PRB Monitoring Report 2019
Annex III – Safety Report

The 2019 monitoring consists of five reports:

- – PRB Monitoring Report 2019
- – Annex I – Union-wide detailed analysis for experts
- – Annex II – Member States' detailed analysis for experts
- – **Annex III – Safety Report**
- – Annex IV – CAPEX Report

October 2020

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1 Introduction and Context

1.1 About this document

1 The PRB Monitoring Report 2019 provides analysis of the performance achieved by Member States of the Single European Sky (SES), covering the fifth year (2019) of the second reference period (RP2), which runs for five years from 2015 to 2019. The report also provides an overview of the developments over all five years of RP2.

2 In 2019, the PRB Monitoring Report is supported by four Annexes to provide detailed analysis of performance:

- PRB Monitoring Report 2019

- Annex I – Union-wide detailed Analysis for Experts

- Annex II – Member States' detailed Analysis for Experts

- **Annex III – Safety Report (this document)**

- Annex IV – CAPEX Report.

3 This document is the Annex III – Safety Report. The report provides a summary of the Air Navigation Services (ANS) and network functions performance achieved in 2019 in the Key Performance Area (KPA) of safety. It refers to, and uses data from, the Member States subject to the provisions of the SES performance scheme in RP2, as laid down in Article 1 of Regulation (EU) No 390/2013. Therefore, it covers the 28 EU Member States, plus Norway and Switzerland.

4 This Safety Report was prepared by the European Aviation Safety Agency (EASA) in support to the Performance Review Body (PRB) of the Single European Sky (SES).

5 The document is structured in four chapters. The first chapter describes the background and a provides a brief reminder of Safety Key Performance Indicators (Safety KPIs) and targets used in RP2, and the process and methods used to collect data, to assess and review the performance of the ANS from a safety perspective. This section is similar to the one published in the previous years, but it is repeated for convenience to the reader. The second chapter presents and analyses in detail the achieved values of Safety KPIs during the year 2019, and more generally during the whole of RP2. The report is based on the information gathered from the submitted data by each Member State/Functional Airspace Block (FAB) in their FAB Performance Monitoring Reports (PMRs), as well as to provide feedback on safety performance and against targets, when applicable. The third chapter provides an assessment of safety indicators of the network functions for the same period 2019. The final, fourth chapter provides a summary of the safety performance achieved and observations regarding performance.

1.2 Background

6 The performance scheme for the ANS and network functions was created to contribute to a sustainable development of the air transport system by improving the key performance areas of safety, environment, capacity, and cost-efficiency of the ANS and network functions. Regulation (EU) 691/2010 established the principles of the scheme and the provisions of the initial implementation during RP1 – from 2012 until 2014 – through target setting and continuous monitoring of national supervisory authorities (NSAs), air navigation services providers (ANSPs) and network functions at national/FAB and Union-wide level. RP1 was considered a transitional period of three years, during which the performance area of safety was limited to Safety PIs used for monitoring purposes only, with no targeted indicators.

7   Regulation (EU) No 390/2013, repealing Regulation (EU) No 691/2010, was adopted on the 3rd May 2013, and established the measures for RP2 aiming at improving the processes of the performance scheme based on the experience gained during RP1. In particular, and related to the safety performance area, Regulation (EU) No 390/2013 introduced additional Safety KPIs with associated targets (defined in Commission Implementing Decision 132/2014). The Regulation includes a number of Safety KPIs to be monitored at both European and national/FAB levels and used for the safety performance assessment during RP2.

8   In addition, EASA has adopted Acceptable Means of Compliance (AMC) and Guidance Material (GM) for point 1 of Section 2 of Annex I to Regulation (EU) No 390/2013for the implementation and measurement of Safety KPIs[1]. AMCs are non-binding standards adopted by EASA to illustrate means to establish compliance with the safety related requirements in the performance scheme Regulation. When these AMCs are complied with, the obligations on measurement of the Safety KPIs in the performance scheme Regulation are considered to be met.

1.3   Overview of Safety KPIs and associated targets for RP2

9   In RP2, three indicators have been defined by the Regulation (EU) No 390/2013for setting the safety targets:

- Safety KPI1: the Effectiveness of Safety Management (EoSM);
- Safety KPI2: the application of the severity classification based on the Risk Analysis Tool (RAT) methodology;
- Safety KPI3: the level of Just Culture (JC).

10 The Safety KPI EoSM measures, at a State level, the capability of authorities to manage the State Safety Programme (SSP) whenever it is in place and, at a service provision level, the service provider's capability to manage an effective Safety Management System (SMS). The starting point was the International Civil Aviation Organization (ICAO) State Safety Programme (SSP) and SMS framework while additional components and elements have been added to better reflect the European context.

11 The Safety KPI 'the application of the severity classification based on the RAT methodology' measures to what extent the RAT methodology has been applied to assign severity levels to reported ATM incidents by the ANSPs and the Member States.

12 The Safety KPI 'the level of JC' measures the level of presence of Just Culture at Member State and at ANSP level. The main objective of the indicator is to identify possible obstacles and impediments to the application of Just Culture at Member State and ANSP level.

13 In addition, the Regulation introduces three additional performance indicators (PIs) for safety without targets and for monitoring purposes. These are as follows:

- Safety PI1: Application by the ANSPs of automated safety data recording systems where available, which shall include, as a minimum monitoring of separation minima infringements (SMI) and runway incursions (RI). It measures if ANSPs use these tools in a Just Culture environment to improve the gathering of occurrences' information and analysis by the organisations' SMS;

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[1] Decision 2015/028/R of 17th December 2015 of the Executive Director of the Agency amending Decision 2014/035/R of 16th December 2014 'AMC and GM for the implementation and measurement of safety (Key) Performance Indicators (S(K)PIs)' — Issue 2, Amendment 1.

- Safety PI2: Reporting by the Member States and ANSPs on the level of occurrence reporting, on an annual basis, measuring the level of reporting and addressing the issue of improvement of reporting culture; and

- Safety PI3: The number of, as a minimum, separation minima infringements, runway incursions, airspace infringements, and ATM-specific occurrences at all air traffic services units.

14 The overview of all Safety KPIs used in RP2 and their associated targets are presented in Table 1.

S(K)PI	TARGET LEVEL
The Effectiveness of Safety Management (EoSM)	Union-wide and local
The application of the severity classification based on the RAT methodology to the reporting of, as a minimum, three categories of occurrences: SMIs, RIs and ATM-specific occurrences at all air traffic services units.	Union-wide and local
The reporting by the Member States and their ANSPs of the level of presence and corresponding level of absence of Just Culture.	Local
The application by the ANSPs of automated safety data recording systems where available, which shall include, as a minimum monitoring of SMIs and RIs.	None
The reporting by the Member States and ANSPs on the level of occurrence reporting, on an annual basis, aiming at measuring the level of reporting and addressing the issue of improvement of reporting culture.	None
The number of, as a minimum, separation SMIs, RIs, airspace infringements (AIs), and ATM-specific occurrences at all air traffic services units.	None

Table 1 – Safety KPIs in RP2.

15 Table 2 and Table 3 show the Union-wide targets for RP2 defined by Commission Implementing Decision 132/2014[2].

LEVEL OF EFFECTIVENESS OF SAFETY MANAGEMENT (EoSM)		2015	2016	2017	2018	2019
State level	Union-wide target					C
ANSP level	Union-wide target for Safety Culture Management Objective (MO)					C
	Union-wide target for all other MOs					D

Table 2 – RP2 target for Effectiveness of Safety Management (EoSM).

APPLICATION OF THE SEVERITY CLASSIFICATION BASED ON THE RAT METHODOLOGY						
Ground score (ANSP level)		2015	2016	2017	2018	2019
Union-wide targets	SMIs			≥ 80%		100%
	RIs			≥ 80%		100%
	ATM-S			≥ 80%		100%
Overall score (State level)		2015	2016	2017	2018	2019
Union-wide targets	SMIs			≥ 80%	≥ 80%	≥ 80%
	RIs			≥ 80%	≥ 80%	≥ 80%
	ATM-S[3]			≥ 80%		100%

Table 3 – RP2 target for application of the severity classification based on the Risk Analysis Tool (RAT) methodology.

1.4 Safety performance review

16   The review of safety performance is based on the data submitted by the Member States through different instruments. Member States, through their NSAs or bodies which are responsible for co-ordination within the FAB as regards the monitoring of the performance plans, are required to submit their Performance Monitoring Reports (PMRs) to the European Commission (EC) by 1st June each year with the aim of monitoring performance plans and targets. With regard to data related to Safety KPIs, Member States are required to submit EoSM and JC questionnaires to EASA by 1st February each year, while information on the RAT methodology application should, if completed using the Annual Safety Template (AST) mechanism, be submitted by 21st April.

17   With regard to other Safety PIs, and in order to facilitate the task of Member States to elaborate the PMRs and to submit the safety data as required by the Regulation (EU) 390/2013 and its associated AMC/GM as described in the EASA Decision 2014/035/R of 16th December 2014 and its amendments, the PRU and EASA elaborated a template where all data required for the performance review are collected. During the summer, these reports, together with results of Safety PIs monitoring for 2019, are assessed by the PRB (supported by PRU and EASA) resulting in the preparation of this PRB Annual Monitoring Report.

18   The output of this review of safety performance, together with identified risks and recommendations, is submitted to the PRB, the EC and shared more widely within EASA.

1.5 Verification activities

19   The safety review process includes some verification of the data submitted by the Member States to compute the Safety KPIs. These verification activities were performed by EASA for EoSM and JC, whilst application of the RAT methodology was verified by Eurocontrol. Measuring and verifying the Safety KPIs of the performance scheme Regulation (EU) No 390/2013 is done in accordance

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[3] The values for ATM Ground and ATM Overall scores of the application of RAT for the ATM-specific occurrences are identical, as there is no difference between ground and overall component in the method. The two targets for ATM-S ground and overall are effectively one single target.

with the AMC/GM annexed to ED Decision 2014/035/R[4] and its amendment ED Decision 2015/028/R[5].

1.5.1   Verification process of Effectiveness of Safety Management

20   The EoSM indicator is measured by the verified responses to questionnaires[6] respectively completed by Member States/competent authorities (normally the NSAs) and their ANSPs, which results in a double metric: a score and a maturity level. The score is measured as a value in a scale from zero to 100, and the maturity level in a scale from A to E for each question (shown to the right), later grouped in components. This is done in accordance with AMC/GM published by EASA (ED Decision 2014/035/R[7] and ED Decision 2015/028/R[8]).

Maturity Levels are defined as:

- Level A "Initiating" — processes are usually ad hoc and chaotic;
- Level B "Planning/Initial Implementation" — activities, processes and services are managed;
- Level C "Implementing" — defined and standard processes are used for managing;
- Level D "Managing & Measuring" — objectives are used to manage processes and performance is measured;
- Level E "Continuous Improvement" — continuous improvement of processes and process performance.

(for detailed information see EASA AMC)

Figure 1 – Definition of EoSM Maturity Levels.

21   The EoSM SKPI shows, at a State level, the capability of authorities to manage the State Safety Programme (SSP) whenever it is in place and, at a service provision level, the service provider's capability to manage an effective Safety Management System (SMS). The starting point was the ICAO State Safety Programme (SSP) and SMS framework while additional components and elements have been added to better reflect the European context.

22   The results of the Member States' EoSM self-evaluated questionnaires and the evidence provided were cross-checked with the results of the EASA standardisation inspections on the NSAs, and the level of maturity and score corrected, when necessary, based on those inspections.

23   The coordination between EASA and the NSAs is done through the National Coordinator appointed by the State in accordance with Article 6 of the Commission Implementing Regulation (EU) No 628/2013. In most cases this is directly managed with a Sectorial Focal Point dealing with ATM issues, who is responsible for coordinating within the State authorities and for coordinating with the ANSPs in order to provide EASA with the responses to the questionnaires (both competent authority and ANSP, aggregated where required).

1.5.2   Verification process for Just Culture

24   The Just Culture Safety KPIs measures the level of presence and corresponding level of absence of Just Culture at State and at ANSP level. The main objective of the indicator and questionnaires is to identify possible obstacles and impediments to the application of Just Culture at State and ANSP level. The Just Culture indicator is also measured by evaluating the verified responses to questionnaires[9].

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[4] Decision 2014/035/R of 16 December 2014 of the Executive Director of the Agency adopting Acceptable Means of Compliance and Guidance Material for point 1 of Section 2 of Annex I to Regulation (EU) No 390/2013 and repealing Decision 2011/017/R of the Executive Director of the Agency of 16 December 2011 — 'AMC and GM for the implementation and measurement of safety (Key) Performance Indicators (S(K)PIs)' — Issue 2.

[5] Decision 2015/028/R of 17 December 2015 of the Executive Director of the Agency amending Decision 2014/035/R of 16 December 2014 'AMC and GM for the implementation and measurement of safety (Key) Performance Indicators (S(K)PIs)' — Issue 2, Amendment 1.

[6] 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.

[7] ED Decision 2014/035/R - http://easa.europa.eu/system/files/dfu/ED Decision 2014-035-R.pdf

[8] http://www.easa.europa.eu/document-library/acceptable-means-of-compliance-and-guidance-materials/amcgm-skpi-issue-2-amendment.

[9] The content of these questionnaires is provided in Appendix 1 to AMC9 SKPI and Appendix 1 to AMC10 SKPI of ED Decision 2014/035/R.

25 The questionnaires for both the State and the ANSP level were divided into sections where Just Culture elements are relevant, with an additional sub-division into key elements for each section. The three main areas are:

- Policy and its implementation;

- Legal/judiciary;

- Occurrence reporting and investigation.

26 As for the previous years, the questions were to be answered by "yes" or "no", and States and ANSPs were encouraged to provide additional information and justification to their responses.

27 In addition, although the AMC/GM indicate that a positive reply gives an indication of a Just Culture context, while a negative reply indicates potential deficit/obstacles in Just Culture implementation, the key element which allows for the measurement of an effective level of Just Culture is not in the counting of the "yes" and "no" responses but in the explanation and justification provided by the State and the ANSP, which are captured in this report as best practices.

28 The information provided by States and ANSPs relating to the Safety KPI Just Culture was not verified in 2019 and is the result of self-assessment.

1.5.3   Verification of RAT methodology application

29 The application of the severity classification using the RAT methodology is identified for each individual occurrence using "yes" or "no" regarding the application of the RAT methodology for severity classifications of all Separation Minima Infringements (SMIs), Runway Incursions (RIs) and ATM specific occurrences (ATM-S) at ATS Centres and airports, as appropriate.

30 The indicator is measured as the percentage (%) of occurrences for which the severity has been assessed using the RAT methodology over a subset of the annually reported occurrences in relation to the respective scope of the RAT method.[10]

31 This subset of occurrences was introduced during RP2 and it is restricted to:

- RAT methodology is only mandatory for deriving the severity of A, B and C reported SMIs and RIs, and AA, A, B and C severity for ATM-S[11];

- Regulation (EU) No 390/2013 may not be applicable at airports and traffic units with less than 70,000 instrument flight rules (IFR) movements per year (hence, the use of the RAT methodology on the occurrences that were reported at those units may be excluded);

- Contrary to the previous reference period, the EC set targets for the application of the RAT methodology (Commission Implementing Decision 2014/132/EU) for deriving the severity of both ATM Ground and ATM Overall of SMIs, RIs, and ATM-S.

32 The EASA AMC 8 - Safety KPI RAT methodology — Monitoring mechanism, accepts both existing occurrence reporting mechanisms (Annual Summary Template (AST) or the European Central Re-

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[10] ATM Ground occurrences are assessed by the ANSPs and ATM Overall as assessed by the NSAs. In some States, there is an agreement for the ANSP to provide both the ATM Ground and Overall elements of the RAT method.
[11] The Regulation does not provide any indication of how Member States and their providers are expected to determine the severity of the reported occurrences.

pository (ECR)) as the measure of application of the RAT. For this analysis, data regarding the application of the RAT has been collected via the AST mechanism for all Member States and the ECR data has only been used for verification purposes.[12]

33 As the AST reporting mechanism was used for reporting the application of the RAT methodology, Eurocontrol DPS/SSR performed the following verification activities to measure performance of this Safety KPI during 2019:

- Collected and processed the RAT derived severity score for each reported occurrence;

- Validated the correctness of the processed data with the national AST Focal Points;

- Agreed, in case differences are still identified between the RAT score reported via the AST mechanism and the PMRs, actions with the AST Focal Points to address the issues.

1.6 Data sources and associated caveats

34 This section discusses the sources of data used to populate the performance indicators, the exposure data used and some caveats related to both data sets.

1.6.1 Data sources to populate Safety KPIs

35 Three main data sources have been used to populate the safety information in the Safety KPIs, in addition to the Network Manager for the exposure data and EASA database to gather information of accidents and serious incidents, as explained later. These sources are:

- Questionnaires, that capture information from Member States and their ANSPs through a web platform managed and later verified by EASA, are used to populate Safety KPI1 (EoSM) and Safety KPI2 (Just Culture). Member States submit completed questionnaires for the State level and the ANSP level (each State's largest ANSP also submits its questionnaire). However, EASA is only responsible for verification of responses at State level, while the NSAs are responsible for the verification of ANSP's responses. The verification process relies on cross-referencing evidence that has been reported with the results of authorities' oversight activities;

- Reporting of the number of each type of occurrences and the severity classification was carried out through the AST reporting mechanism, operated by Eurocontrol. The AST database was used to gather information related to Safety KPI2 (application of the RAT methodology) and Safety PI2 (ratio of high-severity and low-severity occurrences), and Safety PI3 (number of occurrences). In a few cases, the data was cross-checked with data submitted in the ECR;

- The submitted FAB Performance Monitoring Reports are used to gather information related to Safety PI1 (use of automated reporting tool), and any amendment of incorrect figures of the other indicators.

36 EASA AMC/GM gives the option of using the ECR or AST as source of ANS occurrences to populate the Safety KPIs for the performance scheme on an individual basis. Due to the fact that Regulation (EU) 376/2014 entered into force as from 15th November 2015, and that not all information related to occurrences are reported consistently in ECR, e.g. RAT application, the AST data has been used during this year, as in previous years of RP2. In 2018 EASA initiated standardisation inspections, on behalf of the European Commission, to verify the applicability of certain articles of the

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[12] The use of the ECR as the common repository of all aviation occurrences was introduced on 16th November 2015, as per Regulation (EU) 376/2014.

Regulation (EU) 376/2014, which will result in an improvement of data quality and harmonisation of the reporting of occurrences into the ECR. As the quality and completeness of the ECR improves, its use within the performance scheme will evolve in the future, with the objective of becoming as the single data occurrence source in RP3.

37 Whereas the ECR data contains detailed information regarding the nature and location of the occurrence, it is important to take into account that the AST contains only aggregated numbers. It does not include the location information of the occurrence, so it is impossible to identify the occurrences that happened within locations included in the performance scheme, if they have not been filtered beforehand by the State reporters. Eurocontrol DPS/SSR has been in close contact coordination with reporters to filter and eliminate occurrences that are outside of the scope of the performance scheme, and the figures included in the pre-filled report were the best data available at the time. This may have been a source of inaccurate figures in some instances. In some instances, ECR data has been used to verify the data submitted by the Member States.

38 The data used in the performance indicators (Safety PI1, Safety PI2, and Safety PI3) were taken directly from what Member States reported in their PMRs without further verification (e.g. use of automated reporting tools or the total number of occurrences by type).

1.6.2   Exposure data

39 The use of exposure data (e.g. number of airport movements or flight hours) is limited to one single performance indicator (Safety PI2 on level of occurrence reporting) and is not used directly to derive the indicator, but as a way to normalise the number of occurrences in each Member State and have a Union-wide overview of the distribution of occurrence rates for reference in the analysis. This allows the estimation of occurrence type rates, i.e. 'the number of outcomes' divided by 'the number of units of exposure'. Otherwise, the comparison of occurrences reported between different States that have different units of exposure may not be possible and lead to incorrect conclusions.

