PRB
Annual Monitoring Report 2016

Volume 3:
Safety

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1 Introduction and Context

1.1 About this Document

1.1.1 This Annual Monitoring Report 2016 – Volume 3 – *Safety* was prepared by the European Aviation Safety Agency (EASA) in support to the Performance Review Body (PRB) of the Single European Sky (SES). It covers the second year (2016) of the second Reference Period (RP2) which runs for five years from 2015 to 2019. The report provides a summary of the Air Navigation Services (ANS) and network functions performance achieved for 2016 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 (RP2 SES States), as laid down in Article 1 of Regulation (EU) No 390/2013. Therefore, it covers the 28 EU Member States, Norway and Switzerland.

1.1.2 The document is structured in three Chapters. This first Chapter describes the background and a brief description of Safety (Key) Performance Indicators (S(K)PIs) and targets used in the RP2, and the process and methods used to assess and review the performance of the ANS from a safety perspective. The second Chapter presents and analyses in detail the achieved values of S(K)PIs during the RP2 based on the information gathered from the submitted data from 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 final third Chapter provides a summary of the safety performance achieved and observations.

1.2 Background

1.2.1 The performance scheme for the ANS and network functions was set up by the Regulation (EU) No 691/2010 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. This Regulation established the principles of the scheme and the provisions of the initial implementation during RP1 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. During RP1, established as a transitional period of three years, the performance area of safety was limited to SPIs used for monitoring purposes only, with no targeted SKPIs.

1.2.2 Regulation (EU) No 390/2013, repealing Regulation (EU) No 691/2010, was adopted on the 3rd May 2013, establishing the measures for the current RP2 aiming at improving the processes of the performance scheme based on the experienced gained during RP1. In particular, and related to the safety performance area, the current Regulation (EU) No 390/2013 introduced additional S(K)PIs with associated targets (set up in Commission Implementing Decision 132/2014). The regulation defines a number of S(K)PIs, which shall be monitored at both European and national/FAB levels and used for the safety performance assessment during the second Reference Period (RP2).

1.2.3 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 390/2013 for the implementation and measurement of S(K)PIs[i]. AMCs are non-binding standards adopted by EASA to illustrate means to establish compliance with the performance scheme Regulation. When these AMCs are complied with, the obligations on measurement of the S(K)PIs in the performance scheme Regulation are considered as met.

1.3 Overview of S(K)PIs and Associated Targets for RP2

1.3.1 In RP2, targets have been introduced by the Regulation 390/2014 for three RP1 SPIs:

- SKPI1: the Effectiveness of Safety Management (EoSM);
- SKPI2: the application of the severity classification based on the Risk Analysis Tool (RAT) methodology; and
- SKPI3: the level of just culture (JC).

1.3.2 The SKPI EoSM 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.

1.3.3 The SKPI 'the application of the severity classification based on the RAT methodology' aims at measuring to what extent the RAT methodology has been applied to assign severity levels to reported ATM incidents by the ANSPs and the Member States.

1.3.4 The SKPI 'the level of JC' aims at measuring the level of presence and corresponding level of absence of just culture at 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 State and ANSP level.

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

- SPI1: The application by the air navigation service providers of automated safety data recording systems where available, which shall include, as a minimum monitoring of separation minima infringements and runway incursions; (This PI aims at measuring if ANSPs use these tools in a just culture environment to improve the gathering of occurrences' information and analysis by the organisations' SMS)
- SPI2: The reporting by the Member States and air navigation service providers 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; and
- SPI3: The number of, as a minimum, separation minima infringements, runway incursions, airspace infringements, and ATM-specific occurrences at all air traffic services units.

1.3.6 The overview of all S(K)PIs used in RP2 and their associated targets are presented in the next table:

KPI	TARGET LEVEL
The Effectiveness of Safety Management (EoSM)	Union Wide and Local
The application of the severity classification based on the Risk Analysis Tool (RAT) methodology to the reporting of, as a minimum, three categories of occurrences: separation minima infringements, runway incursions and ATM-specific occurrences at all air traffic services units	Union-Wide and Local
The reporting by the Member States and their air navigation service providers of the level of presence and corresponding level of absence of just culture (JC).	Local
The application by the air navigation service providers of automated safety data recording systems where available, which shall include, as a minimum monitoring of separation minima infringements and runway incursions.	None
The reporting by the Member States and air navigation service providers 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 minima infringements, runway incursions, airspace infringements, and ATM-specific occurrences at all air traffic services units.	None

Figure 1: Safety (K)PIs in RP2

1.3.7 Figure 2 and Figure 3 show the Union-wide targets for RP2 which were set at Union-Wide level by Commission Implementing Decision 132/2014[ii].

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

Figure 2: RP2 target for Effectiveness of Safety Management (EoSM)

APPLICATION OF THE SEVERITY CLASSIFICATION BASED ON THE RISK ANALYSIS TOOL (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[iii]			**≥ 80%**		**100%**

Figure 3: RP2 target for application of the severity classification based on the Risk Analysis Tool (RAT) methodology

1.4 Safety Performance Review

1.4.1 The review of safety performance is based on the data submitted by the Member States through different instruments. The Member States, through their National Supervisory Authorities (NSAs) or bodies which are responsible for coordination within the FAB as regard the monitoring of the performance plans, are required to submit their performance monitoring reports (PMRs) to the European Commission (EC) by 1st of June each year with the aim of monitoring performance plans and targets. With regard to data related to SKPIs, the States are required to submit/populate EoSM and JC questionnaires by 1st February of each year, while information on the RAT methodology application should, if submitted via the Annual Safety Template (AST) mechanism, be submitted by 21st April.

1.4.2 With regard to other SPIs, 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 16 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 SPI monitoring for 2016 are assessed by the PRB (supported by PRU and EASA) resulting in the preparation of this PRB Performance Review Report.

1.4.3 The output of this review of safety performance together with identified risks and recommendations will be submitted to the EC and shared within EASA.

1.4.4 The review of PMRs in relation with the safety KPA consists of an assessment of the safety aspects of the performance monitoring reports, in particular the reporting on performance indicators. The

general objective is to review and report on achieved safety performance of the NSAs and ANSPs to ensure an effective monitoring of the safety performance of ANS and network functions. The assessment of the PMRs is conducted by EASA and focuses on two distinct areas: those elements, which are addressed in the safety–related sections of the PMRs and those elements received through measurement of SKPIs reported to and collected by EASA in February 2017. In addition, this review of the PMRs includes adequately substantiated comments and recommendations to be followed by States.

1.5 Verification Activities

1.5.1 The safety review process includes some verification of the data submitted by the Member States to compute the SKPIs. These verification activities were performed by EASA for EoSM and JC, whilst application of the RAT methodology was verified by the EUROCONTROL Directorate Pan-European Single Sky - Support to States and Regional Initiatives unit (DPS/SSR). Measuring and verifying the S(K)PIs of the performance scheme Regulation (EU) No 390/2013 is done in accordance with the AMC/GM annexed to ED Decision 2014/035/R[iv] and its amendment ED Decision 2015/028/R[v].

Verification Process of Effectiveness of Safety Management

1.5.2 The EoSM indicator is measured by the verified responses to questionnaires[vi] respectively completed by the State/competent authorities (normally the NSA) 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 0 to 100, and the level in a scale from A to E. This is done in accordance with Acceptable Means of Compliance (AMC) and Guidance Material (GM) for the Implementation and Measurement of Safety Key Performance Indicators (EASA Decisions ED Decision 2014/035/R[vii] and ED Decision 2015/028/R[viii]).

1.5.3 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.

1.5.4 The results of the States' EoSM questionnaires were cross-checked with the results of the EASA standardisation inspections on the NSAs.

1.5.5 The coordination between EASA and the competent authority/authorities is done through the National Coordinator appointed by the State in accordance with Article 6 of Commission Implementing Regulation (EU) No 628/2013. The National Coordinator is responsible for coordination within the State authorities and for coordination with the ANSPs in order to provide EASA with the responses to the questionnaires (both competent authority and ANSP, aggregated where required).

Verification Process for Just Culture

1.5.6 The Just Culture SKPI aims at measuring 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 of the questionnaires is to identify possible obstacles and impediments to the application of Just Culture at State and ANSP level. In that sense, the questions were elaborated taking into account elements specific to the State and to the ANSP. The Just Cultures indicator is measured as well by evaluating the verified responses to questionnaires[ix].

1.5.7 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; and
- occurrence reporting and investigation.

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

1.5.9 In addition, it should be highlighted once more, that 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.

1.5.10 The information provided by States and ANSPs relating to the SKPI Just Culture was verified during RP1 and 2015, and no major changes have been reported this year so no additional verification has been performed in 2016.

Verification of RAT Methodology Application

1.5.11 The application of the severity classification using the RAT methodology is identified for each individual occurrence using "YES/NO" value of 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.

1.5.12 The indicator is measured as the percentage (%) of occurrences for which severity has been assessed using the RAT methodology over a subset of the annually reported occurrences by Member States and ANS Providers in relation with the respective scope of the RAT method: ATM Ground and ATM Overall.

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

- the 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^X;
- the Regulation (EU) No. 390/2013 may not be applicable at airports and traffic units with less than 70,000 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 has 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.

1.5.14 The EASA AMC 8 - SKPI RAT methodology — Monitoring mechanism, accepts any of both existing occurrence reporting mechanisms for the measure of application of the RAT methodology such as the Annual Summary Template (AST) or the European Central Repository (ECR). During this year, figures of the RAT application have been collected via the AST mechanism for all Member States, as the use of ECR as common repository of all aviation occurrences has been only introduced since 16 November 2015, as per Regulation (EU) 376/2014. Information of ECR has been extracted and used for cross-checking purposes.

1.5.15 As the AST reporting mechanism was used for reporting of RAT methodology application, the EUROCONTROL DPS/SSR has performed the following verification activities to measure performance of this SKPI during 2017:

- Collected and processed the RAT derived severity score for each reported occurrence via the AST mechanism;
- Validated the correctness of the processed data with the national AST Focal Points to ensure the accuracy of the aggregated values;
- 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

1.6.1 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.

Data Sources to Populate S(K)PIs

1.6.2 Three data sources have been used to populate the safety information in the S(K)PIs, 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 three sources are as follow:

- Questionnaires that capture information from the States and their ANSPs through a web platform managed and later verified by EASA, used to populate SKPI1 (EoSM) and SKPI2 (Just Culture). Member States submit completed questionnaires for the State level and the ANSP level (State's largest ANSP also submits its questionnaire). However, EASA is only responsible for verification of responses at the State level, while the NSAs are responsible of the verification of ANSP's responses. The verification process relies on cross-referencing what 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 DPS/SSR. AST database was used to gather information related to SKPI2 (application of the RAT methodology) and SPI2 (ratio of high-severity and low-severity occurrences), and SPI3 (number of occurrences).
- The submitted FAB Monitoring Reports used to gather information related to SPI1 (use of automated reporting tool), SPI3 (number of occurrences), and any amendment of incorrect figures of other PIs.

1.6.3 It is worth noting that EASA AMC/GM gives the option of using the ECR or AST as source of ANS occurrences to populate the S(K)PIs 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 the States may still be on the process to report consistently in ECR, the AST data has been selected as source of this type of information during this year. As the RP2 progresses, the source may change and collection of occurrences should rely on the data stored in the ECR, if the data quality of ECR's records permits.

1.6.4 Whereas the ECR data contains detailed information regarding the nature and location of the occurrence, it is important to note that the AST contains only aggregated numbers. It does not include the location information of the occurrence, so it is impossible to discriminate 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.

1.6.5 For this reporting year, the data used in the performance indicators (SPI1, SPI2, and SPI3) were taken directly from what the States reported in their Monitoring Reports without further verification or challenge (e.g. use of automated reporting tools or the total number of occurrences by type). To facilitate gathering the data, a reporting template was developed, which was part of the FAB Monitoring Report Template.

1.6.6 Overall the safety reporting environment is changing in Europe, due to introduction of the Occurrence Reporting Regulation and it has to be accepted that the next few years will be a transition phase. During this time, in order to maintain and improve European reporting, it is important that actors responsible for the collection of safety data work together in order to create an optimum solution.

1.6.7 The quality and completeness of the used databases will continue to be monitored and the choice of databases might change in the future.

Exposure Data

1.6.8 The use of exposure data (e.g. number of airport movements or flight hours) is limited to one single performance indicator (SPI 2 on level of occurrence reporting) and they are not used to directly derive the indicator, but as a way to normalise the number of occurrences in each Member State and have a Union-wide overview of 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 amount 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.

1.6.9 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. In certain cases, the most appropriate exposure units were not the ideal, but due to unavailability of data or quality issues, alternative units were chosen. In those cases, the selection of exposure units was based on feasibility to capture and use. This principle has been applied in this report analysis in relation to the use of IFR flights, as explained below.

1.6.10 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 IFR flights, with capture of only a minimal number of VFR flights) and in certain cases to use corrected data provided by Member States through their Monitoring Reports.

1.6.11 The exposure data selected for the different type of occurrences are as follows:

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

1.6.12 The exposure data cover the scope as defined in the RP2 legislation, i.e., when related to airports, they cover all airports above 70.000 IFR flights or the largest airport in the Member State if such airport does not exist (as per Regulation 390/2013 Art 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 of provisions of ANS (as per Art 1 paragraph 1 of said Regulation). Therefore, those territories outside

EUR 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 ANSP.

1.6.13 It is worth noting that in some cases, the units of exposure are not the ideal ones 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 may be more prone to infringe controlled airspace, and therefore, the VFR and IFR flight hours could be more appropriate exposure unit for the calculation of the airspace infringement rate. However, VFR flight hours were not consistently available. Similarly, the operating hours of ATS units to calculate rates of ATM-S may be the most appropriate exposure unit to use, but again these data are not available, 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 FDPS).

2 Safety Performance Analysis

2.1 ANS-Related Accidents and Serious Incidents

2.1.1 Besides the S(K)PIs required by Regulation (EU) 390/2013, this section provides an analysis of additional performance measurements using information from the EASA's Occurrence Database[xi]. More precisely, the section presents the review of ANS-related accidents and serious incidents extracted from the EASA database[xii] for the duration of the performance Scheme, covering the period 2009 – 2016. The scope of the review is Commercial Air Transport (CAT) fixed wing aeroplanes above 2,250 kg maximum take-off mass and it covers the EU 28 States plus Norway and Switzerland (SES States).

2.1.2 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 EU-level[xiii].

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

2.1.3 The data presented in this section relate to accidents and serious incidents between 2009 and 2016, defined by ICAO Annex 13 and assigned to an occurrence by an European Accident Investigation Authority. The occurrences include ANS-related occurrences in the SES States which involve CAT fixed wing aeroplanes above 2,250 kg maximum take-off mass.

2.1.4 Figure 4 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 eight year period analysed, it is worth noting that most of the ANS-related accidents reported in the figure were non-fatal, being the last fatal accident observed in 2012 (with 2 accidents that year), and that no fatal accident with ANS contribution is registered in the analysed period, which makes them rare.

2.1.5 The figure also shows an overall decreasing trend in the number of serious incidents since 2010 to reach a stabilised level around the last five years, whereas the number of accidents has remained approximately static with small fluctuations within the analysed period. Despite the reversal in the decreasing trend of serious incidents shown in 2014 and in the overall accident and serious incident rate, the figures appear to stabilise around the level observed in 2013 for the last two years. 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[xiv].

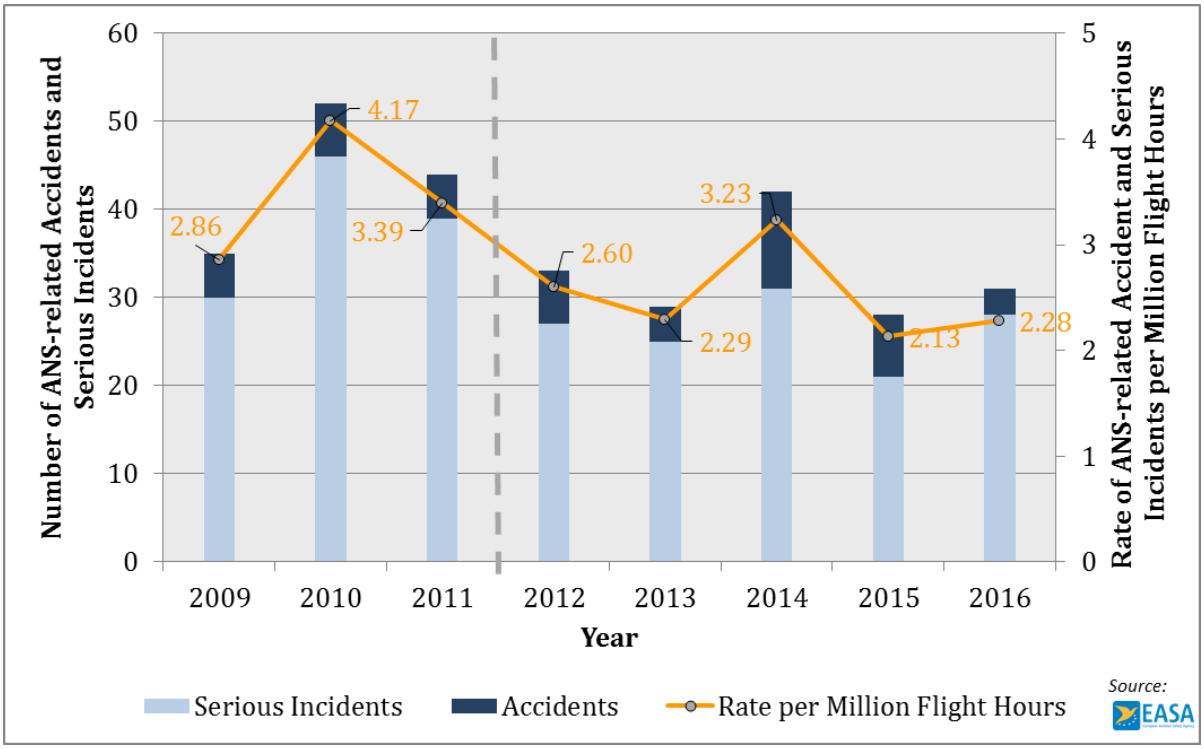


Figure 4: ANS related accidents and serious incidents (2009-2016)

2.1.6 Although presented alongside one another, the accidents and serious incidents that the data comprises are very different in their characteristics. Taking the most recent year, 2016, as an example, the three (3) accidents were categorised into four[xv] types:

- Turbulence encounters that injure aircraft occupants (2 accidents);
- Abnormal runway contact (1 accident); and
- Thunderstorm encounter (1 accident).

2.1.7 None of these three accidents appear at the first glance to be related to air traffic management, however, all of them have in common that ANS may have a role in preventing future accidents of these types (e.g., having additional and more accurate information available to ATC help pilot to avoid certain geographic areas with risk of turbulence or thunderstorm). They certainly did not have the ANS as contributory factor. By contrast, the serious incidents are more clearly linked to ANS. They are typically events that could lead to far more serious accidents than the three accidents listed above and may share with accidents similar precursors, hence the interest in analysing them together. For example, out of the 28 serious incidents in 2016, there were:

- Near mid-air collisions (16 serious incidents);
- Occurrences with ATM contribution (9 serious incidents);
- Runway incursions (4 serious incidents);
- Navigation error (4 serious incidents);
- Aerodrome design and operation related (3 serious incidents);
- Runway excursions (3 serious incidents);
- Abnormal Runway Contact (2 serious incidents);
- System failure on board other than power-plant related (1 serious incident);
- Loss of control-in flight (1 serious incident);
- Fuel related (1 serious incident); and

- Loss of control-ground (1 serious incident).

2.1.8 Therefore, serious incidents are often a better measure of the performance of the ANS system than accidents, because they relate more closely to ANS itself. These preliminary figures for 2016 suggest a similar level of ANS safety performance compared with 2015, and overall a better level than average previous eight (8) years.

2.1.9 The rate of ANS-contribution accidents and serious incidents has fluctuated in the analysed period, mainly due to the lower number of occurrences. Figure 5 indicates that the trend is decreasing from RP1 to RP2 and be stabilised in RP2. This suggests that overall, safety outcomes 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. All in all, it could be concluded that the ANS sector has improved at managing risks that directly relate to the air navigation services provided.

