



The European Network of Civil Aviation Safety Investigation Authorities (ENCASIA)

Investigation of Serious Incidents

EU-ASA AIG Workshop
Dakar, Senegal – May 2024

1



European Network of Civil Aviation Safety Investigation Authorities

Obligation to investigate:

- Accidents
- Serious Incidents
“an incident involving circumstances indicating that there was a high probability of an accident...” and
“the difference between an accident and a serious incident lies only in the result”.
- Incidents
“an occurrence, other than an accident, associated with the operation of an aircraft which affects or could affect the safety of operation”.

2



European Network of Civil Aviation Safety Investigation Authorities

- Serious Incidents
 “an incident involving circumstances indicating that there was a high probability of an accident...” and
 “the difference between an accident and a serious incident lies only in the result”.

“high probability of an accident” is usually inherently subjective and sometimes difficult to establish from the limited information available in an occurrence notification.

Investigation of Serious Incidents - 3

3



European Network of Civil Aviation Safety Investigation Authorities

To promote greater consistency in the treatment of serious incidents, without limiting SIA's freedom to make decisions independently.

Round 1:

- ECAC Workshop 2012

What were the procedures/processes at the different SIAs when identifying/classifying notifications of serious incidents?

Investigation of Serious Incidents - 4

4



European Network of Civil Aviation Safety Investigation Authorities

Outcome of Round 1:

- No uniform way of treating notifications
- Classification depended on the experience and qualifications of the investigator
- Some SIAs had developed their own processes for classification
- Small/medium/large SIAs could use guidance material or tools for assessing and classification

Investigation of Serious Incidents - 5

5



European Network of Civil Aviation Safety Investigation Authorities

Attachment C to ICAO Annex 13

| | | | |
|----------------------------------|--------------------|--|------------------|
| | | <i>b) Remaining defences between the incident and the potential accident</i> | |
| | | <i>Effective</i> | <i>Limited</i> |
| <i>a) Most credible scenario</i> | <i>Accident</i> | Incident | Serious Incident |
| | <i>No accident</i> | Incident | |

Investigation of Serious Incidents - 6

6



European Network of Civil Aviation Safety Investigation Authorities

Round 2:

- ECAC Workshop 2023
- ENCASIA Working Group 2 - Cooperation (Best/Good Practices)

- Some of the reasons for revisiting the theme again
 - Fewer CAT accidents
 - To maintain or improve the statistics of CAT accidents
 - Explore if there are new tools to assist investigators in classifying and choosing occurrences to be investigated

Investigation of Serious Incidents - 7

7



European Network of Civil Aviation Safety Investigation Authorities

New Tools

- Annex 13 Attachment C
- European Risk Classification Scheme (ERCS)
- Runway Incursion Severity Calculator (RISC)
- Artificial Intelligence (AI)

Investigation of Serious Incidents - 8

8



European Network of Civil Aviation Safety Investigation Authorities

Annex 13 Attachment C

| | | | |
|---------------------------|-------------|---|------------------|
| | | b) Remaining defences between the incident and the potential accident | |
| | | Effective | Limited |
| a) Most credible scenario | Accident | Incident | Serious Incident |
| | No accident | Incident | |

An event risk-based analysis

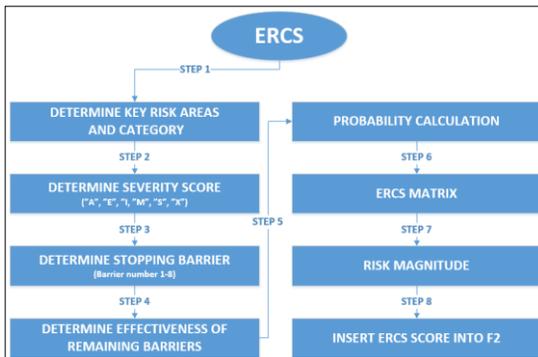
- consider whether there is a credible scenario by which this incident could have escalated to an accident; and
- assess the remaining defences between the incident and the potential accident as:
 - effective, if several defences remained and needed to coincidentally fail; or
 - limited, if few or no defences remained, or when the accident was only avoided due to providence.
- Consider both the number and robustness of the remaining defences between the incident and the potential accident.
Ignore defences that failed, and consider only those that worked and any subsequent defences still in place.

Investigation of Serious Incidents - 9



European Network of Civil Aviation Safety Investigation Authorities

European Risk Classification Scheme (ERCS)



