ICAO

SAFETY

MID Region Annual Safety Report

Seventh Edition

April 2019

Reference Period (2013 - 2017)

Regional Aviation Safety Group – Middle East (RASG-MID)
Seventh Edition April, 2019
Reference Period (2013-2017)

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Contents

1. 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 three main teams; the Annual Safety Report Team (ASRT), the Regional Aviation Safety Team (RAST), and the Safety Support Team (SST). The Annual Safety Report Team (ASRT) is in charge of collecting and analysing safety information. The Team is also responsible for the identification of the safety focus areas 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.

2. Executive Summary

Over the last five years, the global scheduled commercial international operations accounted for approximately 36.3 million departures in 2017, compared to 31.3 million departures in 2013. The MID Region showed a stable growth in traffic volumes. Total scheduled commercial departures in 2017 accounted approximately for 1.37 million departures compared to 1.08 million departures in 2013. In terms of aircraft accident, the MID Region had an accident rate of 1.45 accidents per million departures in 2017, which decreased compared to 2.3 in 2016. The MID Region accident rate in 2017 is decreased compared to the global accident rate (2.4 accidents per million departures).

However, the 5-year average accident rate for 2013-2017 is 2.67, which is slightly above the global average rate (2.64) for the same period. The average rate of fatal accidents in the MID Region for the period (2013-2017) is 0.64 accident per million departures, compared to 0.44 for the globe. The MID Region had no fatal accidents in 2013, and 2017. However, three fatal accidents occurred in 2014, 2015 and 2016. The 2014 accident caused 38 fatalities, 224 fatalities were registered in 2015 and 1 fatality in 2016.

Based on the analyses of all accidents, serious incidents, and incidents data, it is concluded that the Focus Areas for the MID Region are:

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

New emerging risks have been identified, as follows:

1. Security risks with impact on safety-SEC;
2. Fire/Smoke-non impact- (F-NI);
3. Runway Incursion- (RI);
4. Birdstrike- (BIRD);
5. Wake Turbulence (Vortex); and
6. Wind shear.

The regional average overall Effective Implementation (EI) in the MID Region (13 out of 15 States have been audited) is 73.24 %, which is above the world average 66.27% (as of 10 October 2018). Three (3) States are currently below EI 60%.

The EI by Area (e.g. Operations, Airworthiness) shows that all areas are above 60% EI, which reflect the improvement in the oversight capabilities particularly in the area of ANS and AGA. With respect to the Critical Elements (CEs), CE4 (Qualified technical personnel) still represents the lowest with 56.89% EI, whereas CE8 (resolution of safety issues) is also below EI 60% (56. 84).

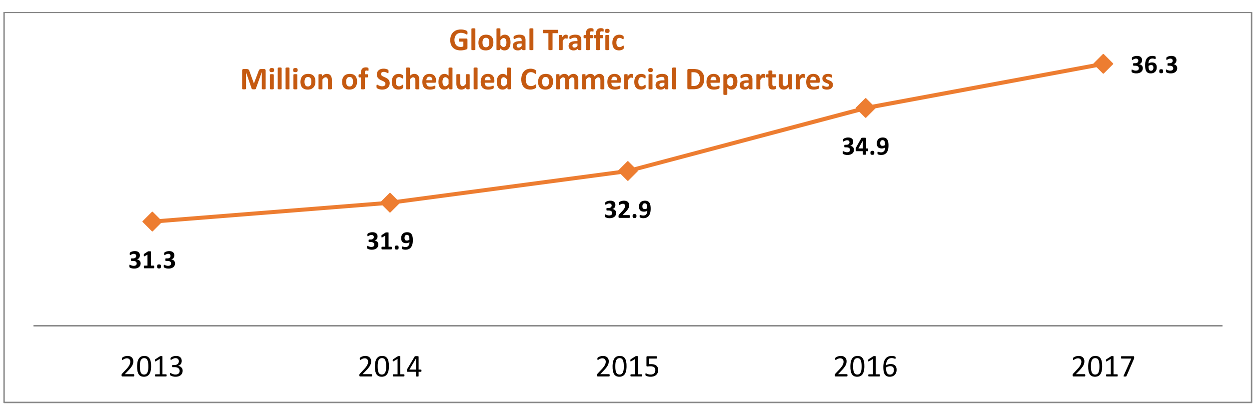
Implementation of SSP is one of the main challenges faced by States in the MID Region. The RASG-MID addresses the improvement of SSP implementation in the MID Region as one of the top Safety Enhancement Initiatives (SEIs). Currently, States in the MID Region could not reach to full implementation of the SSP framework. Common challenges/difficulties have been identified based on the States feedback and recommendations for the way forward were provided in this regard.

Several activities took place to support the implementation of SSP/SMS, including the new ICAO Safety Management Training Programme (SMTP), Workshops, Safety Summits and meetings in order to address the challenges and difficulties, as well as sharing of experiences and best practices.

3. Traffic Volumes

Global Traffic

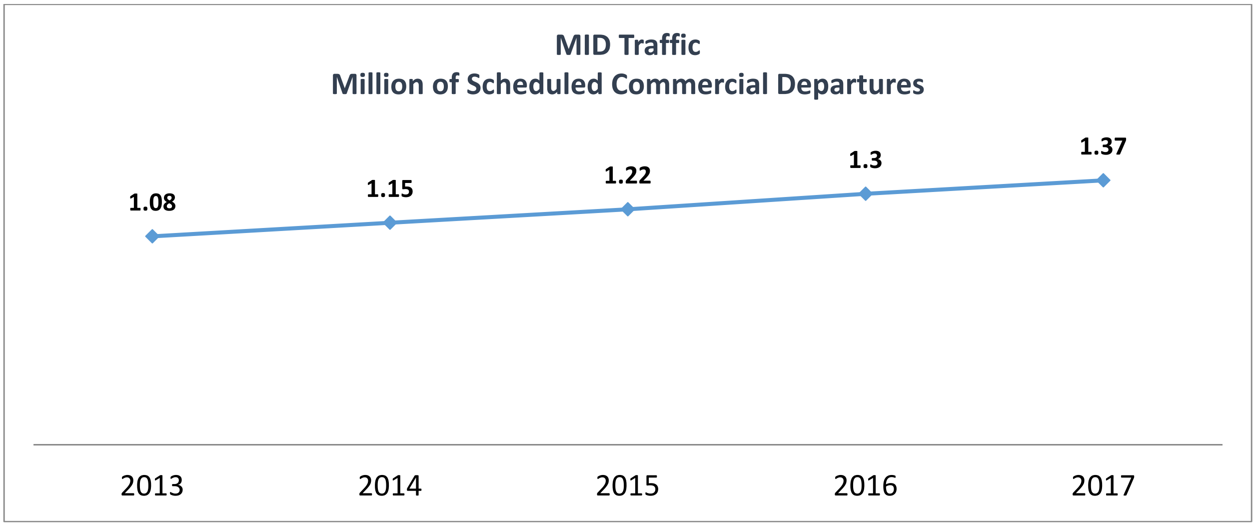
The global scheduled commercial international operations accounted for approximately 36.3 million departures in 2017, compared to 31.3 million departures in 2013.



Graph 1: Global Traffic Volume (Source iSTARSs of 8 Oct 218)

MID Traffic

The MID Region shows a stable growth in traffic volumes. Total scheduled commercial departures in 2017 accounted approximately for 1.37 million departures compared to 1.08 million departures in 2013.



Graph 2: MID Traffic Growth (Source iSTARSs of 8 Oct 218)

4. Reactive Safety Information

4.1 Safety Risk Assessment Methodology

In order to facilitate the identification and prioritization of the main Regional Risk Category Focus Areas (FAs), accidents and serious incidents are categorized in terms of frequency and severity. The severity assessment is based on the fatalities, injuries and damage to aircraft, property and equipment. (For Frequency rating: 1 is the most frequent and 6 is the least frequent. For Severity: 1 is the most severe and 4 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 focus areas (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

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

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

Nb	Identfication 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 surafce 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

4.2 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 (ADREP et al and API Data service.) applications contain an aggregation of different accident and incident data sources including ADREP, Aviation Safety Network and Aviation Herald to provide official ICAO accident statistics used for the development of the ICAO Safety Reports.

Note: *The accident and serious incidents 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).*

The main part of this Section provides analysis of the accidents that occurred in the MID Region (State of Occurrence) for the period (2013-2017), which is used for monitoring the progress of achieving the Safety Targets in the MID Region Safety Strategy.

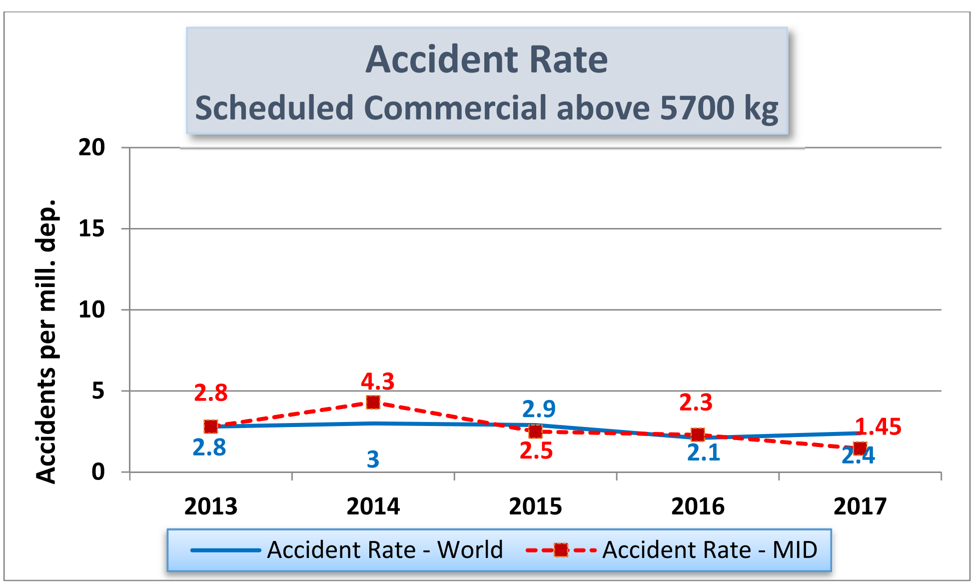
In addition, it provides data analysis regarding accidents and serious incidents of aircraft registered in the MID Region (State of Registry) as well as for the MID air operators (State of the Operator) using the same criteria mentioned above. It is to be highlighted that the State of registry and State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

4.2.1 MID State of Occurrence

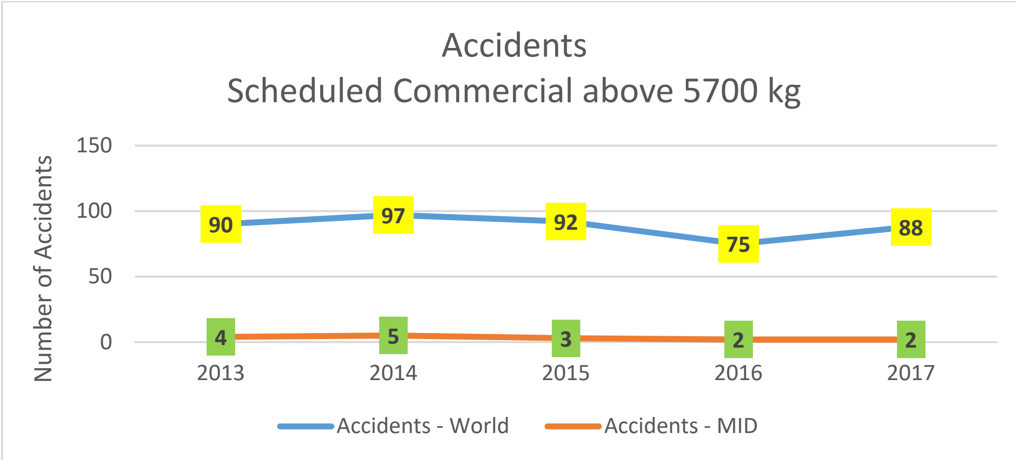
Accidents Rates and Fatalities

The Graph 3 shows that the MID Region had an accident rate of 1.45 accidents per million departures in 2017, which decreased compared to the previous year (2016). However, the 5-year average accident rate for 2013-2017 is 2.67, which is slightly above the global average rate (2.64) for the same period.

The Graph 4 shows that 16 accidents occurred in the MID Region during the period (2013-2017), whereas (442) accidents occurred globally.

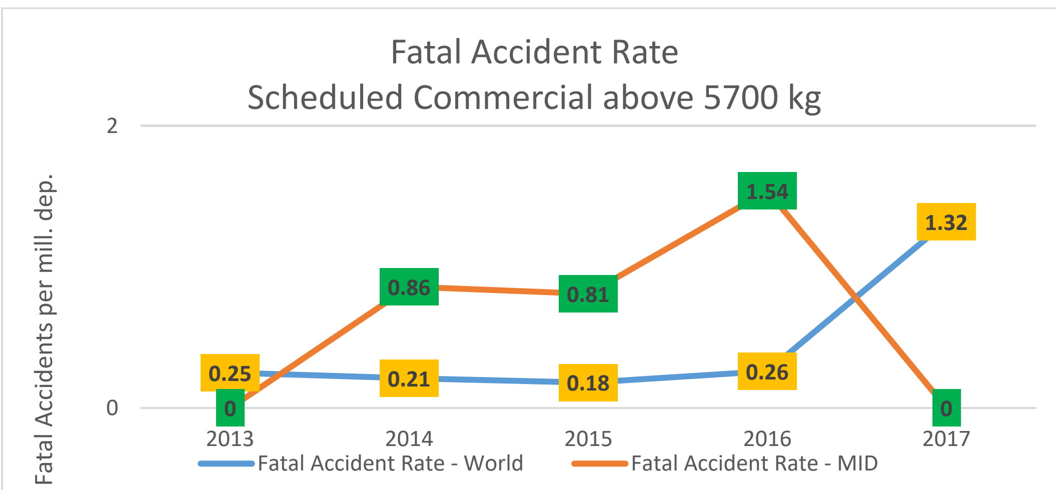


Graph 3: Global Accident Rate Vs MID Accident Rate (Source iSATRS as of 10 Oct 2018)

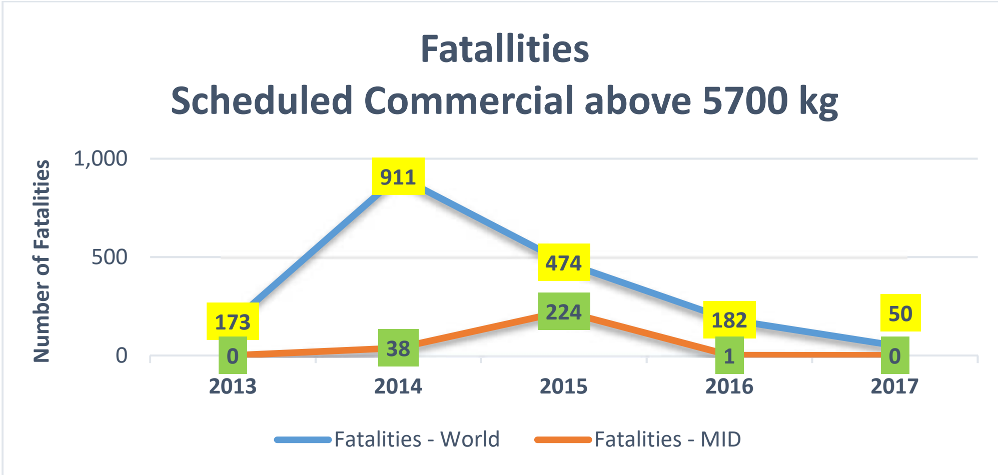


Graph 4: Number of MID Accidents Vs. Number of Global Accidents Per Year (Source: iSTARS as of 8 Oct 2018)

The Graph 5 shows that the average rate of fatal accidents in the MID Region for the period (2013-2017) is 0.64 accident per million departures, compared to 0.44 for the globe. The MID Region had no fatal accidents in 2013 and 2017. However, three fatal accidents occurred in 2014, 2015 and 2016. The 2014 accident caused 38 fatalities, 224 fatalities were registered in 2015 and 1 fatality in 2016 as shown in Graph 6.

