SIRM 28 Bulletin

IATA Safety Issue Review Meeting

SIRM 28
Montreal
May 3-4, 2022

A Message from IATA

Mark Searle, Director, Safety

I was delighted to host, and attend in person, the first face-to-face meeting of the IATA Safety Issue Review Meeting (SIRM) since the world was consumed by COVID-19 over two years ago. It was great to see so many safety practitioners join us in Montreal and a special thanks goes out to all those who gave up their time to present specific issues that they have encountered during a time where our industry is focused on driving forwards its recovery after such a deep crisis.

It was very clear to see, from those who attended, the value of being physically together and the networking opportunities that this presented. In particular, how people took every chance, whether between formal sessions over coffee or in the evening over dinner, to get into the detail of what was presented and how a deeper understanding of the issues was achieved between stakeholders. I'm aware, however, that many are still impacted by travel restrictions or tight travel budgets, and this meant many key stakeholders could not attend. It's important, in this current hybrid working environment, we ensure communication lines remain open across our global safety community to allow all to be alerted to issues identified within our operational environment.

Some excellent articles, yet again, in this SIRM bulletin and I thank all those who have contributed to its publication. The next SIRM will take place during the week of the IATA Safety Conference, in Dubai this October, and I look forward to welcoming you there. In the meantime, please continue to review the risks captured within the IATA Safety Risk Management Framework available through this link and, if there's a specific issue that you've identified but isn't currently captured, please highlight it to us through safetyrisk@iata.org

A Message from the IATA Safety Group Vice-Chair

Mike Chapman, Head of Safety, Jetstar Airways, (Qantas Group)

Hello everyone and welcome to the latest SIRM Bulletin. The tide has certainly turned on our industry in 2022 and that is a positive for all of us but with it comes a new set of challenges with the significant increase in operational activity to match the demand we are seeing globally. The aftermath of the core of the pandemic continues to highlight safety risks that we collectively continue to manage. New and emerging risks such as the 5G issue remain at the forefront and the ongoing challenges in Eastern Europe, and the Middle East with GNSS/GPS interference, are articles in this edition that will resonate with many operators.

It was wonderful to have our first face-to-face SIRM and SG meeting in Montreal in May in over two years. To have in-person conversations and share the issues, risks and mitigations that we are all facing and implementing, was a true highlight and demonstrated the real benefit of getting together like we did in years past.

This bulletin contains some very interesting articles including "lessons learned" on various elements during the pandemic including parking and storage, human factors and fatigue. The latter topic being of particular interest given

the ongoing resourcing challenges the industry is experiencing and how we can attract, train and retain skilled people to our industry to meet the significant global demand.

I would like to thank those operators that have contributed to this edition and to all of the presenters and attendees at the meeting in Montreal. It is worth noting that there continues to be challenges with border closures, budget constraints and isolation requirements that impacted the attendance of many operators. That is a timely reminder that COVID-19 and its variants remain a risk.

Our next SIRM and SG meeting will be in Dubai in October, hosted by Emirates (thank you Mark and the EK team!). These meetings will coincide with the first Safety Conference in some years. On behalf of Mark, I do hope you can join us for what will be a valuable series of sessions and discussions centred around the safety conference theme of *"Emerging stronger – safely transforming to a more resilient tomorrow"*.

We do hope to see as many of you as possible in Dubai and in the meantime, we hope you find the latest bulletin of interest and informative.

Stay safe and regards.

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*The **Safety Issue Review Meeting (SIRM)** is a biannual meeting, created in 2006 and managed by IATA Safety and member airlines through the IATA Safety Group. The meeting is open to safety professionals from airlines, manufacturers, ground service providers and airports, as well as to invited subject matter experts from academia, pilot associations and other relevant industry stakeholders. The SIRM is held under Chatham House Rule, to create a protected, confidential environment for industry to discuss safety risks, hazards and lessons-learned from accidents and incidents, emerging concerns as well as results of safety studies. The output of the SIRM is the SIRM Bulletin, summarizing the topics and issues presented during the meeting. Information in the Bulletins is de-identified, unless otherwise authorized by the organization, and it is distributed to a wider aviation community.*

***SIRM Bulletin** contents do not necessarily constitute the views of IATA or its Members. Any recommendations or suggested best practices are strictly those of the individual's discussing topics and issues during the meeting and have not been developed in conjunction with IATA or its standard setting mechanisms.*

SIRM 28 Bulletin Articles

NOTE: *All articles have been de-identified, unless authorized otherwise by the submitting organization.*

1. Update from the IATA Accident Classification Task Force (ACTF)

The ACTF is a sub-group to the Safety Group (SG) and is comprised of safety experts from airlines and manufacturers, pilot associations which ensures that a variety of accident and incident aspects are covered. The group analyses accidents, identifies contributing factors, determines trends and areas of concern relating to operational safety and develops prevention strategies. The group uses the IATA Accident Database, which covers all commercial aviation accidents worldwide since 2005 that meet IATA accident criteria. The list of new accidents is validated and classified every quarter using a Threat and Error Management (TEM) model. In addition, the ACTF makes specific recommendations for safety improvements.

ACTF mandate is to provide knowledge and expertise to:

- Identify major hazard and risk areas
- Suggest areas of safety emphasis
- Make specific recommendations for safety improvement
- Support commercial carriers' safety efforts

The results of the group's work are incorporated in the following publications:

Annual IATA Safety Report

Mid-Year Accident Analysis Report

CTF Accident Prevention Strategies

The 2021 IATA Safety Report can be downloaded here.

2021 Industry Safety Performance

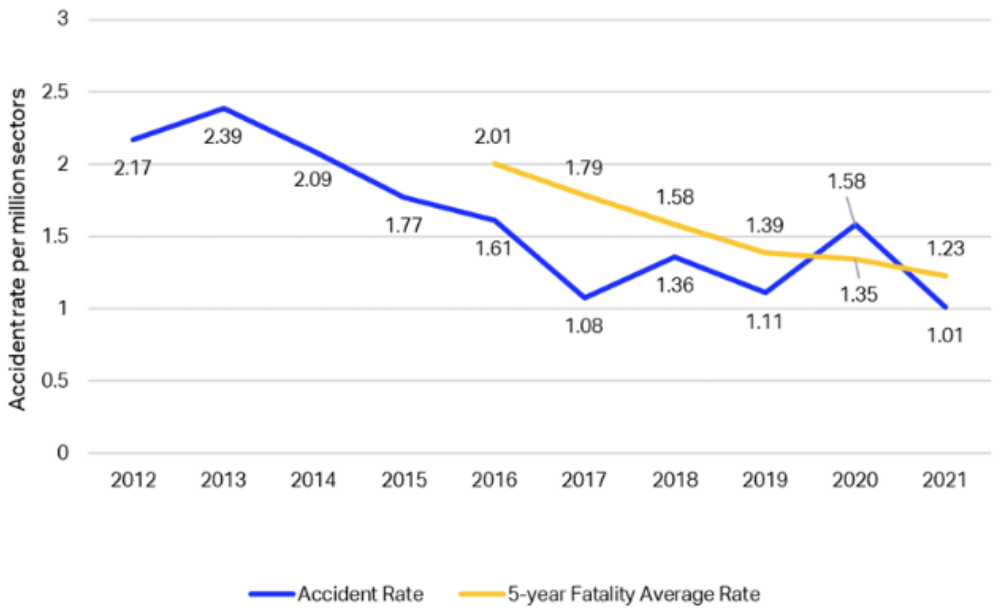
2021 safety performance data shows strong improvement in several areas compared to both 2020 and to the 5-years 2017-2021 average rates:

	2019	2020	2021
Total Accidents	52	38	26
Total Jet Hull Losses	6	3	3
Total Turboprop Hull Losses	5	5	5
Total Fatal Accidents	8	5	7
Total Fatalities on board	240	132	121
Total IATA Member Accidents	22	12	8
Sectors*	46.8	22.2	25.7

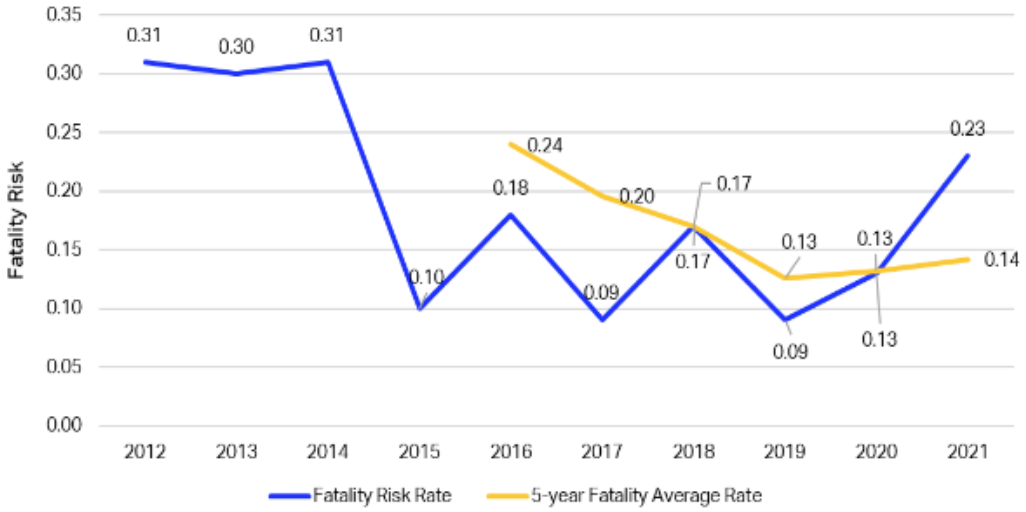
* In Million flights

The total number of accidents decreased from 38 in 2020 to 26 in 2021; the all-accident rate decreased from 1.58 in 2020 to 1.01 accident per million sectors in 2021and the number of fatalities – from 132 in 2020 to 121 in 2021.

