

**61ST CONFERENCE OF
DIRECTORS GENERAL OF CIVIL AVIATION
ASIA AND PACIFIC REGION**

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AGENDA ITEM 3: AVIATION SAFETY

**CIVIL AVIATION AUTHORITY OF MALAYSIA (CAAM)
AVIATION REPORTING SYSTEM (CARES) 3.0 WITH SAFETY
INTELLIGENCE: MALAYSIA’S EVOLUTION OF SAFETY
DATA COLLECTION**

(Presented by Malaysia)

INFORMATION PAPER

SUMMARY

This paper informs the Conference of the implementation of the Civil Aviation Authority of Malaysia (CAAM) Aviation Reporting System (CAREs) 2.0 under the Malaysia Aviation Safety Plan (MASP) 2026-2028 and presents Malaysia’s forward roadmap towards CAREs 3.0 with Safety Intelligence. CAREs 3.0 will evolve the national occurrence reporting system from a data collection platform into a safety intelligence capability, enriching occurrence data with air traffic, meteorological, surveillance and personnel licensing data, and applying analytics and machine learning, guided by the International Civil Aviation Safety Intelligence Manual (Doc 10159).

CAAM AVIATION REPORTING SYSTEM (CAREs) 3.0 WITH SAFETY INTELLIGENCE: MALAYSIA'S EVOLUTION OF SAFETY DATA COLLECTION

1. INTRODUCTION

1.1 The CAAM Aviation Reporting System (CAREs) is Malaysia's national system for the collection, processing and management of aviation safety occurrence reports submitted by aviation service providers and individual aviation personnel. It receives Mandatory Occurrence Reports (MOR), covering accidents, serious incidents and other reportable occurrences, and Voluntary Reports (VOR), through which any person may confidentially report hazards, near-misses and safety concerns falling outside mandatory reporting requirements. Together, these reporting streams constitute Malaysia's Safety Data Collection and Processing Systems (SDCPS), established in accordance with ICAO Annex 19 – Safety Management, and serve as the primary input to Malaysia's State Safety Programme (SSP) safety intelligence activities, including national risk trend identification and the monitoring of Safety Performance Indicators (SPIs) under the Malaysia Aviation Safety Plan (MASP).

1.2 Prior to 2023, occurrence reporting to CAAM was paper-based: reports were completed in Portable Document Format (PDF), then transmitted and processed manually. This constrained the timeliness of reporting, introduced transcription errors, limited the completeness of the information captured, and made systematic analysis of the national occurrence dataset labour-intensive. CAAM therefore launched CAREs in 2023 as the national digital reporting platform, replacing paper-based submission with structured online reporting. The transition increased the combined number of MOR and VOR received by 400%, reflecting both improved accessibility and growing confidence in the national reporting system, and materially improved the timeliness and quality of the safety data available for analysis. Building on this foundation, CAAM launched CAREs 2.0 in 2026 under the MASP 2026–2028.

1.3 This paper informs the Conference of the development of CAREs 2.0 and presents Malaysia's forward roadmap towards CAREs 3.0 with Safety Intelligence, the next stage of the national reporting capability that will advance Malaysia's safety management approach from reactive to proactive, and towards predictive capability, through the application of analytics, machine learning and large language model (LLM) functions, guided by the ICAO Safety Intelligence Manual (Doc 10159).

2. DISCUSSION

2.1 Limitations of the Current Reporting Environment

2.1.1 Like many States, Malaysia's experience with its first-generation reporting system highlighted a common structural challenge: safety occurrence data, once collected, served a single function primarily. Occurrence records were accessed principally by the SSP Unit for national trend monitoring, while their broader analytical potential for airworthiness oversight decisions, inspector prioritisation, aerodrome surveillance planning and human factors programme design remained largely unrealised. Data quality was inconsistent across reporting organisations, trend analysis required substantial manual effort, and cross-referencing occurrence data with other national data streams, such as traffic movement data or audit findings, was not possible through any existing system.

2.1.2 These limitations informed the design philosophy of the CAREs modernisation programme: the national reporting system should not merely be upgraded as a better repository, but progressively transformed into the analytical engine of an integrated national safety data ecosystem.

2.2 CAREs 2.0 Development

2.2.1 CAREs 2.0 is designed as a holistic safety data management platform, covering the reporting, management, analysis, and production of safety reports. Its scope expands beyond MOR and VOR to include aviation security (AVSEC) incident reports, consolidating three national report streams under a single, analytically capable system and providing, for the first time, a unified national view across safety and security occurrence reporting.