40 The selection of the units of exposure should consider both the relationship of the exposure unit on the occurrence type and the data availability and quality. The selection of exposure data was made based on the best data availability and quality at the time of elaboration of this report. Therefore, it was decided to use data from the Network Manager (restricted mainly to instrument flight rules (IFR) flights, capturing only a minimal number of visual flight rules (VFR) flights).

41 The following exposure data is selected for the different type of occurrences:

- For SMIs, the number of IFR flight hours is used;
- For RIs, the number of IFR movements (departures and arrivals) is used;
- For AIs, the number of IFR flight hours is used;
- For the ATM-Specific, the number of IFR movements is used.

42 The exposure data covers the scope as defined in the RP2 legislation, i.e., when related to airports, it covers all airports above 70,000 IFR flights or the largest airport in the Member State if such airport does not exist (as per Regulation (EU) 390/2013, Article 1, paragraphs 3 and 4). To identify the list of airports included in the performance scheme, the latest available performance plan was used. Also, the regions are those, within EUR and AFI ICAO regions, where the States are responsible for the provision of ANS (as per Article 1, paragraph 1 of the said Regulation). Therefore, those territories outside the EU and AFI regions were not included. The basis taken to aggregate flight hours was the Flight Information Regions (FIRs), as opposed to flight hours controlled by ANSPs.

43 In some cases, the units of exposure are not ideal when considering the relationship between the unit and the occurrence type, however based on availability and quality criteria, they have been considered adequate for the purpose of the indicator. For example, VFR flights are more prone to infringe controlled airspace, and therefore, the VFR and IFR flight hours could be a more appropriate exposure unit for the calculation of the airspace infringement rate. However, VFR flight hours were not consistently available. IFR flight hours can be, however, considered a valid notion of exposure as the IFR flights are the main receivers of ATC services. Similarly, the operating hours of ATS units to calculate rates of ATM-S may be the most appropriate exposure unit to use, but again this data is not available to EASA, hence IFR flight hours were used. There is, however, a notional link between the amount of traffic handled by the system and the demand on the system performance (e.g., amount of flight plans correlated by Flight Data Processing System).

2 Safety performance analysis

2.1 ANS-related accidents and serious incidents

44 Besides the Safety KPIs required by Regulation (EU) 390/2013, this section provides an analysis of additional performance measurements using information from the EASA's Occurrence Database[13]. More precisely, the section presents the review of ANS-related accidents and serious incidents, as defined by ICAO Annex 13, extracted from the EASA database for the duration of the performance scheme, covering the period from 2010 to 2019. The scope of the review is Commercial Air Transport (CAT) fixed wing aeroplanes above 2,250 kg maximum take-off mass and covers the 28 EU States plus Norway and Switzerland (SES States).

45 This additional analysis brings value to the performance review of safety as it provides an overview of the ANS-related safety occurrences with highest risks at Union-wide level[14]. The scope of the data is different, however, as it includes all accidents/serious incidents reported in the Member States within the performance scheme without removing occurrences of ANS providers that are not within the remit of the performance scheme.

> ### ANS-related vs. ANS contribution
> '**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

46 Figure 2 shows the number of accidents and serious incidents per year that are related to the provision of ANS, alongside a rate calculated using the number of flight hours performed within the EU. In the ten-year period analysed, most of the ANS-related accidents reported in the figure were non-fatal (54 out of 56). The last fatal accident was in 2012 (with two accidents that year). No fatal accident with ANS contribution is registered in the analysed period.

47 The figure shows an initial decreasing rate of accidents plus serious incidents in the years before RP1, reaching a minimum in the early years of RP2, and a moderate increasing trend in the last two 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 2019, there were recorded eight ATM-related accidents without fatalities. This observation is also reflected in other measures of aviation system safety, such as the global fatality rate for CAT Aeroplanes, or the European CAT accident rate.[15]

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[13] The EASA's occurrence database collects accidents and serious incidents reported to EASA by Accident Investigation Authorities world-wide and which 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. In addition, the scope of the review may be changed in future reports depending on the added value for reviewing the ANS safety performance and on the improvement in data granularity and data quality.

[15] https://www.easa.europa.eu/document-library/general-publications/annual-safety-review-2020.
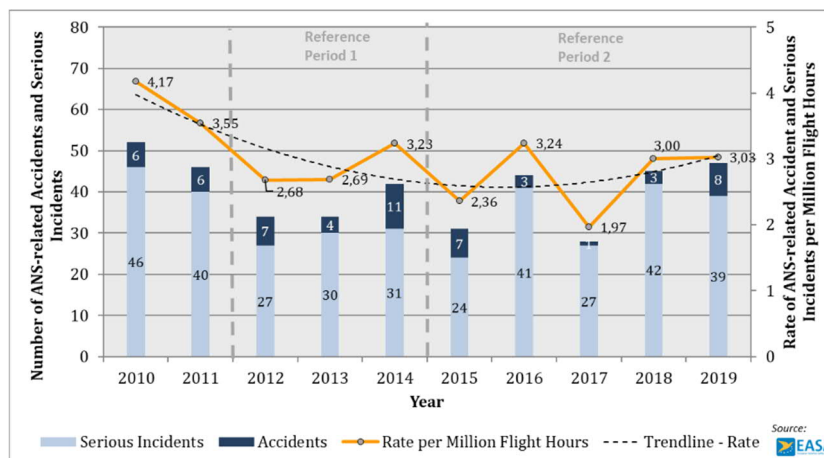
Figure 2 – ANS-related accidents and serious incidents (2010-2019).

48 Figure 3 shows the number of accidents and serious incidents with some contribution by the ANS services per year, alongside a rate calculated using the number of flight hours performed within the EU. This is a more appropriate metric to directly measure the performance of the ANS system. The figure shows a decreasing trend in the rate of accidents plus serious incidents since 2010, with a minimum reached in 2019 without an accident with ANS contribution. The accidents shown in the graph were all non-fatal in the ten-year period analysed. Figure 3 also indicates that the trend in number of accidents (dark blue bar) is decreasing from RP1 to RP2, from two accidents per year to less than one accident per year. This suggests that overall, safety outcomes with ANS contribution have improved since the beginning of the performance scheme, even though there is no evidence of a causal effect with the introduction of the performance scheme. The observation should be taken cautiously due to the low number of events considered. It could be concluded that the ANSPs are managing acceptably the safety risks that directly relate to the services provided.
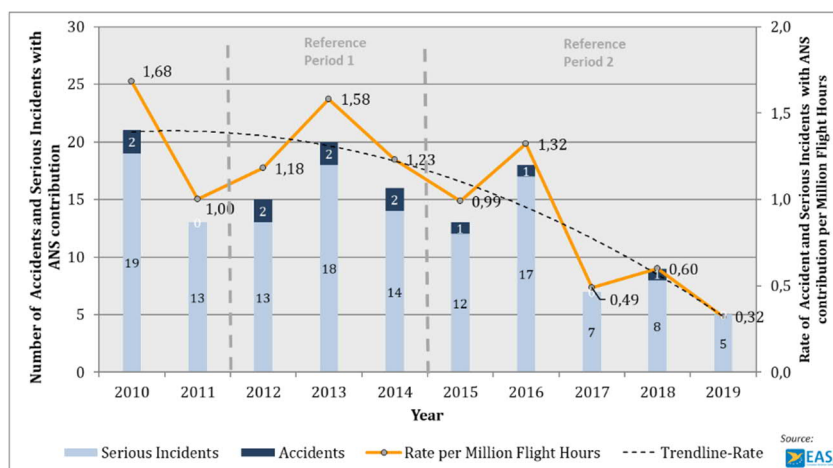

Figure 3 – ANS contribution accidents and serious incidents (2010-2019).

49 Figure 4 and Figure 5 show the top occurrence categories assigned, respectively, to ANS-related and ANS contribution accidents and serious incidents during the last eight-year period (RP1 and RP2). The occurrence categories describe at a high level the type of occurrence, and more than one category can be assigned per occurrence.

50 Some of these occurrence types may appear at the first glance unrelated to air traffic management, e.g. loss of control in-flight. However, occurrences are the result of the coincidence of several factors or related events, where, for example, a trigger event like a TCAS-RA may lead to a

subsequent abrupt manoeuvre and later a loss of aircraft control. By monitoring the occurrence types, it is possible to identify risk-transfer from one aviation sector to another.

51 Therefore, any accident and serious incident may be coded using more than one occurrence category[16] either because several occurrence types are pertinent to the event or due to the presence of several events in the same occurrence report. This explains why the number of occurrence types present in accidents and serious incidents is higher than the number of reports. Both figures indicate whether the ANS had a contribution (light blue bars) or not (dark blue bars) and the type of occurrence in question.
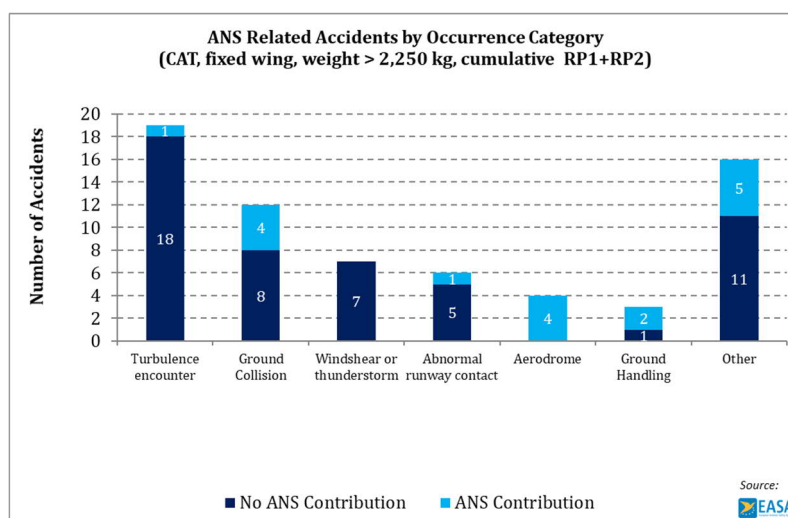
Figure 4 – Accident occurrence categories (2012-2019).

52 In some other occurrences, even though there was no ANS contribution to the event, the ANS may have a role in preventing future accidents of these types (e.g. having additional and more accurate weather information available to ATC to help a pilot avoid certain airspace with a risk of turbulence or thunderstorms and thus reduce the risk of turbulence encounter identified in Figure 4).

53 Serious incidents are typically events that are triggered by similar precursors as accidents, hence, the interest in analysing them together. Moreover, because serious incidents are more frequent they are often a better measure of performance of the ANS system than accidents, or at least they should be considered in combination. When looking at serious incidents, as shown in Figure 5, the most frequent occurrence category related to them was near mid-air collisions (present in 136 serious incidents), navigation error (present in 40 serious incidents), and RI (in 39 encounters), which may be considered the areas with higher risks for the provision of ANS.

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[16] The occurrences are also coded with a category "ATM/ANS", which in general terms, indicates that, either directly or indirectly, ATM/ANS had a contribution in that occurrence. This number is reported in the graph as individual category, but embedded in the colour coded of the other categories, indicating that concurrently occur with other types of occurrence description, such as mid-air collision or RI, for instance.
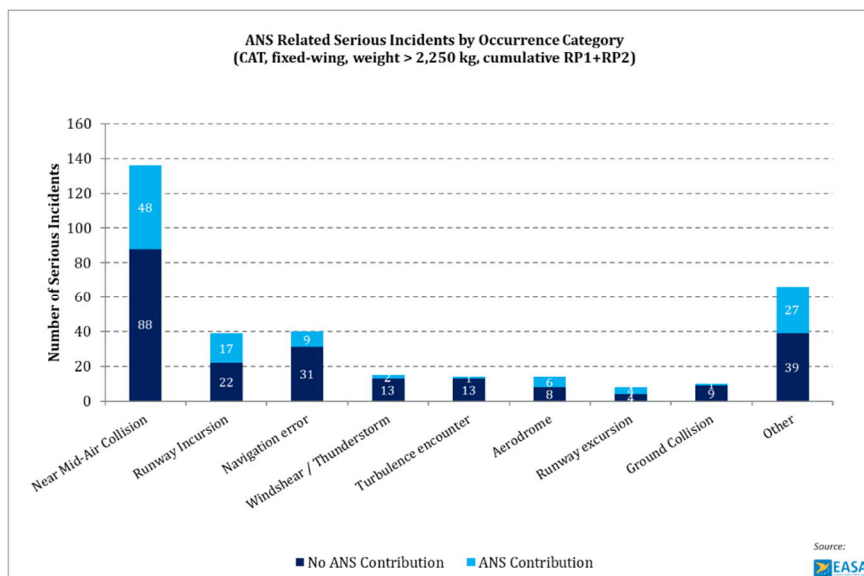
Figure 5 – Serious incident occurrence categories (2012-2019).

54   Figure 6 reinforces more clearly the observation that the proportion of occurrences with ANS contribution is smaller in ANS-related accidents than in ANS-related serious incidents during the last eight-year period. This seems to indicate that ANS has a lower contribution to the highest severity type of occurrences, i.e., accidents.
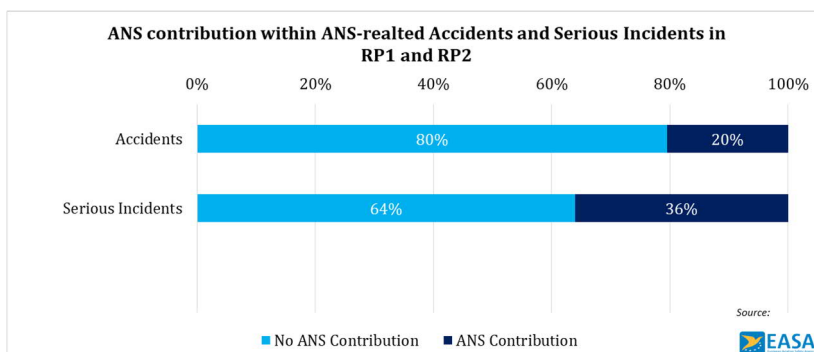

Figure 6 – Proportion of ANS contribution in accidents and serious incidents (2012-2019).

2.2   Safety Key Performance Indicators

55   This section describes the Union-wide review of 2019 safety performance measured by the Key Safety Performance Indicators (KPIs) required by Regulation (EU) 390/2013.

2.2.1   Effectiveness of Safety Management

56   All 30 States and 31 ANSPs, including MUAC, filled in the dedicated questionnaires used to measure the EoSM Safety KPI in accordance with EASA AMC/GM for the Implementation and Measurement of Safety Key Performance Indicators (EASA Decision 2011/017R, amended by ED Decision 2014/035/R and ED Decision 2015/028/R). In accordance with this AMC/GM, the responses of all States have been verified by the EASA standardisation team using the data from the standardisation audits and the follow-up of the corrective measures, while the responses of the ANSPs have been verified by the State NSA.

2.2.1.1 EoSM – ANSP performance

57 Figure 7 shows the EoSM results of ANSPs in 2019, and therefore the performance levels achieved at the end of RP2. The figure depicts the EoSM overall Maturity Score (blue bars), which has no associated target, the minimum Maturity Level (on the second axis – orange dots for the Safety Culture component and purple triangle for all other Management Objectives (MO)) achieved at ANSP level, which has targets associated on different MOs. The 2019 targets are as follows: to achieve at least minimum level D for Safety Policy and Objectives, Safety Risk Management, Safety Assurance, and Safety Promotion (depicted as a horizontal blue line in the graph) and at least level C for Safety Culture (depicted as an horizontal red line), as per Commission Implementing Decision (EU) 2015/19.

58 The analysis of the EoSM minimum Maturity Level achieved by ANSPs shows that:

- All ANSPs achieved the RP2 target for Safety Culture, as they are at Level C or above for this MO;

- 28 out of 31 ANSPs achieved the RP2 target for all other MOs (the four EoSM components other than Safety Culture), as they achieved Level D or above in all these MOs. This means that 90.3% of ANSPs achieved the target. Three ANSPs (CYATS, LFV, LGS) failed to achieve the RP2 target;

- The average EoSM score value achieved by all ANSPs is 84.7. The minimum score achieved by an individual ANSP is 62 (CYATS), while the maximum EoSM score is 98 (ENAIRE), with ten ANSPs above 90.
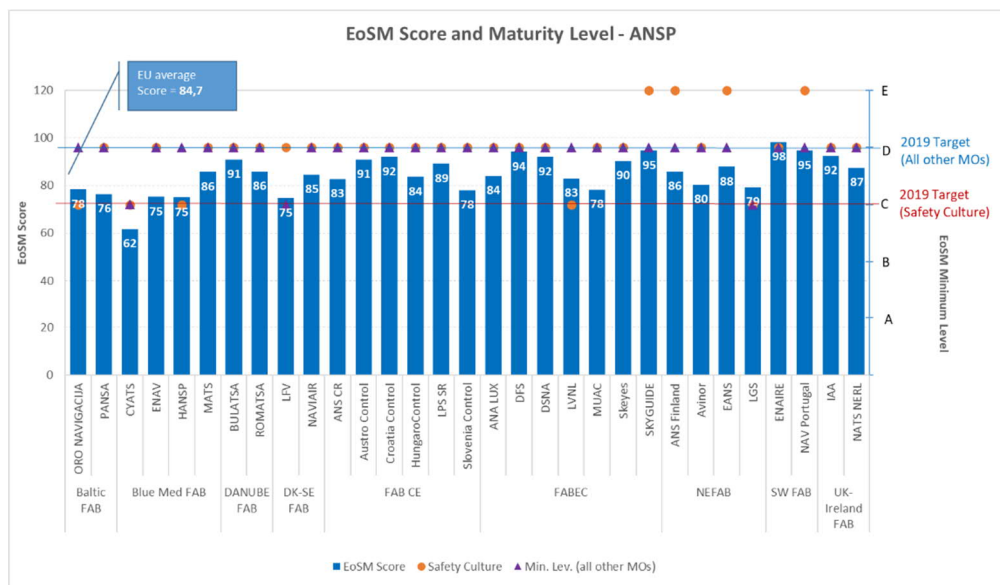

Figure 7 – Effectiveness of Safety Management for ANSPs – year 2019.

59 The collective Union-wide analysis of aggregated responses of the EoSM ANSP questionnaire per component (Figure 8) shows that the number of EoSM areas / Management Objectives that achieved lower Maturity Levels and, therefore need more improvement, are within areas of Safety Assurance and Safety Policy and Objectives.
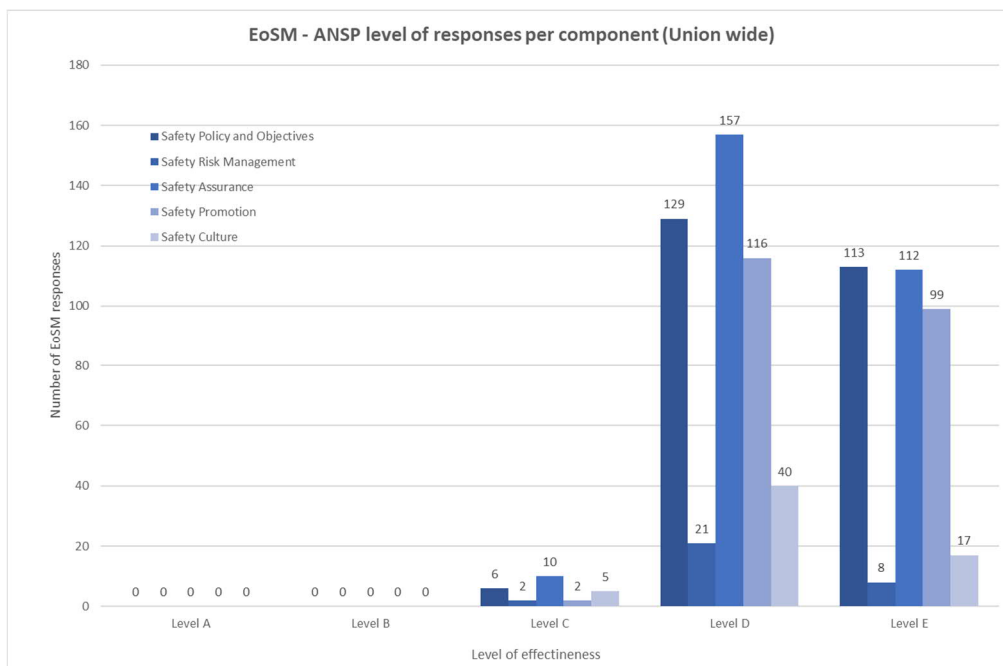
Figure 8 – ANSP EoSM responses per component (Union-wide).

