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MID Region Annual Safety Report

Sixth Edition

June 2018

Reference Period (2012 - 2016)

ICAO

Regional Aviation Safety Group – Middle East (RASG-MID)
Sixth Edition, June 2018

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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 34.9 million departures in 2016, compared to 30.9 million departures in 2012. The MID Region showed a stable growth in traffic volumes. Total scheduled commercial departures in 2016 accounted approximately for 1.30 million departures compared to 1.06 million departures in 2012. In terms of aircraft accident, the MID Region had an accident rate of 2.3 accidents per million departures in 2016. However, the MID Region five-year average accident rate for 2012 – 2016 is 2.76, which is equal to the global average rate for the same period.

The average rate of fatal accidents in the MID Region for the period (2012-2016) is 0.64 accident per million departures, compared to 0.26 for the globe. The MID Region had no fatal accidents in 2012 and 2013. However, four fatal accidents occurred in 2014, 2015 and 2016 (one, one and two, respectively). 38 fatalities in 2014, 224 fatalities in 2015 and 67 fatalities in 2016.

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

1. Runway Safety (RS)- (mainly RE and ARC during landing);
2. System Component Failure- Power Plant - (SCF-PP); and
3. Loss of Control Inflight - (LOC-I).

New emerging risks have been identified, as follows:

1. Fire/Smoke (non-impact) – F-NI;
2. Turbulence Encounter (TURB); and
3. Medical (MED).

With respect to the USOAP CMA, the regional average overall Effective Implementation (EI) in the MID Region is 70.47 %, which is above the world average 65.15% (as of January 2018). Three (3) States are currently below 60% EI.

The EI by Area (e.g. Operations, Airworthiness) shows that all areas are above 60% EI, which reflects the improvement in the oversight capabilities particularly in the area of ANS and AGA. The Critical Elements (CE4) related to qualified technical personnel still represents the lowest with 50.52% EI, whereas (CE8) related to resolution of safety issues is also below EI 60%.

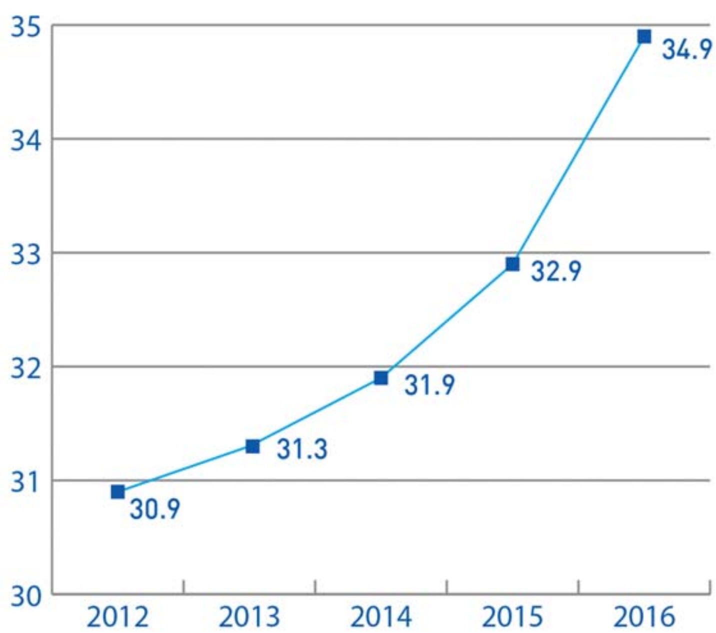
Implementation of SSP is one of the main challenges faced by States in the MID Region. The RASG-MID addresses the improvement of SSP implementation in the MID Region as one of the top Safety Enhancement Initiatives (SEIs). Currently, States in the MID Region could not reach to full implementation of 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

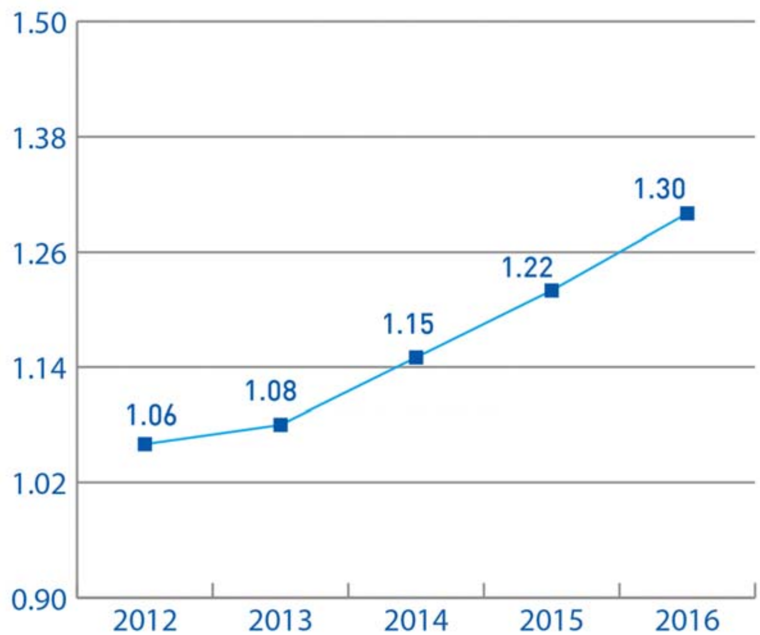
The global scheduled commercial international operations accounted for approximately 34.9 million departures in 2016, compared to 30.9 million departures in 2012.



Graph 1: Global Traffic Volume

MID Traffic

The MID Region shows a stable growth in traffic volumes. Total scheduled commercial departures in 2016 accounted approximately for 1.30 million departures compared to 1.06 million departures in 2012.



Graph 2: MID Traffic Growth

4. Reactive Safety Information

4.1 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 (2012-2016), which is used for monitoring the progress of achieving the Safety Targets in the MID Region Safety Strategy.

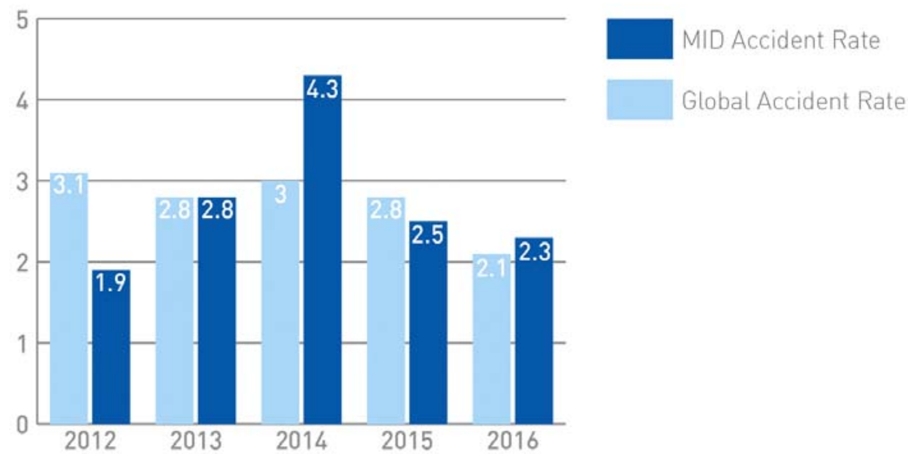
In addition, it provides data analysis regarding accidents and serious incidents of aircraft registered in the MID Region (State of Registry) as well as for the MID air operators (State of the Operator) using the same criteria mentioned above. It is to be highlighted that the State of registry and State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

4.1.1 MID State of Occurrence

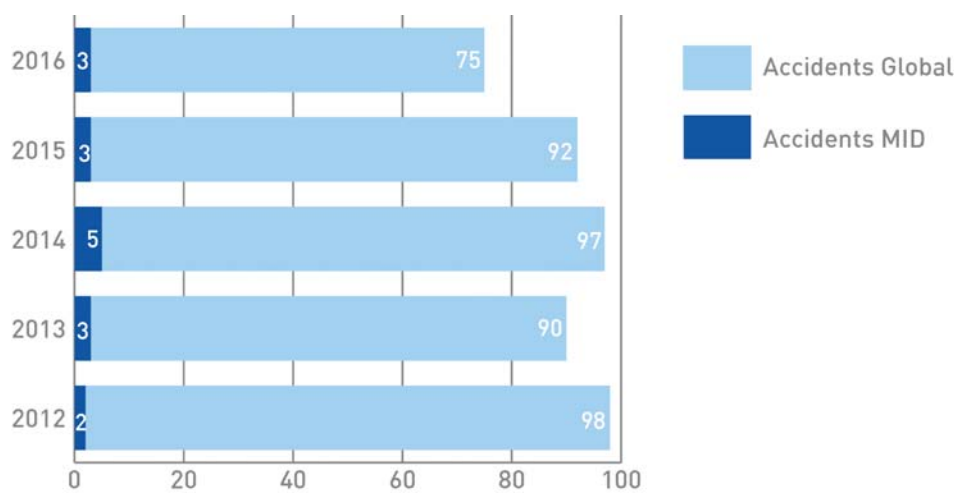
Accidents Rates and Fatalities

The MID Region had an accident rate of 2.3 accidents per million departures in 2016, which slightly decreased compared to the previous year (2015). However, the 5-year average accident rate for 2012-2016 is 2.76, which is equal to the global average rate for the same period.

The Graph 4 shows that 16 accidents occurred in the MID Region during the period (2012-2016), whereas (452) accidents occurred globally. The accidents that occurred in the MID Region represent 3.5% of the global accidents.

