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WORKING PAPER

ASSEMBLY — 40TH SESSION

TECHNICAL COMMISSION

Agenda Item 30: Other issues to be considered by the Technical Commission

SYSTEMISATION OF AIRCRAFT ACCIDENT AND INCIDENT INVESTIGATION PROCESS BY SOFTWARE APPLICATION

(Presented by the United Arab Emirates)

EXECUTIVE SUMMARY

This working paper presents a proposal related to the benefits of introducing a software as a management tool for the Annex 13 — *Aircraft Accident and Incident Investigation,* investigation process, and how the application of a software would optimize the utilization of States' resources, and achieve full documentation and traceability of the safety investigation process.

Action: The Assembly is invited to:

a) note the contents of this working paper;
b) request ICAO to consider the benefits of introducing a software for systemizing the investigation process to aid in improving the effectiveness of investigations, with feasible utilisation of resources; and
c) encourage States to share their experience in accident and incident investigation software application(s) that they have in their possession.

Strategic Objectives:	This working paper relates to the global strategies contained in the Global Aviation Safety Plan (GASP) which supports the prioritization and continuous improvement of civil aviation safety.
Financial implications:	Not applicable
References:	A Software System Development Study prepared for the establishment of the United Arab Emirates Air Accident Investigation Management System (UAE AIMS) software.

1. INTRODUCTION

1.1 The aircraft accident and incident investigation process must be managed efficiently and be well-documented, consistent, and allow follow-up of important actions. The accident investigation checklists are well-defined and implemented, and each activity within the investigation process is referred to recognised national and internationally practices.

1.2 In many aircraft accident and incident investigations, the aircraft accident investigation authorities (AIAs) manage the investigation process by using a traditional system with limited system software capability. This does not mean that an AIA will lack the ability to document the investigation process, but the traditional approach is vulnerable to human errors that may adversely affect the investigation effectiveness. Such errors can be reduced or eliminated by the use of a systematic software-based method. All of the accumulated data and information gathered by the investigation will be readily accessible to the investigation team from any location.

1.3 Successful implementation of the investigation process is a determining factor in achieving an effective investigation outcome. The investigation encompasses several sub-processes that are triggered by chronological events from the time of the accident or incident occurrence, until the time that the safety recommendations are issued. Any missing, or any less-than efficient activity, may prevent the AIA from identifying the actual hazards, carrying out accurate risk assessment functions, and issuing appropriate remedial actions. The lack of secure and efficient data storage will contribute to this systemic deficiency, and the results will affect the inputs to the State safety programme (SSP), and consequently its effectiveness.

1.4 A short survey of States investigation process indicates that there is no investigation software programme in place that integrally manages the investigation from the moment an AIA receives an accident or incident notification until releasing the Final Report, including monitoring the safety recommendations issued during the course of the investigation or contained in the Final Report. Some States utilize software programmes for specific investigation tasks such as accident and serious incident immediate reporting or notification. Safety recommendation tracking is sometimes undertaken using a software monitoring programme.

2. DISCUSSION

2.1 On some occasions, investigations are delayed because of a lack of important evidence that was not collected from the accident site, or is either mistakenly scrapped or perished. Some investigations are not conducted according to the best investigation management principles because of a shortage of investigation guidance material or investigation job aids.

2.2 Applying a wider perspective, communication between States in relation to accident investigation is found deficient in many instances because of failure in exchanging data within a reasonable timeframe. This can be inferred from the delay of releasing Final Reports, especially when knowing that approximately 60 per cent of fatal accident Final Reports, on the global level, were not released.

2.3 There have been occasions where States have had difficulty in exchanging investigation data and information. This includes evidence sharing, data analysis, records of analysis meetings, and safety recommendations management as referred to by Doc 9756, *Manual of Aircraft Accident and Incident Investigation*, Part IV — *Reporting*. This caused a lack of essential dataset that may have aided

the concerned States in sharing large volume of data and would have facilitated the States to conduct effective investigations by effective participation of the concerned States.

2.4 An accident investigation software may present a good solution for the State conducting the investigation to manage the investigation events in a systemised manner. A highly secure software, accessible to the investigators, with selectable updating access rights for accredited representatives and controlled by the investigator-in-charge, will be a robust platform for exchanging data and information and controlling the investigation sub-processes. The software will provide a common database, for a specific investigation, where all the investigation material can be stored, retrieved, and analysed in real time. This database will accommodate secure cloud file sharing.

2.5 The application of a software is not the sole solution for improving accident investigation effectiveness, but it can be considered as a very efficient and effective means to optimise the utilisation of the various investigation resources including investigators, tools and equipment, and financial resources. In the future, the software capabilities can be upgraded by the incorporation of an appropriate level of artificial intelligence. In turn, this can facilitate effective linkages with the SSP through interfaces among the various risk management system elements, including aircraft accident and incident investigations.

2.6 A comprehensive study carried out by the United Arab Emirates found that the introduction of an investigation software would lead to significant improvements in all aspects of the investigation process. The study resulted in the development of a software programme called "Air Accident Investigation Management System (UAE AIMS)", which is now contributing to enhancing the efficiency of the following investigation functions:

a) The occurrence notification system is now documented, and the details of notifications have greater visibility to the AIA. This enables the AIA to run a simple risk-based assessment to assist in determining whether to conduct an investigation or not. This analysis is important for assuring that serious incidents that are not explicitly listed in Attachment C to Annex 13 are identified from the risk analysis and are investigated.

b) The Doc 9756, Part II — *Procedures and Checklists*, checklists are stored in the software, and retrieving the relevant checklists can be achieved rapidly.

c) The software contains an evidence module to control evidence the time the evidence is collected, subjected to any necessary examinations, until it is released. This module documents the evidence state, where the evidence is stored, and the evidence custody/possession chain.

d) A template of the Final Report is built into the software to facilitate report-writing. This template is developed according to the approved report-writing style and contains a glossary of aviation terminology, an aviation dictionary, and auto-formatting. The template is based on ICAO Doc 9756, Part IV Final Report format and can identify any non-conformity in the Report language or structure and suggest corrections.

e) The software facilitates correspondence with States, with auto generated editable transmittal letters.

f) The software monitors the safety recommendations that are issued during the course of an investigation, or in the Final Reports or safety studies, as well as safety

recommendations received from other States. The software documents all correspondence pertinent to a safety recommendation until the determination of the safety recommendation status.

2.7 From the experience of applying the UAE AIMS, it can be concluded that it is possible that a State, region, or group of States develop a comprehensive software that can be shared with all ICAO Contracting States similar to the European Co-ordination Centre for Accident and Incident Reporting Systems (ECCAIRS) that was voluntarily developed by European States and freely shared with other States through ICAO. This will help the States exchange bulk of data on real time, control the investigation rights and obligations, secure sensitive investigation information, and assure that no step, necessary for the investigation, is skipped or went invisible. That software can provide a systemised aid for the State conducting the investigation with provisions for effective participation of the States that have role in the investigation.

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