60　Figure 9 shows how many ANSPs are below the RP2 EoSM target level on each EoSM component. The components that require more improving efforts, as greater number of ANSPs did not reach the target level, are Safety Policy and Objectives, Safety Risk Management and Safety Assurance. At the same time, there are major improvements in the EoSM components during the entire RP2 period. Despite some deterioration observed in 2018 in some areas, overall most areas have shown improvement except the area of Safety Risk Management, where the number of ANSPs below target has remained constant and equal to two. The Safety culture target has been achieved by all ANSPs almost from the beginning of the RP2 period, as shown later in Figure 15, contrary to the State level, where this component was the one that needs more attention and improvement.
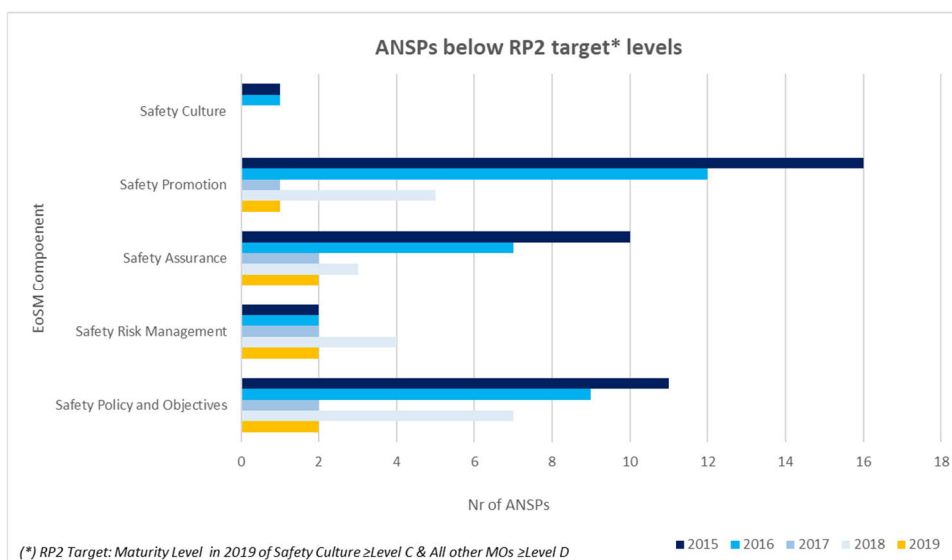

Figure 9 – Number of ANSPs below EoSM RP2 target level per each EoSM component.

61　Another view of the evolution in the overall achieved performance of the EoSM indicator over the entire RP2 is shown in Figure 10. The average EoSM score value achieved by all ANSPs shows a continuous improvement throughout the RP2 period from 79.3 in 2015 to 84.7 in 2019. At the

same time, the number of ANSPs below target has decreased steadily from ten in 2015 to three at the end of RP2.
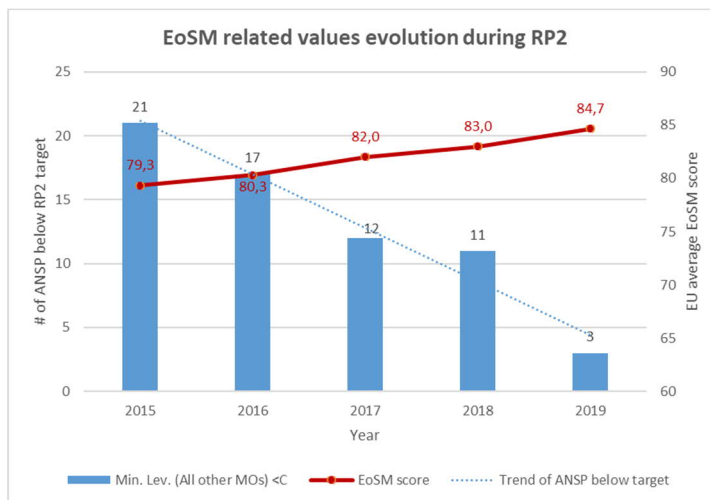

Figure 10 – EoSM related values during RP2 – ANSP level.

62 The analysis of the individual ANSP performance, taking into account the questionnaire responses, is shown in Figure 11. It illustrates the number of questions in each Maturity Level. It is complemented by Figure 12, which shows the number of questions for each ANSP that are below the target level. Among the three ANSPs that did not achieve the RP2 target, significant effort is still needed by CYATS to achieve the RP2 targets (14 questions need improvement), while LFV needs to improve in five question an LGS only missed the target by one question.
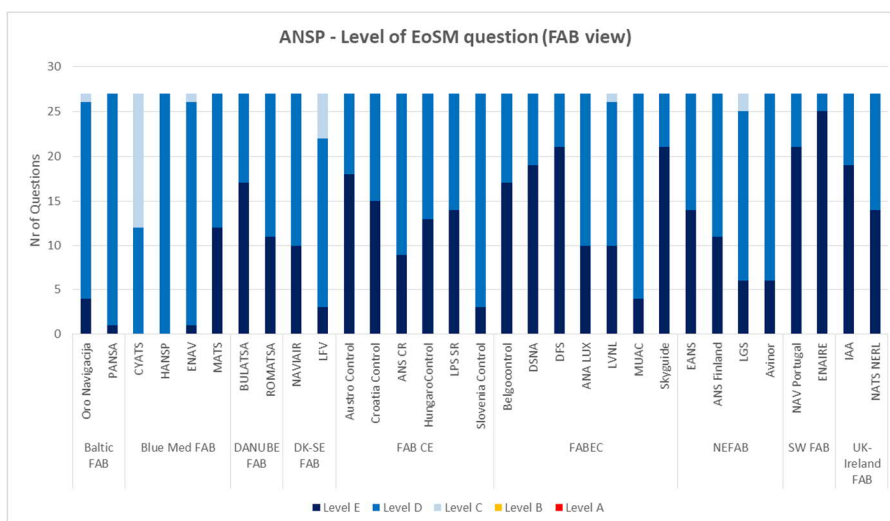

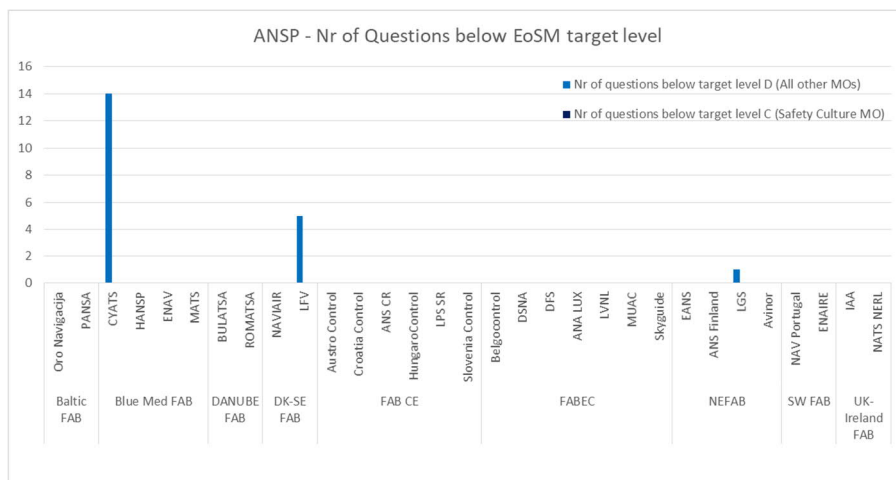Figure 11 – ANSP EoSM responses (excluding Safety Culture) per EoSM level (FAB view).

Figure 12 – Number of EoSM ANSP questions below 2019 EoSM target – level C or D.

2.2.1.2 EoSM Union-wide view – State performance

63 Figure 13 shows the EoSM results of Member States in 2019 (both the EoSM overall score (blue bars) and the EoSM Maturity Level (on the second axis – orange dots) achieved at State level). RP2 introduced the target for Member States to achieve at least level C on the EoSM minimum Maturity Level for all MOs, as per Commission Implementing Decision (EU) 2015/19. The EoSM score gives an overview of the effectiveness in a single continuous scale but has no associated target.

64 The analysis of the EoSM minimum Maturity Level achieved by Member States shows that:

- 16 out of 30 States achieved the RP2 target for the maturity of all EoSM components, as they achieved Level C or above. This means that 14 States (BG, DK, ES, FI, FR, IT, LT, LU, MT, NL, PT, RO, SE, SK) failed to achieve the RP2 target;

- When excluding component 5 – Safety Culture, which was self-assessed and not verified by EASA, the number of States that achieve the target (i.e. level C) is 20;

- The average EoSM score value achieved by all States is 68.5. The minimum score achieved by an individual State is 46 (BG), while the maximum EoSM score is 89 (UK).

65 Despite the improvement of the EoSM overall score observed in 2019, Figure 13 shows that some core elements of the safety oversight system still need further improvement in several Member States, as they failed to achieve the RP2 target. These elements will be closely monitored by EASA in future standardisation inspections as part of its oversight obligations.
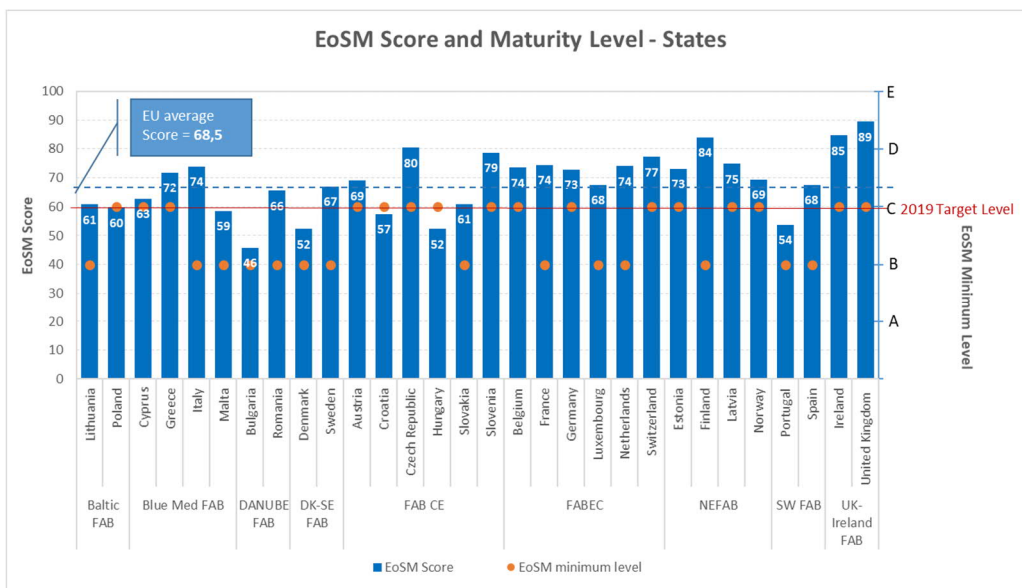
Figure 13 – Effectiveness of Safety Management for States – year 2019.

66 Figure 14 shows the level of maturity of EoSM State questions (marked from Level A to Level E) per EoSM component. The EoSM MOs that need the most improvement are Safety Assurance, Safety Policy and Objective, and Safety Culture. On the contrary, the most effective component at State level is Safety Risk Management.
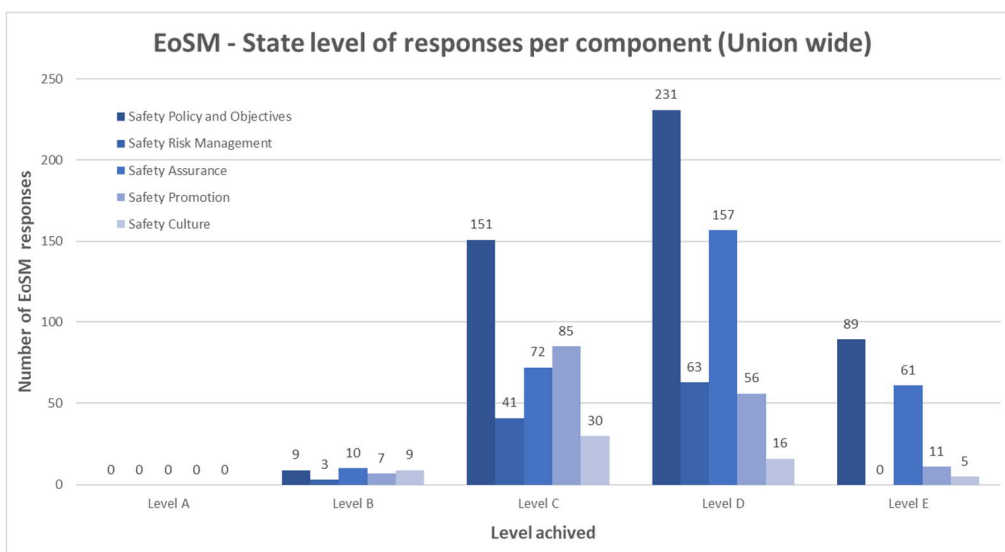

Figure 14 – State EoSM level per component (Union-wide) – year 2019.

67 Figure 15 shows how many Member States are below the RP2 EoSM target level on each EoSM component. The components that require more effort to improve, as greater number of States did not reach the target level, are Safety Culture and Safety Promotion, with eight and five States failing to achieve the target, respectively. At the same time, there are major improvements in the EoSM components during the entire RP2 period. Despite some deterioration observed in 2018 in some areas, overall all areas have experienced a continuous improvement from the beginning of the RP2 period, which, however, has not been sufficient to achieve the targets.
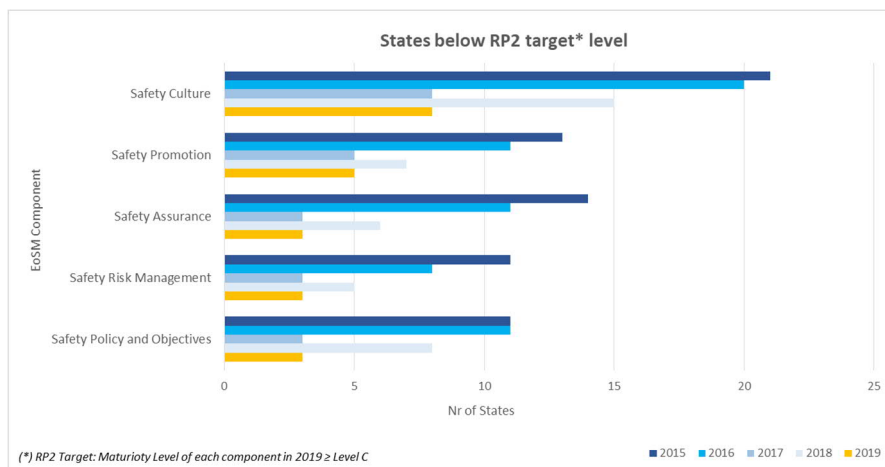
Figure 15 – Number of States below EoSM 2019 target level per each EoSM component.

68 Another view of the evolution in the overall achieved performance of the EoSM indicator over the entire RP2 is shown in Figure 16. The average EoSM score value achieved by all States shows a continuous improvement throughout the RP2 period from 55.7 in 2015 to 68.5 in 2019. The number of States below target has decreased steadily from 29 (all States but one) in 2015 to 14 at the end of RP2. These values are not directly comparable with RP1 values because RP1 outcomes were based on the self-assessed score and EASA did not verify the responses. From the start of RP2, EASA has verified all self-assessed scores including levels D and E with the exception of the questions Q3.8 (Safety Assurance), Q5.1 and Q5.2 (Safety Culture), all of them related to the existence and measurement of a Safety Culture. This means that State responses were adjusted (if necessary) after EASA verification.
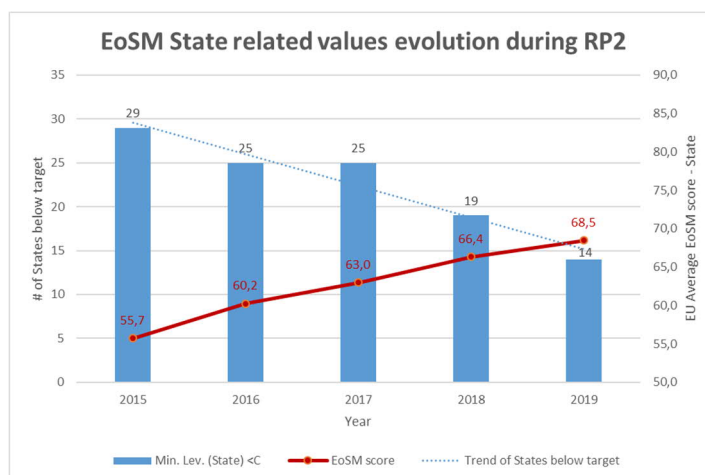

Figure 16 – EoSM related values during RP2 – State level.

69 Based on the analysis of the individual EoSM State questionnaire responses, Figure 17 shows that the majority of Member States/FABs missed the target by only a small number of questions. Bulgaria should improve maturity in a significant number of areas, as it did not reach the target level C in 14 questions in the EoSM (see Figure 18). Portugal should improve a number of areas, with up to six questions below the target level C. The rest of the Member States that did not reach the target, 12 States have to improve between one to a maximum of three questions of the EoSM questionnaire out of 36 (see Figure 18).