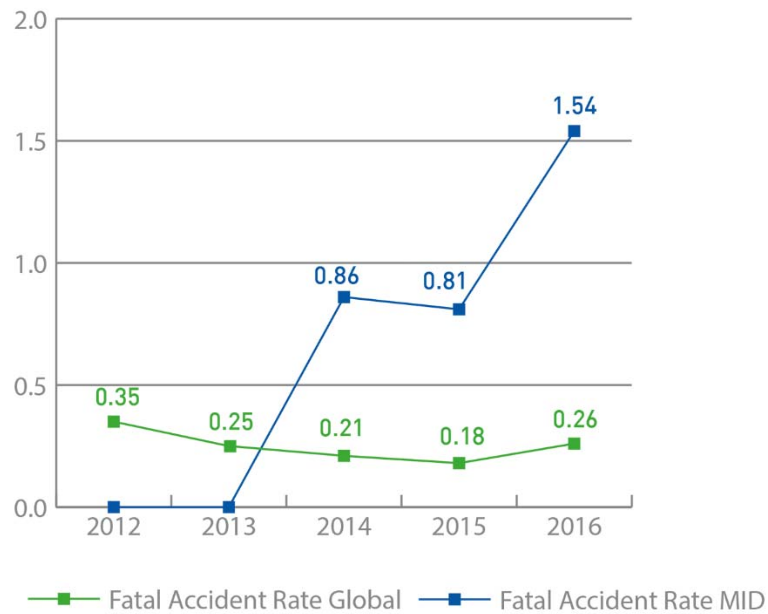


Graph 3: Global Accident Rate Vs MID Accident Rate

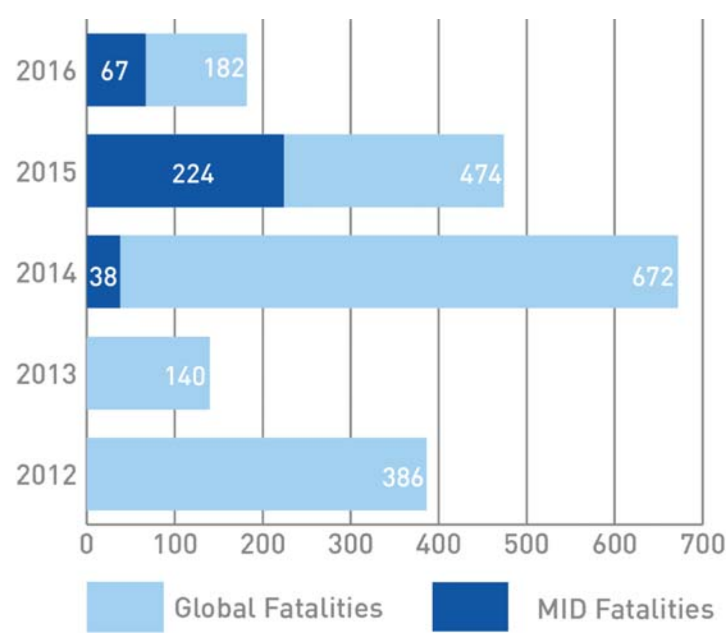


Graph 4: Number of MID Accidents Vs. Number of Global Accidents Per Year

The Graph 5 shows that the average rate of fatal accidents in the MID Region for the period (2012-2016) is 0.64 accident per million departures, compared to 0.26 for the globe. The MID Region had no fatal accidents in 2012 and 2013. However, four fatal accidents occurred in 2014, 2015 and 2016 (one, one and two, respectively). The 2014 accident caused 38 fatalities, 224 fatalities were registered in 2015 and 67 in 2016 as shown in Graph 6.

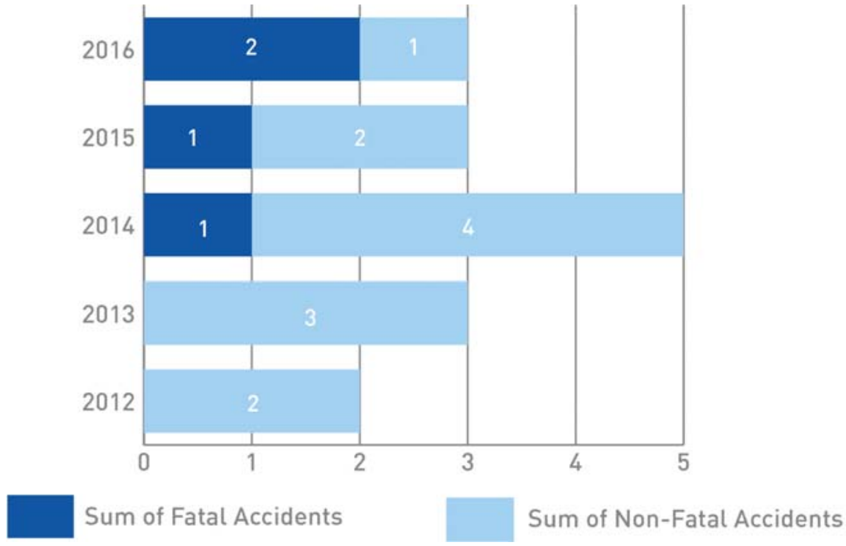


Graph 5: Global Fatal Accident Rate Vs MID Fatal Accident Rate



Graph 6: Number of MID Fatalities Vs. Global Fatalities

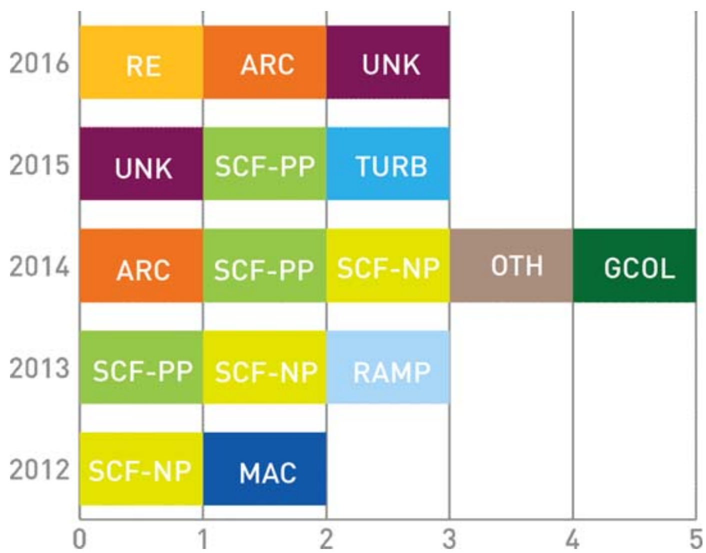
The Graph 7 shows that two fatal accidents occurred in 2016, which caused an increase of the number of fatal accidents compared to the previous year. However, in terms of fatalities, 2016 shows a significant decrease of number of fatalities with a total of 67 fatalities compared to 2015, which registered a total number of 224 fatalities.



Graph 7: Number of Fatal Accidents Vs Non-Fatal Accidents Per Year (2012-2016)

Occurrence Category

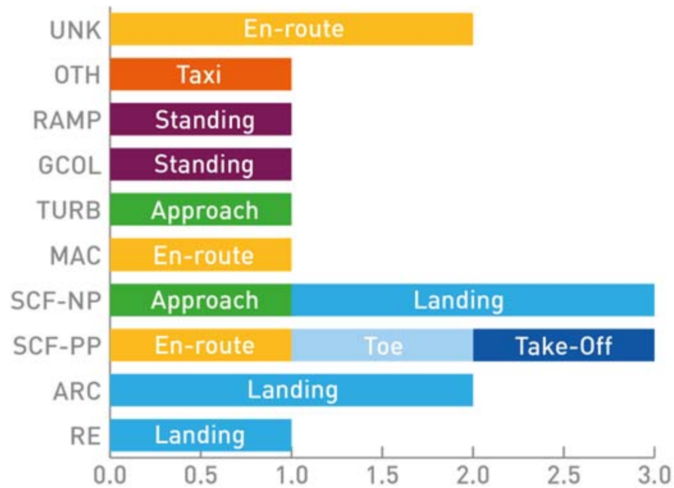
The Graph 8 indicates that during the period (2012-2016), the LOC-I and CFIT accidents have not been reported. However, the engine failure/malfunction (SCF-PP), runway excursion (RE), and abnormal runway contact (ARC) events represent the main areas of concern. Regarding "Unknown" occurrence category, the causal factors of the accident are still under investigation and thus the occurrence category could not be defined at this stage.



Graph 8: Distribution of Occurrence Category Per Year (2012-2016)

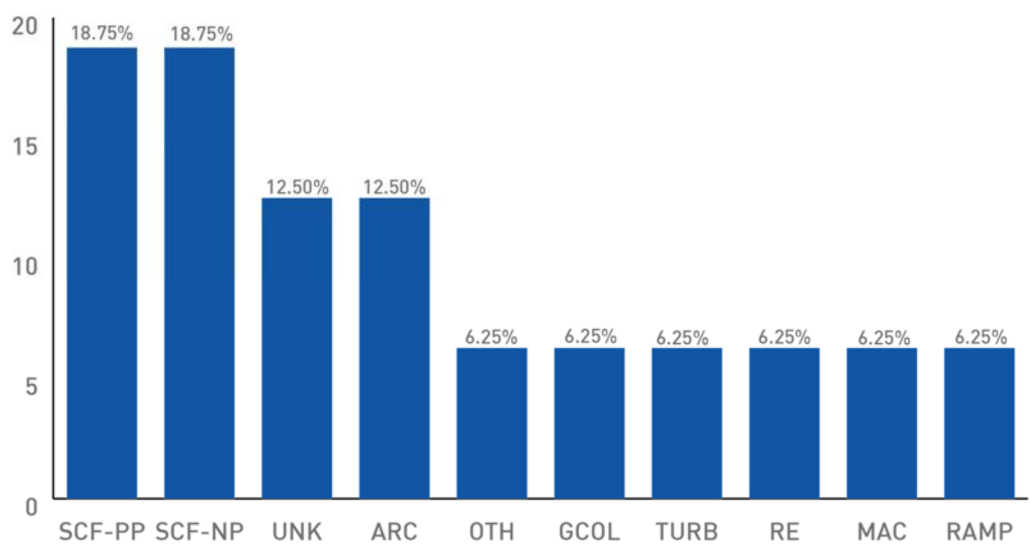
Phase of Flight

The Graph 9 shows that the majority of accidents occurred during landing and En-route phase of flights. 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.