The rolling average accident rate of the five-years going back to (2012-2016), till today the 5-year (2017-2021), shows a continued downward trend from 2.01 to 1.23 accidents per million sectors.



Although the rolling average Fatality Risk shows a continued downward trend, the industry fatality risk in 2021 was 0.23, above the 5-year fatality risk average of 0.14.



For the first time in 15 years, there were no runway excursion and ground damage accidents in 2021,

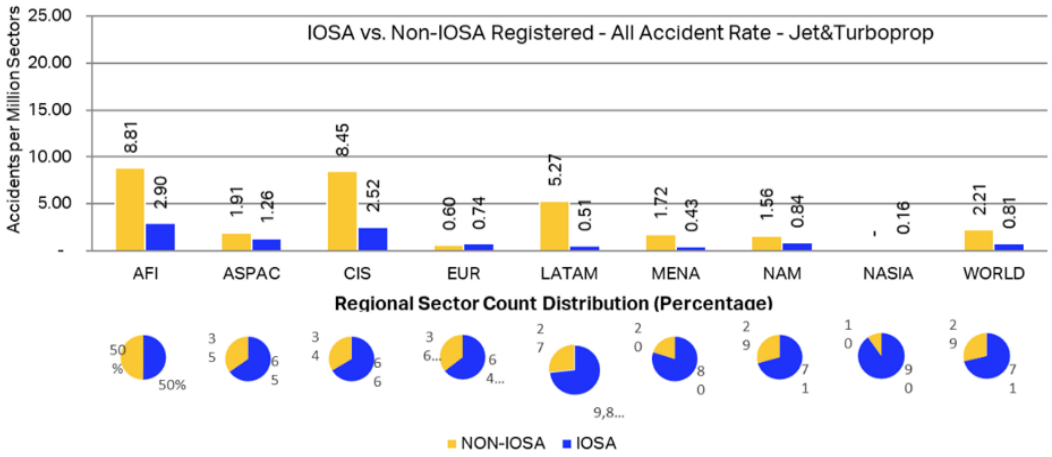
LOC-I caused the most fatalities from 2017 to 2021

(1) The area of the bubble indicates the number of fatalities associated with the accident category, the value is displayed

(2) Fatality Risk: number of full-loss equivalents per 1 million flights

(3) Accidents not involving fatalities are displayed on this graph as black circles

IOSA registered airlines keep outperforming non-IOSA airlines. The 5-years IOSA carriers' accident rate is lower than that of non-IOSA (0.81 vs. 2.21)



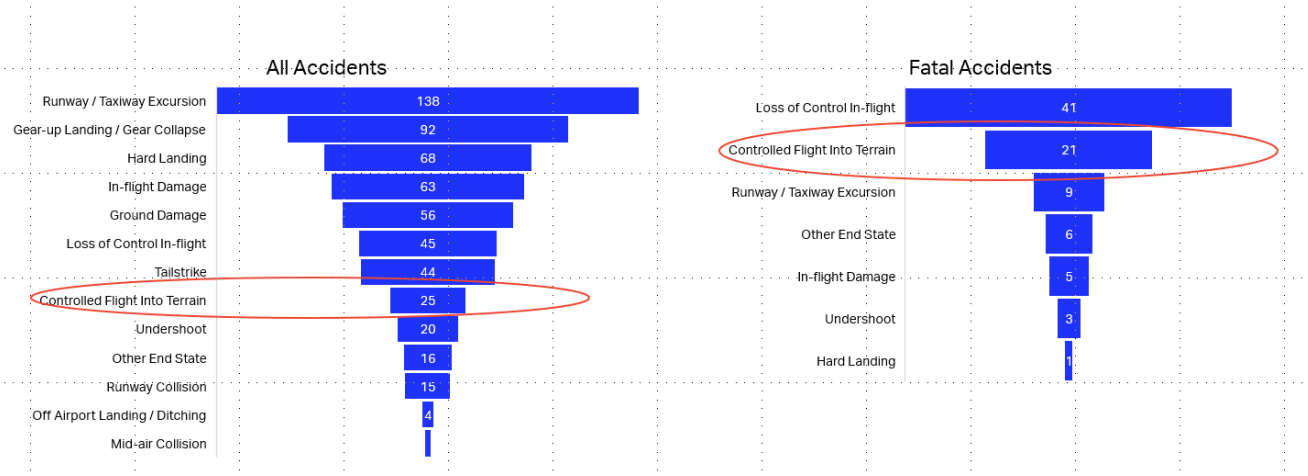
2. Controlled Flight Into Terrain Detailed Implementation Plan (CFIT DIP)

Background

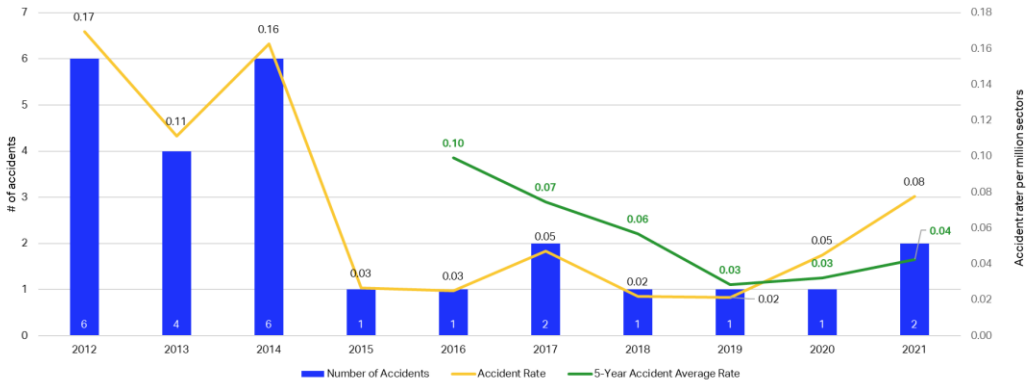
CFIT refers to accidents in which there was an in-flight collision with terrain, water, or obstacle, without indication of loss of control. The critical distinction in these types of accidents is the fact that the aircraft was under the control of the flight crew at the time of the collision. Although CFIT is not the most frequent of accident categories, such accidents account for a substantial number of fatalities.

Overview of CFIT accidents over a 10-year period

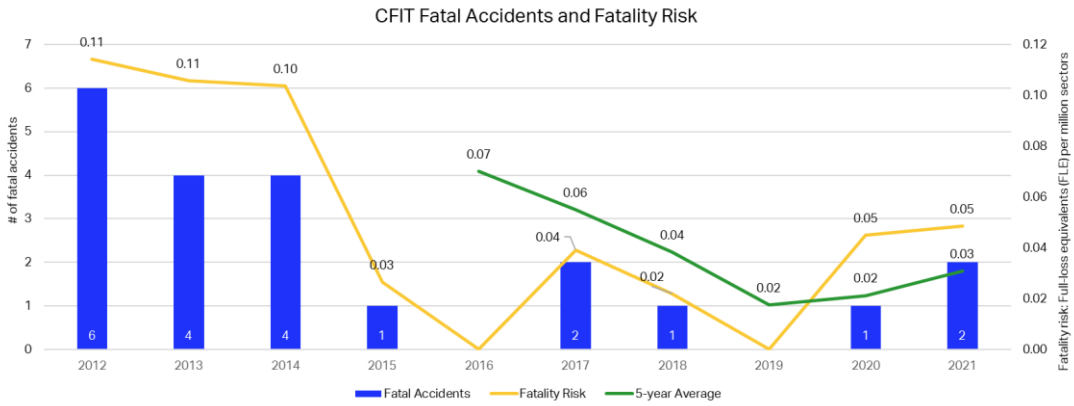
From 2012-2021, aviation experienced a total of 592 accidents, 25 of which were CFIT. CFIT is 8th accident category in terms of frequency, but the second cause of fatal accidents with 21 accidents, resulting in 323 fatalities.