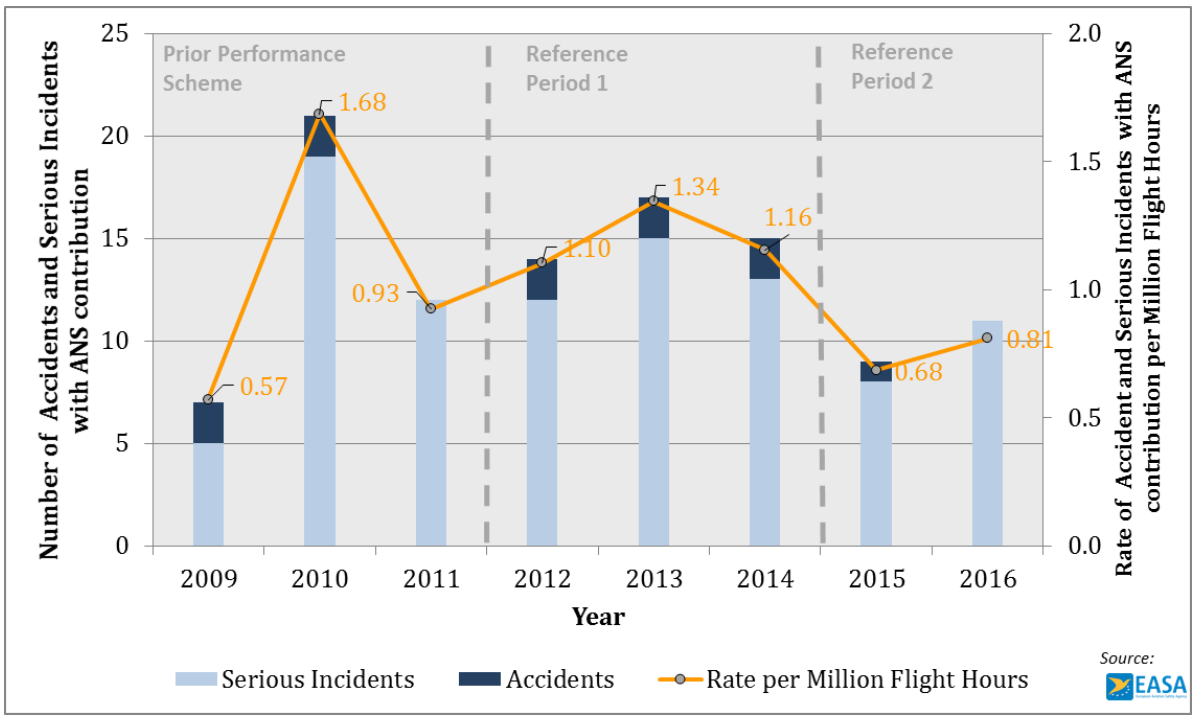


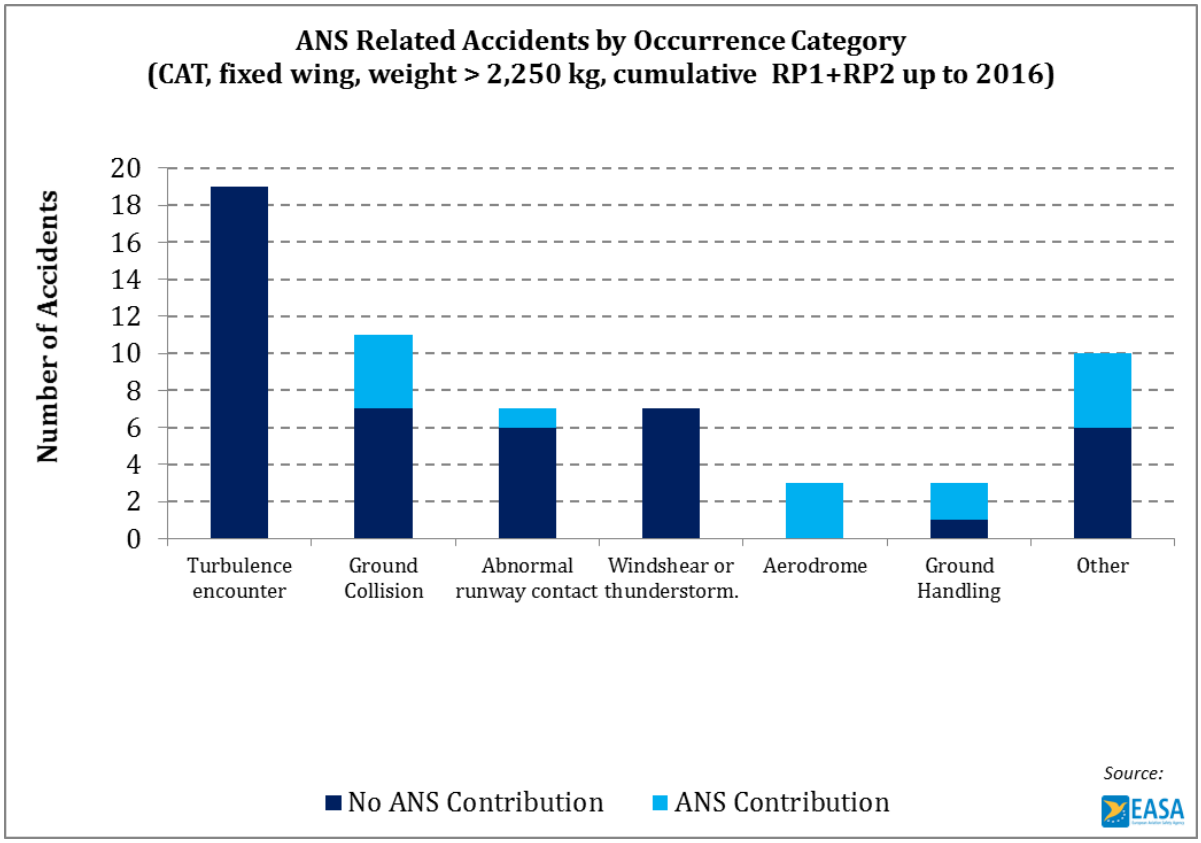
Figure 5: ANS contribution accidents and serious incidents (2009-2016)

Types of ANS-Related Accidents and Serious Incidents

2.1.10 Figure 6 and Figure 7 show the top occurrence categories assigned to ANS-related and ANS-contribution accidents and serious incidents during the last five-year period, which correspond to the RP1 and the two first years of RP2. The reader should note that the occurrence categories describe at a high level the type of occurrence. Also should be noted that more than one category can be assigned per occurrence.

2.1.11 For example, the inclusion of loss of control in-flight may appear to be unrelated to ANS, however, occurrences are the result of the coincidence of several factors or the sequence of related events, where (for example) a trigger event like a TCAS-RA may lead to a subsequent abrupt manoeuvre and loss of aircraft control. By monitoring the occurrence types, it is possible to identify risk-transfer from one aviation sector to another.

2.1.12 Therefore, any accident and serious incident may be coded using more than one occurrence category[xvi] 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 and the type of occurrence in question.



2.1.13

Figure 6: Accident occurrence categories (2012-2016)

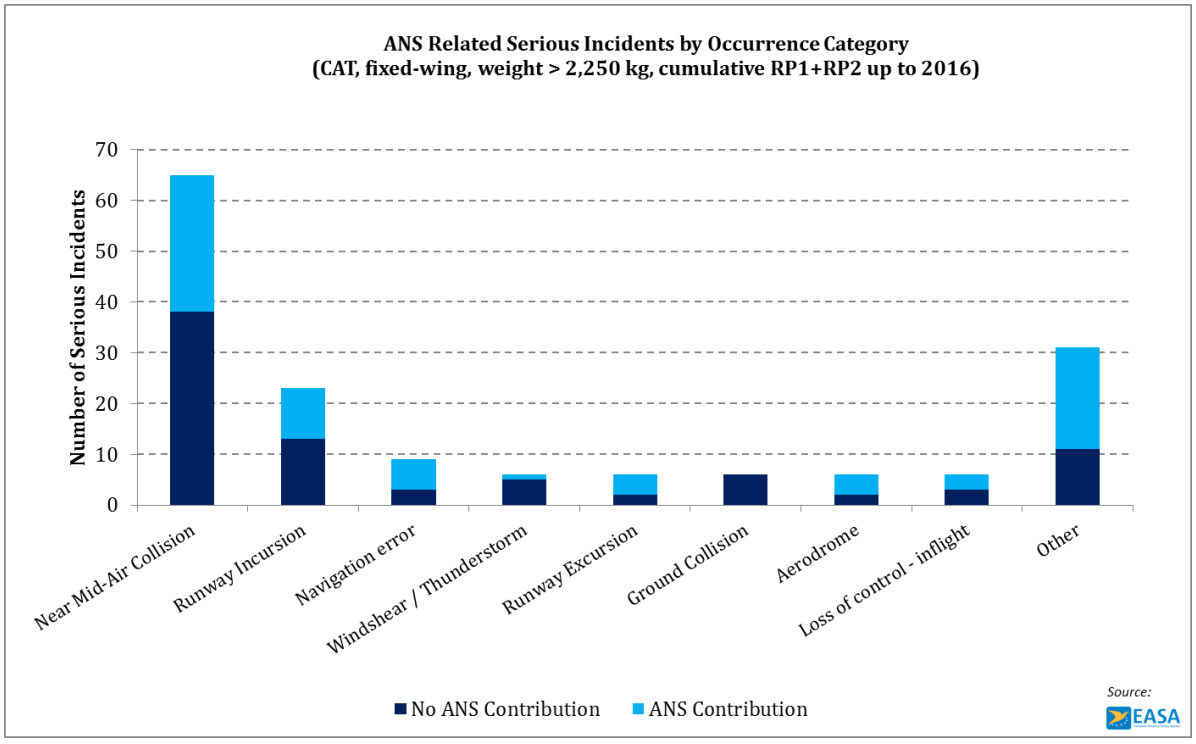


Figure 7: Serious Incident Occurrence Categories (2012-2016)

2.1.14 Figure 6 and Figure 7 show that the most frequent categories coded in occurrences differ between accidents and serious incidents. For example, the most frequent occurrence types in serious incidents are near mid-air collisions, and runway incursions, with similar proportion of ANS contribution. The third most numerous serious incident category is the presence of some navigation error (e.g. level bust are included here) with an ANS contribution in most of them. By contrast, the

most frequent occurrence types found in accidents i.e., turbulence, ground collision and abnormal runway contact, are of different nature and with a relative fewer proportion of events involving ANS contribution than those types found in the serious incidents. Note, for example, that ANS did not contribute to any accident due to turbulence encounters.

2.1.15 Figure 8 reinforces more clearly the observation that the proportion of events with ANS contribution is smaller in ANS-related accidents than in ANS-related serious incidents during the last five-year period. This seems to indicate that the ANS has lower contribution in the highest sever occurrences, i.e., accidents.

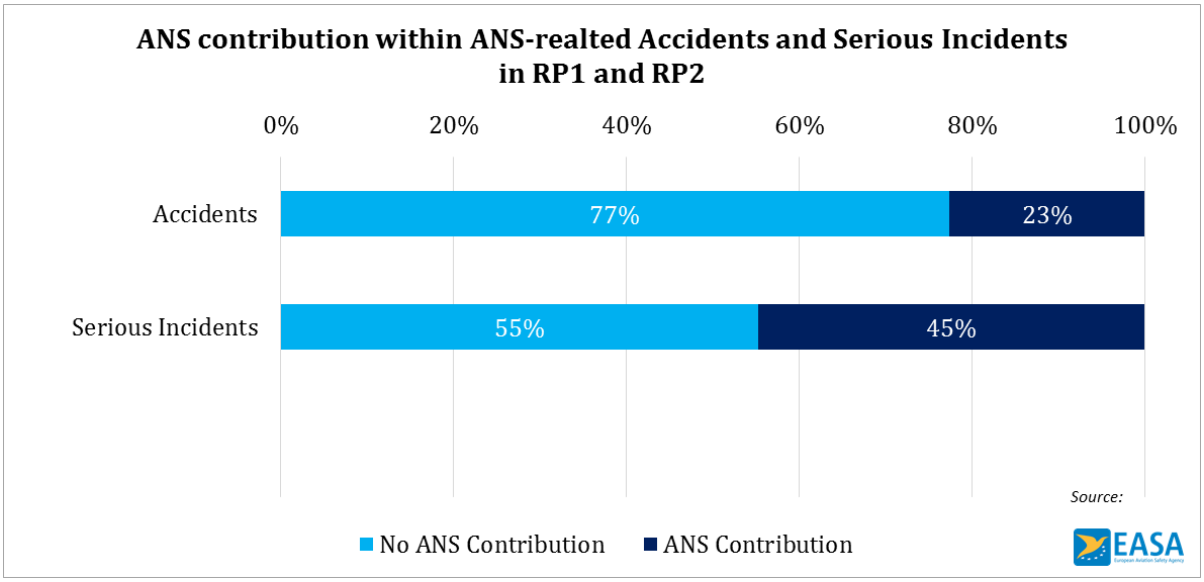


Figure 8: Proportion of ANS contribution in accidents and serious incidents (2012-2016)

2.2 Safety Key Performance Indicators

2.2.1 This Section describes the Union-wide review of 2016 safety performance measured by the Key Safety Performance Indicators (KPIs) required by Regulation (EU) 390/2013: EoSM, RAT methodology application and JC for States subject to the Performance Scheme.

Effectiveness of Safety Management

2.2.2 All 30 States and 31 ANSPs, including MUAC, filled in the questionnaires used for the measurement of the EoSM SKPI in accordance with 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 the AMC, the responses of all States have been verified by EASA standardisation team while the responses of the ANSPs have been verified by the State Competent Authorities.

2.2.3 The following sections provide the analysis of the EoSM results provided by the States and ANSPs. Note that the EoSM scores provided by States, were subject to EASA review using the data from the standardisation audits and the follow-up of the corrective measures. Results of this verification exercise on State level can be found in the PRB Annual Monitoring Report - Volume 2.

2.2.4 Figure 9 shows the EoSM results of States in 2016. The figure depicts both the EoSM overall Maturity Score (blue bars) and the EoSM Maturity Level (on the second axis – orange dots) achieved at State level. The RP2 has introduced targets to be achieved by 2019 only on the EoSM minimum Level achieved: at least level C for all management objectives shall be achieved, as per Commission Implementing Decision (EU) 2015/19. The EoSM score gives an overview of the effectiveness in a single continuous scale.

2.2.5 The lowest EoSM Score provided by the individual States in 2016 is 40 with six (6) of the States scoring below 50, as opposed to 9 in 2015, and the highest EoSM score at State level in 2016 is 86 (Figure 9). The average EoSM score has increased from 56 in 2015 to 60 in 2016. These values are not directly comparable with RP1 values as there was no verification of the self-assessed score in RP1. 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.

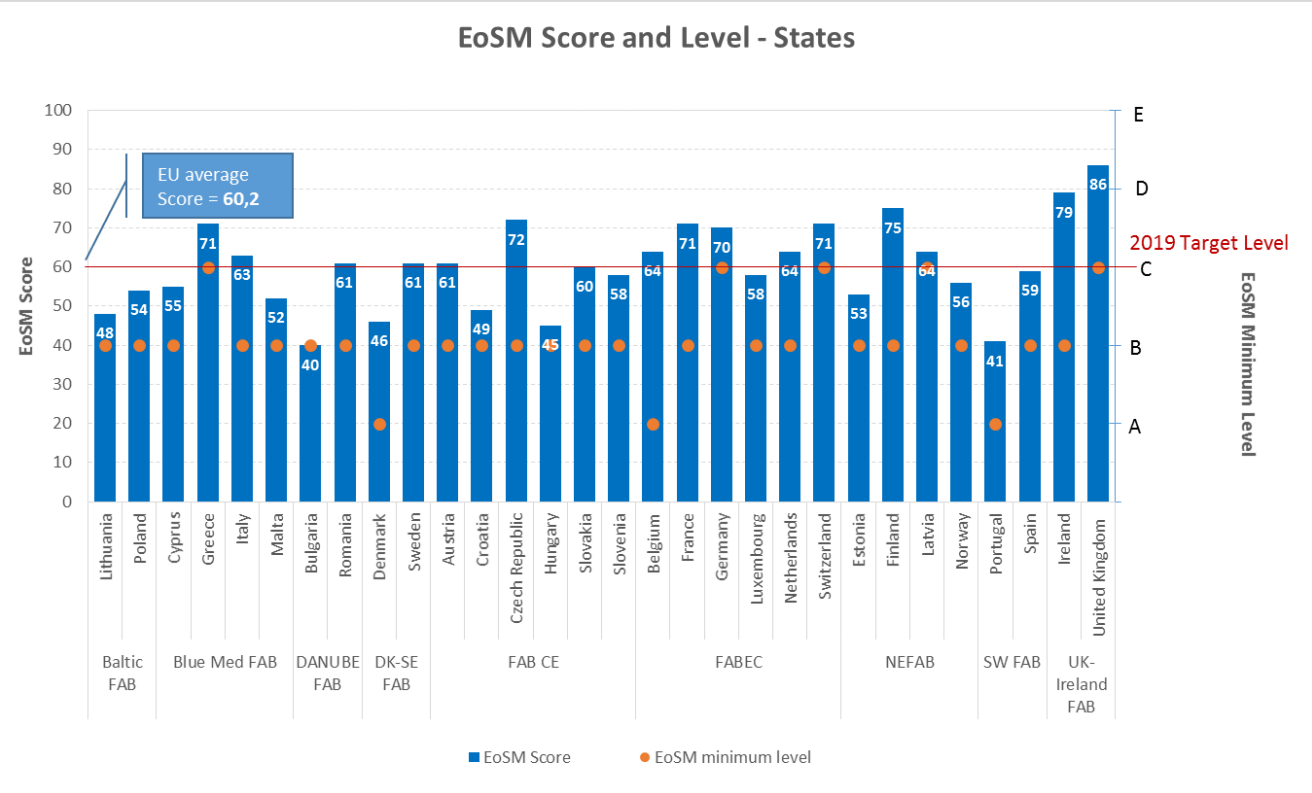


Figure 9: 2016 Effectiveness of Safety Management for States

2.2.6 Despite the improvement on the EoSM overall score in 2016, Figure 9 supports the observation that some core elements of the safety oversight system are still missing in many States. These elements are closely monitored by EASA as part of its obligations.

2.2.7 Analysis of the overall EoSM Minimum Maturity Level Achieved further shows that five (5) States out of 30 are already at Level C (Figure 9), as opposed to last year when only one State had reached that level. Three States have a Level A. When excluding Component 5 – *Safety Culture*, which was not verified, there are still 19 States out of 30, approximately 63%, below 2019 RP2 target level C.

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)

2.2.8 Figure 10 shows how the level of EoSM State questions (marked from Level A to Level E) are distributed per each EoSM Component. It can be observed that the EoSM Management Objectives that need the most improvement are *Safety Policy and Objectives, Safety Assurance*, and *Safety Culture.* On the contrary, the most effective component is *Safety Risk Management*.

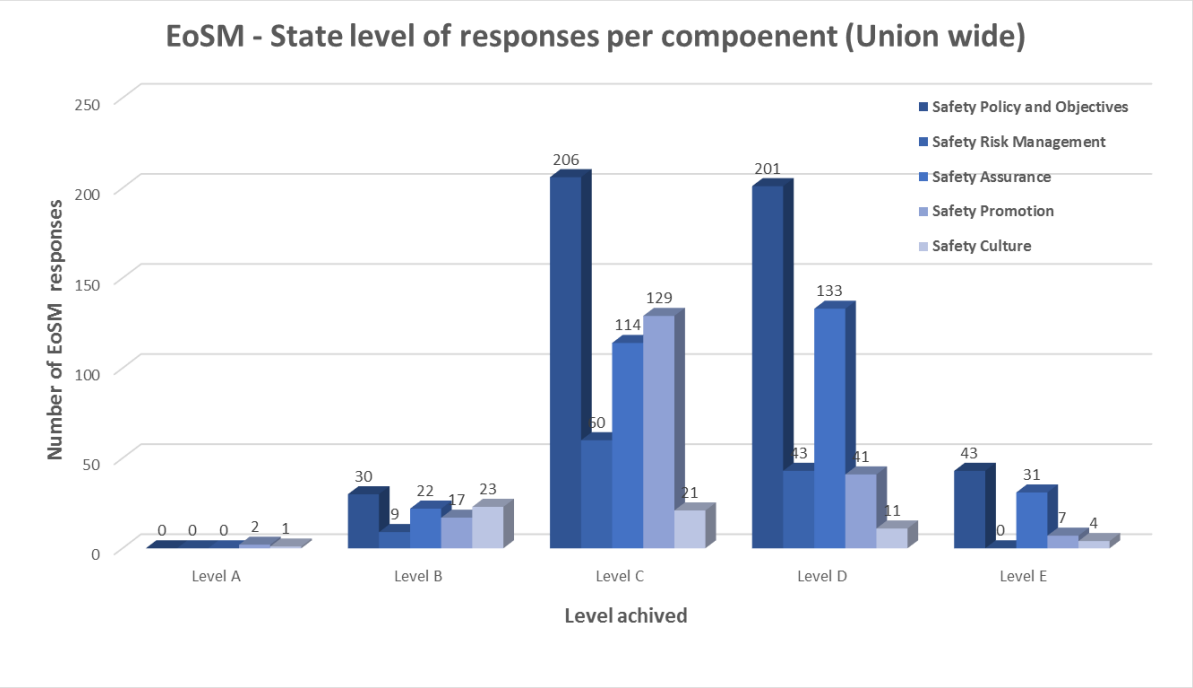


Figure 10: State EoSM level per Component (Union-wide)

2.2.9 Figure 11 shows the evolution by EoSM component where the States were below Level C in 2015 and 2016. There have been improvements in the level achieved on the components *Safety Assurance* and *Safety Risk Management*, while the rest of EoSM Components without reaching level C remain at the same number. It also supports the finding that area of *Safety Culture* will require the most attention in the future, as 20 States have not achieved the target level C yet, one less than last year.

