EUROCONTROL

EVAIR Bulletin No 24

Years 2016 - 2020

SUPPORTING EUROPEAN AVIATION

CONSORTIUM COORDINATOR sesar DEPLOYMENT MANAGER

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NETWORK MANAGER

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EVAIR FUNCTION MANAGER'S PERSPECTIVE

Dear readers,

This EVAIR Bulletin covers the period 2016-2020. Following good practice established years ago, we have combined European EVAIR and global IATA findings. In this way we make it possible for ATM experts to compare the European and global pictures. The trends shown in Figure 1 include the year 2020 which was heavily affected by the COVID-19 measures.

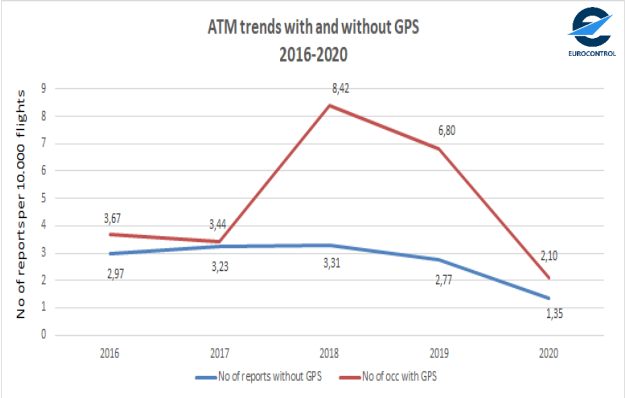


***Figure 1**: ATM occurrence trends in the period 2016-2020*

Data collection

Between 2016 and 2020, aircraft operators and ANSPs provided EVAIR with some 10,680 ATM reports, which represents 2,000 reports fewer than for the previous five years (2015-2019). During the same period EVAIR collected 9,365 GPS outage reports, which is slightly more than the number of reports received during the previous five years. For the monitoring of the efficiency of the Call Sign Similarity De-Confliction Tool (CSST) there were 10,629 call sign similarity/confusion reports, almost 2,000 fewer than for the previous five years. In total, EVAIR collected a little over 30,000 reports in all data collection fields.

For the period in question, more than 300 aircraft operators (AOs) flying to/from Europe provided their reports to EVAIR. For the five-year period analysed, these airlines executed 37.5 million flights. This equated to almost 2 million flights fewer than for the previous five years period (2015-2019). The impact of the measures taken during the COVID-19 pandemic is more than obvious. We are glad to say that all European ANSPs including some of the ANSPs from the Middle East, North Africa, and the former Soviet Union countries, including the Russian Federation, participated in the incident data reporting and provision of feedbacks.

Feedback – reporting motivator and support for quick fixes

The feedback process remains the most important instrument enabling the exchange of ATM-related occurrence information and results of the investigation performed in the framework of the SMS, between AOs and ANSPs. The EVAIR team maintains a list of ANSP and AO safety contacts to facilitate a seamless feedback mechanism. This is by far the main motivator for stakeholders to continue providing EVAIR with their ATM-related occurrence reports, as it enables the timely provision of feedback and the fixing or mitigating of the identified safety issues.

At the same time, the early identification of problems through the handling of low-level severity occurrences enables a pro-active approach to managing safety.

EVAIR monitors the efficiency of the feedback process and at the same time the completion of the investigations conducted in the framework of the AOs/ANSPs' SMS by counting the number of days needed to carry out investigations and prepare feedback on the occurrence reports submitted. For the period 2016-2020, it took on average 22 days to obtain the feedback. The best result was achieved in 2017. It is interesting that in 2020 despite the low traffic due to the COVID-19 pandemic there was an increase in the number of days needed for the feedback. This could be the result of the fact that many ATM experts did not go regularly to the office during the COVID-19 pandemic, leading to delays in addressing the requests for feedback submitted in the framework of EVAIR.

