ASSEMBLY — 40TH SESSION

TECHNICAL COMMISSION

Agenda Item 28: Aviation Safety and Air Navigation Policy

STATE-INDUSTRY DATA COLLECTION, ANALYSIS AND INFORMATION SHARING FOR AVIATION SAFETY

(Presented by Singapore, the United States, and International Air Transport Association, and co-sponsored by China, Indonesia, the Philippines, the United Kingdom, and Flight Safety Foundation)

EXECUTIVE SUMMARY
Safety information sharing is identified under the ICAO *Global Aviation Safety Plan* (GASP, Doc 10004) as a safety performance enabler to achieve the GASP objectives. At the 38th Session of the ICAO Assembly, regional aviation safety groups were encouraged to develop and implement regional safety information sharing and analysis programmes. This paper highlights existing State-industry collaboration programmes among States/administrations and aviation stakeholders in Asia Pacific, Europe and the United States on data collection, analysis and information sharing for aviation safety. It highlights how such programmes enable the identification of safety risks and development of mitigating measures, through data analysis governed by safety management and data/information protection principles in line with ICAO Annex 19 — *Safety Management*.

Action: The Assembly is invited to
a) recognise the progress of State-industry collaborations to establish regional information sharing and data analysis programmes in support of safety risk management;
b) encourage States/administrations and industry partners to harness and optimise resources to develop safety data collection and analytic capabilities for the fulfilment of regional and global aviation safety priorities and objectives in relation to the GASP under Assembly Resolution A39-12; and
c) recommend that States/administrations and industry partners collaborate on exchange of best practices in safety information sharing and analysis, and share methodologies for safety risk identification, analysis and mitigation, to allow ease of safety information exchange and synergy in alignment and benchmarking of safety studies among different programmes.

Strategic Objectives:	This working paper relates to all Strategic Objectives.
Financial implications:	Not Applicable.
References:	Annex 19 — *Safety Management*

1. **INTRODUCTION**

1.1   The exchange of safety information at the regional level with State-industry collaboration enables the validation of existing safety risks, detection of emerging hazards and risks, and facilitates effective and timely action. Assembly Resolution A39-12 on the GASP identified safety information sharing as a safety performance enabler to achieve the GASP objectives. Underlining the importance of safety data usage and its impact on the State safety programme, ICAO Annex 19 emphasises safety data

collection, analysis and exchange to support States' safety management activities. The 38th Session of the ICAO Assembly also agreed to encourage RASGs to develop and implement regional safety data sharing and analysis programmes.[1]

2. DATA SHARING PROGRAMMES

2.1   Globally, there are State-industry collaboration programmes on data sharing and analysis to monitor safety risks and identify emerging hazards and risks, and to facilitate deployment of effective and timely safety mitigations. In Asia Pacific, there is the Regional Data Collection, Analysis and Information Sharing for Aviation Safety (AP-SHARE) Demonstration Project, in the United States, the Aviation Safety Information Analysis and Sharing (ASIAS) initiative, and in Europe, the Data4Safety (D4S) programme. The airlines have the International Air Transport Association (IATA) Flight Data Exchange (FDX).

2.2   Launched in September 2017, the AP-SHARE Demonstration Project is a regional data sharing initiative involving Asia-Pacific States/administrations and industry partners, in collaboration with Flight Safety Foundation (FSF) and MITRE Corporation. Industry partners include member State airlines, IATA and the Association of Asia Pacific Airlines (AAPA). This is a 3-year project to demonstrate the benefits of regional data analysis and information sharing capabilities in the Asia Pacific Region, and address issues such as data protection and confidentiality, operating models and governance structure. All AP-SHARE members are bound by the governing principles of safety management and information protection. The project is funded through annual contributions by States/administrations and a governing board, supported by a technical working group, presides over the activities of the AP-SHARE.

