International Civil Aviation Organization

MIDANPIRG/23 & RASG-MID/13 Meetings

(Cairo, Egypt, 14 – 18 June 2026)

Agenda Item 4.3: Other Emerging Safety Matters

BUILDING SUSTAINABLE AVIATION SYSTEMS THROUGH POSITIVE SAFETY CULTURE AND SAFETY INTELLIGENCE

(Presented by Saudi Arabia/General Authority of Civil Aviation)

SUMMARY

This Information Paper discusses how aviation sustainability can be improved through positive safety culture and safety intelligence. The paper explains that safe aviation systems need more than regulations and technology.

A strong safety culture helps organizations improve reporting, learning, trust, and communication. Safety intelligence helps organizations use safety data to identify risks early and make better decisions.

The paper also highlights the importance of moving from a proactive to a predictive approach of safety management. Modern aviation systems are becoming more complex, and organizations must use data-driven methods to predict risks before accidents or incidents occur.

The paper advocates that efforts, from aviation authorities and service providers, are put together to strengthen safety culture, improve safety data analysis, and connect sustainability goals with Safety Management Systems (SMS).

Action by the meeting is at paragraph 3.

REFERENCE

- ICAO ANNEX 19 — SAFETY MANAGEMENT.
- ICAO SAFETY MANAGEMENT MANUAL (DOC 9859).
- GACAR PART 5 — SAFETY MANAGEMENT SYSTEMS.
- GACA E-BOOK VOL. 2 — SAFETY MANAGEMENT SYSTEMS.
- ICAO SAFETY INTELLIGENCE MANUAL (DOC 10159).

1. INTRODUCTION

1.1 The aviation industry is becoming more complex because of new technology, increased traffic, automation, and higher operational demands. Aviation organizations must maintain safety while also supporting long-term sustainability.

1.2 The ICAO Annex 19 and ICAO Doc 9859 provide international guidance for Safety Management Systems (SMS) and State Safety Programs (SSP). These documents encourage proactive and predictive safety management instead of only reacting to accidents.

1.3 Aviation Authorities also support these principles through the development of SMS requirements and safety performance monitoring.

1.4 Today, a shift in focus is taking place towards:

- Safety culture;
- Safety intelligence;
- Data-driven decision-making;
- Organizational resilience; and
- Sustainable operations.

This paper explains how positive safety culture and safety intelligence can support safer and more sustainable aviation systems.

2. DISCUSSION

2.1 Safety Intelligence:
In the past, aviation safety focused mainly on accident investigation after events happened. Later, organizations improved by becoming proactive through hazard identification and risk assessments before events occurred. Nevertheless, today, aviation must move further toward predictive safety management that uses:

- Safety data;
- Advanced analytics;
- Artificial intelligence;
- Trend monitoring; and
- Safety intelligence tools.

to identify possible risks before they develop into serious events. This new direction is important because aviation systems are becoming more complex due to:

- Increased air traffic;
- Automation and digital systems;
- Fast operational changes; and
- Growing sustainability challenges.

Reactive and proactive methods alone may no longer be enough to manage future risks effectively, which manifests that need for safety intelligence, as it supports predictive safety by helping organizations in:

- Detecting weak warning signs;
- Predicting operational risks;
- Improving decision-making;
- Reducing disruptions; and
- Strengthening organizational resilience.

Organizations that adopt predictive safety management can improve:

- Operational stability;
- Safety performance;
- Resource planning;
- Sustainability goals; and
- Public confidence in aviation systems.

2.2 Positive Safety Culture:

A positive safety culture means that people at all levels of the organization support safety, while harnessing and embedding key elements of:

- Leadership commitment;
- Open communication;
- Just culture;
- Employee involvement; and
- Continuous learning.

Organizations with strong safety culture usually have better reporting, better teamwork, and stronger resilience during operational changes or crises. In addition, positive safety culture also supports sustainability by improving long-term operational stability and public confidence.

2.3 Sustainability and Safety Management:

Sustainability in aviation is not only environmental. It also includes:

- Safe operations;
- Human performance;
- Organizational resilience; and
- Long-term efficiency.

SMS frameworks help organizations manage risks, monitor performance, and continuously improve operations. However, safety and sustainability should work together instead of being treated separately. Accordingly, modern aviation organizations should integrate sustainability goals within their safety management systems to support safer and more resilient operations.

3. ACTION BY THE MEETING

3.1 The meeting is invited to note the information contained in this paper.
3.2 This paper advocates the importance for both aviation authorities and service providers to work together to ensure the safety of the aviation systems by:

- Improving Safety Culture;
- Strengthening Safety Intelligence;
- Supporting Predictive Safety Management;
- Connecting Safety and Sustainability;
- Developing Human Competencies; and
- Supporting Modern Regulatory Approaches.

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