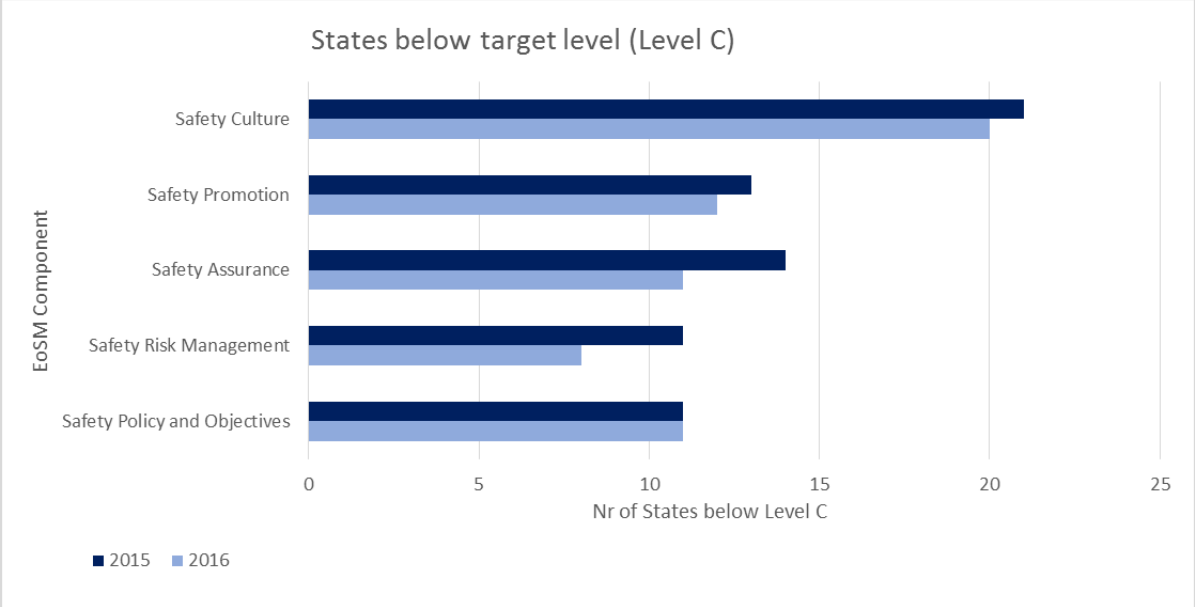


Figure 11: No of States below EoSM 2019 Target Level per each EoSM Component

2.2.10 Figure 12 shows the EoSM results of ANSPs in 2016. The figure depicts the EoSM overall Maturity Score (blue bars), the minimum Maturity Level (on the second axis – orange dots for the Safety

Culture component and purple triangle for all other management objectives) achieved by at ANSP level. The RP2 has introduced targets to be achieved by ANSPs by 2019 on different management objectives of EoSM: to achieve at least minimum level D for *Safety Policy and Objectives*, *Safety Risk Management, Safety Assurance, and Safety Promotion* (depicted as a blue line in the graph) and at least level C for *Safety Culture* (depicted as red line), as per Commission Implementing Decision (EU) 2015/19.

2.2.11 The minimum effectiveness score by an individual ANSPs in 2016 is 29 with only one (1) ANSP scoring below 50. The maximum effectiveness score at ANSP level in 2016 is 92, with five (5) ANSPs above 90. The average score value achieved by all ANSPs increased from 79 in 2015 to 80 in 2016.

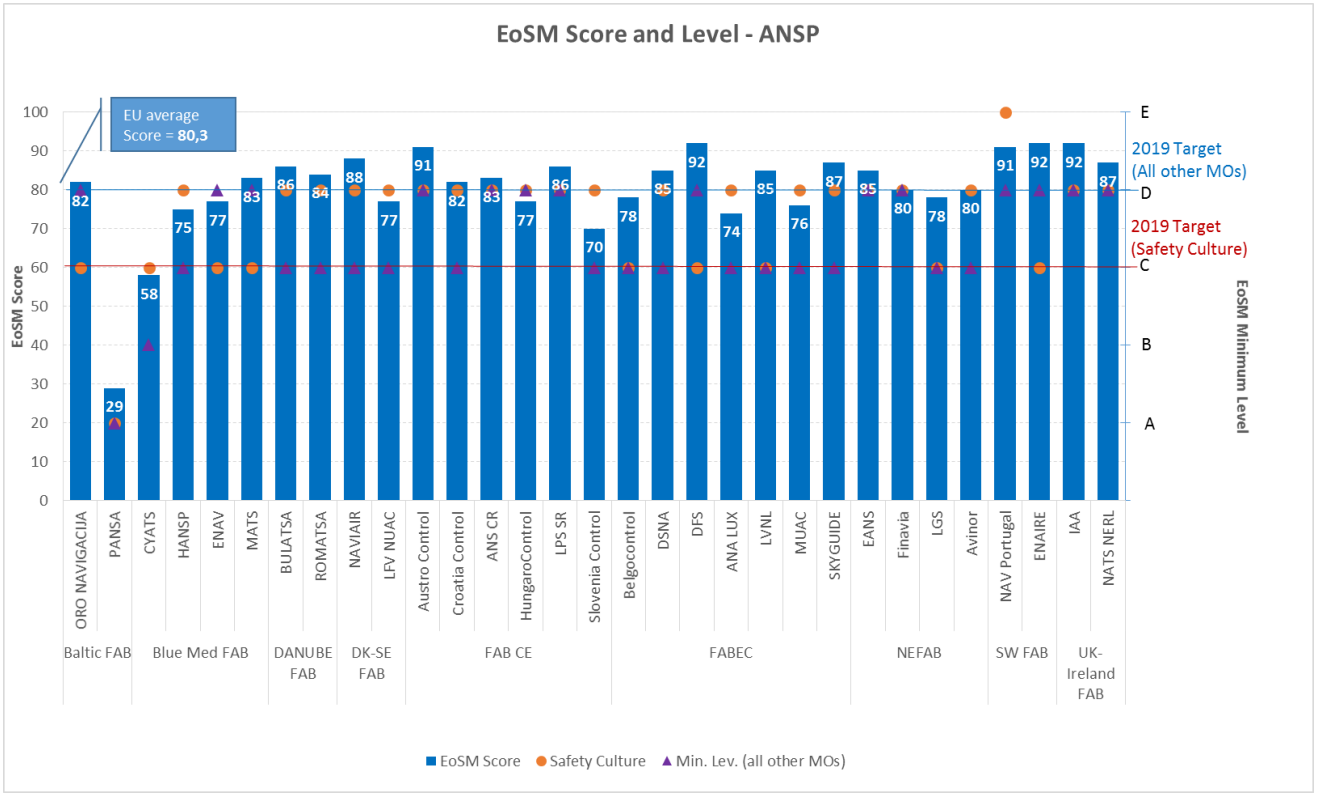


Figure 12: 2016 Effectiveness of Safety Management for ANSPs

2.2.12 The analysis of the overall EoSM Minimum Maturity Level Achieved by ANSPs shows that all ANSPs except one (1) are already at Level C or above for Safety Culture, which is the 2019 target Level, and that 17 ANSPs out of 31, approximately 55%, have already achieved the 2019 EoSM target, i.e. level D, for all other MOs (the four EoSM Components other than Safety Culture). When looking at the evolution of performance from 2015 to 2016, it is worth noting that the number of ANSPs that have achieved the target for all other MOs increased from 10 to 17.

2.2.13 The analysis of the EoSM ANSP questionnaire responses per each EoSM Component (Figure 13) shows that the number of EoSM areas / Management Objectives that need the most improvement are also within areas of *Safety Policy* and *Objectives, and Safety Assurance*. *Safety Risk Management* is the best handled EoSM Component.

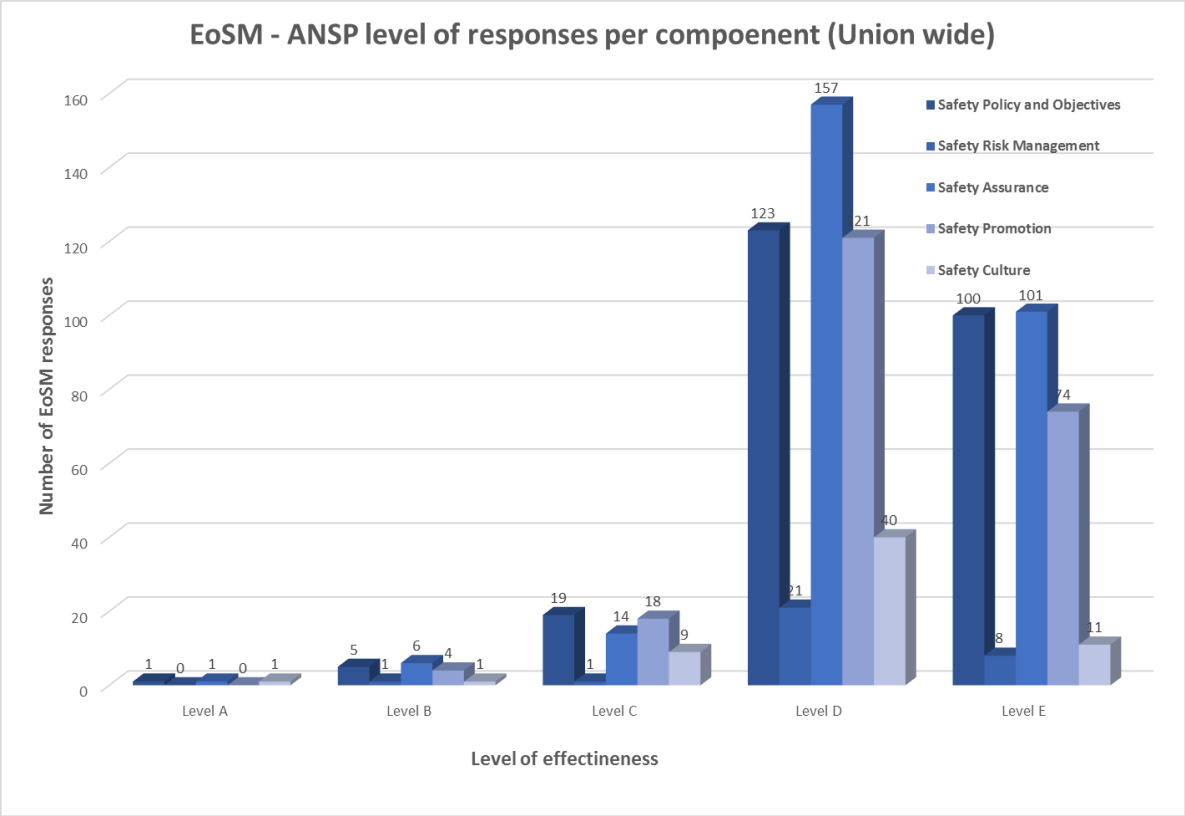


Figure 13: ANSP EoSM responses per Component (Union-wide)

2.2.14 Figure 14 shows how many ANSPs are below the 2019 EoSM Target Level on each EoSM Component, i.e. Level C for Safety Culture and Level D for all others MOs. The components that require more attention, as the ANSPs did not reach the target level, are *Safety Promotion, Safety policy and Objectives, and Safety Assurance*. At the same time, the major improvements during the last year have been achieved in *Safety Promotion and Safety Assurance.* Interestingly, Safety culture has been achieved by all ANSPs but one, contrary to the State level, where this component was the one that needs more attention and improvement.

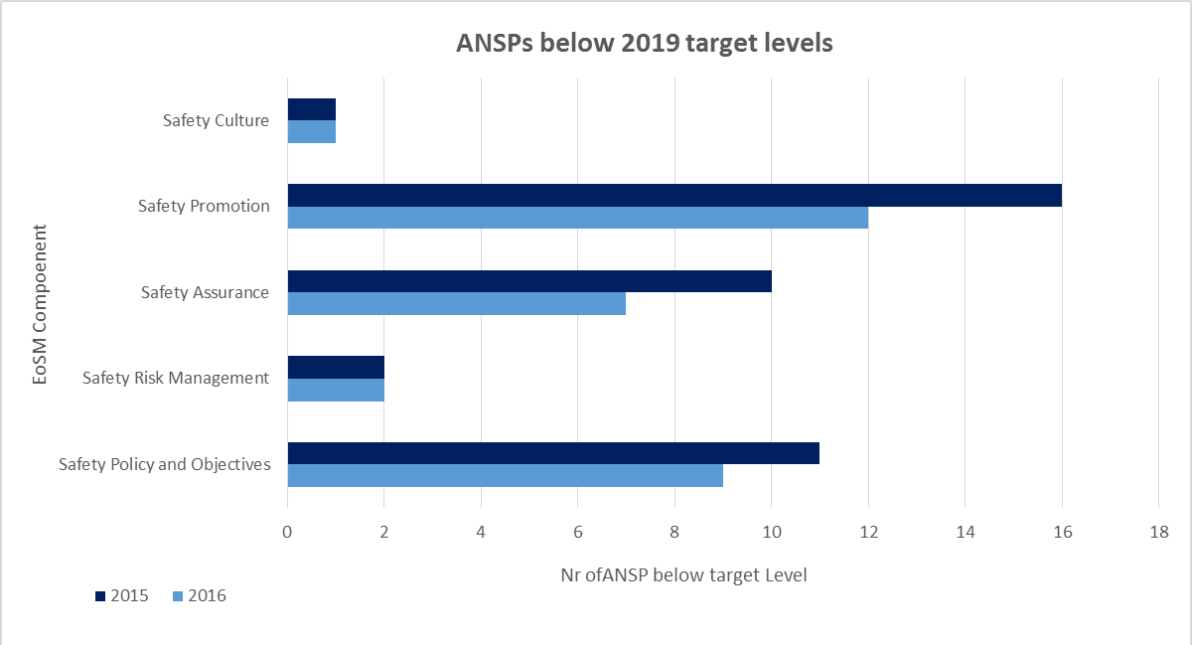


Figure 14: No f ANSPs below EoSM 2019 Target Level per each EoSM Component

2.2.15 Note that more detailed results of EASA EoSM review for each ANSP are available in Volume 2.

EoSM State Level - FAB View

2.2.16 Based on the analysis of the EoSM State questionnaire responses, Figure 15 shows that the majority of States/FABs are on the right path to achieve the 2019 EoSM Target of Level C in all Management Objectives (MOs). There are five (5) States that have already reached the target level C in all EoSM questions. The rest of States, i.e. 25 States, have to improve between 1 and 18 elements of the EoSM questionnaire out of 36.

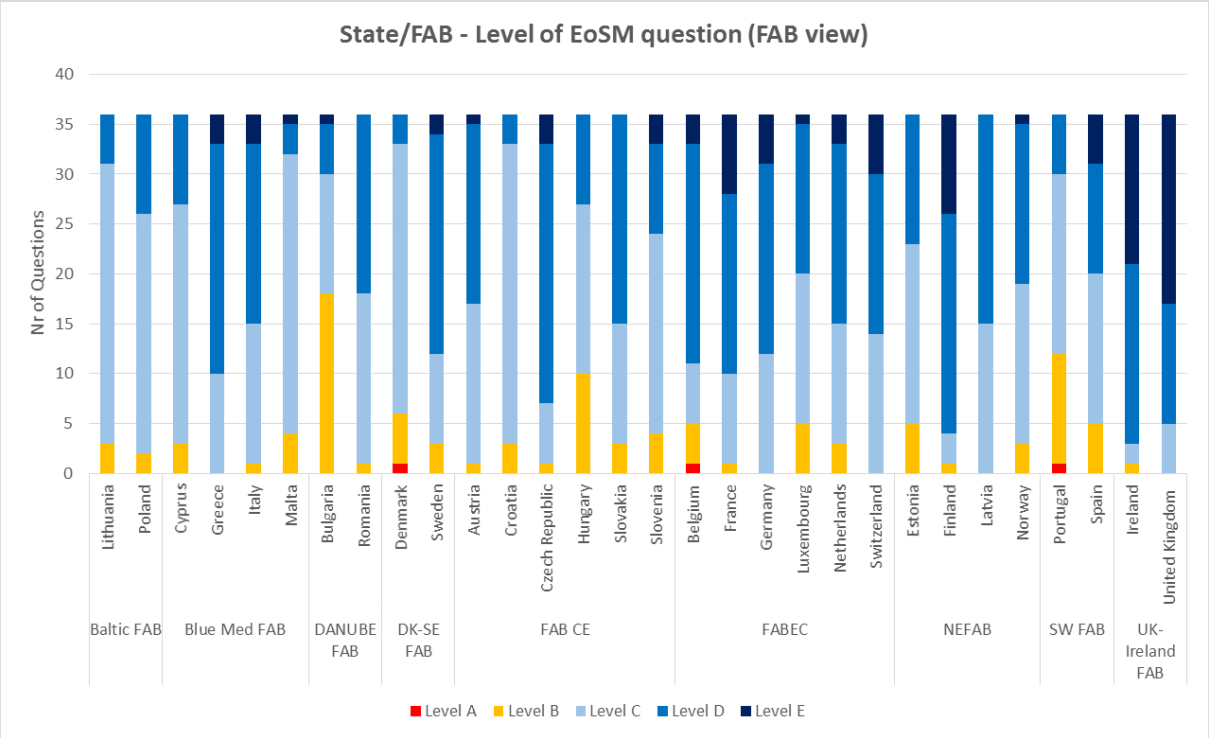


Figure 15: State EoSM responses per EoSM Level (FAB view)

2.2.17 Three States, Bulgaria, Portugal, and Hungary, should increase the effort in improving higher number of elements, i.e., questions in the EoSM for the following years to achieve the target level C in all of them (see Figure 16).

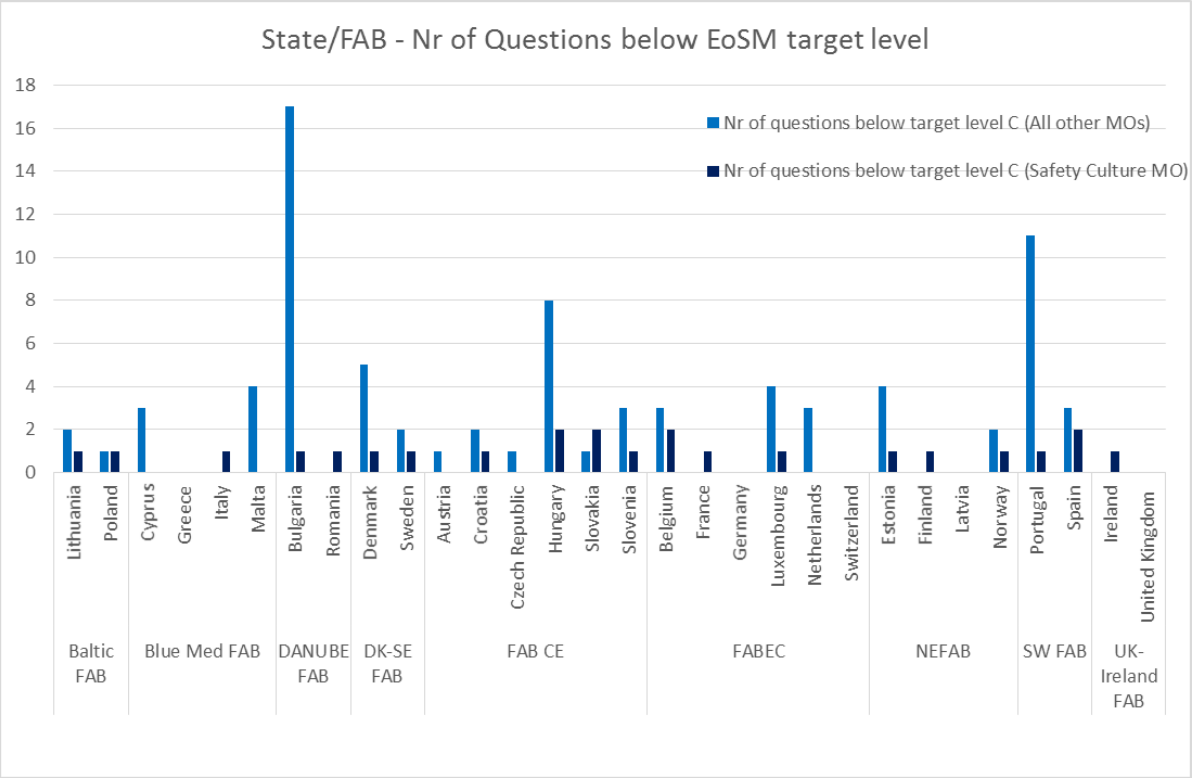


Figure 16: Number of EoSM State questions below 2019 EoSM target – Level C

EoSM ANSP Level - FAB View

2.2.18 The analysis of the individual EoSM ANSP questionnaire responses in Figure 17 shows that the majority of ANSPs/FABs are on the right path to achieve the 2019 EoSM Target of Level C in Safety Culture and Level D in all other Components/MOs. There are only two ANSPs that have areas of SMS implementation below level C.

2.2.19 The Polish Air Navigation Services Agency (PANSA) remains as a concern. PANSA has the effectiveness of safety management score of 29 (see Figure 12) slightly above the score of 24 achieved in 2015, and the levels of effectiveness of safety Culture and All other MOs remains at level A. The Polish CAA has reported in its Monitoring Report that the EoSM in PANSA remains at level A despite the efforts taken by current PANSA safety management staff. PANSA has established a 3-year activities programme aiming at revision of its SMS to enable to achieve the target levels by 2019, which will be constantly verified during continuous safety oversight by the Polish CAA. The main effort should be put in improving 19 areas of SMS implementation out of 27.

