

Performance Review Body

Annex III – Safety Report

The 2020 monitoring consists of five reports:

1. PRB Monitoring Report 2020
2. Annex I – Member States' factsheets
3. Annex II – Member States' detailed analysis for experts
4. **Annex III – Safety report**
5. Annex IV – Investments report

October 2021

TABLE OF CONTENTS

1	INTRODUCTION AND CONTEXT	3
1.1	<i>About this document</i>	3
1.2	<i>Background</i>	3
1.3	<i>Overview of safety KPIs and associated targets for RP3</i>	4
1.4	<i>Safety performance review</i>	6
1.5	<i>Verification Process of Effectiveness of Safety Management</i>	7
1.6	<i>COVID-19</i>	8
2	SAFETY PERFORMANCE ANALYSIS	9
2.1	<i>ANS-Related Accidents and Serious Incidents</i>	9
2.2	<i>Effectiveness of Safety Management for ANSPs</i>	12
2.3	<i>Safety Performance Indicators</i>	15
2.3.1	<i>Rates of separation minima infringement and runway incursion occurrences</i>	15
2.3.2	<i>Automated Safety Data Recording Systems</i>	19
3	NETWORK MANAGER	20
3.1	<i>Effectiveness of Safety Management – Network Manager</i>	21
3.2	<i>Over-deliveries</i>	21
3.3	<i>Top risks in the Network</i>	21
4	SUMMARY OF OBSERVATIONS	22

1 INTRODUCTION AND CONTEXT

1.1 About this document

- 1 This Annex provides a detailed review of the safety performance of air navigation services (ANS) and network functions in 2020. It uses data submitted by Member States subject to the provisions of the Single European Sky (SES) performance scheme in the third reference period (RP3) as laid down in Article 1 of Commission Implementing Regulation (EU) No 2019/317.¹ Therefore, it covers the 27 EU Member States, Norway, and Switzerland.
- 2 This Annex was prepared by the European Union Aviation Safety Agency (EASA) in support to the Performance Review Body (PRB) of the Single European Sky.
- 3 The first section provides an introduction to the safety key performance area (KPA) and a brief reminder of the safety key performance indicators (SKPIs) and associated RP3 targets as well as the safety performance indicators (SPIs). It also describes the process and methods used to collect data from various sources in order to create the review of safety performance in later sections.
- 4 The second chapter presents and analyses in detail the achieved performance in the SKPIs and SPIs during 2020. It also provides a comparison of safety performance against targets where applicable.
- 5 The third chapter provides an assessment of the SKPIs and PIs applicable to the Network Manager's network functions during 2020.
- 6 The fourth and final chapter provides a summary of the safety performance achieved and observations regarding performance.
- 7 The performance and charging scheme was created to improve the European air transport system in four key performance areas: safety, environment, capacity, and cost-efficiency. Commission Regulation (EU) No 691/2010² established the principles of the scheme and the provisions of initial implementation during the first reference period (RP1), which ran from 2012 to 2014. RP1 was considered a transitional period of three years, during which the key performance area of safety was limited to SPIs that were used for monitoring purposes only i.e. no target setting was involved.
- 8 Commission Regulation (EU) No 390/2013, which repealed Commission Regulation (EU) No 691/2010, established measures for the second reference period (RP2) between 2015 and 2019 aimed at improving the performance and charging scheme based on the experience gained during RP1. In particular, it introduced additional SKPIs with associated targets that were defined in Commission Implementing Decision 2014/132/EU.
- 9 A new review of the performance and charging scheme was undertaken during RP2 in preparation for RP3 (2020 – 2024). As a result, Commission Regulation (EU) 2019/317 was adopted on the 11 February 2019, which repealed Implementing Regulations (EU) No 390/2013 and (EU) No 391/2013. The new performance and charging scheme's safety KPA was streamlined based on an EASA report authored by a working group of experts who aimed to reduce the safety reporting burden while maintaining effective safety performance monitoring. In addition, EASA produced Acceptable Means of Compliance (AMC) and Guidance Material (GM) as supporting material for the implementation and measurement of the SKPIs.³
- 10 Commission Regulation (EU) 2019/317 promulgated a single SKPI for RP3, namely the Effectiveness of Safety Management (EoS_M), which applies to air navigation service providers (ANSPs). EoS_M was developed based on the CANSO Standard of Excellence tool, which is based on the SMS framework of the International Civil Aviation Organisation (ICAO). RP3 targets on the EoS_M are provided

¹ Commission Implementing Regulation (EU) 2019/317 laying down a performance and charging scheme in the Single European Sky.

² Commission Regulation laying down a performance scheme for air navigation services and network functions and amending Regulation (EC) No 2096/2005 laying down common requirements for the provision of air navigation services.

³ EASA RP3 Safety Supporting materials (Parts A, B, C): https://webgate.ec.europa.eu/eusinglesky/sites/default/files/rp3_safety_-_supporting_material_part_b_skpi_spi_final.pdf.

in Commission Implementing Decision 2021/891/EU and remain unchanged from the targets defined before the pandemic in Commission Implementing Decision 2019/903/EU.

1.3 Overview of safety KPIs and associated targets for RP3

11 One SKPI, which is used to set targets for ANSPs, has been defined for RP3 by Regulation (EU) 2019/317:

- SKPI: the **Effectiveness of Safety Management (EoSM)** for ANSPs. It was adapted to meet the needs of the performance and charging scheme and to reflect modern safety management approaches. The EoSM is measured by assessing questionnaires that Member States complete and submit to their NSA for verification.⁴

12 The performance and charging scheme introduced five additional safety performance indicators (SPIs), which are for monitoring purposes only i.e. do not have associated targets that ANSPs must achieve. These are as follows:

- SPI1a: **rate of runway incursions (RIs) with a safety impact at Member State level.** SPI1a captures the total number of RIs with a safety impact that occurred at regulated airports in a Member State divided by the total number of IFR and VFR airport movements. It includes all RIs that have been reported under Commission Regulation (EU) No 376/2014 irrespective of the main contributor of the occurrence i.e. individuals, air operators, aerodromes, or ANSPs. As such, this indicator is aggregated at Member State and Union-wide levels.
- SPI1b: **rate of separation minima infringements (SMIs) at Member State level.** SPI1b captures the total number of separation minima infringements with a safety impact that occurred within the airspace of all air traffic service units in a Member State. It is calculated as the total number of SMIs with a safety impact that occurred in a Member State's airspace divided by the total number

of controlled IFR flight hours within the respective airspace. It includes all SMIs that were reported under Commission Regulation (EU) No 376/2014 irrespective of the main contributor of the occurrence i.e. airspace users, or ANSPs. As such, this indicator is aggregated at Member State and Union-wide levels.

- SPI1c: **rate runway incursions (RIs) with ATS/CNS contribution at local (airport) level.** SPI1c is calculated as the total number of RIs with a safety impact that have any contribution from air traffic or CNS services at a specific airport divided by the total number of IFR and VFR movements at that airport.⁵ It includes only a subset of RIs that have been reported under Commission Regulation (EU) No 376/2014 i.e. only those RIs which an ANSP was identified as having a direct or indirect contribution in causing. This indicator aims to capture trends in RIs that are under the influence of the ATC provider at the airport concerned and thus is aggregated at the airport level only.
- SPI1d: **rate of separation minima infringements (SMIs) with ATS/CNS contribution at ANSP level.** SPI1d is calculated as the total number of SMIs with a safety impact that have any contribution from air traffic or communications, navigation and surveillance (CNS) services divided by the total number of controlled IFR flight hours within the air navigation service provider's controlled airspace. It includes only a subset of SMIs that have been reported under Commission Regulation (EU) No 376/2014 i.e. only those SMIs, which an ANSP was identified as having a direct or indirect contribution to causing. This indicator captures all SMIs that occurred in the airspace where an ANSP provides its ATC services and thus is aggregated at the ANSP level.
- SPI2: **Application by the ANSPs of automated safety data recording systems.** SPI2 captures whether or not ANSPs use automated safety data recording tools to improve the gathering of occurrence data (SMI and RIs) and analysis by the organisations' SMS.