CFIT accident rates are much lower than a decade ago. Below graph depicts CFIT accidents from 2012-2021.



Although the rolling average of CFIT Fatality Risk shows a continued downward trend, the industry fatality risk in 2021 was 0.03, below the 5-year fatality risk average of 0.05.

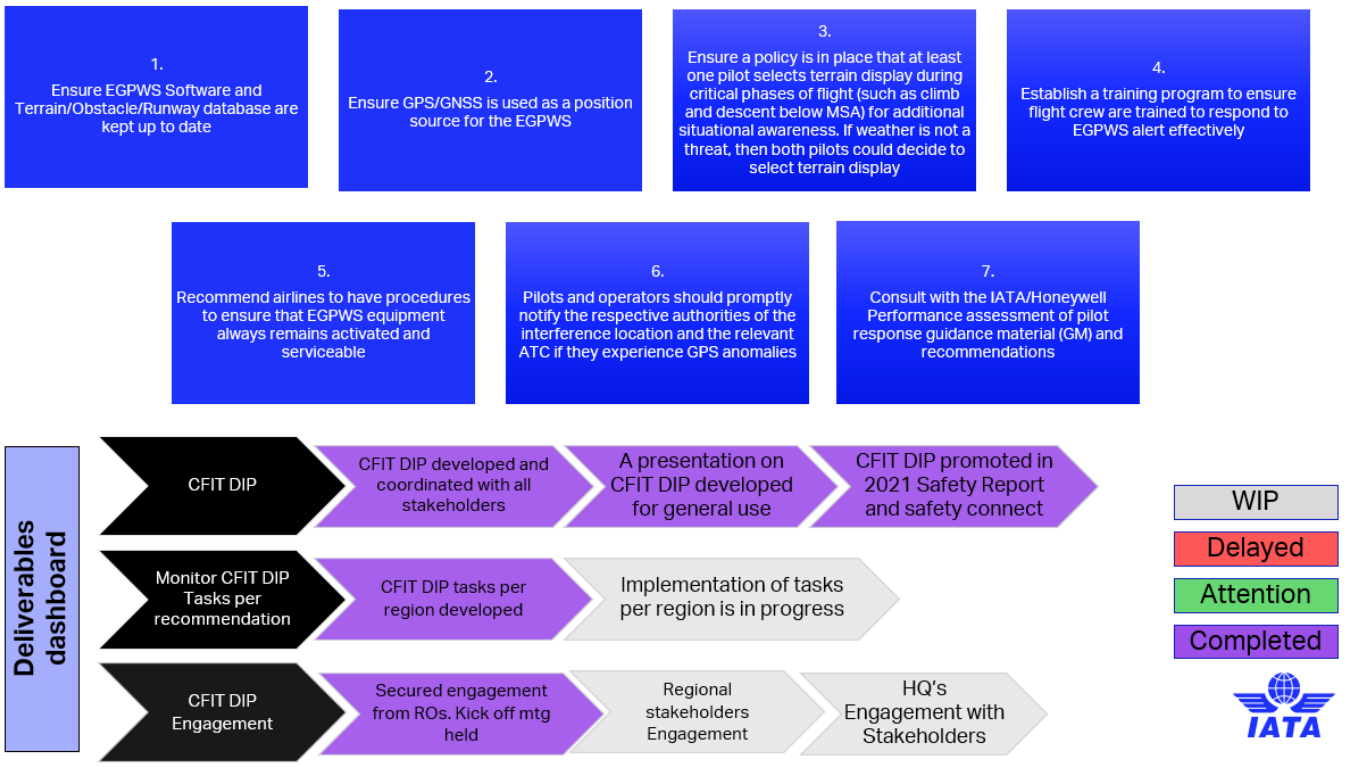


The number of aircraft that have landed safely after the terrain awareness and warning system/ enhanced ground proximity warning (TWAS/ EGPWS warning is growing. Nevertheless, as we can see, CFIT accidents continue to occur.

To address this risk, different industry stakeholders have coordinated multiple actions, one of which is the "Guidance on performance assessment of pilot compliance to Enhanced Ground Proximity System (EGPWS)", produced by IATA and Honeywell in 2019. This guidance highlights the importance of keeping the terrain/obstacle/runway database up to date. Also, it encourages pilots to perform the proper and timely terrain avoidance manoeuvre required in response to a EGPWS warning.

In support of the guidance document, IATA developed a CFIT Detailed Implementation Plan (DIP), which aims to reduce the risk of CFIT events. The DIP covers the following:

- Highlights seven recommendations
- Facilitates the execution of the proposed recommendations
- Identifies and communicates with the concerned resources for the execution of the plan
- Reports progress against the plan
- Measures the implementation and the effectiveness of the plan



Recommendations

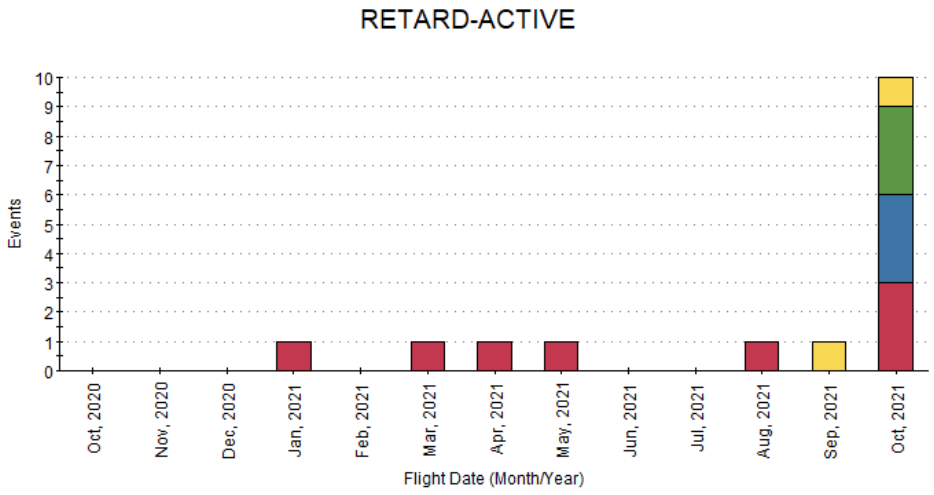
- Ensure EGPWS Software and Terrain/Obstacle/Runway database are kept up to date;
- Ensure GPS is used as a position source for the EGPWS;
- Ensure a policy is in place that at least one pilot selects terrain display during critical phases of flight (such as climb and descent below MSA) for additional situational awareness. If weather is not a threat, then both pilots could decide to select terrain display;
- Establish a training program to ensure flight crew are trained to respond to EGPWS alert effectively;
- Recommend airlines to have procedures to ensure that EGPWS equipment always remains activated and serviceable; and
- Pilots and operators should promptly notify the respective authorities of the interference location and the relevant ATC if they experience GPS anomalies.

IATA is working with its working groups and task forces, member airlines, OEMs, international organizations and other relevant stakeholders to monitor application of these recommendations.

More information about the DIP can be found here.

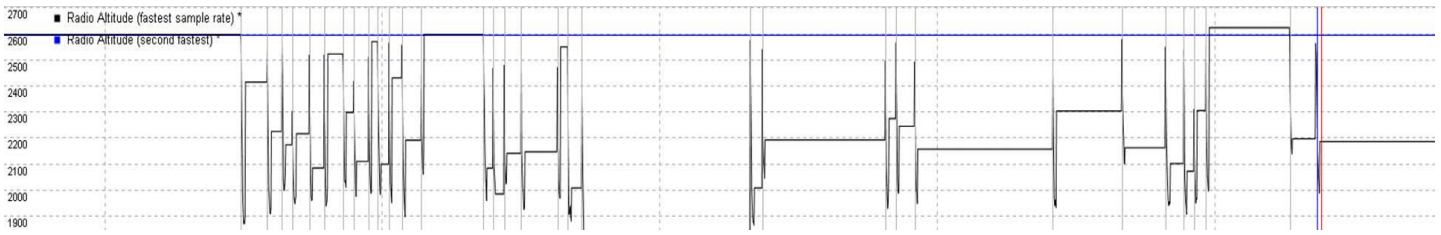
3. A220 Retard Active Events

In October 2021, an operator was informed through Flight Crew reports of events where the A220 autothrottle system commanded thrust reduction to idle during climb and descent phases. A review of flight data indicated a total of 20 events in a 13-month period where the autothrottle system went into RETARD ACTIVE mode. The events primarily occurred between 2,400' and 6,200' height above airport elevation (HAT) in both climb and descent phases. In most cases, the crew identified the event, disconnected the autothrottles and increased thrust to the engines. Once the RETARD annunciation was extinguished the flight crews were able to resume use of the autothrottles. Due to the large number of events in October 2021, the operator's fleet leadership elected to have 4 aircraft grounded that experienced the majority of the events until a full system task analysis could be conducted.