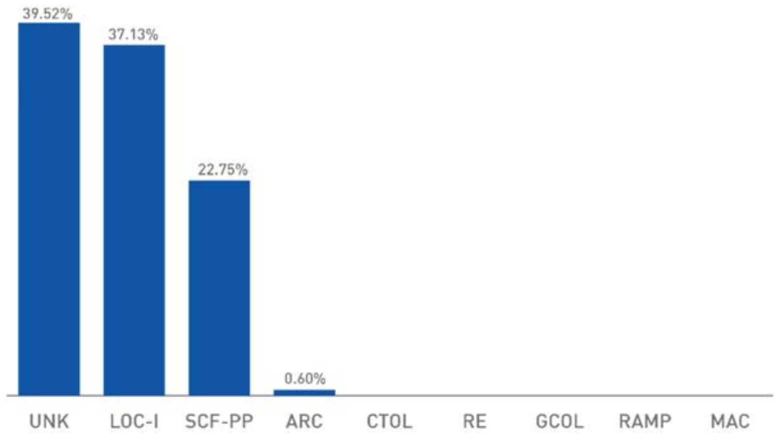
Graph 9: Distribution of Occurrence Category Per Phase of Flight (2012-2016)

The Graph 10 shows that most of the accidents categories experienced during the 2012-2016 were the system component failures, followed by abnormal runway contact.



Graph 10: Occurrence Category Distribution as Percentage Per Accident

The Graph 11 shows that the fatalities for the period 2012-2016 were associated to the following Occurrence Categories: Unknown (UNK), engine failure/malfunction (SCF-PP) and Abnormal Runway Contact (ARC).



Graph 11: Fatalities Distribution as Percentage by Occurrence Category (2012-2016)

Taking a more in-depth look at the fatal accidents and accidents for the MID Region (State of occurrence) for the period 2012-2016, the following observations are made:

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

1. Unknown – UNK;
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 (SCF) - (SCF-PP and SCF-NP); and
3. Mid Air Collision – (MAC).

It is to be highlighted that MAC was considered because of its severity outcome, which could be catastrophic though it only occurred once.

Identification of the main Risk Areas based on the analysis of accident data related to the State of Occurrence (2012-2016)

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. 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.

Accordingly, the following matrix shows the assessment for the top accidents categories (excluding UNK and OTHR). (For Frequency rating: 1 is the most frequent and 6 is the least frequent. For Severity: 1 is the most severe and 3 is the least severe):

Severity \ Frequency	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

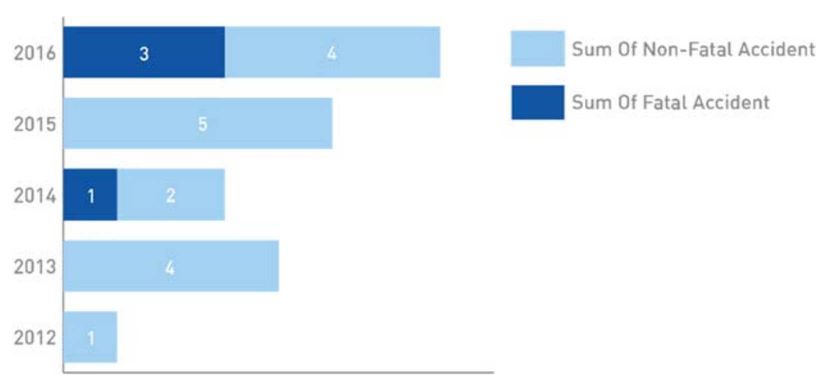
Based on the risk matrix, priority was given to the categories, which scored below 6. Therefore, the safety risk areas according to the State of occurrence's accidents data are:

a) Runway Safety (RS): Runway Excursion (RE) and Abnormal Runway Contact (ARC) during landing
b) System Component Failure-Power Plant (SCF-PP)

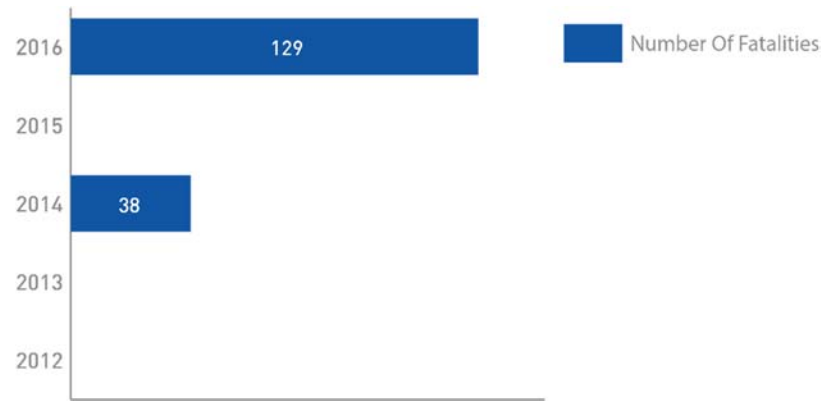
4.1.2 MID State of Registry of Operator

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 three fatal accidents occurred in 2016 involving MID Operators, which indicated an increased number of fatal accidents in 2016 compared to the previous years. In terms of fatalities, the Graph 13 shows that the three fatal accidents, which occurred in 2016, resulted in 129 fatalities.



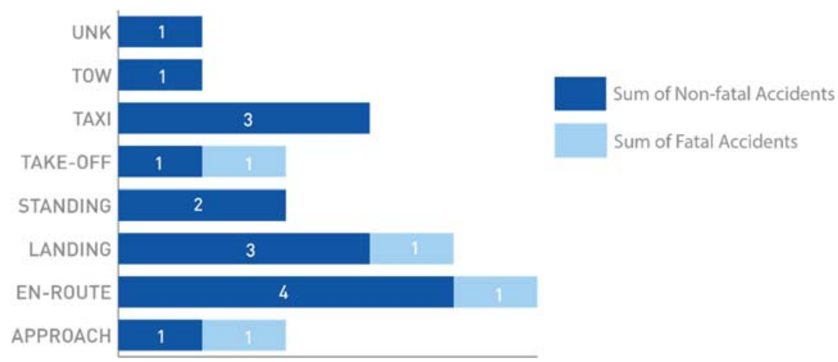
Graph 12: Number of Fatal and Non-Fatal Accidents per Year (2012-2016



Graph 13: Number of Fatalities per Year (2012-2016)

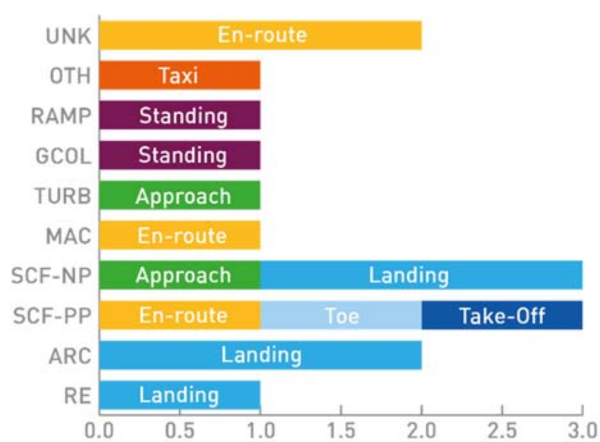
Phase of Flight

The Graph 14 shows that the majority of fatal accident and non-fatal accidents are still taking place during the En-route phase, followed by the landing, take-off, and approach.



Graph 14: Fatal accidents and Non-Fatal Accidents per Phase of Flight (2012-2016)

The Graph 15 shows that the majority of accidents related to Runway Excursion and Abnormal Runway Contact 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 15: Distribution of the Number of Accidents Category per Phase of Flight (2012-2016)

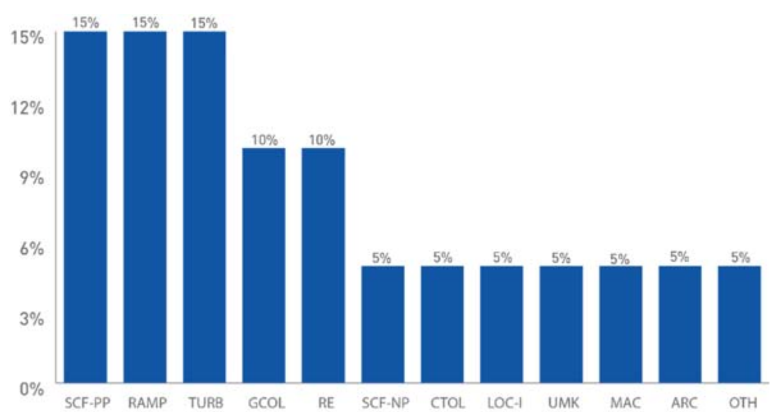
During 2012-2016, two fatal accidents took place during approach (go-around-GOA) phase of flight (For further analysis on the Go-Around procedures see the **Appendix B**). Therefore, En-route, Go-around (GOA), and Initial Climb (ICL) represent the most critical flight phases in the MID Region.

Occurrence Category

The Graph 16 shows the percentage of fatalities associated with the accident Categories for the period 2012-2016: Unknown (UKN), Loss of Control in flight (LOC-I), engine failure/malfunction (SCF-PP) and Abnormal Runway Contact (ARC).