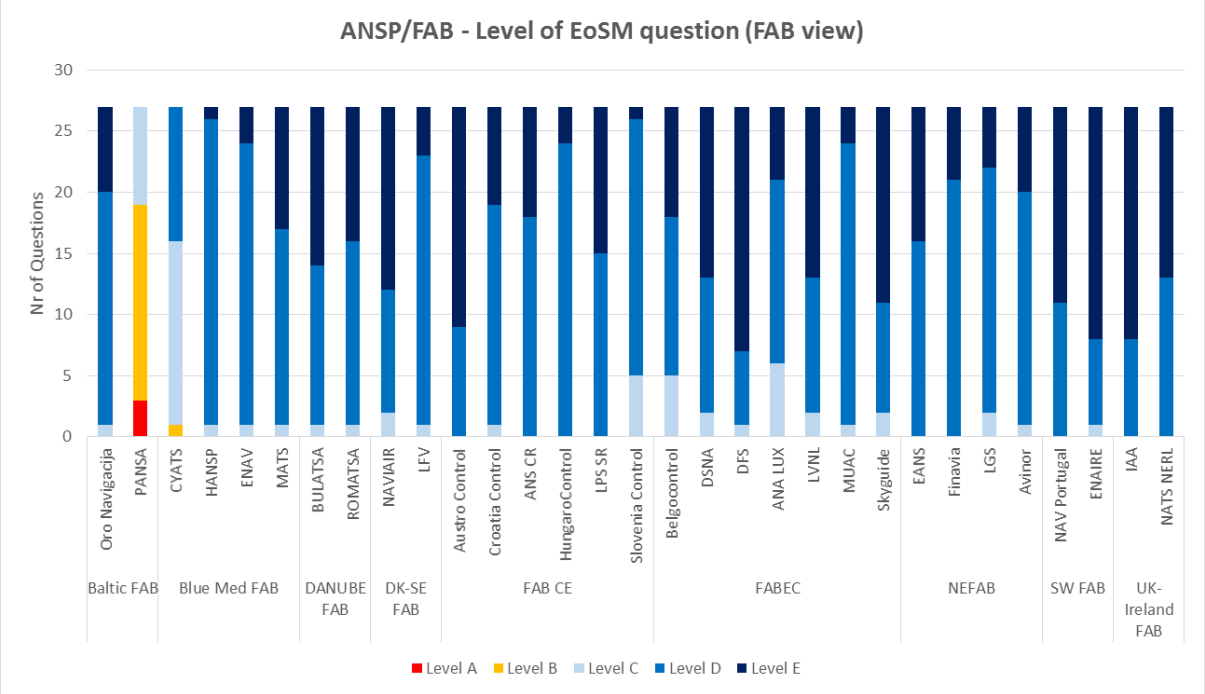


Figure 17: ANSP EoSM responses (excluding Safety Culture) per EoSM Level (FAB view)

2.2.20 Figure 18 shows the number of questions that are below the target level. Only one ANSP (PANSA) is below the Safety Culture 2019 target level, whilst 17 out 31 ANSPs achieved the 2019 target level for All Other Management Objectives.

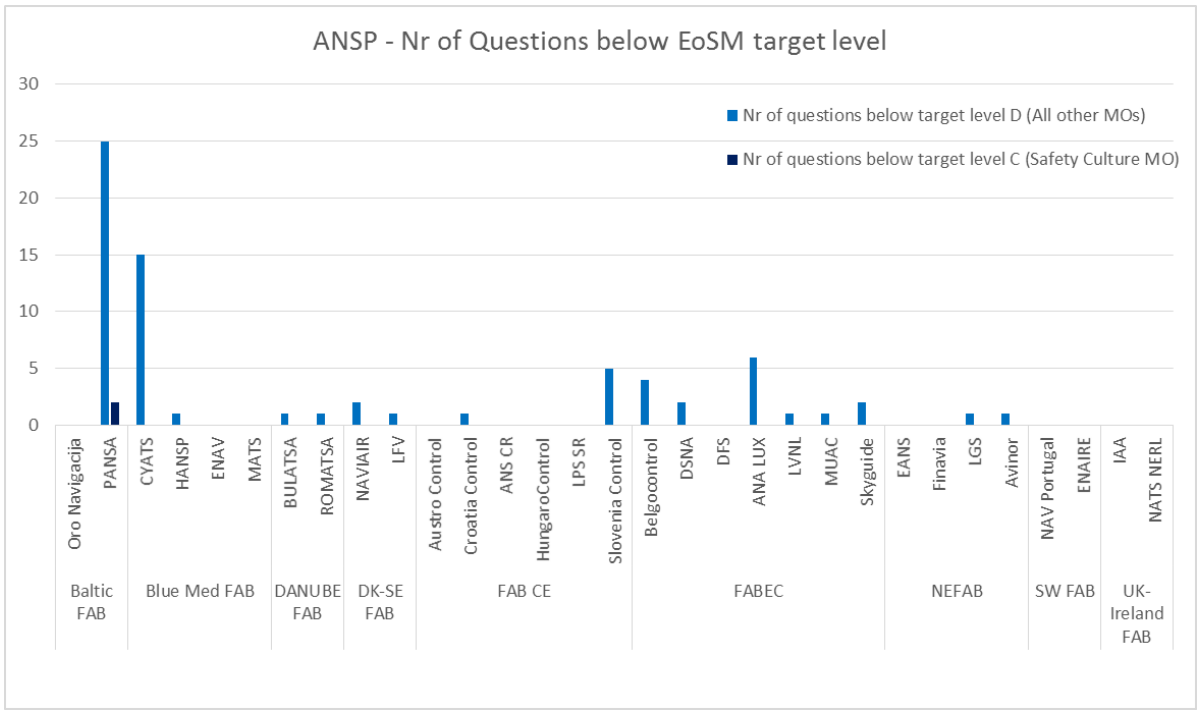


Figure 18: Number of EoSM ANSP questions below 2019 EoSM target – Level C or D

Application of the RAT Methodology

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

2.2.22 In the first two years of RP2 monitoring, the AST reporting mechanism was still used as the main vehicle for reporting the application of severity classification using the RAT methodology.

> ***Note**: The data presented and analysed takes into account the information reported by the end of March 2017covering the whole 2016 reporting year. As mentioned above, updates are expected during the September 2017 AST reporting cycle, which may be reflected in the final figures reported in this report.*

2.2.23 The following sections provide the analysis of the severity classification 2016 results provided by States. The analysis of the of severity classification using the RAT methodology is split by the scope of the assessment: ATM Ground and ATM Overall. For more information refer to EASA AMC/GM in ED Decision 2014/035/R amended by ED Decision 2015/028/R.

2.2.24 Important to note is that 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 numbers of occurrences that require the application of RAT for ATM Ground and ATM Overall may be different or that reported occurrences that are considered in SPI#3, if pre-assessed as D or E, may not severity assessed with the RAT methodology, as they are left out of the target.

2.2.25 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 the application of the AT methodology could be mandatory for the ATM Ground and not for the ATM Overall, or vice-versa. Moreover, Member 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.

2.2.26 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.

2.2.27 From the Union-wide perspective and taken all occurrences reported collectively into account, targets for 2017, as per Commission Implementing Decision (EU) 2015/19, are already achieved for its application to the SMI occurrences and to the RI Ground (see Figure 19). For RI Overall, and ATM-specific occurrences the percentages do not achieve the targets of 2017. The situation in 2016 has deteriorated in comparison with 2015. The RAT application to RI Overall and ATM-s overall are again the categories below the targets but the percent of RAT application dropped in those compoenet sand RI-ground too.

2.2.28 The most concerning indicator is related to the RAT applicability to the RI. While the RI Ground applied by ANSPs reaches 83% and it is above the target in 2017, i.e. 80%, the proportion of occurrences where RAT was applied to RI Overall by States only reached 73%. It is worth noting that the main issue is limited to a reduced number of States, as indicated below, which may have been the result of a temporary resource problem in those States.

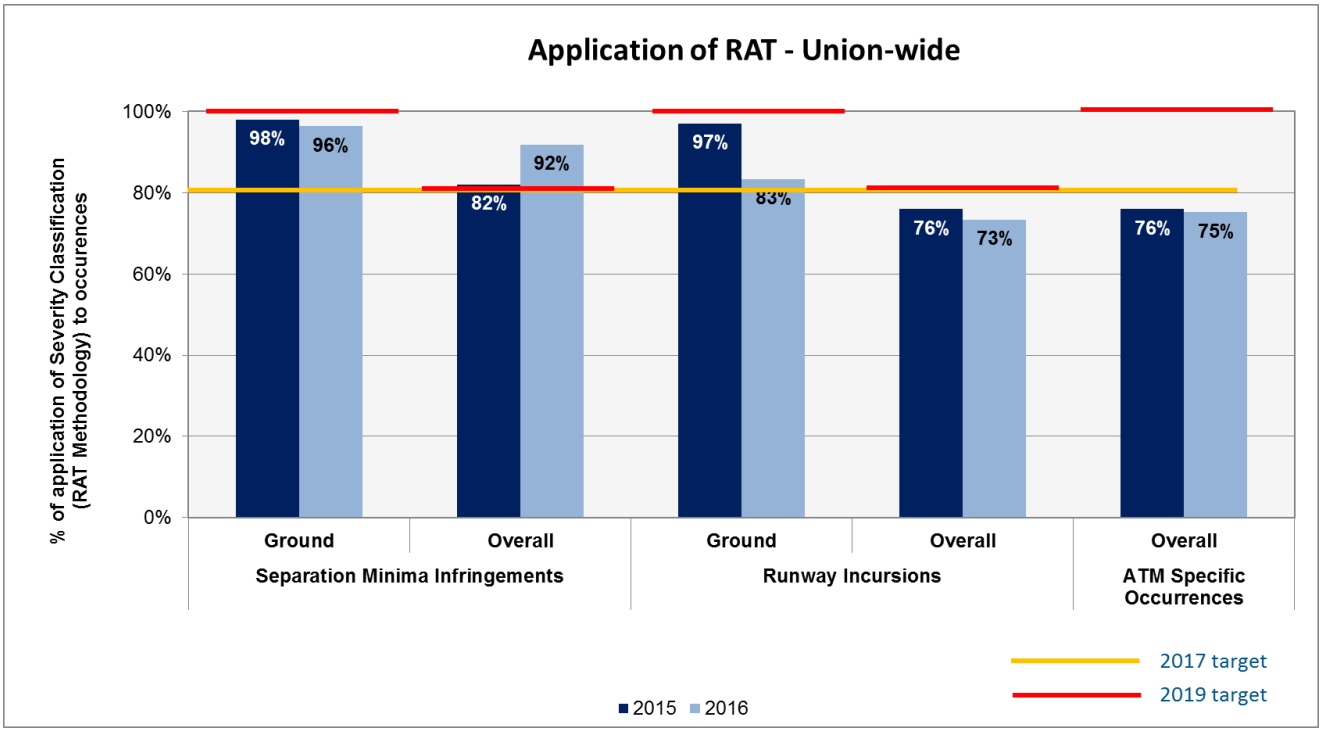


Figure 19: 2016 severity assessment using RAT methodology (Union wide)

2.2.29 It is observed that, at the Union level, the number of SMI, RI and ATM-s occurrences that required the application of RAT have increased in both elements where RAT is applied, ground and overall (see Figure 20). Because the total number of these types of occurrences have either decreased or increased but in smaller proportion (see Table 2) it can be concluded that occurrences, of all types, have been classified with higher severity. This may be the result of experiencing more severe occurrences or the application of more conservative criteria to rate the severity of a certain occurrence, with a biased towards more severe rating criteria. The increase in the number of RI that required RAT application may, in an environment of scarce resources in the NSAs, explain the worse results of the SKPI#2 for both RI Ground and Overall with respect to 2015, as shown in Figure 19.

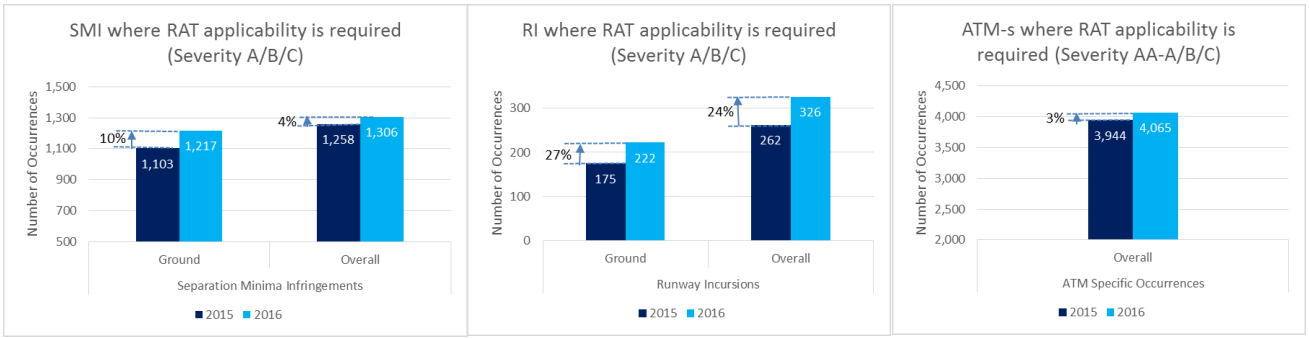


Figure 20: Variation of occurrences that SES Performance Scheme requires RAT application

2.2.30 When looking only at occurrences with high severity rating (i.e. severities AA-A and B) in Figure 21, the increasing trend is not generally observed in all types of occurrences. Only the SMIs show an increase trend (from 241 to 266). Therefore, the increased in rating the occurrence severity has only occurred with the Severity C. It is worth noting the significant decrease in severity rating observed in the ATM-s occurrences (from 460 to 183).

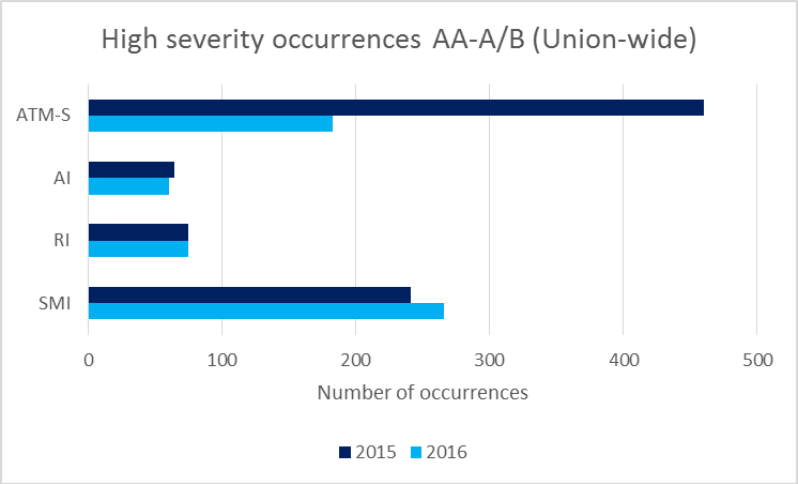


Figure 21: Variation of high severe occurrences (severity AA-A/B)

Application of the RAT Methodology - FAB View

2.2.31 Figure 22 shows the average application of the RAT methodology in FABs during 2016 based on the data reported in April 2017 and verified during the summer, for SMIs, RIs and ATM Specific Occurrences respectively.

2.2.32 Union-wide targets for 2017 and 2019 have already been achieved in full by five (5) FABs: Danube FAB, DK-SE FAB, FAB CE, NEFAB and UK-Ireland FAB.

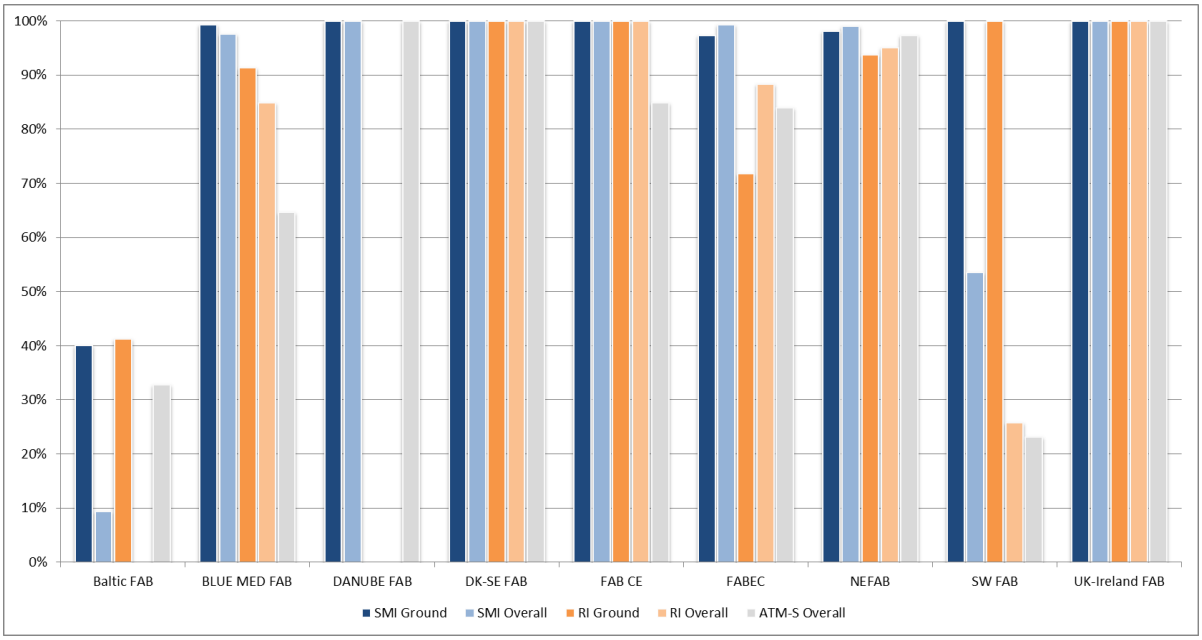


Figure 22: 2016 severity assessment using RAT methodology (FAB view)

2.2.33 Twenty-five (28) States used the RAT Methodology for deriving the severity of applicable Separation Minima Infringements (Figure 23). The assessment of SMI Ground and SMI overall was performed in 26 States.

2.2.34 Note that three States (Poland, Cyprus, and Hungary) did not apply the RAT methodology to derive either the ATM Ground or the ATM Overall components for those SMIs within the scope of the Performance Scheme when they should. In addition, three (3) States did not apply RAT either because they did not report any SMIs (Malta and Croatia) or because the severity was below C (Latvia), hence, there was no scope for the application of the RAT Methodology (they are represented without any bar in the figure and the letters “N/A”).

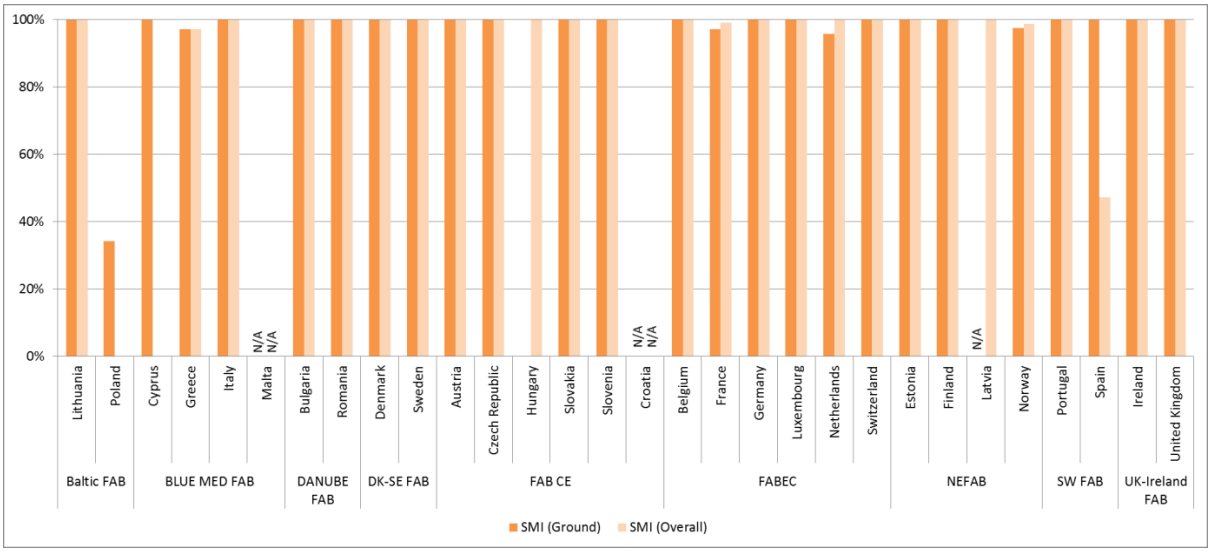


Figure 23: RAT methodology application for severity classification of SMIs

2.2.35 Twenty-two (25) States used the RAT Methodology for deriving the severity of applicable Runway Incursions (Figure 24). The assessment of ATM Overall was provided in 23 of these States, whilst 21 States assessed the ATM Ground component.

2.2.36 Note that two (2) States, Poland and Cyprus, did not apply the RAT methodology to derive the RI Overall component for those RIs within the scope of the Performance Scheme when they should. In addition, two (2) States, Lithuania and Bulgaria, did not report any RIs and seven (7) States did report RIs but with severity below C of at least one component, either Overall or Ground, hence, there was no scope for the application of the RAT Methodology (they are represented without any bar in the figure and the letters "N/A").

