



**DIRECTORS GENERAL OF CIVIL AVIATION - ICAO EUROPEAN AND NORTH ATLANTIC
REGIONS**

2023 MEETING (EUR/NAT-DGCA/2023)

(Paris, France, 20 June 2023)

Agenda Item 4: ICAO Update

EUR/NAT ANNUAL SAFETY REPORTS

(Presented by ICAO Secretariat)

SUMMARY

This Information Paper presents the draft EUR 2022 Annual Safety Report and the draft 2022 NAT Annual Safety Report to be made publicly available in July 2023 on the ICAO EUR/NAT website.

1. Introduction

1.1 The 2023-2025 edition of the Global Aviation Safety Plan (GASP, ICAO Doc 10004) was endorsed at the 41st ICAO Assembly in October 2022.

1.2 In accordance with the GASP goals and targets, the 2022-2024 version of the European Regional Aviation Safety Plan (EUR RASP) presents the safety performance metrics reflecting the strategic priorities for the States in the EUR region.

1.3 In line with the GASP, the North Atlantic Systems Planning Group (NAT SPG) aims to achieve the highest level of safety performance and meet regional safety objectives to maintain and, where possible, improve the agreed safety standards in all activities supporting the provision of air navigation services in the North Atlantic High Level Airspace (NAT HLA).

2. Discussion

EUR 2022 Annual Safety Report

2.1 The ICAO EUR 2022 Annual Safety Report (EUR ASR 2022) presented at **Appendix A** provides the 2022 values of a series of Safety Performance Indicators (SPI), including number of fatalities, accident rate, effective implementation of safety oversight system and SSP in an attempt to measure the achievement of the EUR Region towards the EUR RASP targets and ultimately towards the GASP goals:

- a) Goal 1 is to achieve a continuous reduction of operational safety risks.
- b) Goal 2 calls for all States to strengthen their safety oversight capabilities.

- c) Goal 3 calls for the implementation of effective State safety programmes.
- d) Goal 4 calls for States to increase collaboration at the regional level to enhance safety

2.2 The EUR ASR 2022 is planned to be made publicly available on the ICAO EUR/NAT website in July 2023 after its endorsement by the European Region Aviation System Planning Group (EASPG).

NAT 2022 Annual Safety Report

2.3 The draft NAT Annual Safety Report presented at **Appendix B** provides the 2022 values of the Safety Key Performance Indicators (SKPIs) and CREs defined in the NAT SPG Handbook (NAT Doc 001). It includes information regarding:

- a) Safety Policy, as stipulated in NAT Doc 001 and its alignment with the ICAO GASP;
- b) The North Atlantic Scenario;
- c) Results of the scrutiny of events of year 2022, including the identified contributing issues, and the mitigations that were used for preventions;
- d) NAT Regional Priorities

2.4 The NAT ASR 2022 is planned to be made publicly available on the ICAO EUR/NAT website in July 2023 after its endorsement by the NAT SPG at its 59th meeting in Paris on 27-29 June 2023.

3. Action by the Meeting

3.1 The meeting is invited to note the information provided.

The following Appendices are provided as separate documents with this working paper:

APPENDIX A: EUR 2022 Annual Safety Report (EUR ASR 2022)

APPENDIX B: NAT 2022 Annual Safety Report (NAT ASR 2022)



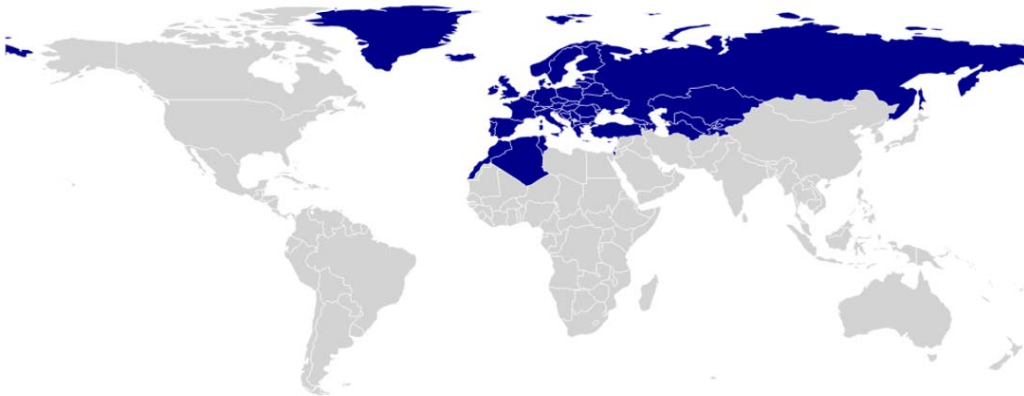
ICAO

SAFETY

EUROPEAN AVIATION SYSTEMS PLANNING GROUP

EUR 2022 Annual Safety Report

2023 Edition



European and North
Atlantic Office

The Annual Safety Report and other EASPG related documentation can be downloaded at:
<https://www.icao.int/EURNAT/Pages/EUR-and-NAT-Document.aspx>

Introduction

Consistent with the 2023-2025 edition of the *Global Aviation Safety Plan (GASP, Doc 10004)*, the European Regional Aviation Safety Plan (EUR RASP) outlines the EUR Region’s strategic direction for the management of aviation safety. The EUR RASP 2022-2024 provides a summary of the regional initiatives to address the high-risk categories of occurrences (HRCs) set out in the GASP as well as to support achieving the GASP goals and EUR RASP targets:

