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State Safety Performance Monitoring of ATM/ANS

1. Purpose


- 1.1. This notice describes how CA safety performance monitoring (SPM), as required by Implementing Regulation (EU) 2017/373 ATM/ANS.AR.C.001 and complementing the monitoring of safety performance indicators as required by Regulation (EU) 2019/317 during RP3, is conducted by the IAA. This SPM process also complements IAA SPAS Safety Performance Indicators which require monitoring to ensure relevant safety management and operational safety objectives are being met.
- 1.2. The process involves analysis of historical mandatory occurrence reporting data, as maintained in the National database, and supports the identification and monitoring of an Acceptable Level of Safety Performance. This process is based on the approach recommended in ICAO Doc 9859 and adopts a total system safety approach.
- 1.3. For a number of safety performance indicators (defined in Appendix A) a set of associated safety targets/alert criteria have been established in IAA policy OPS.ANS.233. It is important to state that these targets are intended to be used to provide a reference level for tracking safety performance. The targets are employed as a tool supporting the CA in its on-going monitoring of safety performance levels in accordance with its regulatory obligations.
- 1.4. It is intended that this notice will be amended as necessary in line with relevant emerging developments. This notice will remain in force until cancelled by a further notice.

2. Scope

This notice provides an overview of the safety performance monitoring process utilised by the Irish Competent Authority (CA) in the ATM/ANS domain.

3. References

- ICAO Annex 19 Safety Management, Second Edition July 2016
- ICAO Doc 9859 Safety Management Manual, Fourth Edition – 2018
- European Plan for Aviation Safety (EPAS) 2023 - 2025
- Irish State Plan for Aviation Safety 2023 – 2025
- Implementing Regulation (EU) 2017/373 Common Requirements for Providers of ATM/ANS
- Implementing Regulation (EU) 2019/317 Performance and Charging Scheme in the SES
- IAA Policy STRAT.SSP.4 State Safety Programme
- STRAT.SYS.200, Safety and Security Risk Management Process
- IAA Policy OPS.ANS.233 Safety Targets and Safety Indicators established by the CA for Ireland


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4. Background

- 4.1. ICAO Annex 19 sets out the requirement for States to establish a State Safety Programme (SSP) in order to achieve an acceptable level of safety performance (ALoSP) in a number of activities including the provision of air traffic services. ICAO Doc 9859 (Safety Management Manual) provides guidance on how to define an ALoSP. The Irish CA's policy OPS.ANS.233 aligns with the guidance in ICAO Doc 9859 with respect to the principles for setting safety performance targets and identifying associated alert criteria in the ATM/ANS domain.
- 4.2. Furthermore, the Irish State Plan for Aviation Safety 2023 – 2025 describes SPI's and SPT's to support the measurement of safety performance across all sectors of the Irish civil aviation system', whilst recognising that SKPIs and SPIs in the ATM/ANS domain are well established through EU Performance Scheme in the Single European Sky.
- 4.3. Reference is also made to the European Plan for Aviation Safety 2023 - 2025, MST.0001. This member state action requires prioritisation of SSP maintenance, including to '*establish a process to determine SPIs at State level addressing outcomes and processes*'
- 4.4. In Ireland, ATM/ANS outcome-based safety performance indicators have been in place since 2013 and this policy is intended to demonstrate how continue to be actively monitored and updated.
- 4.5. This notice has been reviewed and updated in conjunction with the CA's safety targets policy (OPS.ANS.233), and a summary of significant changes is described here.
- 4.6. In 2017, this notice was revised to outline the CA's safety monitoring process, whereby numerical targets and alert criteria have been relocated to internal CA policy OPS.ANS.233 and are no longer published.
- 4.7. In 2021, Safety Indicator SI-3 '*Aircraft Deviation from ATC Clearance*' has been historically measured as a rate of occurrences per flight hours for all deviations, regardless of whether the occurrence was an airborne or ground-based deviation.
- 4.8. In 2021, the SI-3 '*Aircraft Deviations*' has been sub-divided to airborne and ground-based deviations to facilitate more relevant measurement of these occurrences. i.e. rated against flight hours for airborne deviations, and against movements for ground-based deviations.