The A220 autothrottle system works by taking data from one of 2 (or 3 if installed) Radar Altimeters (RA). RA1 is tied to the Captain's flight guidance, RA2 is tied to the First Officer's flight guidance, and RA3 (if installed) replaces RA1 or RA2 if one is on MEL. All 3 RA's are used by the autoland system to determine aircraft height, but only the RA on the operating autopilot is used to determine aircraft height for activating the retard arm function on normal landings. At 400' HAT, the system goes into RETARD ARMED mode and RETARD will be displayed in White in the FMA. At 30' HAT, the system goes into RETARD ACTIVE mode, and RETARD will be displayed in Green in the FMA. There is no aural indication of autothrottles in RETARD ACTIVE mode, and thrust is reduced at a fixed rate to reach idle at touchdown.

The operator discovered that erratic "jumps" in altitude on 1 or more RA's is the trigger for these events. An example of these jumps is below. When the RA on the operating autopilot measures below 30' for one sample, the system actives the RETARD mode and the autothrottles begin to reduce to idle. A joint review by the operator's engineering team and Airbus Canada identified a potential cause of the erratic "jumps", bonding issues with the Radar Altimeter to the fuselage of the aircraft.



Mitigations

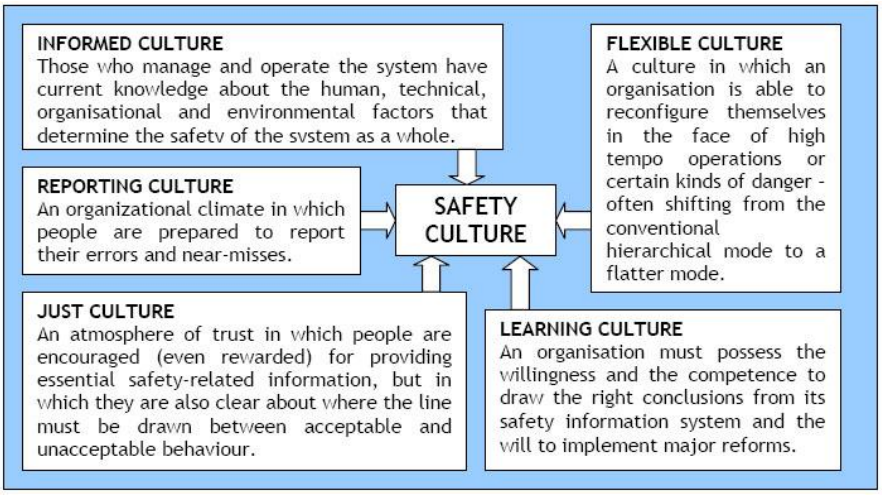
- The operator developed 2 FOQA profiles to capture events and precursor events.
  - The system will detect anytime the aircraft goes into RETARD ACTIVE mode above 400' HAT and an automated email is sent to the maintenance control team who will place the RA system on MEL.
  - The system will also identify ships that have erratic jumps and the lowest recorded jump. This data is fed to the operator's predictive maintenance team who has developed a threshold at which a work package is issued, and the affected RA system is placed on MEL.
- The operator released a fleet campaign directive to check Radar Altimeter bonding.
- Airbus Canada is developing a software update to inhibit RETARD ACTIVE modes in certain phases of flight.

Lessons Learned

- When looking at the hazard identification and immediate action portion of SMS, operators should establish policies and procedures around how specific aircraft are grounded following identification of a high-risk event.
- A downward event trend does not always equate to hazard elimination, there can be times where there is data that shows precursor events still occurring, but the subject event does not occur.
- A220 operators should review Airbus Service Letter CS-SL-22-30-001.

4. Just Culture

A North American operator presented on Just Culture and the importance of a just culture as one component to an overall safety culture.



Just Culture is learning from honest human mistakes. It is all about what went wrong, and not who had erred. In a just culture, there is an ability for employees to discuss openly the preconditions and sequence of events that led up to an error, without the fear of punitive discipline. It is important to note, that a just culture is not a "no blame" culture.

In a just culture, both the employees and the company have a chance to learn and change from inadvertent and unintentional acts. The employee may receive coaching from a peer, or additional time with an instructor, but those opportunities are not kept in official training records, or personnel files and are meant to help the employee learn from the event. Likewise, the company also learns about the event and can take steps, such as manual or training changes, to reduce the likelihood of the event reoccurring. Remember, being a professional does not make one perfect!

To ensure Just Culture is embedded throughout the organization, it is important the leaders at the top level of the organization embrace the culture. One way to highlight this is through a safety policy signed by the top executives in the company. Additionally, establishing non-punitive safety reporting systems, an open-door policy where issues and concerns discussed with leaders are treated in the same manner as a safety report are key cornerstones of a just culture.

The operator presented on a few enhancements to the just culture they have implemented in the past few years, including:

- A focus on **cognitive interviewing**, asking the right questions while setting a positive post-event debrief tone.
- The ability to **crosstalk** between the operator's **safety reporting system** (pilot reporting) and the **flight data management** (FOQA). This allows the operator to understand both the "what" and "why" of the event to better detail corrective actions to improve safety in a non-punitive manner.
- Giving the line pilot the **ability to see his or her own FOQA data**. Applications such as GE's Flight Pulse or CEFA's AMS allow pilots to see selected parameters (and even replay) past flights.

One important note about Just Culture: an operator's safety policy must outline unacceptable behaviors. Just Culture does not condone reckless or unacceptable behavior, and policies should highlight this to all employees. The operator does this through their safety and security policy. **An excerpt from that policy on Just Culture is below**:

[Operator] is committed to Just Culture principles, where there is no penalty for mistakes and errors. However, certain behaviors will not be tolerated. Employees engaging in unacceptable behavior involving any of the following are subject to disciplinary action, up to and including termination of employment:

• Illegal activities
• Violation of [Operators] Anti-Drug & Alcohol Policy
• Intentional disregard for regulatory requirements and/or company policies and procedures
• Reckless conduct
• Intentional falsification

5. TCAS-RA not followed

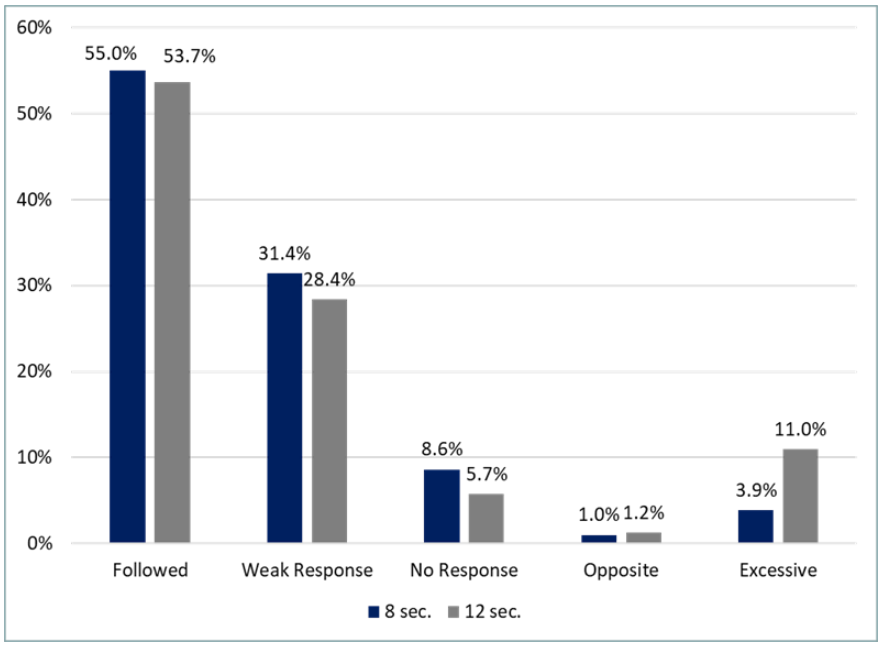
TCAS II mitigates a risk of midair collision by issuing Resolution Advisories. Unless the aircraft is equipped with an automatic RA response feature (like Airbus' APFD), correct and prompt pilot responses to RAs are essential. An opposite or too weak a response carries a risk that the vertical spacing at the closest approach will not be sufficient to prevent a collision, while excessive responses may lead to a follow up conflict with an aircraft at the adjacent level.