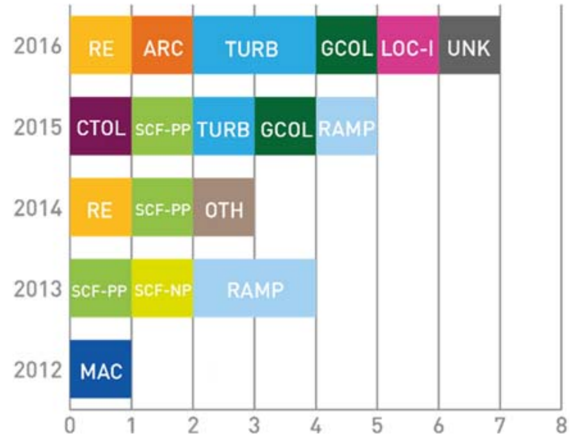
Graph 16: Fatalities Distribution as Percentage by Occuurrence Category (2012-2016)

The Graph 17 shows that most of the accidents categories experienced during the period 2012 - 2016 were the engine failure/malfunction (SCF-PP), followed by Turbulence and Ramp. However, considering that RE, GCOL, RAMP and ARC are all considered part of the Runway Safety (RS) Risk Category, RS is still the most frequent. 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 17: Accident Distribution as Percentage per Occurrence Category (2012-2016)

During 2012-2016, 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 18: Accident Category Distribution per Year

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 2012-2016, the following is to be highlighted:

a) In terms of fatality, the fatal accidents categories in the MID Region for the period 2012 – 2016 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 2012 – 2016 are:

1. Runway Safety (RS) – (RE, ARC, GCOL, RAMP, CTOL);
2. System Component Failure-Power Plant (SCF-PP);
3. Turbulence encounter – (TURB); and
4. Mid Air Collision (MAC).

It is to be highlighted that MAC was considered because of its severity outcome, which could be catastrophic though it only occurred once.

Identification of the main Risk Areas based on the analysis of safety data related to the State of registry and State of operator (2012-2016)

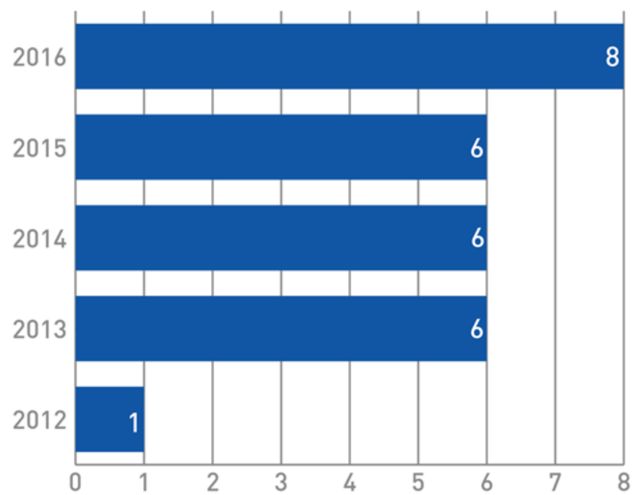
To facilitate the identification of the safety priority areas; the accidents data has been analysed in terms of frequency and severity using the below risk matrix (for Frequency rating: 1 is the most frequent and 6 is the least frequent. For Severity: 1 is the most severe and 3 is the least severe):

Based on the risk matrix, priority was given to the categories, which scored below 6. Therefore, the safety risk areas according to the State of Registry and State of Operator's accidents data are:

a) Runway Safety (RS): Runway Excursion (RE) and Abnormal Runway Contact (ARC) during landing;
b) System Component Failure-Power Plant (SCF-PP);
c) Loss of Control-Inflight (LOC-I); and
d) Turbulence encounter (TURB).

Serious Incidents Data Analysis

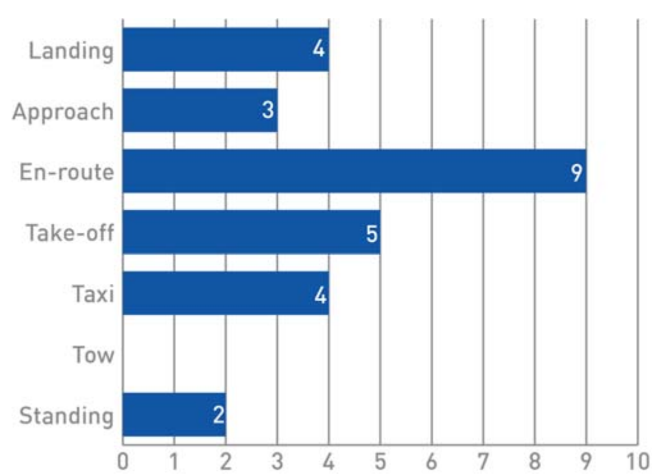
The Graph 19 shows that there was a slight increase in the number of reported serious incidents during 2016 compared to the previous years, resulting in a total of eight (8) serious incidents. This increase is likely to be due to the better reporting channels and data capture from the MID States.



Graph 19: Number of Serious Incidents per Year (2012-2016)

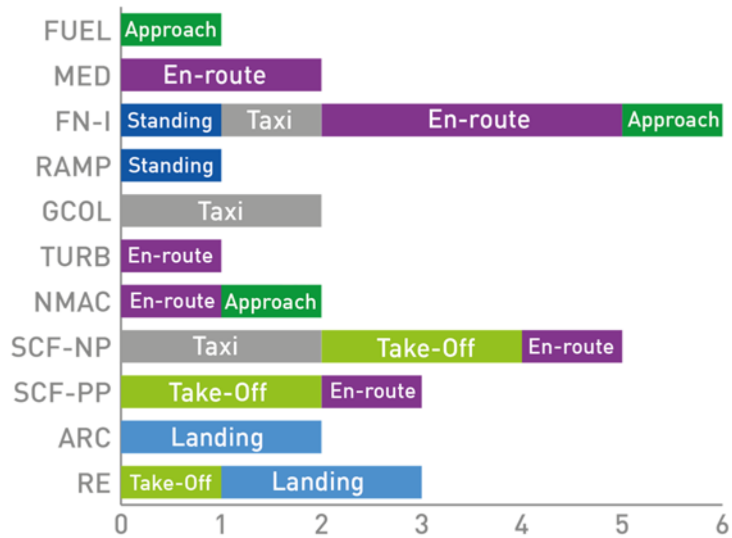
Phase of Flight

The Graph 20 shows that the majority of serious incidents are taking place during the En-route phase, followed by take-off and landing.



Graph 20: Serious Incidents per Phase of Flight (2012-2016)

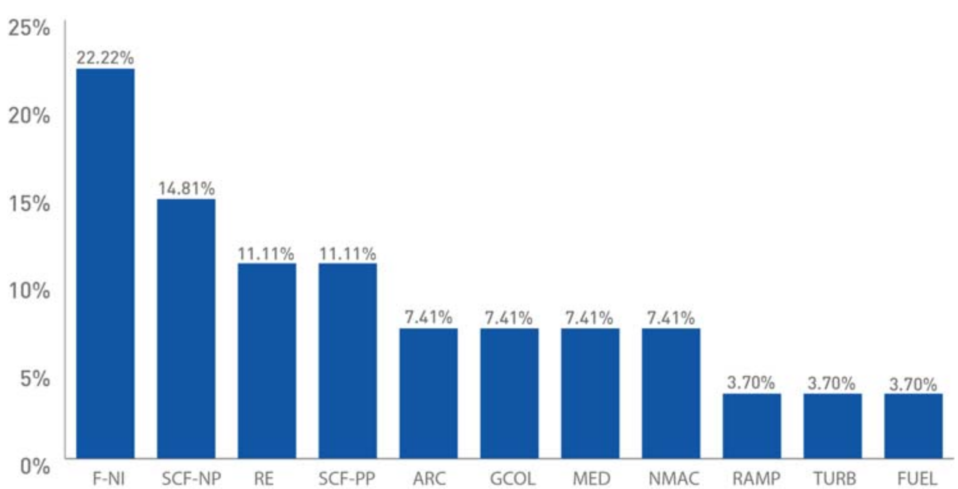
The Graph 21 shows that the majority of Runway Excursion and Abnormal Runway Contact occurrence categories took place during landing flight phase. The data analysis also shows that fire/smoke events mainly occurred during En-route phase of flight. It was also noted that the engine failure/malfunction events occurred during take-off flight phase.



Graph 21: Distribution the Number of Serious Incidents Category per Phase of Flight (2012-2016)

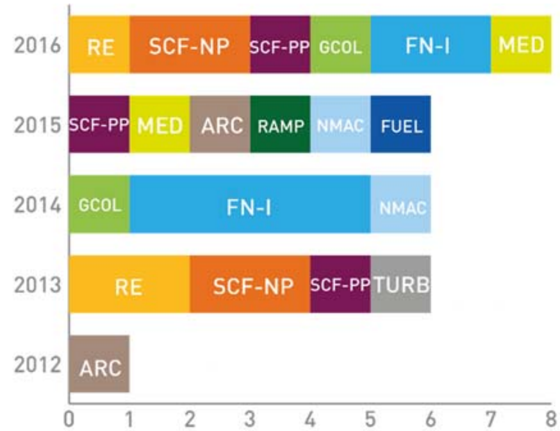
Occurrence Category

The Graph 22 shows that most of the serious incident categories experienced during the period 2012 - 2016 were the system component failures (PP and NP combined), followed by the fire/smoke, Runway Excursion and abnormal runway Contact categories. The near midair collision events have been recorded, but took place outside the MID Region airspace.



Graph 22: Serious Incidents Distribution as Percentage per Occurrence Category (2012-2016)

The Graph 23 shows that during 2012-2016, System component failures, Runway Excursion (RE), Abnormal Runway Contact (ARC) events were registered and are still prevailing. However, the fire/smoke and medical (Flight crew incapacitation during flight) events have been emerged during this period.



Graph 23: Serious Incidents Category Distribution per year

Taking a more in-depth look at the serious incidents for the MID Region (State of registry and State of operator) for the period 2012-2016, 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);
2. System Component Failure (SCF) - (SCF-PP and SCF-NP);
3. Fire/smoke- (FN-I);
4. Near Mid Air Collision (NMAC);
5. Medical (MED);
6. Turbulence (TURB); and
7. Fuel.

4.1.3 Overall Analysis

Taking into consideration the last 5 years fatal accidents, non-fatal accidents, and serious incidents involving State of occurrence, State of operator, and State of registry; the main risk areas for the MID Region are:

1. Runway Safety (RS); mainly (RE and ARC during landing);
2. System Component Failure –Power Plant- (SCF-PP); and
3. Loss of Control-In Flight (LOC-I).