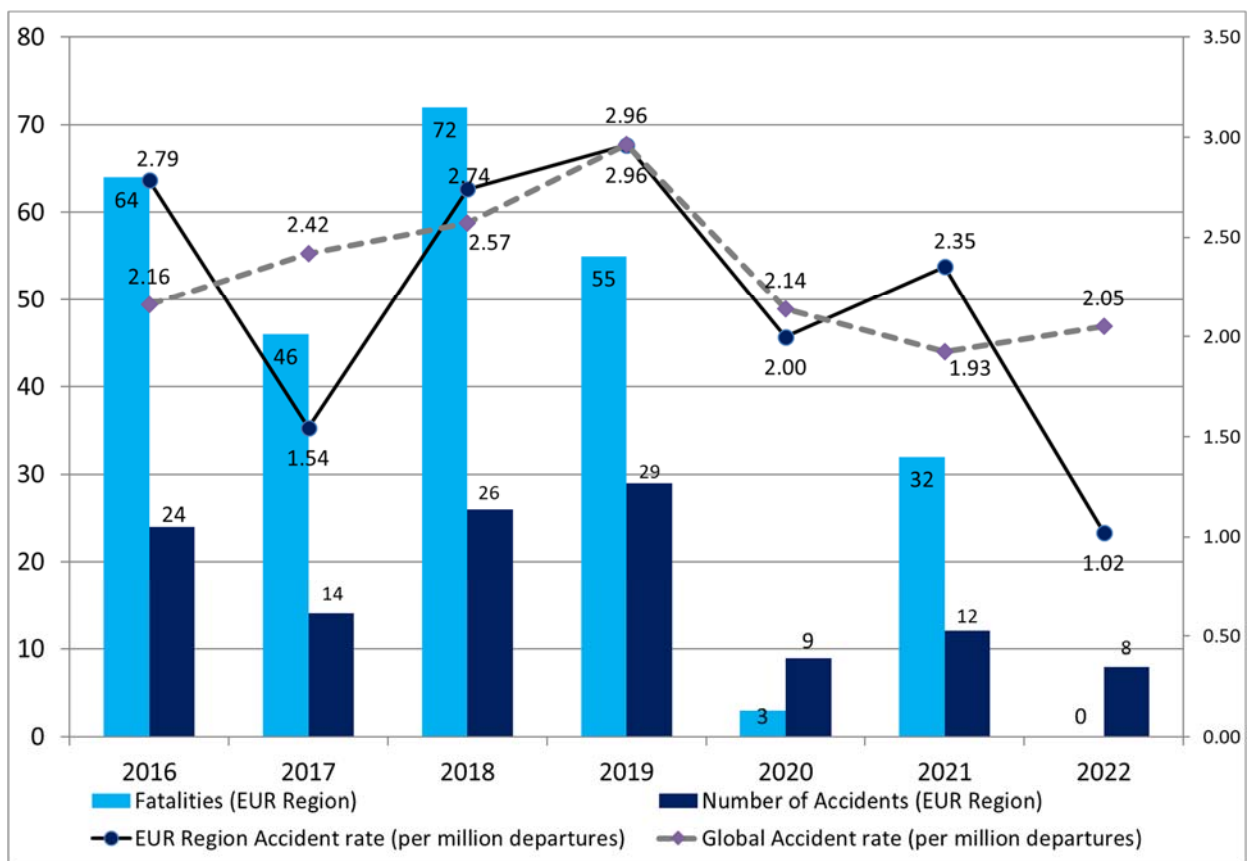
GASP Goals	EUR RASP Targets (2022-2024)
Goal 1: Achieve a continuous reduction of operational safety risks	1.1 – EUR States to maintain a decreasing trend of regional accident rate
Goal 2: Strengthen States’ safety oversight capabilities	2.1 – EUR States to improve their score for the effective implementation (EI) of the critical elements (CEs) of the State’s safety oversight system (with focus on priority PQs) as follows: 75% by 2024; 85% by 2026 and 95% by 2030
Goal 3: Implement effective State safety programmes (SSPs)	3.1 - By 2023, all EUR States to implement the foundation of an SSP 3.2 - By 2024, all EUR States to publish a National Aviation Safety Plan (NASP) 3.3 All States to work towards an effective SSP as follows: a) by 2025 – Present b) by 2028 - Present and effective
Goal 4: Increase collaboration at the regional level	4.1 - By 2023, EUR States that do not expect to meet GASP Goals 2 and 3, to seek assistance to strengthen their safety oversight capabilities or facilitate SSP implementation 4.3 - By 2025, all States to contribute information on operational safety risks, including SSP safety performance indicators (SPIs), and emerging issues, to their respective regional aviation safety group (<i>for EUR, EASPG RESG</i>)
Goal 5: Expand the use of industry programmes and safety information sharing networks by service providers	5.1 - Maintain an increasing trend in EUR industry’s contribution in safety information sharing networks, including harmonized SPIs as part of their safety management system (SMS), to EUR States and EUR region to assist in the development of national and regional aviation safety plans
Goal 6: Ensure the appropriate infrastructure is available to support safe operations	6.1 - By 2025, maintain an increasing trend of EUR States with air navigation and aerodrome infrastructure that meets relevant ICAO Standards

This ICAO EUR 2022 Annual Safety Report (EUR 2022 ASR) provides the 2022 values of a series of Safety Performance Indicators (SPI), including number of fatalities, accident rate, effective implementation of safety oversight system and SSP in an attempt to measure the achievement of the EUR Region towards the EUR RASP targets and ultimately towards the GASP goals 1 to 6.

Accident statistics and analysis

The number of accidents involving scheduled commercial operations with aircraft of maximum mass of over 5700 kg and occurring in one of the 55 States in the EUR Region has decreased in 2022 compared to 2021: 8 of such accidents occurred in 2022. None of them was fatal. This resulted in a regional accident rate of 1.02 accidents per million departures, down 57% from the 2021 rate of 2.35 accidents per million departures.

8 ↓ 2022 EUR Number of accidents (a/c ≥ 5700 kg only) <i>(12 in 2021)</i>	1.02 ↓ 2022 EUR Accident rate per million departures <i>(2.35 in 2021)</i>	0 ↓ 2022 EUR Number of fatal accidents <i>(2 in 2021)</i>	0.00 ↓ 2022 EUR Fatal accident rate per million departures <i>(0.42 in 2021)</i>	0 ↓ 2022 EUR Number of fatalities <i>(32 in 2021)</i>	0.0 ↓ 2022 EUR Fatality rate per million passengers carried <i>(0.062 in 2021)</i>	12% ↓ 2022 EUR Accidents related to HRCs <i>(17% in 2021)</i>	55 ↑ 2022 EUR Number of accidents to a/c ≥ 2250 kg <i>(41 in 2021)</i>
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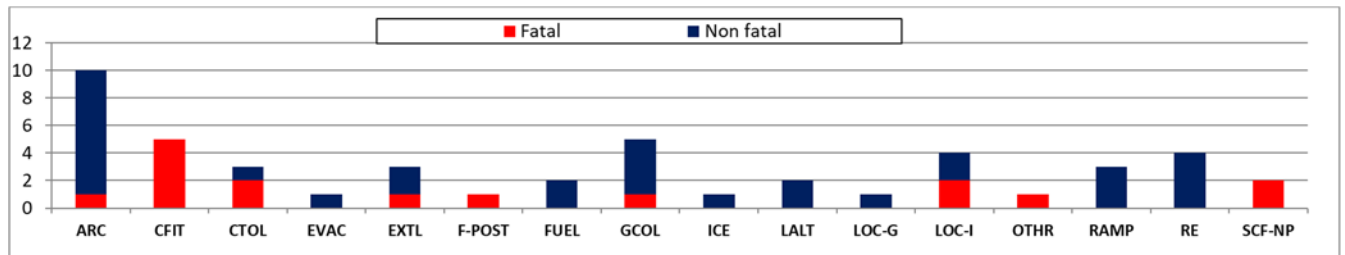


The vision of the Global Aviation Safety Plan (GASP) and of the EUR RASP is to achieve and maintain the goal of zero fatalities in commercial operations. Five high-risk categories of occurrence (HRCs) need to be addressed to mitigate the risk of fatalities: controlled flight into terrain (CFIT), loss of control in-flight (LOC-I), runway excursion (RE), runway incursion (RI) and mid-air collision (MAC). For States in the EUR Region, HRCs represent 12% of all accident categories for accidents involving scheduled commercial operations with aircraft of maximum mass of over 5700 kg. This is a decrease to what it was in 2021 (17%).

Annex 13 — Aircraft Accident and Incident Investigation requires that the State of Occurrence forward a notification of an accident to ICAO when the aircraft involved is of maximum mass of over 2 250 kg or is a turbojet-powered aeroplane. In 2022, **55** accidents involving civilian aircraft of maximum mass of over 2 250 kg occurred in the EUR Region, including 20 fatal accidents, causing 51 fatalities. In comparison, in 2021, there were 41 of such accidents, including 10 fatal accidents, causing 69 fatalities.