TCAS RA not followed has been recognised as one of EUROCONTROL's Top 5 operational risk priorities (the other four being controller blind spot; flight without a transponder or with a dysfunctional one; failure of detection of runway conflict by air traffic controllers; and airspace infringement).

In order to support aircraft operators in the assessment of pilot compliance with TCAS RAs and introduce a uniform industry-wide assessment method, in 2019 IATA and EUROCONTROL jointly published the first edition of Guidance Material for the assessment of pilot compliance. The Guidance Material has subsequently been updated and an additional assessment method has been introduced. The additional method (a.k.a. *Method B*) gives credit to a pilot having to significantly change vertical rate (e.g. from climb to descent) even if the final required vertical rate has not yet been met.

In 2020, using Mode S radar recordings, EUROCONTROL conducted a study assessing pilot responses to TCAS RAs in core European airspace (airspace in the western and central part of Europe where traffic density is high) using both assessment methods outlined in the Guidance Material. The evaluation of 1176 RAs found that a substantial proportion of RAs were not followed correctly. Compliance varied depending on RA type and duration; in the worst cases the correct compliance was achieved in only a third of encounters. No significant performance differences were observed while comparing different aircraft types. However, it was noticed that airline pilots are generally better at compliance with the RA than other operations (cargo, military, and business jets).

The mean compliance rates for Climbs, Descends and Level Offs RAs at 8 seconds and 12 seconds after the RA has been posted are shown in figure. Just over half of the RAs were followed correctly, while almost a third had too weak responses. An RA has been classified as a *too weak response* if the pilot has made an adjustment in vertical speed in the required direction, but insufficient in vertical speed or acceleration to fulfil the RA requirement.

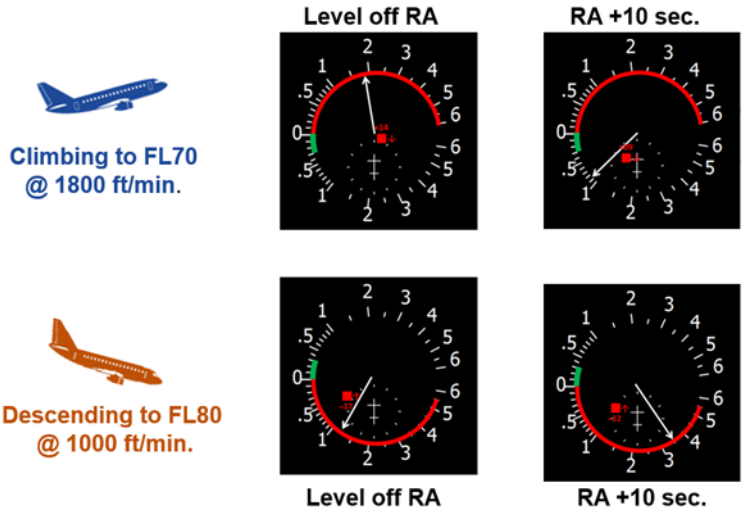


It needs to be noted that the RA compliance assessment using Mode S radar data comes with some limitations. Firstly, the update frequency of radar data is determined by the rotation speed of the radar antenna, typically 4-5 seconds for short range radars and as much as 12 seconds for long range. Furthermore, the vertical rates provided in the radar recordings are subject to noise, altitude quantisation and tracker lag, consequently introducing some inaccuracies. In the above-mentioned study these elements have been taken into account and calculation adjusted accordingly.

While the radar data provides a good overall view on the pilot compliance levels, the compliance can only be reliably assessed using airborne data which provides the accurate RA generation time and vertical speeds. It is very important that aircraft operators assess all RAs for pilot compliance to identify any recurring errors or training deficiencies, even if the incident did not lead to any serious loss of separation. As illustrated by the case below, often pilots do not realise

that their responses to RAs were incorrect, and only monitoring based on the assessment of flight data (or other airborne data) can provide them with feedback.

Two aircraft were on crossing tracks, climbing and descending to adjacent flight levels. The combined vertical rates and relatively low predicted horizontal miss distance at the point of closest approach, triggered Level Off RAs for both aircraft (target vertical rate 0 ft/min.). The climbing aircraft pilot reacted to the RA by reducing the vertical rate from +1800 ft/min. to –800 ft/min. (excessive response to the RA) while the descending aircraft crew increased their vertical speed from –1000 ft/min. to achieve –3500 ft/min. just 10 seconds after the RA (opposite reaction to the RA). The incorrect responses were detected only fortuitously by the ANSP's safety manager.



Finally, it needs to be noted the EUROCONTROL study found that the correct responses to TCAS RAs have a measurable safety effect: for Climb and Descend RAs that were followed correctly, the vertical miss distance at the closest point of approach was significantly larger compared to weak or opposite responses.

6. Impact of COVID19 and political crisis and GNSS issues - Europe

- Analyzing the traffic situation in Europe by taking into account all potential elements including the impact of COVID19 and political crisis, EUROCONTROL publishes regular weekly traffic forecast scenarios. For the IATA IRM meeting EUROCONTROL presented the scenario prepared on 6 Apr 2022. This traffic scenario shows that for the first two weeks in April 2022 traffic in Europe reached 79% of the level, which was for the same period in 2019, and taken as a base. Scenarios done after April 2022 show that European traffic returns slowly to normal after significant drop in 2020 and 2021.

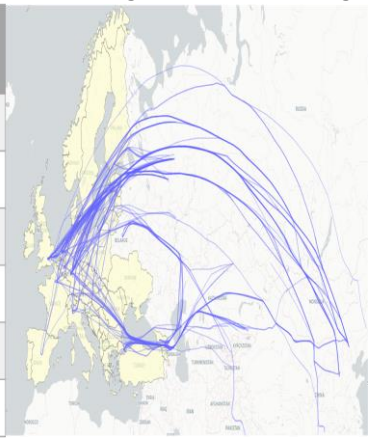
- Besides COVID19, Ukrainian crisis and closure of its airspace affected traffic flying through and within the region. The most affected in the region are besides Ukraine adjacent FIRs, some of them experiencing a few percent of the lost traffic while some of them had drastic drop, like Moldova, Lithuania, Latvia, and

- Analyzing above-mentioned activities and their impact on the safety, EUROCONTROL identified number of potential safety issues:
- Non-coordinated military flights;
- Military RPAS interference with the civil traffic;
- NAV, SUR (massive garbling), COM degradation;
- Electronic warfare effect on ATM and aircraft systems;
- Datalink messages hacking;
- Increased Prolonged Loss of Communication (PLOC);
- Institutional instability.
- Special attention EUROCONTROL addresses to the GNSS interferences and in that regard GPS outages, interferences, and spoofing.

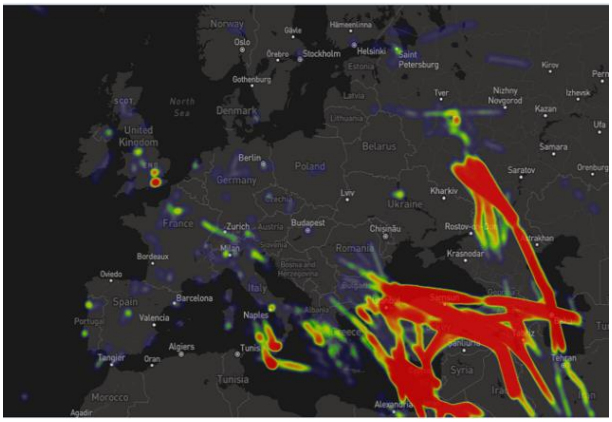
- EUROCONTROL Voluntary ATM Incident Reporting (EVAIR) collects on a daily basis ATM occurrence report and in that regard GPS outages, provided by

Poland. At the same time, due to the move of the traffic flows outside the war activities, some of the FIRs experienced high traffic increase because they got traffic, which normally does not fly, through their airspace. Aircraft Operators flying on certain city pairs experienced from a few hours up to almost five hours longer routes. The most affected city pairs are those using trans-Siberian routes (Helsinki-Tokyo; Paris-Tokyo; Frankfurt-Tokyo; and those flying through the Russian airspace to Beijing (Helsinki-Beijing; Amsterdam-Beijing; Frankfurt-Beijing).