2.2.2 Key enhancements being delivered under CARES 2.0 include:

- a) a standardised occurrence taxonomy aligned with international classification practices, improving data quality, consistency and comparability across report types and reporting organisations, and facilitating future regional data exchange based on common definitions;
- b) streamlined digital submission channels for operators and individual reporters, with structured data fields and validation at the point of entry, supporting the timeliness, completeness and analytical usability of reports;
- c) built-in analytical and trend analysis functions, including occurrence categorisation dashboards and reporting-rate tracking by organisation, reducing the manual effort currently required to produce national safety trend reports; and
- d) workflow management for report triage, follow-up, and the tracking of safety recommendations and their implementation status.

2.3 From Reporting to Intelligence – The CARES 3.0

2.3.1 The development of CARES 3.0 is best understood as the third stage of a deliberate staged evolution of Malaysia's national reporting capability. CARES, launched in 2023, digitised the traditional paper-based reporting process. CARES 2.0, launched in 2026, advanced the system from collection to management and analysis which introducing a standardised taxonomy, consolidated report streams, structured workflows, and built-in trend analysis and SPI monitoring. CARES 3.0 completes this progression by adding predictive capability, anticipating where risk is accumulating before serious occurrences take place.

2.3.2 CARES 3.0 is a practical implementation of the principles outlined in the ICAO Safety Intelligence Manual (Doc 10159). It is conceived as the safety intelligence engine of Malaysia's integrated national safety data ecosystem, consolidating occurrence data with air traffic management (ATM) data, regulatory audit and surveillance findings, personnel licensing data, meteorological data and international benchmarks in a single governed environment. The distinguishing characteristic of CARES 3.0 is not the volume of data it holds, but the context it attaches to every report and the forward-looking insight it derives from the integrated dataset.

2.3.3 Consistent with ICAO's aspiration for safety intelligence under advanced SSP implementation (ICAO Doc 9859 – Safety Management Manual), CARES 3.0 will progressively advance national analytical capability along the analysis continuum described in Doc 10159, applying analytics and machine learning across the integrated national dataset to transform contextualised safety information into safety intelligence. In line with Doc 10159 guidance, all analytical outputs will remain subject to interpretation and validation by qualified safety analysts before informing oversight decisions.

2.3.4 Predictive capability will be built by correlating external data sources with historical occurrence data to provide operational context for actionable safety intelligence. Meteorological data will enable occurrences to be analysed against the weather conditions under which they arose; ATM traffic data will provide exposure context, normalising occurrence rates against actual movements by aerodrome, route, aircraft type and time period; and multi-year occurrence data will serve as the historical baseline on which machine learning models are trained. By correlating these data streams, CARES 3.0 will identify the combinations of weather, traffic and operational conditions historically associated with elevated occurrence likelihood, and prospectively flag periods, locations or operations exhibiting similar risk profiles, enabling oversight and mitigation action to be taken before occurrences materialise.

2.3.5 CARES 3.0 will also support a more evidence-based approach to safety culture and human factors programmes. Longitudinal reporting-rate data, correlated with safety outcomes, will help distinguish organisations demonstrating genuine Just Culture behaviours, healthy reporting levels with low serious-occurrence rates, from those whose reporting patterns are inconsistent with their occurrence experience, so that safety promotion efforts can be targeted where the data signals cultural risk.

2.4 Safety Data Protection and Governance

2.4.1 The development of CARES 3.0 is underpinned by a data governance framework aligned with ICAO Annex 19 protections for safety data and safety information. Occurrence data is classified as protected, access is restricted to authorised safety analysis purposes, and safety reporting data will not be used for punitive purposes, preserving the Just Culture principles on which effective voluntary reporting depends. Data ownership, quality standards, retention periods and access controls are documented through formal data governance arrangements, with full audit trails of data access and analytical use. To further protect sensitive information, appropriate de-identification measures, including anonymisation and pseudonymisation, are applied at the point of data ingestion and throughout the data lifecycle where necessary.

2.5 Regional Data Sharing Initiative

2.5.1 The improved data quality, standardised taxonomy and analytical capability delivered by CARES 2.0 and CARES 3.0 are also expected to strengthen Malaysia's contribution to regional data sharing initiatives, including participation in regional occurrence data exchange, the voluntary sharing of de-identified SPI rates, and more timely and accurate submissions to ICAO safety data platforms through automated reporting.

2.5.2 A common taxonomy, quality-assured data and robust protections are precisely what Annex 19, Amendment 1 and Chapter 8 of Doc 10159 identify as the prerequisites for the effective sharing and exchange of safety information and safety intelligence among collaborating States, positioning CARES as a national capability that is regional-exchange ready. Malaysia stands ready to share its development experience and lessons learned with interested States/Administrations.

3. ACTION BY THE CONFERENCE

3.1 The Conference is invited to note the information contained in this Paper.

- a) note the development progress of CARES 2.0 and Malaysia's forward roadmap towards CARES 3.0 with Safety Intelligence; and
- b) note Malaysia's readiness to share its experience in modernising its national safety reporting system and developing safety intelligence capability with interested States/Administrations.

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