Date of Occurrence	State Of Occurrence	Registration	Aircraft Type	Phase Of Flight	Fatalities	Occurrence Category
03-Jan-22	United Kingdom	G-GHSV	BEECHCRAFT SUPER KING AIR	Landing	0	ARC
07-Jan-22	Russian Federation	RA-07295	AS350 Écureuil	En Route	2	SCF-NP
13-Jan-22	Spain	EC-GSK	BELL 412	Maneuvering	0	EXTL
26-Jan-22	France	N38CM	CESSNA 340 A	Landing	0	ICE
27-Jan-22	Greece	2-SLOW	CANADAIR CL-600 CHALLENGER	Landing	0	ARC
31-Jan-22	United Kingdom	N999PX	BOMBARDIER CHALLENGER 300	Landing	0	ARC
11-Feb-22	Russian Federation	RA-33599	ANTONOV AN-2	Climb	2	F-POST
12-Feb-22	Finland	SE-JSS	EUROCOPTER EC145	Landing	0	GCOL
23-Feb-22	Kazakhstan	UP-A0279?	ANTONOV AN-2	Landing	0	UNK
03-Mar-22	Spain	EI-DHH	BOEING 737	Standing	0	RAMP
04-Mar-22	United Kingdom	G-MCGY	SIKORSKY S-92	Landing	1	OTHR
11-Mar-22	Russian Federation	RA-22681	Mil Mi-8	Maneuvering	0	LALT
16-Mar-22	Switzerland	HB-ZTV	AS350 Écureuil	Maneuvering	1	EXTL
29-Mar-22	France	F-GMHJ	EUROCOPTER EC135	Landing	0	ARC
30-Mar-22	Switzerland	D-FLIC	CESSNA 208 CARAVAN	En Route	1	CFIT
02-Apr-22	United Kingdom	G-BJNZ	PIPER PA-23 AZTEC	En Route	0	SCF-PP
22-Apr-22	Ukraine	UR-UZB	ANTONOV AN-26	Take-off	1	CTOL
26-Apr-22	Spain	EI-ENK	BOEING 737	Standing	0	RAMP
30-Apr-22	France	F-GXMP	CESSNA 208 CARAVAN	Approach	0	FUEL
01-May-22	Russian Federation	RA-24212	Mil Mi-8	Landing	1	LOC-I
06-May-22	Italy	YR-BMM	BOEING 737	Landing	0	ARC
21-May-22	France	HB-GAC	BEECHCRAFT 18	Taxi	0	GCOL
09-Jun-22	Italy	I-ELOP	AGUSTA WESTLAND AW109	En Route	7	CFIT
19-Jun-22	United Kingdom	G-AIYR	DE HAVILLAND DH89A	Landing	0	RE
21-Jun-22	Russian Federation	RA-17742	ANTONOV AN-2	En Route	2	CFIT
22-Jun-22	Russian Federation	30001	ANTONOV AN-30	En Route	0	FUEL
25-Jun-22	Switzerland	HB-ZMC	AS350 Écureuil	En Route	0	LALT
29-Jun-22	Russian Federation	RA-25116	Mil Mi-8	En Route	0	SCF-PP
30-Jun-22	Russian Federation	RA-17951	ANTONOV AN-2	Landing	0	ARC
06-Jul-22	France	F-GJRP	AS350 Écureuil	Maneuvering	0	LOC-I
15-Jul-22	Russian Federation	RA-02240	ANTONOV AN-2	Landing	2	CTOL
15-Jul-22	Morocco	SU-KUS	CESSNA 404	Landing	0	ARC
16-Jul-22	Greece	UR-CIC	ANTONOV AN-12B	En Route	8	SCF-PP
19-Jul-22	Greece	SX-HGA	AGUSTA WESTLAND AW109	Taxi	0	LOC-G
20-Jul-22	Hungary	HA-LGA	AIRBUS A321	Standing	0	EVAC
25-Jul-22	Greece	SX-HEJ	BELL 407	Standing	1	GCOL
17-Aug-22	Russian Federation	RA-47848	ANTONOV AN-24	Landing	0	ARC
29-Aug-22	Russian Federation	RA-22833	Mil Mi-8	Landing	4	ARC
03-Sep-22	Poland	SP-HIP	SHORT SC.7 SKYVAN	Approach	2	LOC-I
04-Sep-22	Germany	D-AALU	BOEING 777	Taxi	0	RAMP
04-Sep-22	Latvia	OE-FGR	CESSNA 550 CITATION II	En Route	4	SCF-NP
24-Sep-22	France	EC-NLS	BOEING 737	Landing	0	RE
29-Sep-22	United Kingdom	J2-VBI	BRITTEN NORMAN BN-2 ISLANDER	Landing	0	RE
01-Oct-22	France	F-GZHA	BOEING 737	Landing	0	ARC
05-Oct-22	Greece	SX-EIT	ATR ATR42	Taxi	0	GCOL
19-Oct-22	Spain	EC-MXL	AYRES S2	En Route	1	CFIT
05-Nov-22	Italy	I-PIKI	AGUSTA WESTLAND AW109	En Route	7	UNK
08-Nov-22	Russian Federation	RA-14185	Mil Mi-2	En Route	1	CFIT
15-Nov-22	Russian Federation	RA-25830	Mil Mi-8	Approach	0	LOC-I
20-Nov-22	France	TF-BBM	BOEING 737	Taxi	0	GCOL
23-Nov-22	Italy	I-AMVV	AS350 Écureuil	En Route	0	EXTL
25-Nov-22	France	3A-MVT	AIRBUS HELICOPTERS EC130	En Route	2	UNK
26-Nov-22	United Kingdom	N123CA	DORNIER DO 28A-1	Landing	0	RE
15-Dec-22	Greece	PK-SNF	PILATUS PC-6	Climb	1	SCF-PP
19-Dec-22	Russian Federation	RA-24213	Mil Mi-8	Landing	0	CTOL

The breakdown of the 2022 accidents by Occurrence Categories is on the figure below:



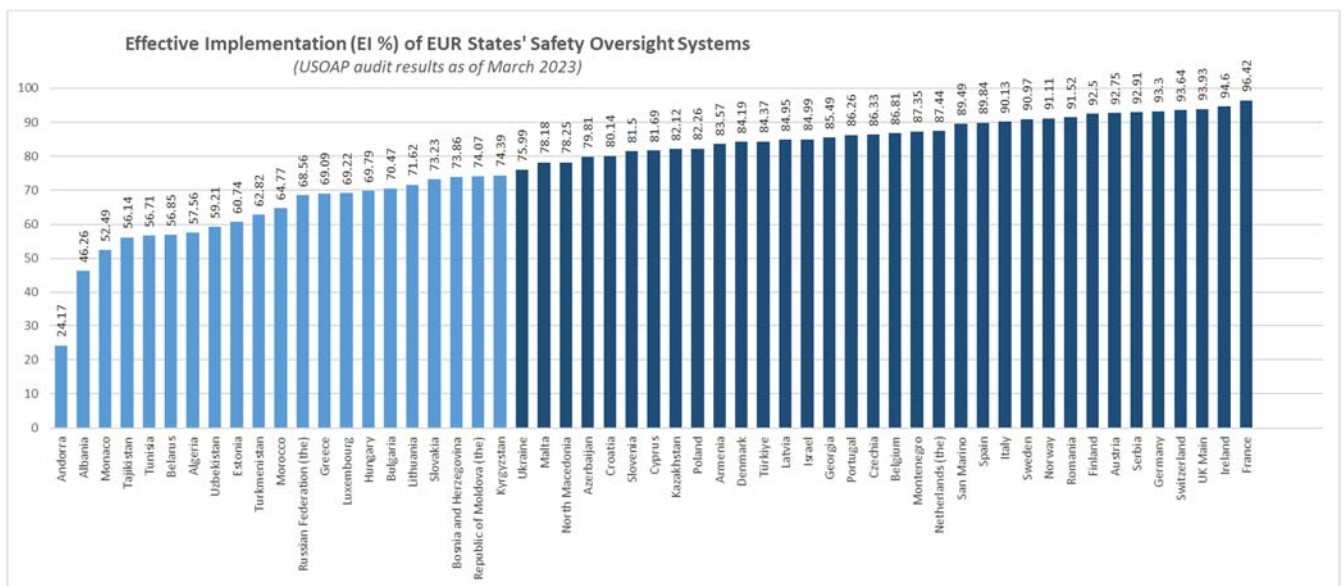
Legend:

Occurrence Category	Occurrence Category Name	Occurrence Category Description
ARC	Abnormal Runway Contact	Any landing or takeoff involving abnormal runway or landing surface contact
CFIT	Controlled Flight Into Or Toward Terrain	In-flight collision or near collision with terrain, water, or obstacle without indication of loss of control.
CTOL	Collision With Obstacle(S) During Takeoff And Landing	Collision with obstacle(s) during takeoff or landing while airborne.
EVAC	Evacuation	Occurrence in which either, (a) a person(s) was/were injured during an evacuation, (b) an unnecessary evacuation was performed, (c) evacuation equipment failed to perform as required, or (d) the evacuation contributed to the severity of the occurrence.
EXTL	External Load Related Occurrences	Occurrences during or as a result of external load or external cargo operations.
F-POST	Fire/Smoke (Post-Impact)	Fire/Smoke resulting from impact.
FUEL	Fuel Related	One or more powerplants experienced reduced or no power output due to fuel exhaustion, fuel starvation/mismanagement, fuel contamination/wrong fuel, or carburetor and/or induction icing.
GCOL	Ground Collision	Collision while taxiing to or from a runway in use.
GTOW	Glider Towing Related Events	Premature release, inadvertent release or non-release during towing, entangling with towing, cable, loss of control, or impact into towing aircraft/winch.
ICE	Icing	Accumulation of snow, ice, freezing rain, or frost on aircraft surfaces that adversely affects aircraft control or performance.
LALT	Low Altitude Operations	Collision or near collision with obstacles/objects/terrain while intentionally operating near the surface (excludes takeoff or landing phases).
LOC-G	Loss Of Control–Ground	Loss of aircraft control while the aircraft is on the ground.
LOC-I	Loss Of Control–Inflight	Loss of aircraft control while, or deviation from intended flightpath, in flight. Loss of control inflight is an extreme manifestation of a deviation from intended flightpath. The phrase “loss of control” may cover only some of the cases during which an unintended deviation occurred.
OTHR	Other	Any occurrence not covered under another category.
RAMP	Ground Handling	Occurrences during (or as a result of) ground handling operations.
RE	Runway Excursion	A veer off or overrun off the runway surface.
SCF-NP	System/Component Failure Or Malfunction (Non-Powerplant)	Failure or malfunction of an aircraft system or component other than the powerplant.

States' safety oversight capabilities

USOAP CMA results show an average Effective Implementation (EI) score for States in the EUR Region of 77.2%, up from the 2021 value of 76.4%. USOAP CMA results also show that 62% of the States in the EUR Region have already achieved the target of 75% EI by 2024, as outlined in the 2023-2025 edition of the GASP.

77.2% Average USOAP EI score for EUR States	34 (62%) of EUR States with an EI>75%	20 (36%) of EUR States with an EI>85%	1 (2%) of EUR States with an EI>95%
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The Universal Safety Oversight Audit Programme Continuous Monitoring Approach (USOAP CMA) measures the effective implementation of a State's safety oversight system. In 2022, 10 USOAP-CMA related activities were completed in 8 States of the EUR Region, while two had to be postponed due to security concern and the COVID-19 pandemic.

State	Type of USOAP Activity	Dates	Status
Albania	Audit	6 to 18 July 2022	Completed
Azerbaijan	ICVM	1 to 8 June 2022	Completed
Italy	SSPIA	15 to 27 June 2022	Completed
	Focused audit	28 June to 5 July 2022	Completed
Luxembourg	Off-site validation	December 2022	Completed
Republic of Moldova	Audit	9 to 21 February 2022	Completed
Russian Federation	Off-site validation	August 2022	Completed
Slovenia	Off-site validation	November 2022	Completed
United Kingdom	SSPIA	16 to 28 November 2022	Completed
	Focused audit	29 November to 6 December 2022	Completed
Belarus	Audit	--	Postponed
Kyrgyzstan	Audit	--	Postponed

<p>65% of priority PQs implemented by EUR States</p>	<p>The GASP and the EUR RASP call for States to improve their score for the Effective Implementation (EI) of the Critical Elements (CEs) of the State's safety oversight system, with a particular focus on the priority PQs. Priority PQs are defined as a subset of protocol questions (PQ) that, if found not satisfactory, may indicate a lack of capability by a State to identify and/or resolve operational safety and fundamental accident investigation deficiencies effectively. The level of implementation of priority PQs by EUR States is 65%.</p>
<p>76% of required corrective action plans (CAPs) submitted by EUR States</p>	<p>When deficiencies in the form of non-satisfactory PQs have been identified a State's safety oversight system, Corrective Action Plans (CAP) should be submitted by States to ICAO, with specific actions and estimated implementation dates to correct the deficiencies identified.</p> <p>Initial proposed CAPs and subsequent CAP updates should meet the following six criteria:</p> <ul style="list-style-type: none"> • Relevant — CAPs should address the issues and requirements related to the finding and corresponding PQ and Critical Element (CE). • Comprehensive — CAPs should be complete; including all elements or aspects associated with the finding. • Detailed — CAPs should be laid out in a step-by-step approach, as required, to outline the implementation process. • Specific — CAPs should identify who will do what, when, in coordination with the responsible office or entity. • Realistic — CAPs should be realistic in terms of contents and implementation timelines. • Consistent -- CAPs should be consistent in relation to other CAPs and with the State self-assessment.
<p>24% of CAPs completed by EUR States</p>	<p>For the EUR Region, 76 % of required CAPs have been submitted to ICAO and 24% have been reported as completed.</p>

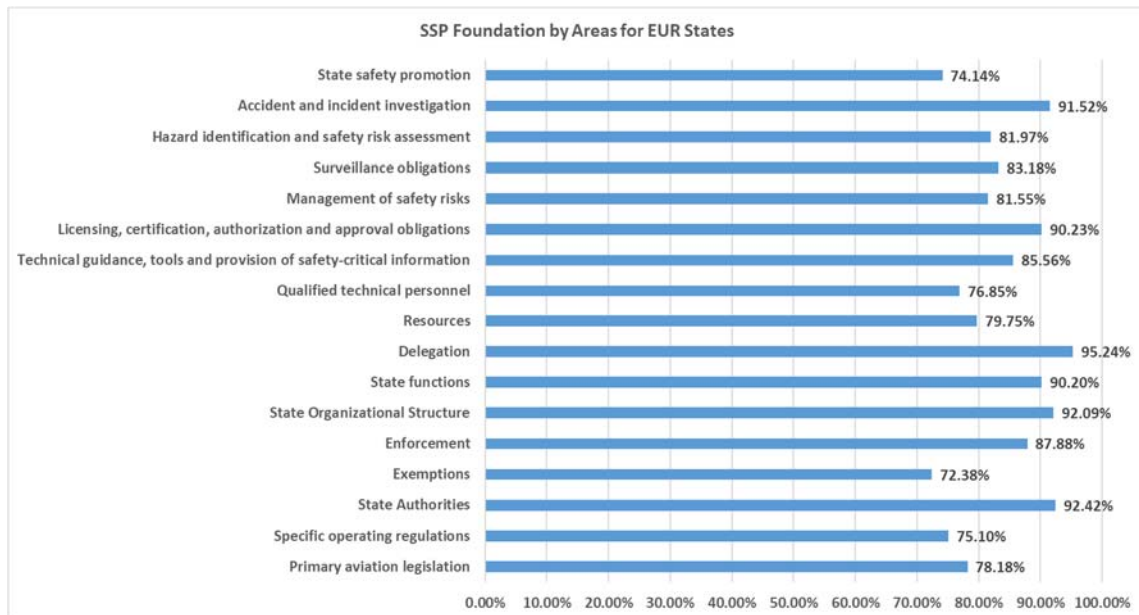
Implementation of State safety programmes

State safety programme (SSP) is an integrated set of regulations and activities aimed at improving safety.