⁴ https://webgate.ec.europa.eu/eusinglesky/sites/default/files/rp3_safety_-_supporting_material_part_c_skpi_spi_final.pdf.

⁵ Occurrences with safety impact should be understood as those occurrences that may represent a risk to aviation. The way to identify these type of occurrences is using the safety risk grade red or amber in the European Risk Classification Scheme (ERCS) matrix when applied to SMIs and RIs, and the ground severity classification A, B, or C after applying the risk analysis tool (RAT) to SMIs and RIs with ATS/CNS contribution.

- 13 An overview of all SKPIs and SPIs used in RP3 are presented in Table 1– A list of the safety KPIs and PIs applicable in RP3.
- 14 Table 2 shows the Union-wide targets for the EoSM SKPI as defined in Implementing Decision 2021/891/EU⁶.

SKPI and SPIs	Target level
Effectiveness of Safety Management (EoSM) for ANSPs	Union-wide and local
Rate of runway incursions (RIs) with a safety impact at State level	None
Rate of separation minima infringements (SMIs) at State level	None
Rate runway incursions (RIs) with ATS/CNS contribution at local (airport) level.	None
Rate of separation minima incursions (SMIs) with ATS/CNS contribution occurred under control of an ANSP	None
Application by the ANSPs of automated safety data recording systems where available, which shall include, as a minimum monitoring of SMIs and RIs.	None

Table 1– A list of the safety KPIs and PIs applicable in RP3.

Effectiveness of Safety Management (EoSM)		2020	2021	2022	2023	2024
ANSP level	Union-wide target for Safety Risk Management Objective					D
	Union-wide target for all other MOs ⁷					C

Table 2– RP3 target for Effectiveness of Safety Management (EoSM). The target is set for the last year of RP3 only.

⁶ Commission Implementing Decision of 2 June 2021 setting revised Union-wide performance targets for the air traffic management network for the third reference period (2020-2024) and repealing Implementing Decision (EU) 2019/903 (2021/891/EU).

⁷ EoSM contains five management objectives or objectives: safety policy and objectives, safety risk management, safety assurance, safety promotion and safety culture. Safety risk management is targeted separately while the other four management objectives are targeted as a group.

1.4 Safety performance review

- 15 The safety performance review is based on data submitted by Member States. Through their national supervisory authorities (NSAs), ANSPs submit Performance Monitoring Reports (PMRs) to the European Commission (EC) by 1st June of each year. This enables EASA and the PRB to monitor Member States' safety performance against their performance plans and targets. ANSPs are also required to complete and submit EoSM questionnaires annually to their NSAs for verification. This is done before the NSAs submit their PMRs and it provides the European Commission with EoSM data.
- 16 In order to facilitate the monitoring task of Member States, the Performance Review Unit (PRU) and EASA provided them with a template that asked for all the data needed to enable a comprehensive safety performance review.
- 17 These templates, together with the PMRs, were assessed by the PRB, PRU, and EASA resulting in the preparation of this annex.
- 19 For the calculation of the indicators related to SMIs and RIs (SPI1a, SPI1b, SPI1c, and SPI1d), RP3 safety supporting material requires that occurrences data reported in the ECR under Commission Regulation (EU) No 376/2014 is used. ANSPs and NSAs should ensure that the information provided through the ECR reporting contains the information needed to compute the performance indicators for monitoring SMIs and RIs. EASA extracts the information needed to calculate the SPIs which are then sent to Member States for verification and elaboration in their PMRs.
- 20 However, this year EASA could not extract data from the ECR in due time and therefore the SPI data was not sent to Member States for verification. Member States had to extract the occurrences from their own national databases with no further involvement from EASA. For future monitoring years, it will be necessary to take the appropriate measures to follow the foreseen process in order to ensure coherent data reporting among ANSPs/Member States.

Data Sources to Populate Performance Indicators

- 18 Two main data sources were used to gather safety data concerning the EoSM SKPI. These two sources are:
- Questionnaires that were completed by ANSPs and the Network Manager (NM) concerning their EoSM. Member States submitted the completed questionnaires at the ANSP level. EASA did not verify ANSP responses to the questionnaires as this was the responsibility of NSAs who have oversight authority. The NSA verification process relied on cross-referencing evidence that is reported with the results of ANSPs' oversight activities. However, EASA did verify the NM's responses as oversight authority;
 - Submitted PMRs were used to gather information related to SPI1a, SPI1b, SPI1c, SPI1d, and SPI2. This data was taken directly from what Member States reported in their PMRs without further verification against the occurrences reported in the European Central Repository (ECR).
- 21 For the calculation of the indicators related to SMIs and RIs (SPI1a, SPI1b, SPI1c, and SPI1d), the occurrences that should be used in the computation of the different rates are only those that have a "safety impact". Whether an occurrence has a safety impact or not should be determined by NSAs using the common European Risk Classification Scheme (ERCS), and by ANSPs using the severity classification using the Risk Analysis Tool (RAT).⁸
- 22 However, the delegated act that regulates the application of ERCS has not been adopted yet so the application of it is voluntary at this stage (it is foreseen that the delegated act will be adopted during 2021 and the use of ERCS be mandated from 2022). ANSPs' use of the RAT was close to 100% at the end of RP2, but its use is not mandated in RP3. Because EASA has not been able to verify the data submitted, this report relies on the correct application of the ERCS and RAT by NSAs and ANSPs, respectively, in order to report the SMIs and RIs that had a safety effect.

⁸ See EASA RP3 Safety supporting materials Part B (https://webgate.ec.europa.eu/eusinglesky/sites/default/files/rp3_safety_-_supporting_material_part_b_skpi_spi_final.pdf).

- 23 It is likely that some are not applying the ERCS and RAT resulting in greater subjectivity in ANSP and NSA interpretations of what constitutes an occurrence that had a safety impact. Nevertheless, this does not invalidate the analysis, but it should be taken into consideration when interpreting the data. At least one Member State (Sweden) declared that it was not able to identify occurrences that had a safety effect.

Exposure Data

- 24 The indicators for monitoring the SPIs related to occurrences are normalised using the following exposure data:
- RIs are normalised by the number of IFR and VFR movements at an airport. It is calculated as the sum of take-offs and landings performed under IFR and VFR rules at an airport. NSAs included these figures in their PMRs.
 - SMIs are normalised by the number of controlled flight hours in the controlled airspace of an ANSP. It is measured as hours of flight under IFR rules that are under the separation control of ANSPs. The Network Manager is best placed to consistently report this for European ANSPs. Since some ANSPs provide cross-border services, the measure of flight hours is based on two different measurements depending on the indicator. The indicator in paragraph (b) of Section 1 of Commission Implementing Regulation (EU) No 2019/317 is calculated using flight hours within the Member States' boundaries, while the indicator in paragraph (d) of Section 1 of

the same regulation is calculated using flight hours controlled by a given ANSP.

1.5 Verification Process of Effectiveness of Safety Management

- 25 The EoS indicator is measured by the verified responses to questionnaires completed by ANSPs, which results in a double metric: a numerical score and a maturity level.⁹ Each question is scored between 0 and 100 (100 being the best) and the maturity level is measured between level A and D (D being the best). Table 3 provides a brief description of the requirements to reach each maturity level. ANSPs select the maturity level that best describes their organisation and provide evidence along with a justification in support of the level selected.
- 26 NSAs verify the evidence submitted and cross-check it with the results of their oversight processes. If necessary, the level of maturity and score is corrected based on the oversight activities. The resulting maturity levels and score are submitted to EASA and to the Commission in the PMRs.
- 27 The scoring and levels should be determined in accordance with the supporting material published in the ESSKY web portal (EASA RP3 safety supporting materials Parts A¹⁰, B¹¹, C¹²).