| EFFECTIVENESS OF REMAINING BARRIERS | | |
|--|--|----------------|
| Step 2: To identify in accordance with section 2.1.2 the effectiveness of the remaining barriers. The remaining barriers are those barriers listed in the table in section 2.1.1 which are placed between the stopping barrier and the potential accident outcome. The barriers listed in the table in section 2.1.1 which are placed before the stopping barrier shall not be considered to have contributed to the prevention of the accident outcome and consequently those barriers shall not be scored as Stopped or Remaining. | | |
| The ERCS barrier model consists of 8 barriers, ordered in a logical sequence and weighted as per the following table: | | |
| Barrier number | Barrier | Barrier weight |
| 1 | 'Aircraft equipment and infrastructure design' includes maintenance and correction, operation support, the prevention of problems related to technical factors that could lead to an accident. | 5 |
| 2 | 'Tactical planning' includes organisational and individual planning prior to the flight or other operational activity that supports the reduction of the cause and contributes to accidents. | 2 |
| 3 | 'Regulations, procedures, processes' includes effective, understandable and available regulations, procedures and processes that are coupled with (with the exclusion of the use of procedures for recovery barriers). | 3 |
| 4 | 'Situational awareness and action' includes human vigilance for operational threats which ensures identification of operational hazards and effective action to prevent an accident. | 2 |
| 5 | 'Warning system operation and action' that could prevent an accident and which are fit for purpose, functioning, operational and are complied with. | 3 |
| 6 | 'Late recovery from a potential accident situation' | 1 |
| 7 | 'Protections' when an event has occurred: the level of the outcome is mitigated or prevents the escalation of the occurrence by 'stopgap' barriers or providence. | 1 |
| 8 | 'Low energy occurrence' occurs the same as 'Protections', but for low-energy key risk areas only (ground damage, excursion, injury). *Not applicable for all other key risk areas. | 1 |
| The effectiveness of each barrier shall be classified as follows: | | |
| — Stopped if the barrier prevented the accident from occurring; | | |
| — Remaining Known if it is known whether the barrier remained between the occurrence under assessment and the potential accident outcome; | | |
| — Remaining Assumed if it is assumed that the barrier remained between the occurrence under assessment and the potential accident outcome; | | |
| — Failed Known if it is known that the barrier has failed; | | |
| — Failed Assumed if it is assumed that the barrier has failed even if insufficient or no information is available to determine this; | | |
| — Not Applicable if the barrier is not relevant to the occurrence under assessment. | | |

Investigation of Serious Incidents - 10



European Network of Civil Aviation Safety Investigation Authorities

European Risk Classification Scheme (ERCS)

Investigation of Serious Incidents - 11

11



European Network of Civil Aviation Safety Investigation Authorities

Runway Incursion Severity Calculator (RISC)

| FAA/TCAO Rating | Calculated numeric value is | Rating Description |
|--|-----------------------------|--|
| Incursions involving two Aircraft, or an Aircraft and Vehicle | | |
| A | ≥ 3.5 | A serious incident in which a collision was narrowly avoided. |
| B | < 3.5 and ≥ 2.5 | An incident in which separation decreases and there is a significant potential for collision, which may result in a time-critical corrective/evasive response to avoid a collision. |
| C | < 2.5 and ≥ 1.5 | An incident characterized by ample time and/or distance to avoid a collision. |
| Incursion involving one Aircraft or Vehicle | | |
| D | < 1.5 and ≥ 1.17 | An incident that meets the definition of runway incursion, such as incorrect presence of a single aircraft or vehicle on the protected area of a surface designated for the landing and take-off of aircraft, but with no immediate safety consequences. |
| Runway Operations on a Taxiway | | |
| RT | RT | Since these are technically not incursions, they do not receive an incursion rating. For the purposes of the RISC software, these events are automatically rated "RT" to signify this. |
| Runway Operations on a Taxiway, with a Conflict | | |
| RTC | RTC | These are technically not incursions. For the purposes of the RISC software, these events are automatically rated "RTC" to signify this. |

Investigation of Serious Incidents - 12

12



European Network of Civil Aviation Safety Investigation Authorities

Artificial Intelligence (AI)

Project by Transport Safety Investigation Bureau of Singapore (TSIB)

Feed AI with existing notifications, assessments/classifications and reports and assist investigators in their work.

Investigation of Serious Incidents - 13

13



European Network of Civil Aviation Safety Investigation Authorities

Outcome of Round 2:

- A combined ECAC/ENCASIA Guidance Note on Investigation of Serious Incidents

Still to promote greater consistency in the treatment of serious incidents, without limiting SIA's freedom to make decisions independently.

Investigation of Serious Incidents - 14

14



European Network of Civil Aviation Safety Investigation Authorities

Recommended decision making process

Step 1A – classify the occurrence

Annex 13 Attachment C

Step 1B – if necessary, consider the risk in more detail (not mandatory)

Consult other assisting tools e.g. ERCS

Step 2 – consider other factors which may influence the decision to investigate

Step 3 – consider the resource implications

Step 4 – decide on the SIA response

Investigation of Serious Incidents - 15

15



European Network of Civil Aviation Safety Investigation Authorities

Something to be aware of...

Step 1A and 1B – classify the occurrence

Still depending on subjective assessment,
but the assisting tools is guiding through the same process each time

Step 2 – consider other factors which may influence the decision to investigate

Type of operation, Type of Occurrence, Novelty, Recurrent Safety issues or Trends,
Added Value from a SIA Investigation

Step 3 – consider the resource implications

Should not be influenced by any consideration of the resources
required to investigate the occurrence or the resources available

Step 4 – decide on the SIA response

The most important thing to consider is the lessons that may be drawn from the investigation
for the benefit of aviation safety

Investigation of Serious Incidents - 16

16



European Network of Civil Aviation Safety Investigation Authorities

DRAFT V4.0



Guidance Note on the Investigation of Serious Incidents

Introduction

This guidance note has been produced jointly by the European Civil Aviation Conference (ECAC) and the European Network of Civil Aviation Safety Investigation Authorities

Investigation of Serious Incidents - 17

17



European Network of Civil Aviation Safety Investigation Authorities

Thank You
for your attention!

18