



WORKING PAPER

**ACCIDENT INVESTIGATION AND PREVENTION (AIG)
DIVISIONAL MEETING (2008)**

Montréal, 13 to 18 October 2008

Agenda Item 4: Management of safety data and representation

The Accident/Incident Reporting System

(Presented by France, on behalf of the European Community and its Member States¹, and by the other States Members of the European Civil Aviation Conference², and by EUROCONTROL)

SUMMARY

A common taxonomy is an indispensable tool to define common safety issues and complementary ways to globally enhance aviation safety. The ADREP system has evolved since AIG 1974 by gradually incorporating the know-how of worldwide safety investigations along the years. This paper summarizes the past and recent developments of the ADREP taxonomy and elaborates on the ECCAIRS system, which provides a common tool for worldwide users to share accident and incident data through the use of compatible repositories. This common tool facilitates electronic data exchange and integration among different organizations from different countries. It facilitates the analysis of safety data originating from a multitude of sources. In order to stay relevant it must constantly adapt to changes in the industry.

Action by the meeting is in paragraph 3.

1. ADREP TAXONOMY

1.1 ADREP History

1.1.1 ICAO started publishing safety statistics in 1951 from a data bank. It was then called ADREP, which stood for « Accident Data Reporting Experts Panel ».

1.1.2 The ADREP (Accident/Incident Data Reporting) system, as it is known today, originated after AIG/1974 (Accident Investigation and Prevention Divisional Meeting). ICAO implemented the ADREP system to centralize safety data on the circumstances and causes of accidents and incidents, as determined by national authorities, and to disseminate these safety data to Contracting States for

¹ Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and United Kingdom. All these 27 States are also Members of the ECAC.

² Albania, Armenia, Azerbaijan, Bosnia and Herzegovina, Croatia, Georgia, Iceland, Moldova, Monaco, Montenegro, Norway, San Marino, Serbia, Switzerland, The former Yugoslav Republic of Macedonia, Turkey and Ukraine.

prevention purposes. It also included the conclusions and the safety recommendation themes, in order to disseminate them and build safety indicators. Decisions taken during AIG/1974 led to ADREP 1976, which became a computer-generated information database derived from the system already being used by the NTSB. It adopted its coding structure but added a field for the narrative. In addition, it provided for translation of the coded information into English, French and Spanish. When ICAO started operating the system, it had back-coded approximately 5000 occurrences dating from the early seventies, coming from the coding of old reports or the conversion of NTSB data and from the “initial notifications of accident” that the Organisation had received earlier. The reporting requirements to the ADREP reporting system were introduced in the fourth edition of Annex 13 in April 1976.

1.2 From ADREP 1976 to ADREP 1987

1.2.1 An update of the ADREP system was requested for AIG/1979. An ADREP study group focused on the events and causal factors. The number of two events (one triggering and the other consequential) was deemed too limiting. The system was therefore revised to allow the coding of up to five events. The factor scheme which contained a list of fixed elements only was abandoned in favour of a tree structure of descriptive and explanatory causal factors. Based on the UK MORS keywords, the “technical factors” were aligned with the ATA100 structure. The upgrade of the ADREP taxonomy developed by the Study Group was implemented in 1987. It reflected the state-of-the-art knowledge by investigation authorities, a no-blame approach to descriptive factors and an initial, limited set of Human Factors.

1.3 From ADREP 1987 to ADREP 2000

1.3.1 AIG/1992 requested another evolution of the ADREP taxonomy and started the ADREP 2000 Study Group. The ADREP 1987 taxonomy was refined with a more advanced and comprehensive structure. In its latest version (ADREP 2000), the SHELL³ model was integrated at the level of the explanatory factors to describe the aviation system. This multilayered structure gives flexibility in analyzing system failures. Indeed, the SHELL items are also presented in tree lists and each can be applied on persons or organizations in order to respectively cover active and systemic failings. In addition, with the increasing importance of incident reporting, new event types were introduced to permit their proper description. During the upgrade to ADREP 2000, the ATM part of the taxonomy inherited the European developments of a project Harmonisation of European Incident and Accident Database Initiative (HEIDI) jointly performed by ICAO, EUROCONTROL and the European Commission Joint Research Centre (JRC).

1.4 ADREP 2000 and ECCAIRS 4 (1 January 2004)

1.4.1 The JRC (located in Ispra, Italy) developed a database system, the European Co-ordination Centre for Aviation Incident Reporting Systems (ECCAIRS⁴) that supports the ICAO ADREP taxonomies. It was initially based on ADREP 1987 and then, it implemented the ADREP 2000 taxonomy with ECCAIRS release 4. On 1 January 2004, ADREP 2000 became operational when ICAO and other investigation authorities started using ECCAIRS 4 to manage occurrence reporting and exchange safety data.

³ SHELL: Software (procedures, symbology, etc.), Hardware (machine, ergonomics, etc.), Environment and Liveware (human). The SHELL model (Edwards, 1972 modified by Hawkins 1987) describes a system as the interaction of humans with four elements: Software, Hardware, Environment and Liveware. Each element of the model includes a list of items based on a tree description.