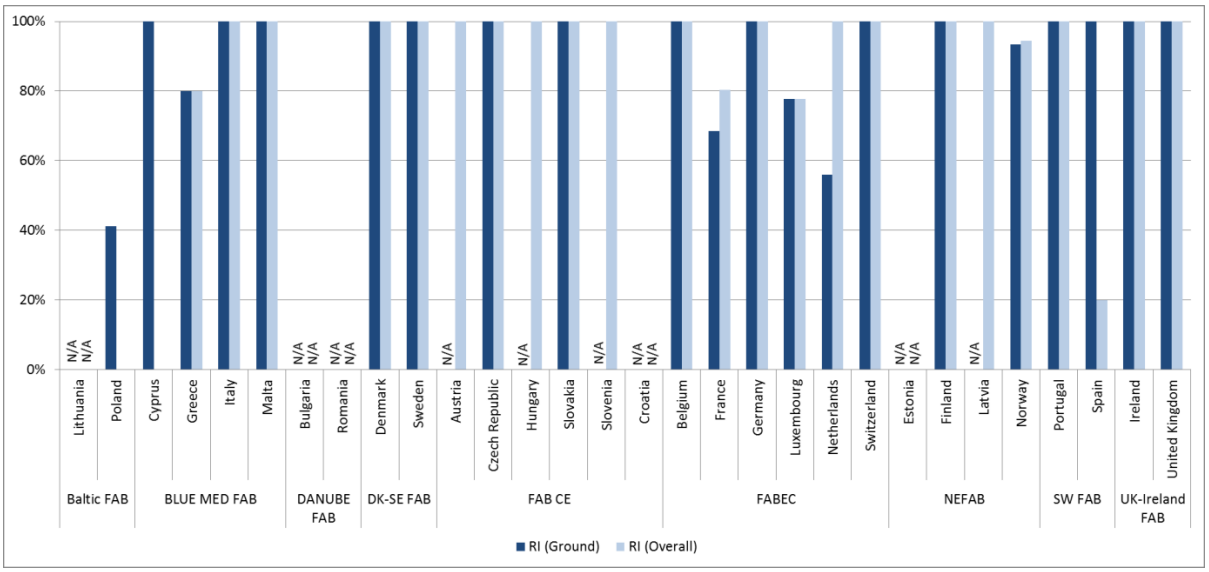


Figure 24: RAT methodology application for severity classification of RIs

2.2.37 Twenty-seven (27) States used the RAT Methodology for deriving the severity of applicable ATM Specific Occurrences (Figure 25). For this type of occurrence the scope of the assessment is ATM Overall only.

2.2.38 Two (2) States, Cyprus and Netherlands, did not apply the RAT methodology for deriving the severity of any of the applicable ATM Specific Occurrences when they should. One (1) State, Latvia, did not apply RAT to the ATM-s Overall as the severity was below C, hence, there was no scope for the application of the RAT Methodology (it is represented without any bar in the figure and the letters "N/A").

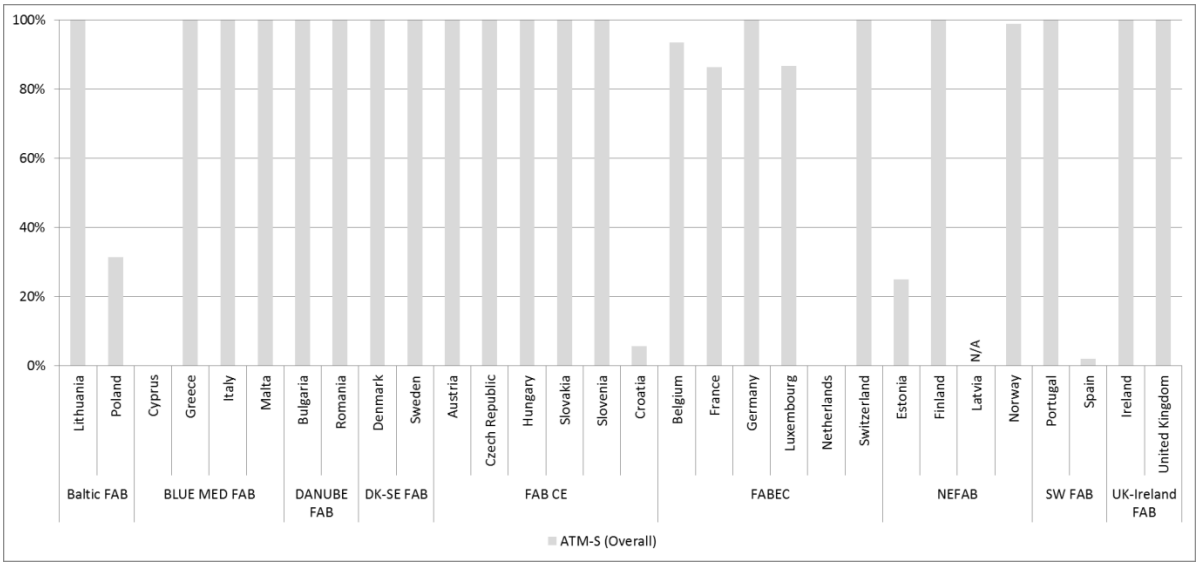


Figure 25: RAT methodology application for severity classification of ATM Specific

2.2.39 Note: *Data concerning the verification of the RAT application is based on **preliminary 2016** information (data collected end of March 2017), and the data submitted by the Member States in their Monitoring Reports of June 2017. Updates are expected during the September 2017 AST reporting session. The Dashboard will be updated with **final 2017** data on the application of RAT severity classification during October 2017.*

Just Culture

2.2.40 The Safety Key Performance Indicator (SKPI) 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) N° 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.

2.2.41 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; and
- Occurrence reporting and investigation.

2.2.42 Under each area, the questions vary for States and ANSPs slightly in order to take into account specific elements pertaining to each.

2.2.43 For RP2 FABs are expected to set Just Culture targets – as per Regulation (EU) N° 390/2013 just culture targets were to be set at the local i.e. FAB level.

2.2.44 For the monitoring exercise of 2016, all 30 States and 30 ANSPs filled in the self-assessment questionnaires used for the measurement of the JC SPI in accordance with EASA AMC/GM.

2.2.45 In addition, FABs were to report via the FAB 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.

2.2.46 Based on the review of the 2016 FAB Monitoring Report, 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 will be measured.

2.2.47 When compared with 2015, very little has changed. This is not surprising as most changes in the Just Culture questionnaire are link to legal changes that requires longer time to be implemented.

2.2.48 Table below show observations based on analysis of 2016 FAB Monitoring Reports.

FAB	OBSERVATION
BALTIC	The BALTIC FAB has not established a common approach to improve Just Culture either at State or at ANSPS level. Possible areas of improvement were not identified for either the State or ANSP level.
BLUE MED	The Blue MED FAB has reported that a common approach to improve Just Culture is established. Possible areas of improvement were not identified for either the State or ANSP level.
Danube FAB	The Danube FAB has reported that a common approach to improve Just Culture is established at both State and ANSP levels; however all areas of improvements in the Just Culture areas reported at the national level (State and ANSP) are generic and do not refer to this FAB common approach. At the State level, individual initiatives to harmonise legislation with just culture principles and Regulations (EU) 996/2010 and 376/2014 are reported, without any reference to a common FAB approach. At ANSP level, individual ANSP implementation of just culture policy and discussion with judiciary bodies are reported, without any reference to a common FAB approach.
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. At State level, a common governance body has been established to identify areas of improvements. No legal changes are foreseen in any State. Legal constraints relating to the exchange of occurrence data at State level (between NSAs) has been reported as having been resolved and is implemented. At the ANSP level, both organisations have implemented a common just culture policy and harmonised SMS, including processes for occurrence reporting and investigation. The legal constraints to exchange of information have been identified and resolved but are yet to be implemented.
FABCE	FABCE has reported that a common approach to improve Just Culture is established at both State and ANSP levels. 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 be endorsed by all CAAs, and that there will be a requirement for ANPS to implement a common just culture policy. There is a commitment to train the staff on Just Culture elements. No other improvements are identified for either the Legal system or occurrence reporting processes. At ANSP level, the ANPS will adopt a common Just Culture policy and principles, and will ensure their staff are trained on Just culture elements.
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 reach as to cover legal aspects with regards Just Culture. With regard occurrence reporting, the collaboration is limited to apply harmonised principles and procedures to classify occurrences and severities. At ANPS level, common actions are reported to taken related to policy aspects without further details.
SW FAB	The SW FAB has not established a common approach to improve Just Culture neither at State nor at ANSPS 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.

FAB	OBSERVATION
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. 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. The occurrence reporting and investigation are reported similar on 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.

Table 1: Just Culture implementation at FAB level

2.2.49 It is apparent that further work is needed in this area, as FAB Member States and their ANSPs need to work together to enhance cooperation in order to ensure that a Just Culture environment is maintained in all the States and in participating ANSPs. Establishing a Just Culture in all Performance Scheme States is an essential pre-requisite for any achievements for the European wide safety improvements and successful use of all Safety (K)PIs.

2.2.50 Even when FABs state that they have established a common FAB approach in certain areas for Just Culture improvements, detailed information that explains the basic elements in place to promote the application of Just Culture is usually not provided (i.e. local/FAB targets appear to be only set formally).

Despite the signature of European Just Culture Declaration[xvii] by major ATM representative organizations and the European Commission, the PRB believes that this fragmented and non-coherent approach is the outcome of a lack of determination to establish a common Union-wide Just Culture. Leaving Just Culture implementation to States, without setting common approaches at FAB level obviously produced additional (unwanted) problems. An approach which should have allowed a maximum level of consistency of the Just Culture approach across Europe and which should have helped avoiding having difficulties

2.3 Safety Performance Indicators

2.3.1 This Section describes the 2016 safety performance review by monitoring at local level the Safety Performance Indicators (SPIs) as defined in paragraph 1.2 Section 2 Annex I of Regulation (EU) 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.

Automated Safety Data Recording Systems

2.3.2 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.

2.3.3 In 2016, 9 States have reported that their ANSPs are using some type of automated safety occurrences recording systems. In addition, five (5) States (Lithuania, Bulgaria, Romania, Denmark, and Sweden) did not provide any information, although in 2015 some reported that their ANSP had not implemented automated safety data recording tool, so it can only be assumed that these systems are not available (depicted in orange in Figure 26). The implementation of these tools looks similar to previous year 2015, except for one ANSP that corrected the information.

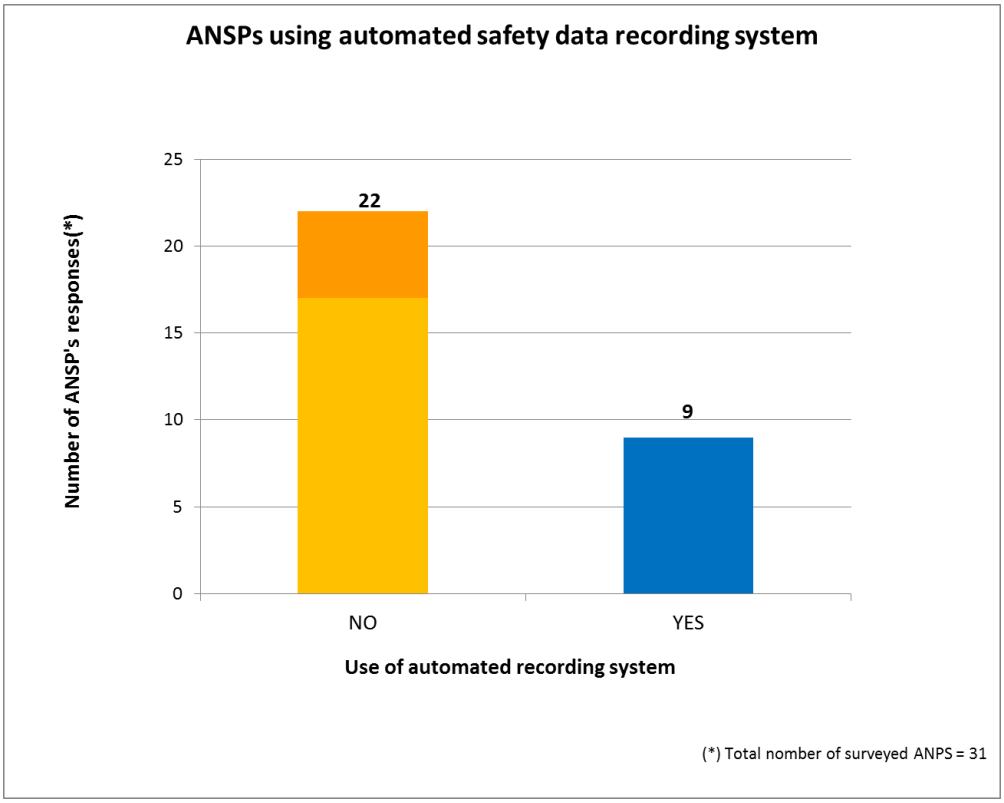


Figure 26: ANSPs using automated recording systems

2.3.4 Out of these nine (9) States that have some type of automated recording systems, seven (7) of them collect information about SMIs, whilst two (2) collect information on both SMIs and RIs (Figure 27).

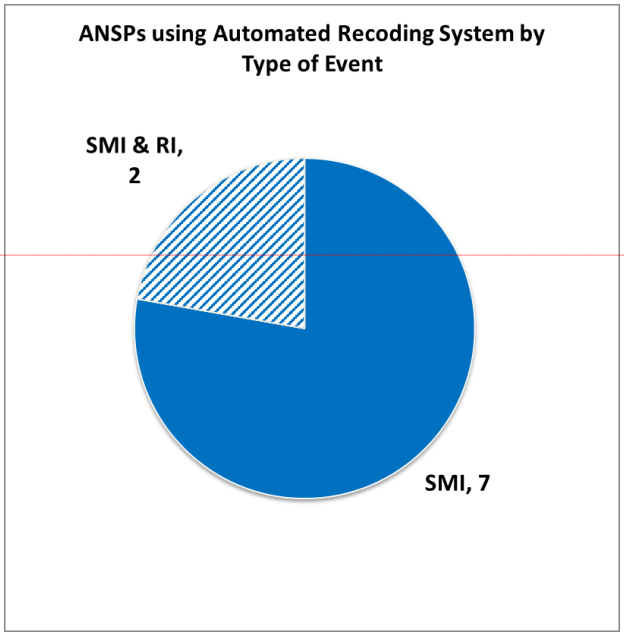


Figure 27: Type of reportable event

2.3.5 Most States did not provide the requested information about numbers of detected events using these automated recording tools. In certain cases the ANSP 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. It is not possible to determine whether these systems actually improved occurrence reporting.

2.3.6 Among the States that did report the use of these automated tools by their ANPSs, only 5 provided the definition of the events that trigger the automatic detection of events for further analysis. In those cases, 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 may differ. Two of these ANSPs use a vertical separation of 800' to trigger the events, and a horizontal parameter similar to the standard separation. Another ANSP triggers the automated SMI when the separation is 50% of the standard separation provided in its controlled airspace, both horizontally

and vertically. Finally, another ANSP uses intermediate parameters: in a 5NM separation standard environment, the tool triggers for aircraft encounters of 3.5 miles laterally and 600 feet vertically, and in a 3NM separation standard environment, it triggers for aircraft encounters of 2 miles laterally and 600 feet vertically. It is apparent that the event definition seems to serve a different purpose for each of the 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 all encounters with separation below prescribed standards, and ultimately may capture many non-genuine events.

2.3.7 Having reviewed the information provided by the Member States during 2015 and 2016, it can be concluded that the use of automated safety data reporting tools is not widely implemented among MS. Nevertheless, this limited implementation does not include a harmonised definition of the events that trigger the occurrence capture. In addition, even when these tools are implemented, their use seems, in some cases, be devoted to operational analysis and not to complement occurrence reporting. A best practice on how to define the triggering event and its use was identified in the UK report and is presented below.

Best practice of defining Triggering Event to capture candidate SMIs with automated data recording tools:

In a 5NM separation standard environment, the automated tool will trigger a candidate event for aircraft encounters of 3.5 miles laterally and 600 feet vertically. In a 3NM separation standard environment, the tool will trigger a candidate event for aircraft encounters of 2 miles laterally and 600 feet vertically. Operational supervisors are required to acknowledge all detected encounters and determine where the event is a genuine Separation Minima Infringement occurrence. For all genuine events the supervisors will confirm whether an associated SMI occurrence has been formally reported. When the event has not been reported a new incident report is raised.

Level of Reporting

2.3.8 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 subsection gives, quantitatively, a Union-wide and FAB view of the characteristics of occurrences reported during 2016, including both the ratio of high-severity and low-severity occurrences and the reporting rates. The second subsection provides a summary of best practices extracted from the reported assessment provided by each Member State about the level of occurrence reporting in their State and ANSP.

Union-wide/FAB Level of Reporting

Ratio of high severity and low severity reported occurrences

2.3.9 Figure 28 collects the reported occurrences during 2016 grouped by severity, high and low, split by type of occurrence, namely SMI, RI, AI, and ATM-S. It is worth noting that the severity of the occurrences has been estimated and reported by the Member States using the following classification: severity AA/A (Serious incident), B (Major incident), C (Significant incident), D (Not determined), and E (No significant safety effect). High-severity occurrences include occurrences classified 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.

2.3.10 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 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	266	1.930
	RI	75	943
	AI	60	3.505
	ATM-S	183	13.038

Figure 28: Union-wide number of high and low severity reported occurrences

2.3.11 Figure 29 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 12% and 7% of high-severity occurrences over the total, respectively, while AIs and ATM-Ss show 2% and 1%, respectively. This difference may be the result that 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.

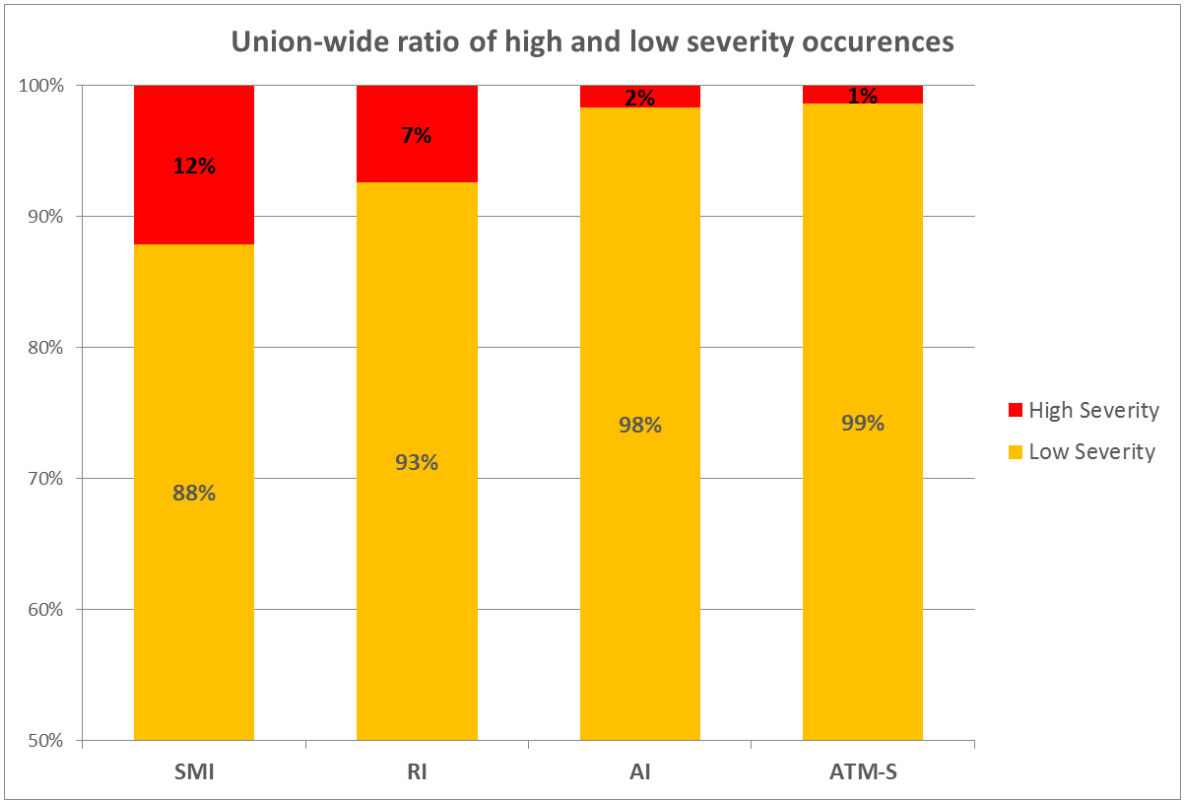


Figure 29: Union-wide proportion of high and low severity reported occurrences

2.3.12 Figure 30 depicts the percent of high-severity occurrences by type of occurrences observed in each FAB. 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 FAB to vary around the Union-wide figures. There are, however, several factors that explain why this is not 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

achieved may be different. The identification of the more likely reasons are not possible with the data available and should be done at local level.

2.3.13 The figure also shows that some FABs seem to consistently report higher ratio of high severity over the total number of occurrences in all or most types of occurrences (see for example Baltic FAB or Blue Med FAB), while others consistently report lower share than the Union-wide (e.g. UK-IE FAB). The reasons of this behaviour cannot be determined with the submitted information, but it may indicate a biased towards rating more severely the reported occurrences, the lack of reporting of low severity occurrences or the existence of higher risks in their systems.