This sub-division of SI-3 is intended to;

- provide more granularity to the safety indicator
- improve the accuracy of occurrence rate measurements

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Therefore, as per Appendix 1, SI-3 '*Aircraft Deviation from ATC Clearance*' shall be monitored at as follows;

- Airborne Deviations: Number of occurrences per [x number] of flight hours
- Ground Deviations: Number of occurrences per [x number] of Aircraft Movements

- 4.9. To improve the accuracy of trend analysis and monitoring, data for SI-3 'aircraft deviations' since 2017 has been reviewed and sub-categorised.
- 4.10. CA Safety Performance Monitoring, conducted through IAA Policy OPS.ANS.233 '*Safety Targets and Safety Indicators established by the CA for Ireland*', has been amended in 2021 to incorporate the amended rates and targets from 2017.

5. CONCEPTS AND DEFINITIONS

- 5.1. As outlined in Doc 9859 (section 1.3.5.1), effective implementation of a State Safety Programme (SSP) and Safety Management System requires that the '*traditional prescriptive requirements are to be complemented with a performance-based approach.*'
- 5.2. ICAO Doc 9859 (section 8.5.5.3) provides further elaboration;


"The acceptable level of safety performance (ALoSP) concept complements the traditional approach to safety oversight that is primarily focused on prescriptive regulatory compliance with a performance-based approach that defines actual safety performance levels within a prescribed SSP framework

...ALoSP is the acceptable level of safety performance of a State as defined by its SSP safety indicators and their associated target and alert levels..."

'The ALoSP expresses the safety levels the State expects of its aviation system, including the targets that each sector needs to achieve and maintain in relation to safety, as well as measures to determine the effectiveness of their own activities and functions that impact safety. ALoSP, then, is a reflection of what the State considers important and is agreed on by the State level aviation stakeholders. ALoSP should not be developed in isolation. Rather, it should be defined having regard for higher level strategic guidance (from the GASP, Regional Plans, etc.) and the safety objectives established in the SSP.'

- 5.3. It is essential to recognise that regulatory compliance still remains at the foundation of safety management. The implementation of an ALoSP "does not replace or supersede the need for States to implement all applicable SARPs" nor does it relieve Ireland from its obligations regarding the Convention on International Civil Aviation and its related provisions (Ref: Doc 9859 section 8.5.5.5).
- 5.4. The applicable ICAO standards and guidance provide the following definitions;

Safety performance indicator: "A data-based parameter used for monitoring and assessing safety performance" (Ref: ICAO Annex 19 Chapter 1).

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Safety performance target

“The State or service provider’s planned or intended target for a safety performance indicator over a given period that aligns with the safety objectives”.(Ref: ICAO Annex 19 Chapter 1).

Safety performance: “A State or a service provider’s safety achievement as defined by its safety performance targets and safety performance indicators” (Ref: ICAO Annex 19 Chapter 1)


Acceptable level of safety performance (ALoSP):

“The level of safety performance agreed by State authorities to be achieved for the civil aviation system in a State, as defined in its State safety programme, expressed in terms of safety performance targets and safety performance indicators.”(Ref: ICAO Doc 9859).

- 5.5. The selection of appropriate Safety Performance Indicators (SPIs) and Safety Performance Targets (SPTs) is key to the development of ALoSP. ICAO Doc 9859 Section 4.4.1 states *“Once an organisation has identified the targets based on the SPIs they believe will deliver the planned outcome, they must ensure the stakeholders follow through by assigning clear responsibility for delivery. Defining SPTs for each aviation authority, sector and service provider supports the achievement of the ALoSP for the State by assigning clear accountability”*

6. STRATEGY FOR DEFINING SAFETY PERFORMANCE INDICATORS

- 6.1. Consideration is given to Regulation (EU) 2019/317 Annex I section 2, which outlines safety indicators for monitoring at local level, including the rates of separation minima infringements and the rates of runway incursions. During RP2 the performance regulation had also included a safety performance indicators for airspace infringements and level busts. These indicators are included in this policy.
- 6.2. The safety performance indicators selected are described in Appendix A. The SPIs are expressed in terms of rates instead of absolute incident numbers as recommended in ICAO Doc 9859 (section 4.3.1.3) *‘SPIs should be reflected in terms of a relative rate to measure the performance level regardless of the level of activity. This provides a normalised measure of performance; whether the activity increases or decreases’*