Level A - Informal Arrangements	Level B - Defined	Level C - Managed	Level D - Assured
SMS processes and/or requirements have not been agreed at the organisation level; they are either not routinely undertaken or depend on the individual assigned to the task.	SMS processes and/or requirements are defined but not yet fully implemented, documented or consistently applied.	SMS processes and/or requirements are fully documented and consistently applied.	Evidence is available to provide confidence that SMS processes and/or requirements are being applied appropriately and are delivering positive, measurable results.

Table 3 - Generic principles for each implementation level

⁹ The content of these questionnaires is provided in Appendix 1 to AMC2 SKPI and Appendix 1 to AMC3 SKPI of ED Decision 2014/035/R.

¹⁰ https://webgate.ec.europa.eu/eusinglesky/sites/default/files/rp3_safety_-_supporting_material_part_a_skpi_spi_final.pdf

¹¹ https://webgate.ec.europa.eu/eusinglesky/sites/default/files/rp3_safety_-_supporting_material_part_b_skpi_spi_final.pdf

¹² https://webgate.ec.europa.eu/eusinglesky/sites/default/files/rp3_safety_-_supporting_material_part_c_skpi_spi_final.pdf

1.6 COVID-19

- 28 The COVID-19 pandemic had profound effects on the aviation sector. Not only did it prompt travel restrictions and the subsequent fall in air travel demand, which severely impacted the revenues of airlines, ANSPs, and airports, but it also introduced other changes in the aviation system such as new hygiene and safety standards, boosted digitalisation, and possibly passenger behaviour.
- 29 IFR movements in 2020 dropped to around 47% of 2019 traffic levels in Europe. In total, 4.5 million flights operated in 2020 compared with 10.8 million in 2019. Moreover, load factors dropped to around 50% of capacity. This traffic decrease led to less congested aerodromes and airspace, which benefitted safety performance in terms of reducing the number of accidents, serious incidents, and occurrences.
- 30 However, the pandemic negatively impacted other aspects of airline, ANSPs, and airport operations with potential safety consequences i.e. severely impacting resources, both economic and human, dedicated to safe operations. For example, lack of practice of pilots and controllers due to fewer flights could have safety implications.
- 31 This annex does not intend to scrutinise the effects of these factors but seeks to highlight the main effects that may have impacted the safety performance of ANSPs in 2020.

2 SAFETY PERFORMANCE ANALYSIS

- Rate of accidents and serious incidents remained at the same level as in 2019.
- 13 ANSPs achieved the EoS targets on all management objectives for RP3 in 2020.
- Only nine ANSPs reported using some form of automated safety data recording systems for occurrences.

2.1 ANS-Related Accidents and Serious Incidents

32 This section presents a review of ANS-related accidents and serious incidents, as defined by ICAO Annex 13, covering the period from 2011 to 2020. The scope of the review includes commercial air transport (CAT) fixed-wing aeroplanes above 2,250 kg maximum take-off mass and covers the 27 EU Member States, Norway, and Switzerland. The data uses information from EASA's Occurrence Database.¹³

33 This analysis is not required since it is not one of the SKPI or SPIs in Commission Implementing Regulation (EU) No 2019/317, but it brings added value to the performance review of safety as it provides an overview of the ANS related accidents and serious incidents at Union-wide level.¹⁴

34 'ANS-related' means that the ANS system may not have had a contribution to a given occurrence, but it may have a role in preventing similar occurrences in the future. 'ANS contribution' means that at least one ANS factor was in the causal chain of events leading to an occurrence, or at least one ANS factor potentially increased the level of risk, or it played a role in the occurrence encountered by the aircraft.

35 Figure 1 (next page) shows the number of accidents and serious incidents per year that are related to the provision of ANS, alongside a rate of accidents and serious incidents calculated using the number of flight hours performed within the SES area. In the ten-year period analysed, most of

the ANS-related accidents reported were non-fatal (57 out of 59). The last fatal accident was in 2012 when two accidents were reported.

36 The data shows the rate of accidents and serious incidents reached a minimum in 2017 with fluctuations around a plateau in recent years. The absolute number of accidents has remained low for the entire period, with a maximum of 11 in 2014 and a minimum of one in 2017. In 2020, three ATM-related accidents were recorded (all without fatalities). These accidents were related to turbulence and lightning strike encounters. This observation is also reflected in other reporting of aviation system safety such as the European CAT accident rate.¹⁵

¹³ The EASA's occurrence database collects accidents and serious incidents reported to EASA by Accident Investigation Authorities worldwide and is augmented by other information collected by EASA. It captures the following: accidents & serious incidents within EASA Member States (all mass categories); accidents to aircraft with MTOM > 2250kg (worldwide); serious incidents to aircraft with MTOM > 5700kg (worldwide).

¹⁴ Note that the final investigation reports for some accidents and incidents may be delayed more than two years, particularly when the investigation is complex. This may have an impact on the update of some graphics in future publications, or with respect some graphics of past publications.

¹⁵ <https://www.easa.europa.eu/document-library/general-publications/annual-safety-review-2020>.

- 37 Figure 2 shows the number of accidents and serious incidents with a contribution by ANS per year alongside a rate of accidents and serious incidents calculated using the number of flight hours performed within the EU. The rate of accidents and incidents is a more appropriate metric to directly measure the performance of the ANS safety system, and it shows a great safety record. The data shows a decreasing trend in the rate of accidents and serious incidents since 2011 with a plateau reached in the last four years. The accidents and serious incidents reflected in Figure 2 were all non-fatal.
- 38 In 2020, the controlled flight hours reduced dramatically due to the COVID-19 pandemic. However, and despite the low number of accidents and serious incidents, the rate remained approximately constant. Three serious incidents were registered in 2020 related to occurrences around the runway at airports: two runway incursions and

an encounter with cones placed at the intersection between runways.

- 39 This suggests that, overall, safety issues with ANS contribution have improved since the beginning of the performance and charging regulation, even though there is no evidence of a causal effect. This observation should be taken cautiously due to the low number of events considered. It could be concluded that ANSPs are acceptably managing the safety risks that directly relate to the services provided.

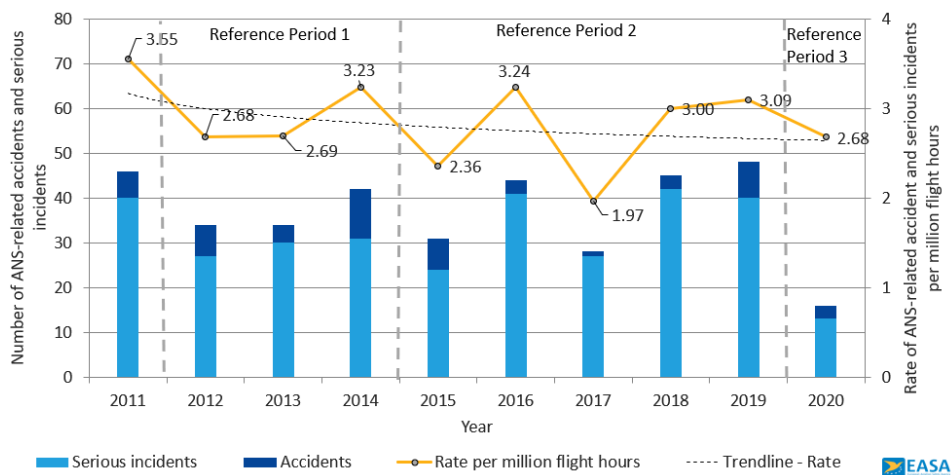


Figure 1 - ANS-related accidents and serious incidents (2011-2020).