Foundation of an SSP" refers to a subset of the Universal Safety Oversight Audit Programme (USOAP) protocol questions (PQs) that have been identified as fundamentals and are considered as prerequisites for sustainable implementation of the full SSP. EUR States have on average implemented 82.64% of these SSP foundational PQs. 44 % of EUR States have implemented at least 90% of the foundation of an SSP, and 2% of EUR States have done so fully.

<p>24 (44%) EUR States having implemented at least 90% of the foundation of an SSP</p>	<p>82.64% Average SSP foundation implementation of EUR States</p>	<p>10 (18%) EUR States that require all applicable service providers under their authority to implement an SMS (as reported in EFOD for Annex 19 std. 3.3.2.1)</p>	<p>30 (54%) of EUR States have issued a national aviation safety plan</p>
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SSP foundational PQs are grouped into subject areas derived from Annex 19. The level of implementation of these SSP subject areas for States in the EUR is as follows:



Effective SSPs include the implementation of SMS by service providers within individual States. In the EUR Region, States require service providers implement an SMS, as part as their safety management system obligations defined in Annex 19. However, only 18% of EUR States have reported that they require all applicable service providers under their authority to implement an SMS.

Every State should develop a national aviation safety plan (NASP), in line with the GASP goals, targets and global high-risk categories of occurrences (G-HRCs). The NASP is the means to demonstrate commitment to the implementation of activities for improvement of safety in the State. More than half of the 55 EUR States have issued a National Aviation Safety Plan (NASP), and made it publicly available on the GASP Library at: [https://www.icao.int/safety/GASP/Pages/NATIONAL-AVIATION-SAFETY-PLAN-\(NASP\).aspx](https://www.icao.int/safety/GASP/Pages/NATIONAL-AVIATION-SAFETY-PLAN-(NASP).aspx).

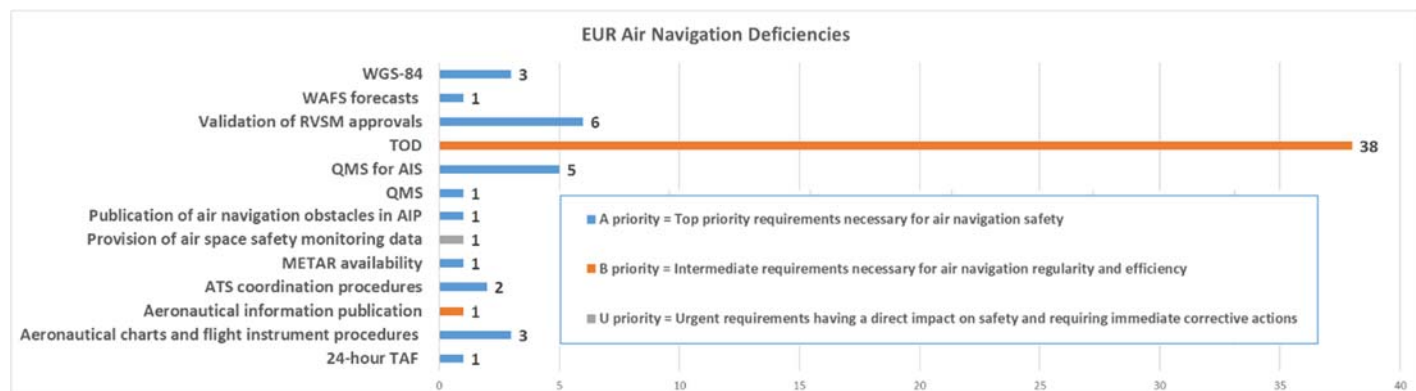
Air navigation and aerodrome infrastructure

GASP Goal 6 focuses on the need to ensure the appropriate infrastructure is available to support safe operations and the EUR RASP calls for all States to implement the air navigation and airport core infrastructure by 2022. Basic Building Blocks (BBB) is a baseline defined by the basic services agreed by the States under the Convention on International Civil Aviation so that international civil aviation may be developed in a safe and orderly manner. The BBB framework describes the backbone of any robust air navigation system by defining the essential air navigation services to be provided for international civil aviation according to ICAO SARPs and Procedures for Air Navigation Services (PANS).

<p style="font-size: 1.5em; font-weight: bold; color: #4F81BD;">80%</p> <p>Level of implementation of the basic building blocks (BBB) for EUR States</p>	<p style="font-size: 1.5em; font-weight: bold; color: #4F81BD;">13 (24%)</p> <p>Number of EUR States having no air navigation deficiency against the EUR air navigation plan</p>	<p style="font-size: 1.5em; font-weight: bold; color: #4F81BD;">41 (75%)</p> <p>Number of EUR States having no air navigation deficiency classified as having implication with air navigation safety</p>
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The level of provision of essential air navigation services (BBBs) and the capability to oversee them, measured by the effective implementation of the USOAP PQs linked to BBB is 80% for EUR States. The relationship between BBB and USOAP PQs is available at <https://www4.icao.int/ganportal/bbbsusoapmapping>

Air Navigation Deficiency is a situation where a facility, service or procedure does not comply with a regional air navigation plan approved by the Council, or with related ICAO SARPs, or Procedures for Air Navigation Services (PANS) and which has a negative impact on safety, regularity and/or efficiency of international civil aviation. In the EUR Region, 41 (75%) States have no air navigation deficiency classified as having implication with air navigation safety while 13 (24%) States have no air navigation deficiency against the EUR air navigation plan. As April 2023, one deficiency having a direct impact on safety and requiring immediate corrective actions was identified in the EUR region. An additional 24 deficiencies classified as having top priority requirements necessary for air navigation safety were identified, and 39 with intermediate requirements necessary for air navigation regularity and efficiency.





SAFETY

**NORTH ATLANTIC SYSTEMS
PLANNING GROUP
(NAT SPG)**

2022 Annual Safety Report



2023 Edition

International Civil Aviation Organization (ICAO) North Atlantic Region

2022 Annual Safety Report

Safety Policy

Safety is the NAT SPG's core business function. The NAT SPG is committed to developing, implementing, maintaining and constantly improving strategies and processes to ensure that all our aviation activities take place under a balanced allocation of organizational resources. The NAT SPG aims to achieve the highest level of safety performance and meet regional safety objectives in line with national and international standards, the Global Aviation Safety Plan (GASP), and the Global Air Navigation Plan (GANP).

Objective

The objective of the NAT SPG member States is to maintain and, where possible, improve the agreed safety standards in all activities supporting the provision of air navigation services in the NAT Region:

- All involved States are accountable for the delivery of the agreed level of safety performance in the provision of air navigation services in the North Atlantic Region.
- All involved States are accountable for the delivery of the agreed level of safety performance in aircraft operations in the North Atlantic Region.
- Safety in the NAT Region is managed through the organization and activities of the relevant implementation and oversight groups established by the NAT SPG, in coordination with the non-member States and observers, to achieve its Safety Objective.