City Pairs	Extra NM	Extra minutes
Helsinki – Tokyo	2,137	286
Helsinki – Beijing	1,729	232
Paris – Tokyo	1,112	150
Frankfurt – Tokyo	1,070	140
Amsterdam – Beijing	855	105
Frankfurt – Beijing	710	91



- Lost ADS-B L/R, wind shear, terrain and surface functionalities;
- Aircraft clocks L or R or both failed or began to count backwards;
- EICAS Transponder L/R;
- Map-shifts.



Aircraft Operators and ANSPs. First GPS reports EVAIR recorded in 2013/4 over and around Black Sea. This coincided with the Ukrainian crisis from 2014. Since then, EVAIR recorded high increase reaching its top in 2018 and 2019. The most affected areas are Black Sea, Caspian Sea, South-East Mediterranean, and Baltic Sea. Due to COVID crisis in 2020 and 2021, number of reported occurrences and in that regard GPS reports reduced significantly.

- The most frequent problems identified in GPS reports are:
- Failure of one or both GPS boxes on board;
- Disagreement between GPS positions and NAV FMSs;
- Terrain warnings, sometimes with pull up requests. (In the majority of cases pull up warnings were disregarded by pilots or function switched off thus removing last safety barrier);
- Unable to fly RNP and request for radar vectoring;
- In a few cases lack of situational awareness and requests for the assistance of radar vectoring to reach the destination;
- Wind and ground speed wrong presentations;
- Lost ADS-B L/R, wind shear, terrain and surface functionalities;
- Aircraft clocks L or R or both failed or began to count backwards;
- EICAS Transponder L/R;
- Map-shifts.

EUROCONTROL experts work closely with the industry. In that regard navigation and surveillance experts have close cooperation with Airbus regarding GNSS and GPS. Airbus post-OPS monitoring from participating aircraft operators shows that in 2021 affected regions were South-East Mediterranean, Black Sea and Caspian Sea. Identified areas of concerns correspond to the EVAIR findings. Data collected through ADS-B show similar picture and potential sources

of interference. On 24 Feb 2022 potential source of interference was along eastern border of Ukraine, while on 6 May multiple sources were suspected within Baltic Sea and Kaliningrad region.

To help in better tracking, analysing and improving the ATM safety issues in the region, Aircraft Operators can send their ATM as well as GPS reports to evair@eurocontrol.int

7. The Operational Learning Review (OLR) – valuable context for our safety data

Developed and refined over the past two years, the OLR has been created to encourage our front-line experts to share knowledge, experience and learning within a psychological safe space**1**. Born out of a PhD research project undertaken by the author, titled "Investigating Human Performance in Complex Socio-technical Systems", data disclosed by our frontline experts during these reviews provides valuable context around a task or event we are trying to learn from – once analyzed this data is then used to make operational, or training adjustments (for the system and for individuals). It also serves to support our Safety Management System (SMS), all the time shining a light on the adaptive capacity of our system.

There are five key benefits of the OLR:

- It allows us to take a systems approach, with learning and improvement as the sole objective.
- It is designed to help us understand why it makes sense for people to do the things that they do.
- Helps us understand normal work.
- It identifies where work went well and why – whilst also enabling deep understanding of events we may be concerned about.
- It allows learning from all operations

The OLR enables us to capture context, patterns and trends to support our already rich sources of data – Air Safety Reports (ASR), Cabin Safety Reports (CSR), Flight Data Analysis, Fatigue Reports etc. - the method provides access to rich data which would normally be outside of our reporting system.

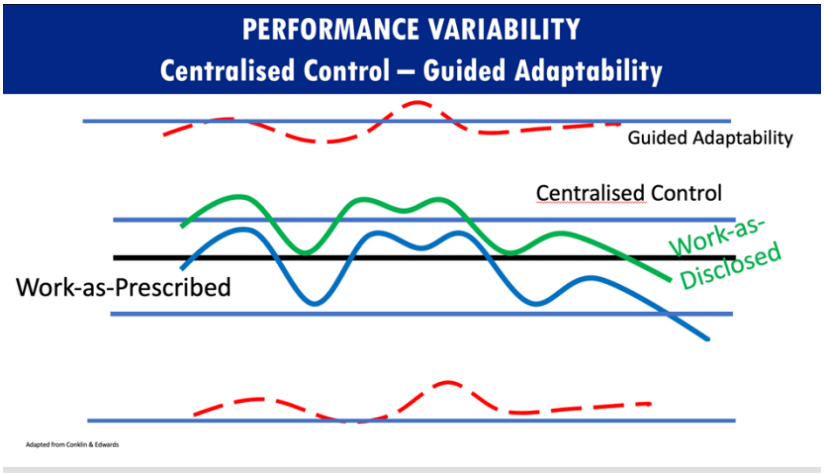
Assumptions

The OLR takes a system's thinking safety approach, it encourages us to move away from the linear thinking of cause and effect, and instead try and identify all of the influencing factors which affect our frontline workers. In order to do this, we must have clarity on the level of control our system expects or believes is in place to control actions or behaviours.

[1] McCarthy, P. (2020). The Application of Safety II in Commercial Aviation – The Operational Learning Review (OLR). In: Harris, D., Li, WC. (eds) Engineering Psychology and Cognitive Ergonomics. Cognition and Design. HCII 2020. Lecture Notes in Computer Science(), vol 12187. Springer, Cham. https://doi.org/10.1007/978-3-030-49183-3_29

Two key control methods may be described as centralized control and guided adaptability **2.** In a system of centralized control we have prescriptive policy, we expect people to comply with instructions, we expect people to know the rules the regulations, the policies and procedures, and to follow them - the basic goal is to control actions and limit decisions. However we also realize that we sometimes expect more than this from our front line experts (e.g. pilots, cabin crew), we expect our experts to apply rules to situations and adapt those rules as needed, to know how to improvise to meet operational goals, to use complex adaptive problem solving or critical thinking skills to achieve results, to use intuition to know when to change the plan- and the basic goal here is to facilitate empowerment.

This feels like a dichotomy of expectation; however this is how our current system actually functions. Taking the OLR approach, we are able to understand how this system works, ensuring performance and behaviour is not drifting out to the boundaries we have set for safety. A well designed and well-developed system will allow for a certain amount of performance variability - the OLR allows us to monitor this variability.