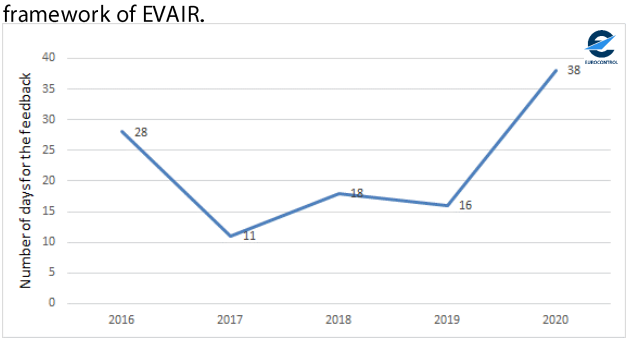


***Figure 2**: Timeframe for the provision of feedback in the period 2016-2020*

Main events

In this short summary, we address the trends of various events that are regularly monitored in our Bulletin.

RPAS/drones – drop in 2019

After a significant increase in 2018, EVAIR recorded a drop in the number of drone events in 2019 and 2020. The approach phase is traditionally the most affected phase of flight. Although EVAIR does not conduct severity assessments of the occurrence reports we have noted a number of reported occurrences where RPAS's were literally a few metres apart from a commercial flight.

GPS outages – small drop in 2019

The total number of GPS outage reports in the EVAIR database is closely linked with the EVAIR requests sent to AOs to

provide their GPS outage reports, especially those that occurred when flying in politically disputed regions such as South-East Mediterranean, Black and Caspian Sea. The fluctuation of GPS outages reported to EVAIR expressed in percentages of the total number of occurrences goes from a few percent in 2015 to 60% in 2018, 59% in 2019 and 38% in 2020.

ACAS RA occurrences – the lowest level in the past 10 years

In 2020, EVAIR recorded 0.18 ACAS RAs per 10,000 flights, which is the lowest level in the past ten years. The very low number of ACAS RAs reported in 2020 is mainly the result of the significant traffic reduction caused by the COVID-19 pandemic. Despite the low number of ACAS RA reports, in 2020, the en-route phase continued to be the most affected, while among ACAS RAs, the instructions 'Level off, level off' was the most frequently recorded type of RA.

Laser interference

Laser threats account for 5.6% of the total number of EVAIR ATM occurrences recorded for the period 2016-2020.
Despite COVID-19 measures, laser events are the only monitored area which recorded a slight increase in 2020. It is to be noted that big hubs suffered more than other airports. The severity of most laser interferences was quite low, as there was no direct contact of the laser beam with the pilots' eyes.

Call sign confusion

EVAIR is authorised to monitor the efficiency of the Call Sign Similarity De-Confliction Tool (CSST). For monitoring purposes EVAIR uses two data sources: reports provided by aircraft operators and those provided by ANSPs. The reports provided by aircraft operators amounted to 6.4% of the total number of ATM reports for 2016-2020, which represents a 1.2% increase compared to the period 2015-2019. Regarding ANSPs and their CSS/C reports, for the period 2016-2020, EVAIR received more than 10,000 call sign similarity/confusion reports.

Contributors to incidents

As in previous years, in 2020 despite the low traffic level due to the COVID-19 pandemic, "air-ground communication" recorded a higher rate than other contributors. Within air - ground communication, spoken communication, which encompasses CSC, language/accent, misunderstanding/interpretation, high R/T workload, etc., continues to dominate, versus e.g. operational communication, which encompasses phraseology, hear back omitted, transfer of communication, handling of radio communication and R/T monitoring sector. Owing to the pandemic, the impact of all monitored contributors recorded decreased in comparison with 2019.

Stakeholder corner

IATA

EUROCONTROL and the International Air Transport Association (IATA) have a very long history of cooperation in the ATM safety domain. This includes the provision of the IATA analysis on selected ATM topics. The availability of combined IATA and EVAIR analyses within this Bulletin make it possible to present global and European ATM trends within the same document.