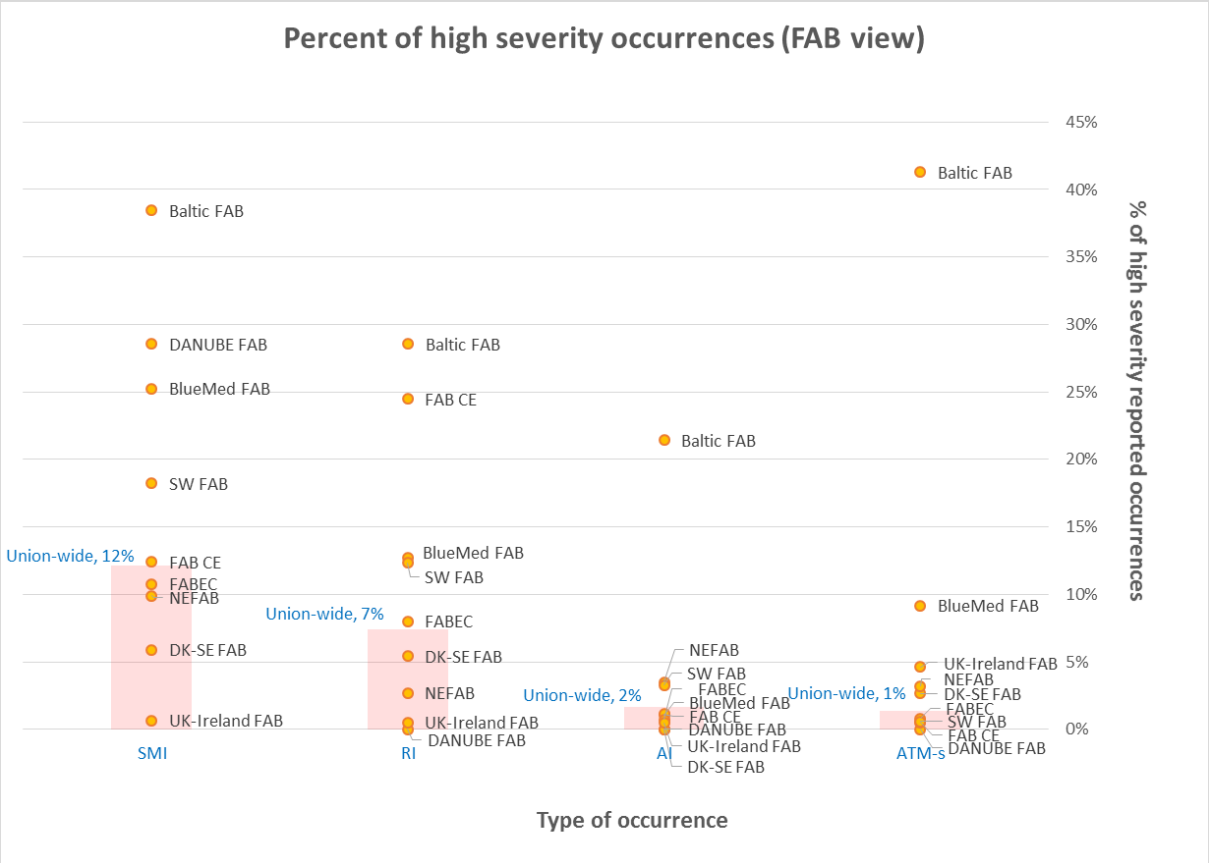


Figure 30: FAB proportion of high severity of reported occurrences vs Union-wide

Occurrence reporting rates per occurrence type

2.3.14 Figure 31, Figure 32, Figure 33, and Figure 34 depict the FAB reporting rates per occurrence type together with the built box plot of reporting rates of Member State in the SES area. A box plot is a way to describe the distribution of the reporting rates across Member States within the Union 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 MS 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.

2.3.15 Figure 31 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 one FAB have higher reporting rates than the 50% box (FABEC) and one has lower rate (DANUBE FAB).

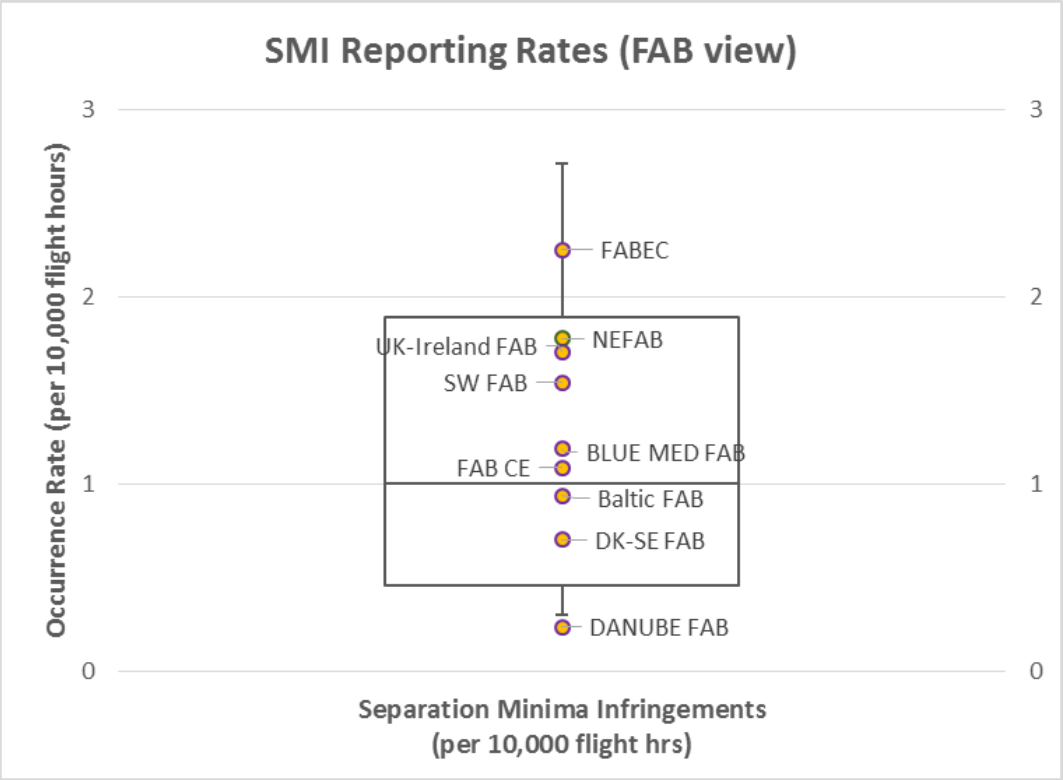


Figure 31: Box plot of Union-wide and FAB reporting rates of SMIs

2.3.16 Figure 32 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. It is worth noting that up to four FABs have higher reporting rates than the 50% box (FABEC, NEFAB, UK-Ireland FAB, SW FAB) and one has lower rate (DANUBE FAB).

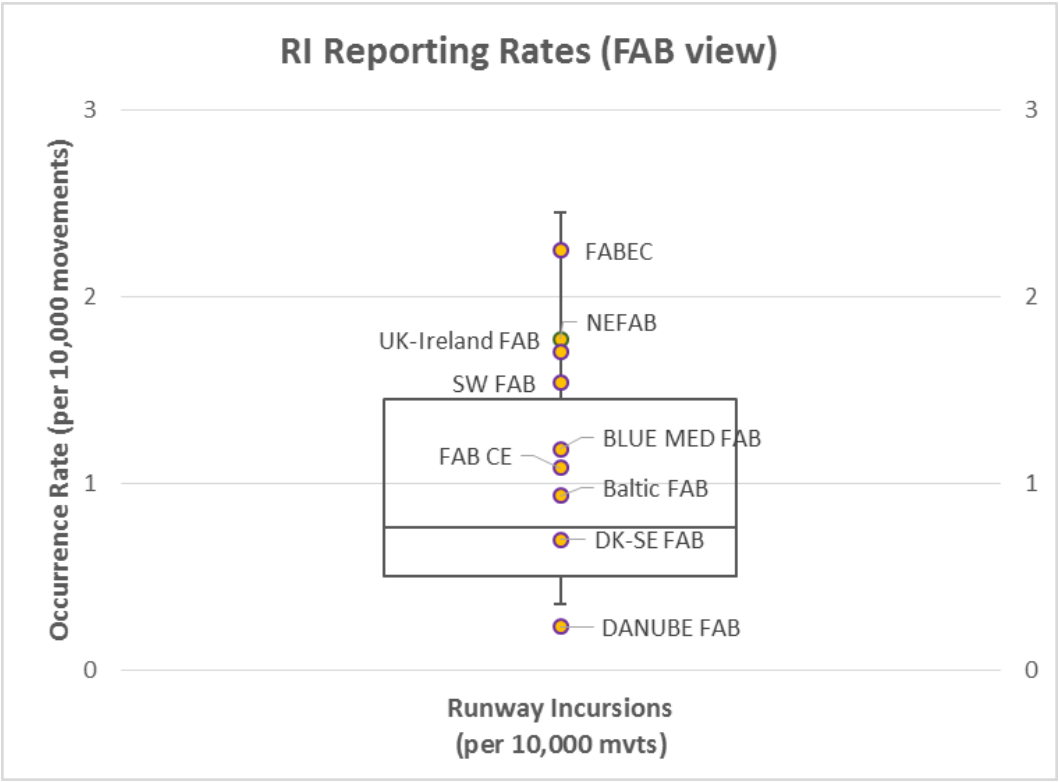


Figure 32: Box plot of Union-wide and FAB reporting rates of RIs

2.3.17 Figure 33 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 (NEFAB and UK-Ireland FAB) and two have lower rate (DANUBE FAB and Baltic FAB).

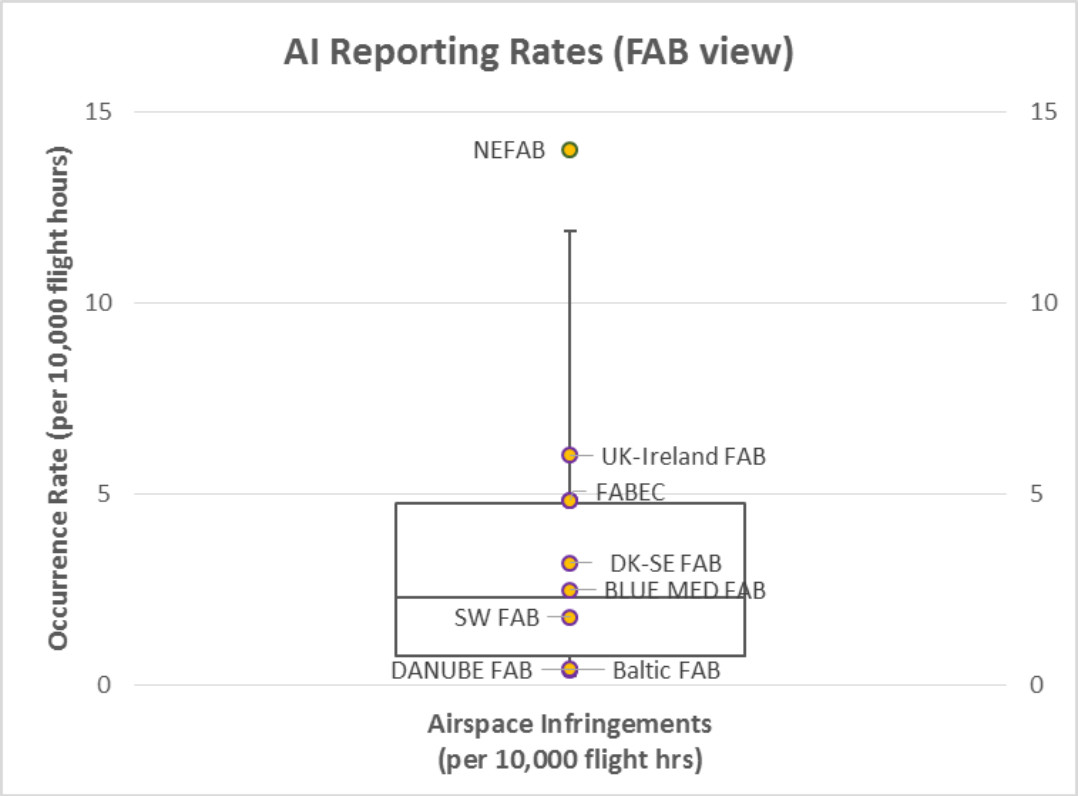


Figure 33: Box plot of Union-wide and FAB reporting rates of AIs

2.3.18 Figure 34 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. It is worth noting that two FABs have higher reporting rates than the 50% box (FABEC, and NEFAB) and two have lower rate (UK-Ireland FAB and BlueMed FAB).

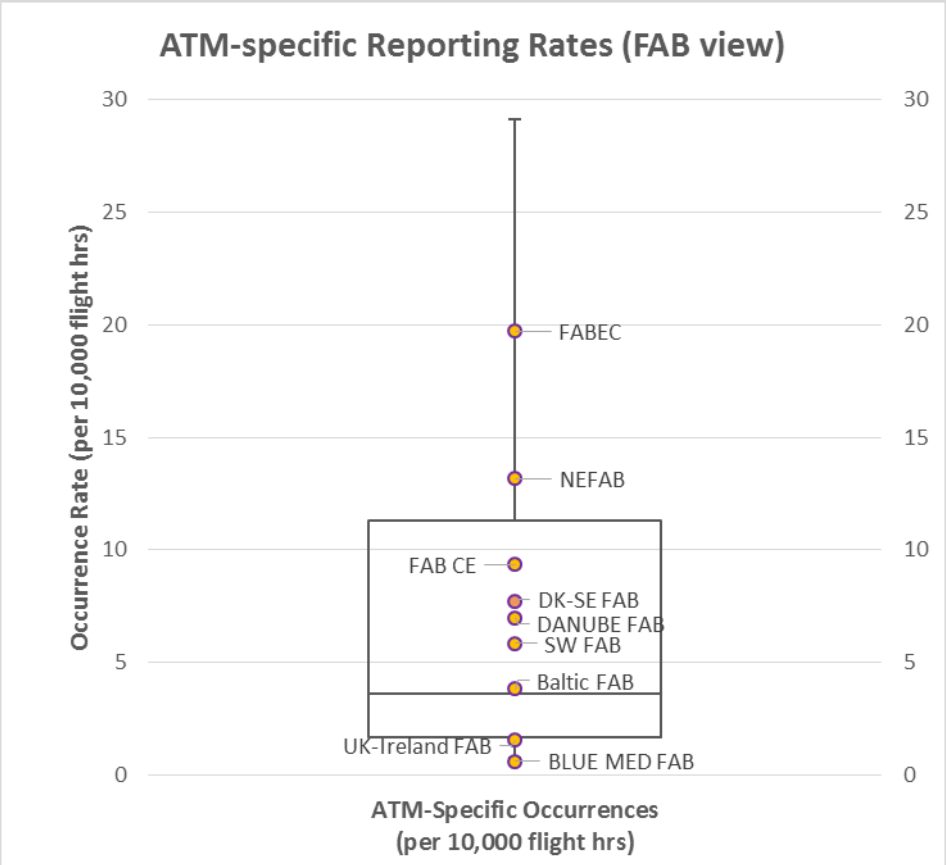


Figure 34: Box plot of Union-wide and FAB reporting rates of ATM-S

2.3.19 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 (wide rectangle box plot), while the spread of SMIs and RIs reporting rates are similar and narrower than the other type of occurrence. This may be an indication that certain occurrence types are potentially analysed less consistently than others across Member States, either because the criteria used by the States/FABs are different or because the method to assign severity and, therefore, consider the event reportable, is applied differently across them, as it may be the case in occurrences with severity classified as D or E, or in AIs (neither of them require the application of RAT).

2.3.20 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 be close. However, in practice, the reporting rates are more or less widely spread around the median for several factors. Some of these are:

- over-reporting leads to Member States/FABs rates higher that 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.
- different safety performance of the services provided could be a factor as well and, finally,
- 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).

2.3.21 It is worth mentioning also that the consistent use of the unit for normalisation across Member States may play a role in the variation of rates.

2.3.22 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 from 2015 and 2016, there are no trends that can be derived in this respect.

Member States/ANSP Level of Reporting

2.3.23 This section summarises the results of Member States submitted analysis of their level of reporting and those of the ANSPs under their jurisdiction. Most 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 SPI and its associated AMC/GM. The reports were limited to qualitative analysis of the situation in each State without a very sound analysis. Therefore, it is difficult to conclude whether an adequate or inadequate level of reporting is implemented in each State, for the most of the States. However, the previous section and the comparison of the reporting rates gives an overview that may suffice. In addition, no major issues related to the reporting levels of the ANSPs were reported by any NSA.

2.3.24 The major observations about the level of reporting analysis reported by the Member States in their 2016 Monitoring Reports can be summarised as follow:

- This year all States reported an analysis of the level of reporting contrary to 2016 when up to four States left blank this SPI, although the level of analysis varies substantially between States. However, only a few performed a combination of quantitative and qualitative assessment, as indicated by the AMC/GM. Nevertheless, the effort to report within this SPI has improved. In many situations the analysis was limited to describe the reporting processes in place or just anecdotal descriptions of the reporting practices, more than to analyse its reporting levels. Anyway, the information submitted gives a valuable picture of the reporting practices in all States.
- None of the Member State reports identified deficiencies in the level of reporting; neither at State nor ANSP level. In line with that, very few actions to improve were reported. In general, Member States reported no issues (“the level of occurrence reporting is considered appropriate”, “improve observed from last year”, “ANSP level of reporting is good”, “level of ANSP is remarkable stable”, “very rarely happens that a report gets forgotten”, “the SMS of the ANSP is mature”, etc. are common expressions used in the conclusions of the reports). Estonia identified the need for better coordination between military and civil safety units in order to improve reporting and analysis, while others identified training campaigns as potential means to improve level of reporting.
- Most of 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 the size of the main ANSP is significantly larger and, thus, it was not considered appropriate to benchmarking them. It is worth noting that, nevertheless, the reporting rates are different in the Member States, as shown in Figure 31, Figure 32, Figure 33, and Figure 34, and that the distribution of occurrence rate within member States were elaborated to allow that comparison at European level, but nonetheless boxplot were not used in their reports.
- Most of the States reported the use of ECCAIRS and compliance with Regulation 376/2014, including the issuance of just culture principles in their safety policy. They reported associated occurrence reporting processes linked to the implementation of the said Regulation 376/2014. Most States specifically stated that all staff is encourage to reports any safety concern event and that confidentiality is ensured.

- Some States have identified an increase of reports due to the implementation of Regulation (EU) 376/2014 as main driver, e.g., Estonia reported increases of ATM-s occurrences, Spain identified increase in operational events, Germany and Belgium identified significant increase of reports in general, and Italy reported an increase of 63% of all reports when taken collectively. On the contrary others claim that the level of report has remained relatively constant (e.g., France reported that the level of reporting has remain close in the last 5 years, Austria reported this stability for many years). Only two States identified some decrease in reporting. UK identified decreased in reporting due to usability issues with the EU portal, but without providing a supporting evidence. Malta reported a temporary decrease.
- Some States confused the analysis of level of reporting, with an analysis of the trend of the severity of their reports and the evolution of the number of SMI, RI, AI, and ATM-S, which was not the purpose of this SPI. Additionally, Some States reported the use of software tools for collection, storage, submission to ECCAIRs and data analysis as facilitators (e.g. eTOKAI, SPSS, Q-pulse).

2.3.25 Lastly, several best practices are extracted from the State reports that may help to improve the level of reporting. These are summarised in the following points:

Best practice 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 to use, e.g. local databases, ECCAIRS/ECR, but in all situations the interchange of 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 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.
- Easy access to reporting means (e.g., web), with fast and user friendly interfaces and might include customised forms for different types of personnel, different level of access, and prefilled mandatory fields that can be changed by the reporter if needed. 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 of 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 are integrated, implementing different control access and confidentiality levels, as appropriate. All reports submitted are subject to analysis and follow up, treating voluntarily reports in the same way as mandatory reports.
- Well established coordination and communication processes, including compatibility between their databases, between Civil Aviation Authority (CAA), Aviation Accident Investigation Board (AAIB), and ANSP are essential for a complete and well design reporting, analysis and follow up system. NAAs may be the central point to coordinate the outputs of ANSPs reports and investigation from the AAIBs. NAA may establish a group of experts of different aviation domains that meet regularly to review, analyse, and share information on occurrences including risk assessment
- 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 understanding 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 means to facilitate collaboration nationally and internationally, improving sharing safety data and incident information learning from these data and enable safety performance improvements. They should be encouraged within the States.
- 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.

Safety Performance by Type of Occurrence

2.3.26 This SPI aims at capturing the number of, as a minimum, separation minima infringements, runway incursions, airspace infringements, and ATM-specific occurrences at all air traffic services units.

2.3.27 The most informative information that can be derived from these safety PIs is linked to the evolution of the metrics across years. However, any trend should be read carefully and not correlate immediately with greater or lower levels of safety of the services as there are additional factors that may influence its evolution, e.g., the level of traffic, improvement/deterioration in the reporting culture, or change of interpretation of occurrence definitions or applicability within the Performance Scheme. The limitations described in Section 1.6 must be taken into consideration as well.

2.3.28 Table 2 lists the evolution of the total number of occurrences at union-wide level. While the number of Separation Minima Infringements (SMIs) and ATM-specific (ATM-s) occurrences have decreased by 3% and 7%, respectively, the reported number of Runway Incursion (RI) and Airspace Infringements (AI) occurrences have both increased by 7% and 20%, respectively in 2016 with respect to 2015. The following paragraphs look into the evolutions within the FABs and Member States, which indicate that the trend is not equally applicable to all States.

TYPE OF OCCURRENCE		2015	2016	VARIATION
Reported occurrences Union-wide	SMI	2,290	2,231	↓ -3 %
	RI	1,024	1,099	↑ 7%
	AI	4,041	4,838	↑ 20%
	ATM-S	15,111	14,089	↓ -7%

Table 2: Union-wide number of high and low severity reported occurrences

2.3.29 Figure 35 depicts the number SMI occurrences reported by each FAB in 2016 and the variation of these numbers as percentage of the figures reported in 2015. It is observed that FAB CE, SW FAB and Baltic FAB have reported increased percentages of SMI in their airspace of 21%, 48% and 59%, respectively, while the rest of FABs reported same number of SMIs (Blue Med) or decreasing numbers of SMIs with percentages ranging from -3% to -26%. The variation of the aggregated numbers of SMIs at EU level is overall -3% as shown in Table 2.