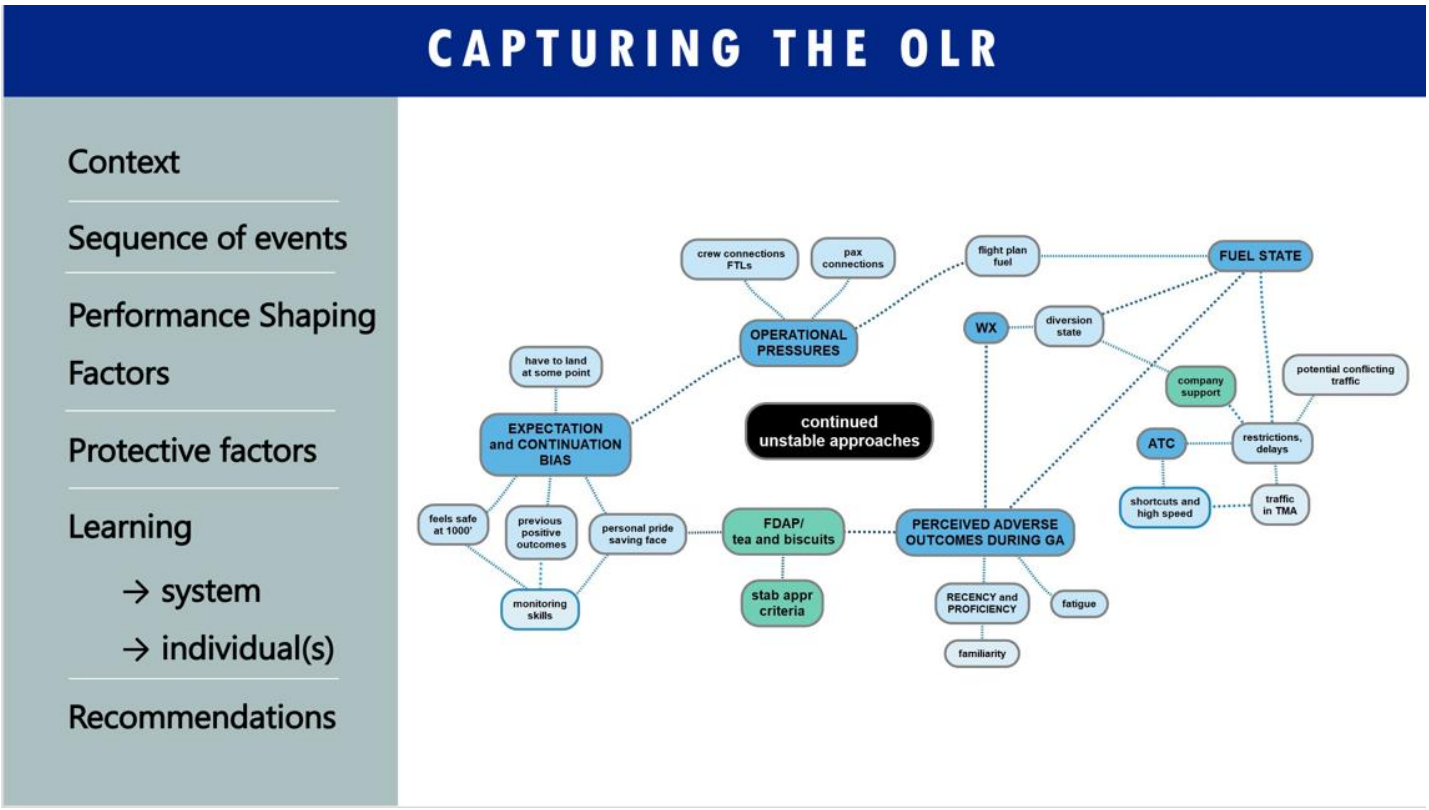
OLR in practice

The OLR in practice Is a scalable tool. The approach may see us conducting a 15-minute conversation to understand a task or event or may require a much more formal review to evaluate change or particular concerns confronting the system. Whatever level of review we are undertaking, we always assume positive intent when talking to our frontline experts and we always undertake the review with curiosity and not judgment!

There are six main steps to undertake in the OLR:

- Identify the opportunities to learn.
- Prepare and plan the review.
- Collect the information through disclosed data.
- Analysis and sensemaking.
- Share the learning.
- Review the effectiveness.

[2] Safety II professionals: How resilience engineering can transform safety practice, David J. Provan, David D. Woods, Sidney W.A. Dekker, Andrew J. Rae, Reliability Engineering & System Safety, Volume 195,2020, 106740, ISSN 0951-8320, https://doi.org/10.1016/j.ress.2019.106740.



OLR utility to date

- Flight operations, as a general tool to understand the effectiveness of our processes and procedures.
- Training, to devise realistic and beneficial scenarios or case studies.
- Engineering, to help understand and probe events they wish to know or understand more clearly.
- Most recently, due to the effects of the pandemic and the restrictions placed upon our crews globally, we have applied the method to better understand well-being, including fatigue, in order to ensure our people are staying well and keeping safe.

Benefits of the OLR

Better safety improvements identified both at a system and individual level. We have seen a positive change in the safety climate, driven by those who experience the method. Anecdotal evidence suggests we have helped to build trust, and an environment whereby our frontline experts are willing to share openly with us - our people see that someone is listening to them and there is an opportunity for them to tell their story and improve the system. We generate safety conversations, and we have a much better understanding of work-as-done, learning about things we would never have otherwise known. All of this provides fast, sensitive feedback for our SMS.

Next steps

The extensive research supporting this approach gives us confidence in the validity and reliability of the OLR, so much so that our next step is to use this disclosed data capture method as a proactive safety audit tool. This is a very valuable addition to our safety toolbox, particularly at a time when more traditional methods are not easily available. This can be discussed further in a future presentation.

8. Fatigue Risk Management-Pre and Post COVID

Fatigue risk management has been a challenge ever since the early days of the airline industry. The increasing capability of aircraft over the past 25 years has identified the need to pay more attention to human performance issues. In 2009, ICAO recognized this need in relation to flight and duty time limitations and started an effort to develop a risk-based methodology that applied current science and operational experience to flight and duty time regulations. This effort started the industry down a path of new regulations that continues today.

Prior to Recovery

The airline industry was on a steady path to improvement until the onset of COVID-19. In the early days, as the passenger side of the industry came to a virtual standstill, there were significant needs to move cargo and essential workers. All stakeholders worked together and did what was needed. Many times, activities performed were unprecedented. During these disruptive times, the challenges encountered included:

- Significant reduction in fatigue reporting
- Daily changing layover restrictions
- Layover disruptions caused by rest interruptions, lack of food, transportation issues and delayed operations
- 30+ hour FDPs with multiple pilots
- Crew experience managing sleep during unconventional operations

Now

As the industry recovers, memory of the traumatic early days remain. There is a strong desire to move forward as quickly as possible to return to “normal operations”. For the most part, our vision of normal were the strong times experienced in 2018 and 2019. Once again, the industry is experiencing unprecedented challenges, which include:

- Balancing network planning demands, crew staffing, and training timelines
- Levels of fatigue reporting never seen before
- Fatigue emerging amongst new groups in Flight Operations (instructors, check captains, support staff)
- Staffing limits outside flight and cabin crew (ground staff, mechanics, ATC)
- Industrial pressure to address fatigue and quality of life issues

Future

The industry needs to refine managing fatigue risk using performance-based principles inside normal day-to day SMS risk management processes. Having a trained fatigue SME that interfaces regularly with both safety and business professionals is essential. Other things to consider are:

- Fatigue SME needs to have authority to influence planning, scheduling, and day-of operations
- SME must collaborate with safety professionals responsible for reporting systems and FDM to assure fatigue risk is properly analyzed and mitigations are implemented
- SRAs must include an analysis of fatigue related risk and take this risk into account when deciding the overall risk to the operation
- Any time human factors are a consideration, fatigue risk should also be a part of that conversation
- New technologies for assessing and quantifying fatigue risk must be sought out and implemented

Fatigue risk will always be present in the airline industry. It is vital that we recognize this and continue our efforts to manage it effectively. Our fellow employees and the travelling public are depending on us.

9. Nose landing gear at 90°

Airbus presented an overview of events with nose landing gear at 90 that took place in 2021 / 2022. These events were fully independent from each other.

These events demonstrated once again the important role of maintenance and operational procedures.

Product enhancements are available to ease the application of these procedures.

10. IOSA – risk-based approach

IOSA Today

The IATA Operational Safety Audit (IOSA) is the global industry standard for airline operational safety. The audit uses a standardized checklist which assesses an airline's conformity with the IOSA standards at two-year intervals.

IOSA has been a mandatory requirement for membership in IATA since 2006. Safety data confirms that in aggregate, airlines on the IOSA registry have a lower accident rate than airlines that are not on the IOSA registry.

IATA has as a strategic objective to continue reducing the industry's already low accident rate. Among leading oversight programs, it is believed that additional improvements in safety assurance and oversight can be achieved by focusing on pertinent safety risks.

In today's dynamic environment, airlines need an IOSA audit that focuses on areas of potential safety risks at their airline rather than applying a one-size fits all approach. Airlines and regulators alike, also expect more insights when evaluating their codeshare partners' audit results. In addition, airlines need more digital information management in the program.

Moving IOSA Forward

Airline needs and IATA's objective to further reduce the industry accident rate will be addressed through the introduction of a risk-based approach under which audits will be tailored to each airline' risk profile. This will increase the effectiveness of the audit and contribute to the overall industry goal of reducing the accident rate.

The process will be supported through a more mature IT solution that will allow the airline to provide information relevant to the risk-based audit. It will be supported by the IATA Global Safety Risk Management Framework.

It will take approximately three years to transition all airlines to the risk-based approach. As part of this activity, the auditing process will gradually be brought in-house.

Risk-Based Approach...

- ... moves away from the 'one-size-fits-all' approach, and therefore better targets an operator's safety-relevant areas;
- ... is going to add value to the airlines, by auditing beyond compliance and looking for maturity;
- ... will improve safety levels through a more comprehensive assessment of the airlines' safety practices; and
- ... is in line with regulators desire to move beyond 'box ticking'

What are the benefits of a Risk-based Approach?

The transition to a risk-based model of IOSA is expected to bring numerous benefits to operators including:

- Bespoke audits that focus on the individual operator's profile needs, including risk, organizational performance, and audit history.

- Improved confidence in audits conducted on code-share partners by focusing on safety performance that goes beyond 'box ticking'.

- Maturity assessment of the key management systems (beyond simple conformity) that will provide valuable feedback on additional areas of improvement.
- Improved, and enhanced, quality assurance program to ensure IOSA continues to be the gold- standard in safety audit programs.
- A continued focus to reduce regulatory burden and audit redundancy.

Let's examine some of them more closely.

1. Tailored Audit Scope

The audit scope will be tailored to the key standards and recommended practices most pertinent to the specific airline undergoing the IOSA. As such, the airline can concentrate its safety efforts where they are needed and not on areas with low criticality.

