standardized template.	ICAO and IATA	Presented to AIM SG9 meeting in September. *(Completed)*	2022 **Completed**
Goal 3: Ensure the Appropriate Infrastructure is available to Support Safe Operations					
.G3-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 Workshops/Training.	ICAO and ACI. Supported by ACAO	1. Training course conducted on implementing Annex 14, during period of 8-12 November 2020. 2. Online Workshop on airport certification conducted by ACAO during the period 25-28 October 2021. *(completed)*	2022 **Completed** **Included in the second MID-RASP Edition**
		A2- Enhance capacity building for States CAAs and Airport operators related to Aerodromes Certification through Workshops/Training	ICAO and ACI	Conducted Training on Aerodrome Certification 15-19 Nov 2021. *(completed)*	2022 **Completed** **Included in the second MID-RASP Edition**

		A3- Develop guidance material/ share best practices on Apron Management	States (UAE and Egypt)	Endorsed by the RASG-MID/9 and published on the ICAO Web Site. *(completed)*	2022 **Completed**
		A4 - Deployment of iPack on Aerodrome Re-Start	ICAO	iPack for Aerodrome Restart deployed for Syria. *(completed)*	2022 **Completed**
G3-SEI-02:	Establish Runway Safety Team (RST) at International Aerodromes	**A1-** Conduct of assistance missions by the Runway Safety Go-Team (RST)	ICAO. Supported RSP (Runway Safety Programme Partners)	Postponed for 2023	2022 **Included in the second MID-RASP Edition**
		A2: Support States to implement the Global Reporting Format Methodology through Workshops/trainings**: (Action addressed under G1-SEI-02: Runway Excursion).**	ICAO and ACI.	1. Webinar has been conducted on 27 Oct 20 2. ACI webinar on Implementing GRF at airports with non-winter conditions; dated 27 May 2021 3. Five customized training on GRF implementation conducted. *(completed)*	2022 **Completed** **Included in the Second MID-RASP Edition**
Goal 4: Expand the Use of Industry Programmes					
G4-SEI-01:	Promote the Use of industry Programmes	**A1-** Encourage IATA's IOSA and ISAGO registrations through safety promotion	IATA	6 States signed the MoU 2 potential States to be added to the list 2022. *(completed)*	2022 **Completed** **Included in the Second MID-RASP Edition**
		A2- Encourage the implementation of ACI Airport Excellence (APEX) in Safety Programme	ICAO and ACI	Postponed for 2023	2022 **Included in the Second MID-RASP Edition**

Goal 5: Implementation of Effective SSPs and SMSs

G5-SEI-01:	Implement an effective Safety Management	**A1**- Conduct ICAO SSP Training Course in Cairo	ICAO	SSP course planned for 18-23 September 2022. Postponed for 5-10 February 2023	2022 **Included in the Second MID-RASP Edition**
		A2- Conduct SSP Workshop in coordination with ACAO in Casablanca, Morocco	ICAO and ACAO	1. ACAO/ICAO SSP Implementation Workshop planned 23-27 May 2022. *2.* An Event Risk Assessment webinar was delivered on 7 June 2021organised by ICAO MID Office. *(completed)*	2022 **Completed** **Included in the Second MID-RASP Edition**
		A3- Provide SSP/SMS Workshops for MID States personnel	ICAO and ACAO	1. SSP Workshop conducted in Kuwait in March 20. *2.* SMS implementation training online course jointly with Singapore CAAS 7-11 Feb 2022. *(completed)*	2022 **Completed** **Included in the Second MID-RASP Edition**

		A4- Develop guidance material/share best practices on occurrence reporting for the CAA personnel on establishing an effective operation of the mandatory and voluntary reporting systems	States (UAE)	WP and GM will be presented by UAE during this meeting. *(completed)*	2022 **Completed**
		A5- Support and guide States in the development of NASPs through Workshops and sharing of best practices	ICAO	1. ICAO organized series of RASP webinars: - MID-RASP Webinar conducted by ICAO on 25 May 2021. 2. ICAO organized series of Webinars related to GASP/NASP: - 16 March 2021: ICAO's Global Safety Strategy: the Global Aviation Safety Plan. - 30 March 2021: Introduction to the National Aviation Safety Plan. - 13 April 2021: Using the Roadmap to Develop a National Aviation Safety Plan. 3. SSP workshop conducted in Morocco including NASP 4. Regional NASP Workshop Cairo	2022 **Completed** **Included in the Second MID-RASP Edition**
		A6- Development of guidance/share best practices for the processes and procedures for oversight of SMS	States (UAE)	WP and GM will be presented by UAE during this meeting. (completed)	2022 **Completed**
		A7- Deployment of the Aviation Safety Risk Management iPack	ICAO	Completion of ASRM iPACK related to COVID-19 project with PACA Oman and conducted the closing meeting on 4 May 2021. *(Completed)*	2020 **Completed**

		A8- Conduct assistance missions by SMIT to support States with SSP implementation	SMIT.	SMIT Handbook endorsed by RASG-MID/9. *(Completed)*	2022 **Completed** **Included in the Second MID-RASP Edition**