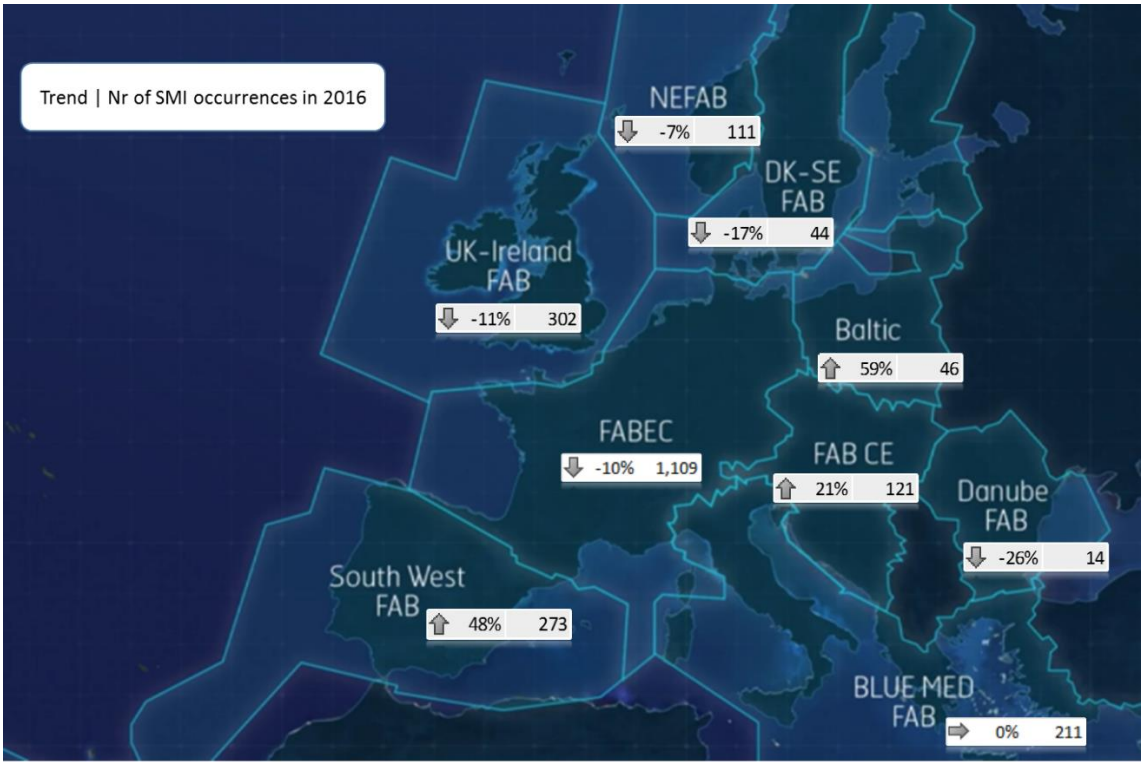


Figure 35: Evolution of number of SMI occurrences reported by FAB in 2016

2.3.30 Figure 36 depicts the number RI occurrences reported by each FAB in 2016 and the evolution of these numbers as percentage of the figures reported in 2015. It is observed that FABEC, UK-IR FAB, and SW FAB have increased the number of RI by 11%, 32%, and 76% respectively. Other FABs have no variation in the reported RIs (Danube FAB) or have reported decreasing numbers, ranging from -10% by NEFAB to -39% by DK-SW FAB. The variation of the aggregated numbers of RIs at EU level has increased by 7% as shown in Table 2.

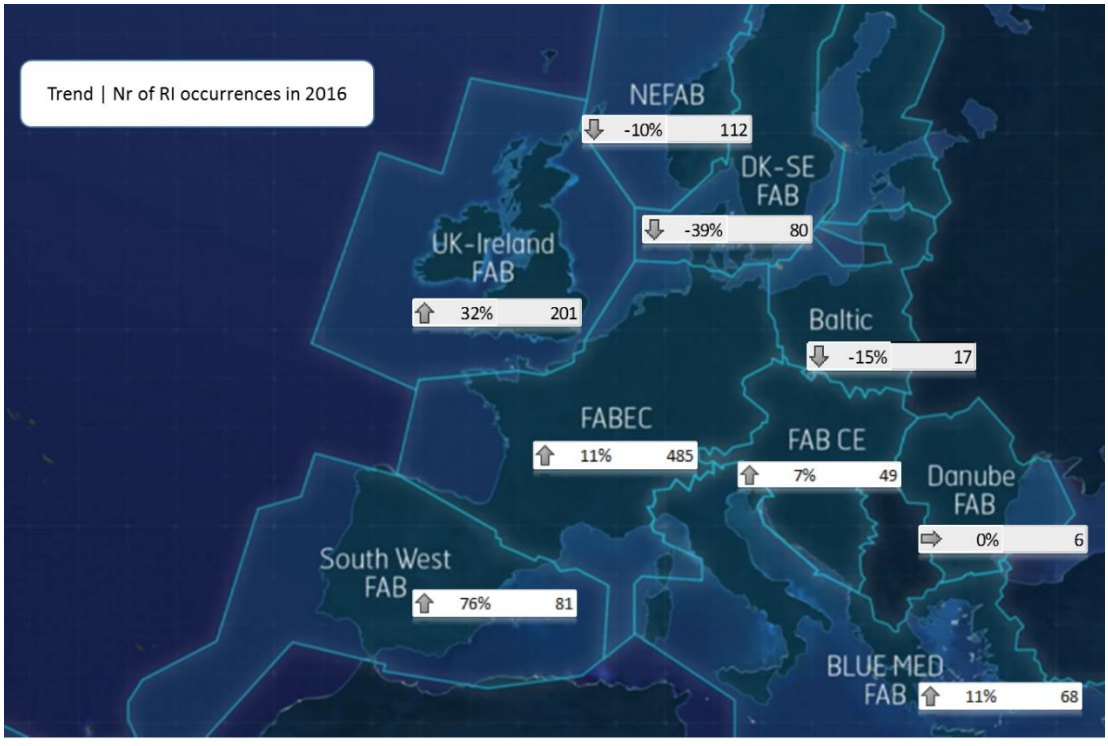


Figure 36: Evolution of number of RI occurrences reported by FAB in 2016

2.3.31 Figure 37 depicts the number AI occurrences reported by each FAB in 2016 and the evolution of these numbers as percentage of the figures reported in 2015. NEFAB and SW FAB reported the highest increases in AI occurrences by 155% % and 181%, respectively. Baltic FAB reported the highest decrease if AIs (-79%). The variation of the aggregated numbers of AIs at EU level has increased by 20% as shown in Table 2.

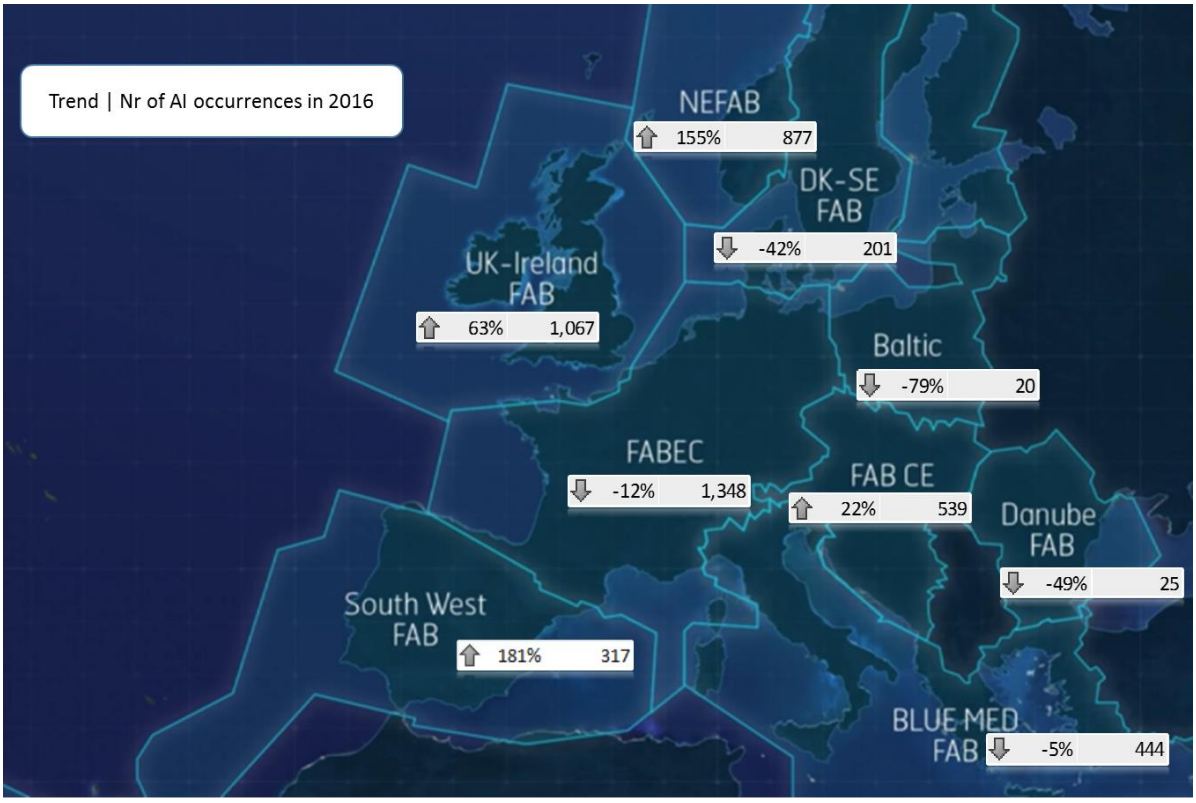


Figure 37: Evolution of number of AI occurrences reported by FAB in 2016

2.3.32 Figure 38 depicts the number ATM-s occurrences reported by each FAB in 2016 and the evolution of these numbers as percentage of figures reported in 2015. Baltic and FAB CE reported the highest increases in ATM-s occurrences by 151% and 52%, respectively. Conversely, DK-SE FAB and Blue Med reported the highest decreases by -44% and -45%, respectively. The variation of the aggregated numbers of ATM-s at EU level decreased by 7% as shown in Table 2.

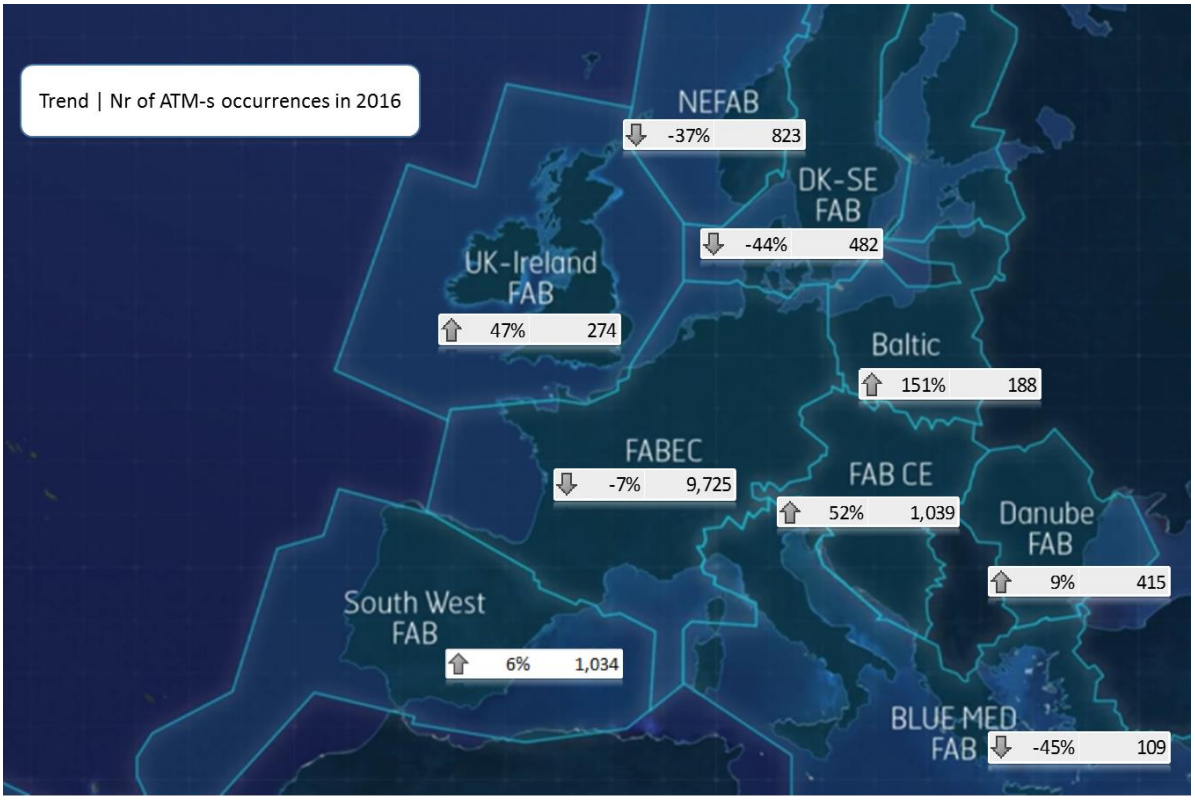


Figure 38: Evolution of number of ATM-s occurrences reported by FAB in 2016

2.3.33 The reasons for the evolution in the reported occurrences in each FAB/State may be multiple and cannot be presently determined with certainty. With regards to the increase in reported occurrences from 2015 to 2016 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. However, this increase is not generally observed across all States, as reporting to the European Central Repository has in fact been in place Union-wide for some time, under Directive 2003/42/EC. 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. The movements at the airports included in the SES Performance Scheme and the controlled flight hours in the airspace of Member States have increased by approximately 12% and 3.5%, respectively.

2.3.34 With regard to the decrease in the number of reported occurrences, 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 the States and the manual intervention in the extraction of occurrences. On several occasions States reduced the number of reported occurrences, arguing that some 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. In the following reporting periods this may be improved if the criteria are consistently applied. Another way of improving would be if the cross-check, or even the extraction of occurrences, is done with occurrences extracted from the ECR, provided that the coding in the ECR is correctly performed.

2.3.35 Nevertheless, some of the substantial variations are of concern and should be closely analysed by local NSAs and ANSPs. It is recommended that local NSAs and ANPSs within those FABs with substantial changes in the reported occurrences investigate further these changes in order to determine if the variations are due to either any of above factors or others, or are the result of an increase in the safety risks. In particular, (the following list is not exhaustive and some individual States may also want to review their occurrences and reporting practices to the Scheme too):

- Baltic FAB should look into its increase of SMIs, and ATM-s as well as into its decreased reported AIs as well;
- DK-SE FAB should look into its decrease of RIs, AIs and ATM-s;
- FAB CE should look into its increase of ATM-s;
- NEFAB CE should look into its increase of AIs;
- SW FAB should look into the increase of SMIs, RIs, AIs, and ATMs,
- UK-IR FAB should look into its increase of AIs and ATM-s.

2.3.36 Figure 39 summarises the distribution of the total number of reported occurrences for each FAB and per type of occurrence. Although it is clear that the total number of reported occurrences varies from FAB to FAB, no conclusion can be drawn on the underlying reasons. Many factors can influence the difference in the absolute numbers, such as differences in traffic levels (movements or flight hours), or differences in complexity of airspace or airfield.