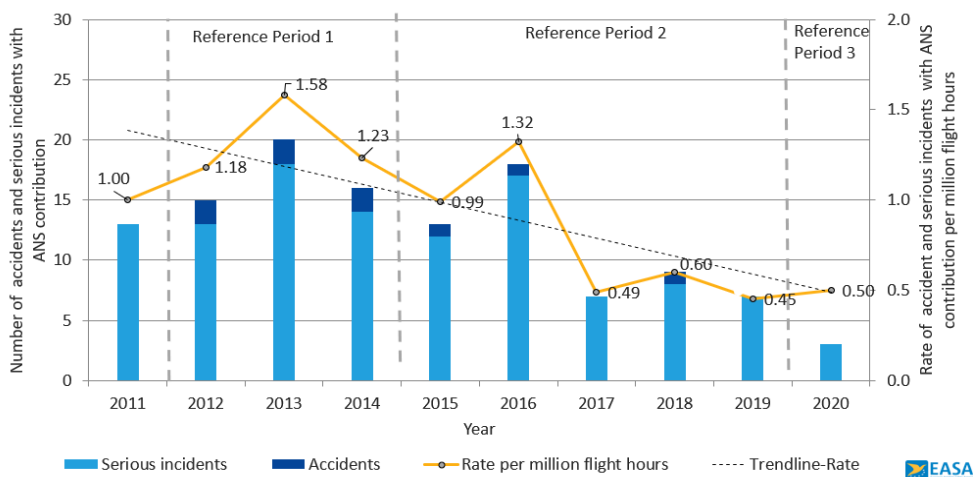


Figure 2 - ANS contribution accidents and serious incidents (2011-2020).

40 Figure 3 shows that the proportion of occurrences with ANS contribution is lower within ANS-related accidents than within ANS-related serious incidents considering all data since the introduction of the performance scheme. This indicates that ANSs has a lower contribution to the highest severity type of occurrences, i.e. accidents.

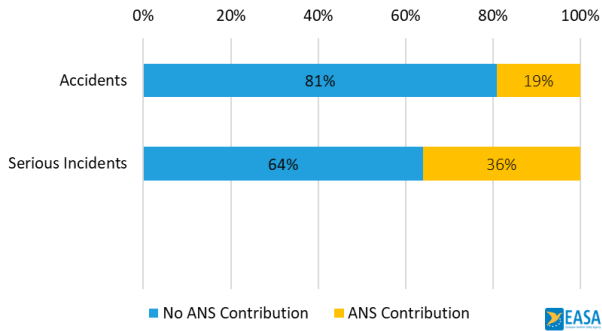


Figure 3 - Proportion of ANS contribution in accidents and serious incidents (2012-2020) Source: EASA.

2.2 Effectiveness of Safety Management for ANSPs

- 41 This section describes the review of 2020 safety performance as measured by the EoSM SKPI for ANSPs.
- 42 33 ANSPs are included in the scope of the performance scheme in RP3 including the Maastrich Upper Area Control Centre (MUAC) over the airspace of Belgium, Luxembourg, the Netherlands, and Germany. In addition to the main en-route ANSPs, there are three ANS providers at terminal airports included, namely FERRONATS in Spain and Port Lotniczy Bydgoszcz and Warmia i Mazury Ltd in Poland.¹⁶
- 43 Figure 4 shows the EoSM results achieved by ANSPs in 2020. The analysis of the achieved performance by ANSPs shows that:

- 15 out of 33 ANSPs achieved the 2024 RP3 target level D for safety risk management.
- 23 out of 33 ANSPs achieved the 2024 RP3 target level for all other MOs (the four management objectives other than safety risk management).
- 13 out of 33 ANSPs achieved the 2024 EoSM targets on all MOs for RP3.
- The average EoSM score achieved by all ANSPs is 88. The minimum score achieved by an

individual ANSPs is 64, while the maximum EoSM score is 100.

- 44 A number of ANSPs reported achieving level D for the safety risk management objective, however EASA standardisation visits showed that not all claims are supported by the evidence. EASA reported that several ANSPs had difficulties in properly implementing the new change management process in Commission Regulation (EU) 2017/373, which also embeds a risk assessment process.

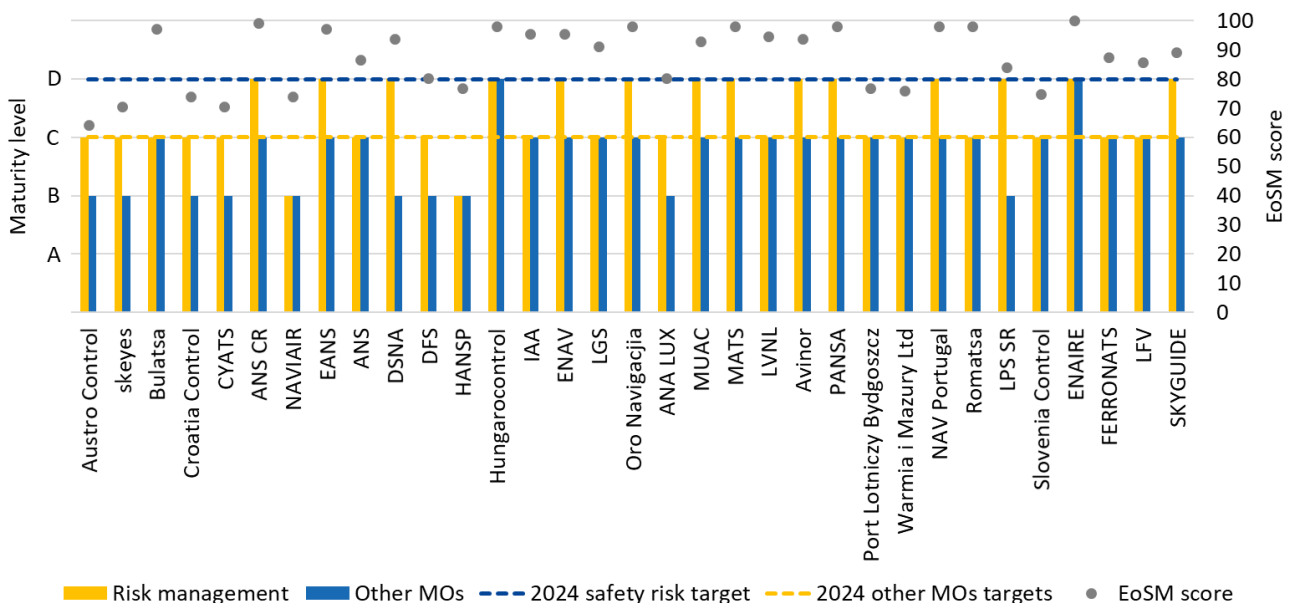


Figure 4 – 2020 ANSP EoSM responses for risk management and other MOs. Safety risk management has a target of level D in 2024 and the other management objectives (MOs) have a target level C in 2024.

¹⁶ At the time of drafting this report, MT had not submitted its Performance Monitoring Report in June, but it had submitted the EoSM evaluation of MATS before.

45 Figure 5 shows ANSPs' aggregated responses to the EoS M questionnaire per management objective. It reveals that safety risk management must improve the most to achieve the 2024 target level D (improvement in 41 questions needed). For the other management objectives, safety policy & objectives is in need of most improvement to achieve the 2024 target level C (improvement in 16 questions needed).