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7. STRATEGY FOR DEFINING SAFETY PERFORMANCE TARGETS

- 7.1. For the defined safety indicators, it is necessary to develop associated safety targets in order to provide quantifiable measures for the maintenance and/or improvement of the level of safety for the ATM/ANS domain in Ireland. In defining the safety targets identified in OPS.ANS.233, consideration has been given to:
- the level of safety risk that applies
 - the safety risk tolerance
 - the cost/benefits of improvements to the aviation system
 - public expectations that the Irish civil aviation system will continue to provide safe air traffic services to the high standards expected in a western European state.

8. SAFETY TRIGGERS


- 8.1. For each safety performance indicator a corresponding alert level is specified as recommended in ICAO Doc 9859. The objective of such alerts is to quantify the “acceptable performance threshold” during the monitoring period providing a trigger for further action. ICAO Doc 9859 4.4.5.2 recommends that the standard deviation of the historical data may be used as a “method for setting out-of-limits trigger criteria for SPTs” (this takes into consideration the volatility of the data when deriving appropriate alert levels – more volatile data will result in more generous alert level values). The alert criteria employed by the Irish CA are defined in Appendix A. Each safety target has an associated numerical alert threshold as detailed in CA policy OPS.ANS.233.

9. APPENDICES

Appendix A: Safety Performance Indicators for ATM/ANS.

10. FURTHER INFORMATION

Requests for further information on the contents of this notice should be addressed to: ansdinfo@iaa.ie

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APPENDIX A: Safety Performance Indicators for ATM/ANS

SI-1

Separation Minima Infringements (as defined in Implementing Regulation (EU) 2015/1018 Annex III): *[Number]* of occurrences measured as a rate per flight hours.

SI-2

Runway Incursions (as defined in ICAO Doc 4444 - PANS-ATM): *[Number]* measured as a rate per Aircraft Movements at Aerodromes

SI-3

Aircraft Deviation from Clearance, Procedures or Regulation
Sub-categorised as

- AD - Air (Airborne Deviation) measured as a rate per flight hours
- AD - Gnd (Ground based Deviation) measured as a rate per aircraft movements at aerodromes

Note: SI-3 includes

- Aircraft deviation from ATC clearance

An event in which an aircraft does not proceed under conditions specified by the controlling ATC unit or other appropriate authority. It includes situation where:

- a) the non-adherence by a pilot to the terms of (an) instruction(s) given by an ATC unit with reference to altitude (level bust) and/or heading and/or speed assignments and/or time restrictions and/or SSR code; or
- b) the execution by a pilot of a manoeuvre which requires prior ATC approval without having secured such approval.

- Aircraft deviation from applicable ATM regulation

An event in which an aircraft does not execute a flight in compliance with the applicable ATM regulation.

e.g. as published in the Aeronautical Information Publication (AIP).

- Aircraft deviation from applicable published ATM procedures

An event in which an aircraft does not execute a flight in compliance with the applicable published ATS procedures.

e.g. Incorrect following of published SIDs and STARs.

SI-4


Level Busts (as defined by EUROCONTROL – HEIDI) measured as a rate per flight hours

SI-5

Airspace Infringements measured as a rate per flight hours

‘An event involving an infringement/unauthorised penetration of a controlled or restricted airspace.’

- ADREP Taxonomy

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Safety Triggers

The alert level¹ for the new monitoring period (current year) is based on the preceding period's performance. The safety target +1.5 standard deviation² (SD), safety target +2SD are employed.

Alert level trigger:

An alert (abnormal/unacceptable trend) is indicated if any of the conditions are met:

- the actual performance exceeds the target + 2*SD level
- the actual performance for two consecutive six-month periods exceeds the target + 1.5*SD level

When an alert is triggered appropriate follow-up action may be necessitated, such as further analysis to determine the source and root cause of the abnormal incident rate and identification of any necessary action to address the trend.

¹ ICAO Doc 9859 provides an example of how targets and safety triggers may be employed and tracked using the **mean** and standard deviation. ANSD reviews safety performance trends on a 6 monthly basis therefore the ICAO methodology has been adapted accordingly.

² Population Standard Deviation as recommended by ICAO Doc 9859.
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