In the last five years, the SCF-PP and LOC-I resulted in fatalities, whereas, runway excursion (RE) and abnormal runway contact (ARC) occurred more often, but resulted in far fewer fatalities.

New emerging risks have been identified, as follows:

1- Fire/Smoke (non-impact) – F-NI;
2- Turbulence Encounter (TURB); and
3- Medical (MED).

4.1.3.1 MID Region Risk Areas In-depth Analysis

A. **Runway Excursions and Abnormal Runway Contact:** During 2012-2016 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

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

3. 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

4. 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

5. 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 2012 and 2016 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 2012-2016 Aircraft upset or loss of control only contributed to one accidents but counted for around 38% of fatalities. During 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

4.1.3.2 MID Region Emerging Risks In-depth Analysis

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

A. **Fire/Smoke (non-impact)- F-NI:** During 2012-2016, fire/smoke contributed to 10% of the serious incidents. The ones identified were mainly smoke and fire from the galley and fire was controlled by the cabin crew-using fire extinguisher; electrical fume, cabin smoke, smoke indication from the after cargo, and engine fire and fire was controlled by aerodrome fire services. Three events occurred inflight and emergency procedures were declared and landed safely.

Root Cause Analysis

1. Latent Conditions
   i. Ineffective SMS implementation including safety risk management and safety assurance.
   ii. Regulatory oversight

2. <u>Threats</u>
   i. Galley fire/smoke events especially Oven malfunction
   ii. Inappropriate storage of paper products adjacent to either hot fluorescent ballast units or the hot water heaters in the toilets
   iii. In-Flight Entertainment (IFE) inappropriate maintenance
   iv. Cabin Lights/Signs failures such as a wiring and faulty ballast units
   v. Galleys equipment failures
   vi. Uncontained engine failure
   vii. Contained engine failures including surges, high pressure and low-pressure turbine failures, compressor failures, false warnings, and bleed failures
   viii. Improper prepared DGs e.g. lithium batteries leaking inner packaging

3. <u>Contributing Factors:</u>
   i. Electrical overheat or arcing issues due chaffing or component failure
   ii. Wiring Inspections not performed adequately Smoke source not in area where detectors are fitted (e.g. not detected or delayed detection)
   iii. Thermal runaway of aircraft equipment batteries issues
   iv. Use of bogus parts
   v. Engine or Auxiliary Power Unit fires

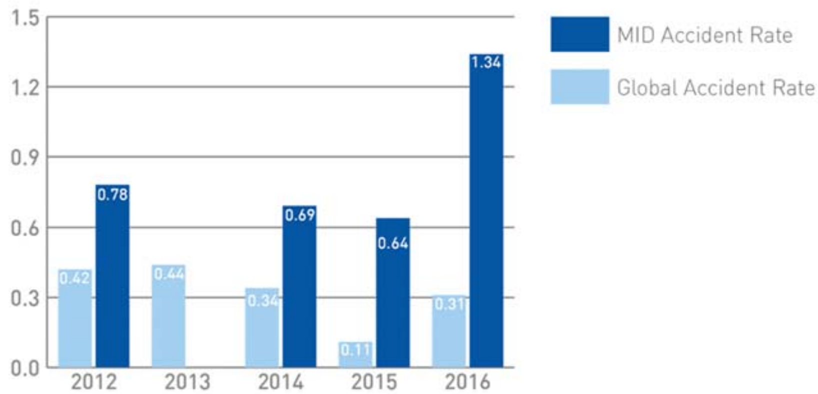
4.2 IATA Data

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 2012 – 2016 and is narrowed down to the MID States.

*4.2.1 **Regional Accidents Rates** (Per million departures)*

4.2.2 Regional Fatal Accident Rates (Per million departures)



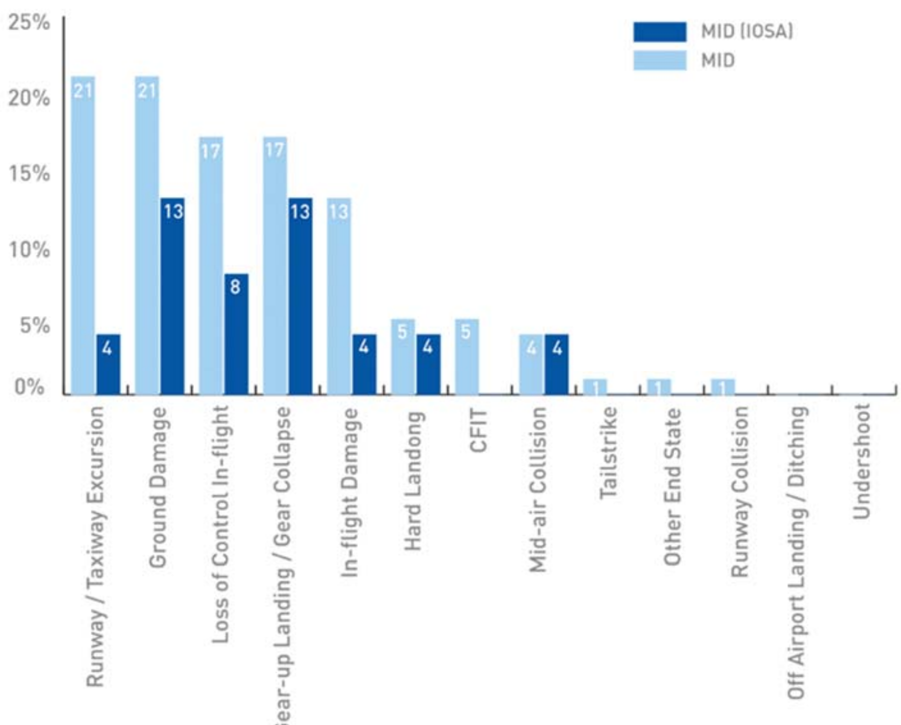
4.2.3 Analysis of MID Accidents between 2012 and 2016

This analysis provides an overview of the accidents between 01 Jan 2012 and 31 Dec 2016.

4.2.3.1 Accidents Categories and Analysis

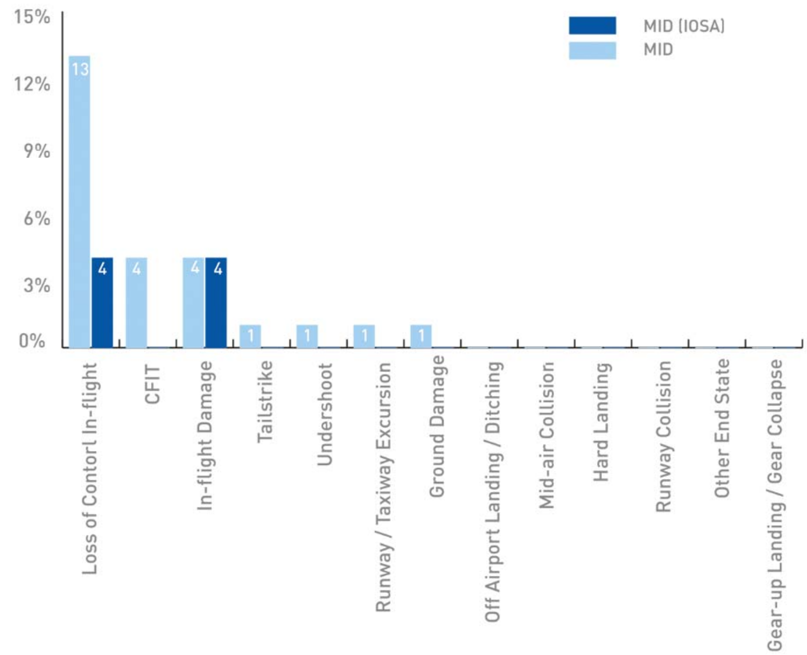
A. MID Accident Categories: 2012-2016

Distribution of accidents as percentage of total.



B. MID Fatal Accident Categories (2012 - 2016)

Distribution of accidents as percentage of total



C. IATA In-Depth Analysis of MID Accidents

Taking a more in-depth look at the IATA accidents statistics for the MID Region (2012-2016), the following observations are made;

1. In terms of frequency, the most frequent accidents categories in the MID Region for the period 2012 – 2016 are:

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

2. In terms of fatality, the top three fatal accidents categories in the MID Region for the period 2012 – 2016 are:

    a) Loss of Control Inflight (LOC-I)
    b) Inflight damage (IFD)
    c) Controlled Flight Into Terrain (C-FIT)

3. Top three flight phases when fatal accidents occur in the MID Region are Landing (LND), Go around (GOA), and Approach (APR).

4. To facilitate the identification of the safety risk areas; the accidents data has been analysed in terms of frequency and severity, in accordance with the methodology endorsed by the RASG-MID.

Priority is given to the categories, which score below 6. As a result, the safety risk areas according to IATA's accidents data are:

a) Runway/ Taxiway Excursion
b) Ground Safety
c) Loss of Control In Flight (LOC-I)
d) Inflight Damage (IFD)
e) Controlled Flight Into Terrain (CFIT)

It is worth mentioning here that according to the ICAO classification, Gear up landing/ Gear collapse and Ground safety fall under Runway Safety.

5. Below is an in-depth analysis for three of the high risk categories identified for the MID Region covering the period 2012 - 2016:

Runway Excursion

1. Trend 2012 to 2016

		2012	2013	2014	2015	2016
MID	**Accident rate**	0.78	0.00	0.69	0	2.01
	# Accidents	1	0	1	0	3
World	**Accident rate**	0.64	0.52	0.45	0.40	0.29
	# Accidents	22	18	16	15	12

2. Severity of outcomes
None of the five accidents in the MID Region were fatal. Two of the accidents resulted in a hull loss and three resulted in substantial damage.