70 Eight Member States (ES, FI, FR, IT, LT, LU, ML, RO) failed to achieve the target by a narrow margin (only one question out of 36 was rated below the target), and five of these (ES, FI, FR, IT, LT) failed

only in the Safety Culture management area that is self-assessed (no EASA verification was carried out in that area).
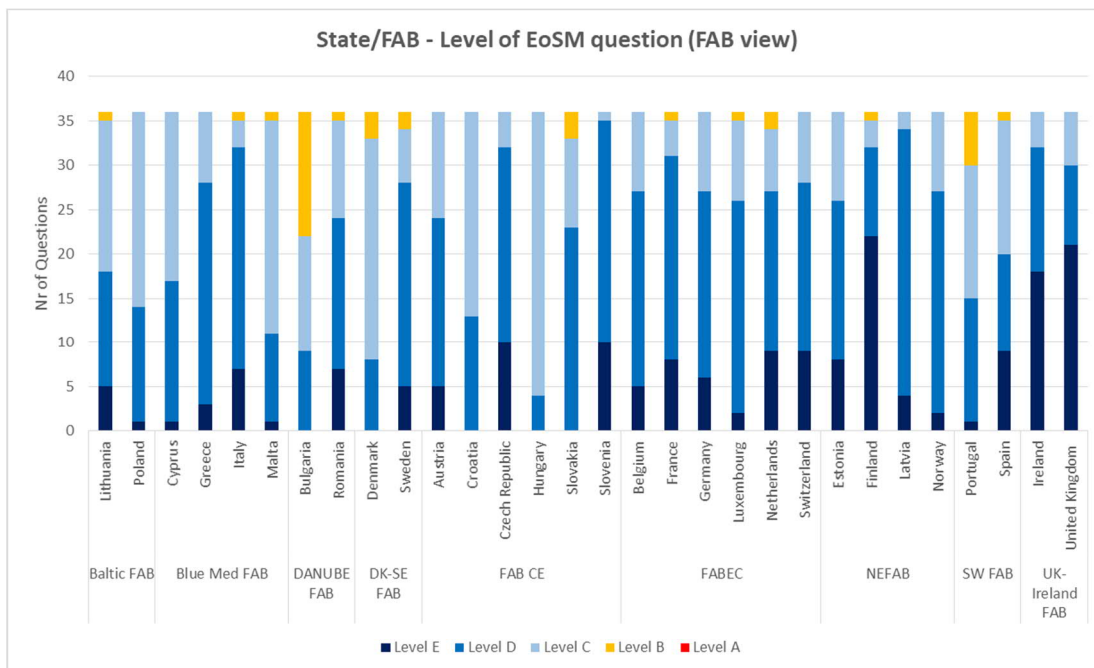

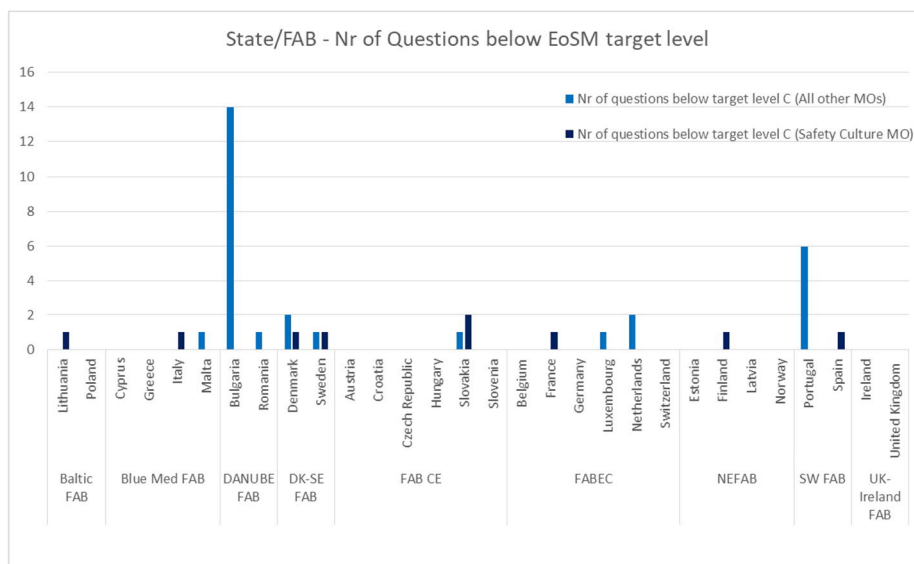Figure 17 – State EoSM responses per EoSM level (FAB view).

Figure 18 – Number of EoSM State questions below 2019 EoSM target – level C.

2.2.2   Application of the RAT methodology

71   In accordance with the Regulation (EU) No 390/2013, Member States are required to report the proportion of SMIs, RIs and ATM-S for which severity classification was assessed using the RAT methodology.

72 During RP2, the AST reporting mechanism[17] was still used as the main vehicle for reporting the application of severity classification using the RAT methodology. The following sections provide the analysis of the severity classification in 2019 provided by Member States (ANSPs and NSAs). The analysis of the of severity classification using the RAT methodology is split by the scope of the assessment: ATM Ground assessed by the ANSPs and ATM Overall assessed by the NSAs. For more information, see EASA AMC/GM in ED Decision 2014/035/R amended by ED Decision 2015/028/R.

73 Due to the change introduced in RP2, with regards to the definition of targets, the total number of occurrences reported is no longer equal to the total number of occurrences for which the application of the RAT methodology is mandated by the target. This means, for example, that the number of occurrences that require the application of RAT for ATM Ground and ATM Overall may be different or that reported occurrences collected in Safety PI3, if pre-assessed as D or E, may not be severity assessed with the RAT methodology, and they are not considered in achieving the target.

74 In addition, the requirement to determine, at the level of individual occurrence, whether it is to be considered within the scope of the performance scheme Regulation based on both the location (traffic higher than 70,000 IFR movements) and the scope, has led to a situation where application of the RAT methodology could be mandatory for the ATM Ground and not for the ATM Overall, or vice-versa. Moreover, States may end up in the difficult situation where the determination of the Overall severity is mandatory without having the possibility to use the results of the ATM Ground severity, provided by the ANSPs, because the ANSP was not required to assess the latter (i.e. if the ATM Ground was severity D or E and Overall severity was A, B, or C). These situations have the potential to negatively affect the harmonisation of the severity assessment using the RAT methodology that has started to be noticeable at the end of RP1.

75 Nevertheless, the main elements of the monitoring for this indicator are still the total number of occurrences for which the application of the methodology is mandatory and the percentage of application over that total.

2.2.2.1 Application of the RAT methodology – Union-wide view

76 From the Union-wide perspective and taking all occurrences reported collectively into account, targets of 2019 were achieved for SMI Ground and Overall and RI Overall. The targets were not achieved by a narrow margin for RI Ground and ATM-S Overall as applied by the ANSPs with 99% and 97% applicability, respectively (see Figure 19). However, only a reduced number of ANSPs/NSAs, as indicated later, are not applying RAT to 100% to the occurrences required by the target.

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[17] The data presented and analysed in this report takes into account the information reported by the end of April 2020, covering the whole 2019 reporting year. As mentioned above, updates may happen during the September 2020 AST reporting cycle, which are reflected at the time of drafting this report.
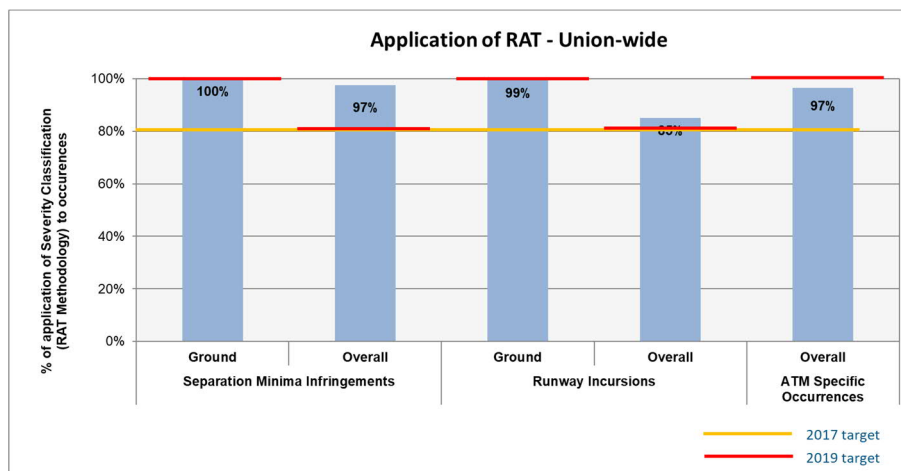
Figure 19 – Severity assessment using RAT methodology (Union-wide) – year 2019.

77   Figure 20 illustrates the percentage of applicability of the RAT method. SMI Ground and RI Ground have remained relatively constant during RP2 close to the target, while SMI Overall, RI Overall and ATM-S Overall have increased from levels below target up to reach the target or close to it.
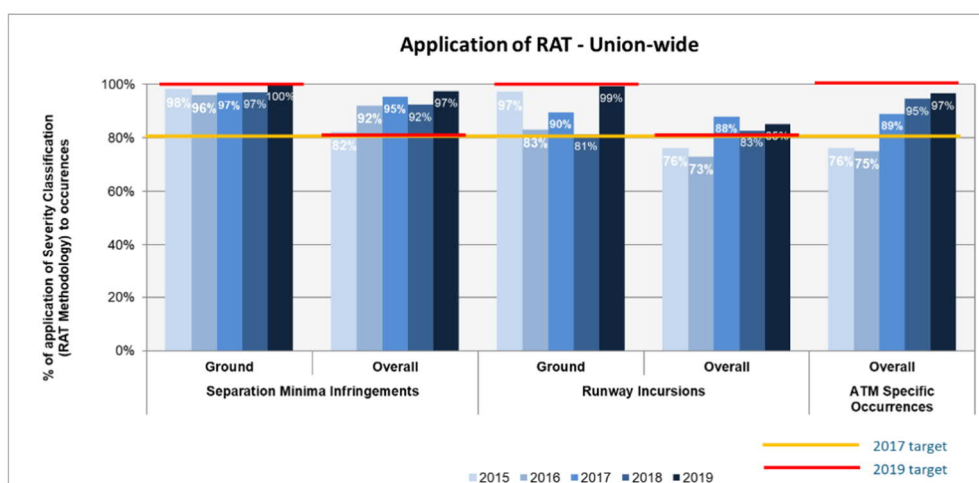
Figure 20 – Severity assessment using RAT methodology (Union-wide) – trend during RP2.

78   The variation of applicability of the RAT methodology is largely dependent on the number of occurrences that require the application of the method, as it is resource consuming. Figure 21 shows the variation of total occurrences that required the applicability of the RAT. In a context of scarce resources, the increase of occurrences that required applicability of RAT, may have created back log of occurrences without severity being scored at the time of data collection, which may have been the reason of decreases in the percentages observed during RP2. On the contrary, decreasing absolute numbers of occurrences throughout the period may have resulted in better percentages of applicability.

Figure 21 – Variation of occurrences for which RAT application is required by SES performance scheme.
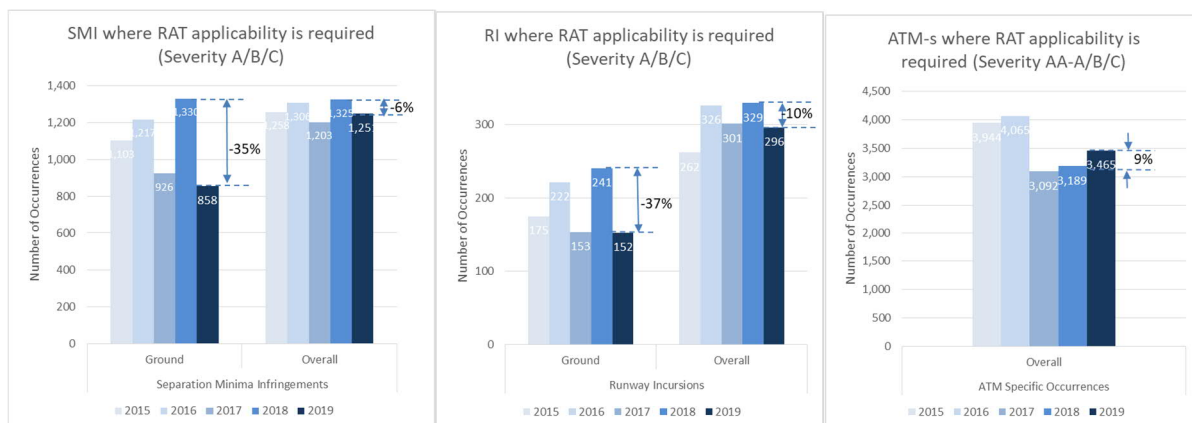
2.2.2.2 Application of the RAT methodology – Member State/FAB view

79 Figure 22, Figure 23, and Figure 24 show the percentage of application of the RAT methodology in each State/FAB during 2019, for SMIs, RIs and ATM-S occurrences, respectively. Note that when an ANSP/NSA did not apply the RAT because they did not report this type of occurrence or because the severity was below the level that requires its application, i.e. below severity C, there is no bar in the figure and with letters "N/A" instead. This demonstrates that the application of the RAT was not required. However, if there were occurrences that required the RAT application, but the RAT was not applied, this is depicted without a bar but with the label '0%', indicating non-compliance with the target.

80 24 States and their ANSPs used the RAT methodology for deriving the severity of reported SMIs (Figure 22) for both ATM Overall and ATM Ground of all SMIs required by the Regulation, respectively.

81 Two SES Member States (Poland and Cyprus) did not apply the RAT methodology to derive the ATM Overall component for those SMIs within the scope of the performance scheme, failing to achieve the target set. In addition, three States did not apply RAT either because they did not report any SMIs (Malta) or because the severity was below C level (Slovenia and Netherlands). Hence, there was no scope for the application of the RAT methodology. Denmark did not provide data in its PMR, and their progress towards the target was not assessed.
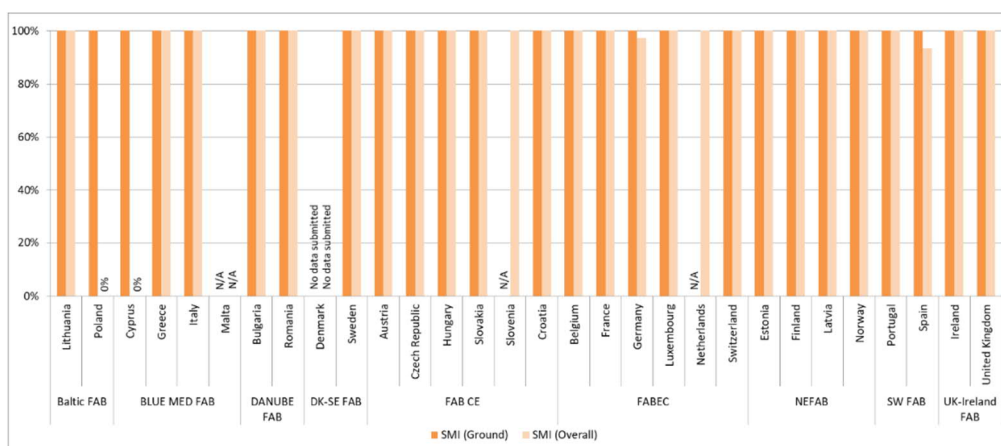

Figure 22 – RAT methodology application for severity classification of SMIs – year 2019.

82 16 Member States and their ANSPs used the RAT methodology for deriving the severity of applicable RIs (Figure 23) for both ATM Overall and ATM Ground of all RIs required by the Regulation, respectively.

83   Denmark did not provide data in its PMR, and their progress towards the target was not assessed. In addition, eight States did not need to apply the RAT either because they did not report any RIs (Cyprus) or because the severity was below C level (Lithuania, Greece, Malta, Romania, Slovenia, Luxemburg, Estonia). Hence, there was no scope for the application of the RAT methodology. The NSA of Poland did not apply RAT. The UK ANSP, while applying the RAT methodology, did not achieve the 2019 target, achieving 67%. The NSA of Spain failed to achieve the target (57%) despite using the RAT methodology. The rest of Member States, i.e. 17 States, achieve in full the 2019 targets.
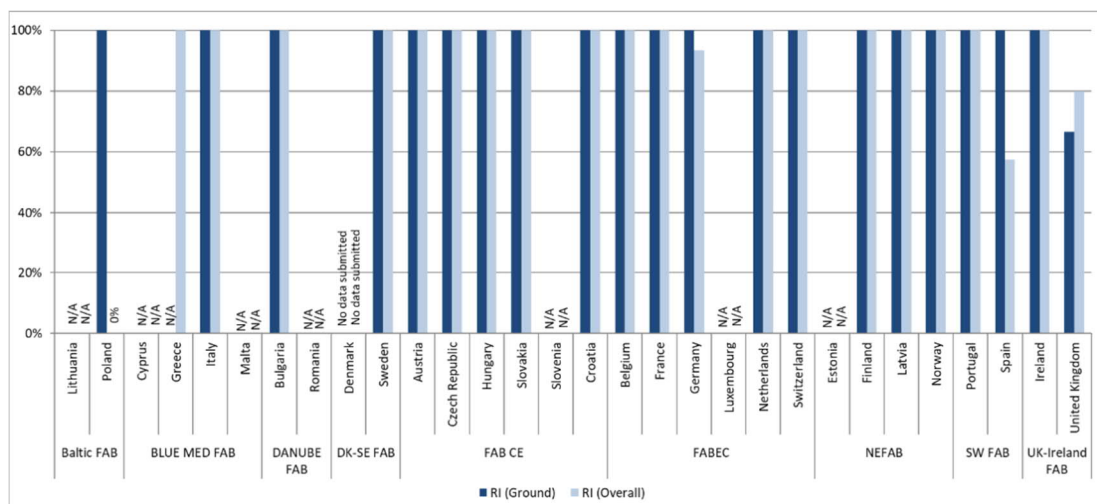
Figure 23 – RAT methodology application for severity classification of RIs – year 2019.

84   26 ANSPs in their States used the RAT methodology for deriving the severity of applicable ATM specific occurrences (Figure 24) for the ATM Overall of all ATM-S occurrences required by the Regulation.

85   Denmark did not provide data, and their progress towards the target was not assessed. One Member State (Spain) did fail to achieve the 2019 target, applying the methodology to 76% of relevant occurrences. Two Member States were slightly below the target: France and Germany with percentages of applicability of 97% in both cases. This is of no surprise as the number of occurrences in these three Member States are quite high and, despite using the RAT methodology, previous years have shown that by the time of the drafting of this report they still have a backlog of occurrences to assess. The rest of Member States, i.e. 26 States, achieved the 2019 target.

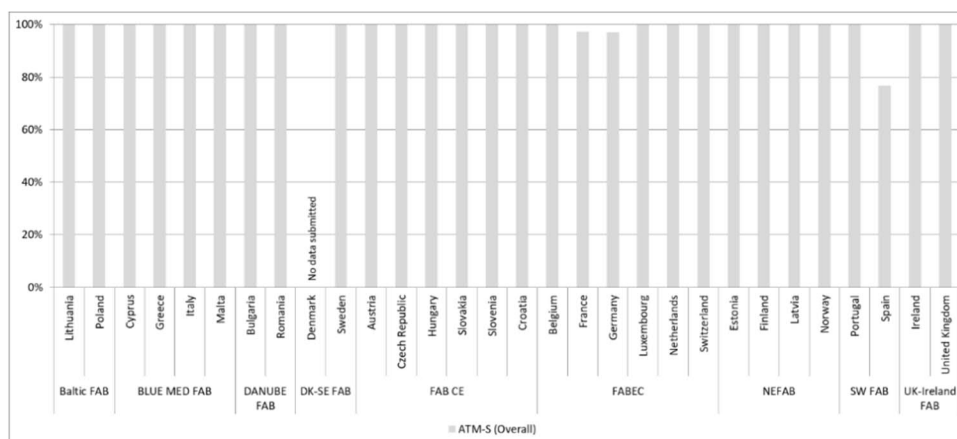
Figure 24 – RAT methodology application for severity classification of ATM-Specific – year 2019.

86 Note: Data concerning the verification of the RAT application is based on **preliminary 2019** information (collected at the end of April 2020), and the data submitted by Member States in their Performance Monitoring Reports of June 2020, later updated during August 2020. Updates may occur during September 2020.

2.2.3   Just Culture

87 The Safety Key Performance Indicator (Safety KPI) on Just Culture is assessed on the basis of the responses given to the self-assessment questionnaires for both States and ANSPs, as defined under Regulation (EU) No 390/2013. The questionnaires are included in AMC/GM material developed by EASA under the rulemaking procedure and adopted as a Decision of the EASA Executive Director.

88 The aim of the assessment is to identify those institutional tendencies and approaches which indicate the presence (or corresponding absence) of a Just Culture environment in a given State or ANSP. Both the State and the ANSP questionnaires on Just Culture are divided into the three main sections:

- Policy and its implementation;
- Legal & Judiciary;
- Occurrence reporting and investigation.

89 For RP2, FABs were expected to set local targets for Just Culture – as per Regulation (EU) No 390/2013, i.e. FAB level.

90 For the monitoring exercise of 2019, all 30 States and 31 ANSPs filled in the self-assessment questionnaires used for the measurement of the JC Safety PI in accordance with the EASA AMC/GM. In addition, FABs were to report via the FAB Performance Monitoring Reports on common FAB approaches for improvement in certain Just Culture areas, providing details on possible areas of improvement at both State and ANSP level.