2.3   The first AP-SHARE safety topic on mid-air collision risks resulted in members adopting a list of 18 traffic collision avoidance system – resolution advisory (TCAS RA) mitigations based on specific operating contexts. At the recent APRAST/14 meeting in May 2019, an AP-SHARE member State shared insights of its TCAS RA mitigations and reported a reduction in TCAS RA occurrence rate. Participating States and industry partners benefitted from this AP-SHARE demonstration. The second and third safety topics under AP-SHARE are approach and landing risk and go-around, which are expected to be finalised in April and October 2020. AP-SHARE will be mapping out a suitable future operating model for the long-term sustainability of an AP-SHARE programme beyond the three-year demonstration period. The future model would address operating costs, funding modalities, and the sources of safety data and information for analysis.

2.4   The ASIAS programme was established in 2007 as a State-industry safety analysis and data sharing collaborative initiative to proactively analyse broad and extensive data to advance aviation safety. The ASIAS Executive Board governs the procedures, operations and analysis activities, and the programme comprises representatives from air operators, labour groups, manufacturers, industry associations and government bodies including the United States Federal Aviation Administration (FAA) aviation safety and air traffic control. Through consensus based governance agreements with participating stakeholders and owners of specific databases, ASIAS analysts are able to gain access to and query millions of de-identified flight data records and textual reports via secured communications channels. The derived safety information is used to facilitate improvements within an individual organization and systemically within the United States National Airspace System (NAS) and globally.

2.5   The United States Commercial Aviation Safety Team (CAST), a government and industry body, utilizes information from voluntary safety programs by leveraging the ASIAS programme to collect and analyse data at a national level in a de-identified manner to identify emerging risks and monitor the effectiveness of deployed mitigations within the United States NAS. Based on the analysis of the information, CAST develops and adopts voluntary safety enhancements to reduce fatality risk in commercial aviation. The last 22 safety enhancements adopted by CAST were based on information from voluntary safety programmes.

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[1] It is important to note that in many safety data and safety information programmes, the terms "data" and "information" are used interchangeably, and not necessarily as defined by ICAO Annex 19.

2.6   D4S is a European-wide system of data exchange and analysis that enables the identification and assessment of the safety and the environmental protection issues. D4S is envisaged to become the main feeder for the European Plan for Aviation Safety (EPAS) and to support the processes for the implementation of relevant safety actions. D4S will enable the measurement of the safety and environmental performance of the European aviation system. Sponsored by the European Commission and the European Union Aviation Safety Agency (EASA), the D4S programme is a co-funded voluntary partnership between the EASA, national aviation authorities and safety partners including airlines, manufacturers, air navigation service providers, maintenance organisations and airports.

2.7   The collaborative and voluntary nature of the programme is reflected at the level of D4S governance that is shared between the authorities (EASA) and the industry safety partners. At the technical level, D4S organises the collection of all safety data residing in different organisations in Europe and integrates these into a big data platform managed by a third party data protection and processing organisation. In the first and current phase of demonstration of the programme (proof of concept), the main sources of operational aviation data contemplated and fused are the flight data from the operators, the safety reports from the European Central Repository, the weather data from the national meteorology offices and the automatic dependent surveillance — broadcast (ADS-B) traffic data. Aviation experts and data scientists collaboratively conduct analysis and implement agreed use cases being organised in ad-hoc and multidisciplinary task teams. The analysis activities are framed, agreed and conducted in a just culture environment and data sources handled always fulfilling the highest standards in terms of data protection.

2.8   The programme will switch into its operational run phase by 2020/2021 but is already strongly connected with other regional data initiatives beyond Europe to exchange on best practices/share experiences as well to ensure that there is a sufficient level of technical alignment between the initiatives and that outputs from the respective systems can be compared/aggregated at the global level. In particular, a cooperation with the ASIAS programme has been formally established by the exchange of letters of information sharing between EASA and the FAA. The actual sharing of information is performed under the control of the respective collaborative governances of the two programmes.