3. Contributing factors:
   i. Safety management
   ii. Regulatory oversight
   iii. Airport facilities
   iv. Ground based navigation aid malfunction
   v. Poor/faint marking signs
   vi. Flight crew errors related to manual handling/ flight controls

Loss of Control In-flight (LOC-I)

1. Trend 2012 to 2016

		2012	2013	2014	2015	2016
MID	**Accidents rate**	0.00	0.00	0.69	0.00	1.34
	# Accidents	0	0	1	0	2
World	**Accidents rate**	0.18	0.23	0.17	0.08	0.17
	# Accidents	6	8	6	3	7

2. Severity of outcomes:
Two of the accidents were fatal resulting in 110 fatalities. Moreover, all three accidents resulted in hull losses.

3. Contributing factors:
    i. Flight Ops: SOP checking
    ii. Environmental threats related metrology, wind/wind shear/ gusty wind
    iii. Contained engine failure/ Power plant malfunction
    iv. Flight crew errors related to manual handling, flight controls, callouts and automation
    v. Operation outside aircraft limitation
    vi. Monitor cross check and workload management

Controlled Flight into Terrain (CFIT)

1. Trend 2012 to 2016

		2012	2013	2014	2015	2016
MID	**Accidents rate**	0.87	0.00	0.00	0.00	0
	# Accidents	1	0	0	0	0
World	**Accidents rate**	0.18	0.14	0.17	0.03	0.05
	# Accidents	6	5	6	1	2

2. Severity of outcomes
   The accident was fatal resulting in 32 fatalities and a hull loss.

3. Contributing factors:
   As per IATA's de-identification rule, the data is insufficient to produce analysis on contributing factors.

4.3 Boeing Data

Boeing safety data comes from the accident set which CAST (Commercial Aviation Safety Team) compiles each year. The accident set includes the following:

a) Worldwide hull loss of Western Built airplanes.

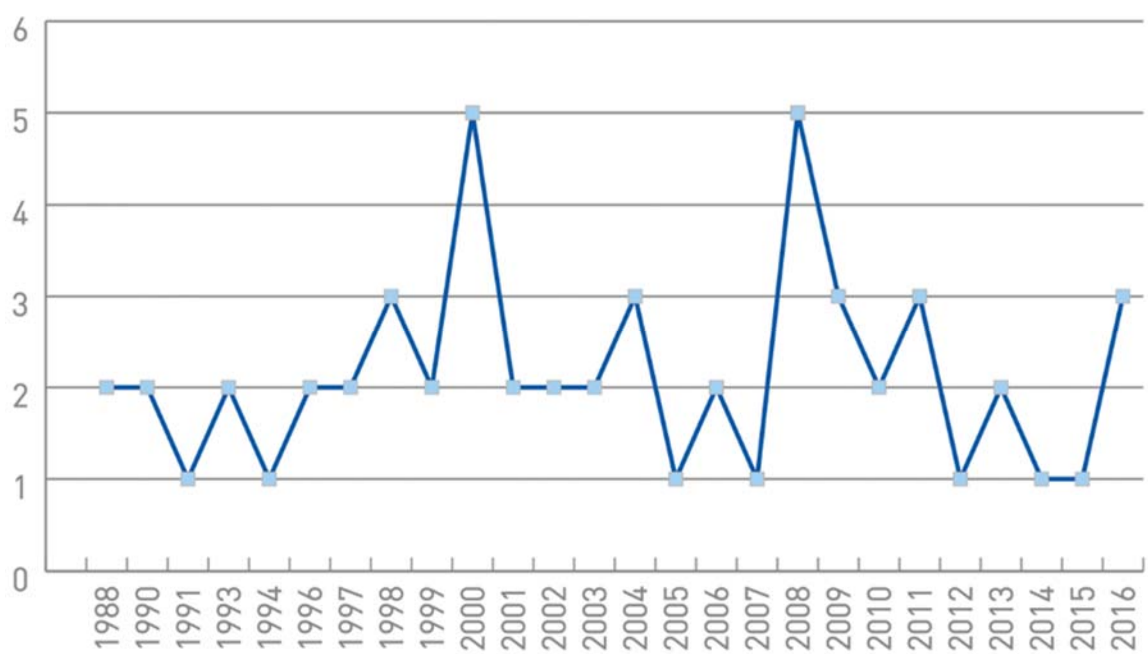
b) Accidents are grouped per State of registry as per the ICAO MID Region.

c) Operations covered in the analysis includes the below criteria:

   i. All commercial passenger operations (scheduled or non-scheduled) as long as the number of passenger seats exceeds 9
   ii. Cargo operations are included (assuming the plane meets the 7500lb requirement)
   iii. Military-operated planes are excluded. Contracted military cargo flights (i.e. on a commercial operator) are included)
   iv. Transport of military/paramilitary/peacekeeping forces and workers on non-military planes are included as part of the 121 equivalent (>9 passengers)
   v. Company owned planes transporting their own employees are not included
   vi. Chartered planes are included

4.3.1 Number of Accidents

The Chart below shows the total number of accidents for the period (1987-2016).



Total – Operator Domicile: Middle East

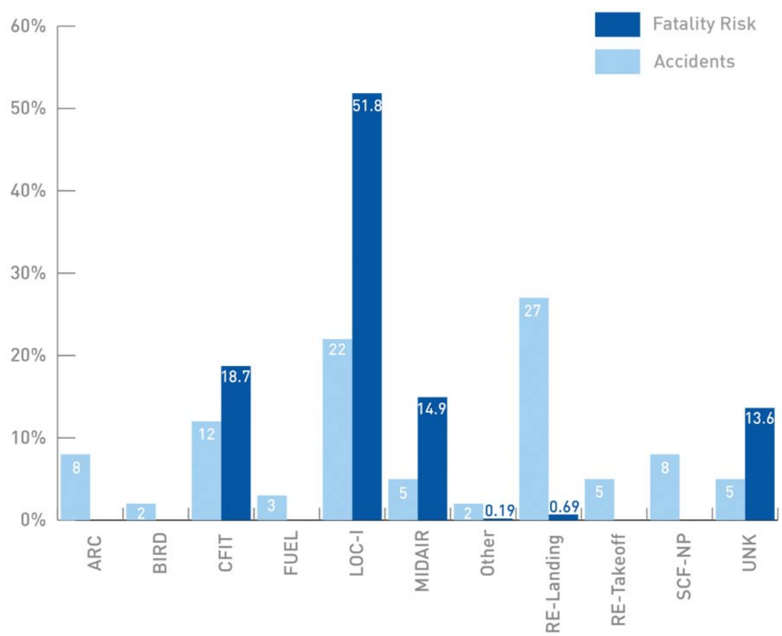
4.3.2 Fatality Risk per Type of Accident

The chart below illustrated that in terms of frequency, the most frequent accidents in the MID Region for the period 1987 – 2016 are:

i. Runway Excursions (landing)
ii. LOC-I
iii. CFIT

In terms of fatality, the top three fatal accidents categories are:

i. LOC-I
ii. CFIT
iii. Mid-air collision



1987-2016 Middle East Hull loss/ Fatal Accidents

4.4 Identification of Focus Areas for MID Region

The identification of the Focus Areas takes into account the global priorities in addition to the regional specific needs arising from the analysis of the regional safety data provided by the different organizations (Boeing, IATA and ICAO).

It should be noted that some differences have been identified between the safety information provided by the participating organizations (Boeing, IATA and ICAO) due to the use of different criteria and classifications of accidents.

Based on the analyses of all accident and serious incident data, and taking into account that ICAO data is the main source for decision-making in case of discrepancies, it is concluded that the Focus Areas for the MID Region are:

1. Runway Safety (RS)- (mainly RE and ARC during landing);
2. System Component Failure- Power Plant - (SCF-PP); and
3. Loss of Control Inflight - (LOC-I).

New emerging risks have been identified, as follows:

1. Fire/Smoke (non-impact) – F-NI;
2. Turbulence Encounter (TURB); and
3. Medical (MED).

4.5 MID Region Safety Performance - Safety Indicators-Reactive

Safety Indicator	Safety Target	Average 2012-2016 MID	Average 2012-2016 Global	2016 MID	2016 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**	2.76	2.76	2.3	2.1
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	0.26	1.54	0.26
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**	1.39	1.48	1.54	1.23
	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	0.07	0	0.09
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	0.08	0	0

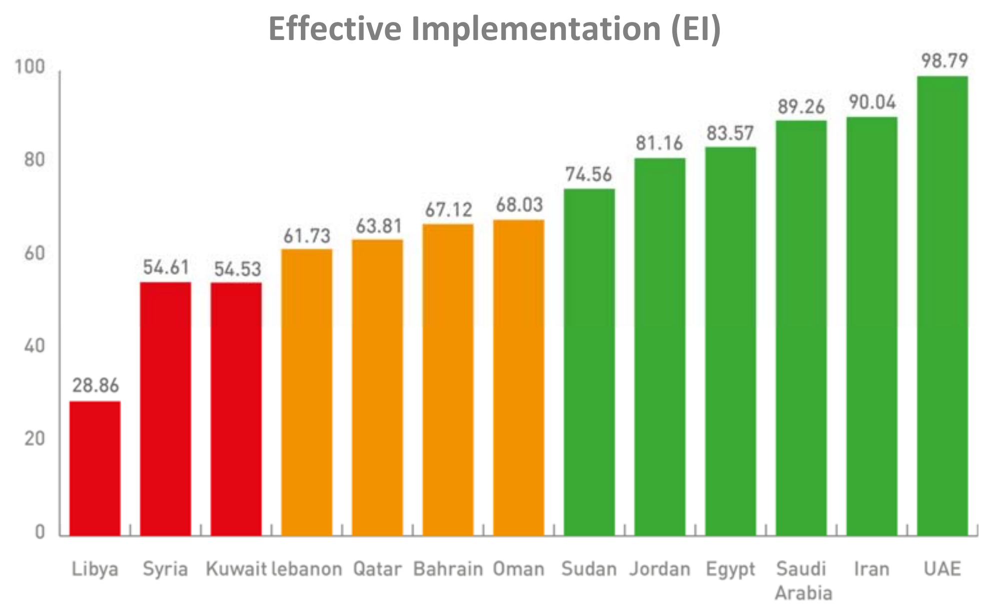
5. Proactive Safety Information

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

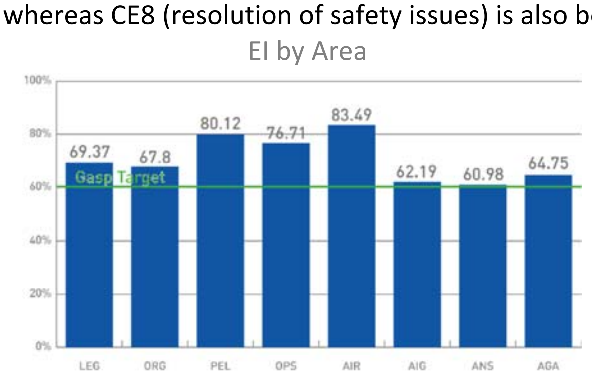
The regional average overall Effective Implementation (EI) in the MID Region (13 out of 15 States have been audited) is 70.47 %, which is above the world average 65.15% (as of January 2018). Three (3) States are currently below EI 60%.