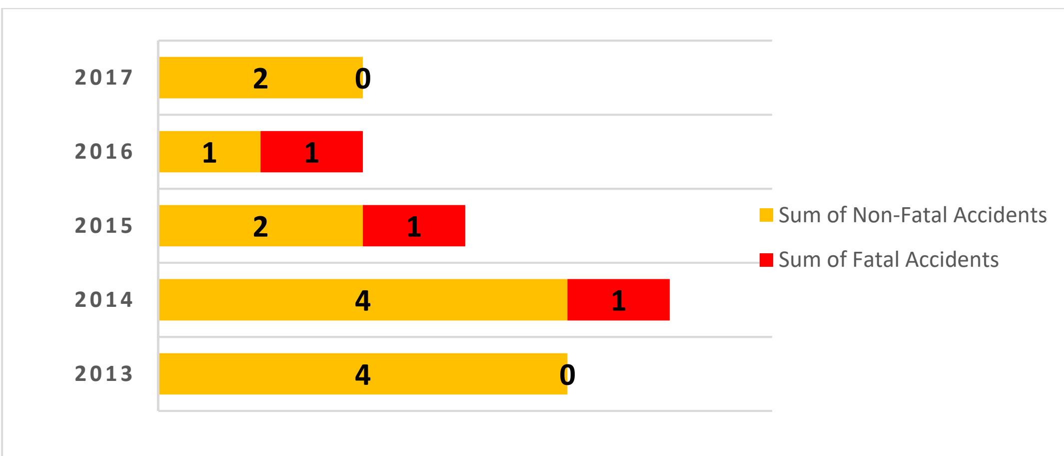


Graph 5: Global Fatal Accident Rate Vs MID Fatal Accident Rate (Source: iSTARS as of 8 Oct 2018)



Graph 6: Number of MID Fatalities Vs. Global Fatalities (Source: iSTARS as of 8 Oct 2018)

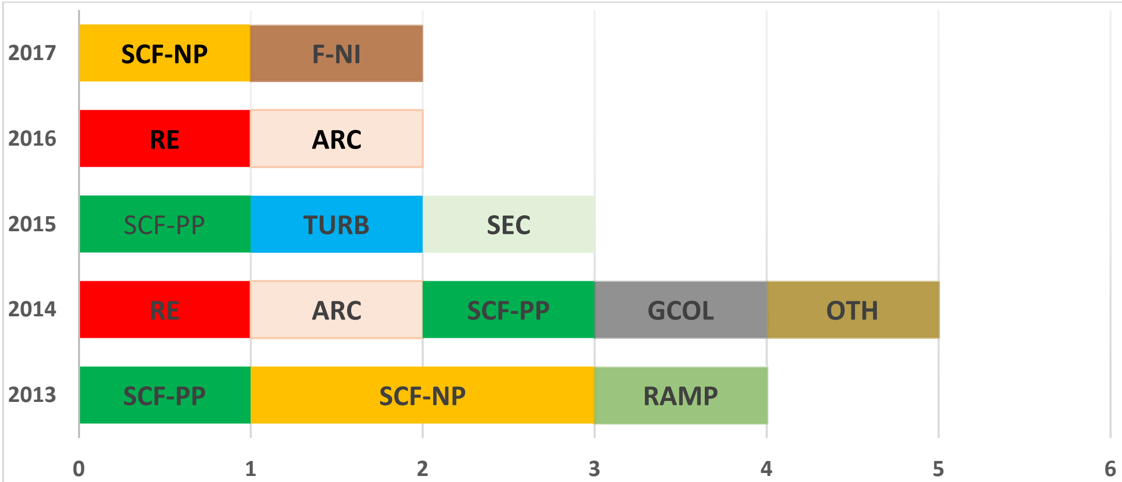
The Graph 7 shows that 16 accidents occurred during the period of 2013-2017 and no fatal accident occurred during the year of 2017. Three fatal accidents occurred respectively during 2014, 2015, and 2016.



Graph 7: Number of Fatal Accidents Vs Non-Fatal Accidents Per Year (2013-2017) (Source: iSTARS as of 8 Oct 2018)

Occurrence Category

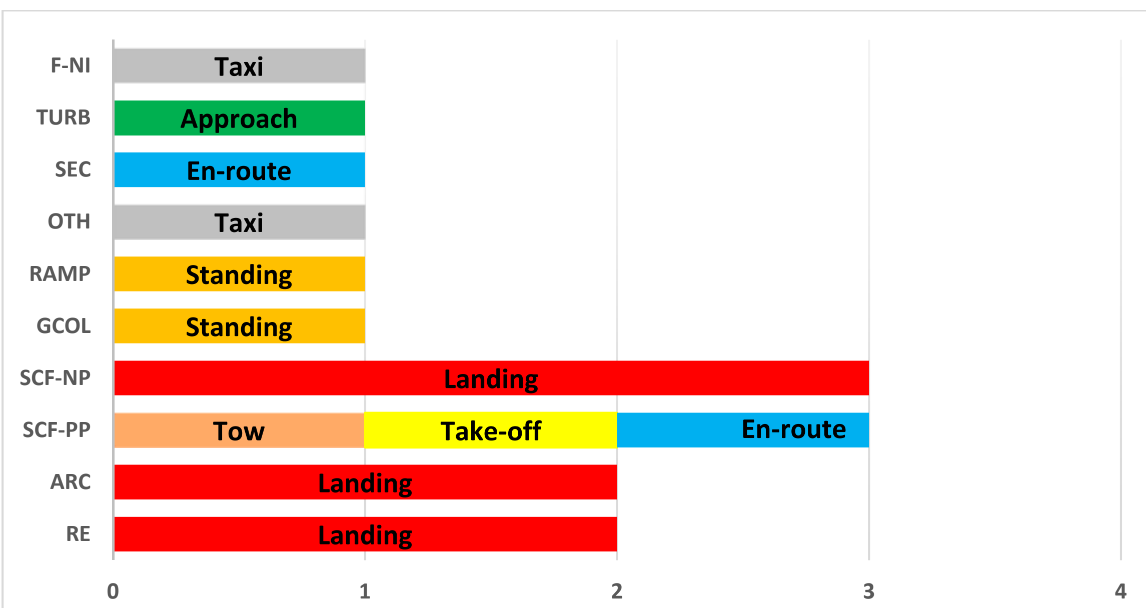
The Graph 8 indicates that during the period (2013-2017), the LOC-I and CFIT accidents have not been reported. However, the engine failure/malfunction (SCF-PP), Non-Power plant (SCF-NP), runway excursion (RE), abnormal runway contact (ARC), and security (SEC) events represent the main areas of concern.



Graph 8: Distribution of Occurrence Category Per Year (2013-2017) (Source: iSTARS as of 8 Oct 2018)

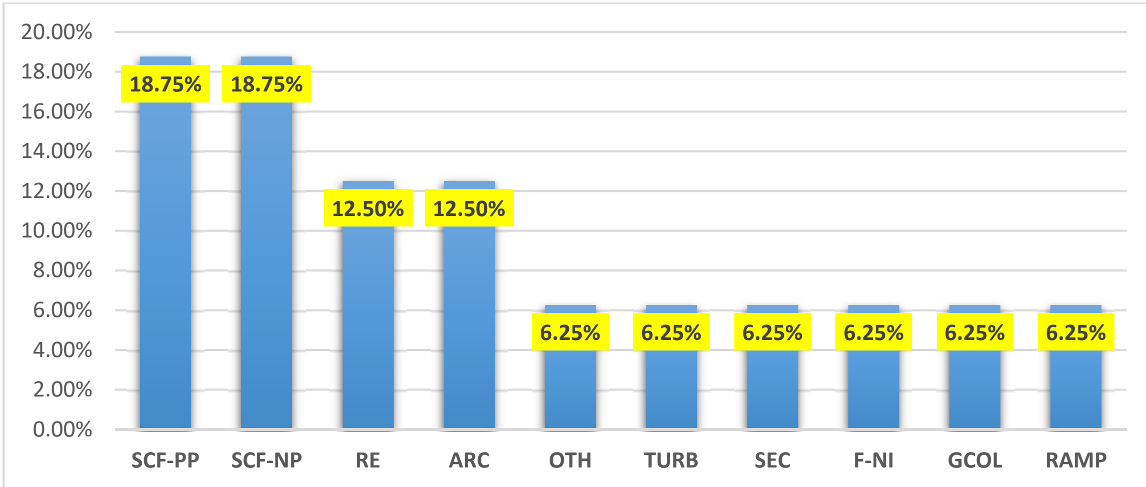
Phase of Flight

The Graph 9 shows that the majority of 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. However, one abnormal runway contact accident took place during landing (Go-around) flight phase. The engine failure/malfunction events occurred during take-off and En-route flight phases.



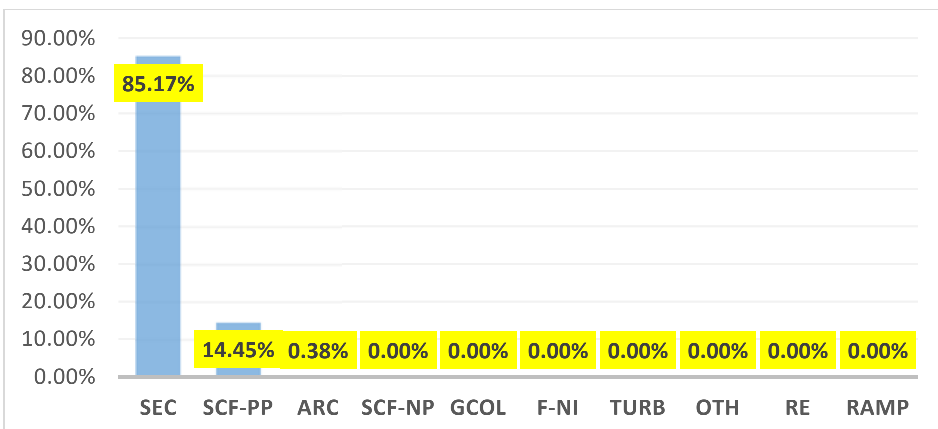
Graph 9: Distribution of Occurrence Category Per Phase of Flight (2013-2017) (Source: iSTARS as of 8 Oct 2018)

The Graph 10 shows that most of the accidents categories experienced during the 2013-2017 were the system component failures, followed by Runway Excursion and abnormal runway contact.



Graph 10: Occurrence Category Distribution as Percentage Per Accident (Source: iSTARSas of 8 Oct 2018)

The Graph 11 shows that the fatalities for the period 2013-2017 were associated to the following Occurrence Categories: Security (SEC), engine failure/malfunction (SCF-PP) and Abnormal Runway Contact (ARC).



Graph 11: Fatalities Distribution as Percentage by Occurrence Category (2013-2017) (Source: Istars as of 8 Oct 2018)

Taking a more in-depth look at the fatal accidents and accidents for the MID Region (State of occurrence) for the period 2013-2017, the following observations are made:

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

1. Security – SEC;
2. System Component Failure- Power Plant - (SCF-PP); and
3. Runway Safety-Abnormal Runway Contact – (RS/ARC).

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

1. Runway Safety (RS) – including (RE, ARC, GCOL, and RAMP);
2. System Component Failure – Power Plant (SCF-PP);
3. System Component Failure– Non-Power Plant (SCF-NP);
4. Fire/Smoke (F-NI); and
5. Turbulence Encounter (TURB)

Identification of the main Risk Areas based on the analysis of accident data related to the State of Occurrence (2013-2017)

To facilitate the identification of the safety priority areas; the safety risk assessment methodology is applied. Applying the "feared consequences" of the risk portfolio of DGAC France, the system component failure- Power Plant fatal accident has led to the potential outcome of Loss of control inflight, consequently, the SCF-PP was considered under the risk of loss of control-inflight.

Main Risk Area	Frequency	Severity	Risk Level
Runway Safety (RS)	1	3	3
Loss of Control-Inflight (LOC-I)	3	1	3
Security (SEC)	3	1	3

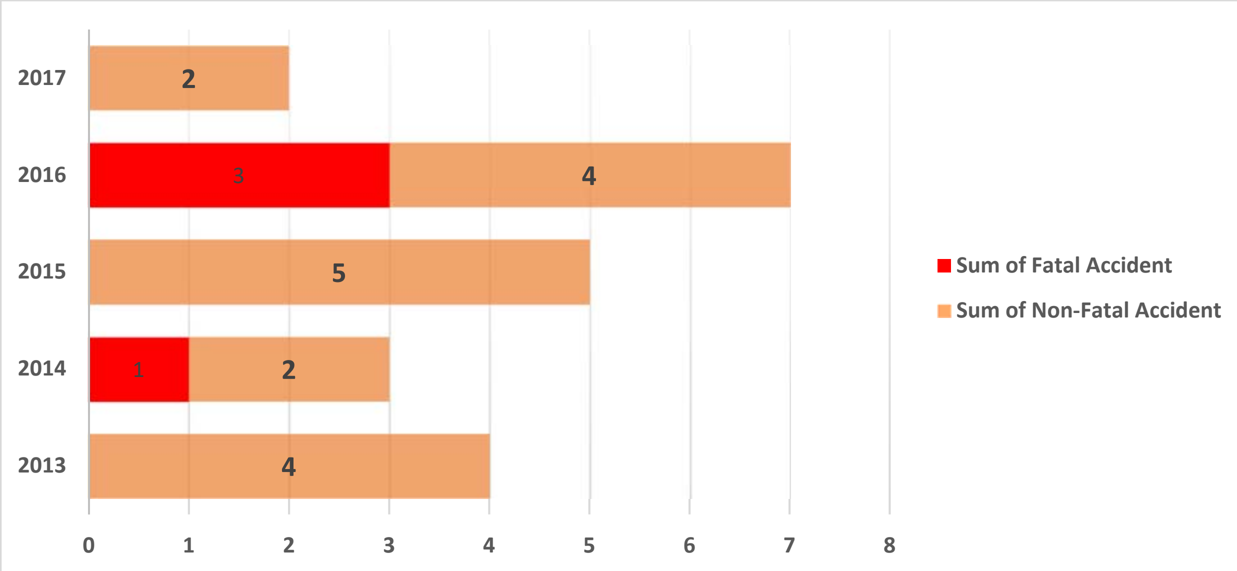
Therefore, the safety risk areas according to the State of occurrence's accidents data are

a) Loss Of Control -Inflight – (LOC-I);
b) Security related-(SEC); and
c) Runway Safety (RS): Runway Excursion (RE) and Abnormal Runway Contact (ARC) during landing

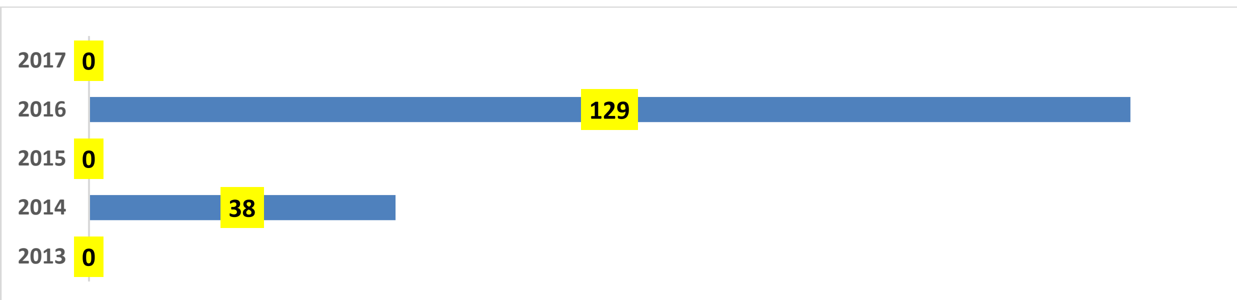
4.2.2 MID State of Registry and Operator

Accident Data Analysis

The 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 no fatal accident was recorded during 2017, which indicated a decreased number of fatal accidents in 2017 compared to the previous years. Three fatal accidents occurred in 2016 involving MID Operators. In terms of fatalities, the Graph 13 shows that the four fatal accidents, which occurred in 2014 and 2016, resulted in 167 fatalities.