Guiding Principles

The NAT SPG will act to:

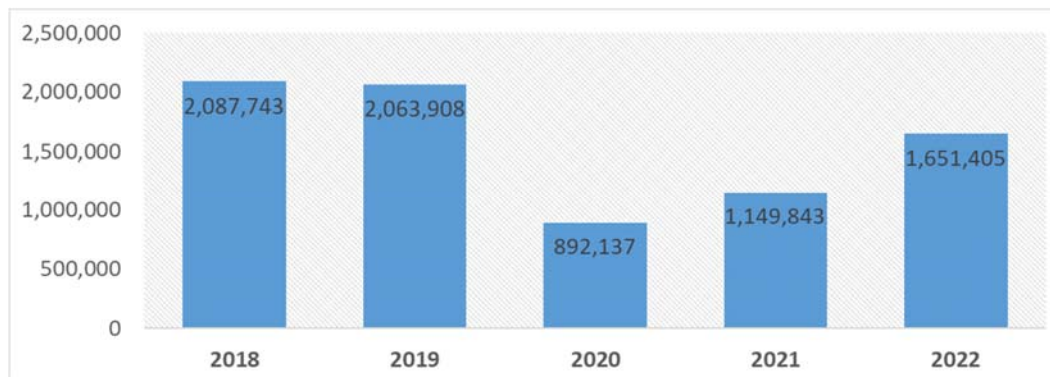
- **Clearly** define all accountabilities and responsibilities for the delivery of safety performance with respect to the provision of air navigation services and participation in the NAT SPG and its contributory bodies;
- **Support** the safety management activities that will result in an organizational culture that fosters safe practices, encourages effective safety reporting and communication, and actively manages safety within the NAT Region;
- **Share** safety related data, knowledge and expertise with concerned stakeholders;
- **Disseminate** safety information and NAT operating requirements to stakeholders;
- **Establish and implement** hazard identification and risk management processes in order to eliminate or mitigate the safety risks associated with air navigation services supporting aircraft operations in the North Atlantic Region;
- **Establish and measure** NAT Region safety performance against agreed safety standards; and
- **Continually improve** our safety performance through safety management processes.

All of the NAT member States contribute experts to the NAT SPG, or one or more of its various subgroups, and so support the overall management of safety in the Region. The NAT safety policy is enhanced by the agreement of member States to use the information shared at NAT SOG meetings for the purposes of education and for making safety improvements within the Region. This has paved the way for members to discuss and share information and act upon it within the framework of the NAT SPG.

Executive Summary

This North Atlantic Region's Annual Safety Report (APR) is issued by ICAO's North Atlantic (NAT) Systems Planning Group (SPG) and covers performance for calendar year 2022.

The NAT SPG structure is established to study, monitor, and evaluate the air navigation system in the NAT region taking into account changes to technology, changing traffic characteristics and traffic forecasts. The number of flight hours in the NAT HLA in 2022 was 1,651,405. This is an increase from that reported in 2021 (1,149,843 flight hours) and reflects the growth of traffic experienced in the NAT throughout the year as traffic begins its recovery to pre-pandemic levels. The busiest recorded week in 2022 (12,247) was approximately 90% of the busiest recorded week for 2019 (13,733).



Safety Performance in the NAT HLA continues to be monitored by the measures and targets associated with Safety Key Performance Indicators (SKPIs) with targets based on three years of rolling data.

While 9 out of 11 SKPIs were met in 2021, 2022 data indicates a reduction to 6 from the agreed set of SKPIs. The SKPIs indicate a reducing performance in the vertical dimension and an increase in the number of reported losses of separation. The SKPIs also indicate positive but stabilising performance in the lateral dimension.

The SKPI performance in the lateral dimension appears to be contradictory with the observed decrease in lateral performance when considering the CRE which indicates a mathematically significant change from 1.0×10^{-9} to 12.9×10^{-9} fatal accidents per flight hour (fapfh). The performance in the lateral dimension is similar to that reported prior to COVID-19.

A year-on-year increase was also observed in the vertical dimension marking an increase on the reported CRE since 2021 at 8.8×10^{-9} (although the 2022 CRE still remains better than pre-pandemic performance levels).

Both lateral and vertical performance metrics are sensitive and can be adversely affected by a single event. With the exclusion of two individual events (one lateral and one vertical) from the calculation, the CRE in both dimensions would be at, or marginally above the target of 5×10^{-9} fapfh. Work continues to identify root causes and implement relevant corrective actions.

As traffic recovers, the number of events reported in 2022 has doubled when compared to that reviewed in 2021 with the profile of root causes similar. The benefits of near, real-time surveillance capability in the NAT has delivered significant benefits in the early detection and mitigation of deviations in the vertical and lateral planes.

The North Atlantic Scenario

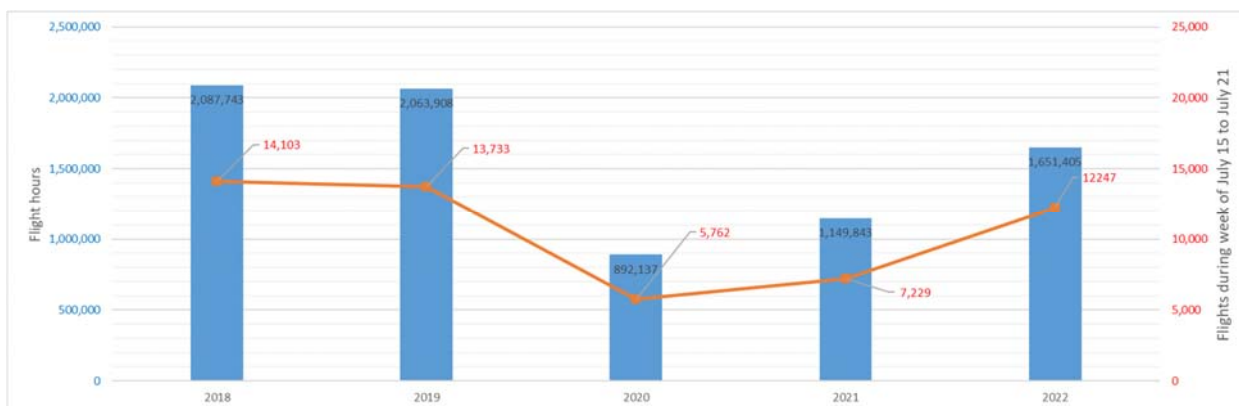
The airspace of the North Atlantic, which links Europe and North America, is the busiest oceanic airspace in the world. The NAT Region is a pioneer in the implementation of advanced procedures and technology supporting the progress of the global air navigation and aviation safety plans.

Traffic mainly flows in a broadly East-West orientation in a twice daily pattern where a daily organized track system takes account of airspace users' needs and weather patterns. NAT core traffic flow is almost exclusively jet transport aircraft that operate in the upper airspace in the en-route phase of flight.

Since March 2019, approximately 70% of the core NAT traffic has been able to make use of the surveillance capability offered by space based Automatic Dependent Surveillance-Broadcast (ADS-B) augmenting an increasing use of Automatic Dependent Surveillance-Contract (ADS-C). The number of flights eligible for the separation standards enabled by ADS-B has increased steadily since the capability was introduced.

Communication is, to a large extent, based on satellite-based data link, also referred to as Controller-Pilot Data Link Communications (CPDLC) with High Frequency radio being utilized less often. This leads to air traffic management and operation that is fundamentally different in concept to typical domestic operations, with a greater focus on strategic rather than tactical techniques although, as the NAT embraces new technologies this balance has begun to change.

The number of flight hours in the NAT HLA in 2022 was 1,651,405, which is an increase from the 1,149,843 in 2021. It is still below the flight hours before the COVID-19 pandemic. The NAT Economic, Financial and Forecast Group (NAT EFFG) estimates that in 2022, during the peak week of July 15 to July 21, approximately 12,247 flights crossed the North Atlantic. This actual figure was 7,229 for that same week in 2021.



Safety Performance Monitoring and Measurement

Collision Risk Estimates

The estimated risk of a mid-air collision, referred to as Collision Risk Estimate (CRE), is reported in terms of fatal accidents per flight-hour (fapfh) and is calculated in the lateral and vertical planes. The model used for computation essentially assumes each aircraft is a box having a fixed x, y, and z orientation and approximates the risk of collision by integrating the crossing rate over the period when two boxes are close to each other in each dimension.