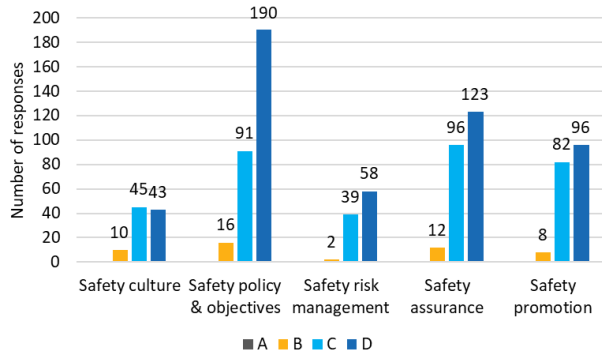


Figure 5 – ANSP's aggregated EoS M responses per management objective. The target response for risk management is level D while it is level C for the other management objectives.

46 Figure 6 shows the maturity levels achieved by the ANSPs in each management objective. 18 ANSPs did not reach the target level D for the safety risk management objective, eight ANSPs did not reach the safety culture and safety policy & objectives management objectives, seven ANSPs did not achieve the assurance management objective, and six ANSPs did not achieve the promotion management objective.

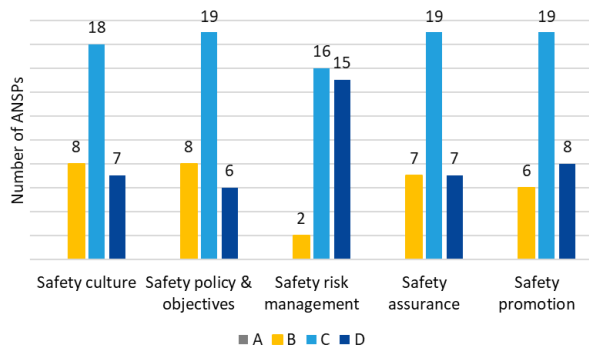


Figure 7 – Number of ANSPs achieving various EoS M levels per objective. The target response for risk management is level D while it is level C for the other management objectives.

47 The EoS M questionnaire was supplemented with a new management objective that aimed to capture how ANSPs manage interdependencies and trade-offs between safety and other business objectives i.e. how the organisation assigns and distributes resources to ensure safe provision of ATS.

This objective is not targeted in RP3 and not included in the EoS M scoring. Figure 7 shows that the majority of ANSPs are at maturity level C for this supplemental management objective. There is room for improvement since four ANSPs are at level B. This is particularly important during and after the pandemic when the pressures to trade off resources towards other business objectives of the organisation are intensified due to loss of traffic and revenues.

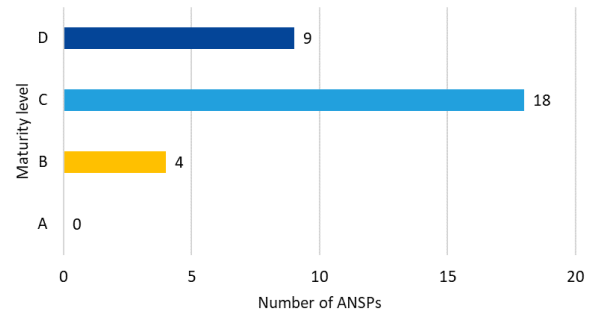


Figure 6 - Number of ANSPs per achieved maturity level in the management of interdependencies management objective.

48 2020 was the first year that the EoS M for ANSPs was measured using a revised set of questions to determine the minimum level of maturity for each management objective. Furthermore, the levels of maturity were rescaled for RP3. In RP2, they ranged between level A and E whereas the levels now range between A and D (with level D being the best performance). This means that level D in 2019 and level D in 2020 are not equivalent, i.e. level D in 2020 required a higher level of rigour and increased responsibilities under the change management process as contained in Regulation (EU) 2017/373.

49 The effect of rescaling the EoS M levels is shown in Table 4. Experience with CANSO's Standard of Excellence showed that Member States that achieved level E in 2019 were anticipated to achieve level D in 2020 and Member States achieving level D in 2019 were anticipated to achieve level C in 2020 and so on for each level.

50 Therefore, all management objectives other than safety risk management showed more instances of ANSPs achieving maturity level B than anticipated.

51 On the other hand, a greater number of ANSPs than anticipated achieved maturity level D, which shows that performance varied across ANSPs.

- 52 Some ANSPs that achieved level D in safety risk management during RP2 (and were therefore anticipated to achieve level C in the first year of RP3) are still achieving level D. These claims are made despite a higher level of rigour required and the increased responsibilities under the change management process as contained in Commission Regulation (EU) 2017/373, and during the many difficulties encountered during the COVID-19 pandemic. Over the remainder of RP3, maturity levels will be cross-checked against EASA standardisation data to ensure verification of ANSPs' responses is completed properly.
- 53 For the safety risk management objective, the achieved levels were better than ANSPs planned to achieve in their draft 2019 performance plans. Six ANSPs planned to achieve the safety risk management target in 2020, but 15 ANSPs ended up achieving the targets. The reason why nine ANSPs
- achieved the target and did not plan to is difficult to explain, but they may have been conservative in their plans or the NSA may have applied less rigor in verifying ANSPs responses.
- 54 Over the course of the remainder of RP3, as the result of cumulative standardisation data, it will become obvious which Member States are performing a less rigorous verification of ANSP responses. This intelligence will aid in the assessment of target achievements per ANSP.

EoS M levels achieved by ANSPs by safety management objective in 2020 vs. 2019					
Safety Management Objective	Year	EoS M Level B	EoS M Level C	EoS M Level D	EoS M Level E
Safety Culture	2019	0	5	22	4
	2020	8	16	7	n/a
Safety Policy and Objectives	2019	0	2	27	2
	2020	8	17	6	n/a
Safety Risk Management	2019	0	2	21	8
	2020	2	14	15	n/a
Safety Assurance	2019	0	2	28	1
	2020	7	17	7	n/a
Safety Promotion	2019	0	1	28	2
	2020	6	17	8	n/a

Table 4 - Number of ANSPs achieving various EoS M levels in 2020 vs. 2019 (source: PRB elaboration), showing the effect of removing EoS M level E during RP3. The green cells reflect the number of ANSPs that achieved the Union-wide RP3 safety targets in 2020 (level C or D for safety culture, policy and objectives, assurance, and promotion, and level D for safety risk management). This table covers 31 ANSPs that include the main en route ANSP for each of the 28 Member States and MUAC, Ferronats, and ANA LUX as only 31 ANSPs were monitored in 2019 i.e. this enables a like-for-like comparison.

2.3 Safety Performance Indicators

55 This section describes the 2020 safety performance as measured by the safety performance indicators (SPIs) as defined in section 1.3.

2.3.1 Rates of separation minima infringement and runway incursion occurrences

56 As described in section 1.3, four SPIs are used to capture the rates of separation minima infringements and runway incursions per number of flights hours controlled by area control centres (ACCs) and airport movements respectively at regulated airports. The most informative information that can be derived from these SPIs is the evolution of the metrics across several years. However, since 2020 was the first year of RP3, a like for like comparison with respect to previous years is not ideal since the occurrences captured by the SPIs in RP2 were different. In RP2, the number of occurrences monitored included all types of occurrences regardless of the level of associated risk and severity. In RP3, only SMIs and RIs with a safety impact are monitored. In addition, two of the SPIs aim to capture occurrences that have an ATS/CNS contribution.

57 Furthermore, benchmarking of rates between ANSPs and Member States is not possible since there are additional factors that may influence the results that are unrelated to ANSPs i.e. differences in the reporting culture, differences in interpretation of occurrence definitions, use of different tools, or interpretation of results. The identification of occurrences that have ATM/CNS contribution is not a straightforward exercise and is subject to interpretations and subjective judgement that can differ from one ANSP and NSA to another. The limitations described in section 1.4 must be taken into consideration.