91 Based on the review of the 2019 FAB PMR, it appears that there is no harmonised approach to the implementation of Just Culture. Some FABs made a commitment to apply the Just Culture principles and to work together on Just Culture issues. Others have provided either no or very little detail on working arrangements and indications of how improvements are measured.

92 Table below shows observations based on analysis of 2019 FAB PMR.

FAB	OBSERVATION
BALTIC	The BALTIC FAB has not established a common approach to improve Just Culture either at State or at ANSP level. At State level, Just Culture training programmes for the staff have been identified as an area for improvement, but not implemented yet. With regards to the legal system, Member States have to implement the provision concerning protection of information and reports in the national legislation, as stated in Art. 16 of Regulation (EU) No 376/2014. No progress is reported yet. At ANSP level, Just Culture training programmes for the staff has been identified as an area for improvement, but not implemented yet.
BLUE MED	The BLUE MED FAB has reported that a common approach to improve Just Culture is established at both State and ANSP level. Possible areas of improvement were not identified at either the State or ANSP level. No progress has been reported.

FAB	OBSERVATION
Danube FAB	The Danube FAB has not established a common approach to improve Just Culture either at State or at ANSP level. In 2017, it reported otherwise at ANSP level. At State level, it is reported that Just Culture principles were adopted within the CAAs of Romania and Bulgaria. These principles have been included in the SSPs. Both States have provisions regarding the protection of reporters and confidentiality in the national database, capturing all main protection and Just Culture requirements of Regulation No 376/2014 into national regulation. Assurance regarding the avoidance of prosecution is given by the CAAs, without prejudice to the applicable criminal law, as a result of unintentional or involuntary violation of the law and serious and ignorance of an obvious risk. No agreements with the judiciary system are reported. At ANSP level, all areas of improvements in the Just Culture areas reported are specific and do not refer to this FAB common approach. ROMATSA has formally implemented a Just Culture policy, having periodic awareness campaigns. BULATSA has updated its Safety Policy to include specifically Just Culture principles stemming from Regulation 2017/373. BULATSA organised a workshop with the judiciary representatives to debate Just Culture principles in 2019.
DK-SE FAB	The DK-SE FAB has reported that a common approach to improve Just Culture is established ANSP level, but not at State level. No progress has been reported under areas of improvement. In 2017 a common governance body was established at State level to identify areas of improvement. No legal changes are foreseen in any State. Legal constraints relating to the exchange of occurrence data at State level (between NSAs) were reported as having been resolved. In 2017, both organisations reported that a common Just Culture policy and harmonised SMS was implemented at the ANSP level, including processes for occurrence reporting and investigation. The legal constraints to exchange information were identified but are not yet implemented.
FAB CE	FAB CE has reported that a common approach to improve Just Culture is established at both State and ANSP levels. No progress has been reported at this stage. Possible areas of improvement were not identified for either State or ANSP level.
FABEC	FABEC has reported that a common approach to improve Just Culture is established at both the State and ANSP levels. At the State level, the FAB has reported the commitment of its Member States to identify a clear Just Culture (endorsed by all CAAs), and that there will be a requirement for ANSPs to implement a common Just Culture policy. There is a commitment to train the staff on Just Culture elements in a harmonised manner across the ANSPs of the FAB. No other improvements are identified for either the Legal system or occurrence reporting processes. At ANSP level, seven ANSPs will adopt a common Just Culture policy and principles, and will ensure their staff are trained on Just Culture elements. Training courses will be prepared in coordination with the NSAs. There are several commitments among the seven ANSPs to: • Ensure subject matter experts are involved in the determination of 'unacceptable behaviour'; • Provide legal support for its own staff in case of prosecution, and to preserve in full the pay and benefits of the staff member concerned until the end of the investigation; • Establish a well-known stress management system.

FAB	OBSERVATION
NEFAB	NEFAB has reported that a common approach to improve Just Culture is established at the ANSP level, but not at the State level. At the State level, a common policy is not foreseen as necessary and no agreements will be reached as to cover legal aspects with regards Just Culture. The legal systems in each State of the FAB are different and they do not expect to cover any common legal aspect regarding Just Culture. Latvia organised a workshop with judiciary representatives on Just Culture principles in 2019. With regards to occurrence reporting, the collaboration is established to harmonise principles and procedures to classify occurrences and severities, which will facilitate exchange and dissemination of safety information at NEFAB level. At ANSP level, possible areas of improvement were not identified and no progress has been reported at this stage.
SW FAB	The SW FAB has not established a common approach to improve Just Culture at State level. They have established a common FAB approach at ANSP level. Possible areas of improvement were not identified for either the State or ANSP level; SW FAB has only reported that work is in progress to define a common framework at ANSP level. Training of Just Culture was reported to have been implemented and delivered in ENAIRE in 2017.
UK-IE FAB	UK-IE FAB has reported that a common approach to improve Just Culture is established at both State and ANSP levels. At State level, a common regulator Just Culture policy was developed including a commitment to deliver focused training to staff. This was delivered. Induction training for new staff since this has included a Just Culture element. The JC programme described above included the implementation of Regulation (EU) 2014/376 in both the CAA and IAA to ensure a common understanding of the implications of this Regulation. Regulatory oversight of this occurrence reporting has been embedded into the routine oversight of all CAA and IAA approved organisations. No areas of improvements were identified in the legal/judiciary system. At ANSP level, both ANSPs have published harmonised Just Culture policies and principles. There is however no identified need for formal agreement with the Judiciary, since safety investigations are protected by law. The occurrence reporting and investigation are reported similarly for both ANSPs, being independent of the operational management, and no further common improvements are foreseen. No national level targets relating to the safety culture questionnaire have been published by the NSAs within the UK-Ireland FAB. No targets have been set for the JC questionnaire.

Table 4 – Just Culture implementation at FAB level.

2.3   Safety Performance Indicators

93   This section describes the 2019 safety performance review, and its evolution during the entire RP2 period, by monitoring at local level the Safety Performance Indicators (Safety PIs) as defined in paragraph 1.2 Section 2 Annex I of Regulation (EU) No 390/2013: the application by ANSPs of automated safety data recording systems, the level of occurrence reporting, and the number of SMIs, RIs, AIs, and ATM-specific occurrences. Local means at Functional Airspace Block level with an indication of the contribution at national level.

2.3.1   Automated safety data recording systems

94   This PI aims at capturing the application by ANSPs of automated safety data recording systems used for detecting, recording and post-operation analysis and reporting of SMIs and RIs.

95 11 ANSPs have reported they used some type of automated safety occurrence recording system in 2019, one more than at the beginning of RP2 in 2015. Some States have not reported information, but in previous years reported that no implementation was undertaken, thus it can be assumed that their ANSPs have not yet implemented these tools. Ireland has reported that its ANSPs is testing such a system and implementation will be effective in the coming years.
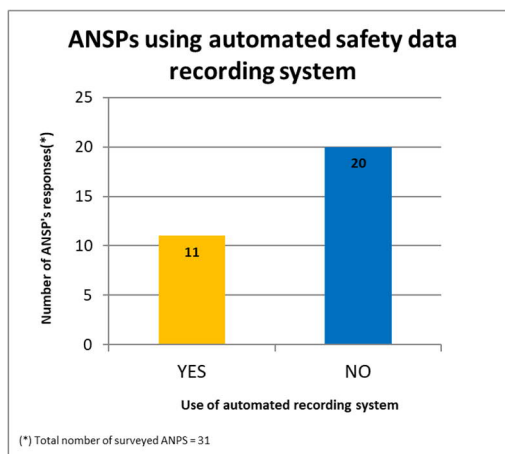

Figure 25 – ANSPs using automated recording systems.

96 Out of these 11 Member States that have some type of automated recording system, eight collect information about SMIs, whilst three (ANS CR, BULATSA, and ENAIRE) collect information on both SMIs and RIs.

97 Most Member States did not provide the requested information about numbers of detected events using these automated recording tools. In certain cases, the ANSPs reported that it was impossible to determine how many formally reported events were automatically detected, or that the use of the tool was not aimed at improving occurrence reporting. Most of the ANSPs reported that the tools were not used to improve occurrence reporting, but for other analytical purposes.

98 Among Member States that did report the use of these automated tools by their ANPSs, nine provided the definition of the events that trigger the automatic detection of events for further analysis. It is observed that the parameters used were not harmonised, which is not, however, surprising as the local ATC environment, the use of the tool and the associated processes by the ANSP differ among ANSPs. For example, two of these ANSPs use a vertical separation of 800 feet to trigger the events, and a horizontal parameter similar to the standard separation. One State reported different triggering parameters for different ACCs. Another ANSP 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. Finally, another ANSP uses intermediate parameters: in a 5NM separation standard environment, the tool is triggered by encounters of 3.5 miles laterally and 600 feet vertically, and in a 3NM separation standard environment and for aircraft encounters of 2.0 miles laterally and 600 feet vertically. 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 nuisance events recorded that will ultimately be discarded as genuine SMIs. On the contrary, the use of parameters close to separation standard, aims at capturing as many encounters with separation below prescribed standards as possible, and ultimately may capture many non-genuine events.

99 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 implemen-

tation of these tools has not increased significantly during the RP2 period. This limited implementation does not include a harmonised definition of the events that trigger the capture of occurrences, as it may serve to different purposes in each ANSP. In addition, even when these tools are implemented, their use seems, in most cases, to be devoted to operational analysis (e.g. identification of hotspots) and not to complement occurrence reporting. The widest automated recording tool is for detecting SMIs, and only three ANSPs use these tools to detect RIs.

2.3.2   Level of occurrence reporting

100   This PI aims at monitoring the level of reporting in the SES States, both at Member State and ANSP level. The section is divided in two subsections. The first one gives, quantitatively, a Union-wide and FAB view of the characteristics of occurrences reported during 2019, including both the ratio of high-severity and low-severity occurrences and the reporting rates. The second provides a summary of the reported assessment provided by each Member State about the level of occurrence reporting in their State and ANSP.

2.3.2.1   Union-wide/FAB level of reporting

101   Table 5 collects the reported occurrences during 2019 grouped by severity, high and low, split by type of occurrence, namely SMI, RI, AI, and ATM-S. High-severity occurrences include occurrences classified using the RAT methodology as AA/A and B and low-severity occurrences include occurrences classified as C and E. Those occurrences for which the severity has not been determined, i.e. class D, where data where insufficient, are excluded from the analysis of this section.

102   This severity scale corresponds to the severity result of the application of the RAT methodology for those occurrences that the performance scheme requires its application. For the other occurrences for which the performance scheme does not require the application of the RAT methodology (i.e. airspace infringements or occurrences with severity E), the severity may have been assigned through other means such as expert judgement or the application of another severity classification method.

TYPE OF OCCURRENCE		# OF HIGH SEVERITY	# OF LOW SEVERITY
Union-wide reported occurrences	SMI	284	1,818
	RI	68	1,108
	AI	38	4,027
	ATM-S	219	14,078

Table 5 – Union-wide number of high and low severity reported occurrences – year 2019.

103   Figure 26 illustrates the percent of high-severity and low-severity occurrences graphically at Union-wide level, i.e. the percentages represented in the figure are calculated considering collectively all reported occurrences by SES Member States. SMIs and RIs show 14% and 6% of high-severity occurrences over the total, respectively, while AIs and ATM-S occurrences show 1% and 2%, respectively.

104   The proportion of high-severity occurrences of AIs and ATM-S are significantly lower that the proportion of high-severity occurrences of SMIs and RIs. This difference is not fully understood. It may be the result that SMI and RI occurrences bear higher severity than AIs or ATM-S, that the assessment of severity of certain type of occurrences were biased by the analysts towards less/higher severe categories, or even that AIs and ATM-S events may contain less information that allows the

investigators to assign accurately the severity of the occurrence, thus having a higher number of classified occurrences as category E. With regards AIs, the ANSP may lack of the aircraft view and the occurrence reporting system may only capture the ground perspective, which may be incomplete. With regards ATM-S, in most of the situations there is no effect on the ATM service due to redundancies in the systems.
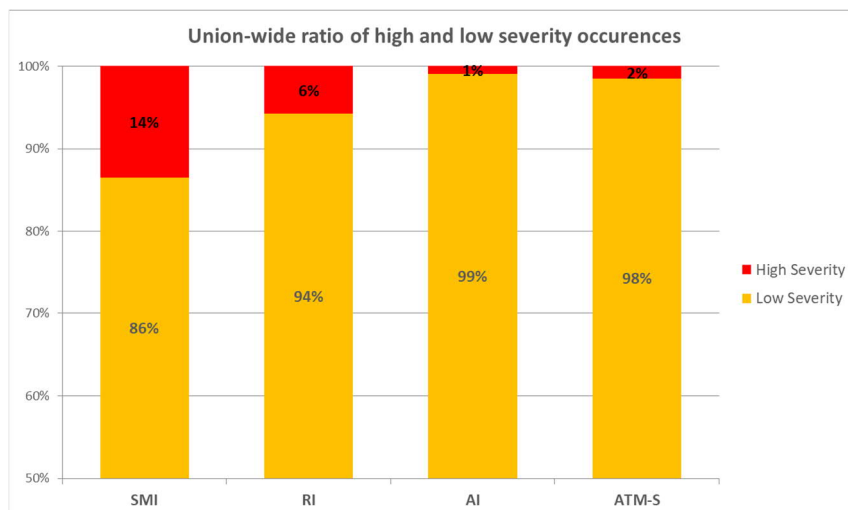

Figure 26 – Union-wide proportion of high and low severity reported occurrences – year 2019.

105 Figure 27 illustrates how the percentage of high-severity occurrences has evolved during RP2. This proportion has increased during the RP2 period for SMI occurrences, for AIs this proportion has decreased, while for ATM-S has remained relatively constant.

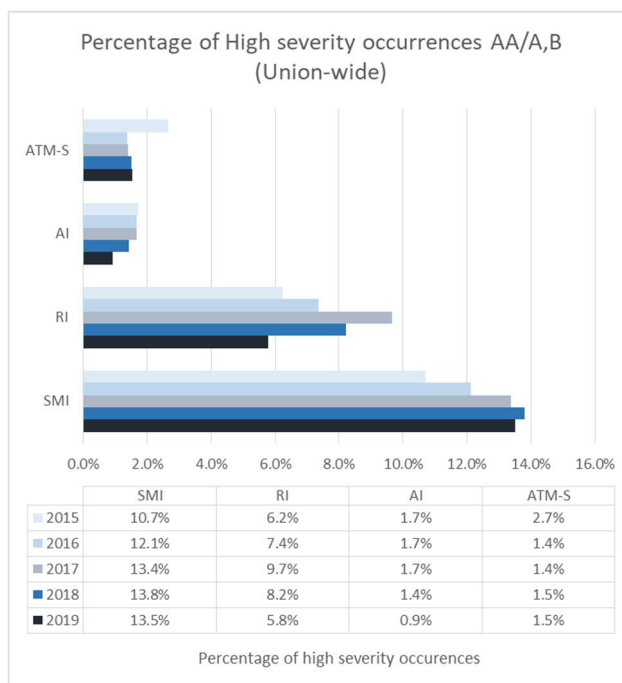|	SMI	RI	AI	ATM-S
2015	10.7%	6.2%	1.7%	2.7%
2016	12.1%	7.4%	1.7%	1.4%
2017	13.4%	9.7%	1.7%	1.4%
2018	13.8%	8.2%	1.4%	1.5%
2019	13.5%	5.8%	0.9%	1.5%

Percentage of high severity occurences

Figure 27 – Union-wide proportion of high-severity reported occurrences – trend during RP2.

106 Figure 28 depicts the percent of high-severity occurrences by type observed in each FAB for the year 2019. It is assumed that consistent levels of reporting within the Member States and similar safety levels in the provision of the services should lead to the proportion of high-severity occurrences in the FABs to vary around the Union-wide figures. The figure shows that this is not the

case, and that there are significant variations in the proportions of reported occurrences with high severities. There are, however, several factors that explain why this may not be the case in practice, among which the more important are: the level of reporting may not be consistent across Member States and/or FABs, analysts may apply different criteria to assign severity across types of occurrence (the likelihood is higher when the method is not common to all type of occurrences or involves higher degree of subjectivity), and the actual safety performance of ANS services achieved may be different. The identification of the more likely reasons is not possible with the data available and should be done at local level.
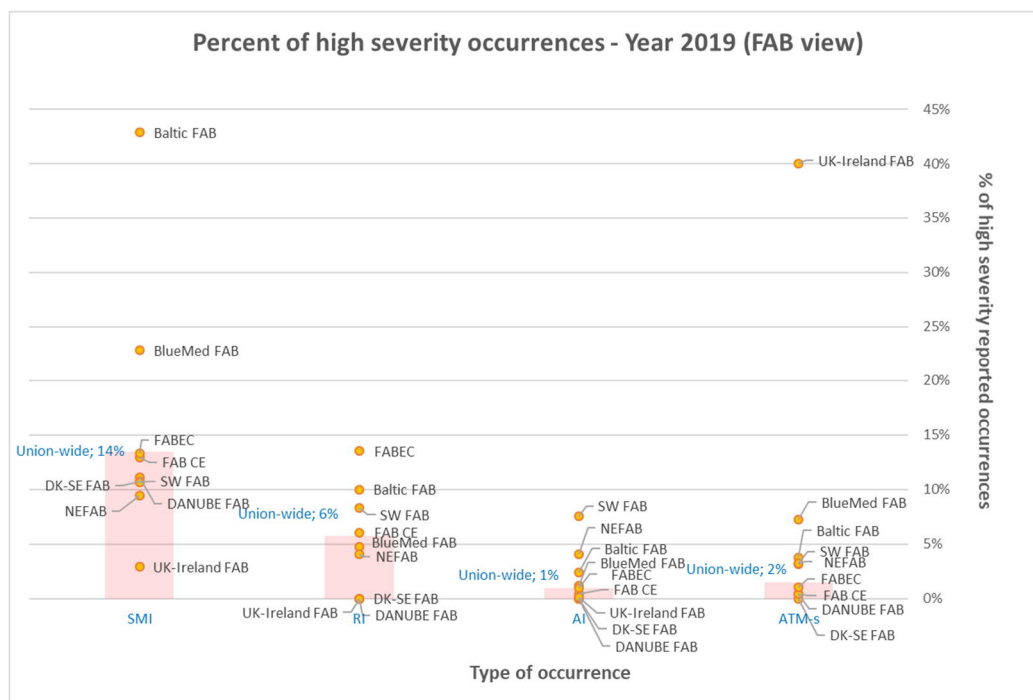

Figure 28 – FAB proportion of high-severity of reported occurrences vs Union-wide.

107 Figure 29, Figure 30, Figure 31, and Figure 32 depict the FAB reporting rates per occurrence type together with the built box plot of reporting rates of Member State in the SES area for the year 2019. A box plot is a way to describe the distribution of the reporting rates across Member States at a glance, showing the reporting rates at quartile ranges. The lower, middle and upper line of the rectangular box represents the 25% (first quartile), 50% (median) and 75% (third quartile) percentile respectively of the distribution of reporting rates of the SES States, i.e. 50 % of the Member States reporting rates lay between the upper and the lower limit of the rectangular box. Above the 3rd quartile line, a vertical line is extended up to a point that marks the 91st percentile value of distribution of MS reporting rates. Below the 1st quartile, a vertical line is extended to a point that marks the 9th percentile value of distribution of Member State reporting rates. The spacing between the different parts of the box indicate the degree of dispersion (spread) and skewness in the data, e.g. the narrower the box plot limits are, the closer the reporting rates of the 50% of the MS around the middle value are. A symmetric box represents a symmetric distribution of rates around the median.