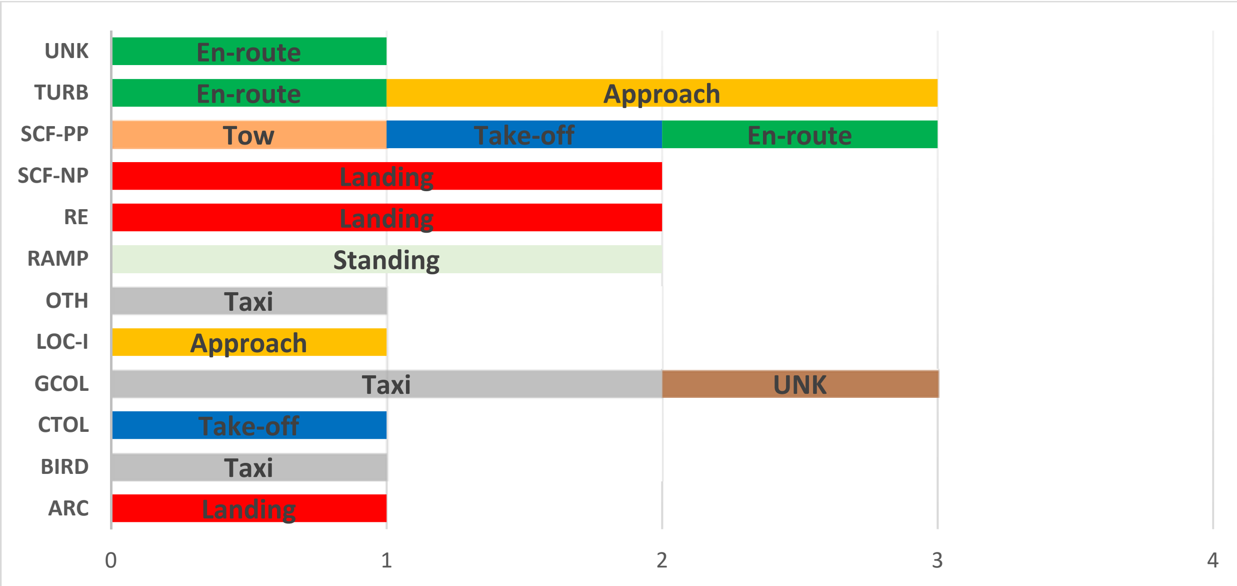
Graph 12: Number of Fatal and Non-Fatal Accidents per Year (2013-2017) (Source: iSTARSas of 8 Oct 2018)



Graph 13: Number of Fatalities per Year (2013-2017) (Source: iSTARSas of 8 Oct 2018)

Phase of Flight

The Graph 14 shows that the majority of accidents related to Runway Excursion, Abnormal Runway Contact, and system component failure- Non-power plant (mainly landing gears technical problems) occurrence categories took place during landing flight phase. It was also noted that the engine failure/malfunction-related accident occurred during take-off (initial climb) phase of flight. Regarding, Loss of Control Inflight (LOC-I), it took place during approach (Go-around) flight phase.

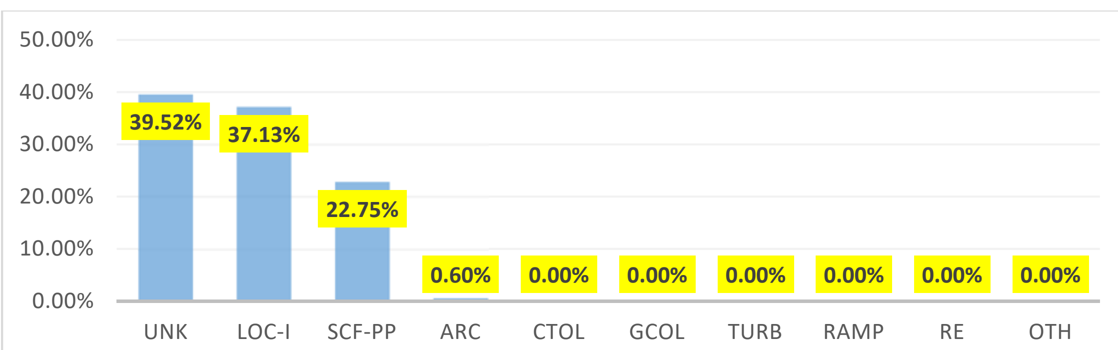


Graph 14: Distribution of the Number of Accidents Category per Phase of Flight (2013-2017) (Source: iSTARS as of 8 Oct 2018)

During 2013-2017, two fatal accidents took place during approach (go-around-GOA) phase of flight (For further analysis on the Go-Around procedures see the **Appendix B**). Therefore, En-route, Go-around (GOA), and Initial Climb (ICL) represent the most critical flight phases in the MID Region.

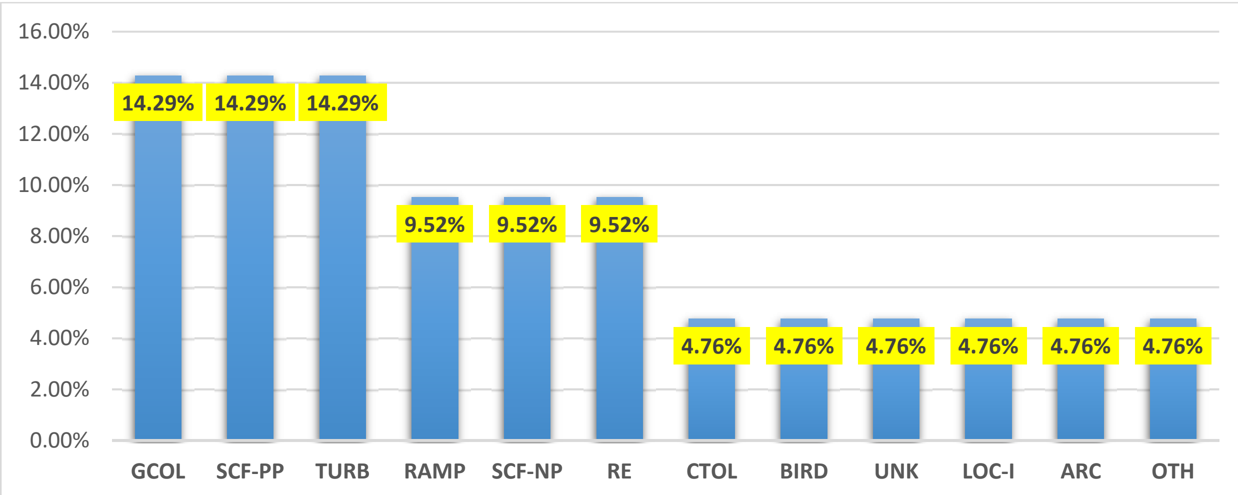
Occurrence Category

The Graph 15 shows the percentage of fatalities associated with the accident Categories for the period 2013-2017: Unknown (UKN), Loss of Control in flight (LOC-I), engine failure/malfunction (SCF-PP) and Abnormal Runway Contact (ARC).



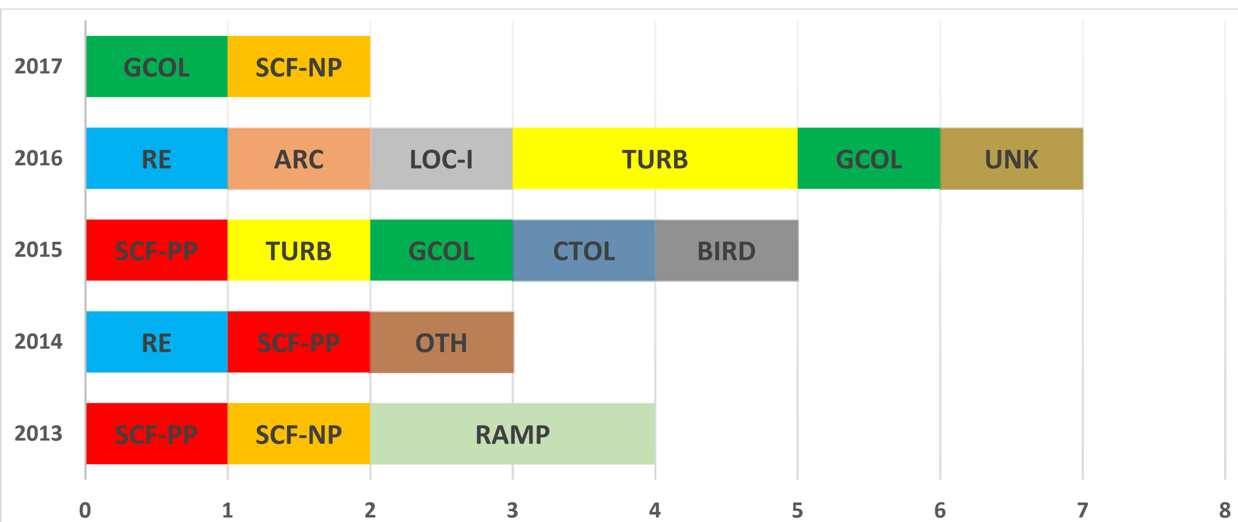
Graph 15: Fatalities Distribution as Percentage by Occurrence Category (2013-2017) (Source: iSTARS as of 8 Oct 2018)

The Graph 16 shows that most of the accidents categories experienced during the period 2013 - 2017 were the engine failure/malfunction (SCF-PP), followed by Turbulence and Ramp. However, considering that RE, GCOL, RAMP, BIRD, CTOL and ARC are all considered part of the Runway Safety (RS) Risk Category, RS is still the most frequent. One LOC-I occurrence had resulted in fatalities. Regarding "Unknown" occurrence category, the causal factors of the accident are still under investigation and thus the occurrence category could not be defined at this stage.



Graph 16: Accident Distribution as Percentage per Occurrence Category (2013-2017) (Source: iSTARS as of 8 Oct 2018)

During 2013-2017, no CFIT accident occurred. However, one LOC-I accident had taken place during 2016. Engine failure/malfunction (SCF-PP), Runway Excursion (RE), Abnormal Runway Contact (ARC), and Turbulence (TURB) events were registered and are still prevailing.



Graph 17: Accident Category Distribution per Year (Source: iSTARS as of 8 Oct 2018)

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 2013-2017, the following is to be highlighted:

a) In terms of fatality, the fatal accidents categories in the MID Region for the period 2013 – 2017 are:

1. Unknown (UNK);
2. Loss Of Control- In-flight (LOC-I);
3. System Component Failure – Power Plant (SCF-PP); and
4. Runway Safety – Abnormal Runway Contact (ARC).

b) In terms of frequency, the most frequent accidents categories in the MID Region (State of registry and State of occurrence) for the period 2013 – 2017 are:

1. Runway Safety (RS) – (RE, ARC, GCOL, RAMP, CTOL, BIRD);
2. System Component Failure-Power Plant (SCF-PP);
3. Turbulence encounter – (TURB); and
4. System Component Failure- non-power plan (SCF-NP).

Identification of the main Risk Areas based on the analysis of safety data related to the State of registry and State of operator (2013-2017)

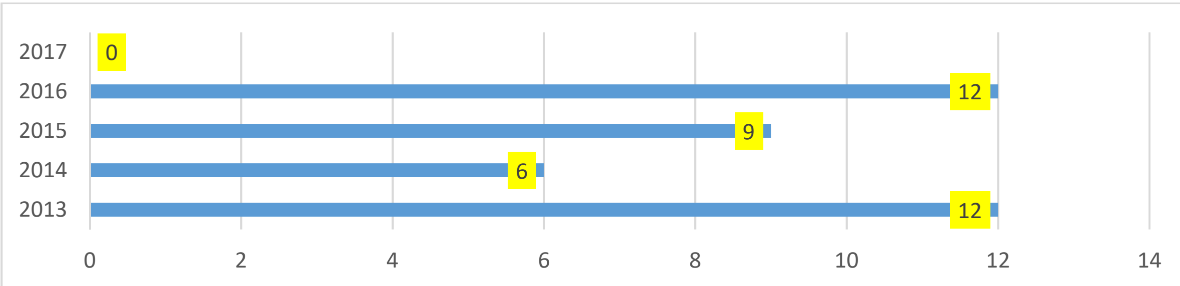
To facilitate the identification of the safety priority areas; the safety risk assessment methodology is applied. Applying of the "feared consequences" of the risk portfolio of DGAC France, the system component failure- Power Plant fatal accident has led to the potential outcome of Loss of control inflight, consequently, the SCF-PP was considered under the risk of loss of control-inflight. Therefore, the safety risk areas according to the State of registry and operator accidents data are:

Main Risk Area	Frequency	Severity	Risk Level
Runway Safety (RS)	1	3	3
Loss of Control-Inflight (LOC-I)	2	1	2
System Component Failure- non power plan (SCF-NP)	2	5	10
Turbulence (TURB)	3	4	12

a) Runway Safety (RS): Runway Excursion (RE) and Abnormal Runway Contact (ARC) during landing;
b) Loss of Control-Inflight (LOC-I).