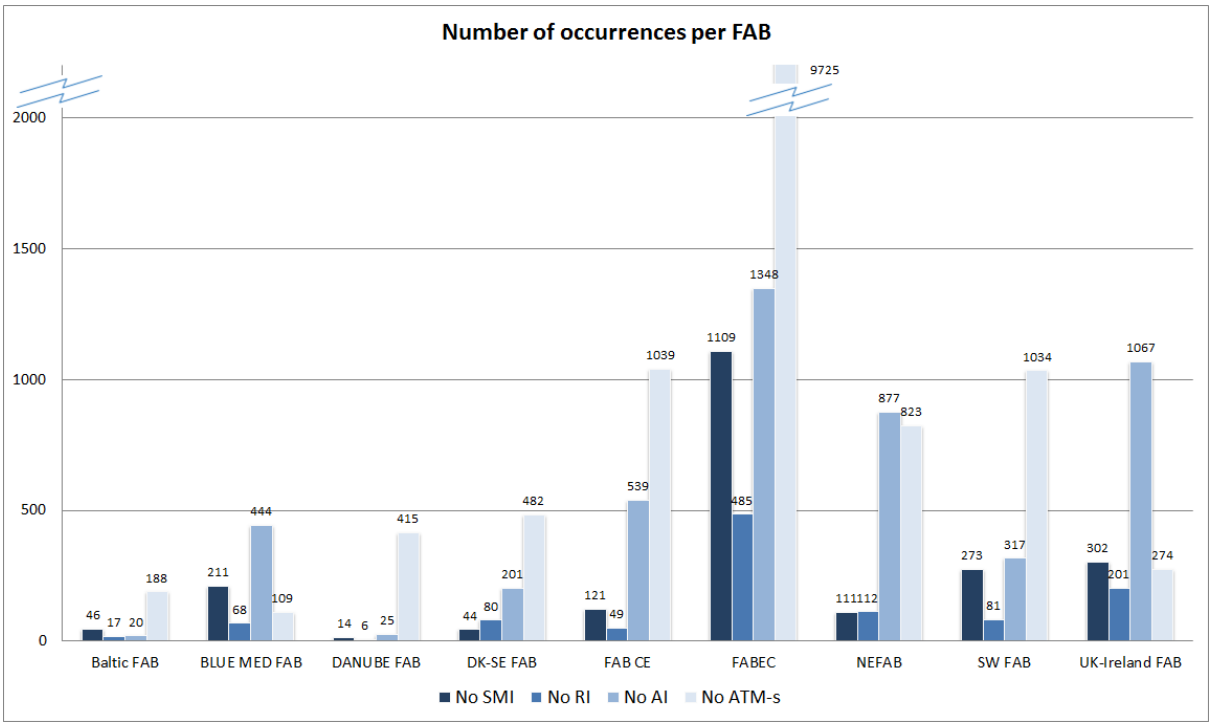


Figure 39: Total number of occurences per FAB

2.3.37 The next four figures show total the number of occurrences reported by each States grouped by FAB.

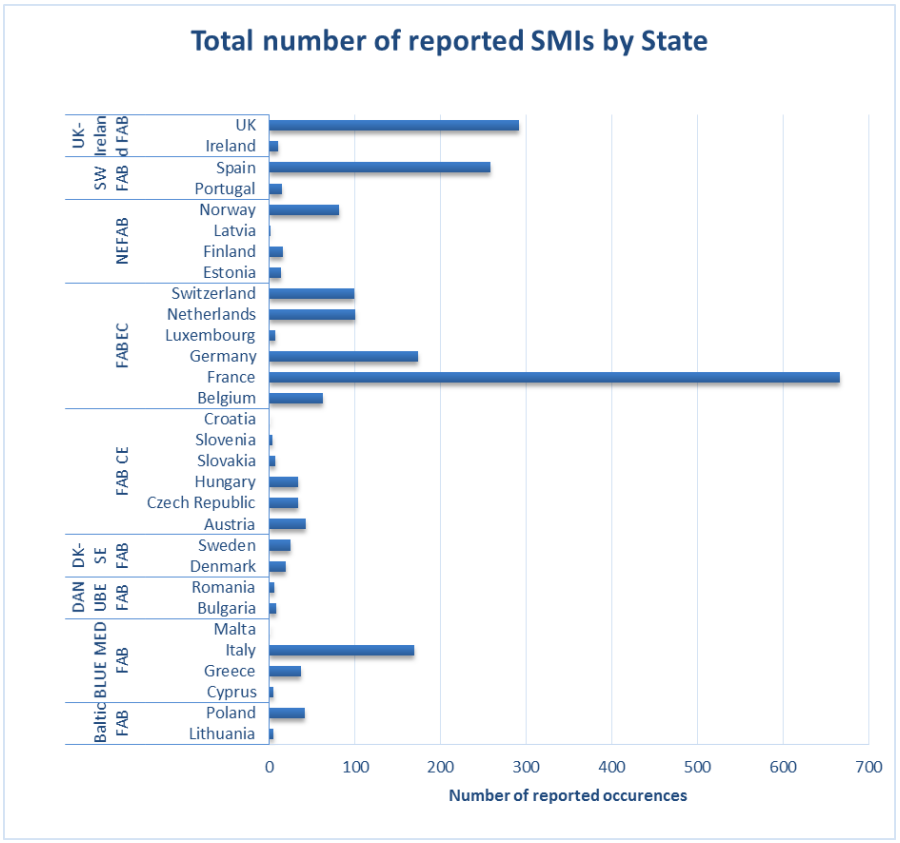


Figure 40: Total number of SMIs per FAB

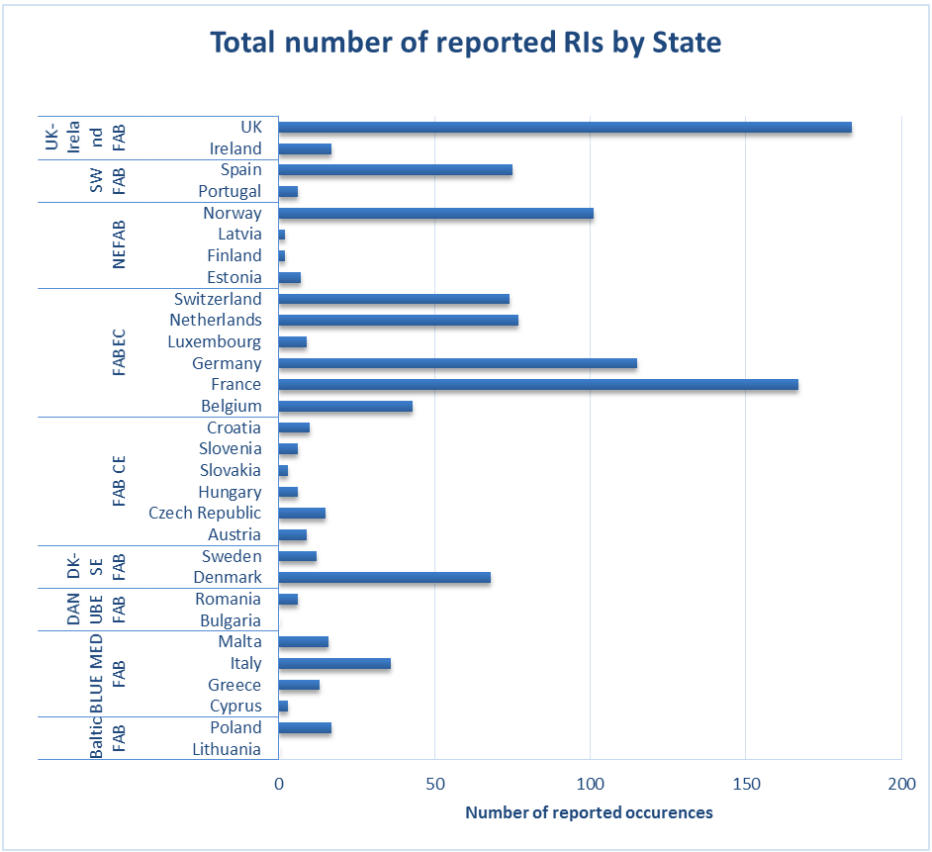


Figure 41: Total number of RIs per FAB

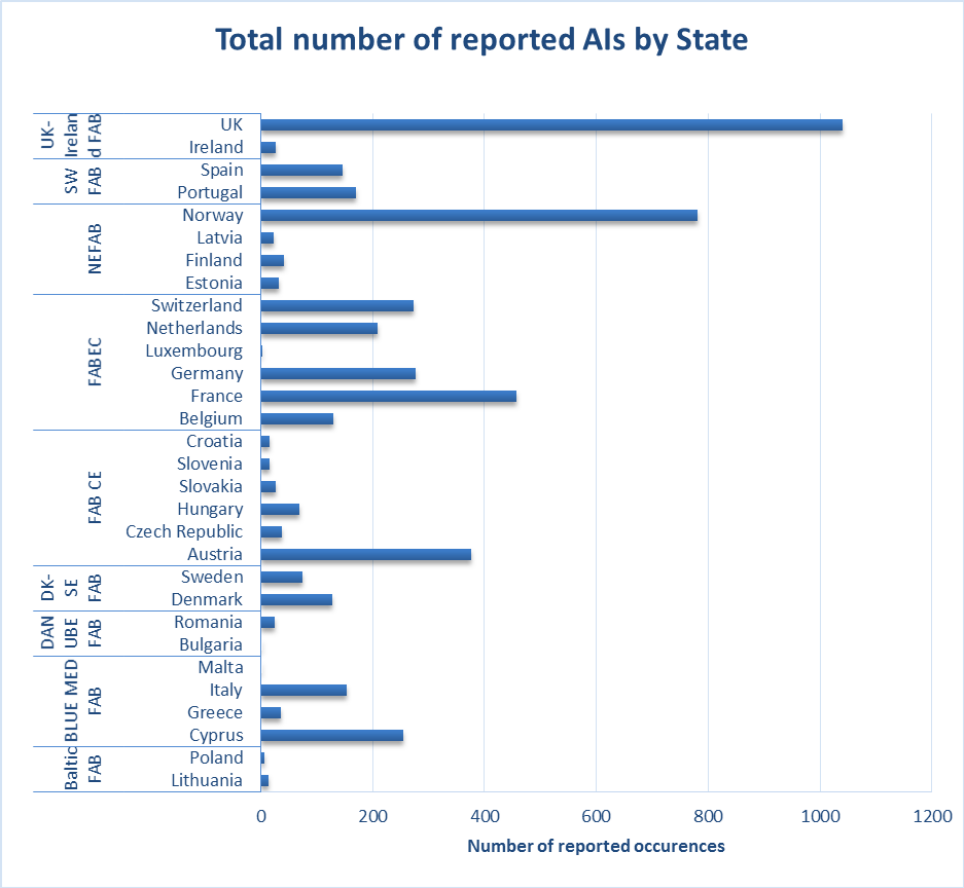


Figure 42: Total number of AIs per FAB

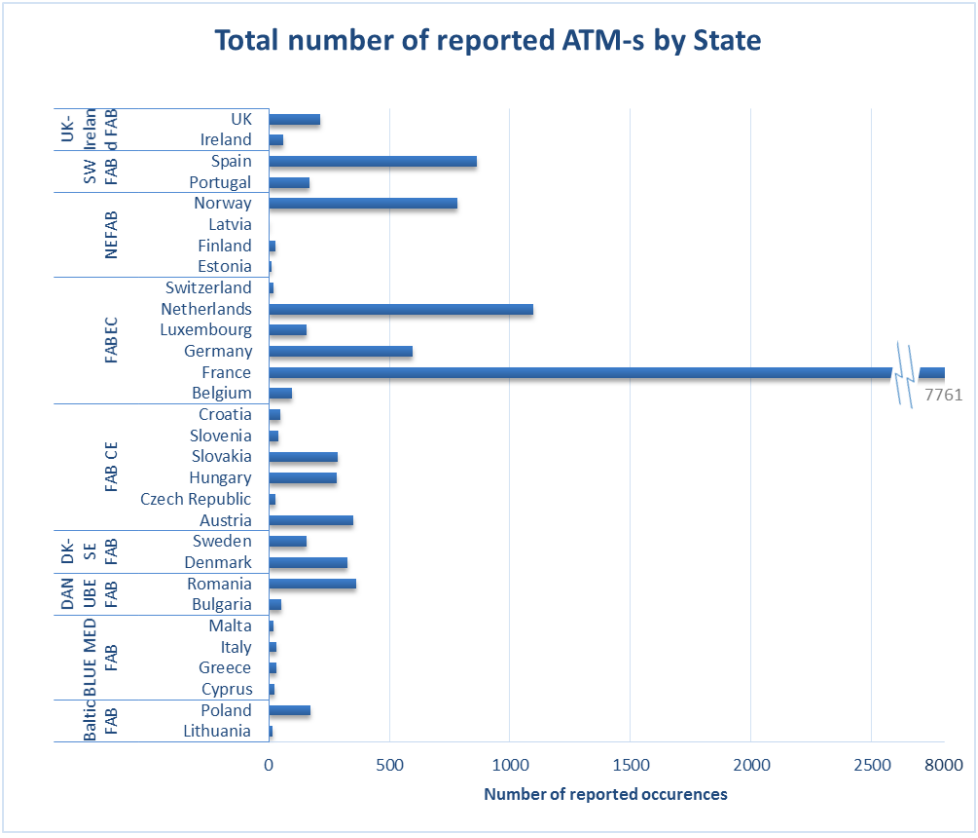


Figure 43: Total number of ATM-S per FAB

3 Network Manager

3.1.1 In accordance with Article 6 of Regulation EU 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.

3.1.2 The NPP for RP2 was submitted on 13 November 2014 and updated and approved by the Network Management Board (NMB). The European Commission approved the Network Performance Plan for the second reference period through Commission Implementing Decision (EU) 2016/1373 of 11 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 8: NM KPIs in NPP 2015-19

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 9: NM PIs in NPP 2015-19

3.1.3 These indicators are assessed in terms of the functions and tasks of the Network Manager in accordance with Regulation EU 677/2011. However, the distinction between NM's activities and other EUROCONTROL activities not related with the network functions is not always evident, what 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.

3.1.4 This chapter addresses the results for 2016 on those SES Safety KPIs and targets laid out in the NPP.

3.2 EoSM - NM

3.2.1 The EoSM questionnaire for the NM was sent to EASA in June 2016. The results and justifications provided by NM were cross-checked with the results of the continuous oversight performed by EASA.

EASA Verification of NM EoSM Results

3.2.2 The Table below shows consolidated 2016 EoSM results of NM.

3.2.3 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 management objectives that are contained in that Component, which is determined by the responses to the EoSM questionnaires as per AMC3 SKPI of the EASA AMC and GM to ED Decision 2014/035/R.

3.2.4 NM EoSM score achieved is 57 based on the verified responses to the questionnaire, which increased from the figure (50) from last year. It must be highlighted that the ANSP model is applied with certain reservations as some of the questions are not fully applicable to NM.

3.2.5 Analysis of the questionnaire responses per each EoSM management objective shows that some elements of NM safety management system are still to be fully consolidated. While significant progress have been recorded in many areas, the continuous oversight carried out by EASA during 2016 still showed that NMD management system has room for improvement, especially in terms of documents/records management and compliance monitoring. This situation is mainly reflected in a few of the questions linked to the areas of *Safety Policy & Objectives, Safety Assurance and Safety Promotion* being rated as effectiveness level B (as shown in Figure 44), i.e. planning/initial implementation. None of the Management Components achieved the target level 'D'. Although only one question in each of the two components Safety Policy & Objectives, and Safety Assurance were rated as 'B', it is the minimum level that determines the overall level achieved for each management objective (MO).

EoSM Component	2016
Safety Culture	***C***
Minimum level achieved for all other MOs	***B***
Safety Policy & Objectives	*B*
Safety Risk Management	*C*
Safety Assurance	*C*
Safety Promotion	*B*

Table 3: NM level of EoSM

3.2.6 With regards to the component of Safety Culture, the NM had already achieved the target level 'C' for 2019, last year, and it is maintained in 2016.

3.2.7 Figure 44 shows how EoSM questionnaire applied to the NM (marked from Level A to Level E) are distributed per each EoSM Component. It can be observed that the lower levels within the area of *Safety Assurance.*

3.2.8 When compared with the results of 2016, the situation of the level of effectiveness of components worsened in one component within *Safety Policy & Objectives* as one question was downgraded to B, while the rest of components maintained the same levels as those achieved in 2016.

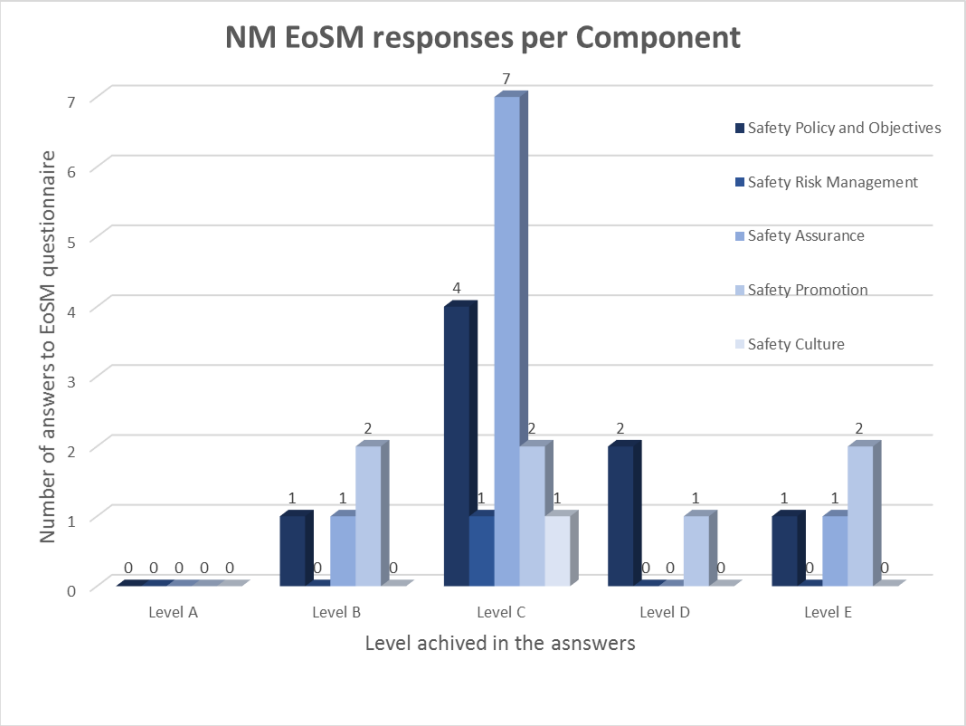


Figure 44: Level of NM answers per Component

3.3 Application of the RAT Methodology - NM

3.3.1 The EASA AMC on the RAT methodology application 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 S(K)PIs) to consider the network specific type of ATM specific occurrences within the scope of Performance Scheme). In this last update of the AMC, how RAT applies to the NM and a group of ATM-specific occurrences exclusively applicable to the NM were introduced.

3.3.2 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 RAT assessed.

3.3.3 Due to the fact that these changes were introduced at the end of 2015, no results were available for occurrences that were reported during 2015. The NM reports that it applied severity classification using the RAT methodology to 100% of AA/A, B or C 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%*			

Figure 45: NM results of application of the severity classification (based on RAT)

3.4 Just Culture - NM

3.4.1 The NPP contains performance targets for all key performance areas and indicators. All KPIs and PIs for the purpose of Union-wide target setting are listed in section 1 of Annex I of Regulation EU 390/2013. In that section 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 S(K)PIs for RP2, in line with the requirement that NM targets should be consistent with the Union-wide performance targets. The NM did not submit the JC questionnaire to EASA in 2016.

3.5 Other Safety PIs – NM

3.5.1 The NPP established a safety objective to identify Network operational safety risks (including for its own operations) as a PI.

3.5.2 The NM has reported in 2016 the identification of operational hazards at network level through a series of workshops with participating ANSPs. The new Top 5 network safety risks that NM reported as identified were:

- Risk of operations without transponder or with dysfunctional one;
- ACAS RA not followed;
- Detection of Occupied runway;
- Blind spot;
- Sudden, high energy runway conflict.

3.5.3 It is worth noting that this activity seems to identify safety risks shared by a group of ANSPs rather than addressing the safety risks associated with the services and functions provided by the NM, which would be more appropriate.

4 Summary of Observations

4.1.1 The following section lists the key observations and conclusions made after the review of the 2016 FAB Monitoring Reports and verified results of monitoring of S(K)PIs for the second year of the second Reference Period of the Performance Scheme. An analysis of the evolution of the SPIs through the years 2015 and 2016 was performed when possible. It should be noted that there was not safety target in 2016.

4.1.2 The safety reporting environment in Europe has recently changed with the introduction of the new Occurrence Reporting Scheme and it has to be accepted that the next few years will be a transition phase.

4.1.3 In 2016 there was no accident registered with ANS-contribution at all in fix wing commercial air transport operation airplanes above 2,250 kg MTOW. No ANS-related fatal accident has been observed since 2012, and no fatal accident with ANS contribution has been registered in the last 8 year period, which makes them rare. The analysis of the ANS-related accidents and serious incidents shows an overall decreasing trend in the number of serious incidents since 2010, whilst the number of accidents has remained approximately static with small fluctuations within the analysed period.

4.1.4 The proportion of events with ANS contribution is significantly smaller in ANS-related accidents than in serious incidents during the last four-year period. This seems to suggest that the barriers present in the aviation system are relatively effective to prevent accidents when the ANS has contributed to trigger the occurrence, and that other aviation risks may not be as well protected by effective barriers as the ANS is.

4.1.5 The analysis of the overall EoSM Minimum Maturity Level Achieved by States shows that five (5) States out of 30 have already achieved the 2019 target Level C as opposed to last year when only one State had reached that level. There are three (3) States with level A. When excluding Component 5 – *Safety Culture*, which was not verified, there are still 19 States out of 30, approximately 63%, below 2019 target level C. Overall, the EoSM Management Objectives that need the most improvement at State level are *Safety Policy and Objectives, Safety Assurance*, and *Safety Culture.* On the contrary, the most effective component is *Safety Risk Management*.

4.1.6 The analysis of the overall EoSM Minimum Maturity Level Achieved by ANSPs shows that all ANSPs except one (1) are already at Level C or above for Safety Culture, which is the 2019 target Level, and that 17 ANSPs out of 31, approximately 55%, have already achieved the 2019 EoSM target level D for all other MOs (the four EoSM Components other than Safety Culture). When looking at the evolution of performance from 2015 to 2016, it is worth noting that the number of ANSPs that have achieved the target for all other MOs increased from 10 to 17.

4.1.7 Overall, the components that require more attention at ANSP level are *Safety Promotion, Safety policy and Objectives, and Safety Assurance*. At the same time, the major improvements during 2016 have been achieved in *Safety Promotion and Safety Assurance.* Interestingly, Safety Culture target has been achieved by all ANSPs but one, contrary to the State level, where this component was the one that needs more attention and improvement.

4.1.8 PANSA still has a low score and level for the EoSM safety indicator despite the Polish CAA oversight, which may compromise the achievement of the safety target in 2019. This level was already observed in the 2015 Monitoring Report. To change this trend, PANSA will need to ensure that measures are put in place that will improve the EoSM indicator, as recommended last year. It is advisable that Commission, EASA and the Polish NSA closely monitor safety management implementation levels by PANSA in the next years of RP2 as to ensure that the measures are effective in reaching the targets in 2019. This can be done by way of NSA to track progress towards achieving the target set for EoSM, i.e., level D, or even by focused inspections and audits, if necessary.

4.1.9 The current definition of the indicator that measures the application of the RAT methodology has led to a situation where the application of the RAT methodology 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, thus reversing an improvement achieved during RP1.

4.1.10 From the Union-wide perspective and taking all occurrences reported collectively into account, targets for 2017 are already achieved for RAT application to the SMI occurrences, and RI-Ground component. For RI-Overall (73%), and ATM-specific (75%) occurrences the percentages do not achieve the 2017 target (i.e. 80%). The situation in 2016 has deteriorated in comparison of 2015 for RIs and ATM-s.

4.1.11 In addition, Union-wide targets for 2017 and 2019 have already been achieved in full by five (5) FABs: Danube FAB, DK-SW FAB, FAB CE, NEFAB and UK-Ireland FAB.

4.1.12 At Union-wide level, the percentages of high severity occurrences over the total reported occurrences by SES Member States are 12% and 7% for SMIs and RIs, respectively, while show figures of 2% and 1% for AIs and ATM-S, respectively. This difference may be the result that 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.

4.1.13 The reported occurrences monitored in this report at the EU level show different trends in 2016 with respect to 2015: while the number of SMIs and ATM-s occurrences have decreased by 3% and 7%, respectively, the reported number of RIs and AIs occurrences have both increased by 7% and 20%, respectively. 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 Commission Implementing Regulation (EU) No. 376/2014 in November 2015, the increase in the number of airports movements and controlled flight hours (approximately 12% and 3.5%, respectively), issues with the coding of occurrences by the States or the manual intervention in the extraction of occurrences may have played an important role in the variation of reported occurrences. Nevertheless, some of the substantial increases are of concern and should be closely analysed by local NSAs and ANSPs. Among others, Baltic FAB should look into its increase of SMIs, and ATM-s; FAB CE should look into its increase of ATM-s ; NEFAB CE should look into its increase of AIs; SW FAB should look into the increase of all categories; and UK-IR FAB should look into its increase of AIs and ATM-s.

5 Summary of Recommendations

The safety statistics on accidents and serious incidents indicate that the domain of ATM/ANS has continued to improve the most severe safety outcomes over the time period examined, therefore no recommendations are made based on these observations.

While an improvement to the State's EoSM results has been observed, it is unclear as to whether the States that are not yet at level C are on track to achieve the 2019 target. These States should consider reviewing their planning processes in light of the results of the EASA verification of EoSM, to ensure that they will meet their 2019 target.

With regard to the ANSP's EoSM results, the main concern, as in the previous year, is related to the levels achieved by PANSA, so two recommendations are laid down:

- Recommendation 1: The Polish NSA to track the progress of PANSA towards achieving the target set for EoSM, i.e., level D, or even by focused inspections and audits, if necessary.
- Recommendation 2: The Commission, EASA and the PRB to monitor the progress of the Polish NSA in improving the safety management implementation levels by PANSA in the next years of RP2, so as to ensure that the measures are effective in reaching the targets in 2019.

- Finally, based on the deterioration of the trend of the applicability of RAT the following recommendation is made:
    - Recommendation 3: ANSPs and NSAs should review the causes of the deterioration in application of severity classification using the RAT methodology for RI Ground and Overall, and for ATM-specific occurrences, with a view to ensuring that the target for 2017 is met.

Annex I. Endnotes

[i] 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.

[ii] Commission Implementing Decision of 11 March 2014 setting the Union-wide performance targets for the air traffic management network and alert thresholds for the second reference period 2015-19 (2014/132/EU)

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

[iv] 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.

[v] 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.

[vi] 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.

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

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

[ix] 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.

[x] The Regulation does not provide any indication of how Member States and their providers are expected to determine the severity of the reported occurrences.

[xi] 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.

[xii] The EASA database 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).

[xiii] 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.

[xiv] See EASA Annual Safety Review 2017.

[xv] Note that an accident may be coded using more than one occurrence category either because several occurrence types are pertinent to the event or due to the presence of several events in the same occurrence report.

[xvi] 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 runway incursion, for instance.

[xvii] http://ec.europa.eu/transport/modes/air/events/doc/2015-10-01-just-culture/declaration.pdf