108 Figure 29 illustrates the Union-wide box plot of reporting rates of SMIs, normalised with the number of IFR flight hours in the airspace included in the performance scheme. The figure depicts the average FAB reporting rate as well. It is worth noting that there is one FAB with higher reporting rates than the 50% box (FABEC) and one has lower rate (DANUBE FAB). Similar reporting patterns have been observed for these FABs in earlier years in RP2.
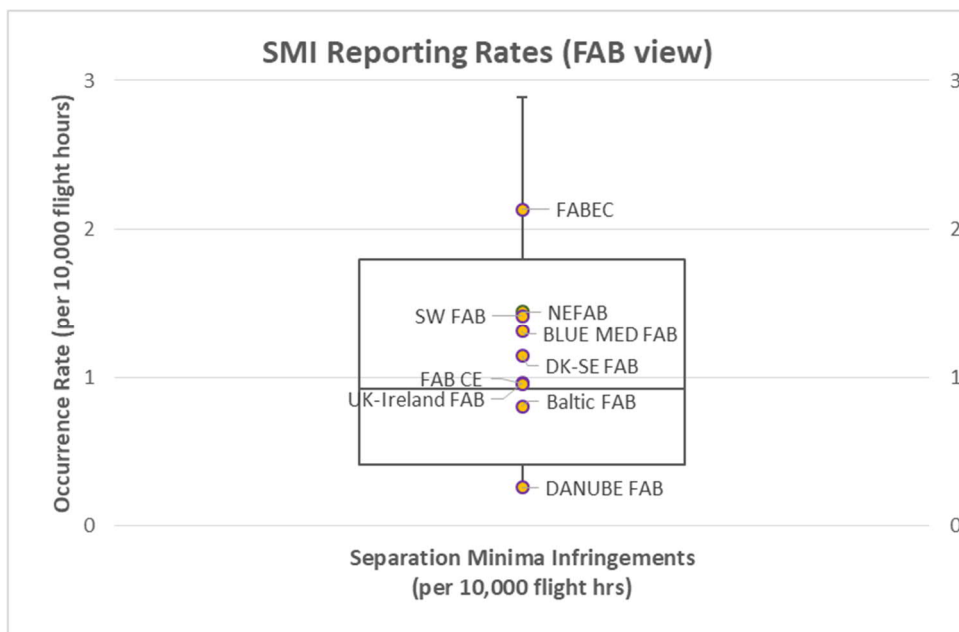
Figure 29 – Box plot of Union-wide and FAB reporting rates of SMIs.

109 Figure 30 illustrates the Union-wide box plot of reporting rates of RIs, normalised with the number of IFR movements at airports included in the performance scheme. The figure depicts the average FAB reporting rate as well. Up to four FABs have higher reporting rates than the 50% box (FABEC, SW FAB, NEFAB, BLUE MED, and DK-SE FAB) and one has lower rate (DANUBE FAB). FABEC and DANUBE FAB have been observed in similar positions in the previous years in RP2.

Figure 30 – Box plot of Union-wide and FAB reporting rates of RIs.

110 Figure 31 illustrates the Union-wide box plot of reporting rates of AIs, normalised with the number of IFR flight hours in the airspace included in the performance scheme. The figure depicts the average FAB reporting rate as well. It is worth noting that two FABs have higher reporting rates than the 50% box (UK-Ireland FAB, FABEC, DK-SE FAB) and two have lower rate (DANUBE and SW FABs).
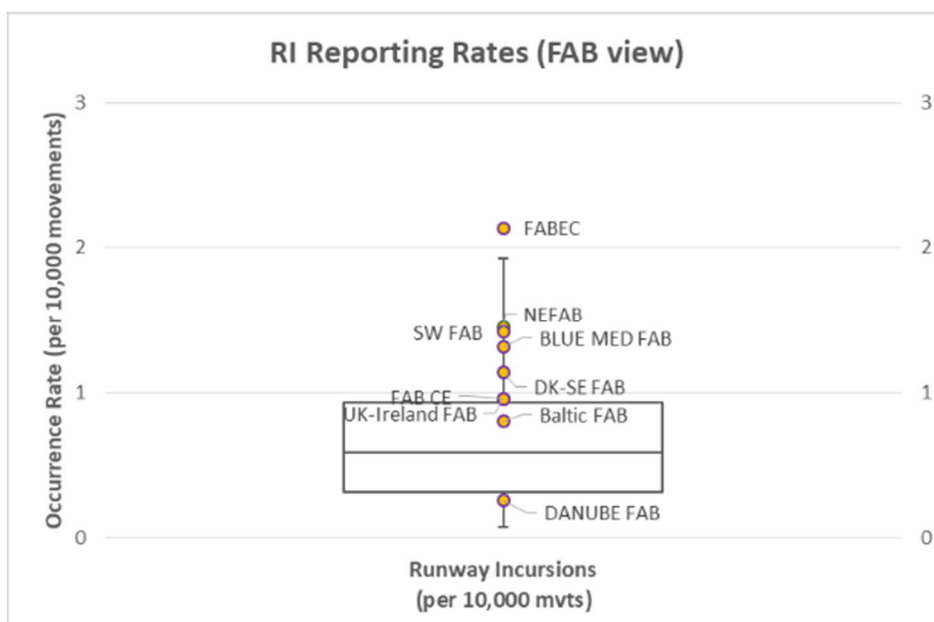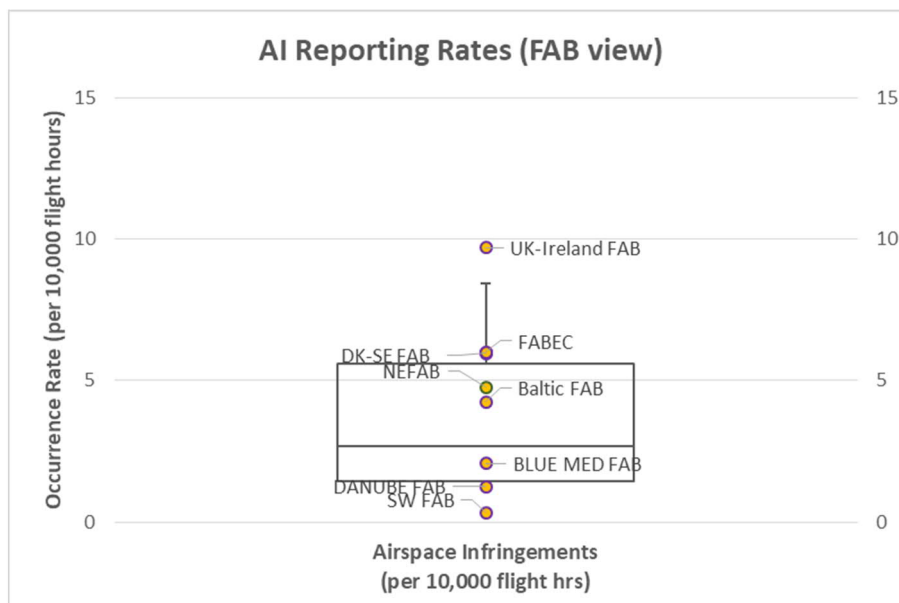
Figure 31 – Box plot of Union-wide and FAB reporting rates of AIs.

111 Figure 32 illustrates the Union-wide box plot of reporting rates of ATM-S occurrences, normalised with the number of IFR flight hours in the airspace included in the performance scheme. The figure depicts the average FAB reporting rate as well. Four FABs have higher reporting rates than the 50% box (DK-SE FAB, NEFAB, FABEC, and FAB CE) and two have lower rate (UK-Ireland FAB and BLUE MED).
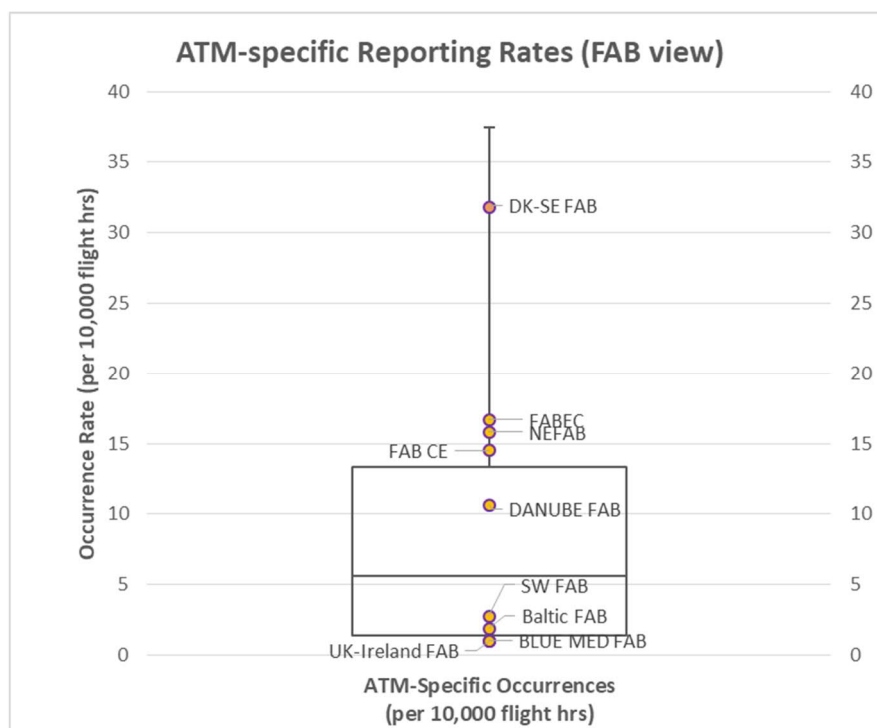

Figure 32 – Box plot of Union-wide and FAB reporting rates of ATM-S.

112 A closer look at the four figures show that the spread of reporting rates of ATM-S is higher than the rest of types of occurrences (wider rectangle box plot), while the spread of SMIs and RIs reporting rates are similar and narrower than the other type of occurrences. This has been observed

for every year of RP2. This may be an indication that certain occurrence types, e.g. ATM-S, are analysed across Member State less consistently than others, either because the assessment criteria used by Member States/FABs are different or because the method to assign severity or even to consider the event reportable, is applied differently across them. This may be the case in occurrences with severity classified as D or E, or in AIs (neither of them requires the application of the RAT). Some States have also reported their change in the criteria used in considering an occurrence as ATM-S. Certain States consider that only technical failures in the ATM systems that have an effect in the services should be reported as ATM-S occurrence, i.e. the failure of a channel of a two-channel VOR (VHF Omnidirectional Radio Range) is not considered as an ATM-S event, if the VOR continues to provide the signal. Others make a distinction between internal, meaning under ANSP control, and external systems. It is apparent that the criteria are not harmonised.

113 The expectation is that consistent levels of reporting across Member States and similar safety performance in the provision of the services should lead to concentration of the reporting rates around the median, and the limits of the box plot should get closer. However, in practice, the reporting rates are spread for several factors. Some of these are:

- Over-reporting leads to Member States/FABs rates higher than the median and outside of the boxplot, under-reporting leads to the opposite – rates below the median and outside of the boxplot;

- Application of different criteria of what constitute a "reportable event" could also influence the spread of reporting rate. This is particularly evident in the event ATM-S, where distributions of rates are much wider;

- Different safety performance of the services provided could be a factor as well;

- Different effectiveness of safety barriers could potentially have an effect (i.e. differences in the effectiveness of safety barriers may lead to experience more frequently a type of occurrences than others).

114 The use of the selected exposure data for normalisation across Member States may play a role in the variation of rates as well.

115 It is observed that DANUBE FAB shows reporting rates at the lower range in three of four of the graphs. On the contrary, FABEC show reporting rates at the higher range in four of the graphs.

116 Union-wide level box plots may be used as a management tool to monitor the evolution of reporting rates during RP2. On the one hand, they can be used to monitor whether the lower reporting rates improve during RP2, so that all the lower reporting rates move into the middle 50%, as defined by the box plot. On the other hand, the plots may determine whether the reporting rates are becoming more consistent as the reference period progresses and the new box plots in the years to come become narrower. When comparing data throughout the RP2 period, this has not been observed.

2.3.2.2 Member States/ANSP level of reporting

117 This section summarises the results of Member States submitted analysis of their level of reporting and those of the ANSPs under their jurisdiction. The level of analysis, deficiencies identified, measures adopted and local specificities that impact the level of reporting is explored. Several best practices are extracted from the State reports that may help to improve the level of reporting. Some Member States failed to provide the requested information in a consistent manner using a combination of quantitative and qualitative analysis of their level of reporting. This seems to be the consequence of a lack of understanding of the requested information in this Safety PI and its associated AMC/GM. The reports were mainly limited to qualitative analysis of the situation in

each State without providing in many circumstances evidence of the statements. However, no major issues related to the reporting levels of the ANSPs were identified by any NSA. On the contrary, most of the States reported good and healthy reporting levels of the ANSPs under their oversight. In addition, the information provided was informative in other aspects such as the implementation of Regulation (EU) No 376/2014, the plans some States have to implement and improve occurrence reporting, establishment of Acceptable Level of Safety Performance (ALoSP)/Target Level of Safety (TLS) or some good practices in the way some States analyse and interact with their ANSP.

118 The main observations about the level of reporting analysis reported by the Member States in their 2019 Performance Monitoring Reports are summarised below:

- The level of analysis varies substantially between Member States. A few States did not provide any analysis of their level of occurrence reporting, (Poland, UK, Malta, Sweden, Belgium, Luxemburg, Netherlands). Some other States (Lithuania, Ireland, Greece, Italy, Bulgaria, Romania, France, Germany, Switzerland, Estonia, Latvia, Norway, Finland, Spain, Portugal) performed a combination of quantitative and qualitative assessment, as indicated by the AMC/GM making an effort to provide some information that supports the status on the occurrence reporting in the country. The analysis was mostly limited to describing the reporting processes in place, according to Regulation (EU) No 376/2014, the establishment of mandatory and voluntary reporting systems and the use of ECCAIRS, the number of events reported in isolation or just anecdotal descriptions of the reporting practices. Some States reported their procedures being under review to comply with the Regulation. Some States reported the use of software tools for collection, storage, submission to ECCAIRs and data analysis as facilitators (e.g. SPSS, Q-pulse, Power BI, but most States declared the use of eTOKAI).

- None of the Member States identified deficiencies in the level of reporting neither at State nor at ANSP level. In general, Member States reported no issues ("reporting culture is improving at ANSP", "level and data quality of occurrence reporting is continuously improving", "the reporting system is well established and accepted", "the level of reporting from ANSP is remarkably stable", "level of occurrence reporting is extremely healthy", "We noticed an increase of reported incidents, given the fact that the mandatory reporting system has been enlarged and a voluntary system has now been used more often" etc. – are common expressions used in the conclusions of the reports). In line with that, not many actions to improve reporting were identified as necessary.

- Some States described the establishment of a dedicated group at the CAA to analyse safety information and monitoring occurrence trends aiming to identify and mitigate major safety risks and to discharge State responsibilities. The output of this analysis feeds both the safety oversight program and the SSP. In addition, several States explicitly indicated the occurrence reporting and the ANSP's SMS processes in this area as an essential part of its annual audit programme of the ANSPs to ensure adequate occurrence reporting.

- Bulgaria, Romania and Lithuania reported that occurrence reporting figures have been used to establish ALoSP/TLS to monitor the safety performance of the ATM/ANS services, and that the level of reporting is monitored routinely against these safety levels. Lithuania has established these targets for the period 2017-2021.

- In previous reports, Member States justified the lack of quantitative analysis because only one ANSP was included in their performance plan, and no other ANSP was available to

compare with or because it was not considered appropriate to benchmarking. Neverthe-less, the reporting rates are different between Member States, as shown in Figure 29, Fig-ure 30, Figure 31, and Figure 32, and the distribution of occurrence rates across Member States were elaborated to allow that comparison at European level, rather than within a single State.

- Member States reported the use of ECCAIRS and compliance with Regulation (EU) No 376/2014, including the issuance of Just Culture principles in their safety policy. They re-ported associated occurrence reporting processes linked to the implementation of Regu-lation (EU) No 376/2014.

- Some Member States have identified and justified an increase in the level of reporting in certain areas. Romania has identified an increase of low severity ATM-S related occur-rences due to the implementation of a new ATM system. France has reported increased numbers of RIs but risks are maintained as acceptable. Portugal reported an increase level or reporting linked to stronger adherence to reporting culture and increase in traf-fic, but no to higher risks levels. Estonia identified significant increase in ATM-S due to winter conditions, but with no specific concern. Similarly, Finland has experienced in-creased in SMI events, but no clear individual reasons have been identified.

119 Finally, several best practices have been extracted from the State reports submitted during the full RP2 period that may help to improve the level of reporting. These are summarised in the following points:

Best practices to improve level of reporting:

The use of electronic databases for collection, storage and analysis is common in all States. There are different approaches on what databases and software solutions are used, e.g. local databases, eTOKAI, ECCAIRS/ECR, etc but in all situations the interchange of automatic information is ensured. Compatibility of formats should be ensured by automatic means, allowing flexibility to continue with the use of legacy databases and to comply with Regulation (EU) 376/2014, while minimising the use of scarce resources. Special attention and effort should be put to improve usability of the reporting portals to facilitate the task of reporters and avoiding frustration.

- Well established coordination and communication processes, including compatibility between their databases, between CAA, Aviation Accident Investigation Board (AAIB), and ANSP are essential for a complete and well designed reporting, analysis and follow up system. National Aviation Authorities (NAAs) may be the central point to coordinate the outputs of ANSPs' reports and investigation from the AAIBs. NAAs may establish a group of experts of different aviation domains that meet regularly to review, analyse, and share information on occurrences including risk assessment and mitigations. Results of this analysis may feed SSPs and the safety oversight programme. In addition, NAAs may receive reports from different stakeholders, and they should always include this information in their analysis. For example, Spain receives a significant amount of reports from airlines and airports that need to be analysed with the information of the ANSP. They have set up regular meetings between the NAA and the ANSP in order to share information and improve the investigation of occurrences with richer information. Estonia has set-up a joint working group to coordinate civil/military analysis and improve coordination to ameliorate the impact of military on the occurrences.

- Easy access to reporting portals (e.g., web, templates to capture occurrences, different level of access, and prefilled mandatory fields that can be changed by the reporter if needed), with fast and user-friendly interfaces will help to easier the collection of reports. For example, dedicated forms for air traffic controllers (ATCOs), Air Traffic Safety Electronics Personnel (ATSEPs), and Aeronautical Information Service (AIS) officers can be built, having most fields prefilled for easy reporting (e.g. date of reporting, dropdown list of options). Different forms for operational and technical reports can be offered. Different means to collect reports should also be offered: web-based, fax, email, paper reports. In addition, the entry points can be the ANSPs, CAAs, AAIBs.

- Local databases are available and accessible to employees, implementing the appropriate level of security and confidentiality as required. Voluntary and mandatory reporting systems may be integrated, implementing different access control and confidentiality levels, as appropriate, but allowing joint analysis. All reports submitted are subject to analysis and follow up, treating voluntary reports in the same way as mandatory reports. Feedback to reporters is provided regularly.

- States, NAAs and ANSPs are adopting "Just Culture" principles, embedding these principles in published Safety policies, which are later communicated to all staff through the official channels and training. Engagement of staff in developing and implementing the Just Culture policy and processes increase trust of the safety investigation and the important role of reporting within the achieved safety levels of the industry.

- ANSP's database that provides feedback from the investigation of reported occurrences to ATCOs, ATSEPs, and other personnel based on a web application and/or email messaging is seen as an excellent tool to reinforce the organisation engagement in safety improvement and in building trust with reporters.

- Stakeholder safety workshops are seen as a means to facilitate collaboration nationally and internationally, improving the sharing of safety data and incident information, learning from this data and enabling safety performance improvements. They should be encouraged within Member States.