Serious Incidents Data Analysis

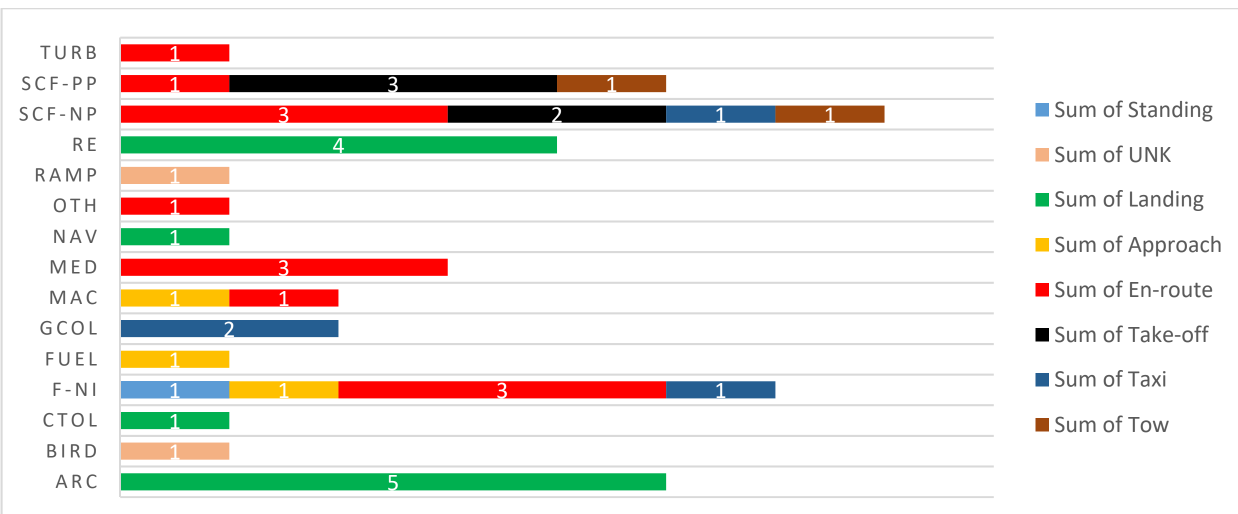
The Graph 18 shows that there was no reported serious incidents during the year of 2017 compared to the previous years.



Graph 18: Number of Serious Incidents per Year (2013-2017)

Phase of Flight

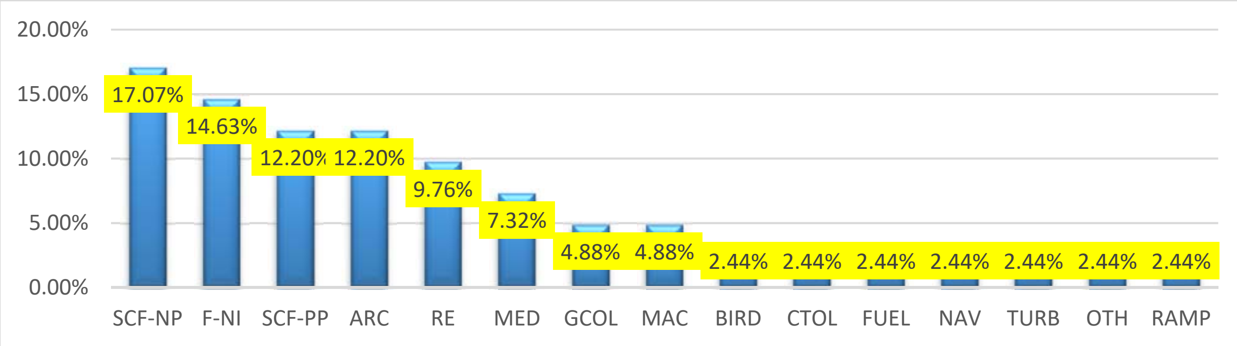
The Graph 20 shows that the majority of Runway Excursion and Abnormal Runway Contact occurrence categories took place during landing flight phase. It was also noted that the engine failure/malfunction events occurred during take-off flight phase.



Graph 19: Distribution the Number of Serious Incidents Category per Phase of Flight (2013-2017)

Occurrence Category

The Graph 20 shows that most of the serious incident categories experienced during the period 2013 - 2017 were the system component failures (PP and NP combined), followed by Runway Excursion and abnormal runway Contact, and the fire/smoke categories. The near midair collision events have been recorded, but took place outside the MID Region airspace.



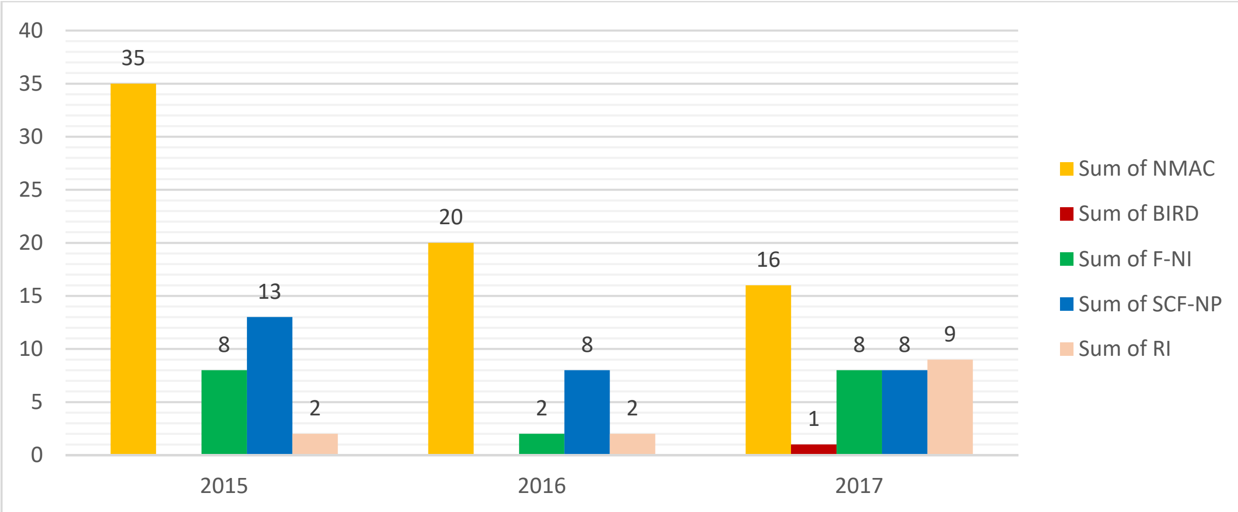
Graph 20: Serious Incidents Distribution as Percentage per Occurrence Category (2013-2017)

Taking a more in-depth look at the serious incidents for the MID Region (State of registry and State of operator) for the period 2013-2017, the following is to be highlighted:

a) In terms of frequency, the most frequent serious incidents categories in the MID Region are:

1. Runway Safety (RS) – (RE, ARC, GCOL, RAMP, BIRD) ;
2. System Component Failure (SCF)- (SCF-PP and SCF-NP);
3. Fire/smoke- (FN-I);
4. Medical (MED);
5. Near Mid Air Collision (NMAC);
6. Turbulence (TURB); and
7. Fuel.

Total number of serious incidents provided by the MID States for the period 2015-2017.
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.



Graph 21: Number of Serious Incidents Distribution Per Year (2015-2017)

Taking a more in-depth look at the serious incidents reported by the MID Region for the period 2015-2017, the following is to be highlighted:

b) 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 (SCF)- (SCF-NP);
3. Runway incursion- (RI)
4. Fire/smoke- inflight- (FN-I);
5. Birdstrike- (BIRD)

4.2.3 ICAO In-depth Analysis of Accidents

A. Runway Excursions and Abnormal Runway Contact: During 2013-2017, Runway Excursions and abnormal runway contact accidents and serious incidents mainly occurred in the landing phase of flight and counted for approximately 1% of fatality. 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.

Root Cause Analysis

1. Latent Conditions:
   - i. Ineffective safety management system
   - ii. Incomplete/inefficient operator SOP
   - iii. Deficient flight crew training
   - iv. Regulatory oversight

2. Threat:
    i. Decision to make a landing on short runway with tailwind.
    ii. Poor judgment and continued landing after an un-stabilized approach
    iii. Improper calculating of landing speed without focusing on the tailwind component
    iv. Technical failures Pilot information
    v. Contaminated runways
    vi. Airport facilities including poor runway paintings/markings
    vii. Meteorology

3. Errors:
    i. Timely crew decisions (very low-level go-arounds)
    ii. Failed to go around after un-stabilized approach
    iii. SOP Manual not updated and maximum tailwind not mentioned
    iv. Manual handling/flight controls
    v. Contaminated runways

4. Contributing factors:
    i. Anti-skid failures of landing gear causing prolong landing distance.
    ii. Instantaneous variable wind condition on aerodrome traffic pattern.
    iii. Late activation of airbrakes and spoilers (especially airbrakes) with tailwind cause to increase the landing roll distance.

Some of the Precursors, which could Lead to Runway Excursion

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

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

B. SCF-PP: Engine Failure or malfunction of an aircraft system or component. The engine failure/malfunction contributed to the accidents and serious incidents and counted for 23% of fatalities. The majority of SCF-PP accidents and serious incidents between 2013 and 2017 occurred mainly during take-off and en-route phase of flight, with one fatal accident involving turboprop aircraft.

Root Cause Analysis

1. Latent Conditions:
    i. Regulatory oversight
    ii. Deficient maintenance standard operating procedures
    iii. Ineffective safety management system
    iv. Insufficient resource availability
    v. Deficiencies in the evaluation to monitor changes

2. Threats:
   i. Improper Airworthiness Directive implementation and Control
   ii. Poor maintenance and errors related to aircraft dispatch or release
   iii. Lack of information sharing and support from the State of manufacturer
   iv. Embargo on aircraft equipment/Spare parts acquisition
   v. Incorrect or incomplete aircraft performance limitations verification
   vi. Errors related to the Aircraft Flight Maintenance adherence
   vii. Extensive/uncontained engine failure
   viii. Incorrect/Unclear aircraft maintenance manual

3. Errors:
   i. Crew inadequate aircraft handling
   ii. Crew SOP Adherence / SOP Cross-verification
   iii. Improper weight and balance calculations

4. Contributory Factors
   i. CAMOs' and AMO organization's responsibilities and communication issue
   ii. Non-compliance with the regulator operational requirements
   iii. Ineffective monitoring in operators line maintenance
   iv. Inadequate monitoring in operations, training and technical divisions

C. **Loss of Control-Inflight:** During 2013-2017 Aircraft upset or loss of control only contributed to one accidents but counted for around 37% of fatalities. During the year 2016, the LOC-I occurred during go around (GOA) phase of flight.

Root Cause Types

The below root-cause analysis is based mainly on industry's analysis of the LOC-I accidents:

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

3. Errors:
   i. Inappropriate/Incorrect use of Automation by flight crew
   ii. Inadequate flight crew monitoring skills/awareness or communication
   iii. Flt Crew mishandling of manual flight path and/or speed control
   iv. Abnormal checklist
   v. Incorrect recovery technique by flight crew when their aircraft has become fully stalled.

4. Contributory Factors:
   i. Unnecessary weather penetration
   ii. Operation outside aircraft limitations
   iii. Unstable approach
   iv. Vertical/lateral speed deviation

5. Direct Precursors to a Loss of Control Event:
   i. Deviation from flight path
   ii. Abnormal airspeed or triggering of stall protections

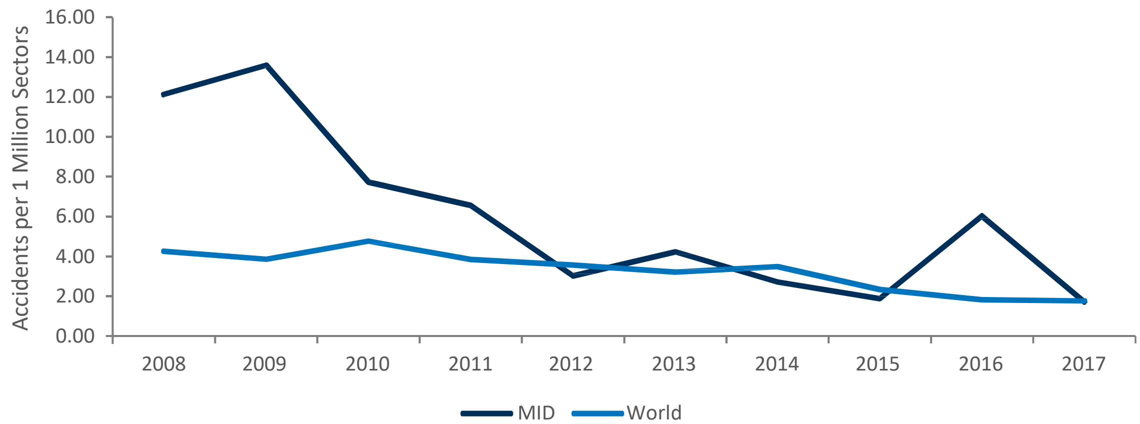
4.3 IATA Data

To calculate the regional accident rates, IATA determines the accidents based on the State of operator. Moreover, the operator's country is specified in the operator's Air Operator Certificate (AOC). For example, if a French-registered operator has an accident in the MID Region, this accident is counted as "European" accident as far as regional accident rates are concerned.

Moreover, the IATA accidents database captures operational accidents for aircraft with maximum take-off weight (MTOF) >5,700 KG, which happen during a commercial operation – operation including flights listed as a scheduled or unscheduled, passenger or cargo flight, or positioning flights). Non-operational accidents are excluded (military, human relief, test flights, training, etc.). The data below captures accident information for the time period 2013 – 2017 and is narrowed down to the MID States.