Goal 6: Increase Collaboration at the Regional Level to Enhance Safety					
	To be developed in the future				
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	IATA will provide the tentative dates on Jan 2022 or Q1 2022	2022 **Included in the Second MID-RASP Edition**
		A2- Advisory Circular: Mode Awareness and Energy State Management Aspects of Flight Deck Automation	IATA and Aircraft manufacturers.	IATA will provide the tentative dates on January 2022 or Q1 2022	2022 **Included in the Second MID-RASP Edition**
		A3- Conduct Upset Recovery Workshop/webinar	ICAO, KSA, and FAA	ICAO, KSA, and FAA UPRT conducted in February 2020.	2022. **Included in the Second MID-RASP Edition**
		A4- Develop guidance material/share best practices on Ground Handling Service Provider Certification Process	IATA and KSA	Reviewed by ASPIG meeting and be presented to RASG-MID/10 for endorsement by RASG-MID/10. (completed)	2022. **Completed**
		A5- Conduct a Ground Handling Workshop	ACAO and ICAO. Supported by FAA	Ground handling Workshop back to back with Dangerous Goods Workshop planned to be held in Joint event ACAO/ICAO	2022 **Completed** To be conducted 12-15 December 2022 in Rabat
G1-SEI-02:	Runway Safety- Runway Excursion	**A1-** Support States to implement the Global Reporting Format (GRF) Methodology through Webinar/ Workshops/Training	ICAO and ACI. s	**05** virtual GRF Training classrooms conducted for the MID Region States/Airport Operators.	2022 **Completed**

					Included in the Second MID-RASP Edition
		A2- Guidance material on un-Stabilized Approach	IATA.	GM on UA shared by IATA. Circulated to States. *(Completed)*	2022 **Completed**
		A3- MID Region Action Plan/Milestones on the Global Reporting Format (GRF) Implementation.	ICAO	Completed and submitted for the States.	2022 **Completed** **Included in the Second MID-RASP Edition**
G1-SEI-03:	Runway Safety- Runway Incursion	**A1-** Support States to implement aerodrome inspection through Workshops/Trainings/Webinars.	ICAO. Supported by FAA and UAE	Postponed for 2023	2022 **Included in the Second MID-RASP Edition**
G1-SEI-4:	Controlled Flight into Terrain (CFIT)	**A1-** Advisory Circular: Guidance for Operators to Ensure Effectiveness of GPWS Equipment.	IATA and Aircraft manufacturers	Draft to be presented to SEIG/4 for review. *(Completed)*	2022 **Completed**
		A2- Advisory Circular: Instrument Approach Procedures Using Continuous Descent Final Approach Techniques.	IATA and Aircraft manufacturers	IATA will provide the tentative dates on January 2022 or Q1 2022	2022 **Included in the Second MID-RASP Edition**
		A3- Circulate ICAO Guidance Doc 10000 on Flight Data Analysis Programme (FDAP) to support States providing oversight to air operators	ICAO	SL on ICAO Guidance Doc 10000 circulated by ICAO during July 2021. *(Completed)*	2022 **Completed**
		A4- Advisory Circular: Crew Resource	IATA, Aircraft	IATA will provide the tentative dates	2022

		Management Training Programme (CRM)	manufacturers	on Jan 2022 or Q1 2022	**Included in the Second MID-RASP Edition**
G1-SEI-05A1:	Loss of separation between civil and military aircraft"	**A1-** States and regional organizations to share occurrences and/or safety analysis/information related to Near Mid Air Collisions (NMACs) including to the "Loss of separation between civil and military aircraft" and ATM-SG to perform a technical analysis of the reported occurrences and and/or safety analysis/information and then come out with recommendations. The technical analysis of the reported occurrences and recommendations be shared with ASRG.	ICAO. Supported by IATA, CANSO, and States	NMACs analysis to be provided by IATA to the ATM-SG for technical review and then the ATM-SG to provide recommendations for the next course of actions. The subject was also presented to the ATM SG/7 to raise awareness and urge the States and ORGs to share occurrences or safety analysis/information related to NMACs to enable the ATM SG to perform the technical analysis.	2022 **Proposed to be deleted**
		A2: Guidance/raising awareness/ coordination related to the civil and military cooperation in particular over high seas.	ACAO and ICAO. Supported by States	Workshop planned to be 10 – 13 October 2022. Postponed for 2023	2022 **Included in the Second MID-RASP Edition**

G1-SEI-05A2:	Interference to GNSS Signals	**A1**: GNSS/GPS Interferences	ICAO and IATA	1. RSA developed and circulated in 2020 2. Safety Data analysis provided by IATA and included in the 11th MID ASR. *(Completed)*	2022 **Completed** **Included in the Second MID-RASP Edition**
G1-SEI-05B:	Ensure the Safe Operations of UAS (drones)	**A1**- Circulate ICAO developed guidance and advisory circulars: Regulatory framework for the operation of drones to support states' CAA personnel in the implementation and oversight of UAS operations	ICAO	SL issued on the subject by ICAO MID office July 2021. *(Completed)*	2021 **Completed**
		A2- Organize symposium on Drones related subjects	ICAO, ACAO. Supported FAA	An ACAO-DfT-TSA Joint Virtual Workshop on Drones has been conducted the 9 & 10 Nov 21 with the attendance of more than 100 participants from 14 Arab States, 5 Regional Organizations and industry stakeholders. The symposium is postponed for 2023	2022 **Included in the Second MID-RASP Edition**
		A3- States and Regional Organizations to share occurrences and/or safety analysis/information involving drones to ASRG to perform a technical analysis of the reported occurrences and come out with recommendations.	ICAO, IATA, ACI, CANSO, and States (TBD)	IATA to provide safety information and safety analysis if available.	2022 **Proposed to be deleted**

-END-

CREDITS

The RASG-MID thanks all those who contributed to the elaboration of this Annual Safety Report and provided necessary support and information to the members of the Annual Safety Report Group (ASRG). Special thanks go to:

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