- Member States, NAAs and ANSPs should complete Just Culture training. As part of NAA's annual audit programme, oversight of occurrence reporting should be included via the continuous monitoring of reports and via the ANPS's compliance with current legislation on SMS.

2.3.3   Safety performance by type of occurrence

120 This Safety PI captures the number of, as a minimum, separation minima infringements, runway incursions, airspace infringements, and ATM-specific occurrences at all ATS units included in the performance scheme.

121 The most informative data that can be derived from these Safety PIs is linked to the evolution of the metrics across years. However, any trend should be considered carefully. There are additional factors that may influence its evolution, e.g., the level of traffic, improvement/deterioration in the reporting culture, or difference in interpretation of occurrence definitions or applicability within the performance scheme and immediate conclusions regarding whether the trend indicates greater or lower levels of safety of the services must be avoided. The limitations described in Section 2.3.2.1 must be taken into consideration.

122 Table 6 lists the evolution of the total number of occurrences at Union-wide level. While the number of SMIs has remained stable, the rest of occurrences, i.e. RIs, AIs, and ATM-S have increased by 34%, 4%, and 17%, respectively, when compared to previous year.

TYPE OF OCCURRENCE		2015	2016	2017	2018	2019	VARIATION 2018-2019
Reported occurrences Union-wide	SMI	2,290	2,231	2,284	2,294	2,287	~ 0 %
	RI	1,024	1,099	940	1,075	1,435	⬆+34%
	AI	4,041	4,838	4,620	4,873	5,691	⬆+17%
	ATM-S	15,111	14,089	14,664	15,576	16,192	⬆ +4%

Table 6 – Union-wide number of reported occurrences – year 2019.

123 Figure 33 illustrates the trends of Union-wide total number of occurrences by type during RP2. Only SMI occurrences were stable during RP2, while RIs, AIs, and ATM-S show an increasing trend in the number of events. This should be analysed in conjunction with the trend of severity of those occurrences in Figure 27 and the increasing flight hours of controlled traffic by the ANSPs and airport movements.
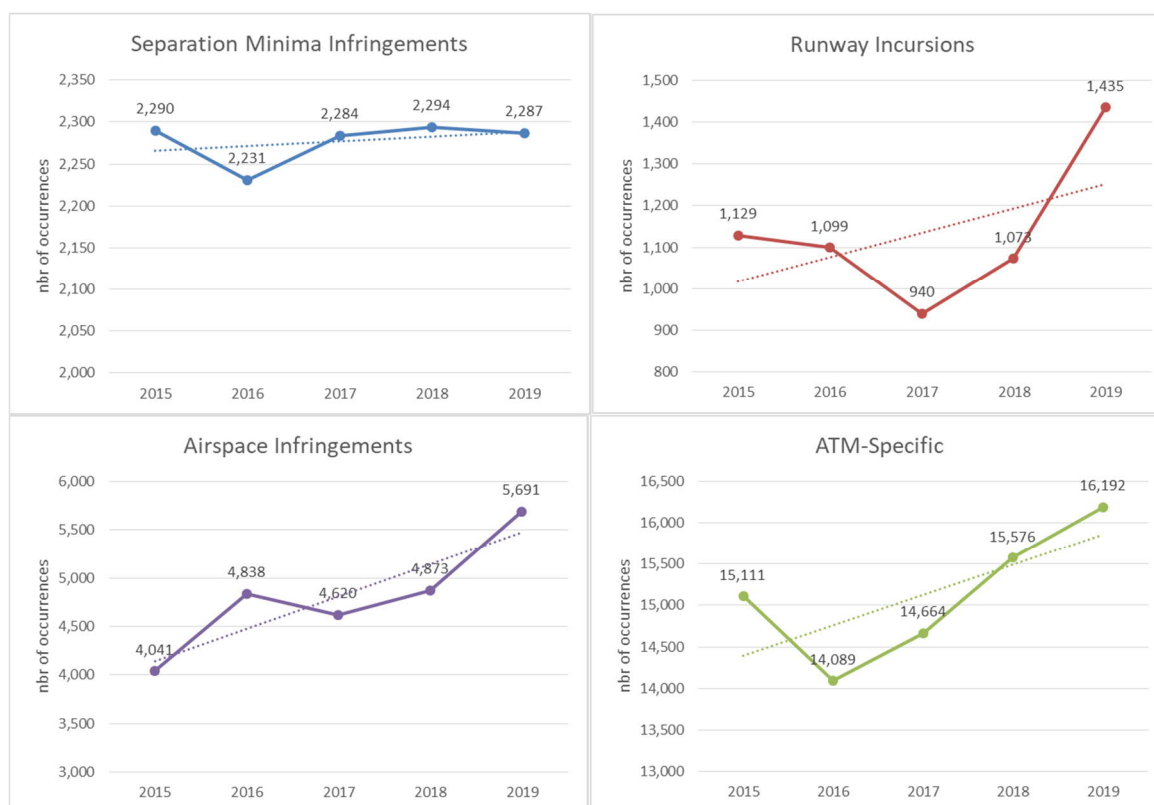

Figure 33 – Union-wide occurrences trend during RP2.

124 Figure 34 depicts the number of SMI occurrences reported by each FAB in 2019 and the variation of these numbers as a percentage of the figures reported in 2018. It is observed that UK-Ireland and Baltic reported a significant decrease in numbers of SMIs by -25 and -11%, respectively, while the NEFAB and DK-SE FAB reported significant increasing numbers of SMIs with percentages including +23% and +19%. The variation of the aggregated numbers of SMIs at Union-wide level has remained almost constant as shown in Table 6.
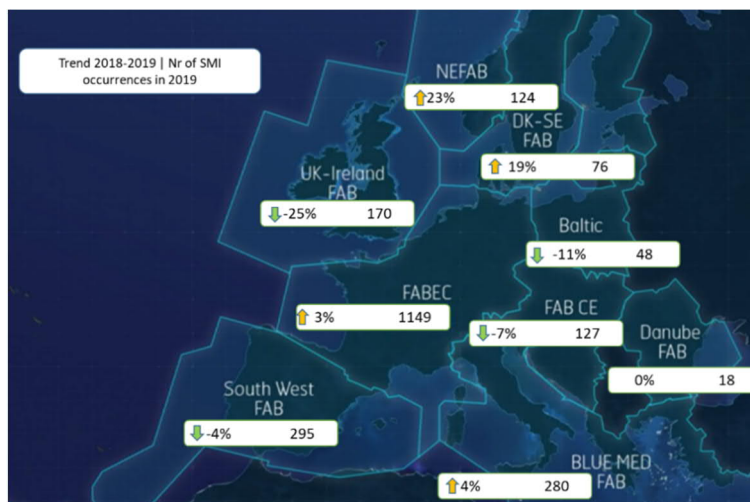
Figure 34 – Evolution of number of SMI occurrences reported by FAB in 2019.

125 Figure 35 depicts the number RI occurrences reported by each FAB in 2019 and the evolution of these numbers as a percentage of the figures reported in the previous year. It is observed that only BLUE MED reported significantly decreased numbers of RIs (by -30%), and the rest of FABs reported increasing numbers of RIs with percentages ranging from 5% to 374%[18], respectively. Other FABs have almost no variation in the reported RIs (FABEC). The variation of the aggregated numbers of RIs at Union-wide level has increased by 34% as shown in Table 6.
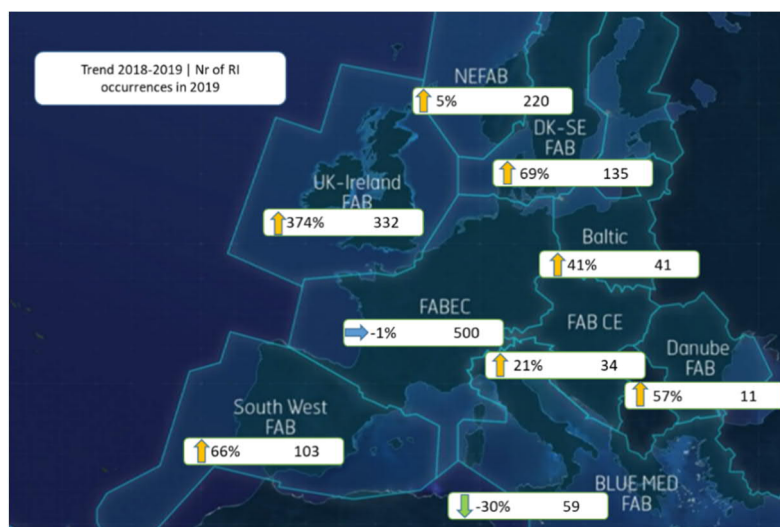

Figure 35 – Evolution of number of RI occurrences reported by FAB in 2019.

126 Figure 36 depicts the number of AI occurrences reported by each FAB in 2019 and the evolution of these numbers as a percentage of the figures reported in the previous year. FAB CE, Danube, FABEC, DK-SE FAB and Baltic, reported the highest increases in AI occurrences by 226%, 81%, 51%, 47% and 11%, respectively. SW FAB reported the highest decrease of AI occurrences (-67%). The variation of the aggregated numbers of AIs at Union-wide level has increased by +4% as shown in Table 6.

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[18] This figure seems to be the result of an error in the reporting chain, which is being investigated.
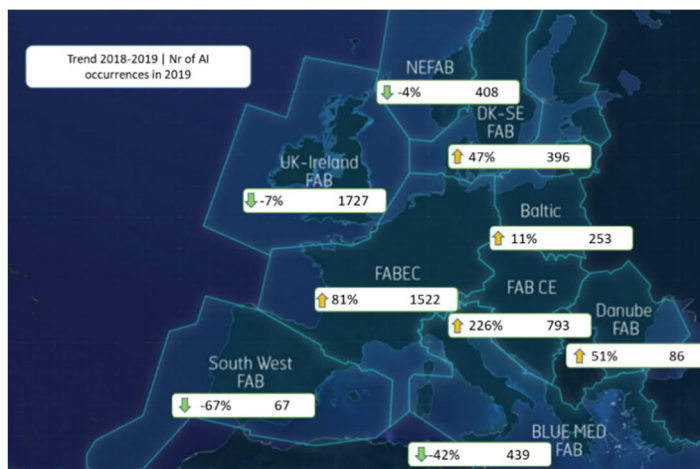
Figure 36 – Evolution of number of AI occurrences reported by FAB in 2019.

127 Figure 37 depicts the number of ATM-S occurrences reported by each FAB in 2019 and the evolution of these numbers as a percentage of figures reported in the previous year. DK-SE FAB, Danube FAB and UK-Ireland FAB reported the highest increases in ATM-S occurrences by 296%, 158%, and 16%, respectively. On the contrary, SW FAB, Baltic and Blue-Med reported the highest decreases by -30%, -22% and -18%, respectively. The variation of the aggregated numbers of ATM-S at the Union-wide level increased by 17% as shown in Table 6.
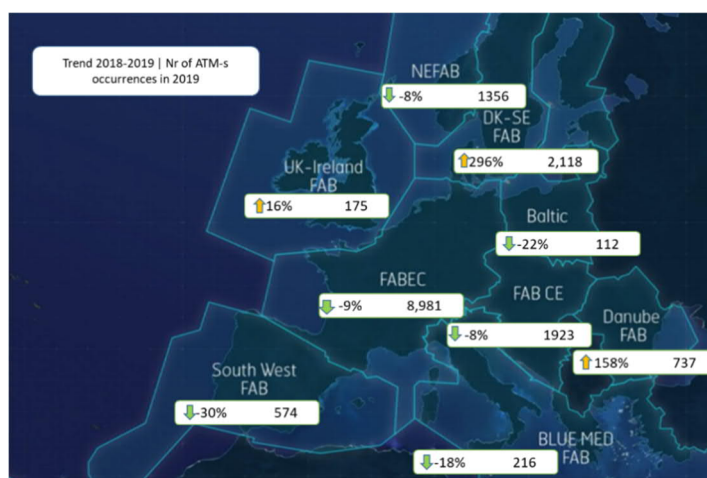

Figure 37 – Evolution of number of ATM-S occurrences reported by FAB in 2019.

128 The reasons for the evolution in the reported occurrences in each FAB/State may be multiple and, because they have not been identified in the PMRs, they cannot be presently determined with certainty. With regards to the increase in reported occurrences in 2019 by some States, the introduction of the Commission Implementing Regulation (EU) No 376/2014 in November 2015, may have played a role in improving the reporting culture, although this effect is likely to be small after some years of implementation. However, this increase is not generally observed across all States. Another factor that may have influenced in the increase of reported occurrences is that the number of airports movements and controlled flight hours have generally increased in most of the States, and thus a better metric should be designed based on normalised indicators of occurrences with the exposure data. The movements at the airports included in the SES performance scheme and the controlled flight hours in the airspace of Member States during 2019 have increased by approximately 1% and 3.5%, respectively.

129 With regard to the decrease in the number of reported occurrences, the reasons may also be multiple. It may be related to an improvement of the safety of the service, but there are caveats related to the data sources and the validation process, as indicated in Section 1.6, which may also have played a role. It has also been observed that there are some issues with the coding of occurrences by Member States and the manual intervention in the extraction of occurrences by Eurocontrol (e.g. occurrences reported through AST do not include the location, thus it always requires the State's correction post-extraction of occurrences by Eurocontrol, which did not always happen). On several occasions, States reduced the number of reported occurrences, arguing that some occurrences were outside of the scope of the SES performance scheme, with no possibility of verification of the criteria used or whether the criteria were homogeneously applied.

130 Nevertheless, some of the substantial variations are of concern and should be closely analysed by local NSAs and ANSPs, who have better insights of the local conditions and circumstances that have led to these variations. It is recommended that local NSAs and ANSPs within those FABs with material changes in the reported occurrences investigate further these changes in order to determine if the variations are due to any of above factors that are related to changes in the reporting culture or criteria, or are the result of a change in the safety risks of their services. The aim should be to further investigate significant increases in one type of occurrences to determine if they correspond to increases in safety risks (or are acceptable variations), and significant decreases to determine if underreporting happened due to any of the above mentioned reasons. The following list contains the FABs that should investigate the highest variations of the reporting occurrences. It is not exhaustive list and some individual States may also want to review their occurrences and reporting practices to the scheme:

- Baltic FAB should investigate its increase of RIs, and AIs, and ATM-S; and the decrease of SMIs;
- BLUE MED should investigate its decrease of RIs, AIs, and ATM-S;
- Danube should investigate its increase of RIs, AIs, and ATM-S;
- DK-SE FAB should investigate the increase in all types of occurrences;
- FAB CE should investigate its increase of RIs and AIs;
- FABEC should investigate its increase in AIs;
- NEFAB CE should investigate its increase in SMIs;
- SW FAB should investigate the increase of RIs and its decrease in AIs and ATM-S;
- UK-IR FAB should investigate its increase of RIs and ATM-S and the decrease of SMIs.

131 The next four figures show the total number of occurrences reported by each Member State. Benchmarking absolute numbers of occurrences should be avoided because the reasons stated above. This is particularly evident in the ATM-S occurrences where the criteria to report occurrences are not harmonised, as indicated in Section 2.3.2.1.
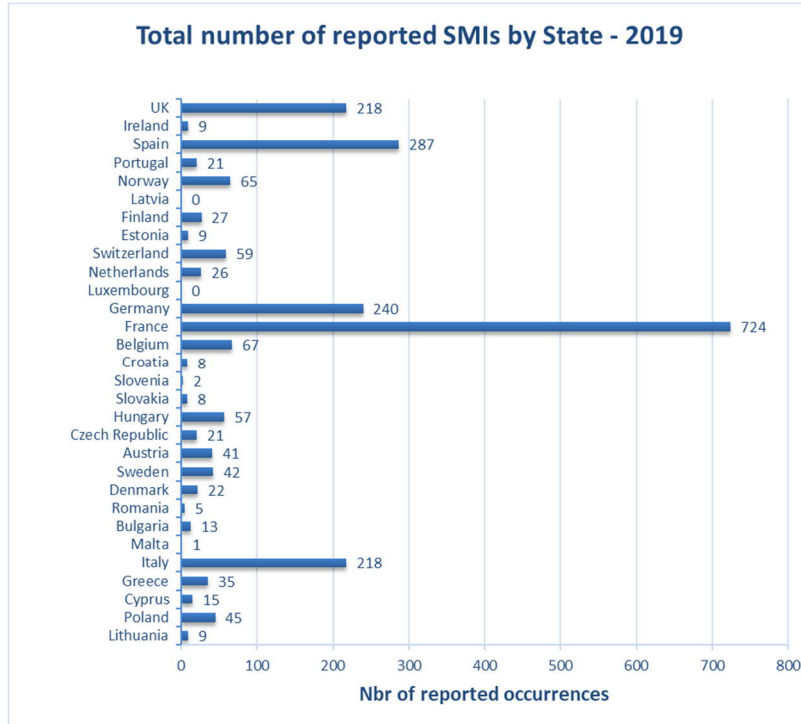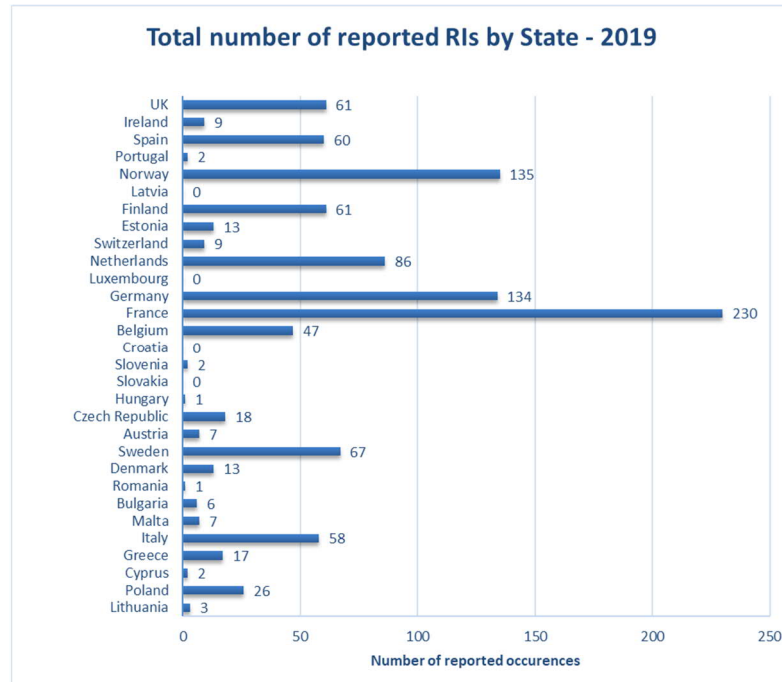
Figure 38 – Total number of SMIs per State.