The analysis was conducted using the datasets of IATA's GADM programmes – Incident Data Exchange (IDX) and Flight Data Exchange (FDX), which collects and collates multiple forms of aviation safety, operational and flight data. The GADM programmes are comprised of de-identified safety incident reports (ASRs) and flight data from over 120 participating airlines throughout the world. Moreover, the data is quality checked to ensure the reliability of the results.

Security and confidentiality

When collecting and processing data, EVAIR follows strict security and confidentiality arrangements. The safety data provided is properly safeguarded and de-identified. The information collected by EVAIR is used solely for the promotion and enhancement of aviation safety.

EVAIR suggestions/improvements

EVAIR is constantly looking for ways to improve its services and products. Suggestions and proposals are more than welcome. Please forward any thoughts, ideas or comments to Ms Dragica Stankovic, EVAIR Function Manager at dragica.stankovic@eurocontrol.int, or to the EVAIR generic email address: evair@eurocontrol.int.

SUPPORT FOR THE MONITORING OF THE EUROPEAN SAFETY ACTION PLANS

Over a long period, EUROCONTROL and IATA regularly provided European and global ATM statistics for agreed areas of concern. Some of these areas also fall under Regulation (EU) No 376/2014 and Commission Implementing Regulation (EU) No 1018/2015.

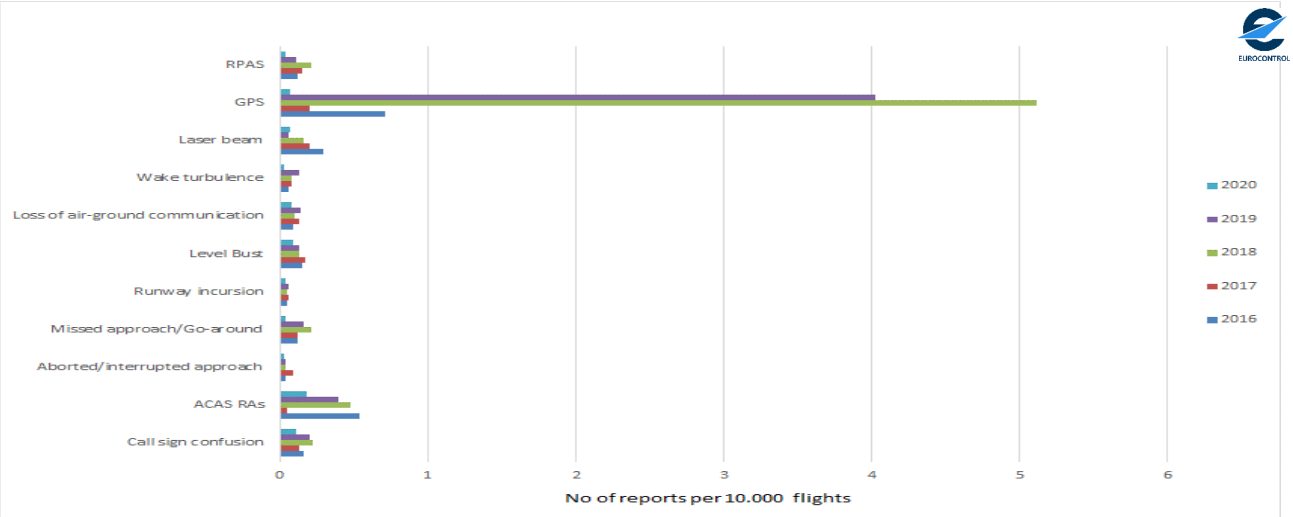


Figure 3: *European ATM events in the period 2016-2020*

In 2020 world passenger traffic was severely affected by the COVID-19 measures. Accordingly, the ATM trends in 2020 in both the EVAIR and IATA global databases went down significantly across all monitored areas. In both databases higher reduction was seen for the wake turbulence events, which represents a direct impact of the significant traffic decrease. In addition, within EVAIR there was a higher reduction in GPS outages. This was partially due to the impact of COVID-19, and the lack of reporting noticed in 2020.