⁴ Details on ECCAIRS can be found at: <http://eccairs-www.jrc.it/Start.asp>

1.5 **ADREP 2000 rev 2007 and ECCAIRS 4.2.7**

1.5.1 Since 2004, the taxonomy has remained fairly unchanged to facilitate the adoption of ECCAIRS 4 by other bodies. The ADREP user-group was formed to deal with the change proposals related to the taxonomy. These proposals were coming mainly from the ECCAIRS user community, which goes beyond Europe (see note on ECCAIRS and ICAO). A growing number of authorities have been using ECCAIRS as their reporting tool. They specifically expressed their needs to better record incident data. In ECCAIRS release 4.2.7, the ADREP taxonomy was revised (rev 2007) to improve incident coding within the limits of the taxonomy structure. This meant that new values were added to record for example specific occurrences related to ATM or airport operations. Adding new data fields requires changing the data structure, which is foreseen for the next ECCAIRS version. Further, a more rigorous approach to the classification of event types was introduced.

1.6 **ECCAIRS Release 4.3: ADREP 2000 revision 2008**

1.6.1 A revision of the ADREP 2000 taxonomy is to be introduced in the next ECCAIRS version (Release 4.3 expected for October 2008). The planned extension will make the taxonomy more appropriate and sufficiently flexible to report all types of occurrences, as requested for example by the Directive EC/2003/42. The dictionary will receive in particular new fields for ground operations, an entire new section dedicated to maintenance and attributes completing the dangerous goods section. Moreover, the bird strike section will be included, in order to comply with ICAO guidelines. Another important update will be the adoption of the three-level aircraft make-model-series standard, based on the material developed by the CAST ICAO Common Taxonomy Team⁵ (CICTT).

2. **ICAO & ECCAIRS**

2.1 The International Civil Aviation Organization (ICAO) has been advocating the implementation of Safety Management Systems (SMS) in its member States. A key component of the SMS framework consists of an occurrence database. The European Commission makes ECCAIRS available free of charge to States outside the European Union. Since ECCAIRS is fully compatible with ICAO's ADREP taxonomy, ICAO has been operating the ECCAIRS software since January 2004. To facilitate electronic data exchange, ICAO requested from the European Commission copies of the ECCAIRS installation kit to send to its Regional Offices. This thus provides a database to some of ICAO's Contracting States that do not have an ADREP compatible reporting system. Implementing ECCAIRS at an international level reinforces the ADREP data flow as required by Annex 13 and at a national level constitutes the first step of the State's Safety Programme. It also increases the cooperation and exchange of information among the States in the interest of aviation safety.

2.2 Because of its widespread use, the system must be adapted to the changes in the aviation system. The aviation world develops fast. New aircraft and operators appear, other vanish. The state-of-the-art of accident investigation evolves. New areas of interest appear for incident reporting. Flight data analysis contributes to events reported. There is thus a constant need to review the reporting systems to reflect the advances made elsewhere. At present, there is no established mechanism for this work. While some efforts have been made within Europe to coordinate the development, there is no matching activity at the level of ICAO. Because of the speed of development, an annual update of the ADREP taxonomy is required.

⁵ CICTT is charged with developing common taxonomies and definitions for aviation accident and incident reporting systems. Most of these high level "target" taxonomies have been adopted by the ADREP user group (e.g. occurrences categories, phases of flight). Details on CICTT can be found at: <http://www.intlaviationstandards.org/>

3. **ACTION PROPOSED**

3.1 The ADREP taxonomy represents the experience gained from many years of investigations throughout the world. It continues to be amended through the experience gained in its use and the appearance of new aircraft, operators and location names. A major revision is about to be introduced in order to better integrate all types of occurrences. The ADREP taxonomy is included in its entirety in the ECCAIRS dictionary.

3.2 The meeting is invited to:

- a) urge States to adopt the ADREP taxonomy as the sole aviation occurrence taxonomy;
- b) encourage the dissemination of ECCAIRS in the ICAO Contracting States which do not have their own ADREP compatible occurrence database;
- c) encourage the facilitation of data-exchanges between the existing ADREP compatible databases;
- d) recommend establishing a means to facilitate a periodical revision of the ADREP taxonomy; and
- e) consider the amendment proposed in the Appendix.

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APPENDIX

PROPOSED AMENDMENT TO ANNEX 13

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CHAPTER 7. ADREP REPORTING

Note 1.— Attachment B provides a notification and reporting checklist.

Note 2.— The provisions of this chapter may require two separate reports for any one accident or incident. They are:

*Preliminary Report
Accident/Incident Data Report*

Note 3.— Guidance for preparing the Preliminary Report and the Accident/Incident Data Report is given in the Accident/Incident Reporting Manual (Doc 9156).

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CHAPTER 8. ACCIDENT PREVENTION MEASURES

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Database systems

8.4 Recommendation.— *A State should establish an accident and incident database to facilitate the effective analysis of information obtained, including that from its incident reporting systems.*

8.5 Recommendation.— *The database systems should use standardized formats to facilitate data exchange.*

Note 1.— Guidance material related to the specification for such databases will be provided by ICAO upon request from States.

Note 2.— States are encouraged to foster regional arrangements, as appropriate, when implementing 8.4.

Note 3.— States are encouraged to use the ECCAIRS system for accident/incident reporting as well as for collecting, storing, and disseminating relevant safety information.

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