Figure 39 – Total number of RIs per State.
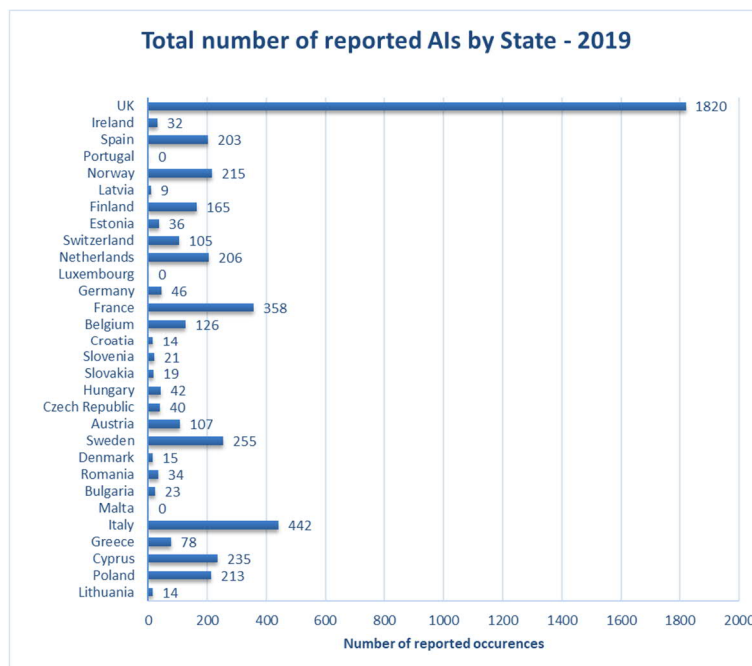
Figure 40 – Total number of AIs per FAB.
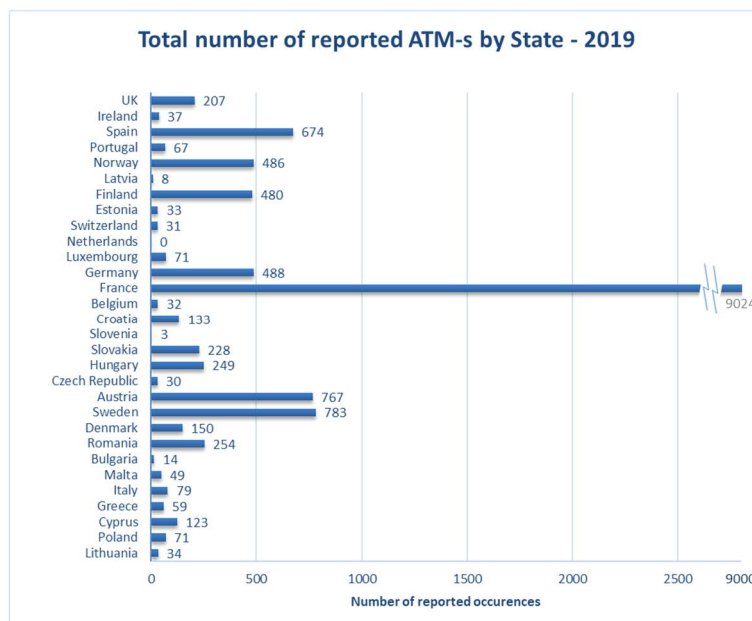
Figure 41 – Total number of ATM-S per State.

3 Network Manager

132 In accordance with Article 6 of Regulation (EU) No 390/2013, the Network Manager shall play a dual role in relation to the performance scheme. On the one hand, it shall support the Commission in the preparation of Union-wide performance targets and monitor and support the achievement of the performance targets by FABs and ANSPs. On the other hand, it shall draw up a Network Performance Plan (NPP) containing performance targets for the NM covering all key performance areas, consistent with the Union-wide performance targets.

133 The NPP for RP2 was submitted on 13th November 2014 and updated and approved by the Network Management Board (NMB). The European Commission approved the NPP for the second reference period through Commission Implementing Decision (EU) 2016/1373 of 11th August 2016. The safety key performance indicators included in the NPP are the following:

Key Performance Indicators		NM Target
EoSM	The minimum level of the effectiveness of safety management	Improving its own SMS to reach at least Level D in the Management Objectives 'safety policy and objectives', 'safety risk management', 'safety assurance', 'safety promotion' and at least Level C in the Management Objective 'safety culture'.
RAT	The percentage of application of the severity classification based on the Risk Analysis Tool (RAT)	Applying the RAT methodology to all reported ATM specific occurrences with the categories AA (total inability to provide safe ATM services, B (partial inability to provide safe ATM services) and C (ability to provide safe but degraded ATM services).

Table 7 – NM KPIs in NPP 2015-2019.

NM Performance Indicators		NM Internal Objective
Top risks	Top 5 Operational safety risks and priorities	Identification of Network operational safety risks (including for its own operations)

Table 8 – NM PIs in NPP 2015-2019.

134 These indicators are assessed in terms of the functions and tasks of the Network Manager in accordance with Regulation (EU) 2019/123. However, the distinction between NM's activities and other Eurocontrol activities not related with the Network functions 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 to achieve their own safety performance targets are performed both by the NM and by the Network Management Directorate/other Eurocontrol units.

3.1   EoSM – NM

135 The EoSM questionnaire for the NM was sent to EASA and justifications provided by NM were cross-checked with the results of the continuous oversight performed by EASA.

136 Table 9 shows consolidated 2019 EoSM results of NM, after EASA verification.

137 Note that the "Minimum level achieved for all other MOs" value is defined as the minimum level achieved for Safety Policy and Objectives, Safety Risk Management, Safety Assurance and Safety Promotion. The level achieved in each component is the minimum level achieved in the MOs that are contained in that component, which is determined by the responses to the EoSM questionnaires as per AMC3 Safety KPI of the EASA AMC and GM to ED Decision 2014/035/R.

138 The NM achieved an EoSM score of 82.8 based on the verified responses to the questionnaire, which has significantly increased in a continuous manner from a value of 50 in the first year of RP2. It must be highlighted that the ANSP model is applied with certain reservations as some of the questions are not fully applicable to NM.

139 Significant progress has been recorded in many areas during 2019. However, the NM did not achieve the RP2 target in full. In the area of Safety Culture, the level achieved is 'D' above the target. Among the All other MOs, only the area of Safety Assurance is at level C, below the target, and it is only by one question (as shown in Table 9 and Figure 42).

EoSM COMPONENT	2019
Safety Culture	D
Minimum level achieved for all other MOs	C
Safety Policy & Objectives	D
Safety Risk Management	D
Safety Assurance	C
Safety Promotion	D

Table 9 – NM level of EoSM.

140 Figure 42 shows how the EoSM questionnaire applied to the NM (marked from Level A to Level E) is distributed per EoSM component.
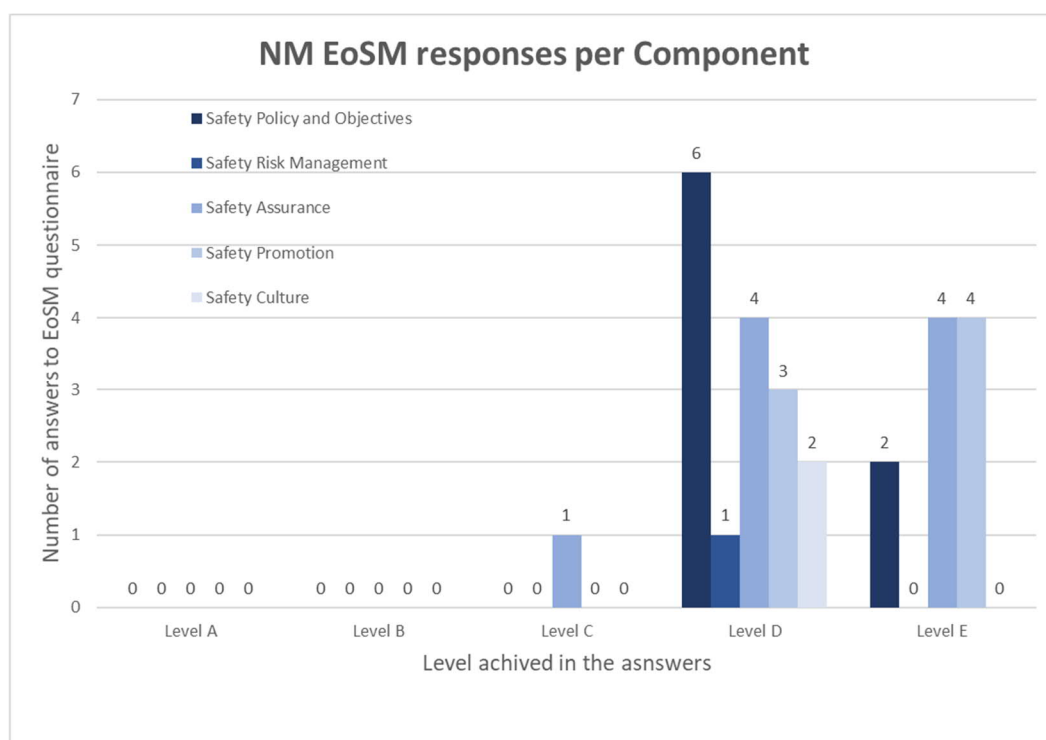

Figure 42 – Level of NM answers per component.

3.2 Application of the RAT methodology – NM

141 The EASA AMC on the application of the RAT methodology was updated in December 2015 (ED Decision 2015/028/R amending AMC and GM to ED Decision 2014/035/R on the implementation and measurement of Safety KPIs) to consider the network specific type of ATM specific occurrences within the scope of performance scheme). In this last update of the AMC, how the RAT applies to the NM and a group of ATM-specific occurrences exclusively applicable to the NM were introduced.

142 In the scope of the Network Functions, those technical events affecting the tactical and real time function that provides traffic prediction, flow monitoring and warnings are the ones to be assessed by the RAT methodology.

143 The NM reported that it applied severity classification using the RAT methodology to 100% of AA/A, B or C ATM-S occurrences, thus achieving the 2019 target. However, these figures have not been verified by either EASA or Eurocontrol/DPS (note that NM does not report its occurrences to AST).

RAT APPLICATION	2015	2016	2017	2018	2019
NM ATM-S target	*N/A*	*80%*	*90%*	*100%*	*100%*
Actual Value	N/A	100%	100%	100%	100%

Table 10 – NM results of application of the severity classification (based on RAT).

3.3   Just Culture – NM

144 There is no Union-wide KPI on Just Culture, thus the NPP submitted by the NM did not include Just Culture as one of the NM Safety KPIs for RP2, in line with the requirement that NM targets should be consistent with the Union-wide performance targets.

4 Summary of observations

145 The following section summarises the key observations and conclusions made after the review of the 2019 FAB Performance Monitoring Reports and verified results of monitoring of Safety KPIs for the last year of RP2, including a review of target achievement in two indicators: EoSM by States and ANSPs, and application of the RAT. An analysis of the evolution of the Safety PIs throughout RP2 was performed when possible.

146 In 2019, there was no accident registered with ANS contribution involving fixed wing commercial air transport operation aircraft above 2,250 kg MTOW, and the number of serious incidents has reached a minimum in the last ten years following a decreasing trend. No ANS-related fatal accident has been observed since 2012, and no fatal accident with ANS contribution has been registered in the last ten-year period. In 2019, eight ATM-related accidents without fatalities were recorded. The analysis of the ANS-related accidents and serious incidents shows a decreasing trend with small fluctuations in RP2.

147 The proportion of events with ANS contribution is significantly smaller in ANS-related accidents than in serious incidents during the last five-year period. This seems to suggest that the barriers present in the aviation system are effective to prevent accidents when the ANS has contributed to trigger the occurrence.

148 The analysis of the overall EoSM minimum Maturity Level Achieved by ANSPs shows that:

- All ANSPs achieved the RP2 target for Safety Culture, as they are at Level C or above for this MO;

- 28 out of 31 ANSPs achieved the RP2 target for all other MOs (the four EoSM components other than Safety Culture), as they achieved Level D or above in all these MOs. This means that 90.3% of ANSPs achieved the target. Three ANSPs (CYATS, LFV, LGS) failed to achieve the RP2 target;

- The average EoSM score value achieved by all ANSPs is 84.7. The minimum score achieved by an individual ANSPs is 62 (CYATS), while the maximum EoSM score is 98 (ENAIRE), with ten ANSPs above 90.

149 The average EoSM score value achieved by all ANSPs shows a continuous improvement throughout RP2, from 79.3 in 2015 to 84.7 in 2019. At the same time, the number of ANSPs below target decreased from ten in 2015 to three at the end of RP2. Interestingly, Safety Culture target has been achieved by all ANSPs, but contrary to the State level, where this component was the one that needs more attention and improvement. This has not significantly changed from 2017.

150 Among the three ANSPs that did not achieve the RP2 target, significant efforts are still needed by CYATS to achieve the RP2 targets (14 questions need improvement), while LFV needs to improve in five questions an LGS only missed the target by one question.

151 The analysis of the EoSM minimum Maturity Level achieved by Member States shows that:

- 16 out of 30 States achieved the RP2 target for the maturity of all EoSM components, as they achieved Level C or above. This means that 14 States (BG, DK, ES, FI, FR, IT, LT, LU, MT, NL, PT, RO, SE, SK) failed to achieve the RP2 target;

- When excluding component 5 – Safety Culture, which was self-assessed and not verified by EASA, the number of Member States that achieve the target (i.e. level C) is 20;

- The average EoSM score value achieved by all States is 68.5. The minimum score achieved by an individual State is 46 (BG), while the maximum EoSM score is 89 (UK).

152 The average EoSM score value achieved by all States shows a continuous improvement through-out the RP2 period from 55.7 in 2015 to 68.5 in 2019. At the same time the number of States below target has decreased steadily from 29 (in 2015 to 14 at the end of RP2, but still this number is high. Despite the improvement on the EoSM overall score observed in 2019, some core elements of Member States' safety oversight system still need further improvements in several States, as they failed to achieve the RP2 target. These elements are closely monitored by EASA as part of its oversight obligations, and will be addressed within the regular standardisation inspection process in RP3.

153 The majority of States that missed the RP2 target did so by a small number of questions. Bulgaria should improve maturity in a significant number of areas, as it did not reach the target level C in 14 questions in the EoSM. Portugal should improve a number of areas, up to six questions are below the target level C. The rest of States that did not reach the target, 12 States, have to improve between one to a maximum of three questions of the EoSM questionnaire out of 36. Eight States (LT, IT, ML, RO, FR, LU, FI, ES) failed to achieve the target by only one question, among which five of them (LT, IT, FR, FI, ES) failed in the Safety Culture management area that is self-assessed.

154 From the Union-wide perspective and taking all occurrences reported collectively into account, RP2 targets in 2019 were achieved for SMI Ground and Overall and RI Overall, they were not achieved by a narrow margin for RI Ground and ATM-S Overall as applied by the ANSPs with 99% and 97% applicability, respectively. SMI Ground and RI Ground have remained relatively constant during RP2 close to the target, while SMI Overall, RI Overall and ATM-S Overall have increased from levels below target up to reach the target or close to it.

155 The current definition of the indicator that measures the application of the RAT methodology has led to a situation where its application could be mandatory for the ATM Ground and not for the ATM Overall, or vice-versa. Such an approach has the potential to negatively affect the harmonisation of the severity assessment using the RAT methodology.

156 From an individual State point of view, all States achieved the RP2 target in 2019 of RAT application (i.e. 100% for ATM-Ground by ANSPs and 80% for ATM Overall by NSAs) to the SMIs occurrences, except the following States:

- For SMI-Overall: Poland and Cyprus NSAs with 0% of application;

- Denmark did not provide data in its Monitoring Report, failing to comply with its reporting obligations, and progress towards the target could not be assessed.

157 From an individual State point of view, in 2019 all States achieved the RP2 target for application of the RAT methodology (i.e. 100% for ATM-Ground by ANSPs and 80% for ATM-Overall by NSAs) to the RIs occurrences, except the following States:

- For RI-Ground: UK ANSP with 67% of application;

- For RI-Overall: the Polish NSA with 0% of application and the Spanish NSA with 57% of application;

- Denmark did not provide data in its PMR, failing to comply with its reporting obligations, and the progress towards the target could not be assessed.

158 From an individual State point of view, all States achieved the RP2 target in 2019 of RAT application (i.e. 100% for ATM-Overall by ANSPs) to the ATM-specific occurrences, except the following States:

- For ATM-S: Spain with 76% of application;

- Denmark did not provide data in its PMR, failing to comply with its reporting obligations, and the progress towards the target could not be assessed.

159 11 States have reported that their ANSPs were using some type of automated safety occurrences recording systems in 2019, one more than at the beginning of the RP2 in 2015. Out of these States, eight collect information about SMIs, whilst three collect information on both SMIs and RIs. This limited implementation does not include a harmonised definition of the events that trigger the capture of occurrences, as it may serve different purposes for each ANSP. In addition, the use of the tool seems aimed at operational analysis and not to complement occurrence reporting.

160 The safety reporting environment in Europe changed at the end of 2015 with the introduction of the new Occurrence Reporting Scheme for the ANSP and it has to be accepted that RP2 is a transition period to consolidate it. There was the expectation that the reporting of occurrences would increase throughout RP2 with the introduction of the Regulation (EU) No 376/2014 and the standardisation visits that monitor States compliance with it.

161 None of the NSAs identified deficiencies in the level of reporting of their ANSPs, but the global analysis shows diverging level of reporting among them.

162 Best practices have been identified that facilitate the occurrence reporting in Member States. The following is a non-exhaustive list to consider:

- to ensure compatibility among databases used in the ANSP/State;

- to ensure data can be interchange between them;

- to improve usability of the reporting portals to facilitate the task of reporters and avoiding frustration;

- to offer different means to collect reports;

- to establish coordination and communication processes between CAA, Aviation AAIB, and ANSP (including compatibility between their databases);

- to adopt "Just Culture" principles in published Safety policies, which are later communicated to all staff through the official channels and training;

- to provide feedback from the investigation of reported occurrences to reporters.

163 At Union-wide level, the percentages of high-severity occurrences over the total reported occurrences by SES Member States are 14% and 6% for SMIs and RIs, respectively, while show figures of 1% and 2% for AIs and ATM-S, respectively. This difference may be because SMI and RI occurrences bear higher severity than AIs or ATM-S or that the assessment of severity of certain type of occurrences were biased by the analysts towards less/higher severe categories, or even a combination of both.

164 The reported occurrences at the Union-wide level show different trends in 2019 than the previous year: while the number of SMIs has remained stable, the rest of occurrences, i.e. RIs, AIs, and ATM-S have increased by 34%, 17% and 4%respectively, when compared to 2018. This trend has also been observed at Union-wide level and during the entire RP2 period. The reasons for the evolution in each FAB/State may be multiple and cannot be presently determined with certainty. Factors such as the introduction of the Regulation (EU) No 376/2014 in November 2015, the increase in the number of airports movements and controlled flight hours, issues with the coding of occurrences by Member States (e.g. changes in criteria to report ATM-S occurrences) or the manual intervention in the extraction of occurrences from databases may have played a role in the variation

of reported occurrences. Nevertheless, substantial increases or decreases are of concern and should be closely analysed by local NSAs and ANSPs. In particular:

- Baltic FAB should investigate its increase of RIs, and AIs, and ATM-S; and the decrease of SMIs;

- BLUE MED should investigate its decrease of RIs, AIs, and ATM-S;

- Danube should investigate its increase of RIs, AIs, and ATM-S;

- DK-SE FAB should investigate the increase in all types of occurrences;

- FAB CE should investigate its increase of RIs and AIs;

- FABEC should investigate its increase in AIs;

- NEFAB CE should investigate its increase in SMIs;

- SW FAB should investigate the increase of RIs and its decrease in AIs and ATM-S;

- UK-IR FAB should investigate its increase of RIs and ATM-S and the decrease of SMIs.

165   Some States have identified and justified an increase of level of reporting in certain areas. Romania has identified an increase of low severity ATM-S related occurrences due to the implementation of a new ATM system. France has reported increased numbers of RIs but with the risks remaining acceptable. Portugal reported an increase in reports linked to stronger adherence to reporting culture and increase in traffic, but not to higher risk levels. Estonia identified a significant increase in ATM-S due to winter conditions, but with no special concern. Similarly, Finland has experienced increased in SMI events, but no concern was reported.

166   The EoSM results for the NM did not achieve the RP2 target in full. In the area of Safety Culture, the level achieved is 'D' above the target. Among the other MOs, only the area of Safety Assurance is at level C, below the target, and it is only by one question. NM EoSM score achieved was 82.8, which has significantly increased in a continuous manner from a value of 50 in the first year of RP2. For RAT applicability, NM has reported 100% application of RAT to all ATM-S occurrences falling under the performance scheme, but this data has not been verified.