Union-level view

58 Table 5 lists the average number of SMIs per 100,000 controlled flight hours in Union-wide airspace and also the average Union-wide number of RIs per 100,000 airport movements. The absolute numbers of each type of occurrences are also provided.

Occurrence	Union-wide Rate ¹⁷	Number of Occurrences
SPI1b: SMI	8.7	520
SPI1a: RI	6.9	533

Table 5— Union-wide rates of all SMIs and RIs.

59 For SPI1c and SPI1d (the rates of occurrences that only consider occurrences with ANS/CNS contribution), the rates are reduced to 5.1 and 1.8 for SMIs and RIs respectively. This indicates that ANS and CNS services contributed to fewer RIs than SMIs. In other words, ANSPs have greater influence and managerial control of ensuring separation between aircraft in the airspace than in preventing the incursionary presence of an aircraft, vehicle, or person on the runway of an airport.

Local-level view

60 Figure 8 (next page) illustrates the rates of RIs with safety impacts that occurred at the airports included in the performance and charging scheme (grouped by Member State). The rate is reported as the number of occurrences per 100,000 airport movements. The highest rate occurred in Sweden (35.5), although Sweden declared it was not able to discriminate occurrences that had a safety impact and therefore reported all types of RIs regardless of the associated safety risk. This means that the number of RIs is higher and so the rate is not comparable to other Member States. On the contrary, five Member States (Cyprus, Hungary, Latvia, Portugal, and Romania) reported no RIs at their airports.

61 Some Member States are not shown in Figure 8 for different reasons. Slovenia and Slovakia did not include any airport in their performance plans and so are not obliged to report RIs. Bulgaria and Croatia did not report data even though it has declared airports in their performance plans, and Malta did not submit its monitoring report at the time of writing this report.

62 It is worth noting that six Member States (France, Italy, Greece, Norway, Spain, and Sweden) reported the RIs at all airports within their territory, not exclusively those included in their performance plans, which may explain why four of these

¹⁷ Number of occurrences of certain type per 100.000 exposure unit, i.e. airport movement in the case of RIs rates or IFR controlled hours in case of SMIs rates.

Member States show the highest rates in the graph.

63 Figure 9 illustrates the rates of SMIs with safety impacts that occurred within the airspace included under the responsibility of each Member State. The rate is reported as the number of occurrences per 100,000 controlled flight hours. The highest rate occurred in the Netherlands (27.06), although it includes all infringements in MUAC due to unavailability of MUAC data split across the four Member States responsible for the airspace. On the opposite side, three Member States (Portugal, Slovenia, and Slovakia) reported no SMIs within their airspace.

64 Only Malta is not represented in the graph, as it did not submit its PMR at the time of writing this report.

65 Sweden declared it was not able to discriminate occurrences with safety impacts and thus reported all types of SMIs regardless of the associated safety risk. This means that the number of SMIs is higher and not comparable to other Member States.

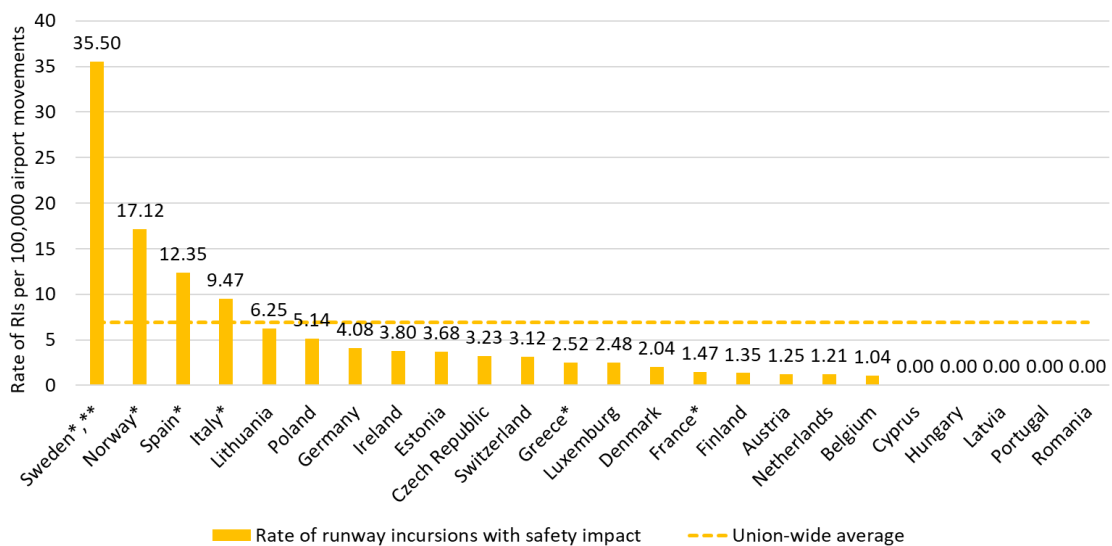


Figure 8 - Rates of runway Incursions with safety impact by State Source: EASA. *Member States reported RIs at all airports (not limited to airports in their performance plans). **Member States reported all RIs (not limited to those with safety effects).

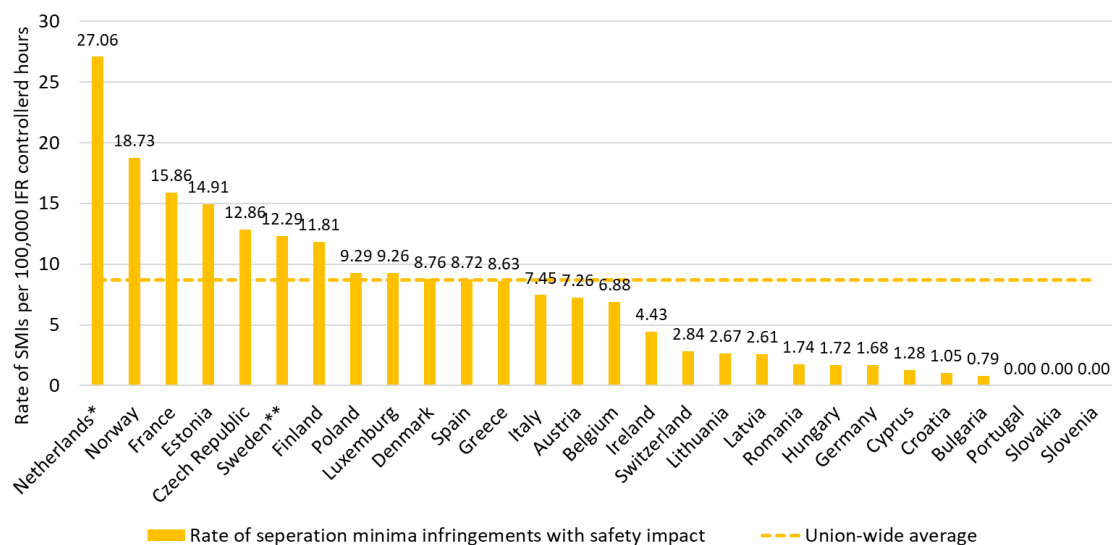


Figure 9 - Rates of separation minima infringements with safety impact by State. Source: EASA. *Member States reported that all SMIs in MUAC have been assigned to NL (due to unavailability of MUAC data split over the four States). **Member States reported all SMIs (not limited to those with safety effects).

- 68 Figure 11 shows the rates of SMIs and absolute number of SMIs which had an ATS/CNS contribution to the occurrence. Only 20 ANSPs reported SMIs which had an ATS/CNS contribution.
- 69 Note the highest rate of SMIs was in LVNL airspace (37.4 SMIs per 100,000 flight hours), which results from the second highest absolute numbers of occurrences (31 SMIs) and fewer flight controlled hours than DSNA. LVNL has a good record in the EoSM questionnaire having achieved the 2024 safety target in all objectives other than in the safety risk management objective, which is at level C. Nevertheless, LVNL should consider looking into the reasons contributing to this rate and take appropriate mitigating actions, if necessary.