Estimates of Vertical and Lateral Collision Risk for 2022 in the NAT HLA are based on risk bearing events reported to the NAT Central Monitoring Agency (CMA) for the period January to December 2022. Flight activity data from five NAT Oceanic Control Areas (OCAs) was used in deriving an estimate of Vertical and Lateral Collision Risk. The risk estimates were calculated for the Middle zone (Gander and Shanwick OCAs), the North zone (the Reykjavik OCA), and the South zone (the New York East and Santa Maria OCAs) and then combined to derive a risk estimate for NAT HLA.

As depicted in figure 1 below, the Vertical Collision Risk Estimate for 2022 was estimated to be 8.8×10^{-9} fapfh for all NAT HLA, which is higher in comparison to 2021 estimate (when taking into account SLOP). This increase in collision risk estimate in the vertical dimension is mostly attributed to one 60-minute event in the South zone. Removing this one event would bring the risk down to 5.0×10^{-9} fapfh.

Figure 1 also presents the 2022 lateral risk estimate of 12.9×10^{-9} fatal accidents per flight hour. This represents a significant increase compared to 2021, when that CRE was only 1.0×10^{-9} fatal accidents per flight hour. The main contributor was a 16-minute event in the middle zone on OTS. If this event was removed, the risk would reduce to 5.6×10^{-9} fapfh.

The vertical and lateral CREs are greater than the Target Level of Safety (TLS) for operational and technical errors of 5×10^{-9} fatal accidents per flight hour (fapfh).



Figure 1 - Collision Risk Estimates in the NAT HLA (2016-2022)

Safety Key Performance Indicators (KPIs)

The NAT SPG has established Safety KPIs and associated targets for the NAT HLA. The NAT HLA performance in 2022 is shown the table below. The 2022 figures are shown in green where the performance meets the targets and red otherwise.

Safety KPI		Target	Previous rolling three-year period of performance (2019-2020-2021)	2019 Performance	2020 Performance	2021 Performance	2022 Performance
NAT.SKI.01	Number of accidents	0	n/a	0	0	0	0
NAT.SPKI.02a	Number of LHD events divided by number of flight hours flown in the NAT HLA	Reduction over previous rolling three-year period of performance	4.30×10^{-5}	3.59×10^{-5}	4.71×10^{-5}	4.61×10^{-5}	5.87×10^{-5}
NAT.SKPI.02b	Overall time of LHDs at unprotected flight level divided by total duration of flights in minutes	Reduction over previous rolling three-year period of performance	0.697×10^{-6}	0.95×10^{-6}	0.52×10^{-6}	0.623×10^{-6}	1.01×10^{-6}
NAT.SKPI.03a	Number of Lateral deviations divided by number of flight hours flown in the NAT HLA	Reduction over previous rolling three-year period of performance	5.66×10^{-5}	5.71×10^{-5}	6.39×10^{-5}	4.87×10^{-5}	5.57×10^{-5}
NAT.SKPI.03b	Overall time of lateral deviations on an unprotected profile divided by total duration of flights in minutes	Reduction over previous rolling three-year period of performance	1.04×10^{-6}	1.70×10^{-6}	0.82×10^{-6}	0.61×10^{-6}	0.83×10^{-6}
NAT.SKPI.04	Number of losses of separation events divided by number of flight hours flown in the NAT HLA	Reduction over previous rolling three-year period of performance	0.91×10^{-5}	1.65×10^{-5}	0.56×10^{-5}	0.522×10^{-5}	1.27×10^{-5}
NAT.SKPI.05a	Number of coordination errors divided by number of flight hours flown in the NAT HLA	Reduction over previous rolling three-year period of performance	1.85×10^{-5}	0.82×10^{-5}	2.91×10^{-5}	1.83×10^{-5}	1.15×10^{-5}
NAT.SKPI.05b	Overall time of coordination errors spent at unprotected profile divided by total duration of flights in minutes	Reduction over previous rolling three-year period of performance	1.09×10^{-6}	0.16×10^{-6}	2.8×10^{-6}	0.30×10^{-6}	0.03×10^{-6}
NAT.SKPI.06a	Collision Risk Estimate (CRE) in the vertical dimension	5×10^{-9} fapfh	n/a	12×10^{-9}	5.5×10^{-9}	6.1×10^{-9}	8.8×10^{-9}
NAT.SKPI.06b	Collision Risk Estimate (CRE) in the lateral dimension	5×10^{-9} fapfh	n/a	13.6×10^{-9}	3.6×10^{-9}	1.0×10^{-9}	12.9×10^{-9}
NAT.SKPI.07	Regional Effective Implementation (EI) score in ANS for NAT provider States	-Maintain 85% or above until 2026 -Reach 95% by 2030	n/a	n/a	n/a	89.21%	88.58%

Table 1 – Safety Key Performance Indicators (SKPIs) and associated targets (2019-2022)

Scrutiny of events (numbers in brackets are 2021 figures)






The NAT SG carried out the scrutiny of 292 (166) events which were reported to the NAT CMA as occurring in the NAT High Level Airspace (HLA) of the Oceanic Control Area (OCA) of Shanwick, Santa Maria, Reykjavik, New York East, Gander and Bodo during the year 2022. These events were categorized as follows:

- 97 (53) Large Height Deviations (LHDs)
- 100 (56) actual lateral deviations, including:
 - 38 (23) GNEs and
 - 36 (5) ATC Interventions where when the Air Traffic Controller (ATCO) caught and corrected a lateral deviation before it developed into a GNE
- 19 (21) coordination events, where coordination between two Units has not been correctly carried out, leading to a vertical, lateral or time event.
- 6 (4) longitudinal loss of separation events.
- 100 (53) prevented events where the ATCO prevented a deviation or an uncoordinated flight profile entering the airspace of another ANSP.

Note: It is important to note that the sum of the values will not equal to the number of events as one event can be counted in one or more dimensions.

It is worth noting that ATC interventions and preventions are positive indicators that the ATC system has recognized an error, often through data link equipage capabilities, warning the controllers in sufficient time to take pre-emptive action. Underlying causes of all lateral deviations (incipient or actual) are often identical – the magnitude depends upon the timeliness of identification and corrective action.

The review of these 292 events of 2022 showed that the top 10 contributing issues allocated to all events were (Arrows indicate relative position from 2021 report):

1. *Flight Plan vs. Clearance* where flying, or intending to fly the planned route instead of the cleared route contributed in 85 (29%) of the events of 2022. In most cases (59 out of the 85), deviations did not actually occur as they were prevented by an ATCO. 
2. *Did not adhere to ATC clearances* in either the vertical or the lateral dimension where a crew, for no identifiable reason, operated a flight profile different to the ATC clearance (e.g. changed vertical profile or routed to a different waypoint which was not contained in the clearance or the filed flight plan or due to contingency) contributed to 40 (14%) of the 2022 events. 
3. *Weather* where weather conditions experienced during the flight contributed in 35 (12%) of the events of 2022. 
4. *ATC coordination* where an error occurring during the coordination between two ATC sectors or ANSPs contributed in 35 (12%) of the events of 2022. 
5. *ATC Clearance*, where a clearance issue contributed in 30 (10%) of the 2022 events. This can for example be caused by ATC not issuing a clearance to an aircraft to match the coordinated profile or by the lack of an appropriate clearance. 

6. *Crew CPDLC uplink message* where crew misunderstood or misread a CPDLC message, or indicated an issue with a CPDLC uplink message, or acknowledged a CPDLC uplink message but did not action it, contributed in 25(9%) of the events in 2022. ↑
7. *ATC Pertinent message not actioned* where ATC response, on receipt of a pertinent message, was not actioned or a message was erroneously discarded contributed in 25 (9%) of the events of 2022. ↔
8. *Crew-Other*, where a crew action contributed to 22 (8%) of the 2022 events but there is insufficient information or evidence to allocate any of the currently scrutinized causal factors. ↔
9. *Incorrect Weather Contingency action* where crew deviated from their assigned clearance to avoid adverse meteorological conditions, but did not follow the correct procedures for in-flight contingencies in Oceanic Airspace contributed to 14 (5%) of the 2022 events. ↔
10. *Truncated Display/ARINC 424* where the FMS does not display the full LAT/LONG waypoints contributed to 13 (4%) of the 2022 events.