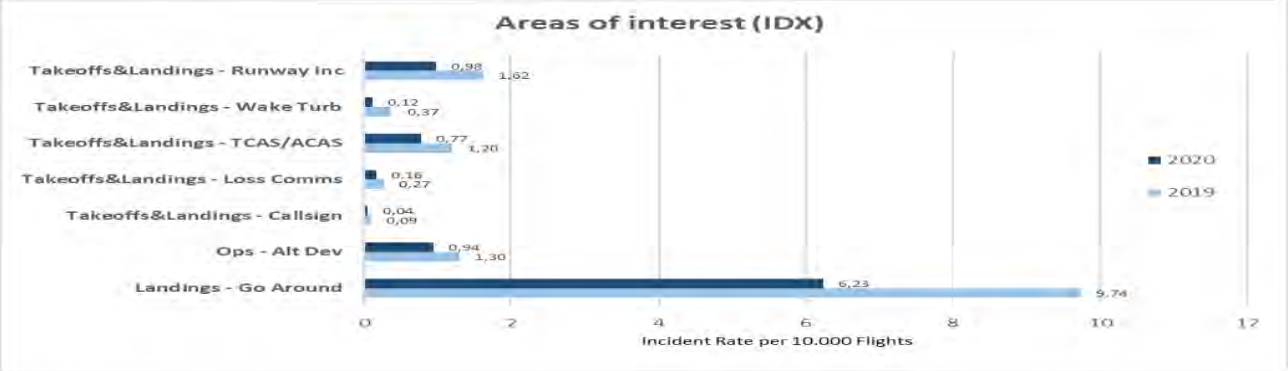


Figure 4*: IATA ATM events in the period 2019-2020*

To find out more about each of the event types, go to SKYbrary:
http://www.skybrary.aero/index.php/European_Action_Plan_for_the_Prevention_of_Level_Bust;
www.skybrary.aero/sites/default/files/bookshelf/4093.pdf;

To learn more about IATA GADM, go to:
https://www.iata.org/en/services/statistics/gadm/

http://www.skybrary.aero/index.php/European_Action_Plan_for_the_Prevention_of_Runway_Excursions_(EAPPRE).

CONTRIBUTORS TO ATM OCCURRENCES IN THE PERIOD 2016-2020

The use of a taxonomy compatible with ICAO's ADREP 2000 and EUROCONTROL's HEIDI, for those areas where ICAO's ADREP is insufficient, enables EVAIR to provide high granularity of causal factors for different types of events.

Figure 5 shows annual trends for various contributors existing in most of the different types of occurrence, especially those presented in Figure 3.