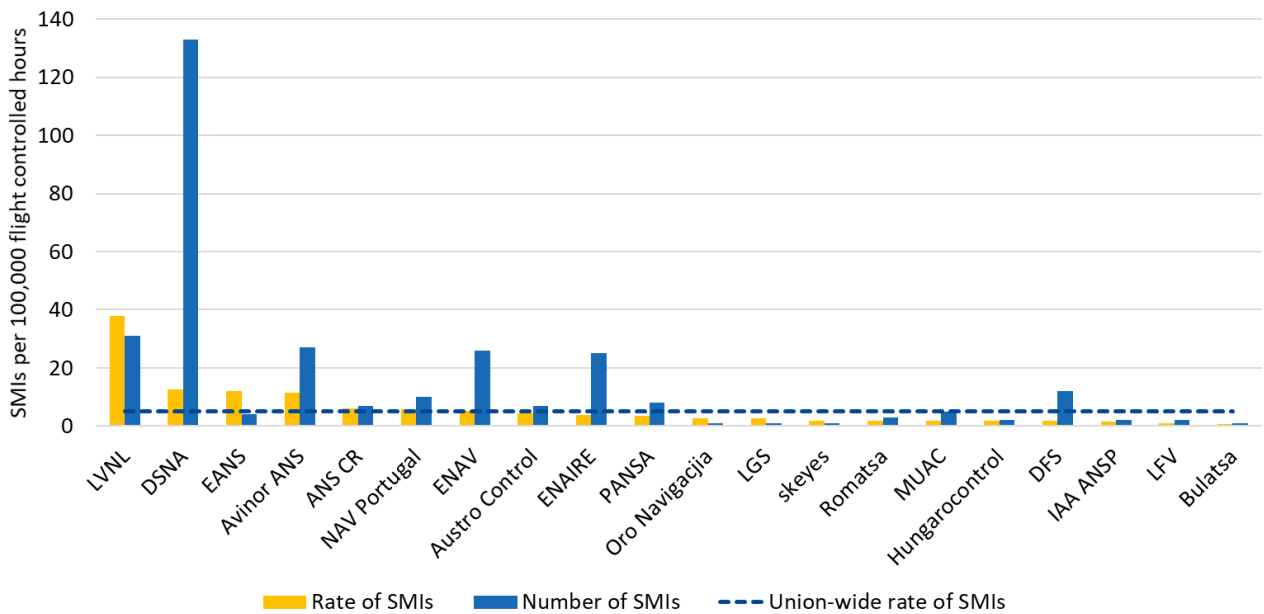


Figure 11 - Rate of separation minima infringements with ATS/CNS contribution by ANSP.

2.3.2 Automated Safety Data Recording Systems

- 70 This SPI captures the use of automated safety data recording systems for detecting, recording, analysing, or reporting SMIs and RIs by ANSPs.
- 71 Nine ANSPs reported the use of some type of automated safety data recording systems in 2020, which is fewer than the number of ANSPs that reported doing so in 2019. The reason is that the U.K. is no longer part of the monitoring (NATS uses this type of tool), and Ireland reported that its ANSP is testing such a system but implementation has not been reported yet.
- 72 All nine of these ANSPs use automated safety data recording systems to detect SMIs. Three out of these nine (ANS CR, BULATSA, and ENAIRE) collect information on RIs too. Note that ENAIRE uses a tool to detect RIs in Málaga and ANS CR does the same at three airports (Ruzyně, Mošnov, and Tuřany). Only two ANSPs use automated safety data recording systems for both SMI and RIs.
- 73 In some cases, the automated safety data recording tool used is the ASMT tool developed by Eurocontrol. Three ANSPs reported using in-house developed tools.
- 74 Among the Member States that provided a definition of the events that trigger the automatic detection of events for further analysis, it is observed that the parameters used were not harmonised. This is not surprising as the use of the tool and the associated processes differ among ANSPs.
- 75 For example, four ANSPs (Croatia Control, Hungarocontrol, DSNA, and MUAC) use a vertical separation of 800 feet to trigger SMI events and a horizontal parameter slightly below the standard separation. One ANSP (ANS CR) reported different triggering parameters for the ACC and aerodrome control (TWR). Another ANSP (ENAIRE) triggers the detection of SMIs when the separation is 50% of the standard separation provided in its controlled airspace, both horizontally and vertically, and only for FL above FL100. It is apparent that the event definition seems to serve a different purpose for each ANSP. For example, the use of triggering parameters much lower than the standard separation aims at reducing the number of occurrences recorded that would otherwise be discarded as they are not genuine occurrences. On the contrary, the use of parameters close to the separation standards aims at capturing as many occurrences as possible and may capture many non-genuine events.
- 76 Having reviewed the information provided by the Member States, it can be concluded that the use of automated safety data reporting tools is not widely implemented among ANSPs. The implementation of these tools remains as in RP2, assuming that the lower number of reported use is a mistake in the reporting information.
- 77 The limited implementation does not include a harmonised definition of the events that trigger the capture of occurrences as it may serve different purposes in each ANSP. In addition, even when these tools are implemented, in most cases their use seems to be dedicated to operational analysis (e.g. identification of hotspots) and not to complement occurrence reporting.

3 NETWORK MANAGER

- The NM over delivery indicator decreased significantly in 2020 compared to 2019.
- The NM should use the new EoSM questionnaire in 2021.

- 78 In accordance with Commission Regulation (EU) 2019/317, the Network Manager must draw up a Network Performance Plan (NPP) containing performance targets for the NM functions covering all key performance areas, consistent with the Union-wide performance targets.
- 79 The NPP for RP3 was initially submitted on 30th September 2019 following its endorsement by the Network Management Board (NMB). Following PRB comments and also taking into account the different economic and operating context due to the COVID-19 pandemic, a new version was elaborated and submitted for endorsement to the NMB and later approval by the Commission.
- 80 The safety key performance indicators included in the draft NPP are presented in the Table 6 and Table 7.
- 81 These indicators are assessed in terms of the functions and tasks of the Network Manager, however, the distinction between NM activities and other Eurocontrol activities is not always evident, which complicates the evaluation of the degree of accomplishment for some of the targets and objectives of the NM. This is specifically the case for the activities in the area of safety management, where activities to support operational stakeholders achieve safety performance targets are performed by the NM and the Network Management Directorate/other Eurocontrol units.
- 82 The safety performance monitoring reported here is based on the NM Annual Report 2020 which was approved by the NMB in May 2021 and feedback received from EASA as oversight authority of NM.

Key Performance Indicators	NM Target
EoSM The minimum level of the effectiveness of safety management	Improving its own management system to reach at least level C in the safety management objectives (MOs) 'safety culture', 'safety policy and objectives', 'safety assurance', and 'safety promotion' and level D in the safety management objective 'safety risk management' for its own Safety Management System in line with the RP3 EU-wide targets

Table 6 – NM KPIs in NPP 2020-2024.

NM Performance Indicators		NM Internal Objective
Over-deliveries	The ATFM over-deliveries (OVD) above the capacity limits of a sector declared by the air navigation service provider where ATFM regulations are imposed	Reduction of over-deliveries
Top risks	Top 5 Operational safety risks and priorities	Identification of Network operational safety risks (including for its own operations)

Table 7 – NM PIs in NPP 2020-2024.

3.1 Effectiveness of Safety Management – Network Manager

- 83 The NM should apply the questionnaire for the measurement of the EoS as it is defined for ATS providers with an appropriate adaptation of the questionnaire where necessary in coordination with EASA.
- 84 The NM did not conduct an evaluation of their EoS using the new RP3 EoS questionnaire in 2020. EASA indicated that the NM is not yet ready to perform its own self-assessment according to the new EoS questionnaire and that an adjustment of the questionnaire is required. This adaptation will be done during 2021.