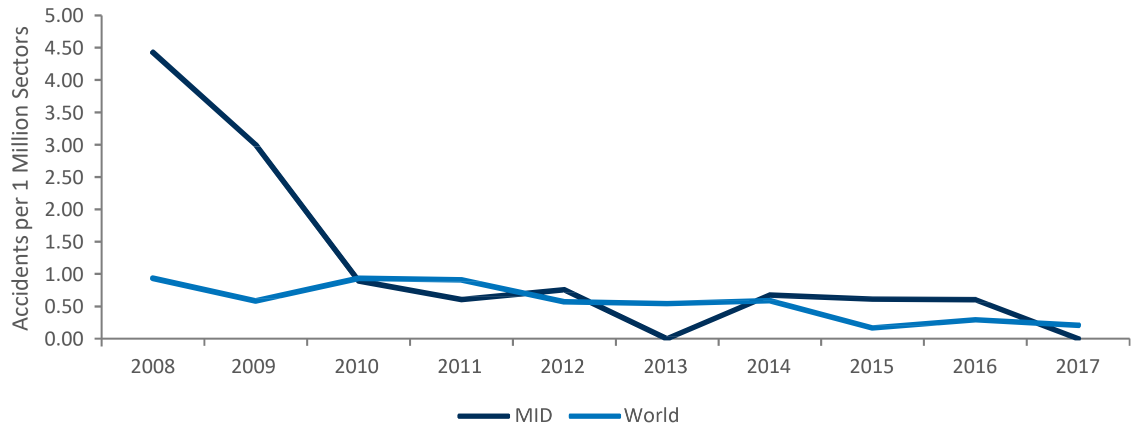
4.3.1 Regional Accidents Rates (Per million departures)

5 years MID States accident rate 2.89



Regional Fatal Accident Rates *(Per million departures)*

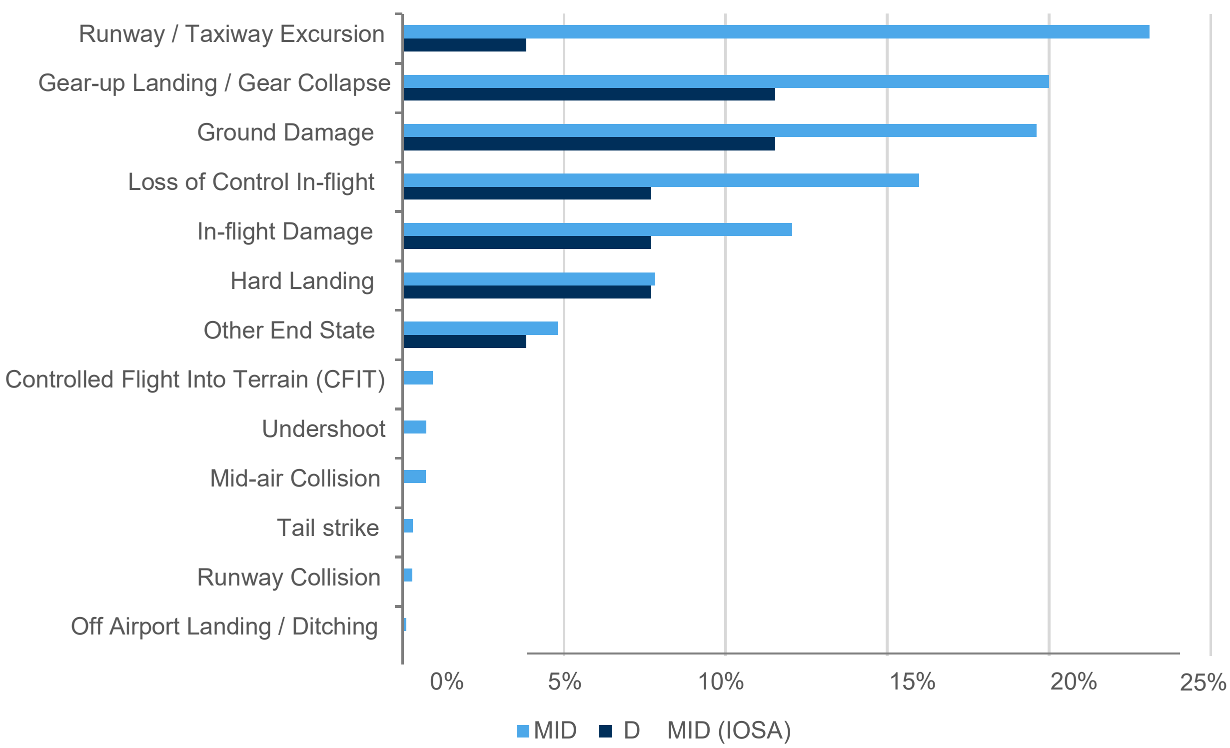
5 years' fatal accident rate



4.3.2 Analysis of MID Accidents between 2013 and 2017

This analysis provides an overview of the accidents between 01 Jan 2013 and 31 Dec 2017.

Distribution of accidents as percentage of total.

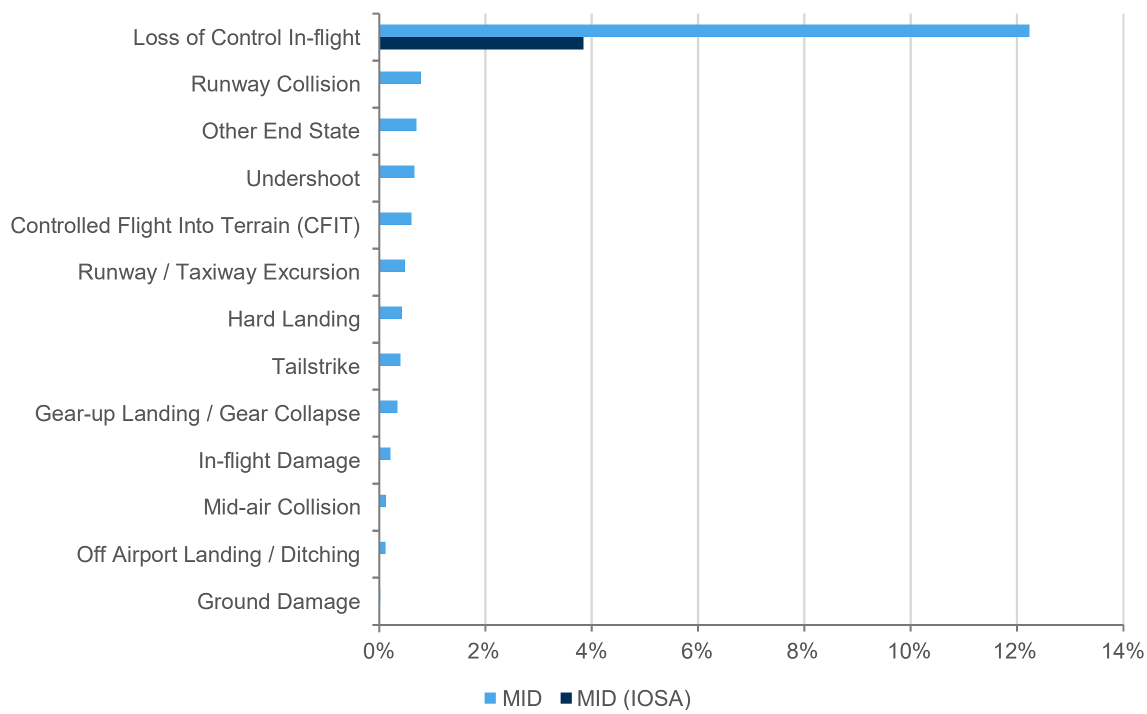


In terms of frequency, based on above figure the most frequent accidents categories in the MID Region for the period 2013 – 2017 are;

1. Runway/ Taxiway excursion
2. Gear up landing/ Gear collapse
3. Ground damage
4. Loss of control in flight
5. Inflight damage

MID Fatal Accident Categories (2013 - 2017)

Accident Category Distribution



In terms of fatality, the top Four fatal accidents categories in the MID Region for the period 2013 – 2017 are;

1. Loss of control inflight (LOC-I)
2. Runway collision
3. Other end state
4. Controlled flight into terrain (C-FIT)

4.3.3 Accidents Categories and Analysis

Top contributing factors (2013-2017)

Latent conditions

	All
Meteorology	16%
Airport Facilities	16%
Other	11%

Environmental Threats

	All
Safety Management	37%
Regulatory Oversight	32%
Design	21%

Airline Threats

	All
Aircraft Malfunction	32%
Maintenance Events	21%
Gear / Tire	21%

Flight Crew Errors

	All
Manual Handling / Flight Controls	32%
SOP Adherence / SOP Cross-verificati	21%
Automation	11%

Countermeasures

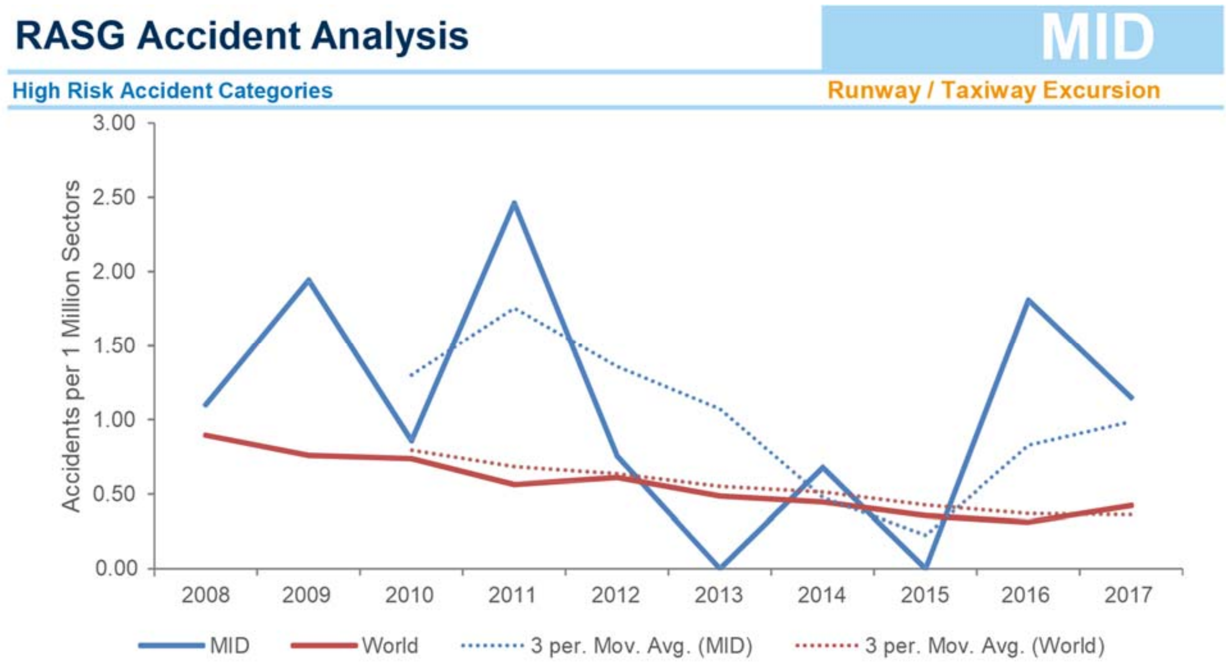
	All
Monitor / Cross-check	26%
Overall Crew Performance	21%
Workload Management	11%

Undesired Aircraft States

All

Long/floated/bounced/firm/off-center/c	21%
Loss of aircraft control while on the grc	16%
Engine	11%

A. IATA In-Depth Analysis of MID Accidents



Top Contributing Factors

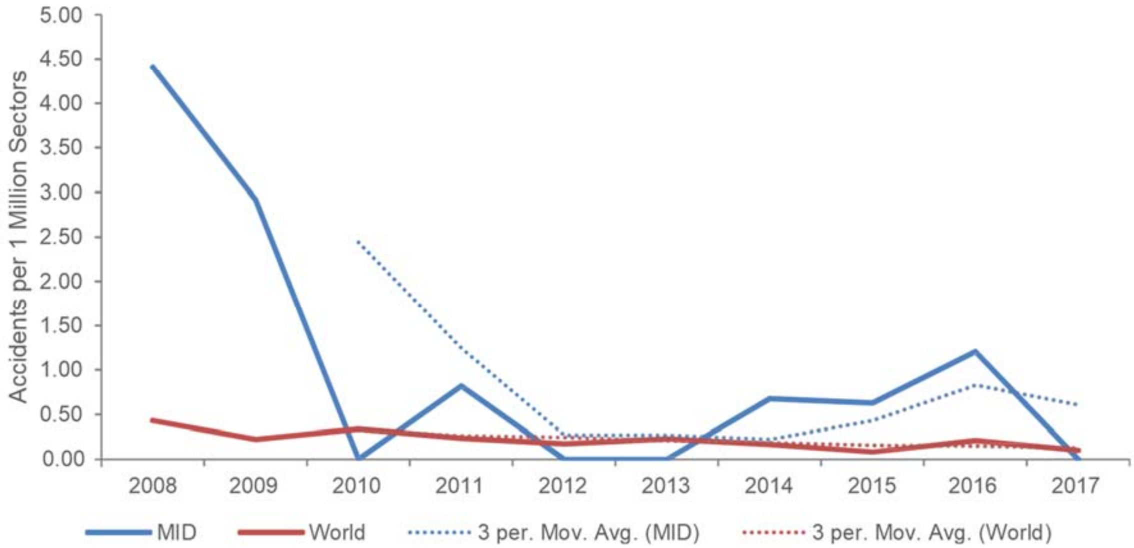
- Regulatory Oversight
- Safety Management
- Airport facilities
- Poor/faint marking/signs or runway/taxiway
- Contaminated runway/taxiway
- Long/floated/bounced/firm/off-center
- Loss of aircraft control while on the ground

RASG Accident Analysis

MID

High Risk Accident Categories — **Loss of Control In-flight**

Loss of Control In-flight Yearly Rate



Top Contributing Factors

- Flight Ops: SOPs & Checking
- Flight Ops: Training Systems
- Wind/Windshear/Gusty wind
- Poor visibility / IMC
- Aircraft Malfunction
- Contained Engine Failure/Powerplant
- Operation Outside Aircraft Limitations
- Vertical / Lateral / Speed Deviation

4.4 MID Region Safety Performance - Safety Indicators-Reactive

		Average 2013-2017		2017	
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 average rate by **2016**	2.67	2.64	1.45	2.42
Number of fatal accidents per million departures	Reduce/Maintain the regional average rate of fatal accidents to be in line with the global average rate by **2016**	0.64	0.44	0	1.32
Number of Runway Safety related accidents per million departures	Reduce/Maintain the regional average rate of Runway Safety related accidents to be below the global average rate by **2016**	1.18	1.22	0	1.12
	Reduce/Maintain the Runway Safety related accidents to be less than 1 accident per million departures by **2016**	1.54			
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 rate by **2016**.	0	0.08	0	0.05
Number of CFIT related accidents per million departures	Reduce/Maintain the regional average rate of CFIT related accidents to be below the global rate by **2016**.	0	0.02	0	0.02

5. Proactive Safety Information

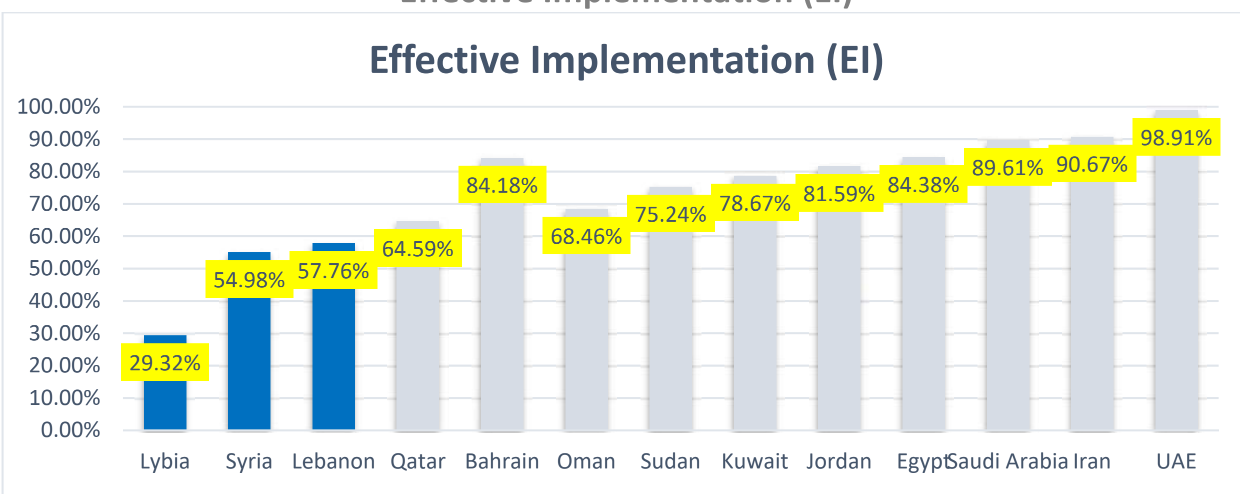
A mature safety management system requires the integration of reactive, proactive and predictive safety data. This section of the Annual Safety Report focuses on proactive safety data analysis to identify additional focus areas that form the basis for the development of SEIs and DIPs for Emerging Risks under RASG-MID.