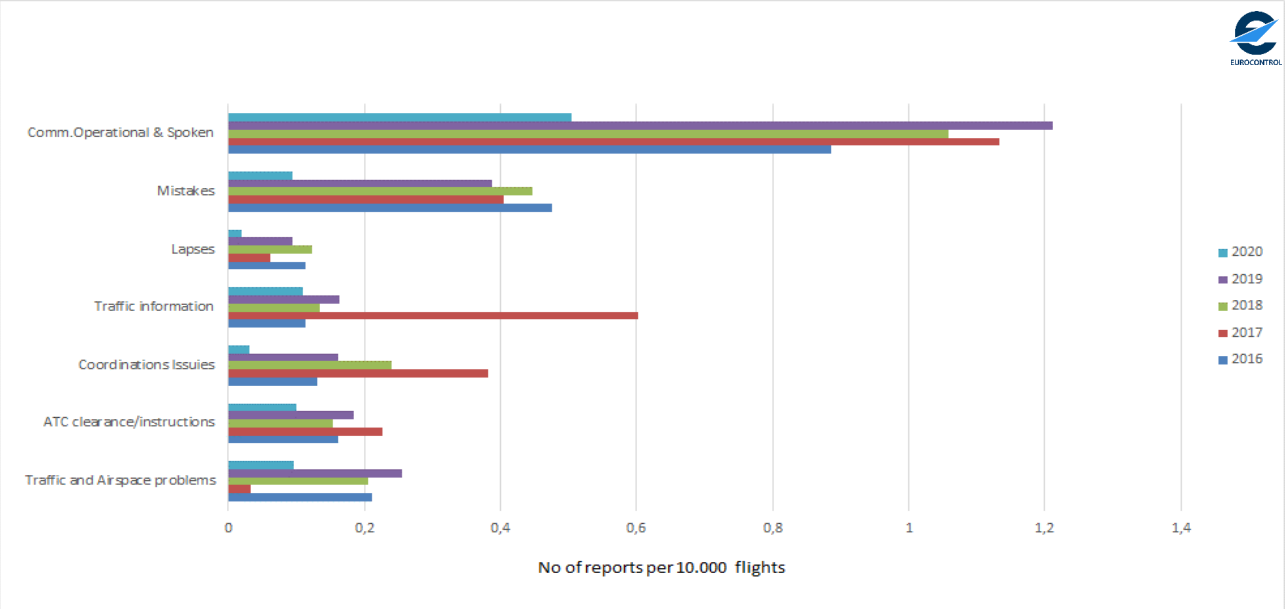


***Figure 5**: Contributors to ATM occurrences in the period 2016-2020*

Air-ground communication, consisting of operational and spoken communication, recorded higher incidents than other monitored areas. It is interesting that in 2020 with the impact of COVID-19 "traffic information", and "ATC clearance/instructions" did not have such a sharp decrease as other contributors. It would be good to have deeper analysis and discussions with ANSPs to investigate whether this could be related to air traffic controllers' more relaxed behaviour.

"Mistakes" cover areas such as judgment, planning, decision-making, knowledge, experience, failure to monitor, misreads or insufficiently learned information, etc. It is notable that "planning" and "judgment" traditionally have the highest trends.

"Traffic information" covers three areas: incorrect and late information and no information provided.

"ATC clearance/instructions" covers the following areas: wrong runway, runway excursion, closed runway, occupied runway, turn direction, rate of climb/descent, assigned or specific speed, assigned or specific track/heading, climb/descent conditional clearance, approach clearance, etc.

"Lapses" covers detection, destruction, forgetting, identification of information, loss of awareness, monitoring, perception of information, receipt of information, timing, etc.

"Coordination problems" covers external coordination, internal coordination, and special coordination procedures with positions within the ATC suite and with sectors in the same unit.

"Traffic and airspace" cover airspace problems, pilot problems, traffic load/complexity and weather problems.

GO-AROUNDS IN THE PERIOD 2016-2020

"Go-around" is a normal phase of flight yet at the same time it is one of the last safety barriers. Pilots are invited to execute it whenever necessary. EVAIR and IATA GADM monitor go-around to identify safety problems associated with this type of event.

For the period 2016-2020, go-around reports made up 4% of the total ATM-related reports, which represents a 2% decrease compared to the previous five-year period (2015-2019). Eighty different airlines provided reports of go-arounds occurring in the European airspace for the period 2016-2020. EVAIR recorded go-around events associated with ATM safety problems in 53 states and 156 locations across Europe. Although in 2020 traffic levels dropped significantly, owing to COVID-19 pandemic measures, the number of states and locations where go-around occurred did not change, proving that this type of occurrence represents a pan-European problem.