2.9   International associations have also created databases and analysis programmes to support a data-driven approach for predictive risk mitigation. IATA's Global Aviation Data Management (GADM) is a voluntary reporting system comprising of three aggregated, de-identified databases including FDX – derived from flight data analysis (FDA)/ flight operations quality assurance (FOQA) programmes, Safety Trend Evaluation, Analysis and Data Exchange Systems (STEADES) – a repository of safety and security incident reports, and the Ground Damage Database (GDDB), all of which are used for member airlines to identify commercial flight safety issues for a wide variety of safety topics.

2.10   CAST and IATA entered into a memorandum of understanding to share safety analysis best practices and de-identified safety information from ASIAS and IATA's FDX. Furthermore, CAST and IATA entered into an agreement with the RASG Asia Pacific (RASG-APAC) and Pan America (RASG-PA) to provide aggregate, de-identified ASIAS and FDX trend information to assist in the creation and evaluation of safety enhancement initiatives within the region.

3.   **DISCUSSIONS**

3.1   Since their inception, there has been much progress made with the data programmes mentioned above. There have also been challenges and refinements made to the frameworks.

3.2   Some challenges and best practices used by the aforementioned programmes to address them include:

3.2.1   *Funding* – Establishing a modality for funding the operating costs to perform the technical and administrative coordination activities for data analysis and the sharing programmes is important. These costs are usually shared across partners in the group with additional contributions through in-kind support.

Careful monitoring of the financial status of the programme ensures the proper use of funds and accountability to all partners.

3.2.2   *Governance* – Establishing a robust governance framework builds trust and confidence among participants on the use of sensitive safety information without jeopardising data providers. It is important to document the governance framework to guide the work of the programme and for the compliance of all partners. Each of the four programmes described above have their own governance documents. Some core principles for governance framework include the following:

    a) safety data/information is used only for the purpose of advancing safety goals;

    b) safety data/information will not be used for punitive and enforcement purposes;

    c) members are bound by the principles of safety management and data protection in ICAO Annex 19 in relation to the use of safety information;

    d) participation is voluntary;

    e) processes for data handling and analysis are carried out with transparency and in accordance to the governance framework; and

    f) confidentiality of sensitive data/information is maintained at all times.

With an established governance framework in place, members are able to contribute safety information and resources with the assurance that the analysis outcomes are shared among the group and only with the aim to advance safety. Some examples of governance framework include AP-SHARE governance plan, ASIAS procedures and operations plan, and D4S governance document.

3.2.3   *Data Sharing and Analysis* – The availability of data and handling of data for analysis present a challenge in itself. A large pool of shared data and information contributes to better analyses, outcomes and safety mitigations. Ideally, the data collection and analysis should be conducted by an independent party with the requisite technical expertise and experience, and working closely with input from programme stakeholders. For good governance, data should be de-identified, aggregated, analysis should be transparent and confidentiality of sensitive information should be respected. This allows States and industry partners to exchange safety information within the programme with confidence and paves the way for coordination and alignment of safety studies between programmes to achieve synergy while avoiding potential duplicative efforts.

3.2.4   *Collaboration Among Multi-Parties* – Lastly, perhaps the biggest challenge is to achieve active collaboration among all participating organisations and across programmes to share resources and support the technical and administrative coordination of the programmes. Encouraging collaborative partnership between State and industry could be achieved through co-leadership management structure with one co-Chair from the State and the other from the Industry. There should be continual efforts to seek collaboration beyond the programme with other partner programmes such as the recent conclusion of cooperation between ASIAS and D4S and the continuing collaboration between CAST/ASIAS and IATA FDX.

3.3   With the continued strong growth in commercial air transport in regions around the world and concomitant increased complexity of operations associated with it, the aviation community would stand to benefit from data sharing programmes that facilitate the proactive identification and management of safety risks. The progress made and developments in AP-SHARE, ASIAS, D4S and FDX are successful demonstrations of State-Industry collaboration to share information and analysis for the sole purpose of enhancing aviation safety. Such collaboration on safety information sharing initiatives can enable States and industry to fulfil global and regional aviation safety priorities and objectives.

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