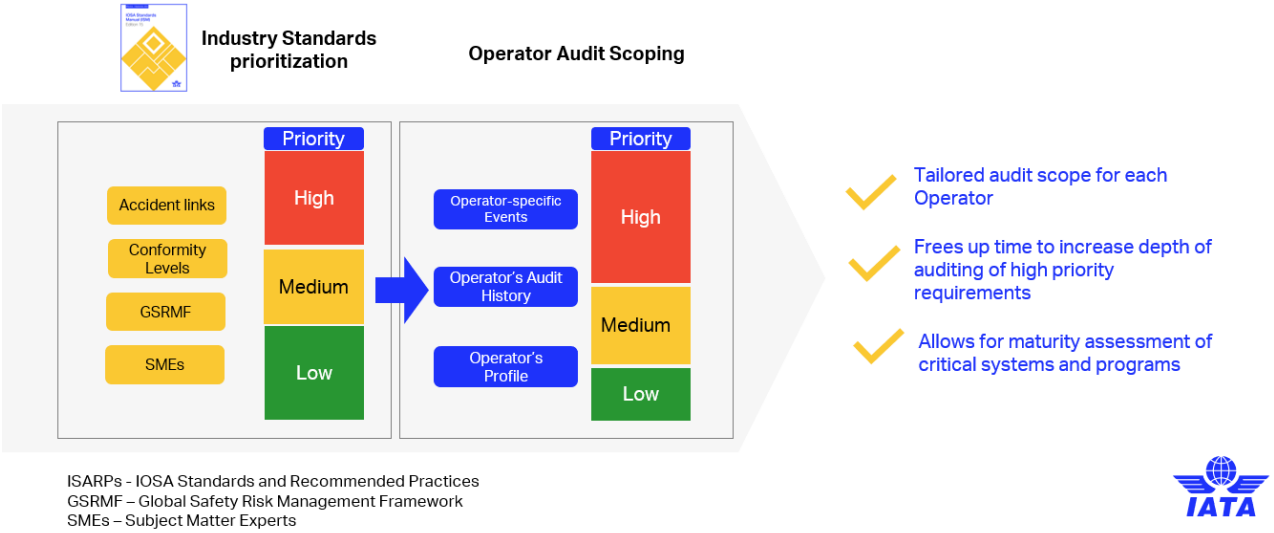


Figure 1 – Illustration of Audit Scoping

Audit Scoping	Today	Future
• Worldwide runway excursion rate has been increasing.	• All ISARPs are audited regardless of their universal criticality.	• Audit standards are prioritized in regular intervals. In this example, ISARPs related to runway excursions are identified as high priority and audited in-depth.
• An operator has been demonstrating conformity with a non-critical ISARP for several consecutive audits.	• All ISARPs are audited regardless of their criticality for the operator.	• The Audit scope is tailored to the operator's profile and audit history. • Audit standards with low criticality may be audited at lower frequency to allow focus on high-criticality ISARPs.

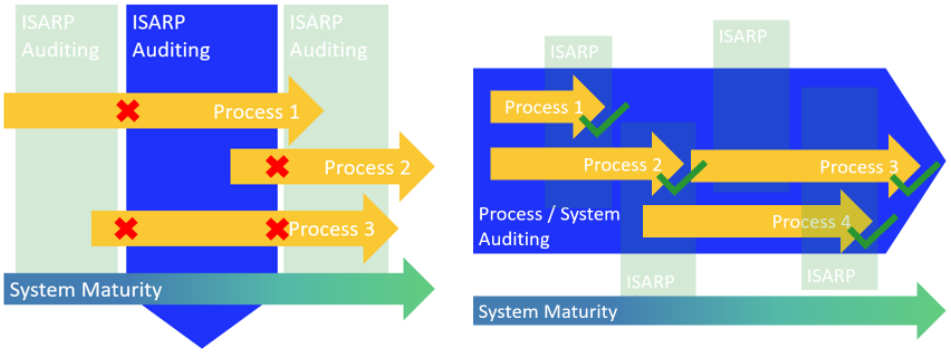
2. Safety Maturity Assessment

The IOSA maturity assessment will introduce a more structured and comprehensive way of providing the airline with an evaluation of its relevant safety systems and programs. This will further assist airlines in determining the next steps in improving their operational safety.

In addition to the conformity assessment with the IOSA standards, the maturity assessment will provide the operator with a nuanced diagnosis of its safety relevant systems and programs.

3. System Assessment

The system-based audit evaluates the operator's system interfaces and continuity of its processes. With the System Assessment, the auditor will follow a process, rather than individual requirements. This will provide valuable insights into an operator's process continuity.



4. Higher Integrity Audit Results

Moving to a risk-based approach will lead to incremental improvements of operators' safety management systems and the industry's safety performance through the focussed assessment in critical areas. Improved service delivery will further increase audit integrity.

Frequently Asked Questions

For further information or questions, please visit the Risk-Based IOSA page.

11. TEM-Based Briefing

Background

Following a Line Operational Safety Audit (LOSA), the presenting airline was advised of insufficient threat anticipation in its briefings, with a recommendation to improve Threat and Error Management (TEM) performance in briefings. The analysis of the airline's Undesired Aircraft States also demonstrated that the lack of TEM and Communication was one of the main identified contributing factors. Indeed, briefings at the airline were typically conducted as a "one-way checklist".

Introduction of Interactive Flight Crew Briefing

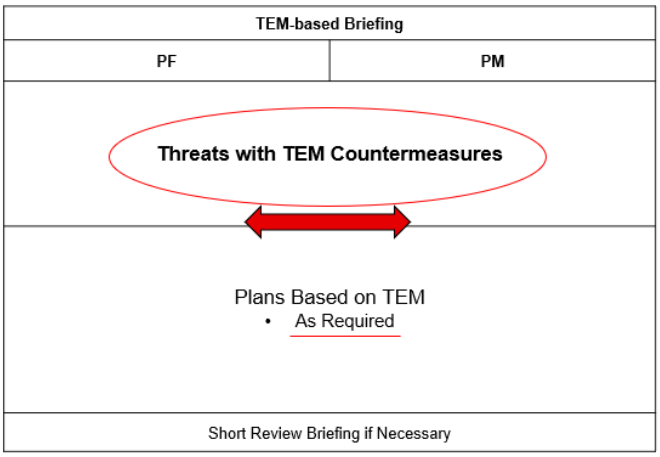
To address the issue, the airline leveraged multi-crew information-processing approach (Pic.1) and developed new briefing rules.

Pic. 1

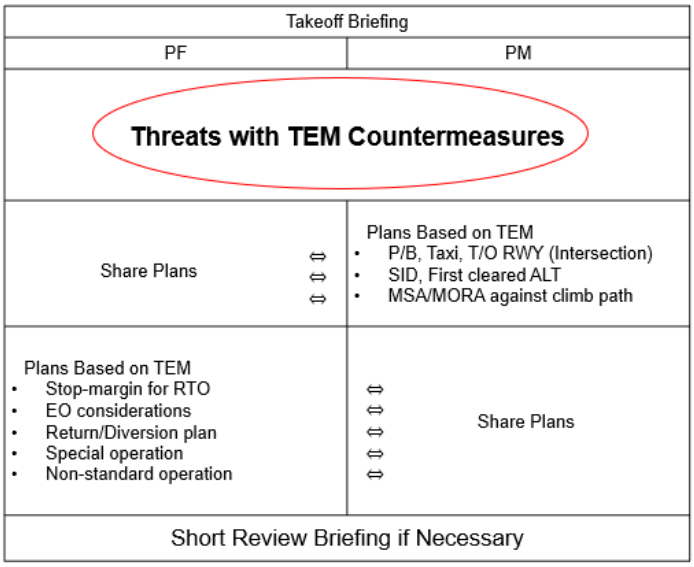
These new rules were aiming at avoiding a "one-way checklist briefing" and introducing an actual TEM practice as a **team**:

- Build up a team where Pilot Flying (PF) and Pilot Monitoring (PM) both actively participate in a **two-way Communication.**
- **Share** the Threat and related Error / Undesired Aircraft State (UAS).
- Clarify the **Countermeasure** and the **role** of PF and PM against Threat, Error and UAS.
- Be **flexible** to perform effective Briefing in different situations.

TEM-based Briefing



Take-off Briefing



Video Training

To enhance the training, the airline also created video materials, recorded on Zoom, with examples of various communication scenarios, recorded by airline's pilots.

Outcome

Following the implementation of above measures, more than 95% of ⅔ crew reported that the PM involvement increased in their briefings. They also stated that TEM practice was enhanced in the briefings. The new approach was also reported to be 75~85% effective in being able to:

- Reduce the "Checklist type Briefing Item";
- Feel the Improvement in quality of Briefing;
- Implement TBB in Training and Check rides.

TEM-focused briefings and the involvement of the Pilot Monitoring in the briefing were identified as two key factors that enhance safety and resilience.