5.1 ICAO USOAP-CMA

The regional average overall Effective Implementation (EI) in the MID Region (13 out of 15 States have been audited) is 73.24 %, which is above the world average 66.27% (as of 10 October 2018). Three (3) States are currently below EI 60%.

Currently, 77% of the audited States achieved the target of 60% EI, as suggested by the Global Aviation Safety Plan (GASP) and the MID Region Safety Strategy. It should be highlighted that some validation activities have been conducted recently such as ICVMs, which would positively affect the results.

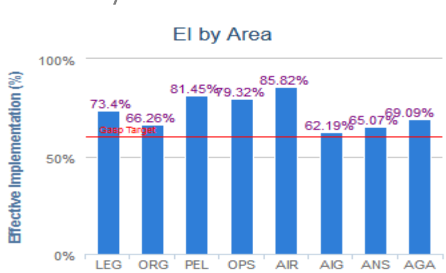
Effective Implementation (EI)



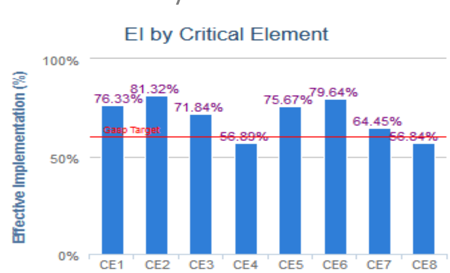
Source: ICAO USOAP CMA On Line Framework (OLF), as of 10 October 2018

The EI by Area (e.g. Operations, Airworthiness) shows that all areas are above 60% EI, which reflect the improvement in the oversight capabilities particularly in the area of ANS and AGA. With respect to the Critical Elements (CEs), CE4 (Qualified technical personnel) still represents the lowest with 56.89% EI, whereas CE8 (resolution of safety issues) is also below EI 60% (56. 84).

EI by Area



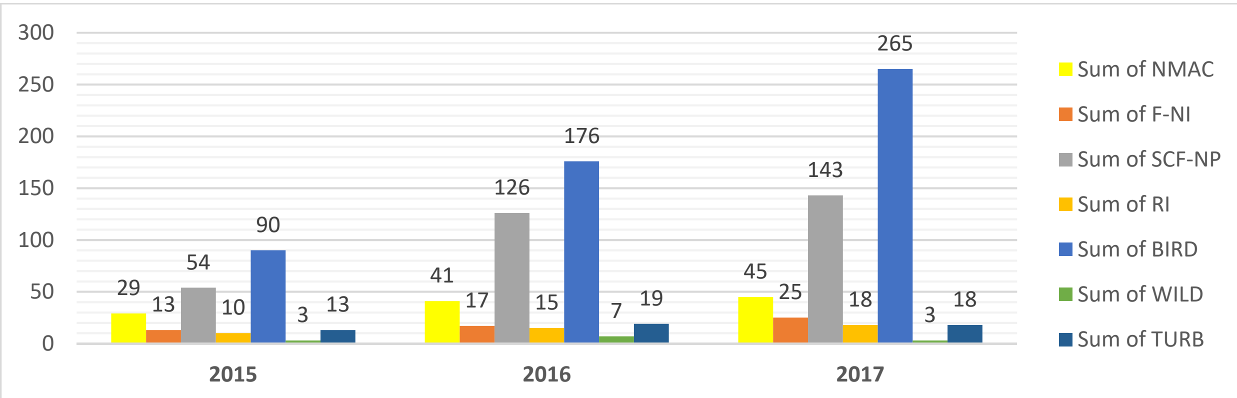
EI by Critical Element



Source: ICAO iSTARS, as of 10 October 2018

Incident data provided by the MID States for the period (2015-2017)

The graph below shows that the number of bird strike incidents reported is the highest one, followed by system component system-non-power plant and airborne conflict incidents (near midair collision). For an in-depth analysis and to identify the underlying safety issues, MID States should provide further data analysis in order to come out with strategic initiatives and mitigations. In addition, the turbulence encounter category incidents needs to be broken down to wake turbulence category in order to conduct a meaning full analysis and States needs to be urged to share the occurrences related to wake Turbulence category.

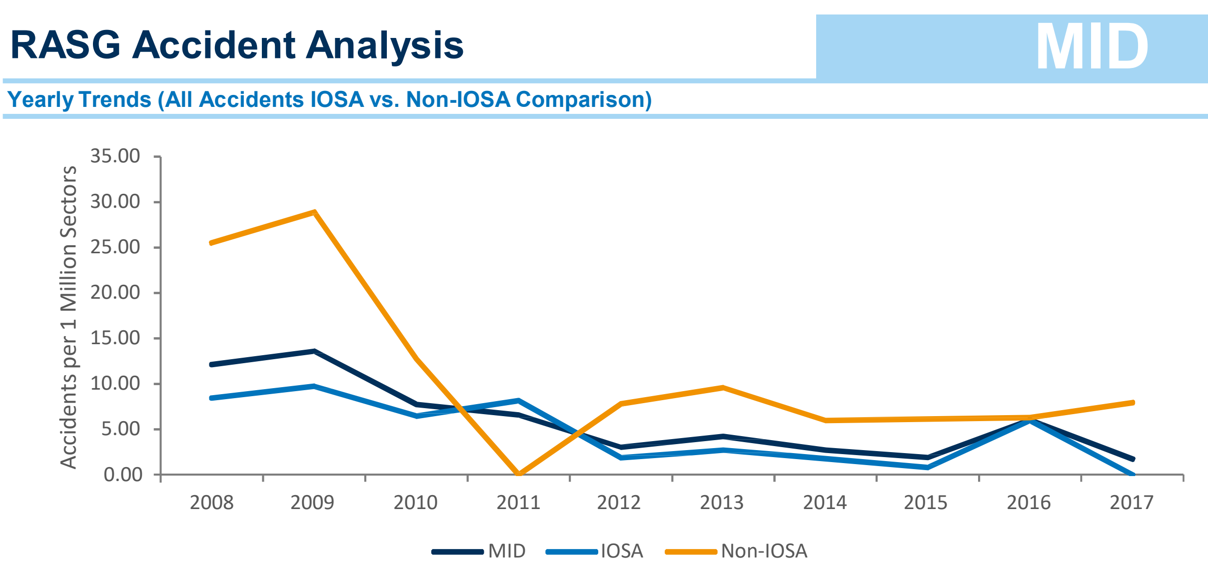


Graph 22: Total number of incidents provided by the MID States for the period 2015-2017

5.2 IATA IOSA and ISAGO

5.2.1 IATA Operational Safety Audit (IOSA)

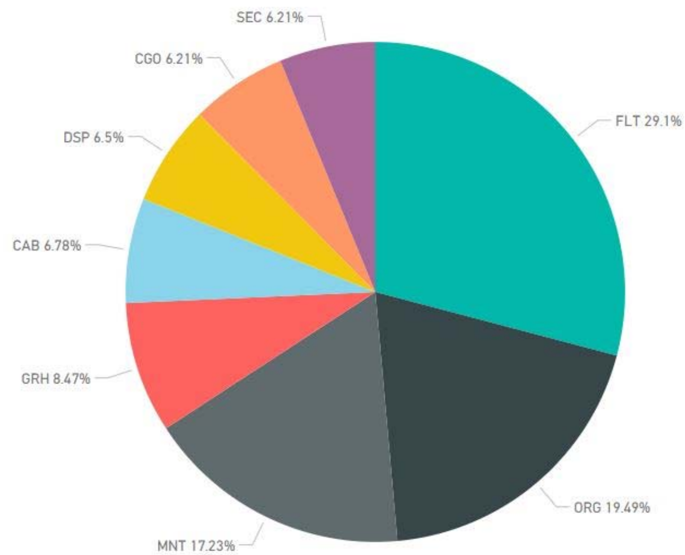
IOSA is an internationally recognized and accepted evaluation system designed to assess the operational management and control systems of an airline. It is worth mentioning that all MID accidents rate among non-IOSA registered operators for the period 2013- 2017, was above the world average.



The IOSA program covers 8 areas including: Organization and Management System (ORG), Maintenance (MNT), Cargo (CGO), Security (SEC), Flight Operations (FLT), Dispatch (DSP), Cabin Safety (CAB) and Ground Handling Operations (GRH).

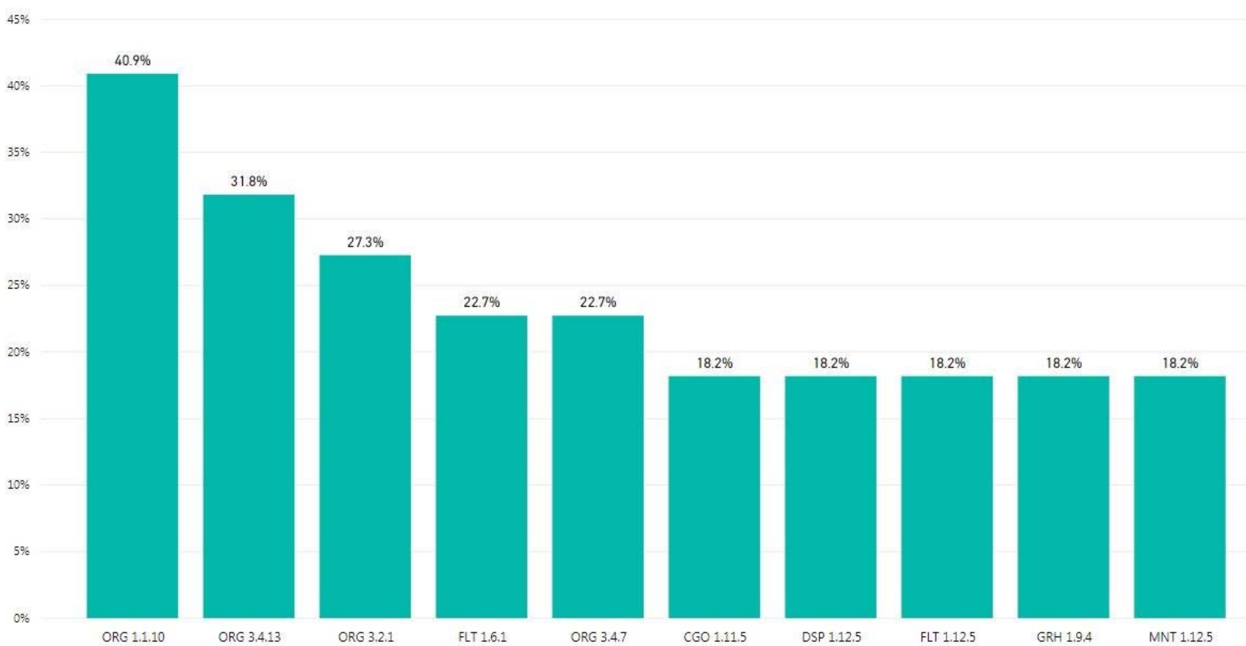
2017 statistics: A total of 18 closed audits from, below is the top findings/observations list.

Findings per discipline



Findings were mainly in the areas of Flight Operations (FLT) (29.1%), Organization Management (ORG)(19.49 %) , Maintenance (MNT) (17.23%) , and Ground Handling Operations (GRH) (8.47%).

Top 10 Findings by Occurrence



ORG 1.1.10 : SMS that is implemented and integrated throughout the organization to ensure management of the safety risks associated with aircraft operations.

ORG 3.4.13: training and qualification program for auditors that conduct auditing under the quality assurance program

ORG 3.2.1 : Processes for setting performance measures as a means to monitor the operational safety performance of the organization and to validate the effectiveness of safety risk controls (SMS).

FLT 1.6.1 : system for the management and control of flight operations documentation and/or data used directly in the conduct or support of operations

ORG 3.4.7 : process for the production of a Conformance Report (CR) that is certified by the accountable executive

CGO 1.11.5 : processes in the cargo operations organization for setting performance measures as a means to monitor the safety performance of the organization and to validate the effectiveness of risk controls.(SMS)

DSP 1.12.5 : processes in the organization responsible for the operational control of flights for setting performance measures as a means to monitor the safety performance of the organization and to validate the effectiveness of risk controls.(SMS)

FLT 1.12.5 : processes in the flight operations organization for setting performance measures as a means to monitor the safety performance of the organization and to validate the effectiveness of risk controls.(SMS)

GRH 1.9.4 : Audit planning process and sufficient resources to ensure audits of ground handling operations

MNT 1.12.5: setting performance measures as a means to verify the safety performance of maintenance operations and to validate the effectiveness of risk controls (SMS)

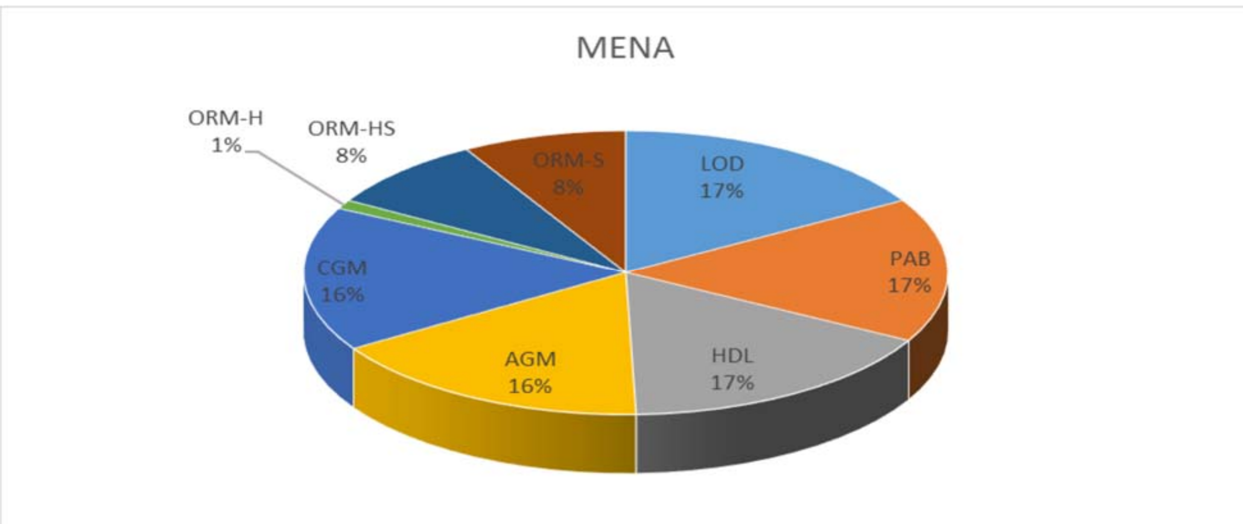
5.2.2 IATA Safety Audit for Ground Operations (ISAGO)

ISAGO implementation aims at improving ground safety and cutting the airlines' costs by drastically reducing the ground accidents and injuries.
The ISAGO program has 7 sections including: Load control (LOD), Passenger & Baggage handling (PAB), Aircraft Handling & Loading (HDL), Aircraft Ground Movement (AGM), Cargo & Mail Handling (CGM), Organization & Management – Corporate (ORM-H), Organization & Management – Co-located (ORM-HS) and Organization & Management – Station (ORM-S).