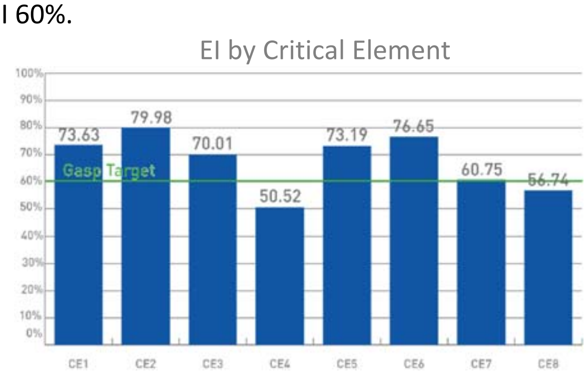
Currently, 77% of the audited States achieved the target of 60% EI, as suggested by the Global Aviation Safety Plan (GASP) and the MID Region Safety Strategy. It should be highlighted that some validation activities have been conducted recently such as ICVMs, which would positively affect the results.



Source: ICAO USOAP CMA On Line Framework (OLF), as of January 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 50.52% EI, whereas CE8 (resolution of safety issues) is also below EI 60%.





5.2 IATA IOSA and ISAGO

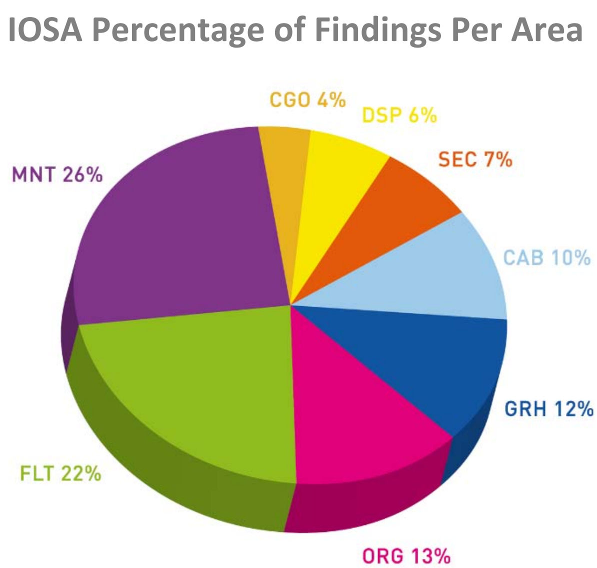
5.2.1 IATA Operational Safety Audit (IOSA)

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 2012- 2016, was above the world average by an average of 8.55.

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).

The IOSA audit results analysis captured under this section cover the period between January 2016 and July 2017. A summary of the IOSA audit findings is as follows:

1. 27 audits were performed in the MENA Region with an average of 5.8 findings per audit.
2. Findings were mainly in the areas of Maintenance (MNT), Flight Operations (FLT), Organization Management (ORG), Ground Handling Operations (GRH), and Cabin Safety (CAB). Below chart demonstrates the percentage of findings per area:



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.

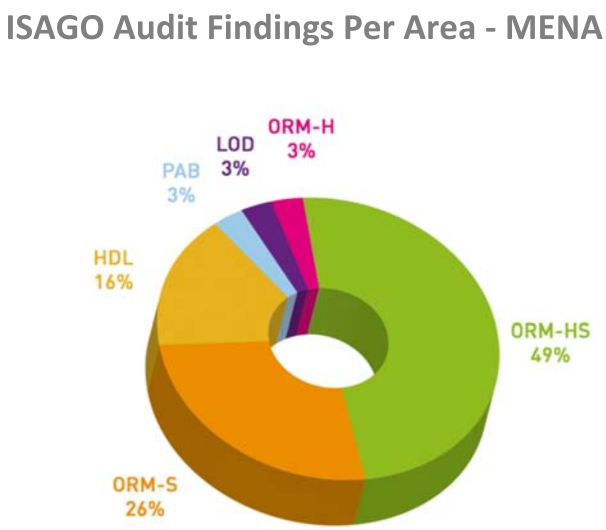
The ISAGO program has 7 sections including: Load control (LOD), Passenger & Baggage handling (PAB), Aircraft Handling & Loading (HDL), Aircraft Ground Movement (AGM), Cargo & Mail Handling (CGM), Organization & Management – Corporate (ORM-H), Organization & Management – Co-located (ORM-HS) and Organization & Management – Station (ORM-S).

The ISAGO audit results analysis captured under this section cover the period between January and December 2016. A summary of the ISAGO findings is as follows:

1. A total of 15 audits took place in 2016 (5 initial audits and 10 renewal audits) have been included in the analysis covering the IATA MENA Region.

2. 32 findings and 481 observations were recorded.

3. Findings were mainly in the areas of Organization & Management – Co-located (ORM-HS), Organization & Management – Station (ORM-S), Organization & Management – Corporate (ORM-H), 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:



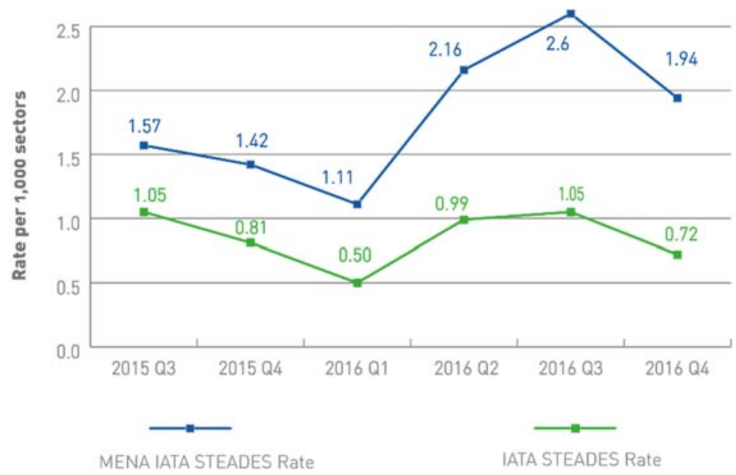
5.3 Incidents Reported by Airlines - STEADES Data

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. 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 in this report covers quarterly trends for the period Q3 2015 – Q4 2016. Some events are captured to complement the analysis under different sections of the report and show trends that can support the work of RASG-MID.

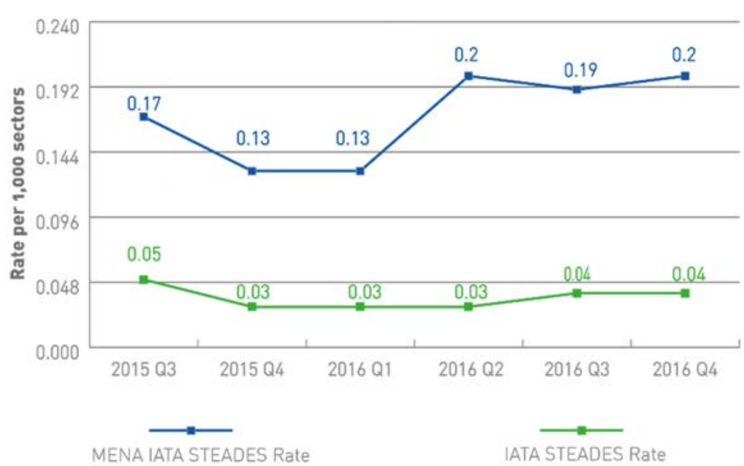
Birdstrikes

The MENA Region has been constantly recording higher birdstrike rates compared to the global level. Moreover, it is important to highlight that the birdstrike rate in MENA has an increasing trend for 2016 compared to the last two quarters of 2015.



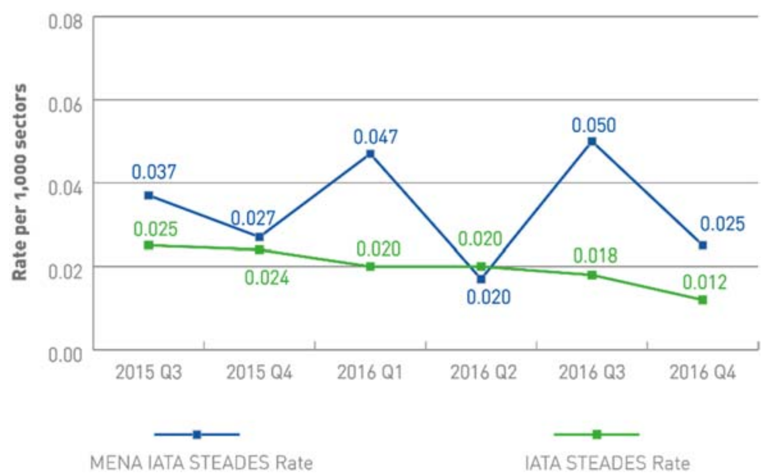
Deep Landing

It can be noted from the figure below that the MENA Region has higher rates of deep landing compared to the global level at all times. An increasing trend of deep landings can be also depicted for 2016 after it was decreasing in 2015.



