International Civil Aviation Organization

AIR NAVIGATION SYSTEMS IMPLEMENTATION GROUP

Third Meeting (ANSIG/3)
(Cairo, Egypt, 2 – 4 July 2018)

Agenda Item 8:   Any Other Business

FACILITATION OF DATA-DRIVEN DECISION-MAKING
IN SUPPORT OF SAFETY RISK MANAGEMENT -
ICAO SAFETY INFORMATION MONITORING SYSTEM (SIMS)

(Presented by the Secretariat)

SUMMARY
This paper presents analysis solutions developed or proposed by ICAO that facilitates data-driven decision-making and assists stakeholders in identifying and managing safety risks in support of the development and dissemination of safety information and the implementation of State safety programmes (SSPs) and safety management systems (SMSs). ICAO developed and launched the Safety Information Monitoring System (SIMS).   Action by the meeting is at paragraph 3.
REFERENCES
  - Annex 19 — Safety Management   - Doc 9859, Safety Management Manual   - Doc 9750, Global Air Navigation Plan   - Doc 10004, 2017-2019 Global Aviation Safety Plan

1.   **INTRODUCTION**

1.1   Annex 19 – *Safety Management* and the *Safety Management Manual* (SMM) (Doc 9859) contain Standards and Recommended Practices (SARPs) and guidance material, respectively, requiring States to establish safety data collection and processing systems (SDCPS) and conduct safety data analysis. ICAO's evolving safety strategy includes several analysis solutions and initiatives that support the effective implementation of State safety programmes (SSPs) and safety management systems (SMSs) by States and service providers while also contributing to increased levels of capacity and efficiency.

1.2   These solutions, collectively referred to as air navigation integration analysis solutions, include data, tools, methodologies and training that facilitate data-driven decision-making and help stakeholders identify and manage safety risks.

1.3   These tools and methodologies also contribute to the development of safety information. In addition, they support the implementation of predictive risk management measures based on the objectives of the Global Aviation Safety Plan (GASP) and allow ICAO to monitor the achievement of targets outlined in the Global Air Navigation Plan (GANP).

2.   **DISCUSSION**

2.1   The aviation system produces large volumes of data that need to be effectively collected and managed. For every flight hour, a modern quick access recorder (QAR) of an aircraft typically generates around 60 000 data points. At the same time, an aircraft equipped with automatic dependent surveillance-broadcast (ADS-B) also emits around 3600 data points. With over 32 million scheduled commercial flights a year, these two systems alone generate over 500 million data points every hour worldwide.

2.2   In addition to the data generated by the equipment, civil aviation authorities as well as other stakeholders generate additional data points through their oversight and surveillance systems. Data collected through audits, inspections, occurrence reports or investigations contribute to the growth of the aviation data lake. This high volume and volatile data cannot be easily processed by conventional programs.

2.3   The use of cutting edge technology, such as cloud computing, big data clusters or artificial intelligence, becomes crucial for processing safety and air navigation data and allows the extraction of actionable information.

2.4   Actionable information is the main output to an effective data-driven decision-making process which will allow Member States to evaluate risk, assess performance and take appropriate decisions. This information is key to implementing predictive risk management, one of the GASP objectives, as well as the performance-based approach of the GANP.

2.5   Annex 19 requires States to establish and maintain a process to analyse the safety data and safety information from the SDCPS and associated safety databases. The Universal Safety Oversight and Audit Programme (USOAP) confirms that only forty-two per cent of all Member State authorities responsible for the implementation of the SSP analyse information from their State's accident and incident database (protocol question 6.511). Effective implementation of this protocol question varies widely from one regional aviation safety group to another.

2.6   Considering the issues discussed above and the complexity of developing and deriving meaningful information and useful insights from stored data, ICAO launched the new Safety Information Monitoring System (SIMS) project in 2017 (https://www.icao.int/safety/Pages/Safety-Information-Monitoring-Service.aspx). SIMS is built upon the iSTARS concept, with the difference that SIMS uses State data in addition to ICAO data. Member States can simply connect their own stored data (inspection results, occurrence reports, etc.) onto SIMS and generate safety information in the form of indicators, graphs and dashboards directly through the system.

2.7   SIMS is a cost-effective way for Member States to gain direct insight into their stored data without having to develop complex in-house information technology systems. Access to the platform is free of charge to the State and its service providers.

2.8   To get a complete picture of the risks and needs within a State's aviation system, only having access to the State's own information is, most of the time, insufficient. In this regard, SIMS also allows participating States to securely exchange the generated safety information with each other. ICAO has developed SIMS legal framework that addresses, among others, data privacy and safety data protection elements. States in exchanging and sharing their safety information with other participating States can sign a Memorandum of Understanding for this.

2.9   In addition to State's provided data, SIMS uses ADS-B data in its applications and processes real-time ADS-B flight position data. This data is used to calculate worldwide air navigation efficiency indicators such as horizontal flight efficiency and frequency of continuous descent operations (CDO). This safety information is accessible to the SIMS participating State, provided that ADS-B ground coverage is good enough.

2.10   The implementation of SIMS within the ICAO Regions is based on a phased approach. The ICAO MID-Region Member States are invited to contact the ICAO MID-Regional Office or sims@icao.int to express their interest in joining this project. A kick-off meeting will follow with information and documentation for the implementation of SIMS in the specific State.

2.11   ICAO's air navigation integration analysis solutions support the effective implementation of SSP and SMS in States and industry while also contributing to an increased level of capacity and efficiency. ICAO has a growing catalogue of available and planned analysis solutions which all stakeholders are invited to use.

3.   **ACTION BY THE MEETING**

3.1   The meeting is invited to encourage States to:

a)   use the ICAO's air navigation analysis solutions;

b)   join the ICAO Safety Information Monitoring System (SIMS) project; and

c)   exchange safety and air navigation information with other Member States through SIMS in support of safety risk management.

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