The ISAGO audit results analysis captured under this section cover the period between January and December 2017. A summary of the ISAGO findings is as follows:

1. A total of 34 audits took place in 2017 have been included in the analysis covering the IATA MENA Region.
2. 40 findings were recorded.
3. Findings were mainly in the areas of Aircraft Handling & Control (HDL), Passenger and Baggage Handling (BAP), and Load Control (LOD). Below is a graph that illustrates the distribution of findings per area:

DISTRIBUTION OF REPORTS PER DISCIPLINE



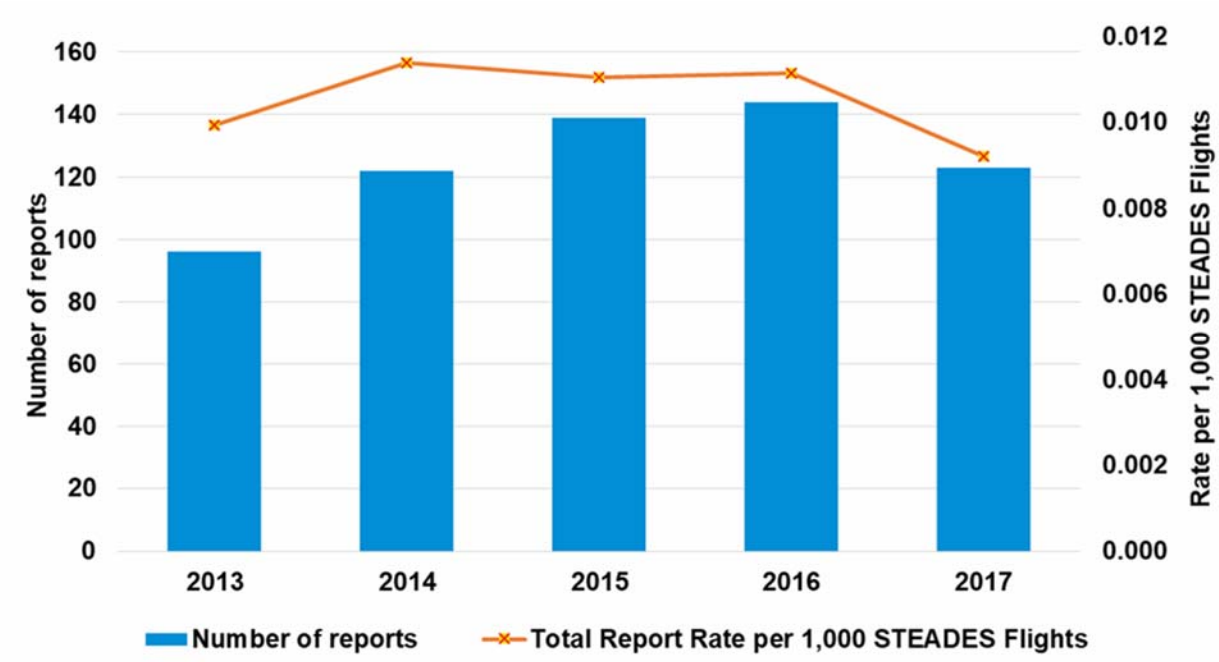
5.2 Incidents Reported by Airlines - STEADES Data

The Safety Trend Evaluation, Analysis & Data Exchange System (STEADES) is IATA's aviation safety incident data management and analysis program. It is a database of de-identified airline incident reports from over 200 participating airlines with an annual reporting rate now exceeding 200,000 reports/year. Safety trend analysis using STEADES is included in this report allows proactive safety mitigation, provides rates on key safety performance indicators, and helps to continuously assess and establish safety performance targets.

The scope of analysis captured covers quarterly trends for the period Q1 2013 to Q4 2017 inclusive. The analysis is conducted on Air Safety Reports (ASR) and Cabin Safety Reports (CSR) held in IATA's STEADES database.

Wake Turbulence

The data query resulted in a total of 1,159 reports in 2017. After quality controls were performed, 624 reports were retained for analysis, which equals to 0.01 reports per 1,000 flights or 1 encounter in every 100,000 flights. The figure below shows the number of reports and the rate per 1000 STEADES flights for the period 2013-2017.

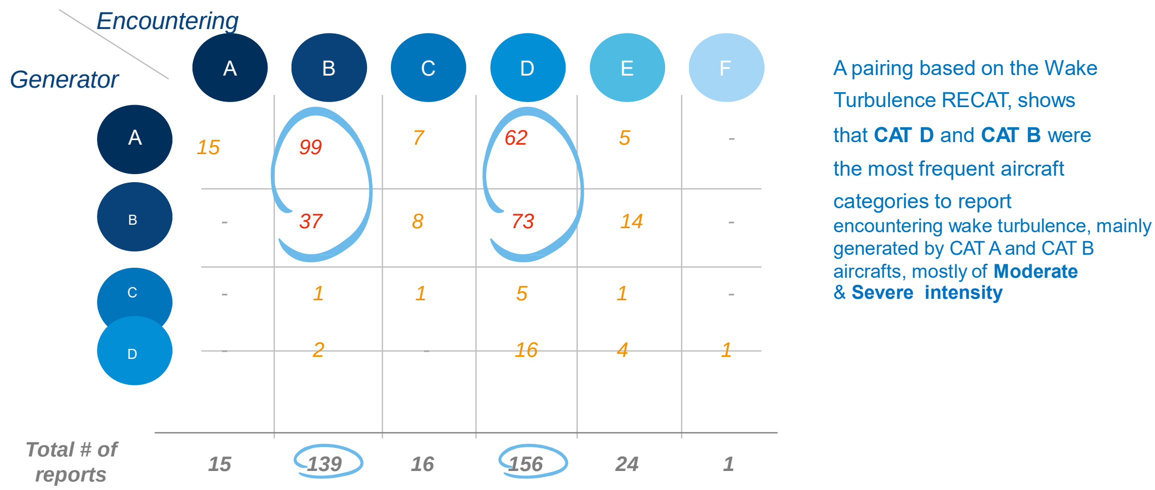


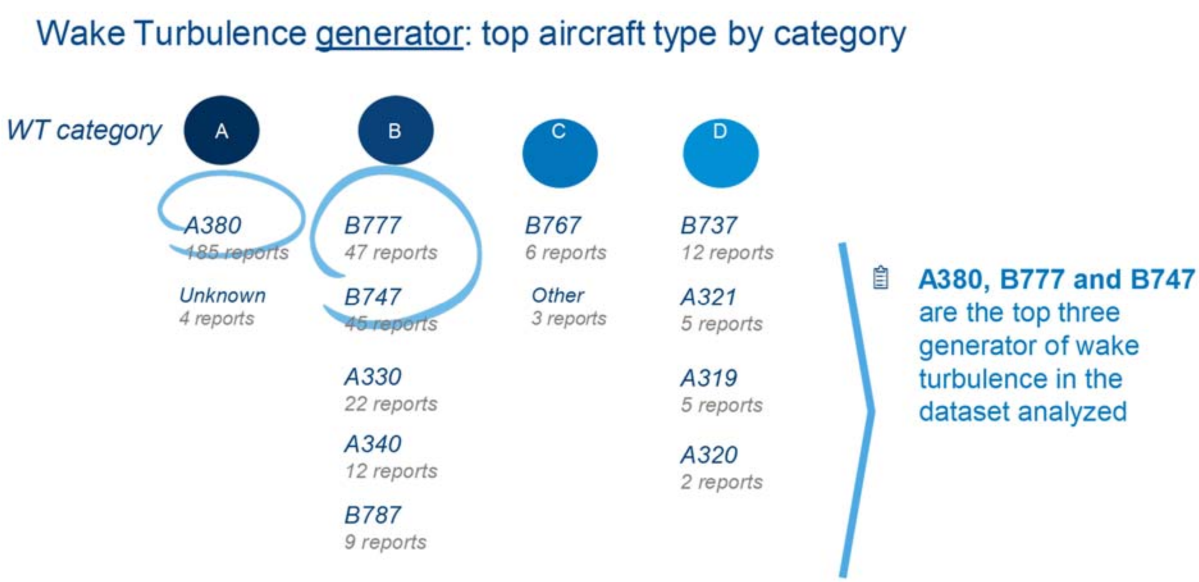
Muscat, Bahrain, Jeddah and Tehran FIRs are the top FIRs in terms of number of reports.

Muscat	12
Bahrain	11
Jeddah	7
Tehran	7

Upper Heavy (CAT B) and *Upper Medium* (CAT D) aircraft reported the highest number of events

Number of reports per Aircraft Wake Turbulence Category





The highest number of reports occurred when both aircraft were in level flight 186 reports.

The highest number of injuries occurred in moderate wake turbulence events

Key findings

- Mumbai, Muscat and Bahrain are the top 3 FIRs in terms of number of reports
- Upper Heavy (CAT B) and Upper Medium (CAT D) aircraft reported the highest number of events of wake turbulence encountered
- Wake Turbulence Encountered by CAT B, C and D generated from CAT A and B is mainly Moderate and Severe in intensity
- A380, B777 and B747 are the top three generator of wake turbulence in the dataset analyzed

- B777, A320, A330 and B737 are the top aircraft that encountered wake turbulence in the dataset analyzed
- The highest number of reports occurred when both aircraft were in level flight

TCAS TA/ RA in MENA

Executive Summary:

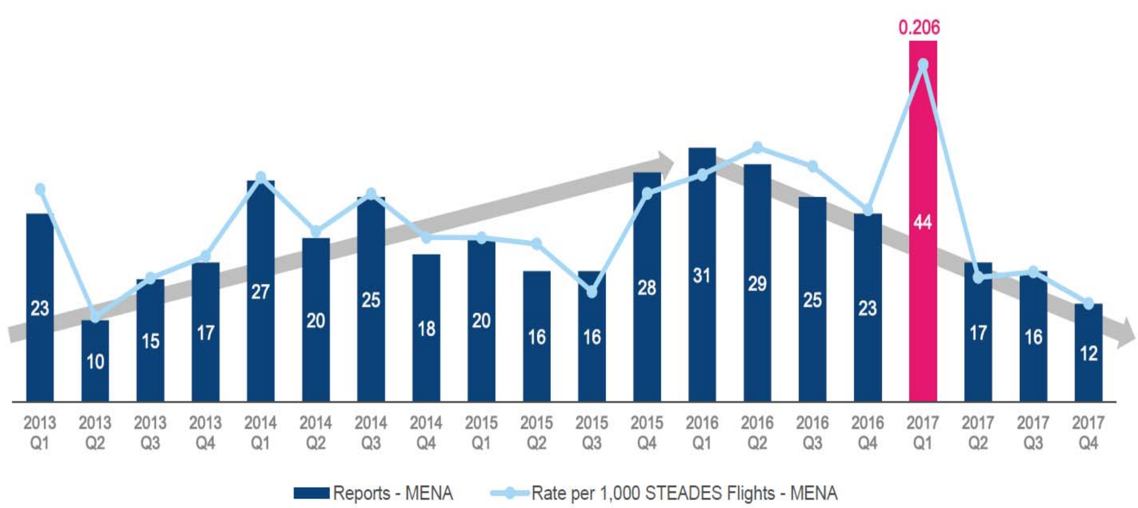
- MENA had a low near Mid Air Collision (MAC)* RATE (0.109 PER 1000 flights) compared to the global rate (0.345 per for 1000 flights) last 5 years. (2013-2017)

**Near MAC: TCAS + (Air proximity & Avoidance manoeuver) + (inadequate separation 7avoidance manoeuver)*

- 79% of near MAC reports were TCAS RAs and among these RA reports, 20% led to Loss of Separation (LOS) cases.
- RA reports from lower altitudes (approach and climb) reported closer proximity between the two aircraft than the RAs at higher altitude (cruising phase).
- The most frequent TCAS report was due to "High Closure Rate" and "communication factors" were reported less frequently, but resulted in closer lateral and vertical proximity.
- In 2017 Q1, there was an exceptional number of near MAC reports in the Arabian Peninsula.

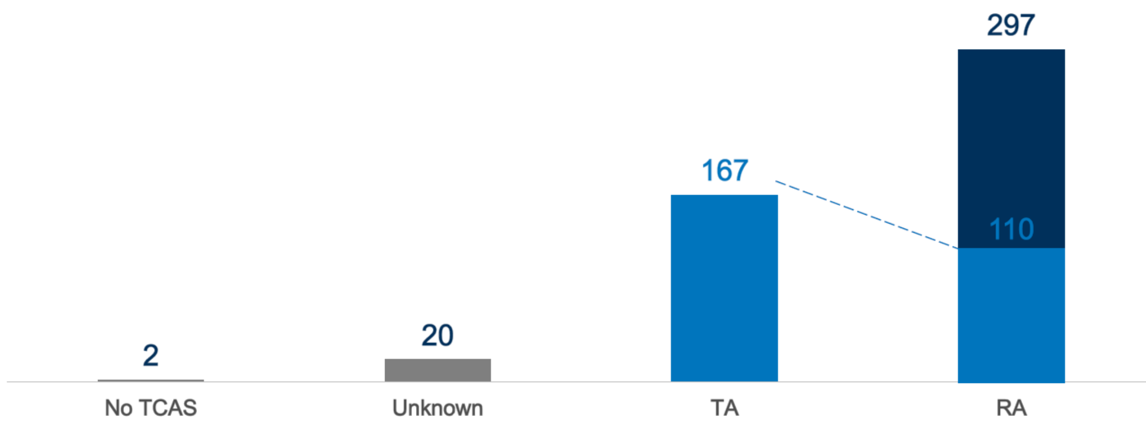
Key findings:

- MENA Region has one of the lowest STEADS reported rates of near MAC events
- MENA operators experience more near MAC incidents outside of MENA airspace
- Near MAC rate in MENA increased from 2014 to 2015, and then descried from 2016 to 2017
- However, 2017 Q1 showed an exceptionally high rate of near MAC events.



STEADES captured 168 TCAS TA reports and 297 TCAS RA reports from MENA from 2013 to 2017

** 110 reports indicated TCAS TAs developed into TCAS RAs*



** No TCAS: Airprox or Inadequate Separation without any TCAS triggered.*

Most near MAC reports were TCAS RA events and 20% of RA also stated Loss of Separation case.