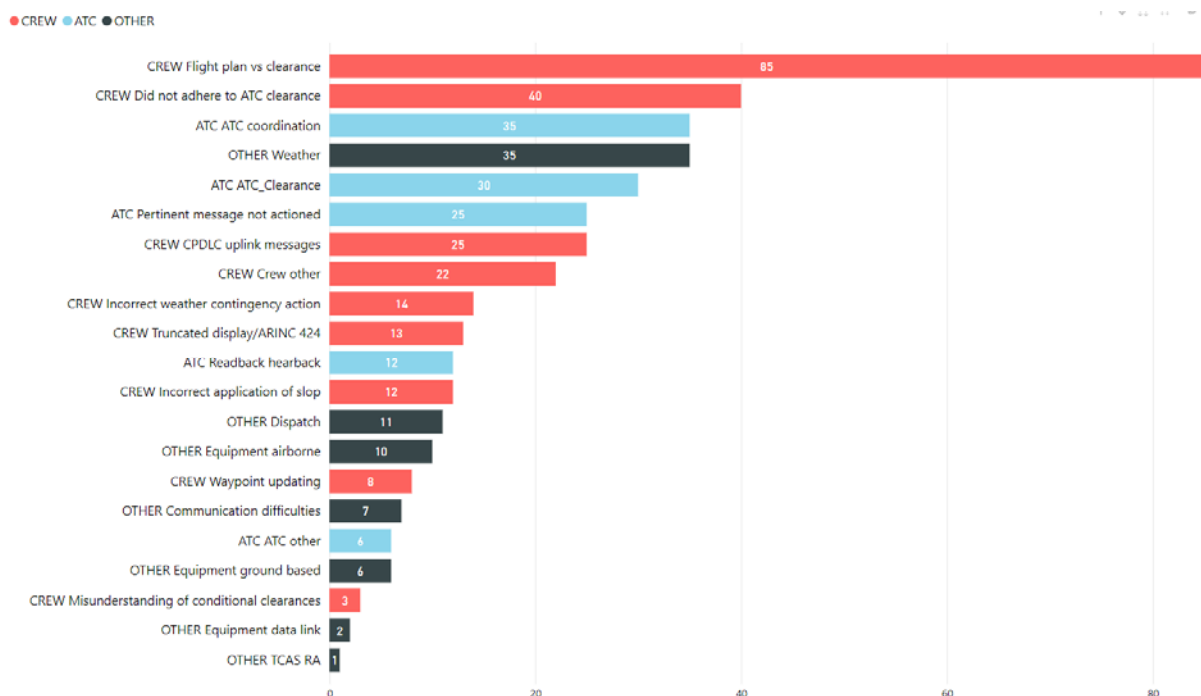


Figure 2: Contributing issues to events in the NAT HLA in 2022

Prevented deviations for all event types were classified according to the implemented mitigations used to avert a deviation. The results of this classification are presented in Figure 3, demonstrating that the practice of requiring position reporting of “NEXT and NEXT +1” and the “CONFIRM ASSIGNED ROUTE” CPDLC message sets (UM137/DM40) are proving to be of benefit.

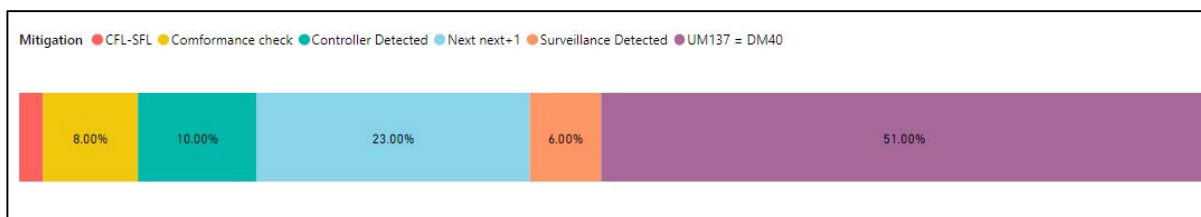


Figure 3: Mitigations used for prevented deviation events in 2022

NAT regional priorities

Early in 2023, a workshop held at the ICAO EUR/NAT office in Paris proposed to refine the NAT vision 2030 high level statement and update the goals and objectives contained therein. Noting that the Vision is now not timebound, it reflects the continued, but ever-changing priorities of the region to adapt to the needs of aviation and deliver a safe operating environment. The NAT Vision Statement is expected to be endorsed at the next meeting of the NAT Systems Planning Group held in mid-2023 and states: “Through collaboration and by leveraging innovation, the NAT SPG leads the way for the provision of safe, secure, efficient, sustainable and resilient Air Traffic Management Services to ensure an optimized seamless service.”

The NAT Vision is evidence of the willingness of all organisations within or bordering the region to work collaboratively to improve the operating environment. The Vision is sympathetic to the changing environment and allows the deliverables to be flexed and reprioritised to deliver the widest benefit for the region over the next decade.

The focus for 2022 has been to rebuild the operating environment and support the growth in traffic demand as the year progressed in its recovery from COVID-19 restrictions. However, the NAT has continued to seek leverage from the benefits that Space-Based ADS-B can offer, by reducing the OTS footprint and exploring innovate “target to target” separations in the Reykjavik CTA. The NAT is working towards the removal of Oceanic Clearances in early 2024 and its enhanced use of “user preferred routings” in its ambition to create seamless boundaries and make a positive impact on some of the causal factors.

Handling today’s traffic profile in more effective ways needs to be done at the same time as developing policies and procedures to facilitate new entrant operators into our system such as those seeking supersonic and hypersonic integration and those developing systems for access to space.

All of this needs to be done while continually seeking to reduce the environmental impacts of the NAT and building resilient and secure systems that can withstand natural and man-made interference while preparing for an ever-developing future.

The NAT vision provides the framework for the region to continue to adapt its services and develop new ways of working to leverage emerging and innovative technologies. The NAT SPG structure ensures that the region implements improvements to its airspace provision while building and enhancing the levels of safety the region has become accustomed to.

Appendix A

ADS-B	Automatic Dependent Surveillance - Broadcast
ADS-C	Automatic Dependent Surveillance – Contract
ANS	Air Navigation Service
ATC	Air Traffic Control
CPDLC	Controller-pilot data link communications (data link)
fapfh	Fatal Accidents per Flight Hour
GASP	Global Aviation Safety Plan
GNE	Gross Navigation Error
HLA	High Level Airspace
ICAO	International Civil Aviation Organization
KPI	Key Performance Indicator
LHD	Large Height Deviation
NAT	North Atlantic
NAT CMA	North Atlantic Central Monitoring Agency
NAT EFFG	North Atlantic Economic, Financial and Forecast Group
NAT MWG	North Atlantic Mathematicians Working Group
NAT SG	North Atlantic Scrutiny Group
NAT SOG	North Atlantic Safety Oversight Group
NAT SPG	North Atlantic Systems Planning Group
OCA	Oceanic Control Area
OTS	Oceanic Track System
SKPI	Safety Key Performance Indicator
SLOP	Strategic Lateral Offset Procedure

— **END** —

**International Civil Aviation Organization (ICAO)
European and North Atlantic (EUR/NAT) Office**



**3 bis villa Émile Bergerat
92522 Neuilly-sur-Seine Cedex, France
Tel.: +33 1 46 41 85 85
Fax: +33 1 46 41 85 00
E-mail: icaoeurnat@icao.int**