3.2 Over-deliveries

- 85 Figure 12 illustrates the evolution of the over-deliveries (OVD) during RP2 (2015-2019) and the first year of RP3 (2020). It can be observed that the over-delivery indicator decreased significantly in 2020. This was influenced by the drop in the number of ATFM regulations due to the decrease in traffic as a consequence of the COVID-19 pandemic. The large proportion of industrial action related regulations was also a factor as these kinds of regulations create fewer over-deliveries.

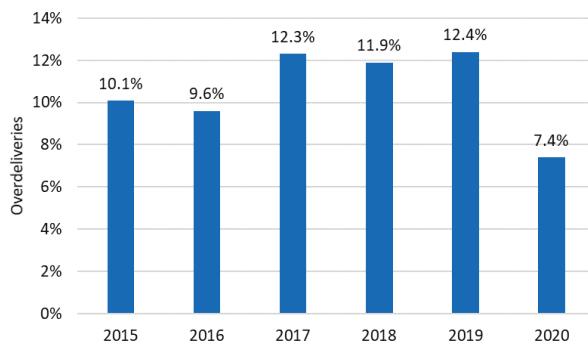


Figure 12– Over-deliveries indicator (combined ENR and ADR) in the period RP2 and 2020.

3.3 Top risks in the Network

- 86 In collaboration with operational stakeholders, the top 5 operational safety priorities were determined for the NM. In 2020, these were as follows:
1. “Controller Blind Spot”
 2. “Flight without transponder or with a dysfunctional one”
 3. “ACAS RA not followed”
 4. “Controller detection of potential runway conflict”

5. “Airspace infringement”

- 87 Considering the specific aspects of the COVID-19 pandemic, another transitional priority was included related to the “risks associated with the COVID-19 situation and the knowledge management in respect of the transitional hazards”.

4 SUMMARY OF OBSERVATIONS

- 88 A summary of observations, conclusions, and recommendations for each section of the report is provided in this section.
- 89 In 2020, there was no accident registered with ANS-contribution, involving fix wing commercial air transport operation airplanes above 2,250 kg MTOW. Three serious incidents with ATM-contribution were recorded, which is the lowest in the last 10 years. No ANS-related fatal accident has been observed since 2012 and no fatal accident with ANS contribution has been registered in the last 10 year period. Three ATM-related accidents without fatalities were recorded, all of these related to turbulence and lighting encounters.
- 90 The number of accidents and serious incidents in 2020 fell compared with 2019 due to lower levels of traffic relating to the COVID-19 pandemic and the exclusion of U.K. data. The rates of both accidents and serious incidents remained similar to previous years.
- 91 The proportion of events with ANS contribution is significantly smaller in ANS-related accidents than in serious incidents – this has been the case since the start of the performance and charging scheme. This seems to suggest that the safeguards present in the aviation system are effective to prevent accidents when ANS has contributed to the cause of occurrences.
- 92 The analysis of the overall EoSM minimum maturity level achieved by ANSPs in 2020 shows that:
- 15 out of 33 ANSPs already achieved the RP3 target level D for safety risk management. This means that 45 % of ANSPs achieved the target in this objective;
 - 23 out of 33 ANSPs already achieved the RP3 target level C or better on all other MOs (the four EoSM objectives other than safety risk management). This means that 70 % of ANSPs achieved this target;
 - 13 out of 33 ANSPs achieved the EoSM targets on all MOs for RP3. This means that 39 % of ANSPs have already achieved the target of EoSM as a whole;
 - The average EoSM score achieved by all ANSPs is 88. The minimum score achieved by an individual ANSPs is 64, while the maximum EoSM score is 100.
- 93 The collective Union-wide analysis of aggregated responses of the EoSM ANSP questionnaire per objective shows that the EoSM objective with many questions that achieved lower maturity levels and therefore needs more improvement are within the safety policy & objectives area.
- 94 Safety risk management needs the greatest improvement to achieve the 2024 target according to the number of questions that require improvements.
- 95 The EoSM questionnaire was supplemented with a new objective that aimed to capture how ANSPs manage interdependencies and trade-offs between safety and other business objectives. The majority of ANSPs are at maturity level C so there is room for improvement to strengthen resilience, particularly given the COVID-19 pandemic. Pressures to trade-off resources towards other business objectives of the organisation due to loss of traffic and revenues are intensified and must be carefully managed.
- 96 The rates of occurrences (SMIs and RIs) at the EU level in 2020 show an average number of 8.7 SMIs per 100,000 controlled flight hours, and also an average number of 6.9 RIs per 100,000 airport movements. If the aggregation is done at Union-wide level with the occurrences where the ANSP was identified as having a contribution, either direct or indirect, the rates are reduced to 5.1 and 1.8 for SMIs and RIs respectively per 100,000 exposure unit. This shows that ANSPs have greater influence and managerial control of ensuring separation between aircraft in the airspace than in preventing the incursionary presence of an aircraft, vehicle, or other on the runway of an airport.
- 97 At the local level, the following rates of occurrences were monitored:
- Rates of RIs with safety impacts that occurred at the airports of a Member State included in the performance and charging scheme showed a maximum in Lithuania (6.25 RIs per 100,000 movements) and five Member States (Cyprus, Hungary, Latvia, Portugal, and Romania) reported no RI at their airports. In addition Sweden, Norway, Spain, and Italy showed the highest rates of RIs but reported

RIs at all airports in their territories (as opposed to those covered by the performance and charging scheme only);

- Rates of SMIs with safety impacts that occurred within the airspace covered by the performance and charging scheme showed the highest rate in the Netherlands (27.06 SMIs per 100,000 controlled flight hours), although it is to be noted that this includes all infringements in MUAC due to unavailability of MUAC data split over the four Member States responsible for MUAC airspace. Four States (Croatia, Portugal, Slovenia, and Slovakia) reported no SMIs within their airspace;
- Only 44 out of 156 airports reported RI occurrence that had ATS/CNS contributions. The majority of these airports reported one or two RIs, and only a handful of them reported 3 or more RIs. Within the top 10 airports with the highest rates of RIs with ATS/CNS contributions, eight out of ten had fewer than 30,000 airport movements (the low number of airport movements makes the rate of occurrences highly sensitive to the number of occurrences). The airport with greater than 80,000 movements and highest rate of RI occurrences (19.5 RIs per 100,000 movements) is LEMG followed by EDDB (16.22);
- Only 20 ANSPs reported SMIs with ATS/CNS contribution while the others 10 ANSPs reported no SMIs. The highest rate was experienced by LVNL (37.4 SMIs per 100,000 flight hours) followed by DSNA (12.6).

98 For the calculation of the above rates of SMIs and RIs, RP3 safety supporting material foresees occurrences data reported in the ECR under Regulation (EU) No 376/2014. It is recommended to take the appropriate measures to follow the foreseen process for the monitoring report of 2021 in order to ensure better alignment of coherent reported data among ANSPs/States as this was not the case in 2020.

99 Nine Member States reported that their ANSPs used some type of automated safety data recording system in 2020. This is fewer than what was recorded in 2019 as the U.K. ceased being part of the performance and charging scheme.

100 The NM did not provide its responses to the new RP3 EoSM questionnaire for 2020. EASA indicated that the NM is not ready yet to perform their self-

assessment according to the new EoSM questionnaire and that an adjustment of the questionnaire is required. This adaptation will be done during 2021.

101 The NM over-delivery indicator decreased significantly in 2020 compared to 2019. This was influenced by the drop in the number of ATFM regulations due to the decrease in traffic as a consequence of the COVID-19 pandemic.