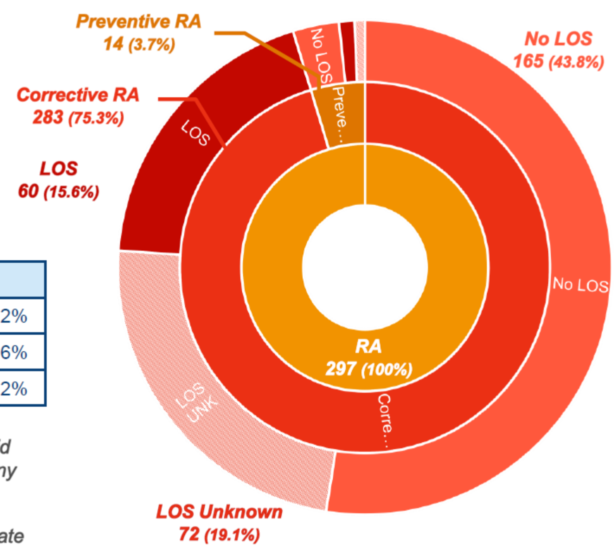
↗ *The end state of 376 TCAS reports:*

No TCAS	2	0.5%
Unknown	20	5.3%
TA	57	15.2%
RA	297	79.0%

↗ *Among 297 RA reports:*

1. RA Category		
Preventive*	14	4.7%
Corrective*	283	95.3%

2. Loss of Separation		
LOS	60	20.2%
No LOS	165	55.6%
Unknown	72	24.2%



** **Preventive RA**: A resolution advisory that advises the pilot to avoid certain deviations from the current flight path but does not require any change in the current flight path. (e.g. Monitor V/S)*

** **Corrective RA**: A resolution advisory that advises the pilot to deviate from the current flight path. (e.g. Climb, Descend)*

5.4 Region Safety Performance - Safety Indicators-Proactive

Safety Indicator	Safety Target	MID	Remark
Regional average EI	Increase the regional average EI to be above 70% by **2020**	70.47	Target Achieved
Number of MID States with an overall EI over 60%.	11 MID States to have at least 60% EI by **2020**	10 States	

Number of MID States with an EI score less than 60% for more than 2 areas (LEG, ORG, PEL, OPS, AIR, AIG, ANS and AGA).	Max 3 MID States with an EI score less than 60% for more than 2 areas by 2017	7 States	
Number of Significant Safety Concerns	MID States resolve identified Significant Safety Concerns as a matter of urgency and in any case within 12 months from their identification. No significant Safety Concern by **2016**.	None	Target Achieved
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, by 2018.	57% (As of Sep 2017) 4 out of 10 States (40%)	
Number of certified international aerodrome as a percentage of all international aerodromes in the MID Region.	a. 50% of the international aerodromes certified by 2015. b. 75% of the international aerodromes certified by 2017.	58%	
Number of established Runway Safety Team (RST) at MID International Aerodromes.	50% of the International Aerodromes by 2020.	56%	

6. Predictive Safety Information

6.1 State Safety Programme (SSP)

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

1. establishment of an initial Acceptable Level of Safety Performance (ALoSP), 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 Implementation Team); 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:

7 continuous update of the SSP Gap Analysis available on iSTARS (13 States completed the Gap Analysis);
7 participate in the new ICAO Safety Management Training Programme (SMTP), with the CBT part and the Safety Management for Practitioners Course (the first course was conducted in the ICAO MID Regional Office, Cairo, Egypt, 14-18 January 2018);
7 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; and
7 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);
7 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 process.

Several Safety Management Workshops, training courses, Safety Summits 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.

6.2 IATA Safety Data

IATA's main database for collecting predictive safety information is Flight Data Exchange (FDX). It is an aggregated de-identified database of FDA/FOQA type events that allows the user to proactively identify safety hazards.

Due to the low levels of participation by the MID Region carriers in FDx program, no useful information could be extracted.

6.3 MID Region Safety Performance – Safety Indicators – Predictive

Safety Indicator	Safety Target	MID
Number of MID States, having completed the SSP gap analysis on iSTARS.	10 MID States by 2015	10 States
Number of MID States that have developed an SSP implementation plan.	10 MID States by 2015	8 States

Number of MID States with EI>60%, having completed implementation of SSP Phase 1.	All MID States with EI>60% to complete phase 1 by **2016**.	3 States (4 States-partially)
Number of MID States with EI>60%, having completed implementation of SSP Phase 2.	All MID States with EI>60% to complete phase 2 by the end of **2017**.	1 State (6 States-partially)
Number of MID States with EI>60%, having completed implementation of SSP Phase 3.	All MID States with **EI>60%** to complete phase 3 by the end of **2018**.	(7 States-partially)
Number of MID States with EI>60%, having completed implementation of SSP.	All MID States with EI>60% to complete SSP implementation by **2020**	None
Number of MID States with EI>60% that have established a process for acceptance of individual service providers' SMS.	a. 30% of MID States with EI>60% by 2015. b. 70% of MID States with EI>60% by 2016. c. 100% of MID States with EI>60% by 2017.	75%

7. Overall Analysis

7.1 Identification of Focus Areas for MID Region

The reactive and proactive safety information provided by ICAO and IATA and The “feared consequences” of the risk portfolio of DGAC France were considered for identifying the main risk areas for the MID Region as follow:

Undesirable/Safety Event		Potential Accident Outcome						
Safety Event	**Accident Severity**	**CFIT**	**LOC-I**	**MAC**	**GCOL**	**RE/ARC**	**Injury or Damage inflight**	**Injury or Damage on Ground**
Technical Problems with Landing Gear Collapse/not Extended during landing	Major					x		x
Contained engine Failure/Power Plant Malfunctions	Catastrophic	x	x				x	
Fire/Smoke-non impact	Catastrophic		x				x	x
Un-stable or non-complaint Approach	Catastrophic	x	x			x		x
Deviation from pitch or roll attitude	Catastrophic	x	x			x		
Security Risks with impact on safety	Catastrophic		x					
Tail/Cross wind/Winds hear	Catastrophic		x			x		x
Loss of separation in flight/ and or airspace/TCAS RA infringement	Catastrophic		x	x			x	
Runway Incursion	Catastrophic				x	x		x
Maintenance events and technical failures	Catastrophic	x	x			x	x	x
Contaminated runway/Poor braking action	Major					x		x
Birdstrike/Engine Bird ingestion	Catastrophic		x			x	x	x
Wake Turbulence	Catastrophic			x			x	
High energy go-around	Catastrophic		x				x	

The table shows that each identified safety issue is linked to the potential accident outcome.

First, Considering ICAO and IATA reactive safety information, the focus areas identified were runway safety (RE/ARC), the Loss of Control-in Flight (LOC-I). Considering the reactive and proactive safety information, safety events have been identified which could lead to the potential accident outcomes of Controlled Flight Into Terrain (CFIT) and Mid Air Collision (MAC) as detailed in the above table of feared consequences" of the risk portfolio of DGAC France. Therefore, the CFIT and MAC were also considered as focus areas due to the potential risk of these type of accidents though the MID States did not experience those accidents during the period 2013-2017.
Based on the analyses of all ICAO and IATA data, it is concluded that the Focus Areas for the MID Region are:

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

Further information about the potential accident outcomes regarding the focus areas is provided below:

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 2013-2017 aircraft, upset or loss of control only contributed two accidents. It includes uncontrolled collisions with terrain following engines failures after take-off, but also occurrences where the aircraft deviated from the intended flight path or aircraft flight parameters, regardless of whether the flight crew realized the deviation and whether it was possible to recover or not.

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 2013-2017, Runway Excursions and abnormal runway contact accidents and serious incidents mainly occurred in the landing phase of flight. This includes materialized runway excursions, both high and low speed and occurrences where the flight crew had difficulties maintaining the directional control of the aircraft or of the braking action during landing, where the landing occurred long, fast, off-centred or hard, or where the aircraft had technical problems with the landing gear (not locked, not extended or collapsed) during landing.

Mid-Air Collision (MAC)
Refers to the potential collision of two aircraft in the air. It includes direct precursors such as separation minima infringements, genuine TCAS resolution advisories or airspace infringements. Although there have been no aero plane mid-air collision accidents in recent years within the MID States, this key risk area has been raised by some MID States. This is one specific safety issue that is a main priority in this key risk area. However, additional data is needed for further analysis in order to identify the underlying safety issues.

Controlled Flight In to Terrain (CFIT)
It comprises those situations where the aircraft collides or nearly collides with terrain while the flight crew has control of the aircraft. It also includes occurrences, which are the direct precursors of a fatal outcome, such as descending below weather minima, undue clearance below radar minima, etc. There was no fatal accident involving MID States operators during this period. This key risk area has been raised by some

MID States and in other parts of the world that make it an area of concern. However, additional data is needed for further analysis in order to identify the underlying safety issues.

7.2 Identification of emerging risks for MID Region

New emerging risks have been identified, as follows:
Regarding the emerging risks mainly identified from the serious incidents, IATA data and the incidents data provided by the States except the risk of security related which was included under the accident data of the State of occurrence.

1. Security Risks with impact on safety-SEC;
2. Fire/smoke- (non-impact)- (FN-I);
3. Runway incursion (RI);
4. Birdstrike-(BIRD);
5. Wake Vortex; and
6. Wind Shear

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

Fire/Smoke- (non-impact) (FN-I)
Uncontrolled fire on board an aircraft, especially when in flight, represents one of the most severe hazards in aviation. In-flight fire can ultimately lead to loss of control-inflight, either because of structural or control system failure, or again because of crew incapacitation. Fire on the ground can take hold rapidly and lead to significant casualties if evacuation and emergency response are not swift enough. Smoke or fumes, whether they are associated with fire or not, can lead to passenger and crew incapacitation and will certainly raise concern and invite a response. Even when they do not give rise to a safety impact, they can give rise to concerns and need to be addressed. While there were no fatal accidents involving MID States operators in the last years involving fires, there have been incidents reported by MID States, which make it an area of concern.

Security related (SEC)
The impact of security in safety is a real concern and should be considered as a strategic priority. In addition, it should be shared with MID shared with MID States and ICAO MID Office (AVSEC) for further data collection and analysis and come out with strategic initiatives.

Birdstrike (BIRD)
Their accident outcomes could lead to runway collisions or Loss of control-inflight or runway excursions. While there were no fatal accidents involving MID States air operators in the last years involving birdstrike, there have been huge number of birdstrike occurrences reported by MID States and that make it an area of concern. Thus, MID States should provide further data analysis in order to identify the root causes and associated safety issues.

Wake Vortex

Their accident outcomes could lead to Loss of control-inflight. While there were no fatal accidents involving MID States air operators in the last years involving wake turbulence. However, there have been number of wake vortex occurrences reported by MID States and highlighted in the IATA data which make it an area of concern. Therefore, further attention should be given this safety issue.

8. Final Conclusions

Following the analysis of the reactive and proactive safety information provided by IATA and ICAO for the period 2013 - 2017, it was concluded that the main Focus Areas for the MID Region are:

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

The following are identified as Emerging Risks in the MID Region besides the old ones:

1. Security risks with impact on safety- SEC;
2. Fire/Smoke (non-impact)- F-NI;
3. Runway Incursion (RI);
4. Birdstrike- (BIRD);
5. Wake vortex; and
6. Wind Shear

The regional average overall Effective Implementation (EI) in the MID Region (13 out of 15 States have been audited) is 73.24 %, which is above the world average 66.27% (as of 10 October 2018). Three (3) States are currently below EI 60%.

The EI by Area (e.g. Operations, Airworthiness) shows that all areas are above 60% EI, which reflect the improvement in the oversight capabilities particularly in the area of ANS and AGA. With respect to the Critical Elements (CEs), CE4 (Qualified technical personnel) still represents the lowest with 56.89% EI, whereas CE8 (resolution of safety issues) is also below EI 60% (56. 84).

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). Common challenges/difficulties related to SSP implementation include identification of a designated entity, establishment of an initial Acceptable Level of Safety Performance (ALoSP), allocation of resources to enable SSP implementation and lack of qualified and competent technical personnel.

It should be highlighted that reporting of incidents is still low in the MID Region (Confidentiality concerns). Moreover, mechanisms for gathering and processing predictive safety information at regional level should be established in order to collect and analyse safety data to proactively identify safety concerns before accidents and/or incidents occur, to develop timely mitigation and prevention measures.

Appendix A: List of Acronyms

ARC	Abnormal Runway Contact
ADRM	Aerodrome
ANSP	Air Navigation Service Provider
ATC	Air Traffic Control
ATS	Air Traffic Services
ASRT	Annual Safety Report Team
BIRD	Birdstrike
CTOL	Collisions with Obstacles during Take Off or Landing
CFIT	Controlled flight into terrain
DIP	Detailed Implementation Plan
F-IN	Fire/Smoke (Non-Impact)
FDA	Flight Data Analysis
FOQA	Flight Operations Quality Assurance
GCOL	Ground Collision
RAMP	Ground Handling
GASP	ICAO Global Aviation Safety Plan
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
LOC-G	Loss of Control - Ground
LOC-I	Loss of control - inflight
MAC	Mid Air Collision
MTOW	Maximum Take-off Weight
MENA	Middle East & North Africa (IATA Region)
MID	Middle East Region (ICAO Region)
RAST	Regional Aviation Safety Group
RE	Runway Excursion (departure or landing)
RI	Runway Incursion
RS	Runway Safety
SEI	Safety Enhancement Initiative
SMS	Safety Management System
SOP	Standard Operating Procedure
SSP	State Safety Programme
SCF-NP	System Component Failure-Non-Power Plant
SCF-PP	System Component Failure-Power Plant
USOS	Undershoot/Overshoot
UAS	Undesirable Aircraft State
USOAP	Universal Safety Oversight Audit Program
WILD	Wildlife

Appendix B: Go- Around

Two MID Region State registered aircraft were involved in fatal accidents in 2016 following a go around. For one accident, the Go-Around was conducted from altitudes other than the missed approach point and for the other one, the Go-around was commanded after Abnormal Runway Contact. The Go-around is a very challenging procedure and flight crew have to be sufficiently familiar with flying Go-arounds through initial and recurrent training.

To shed light on this issue, in August 2013 BEA France published the results of specific study related to the "Areophane State Awareness during Go Around". (ASAGA). The study determined that ASAGA type events are due to the combination of the following:

- Time pressure and a hard workload
- The inadequate control of the primary flight parameters during Go-arounds, especially with startle effect
- Challenges in applying CRM principles in startle situation.
- Inadequate monitoring by the PNF
- The low number of Go-around performed by the flight crew, both in flight and simulators
- Inadequate fidelity on flight simulators
- The non-detection of the non-position of nose-up trim by the crew during go-arounds
- Mismatch between the design of procedures for Go-arounds and the performance characteristics of modern public transport aeroplanes
- Somatogravic illusions related to the excessive thrust on aeroplanes, the lack of evaluation of visual scan during the go arounds
- The channelized attention of crew members
- The difficulty of reading and understanding FMA modes
- Excessive time spent by the PNF on manipulating the FCU/MCP

Based on the study, the BEA worked out a number of safety recommendations, which are included in the report. The complete study is published at http://www.bea.aero/etude/asaga/asaga.php

Additionally, Flight Safety Foundation (FSF) published on March 2017 a study on "Go-around decision-making and execution project" and the study revealed that conducting a Go-around carries a number of risk including:

- Ineffective initiation of a Go-around, which can lead to LOC-I;
- Failure to maintain control during a Go-around, which can lead to LOC-I, including Abnormal Contact with the runway, or to CFIT;
- Failure to fly the required track, which can lead to CFIT or MAC;
- Failure to maintain traffic separation, which can lead to MAC; and
- Generation of wake turbulence, which may create a hazard for another aircraft that, can lead to LOC-I.

Considering the above, a focus on Go-arounds is of extreme importance and the handling of the aircraft during and after a Go-around represents a risk factor to be considered, especially on circumstances not foreseen during simulator training.

CREDITS

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