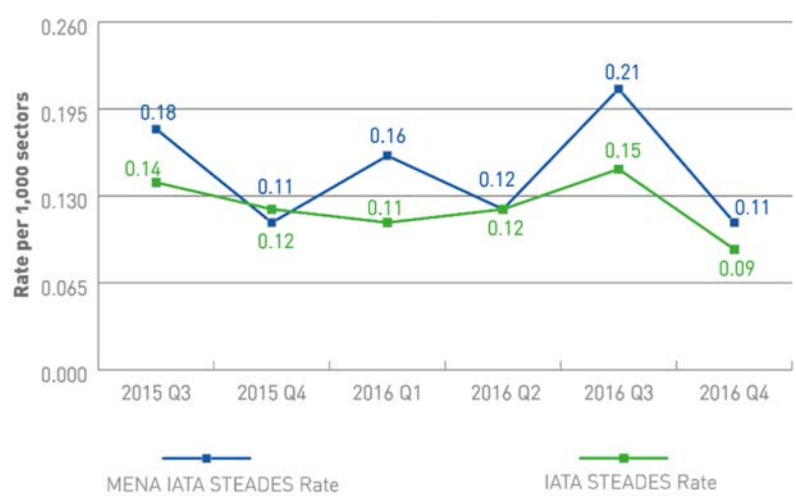
Stall Warning

Below figure demonstrates a higher rate of stall warnings for the MENA Region than the global rate. Stall warning is a major contributing factor to LOC-I accidents.



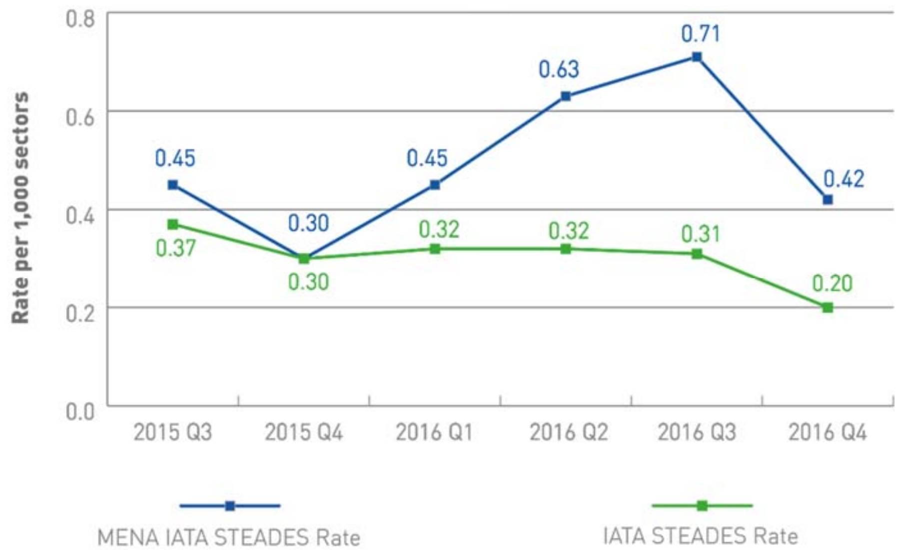
TCAS RA

Despite the decreasing trend of TCAS RA incidents at a global level, the MENA performance was fluctuating in both 2015 and 2016, yet was almost always higher than the global rates. Incidents have been decreasing since 2011. TCAS RA are a major contributing factor for MID Air Collisions.



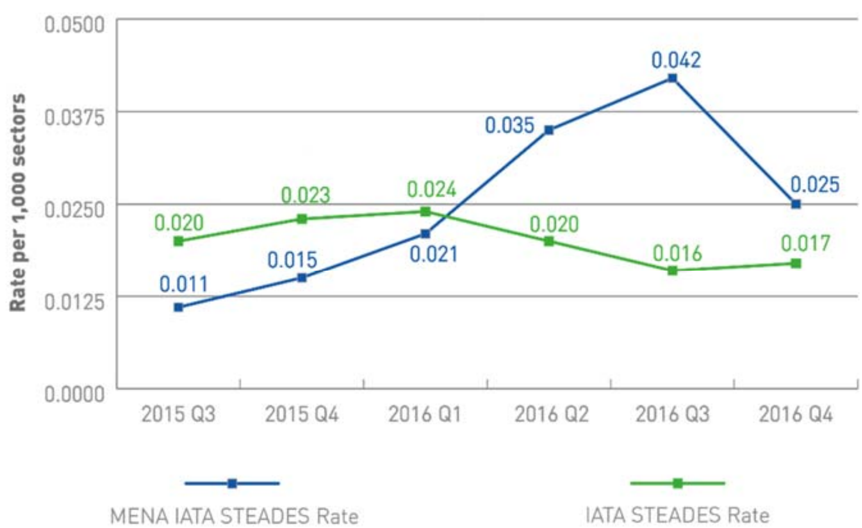
Unstable Approaches

Below figure demonstrates a higher rate of unstable approaches for the MENA Region and an increasing trend compared to the global level which was relatively stable for the period Q4 2015 – Q3 2016. There has been a drop in the rates of unstable approaches at both global and regional levels in Q4 2016. Unstable approaches are a major contributing factor for runway excursions.



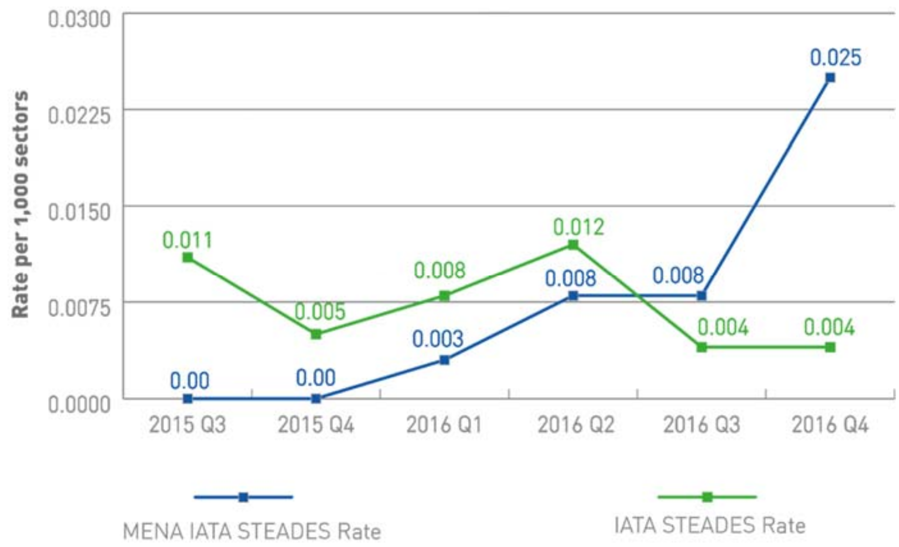
Loss of Communication with ATC

Below graph demonstrates an increasing trend of loss of communication for MENA airlines for the period Q3 2015 – Q3 2016 despite a decreasing trend on a global level for the same period. It is also worth noting that the MENA regional rates have exceeded the global ones in 2016.



Engine Surge/Stall

An increasing trend of engine stall for the MENA Region can be seen in the figure below. Engine stalls can be a contributing factor to LOC-I accidents.



It is also important to note that IATA conducted a safety analysis for Air Traffic Services on both global and regional scale to identify hot spots for ATS performance, which could potentially contribute to degradation in safety. The study covered incident reports for the period 2011-2015 and has identified the below as areas of concern for the MENA Region:

1. Airprox
2. Inadequate Separation
3. Wake turbulence – Encountered
4. Take off clearance with runway in use
5. Call sign confusion

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:

1. continuous update of the SSP Gap Analysis available on iSTARS (13 States completed the Gap Analysis);
2. 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);
3. 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
4. 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);
5. 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.

Unfortunately, due to the low levels of participation by the MID Region carriers in the tool, 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. Final Conclusions

Following the analysis of the reactive safety information provided by Boeing, IATA and ICAO for the period 2012 - 2016, it was concluded that the main Focus Areas for the MID Region are:

1. Runway Safety (RS) - (RE and ARC during landing);
2. System Component Failure- Power Plant- (SCF-PP); and
3. Loss of Control Inflight- (LOC-I).

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

1. Fire/Smoke (non-impact) – F-NI;
2. Turbulence Encounter (TURB); and
3. Medical (MED).

With respect to ICAO USOAP-CMA, the regional average overall Effective Implementation (EI) in the MID Region (13 out of 15 States have been audited) is 70.47 %, which is above the world average 65.15% (as of January 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.

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 50.52% EI, whereas CE8 (resolution of safety issues) is also below EI 60%.

Implementation of SSP is one of the main challenges faced by the 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). 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 analyze safety data to proactively identify safety concerns before accidents and/or incidents occur, to develop timely mitigation and prevention measures.

The ASRT is in the process of exploring ways and means to improve the future Editions of the ASR, inter-alia, through the following actions:

- improve the current risk assessment methodology through the adoption of the "feared consequence" used by DGAC France;
- expand the "Proactive Safety Information" Section to include the results of incidents analyses provided by States for the identification of emerging risks and trends in the Region;
- use of IATA Flight Data Exchange (FDX) as a source of predictive safety data; and
- integration of ICAO and IATA data.

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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Ms. Rose Al Osta,
International Air Transport Association (IATA)

Mr. Mohamed Smaoui, Mashhor Alblowi and Mr. Mohamed Chakib
International Civil Aviation Organization (ICAO)

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ICAO

SAFETY

ICAO, Middle East Office
Egyptian Civil Aviation Complex, Cairo Airport Road, Cairo, Egypt

Mail: P.O. Box 85, Cairo Airport Post Office Terminal One, Cairo 11776,
Arab Republic of Egypt
Tel.: +20 2 2267 4840
Fax: +20 2 2267 4843

E-mail: icaomid@icao.int