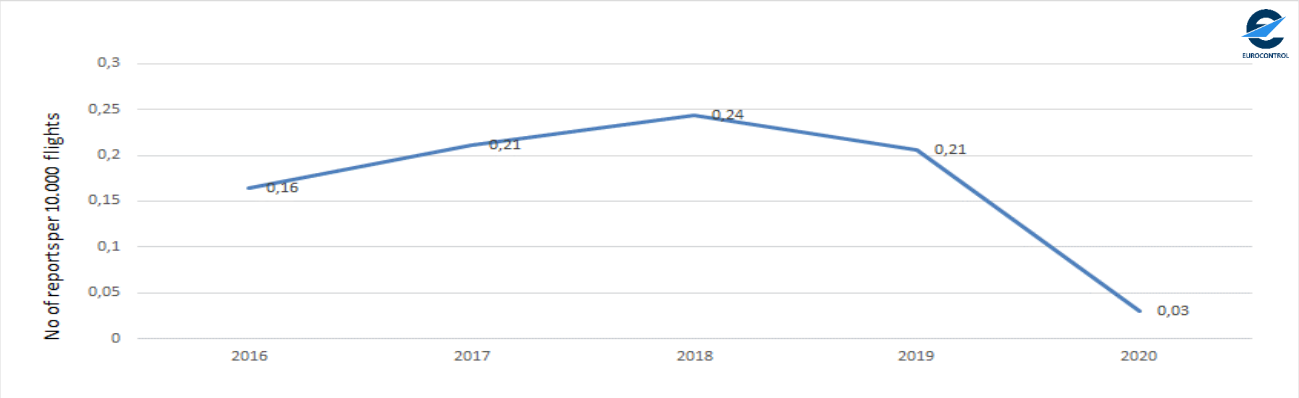


***Figure 6**: European go-arounds in the period 2016-2020*

After relatively stable trends, EVAIR recorded a significant drop in the number of go-around occurrences, due to the measures taken during the COVID-19 pandemic.

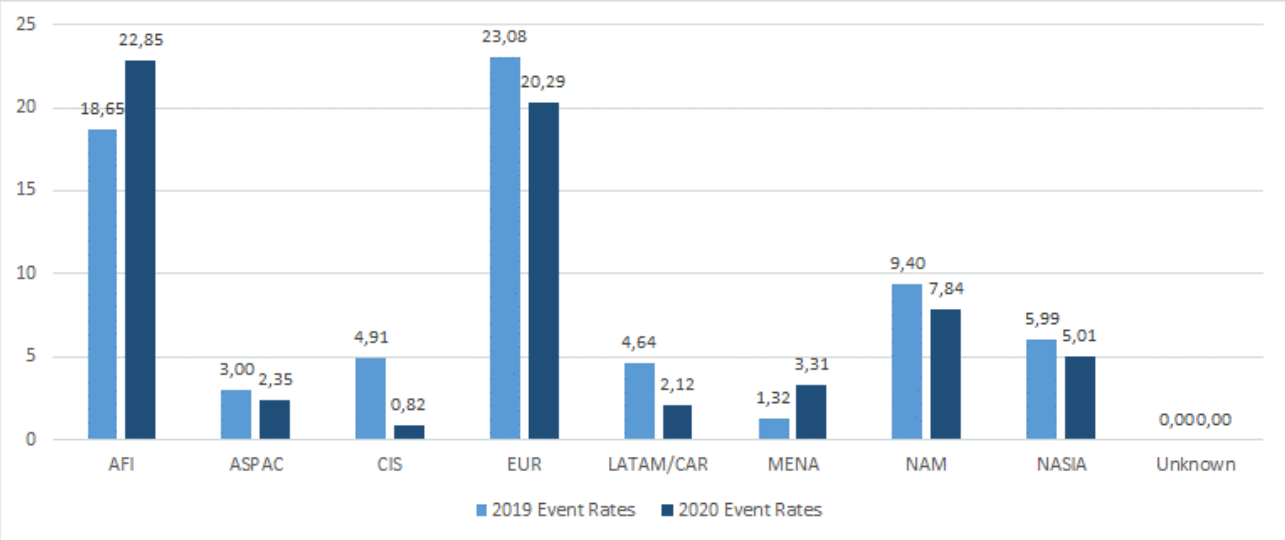


***Figure 7**: IATA global go-arounds in the period 2016-2020*

IATA's GADM database provided go-around trends across eight geographical regions monitored by IATA (AFI – Africa, ASPAC – Asia Pacific, CIS – Commonwealth of Independent States, LATAM/CA – Latin America and Caribbean, MENA – Middle East and North Africa, NAM – North America, NASIA – North Asia).

European and African regions showed higher trends than other regions. Especially Africa, which in spite of the COVID-19

measures impacting passenger traffic, recorded an increased number of go-arounds in comparison with 2019.

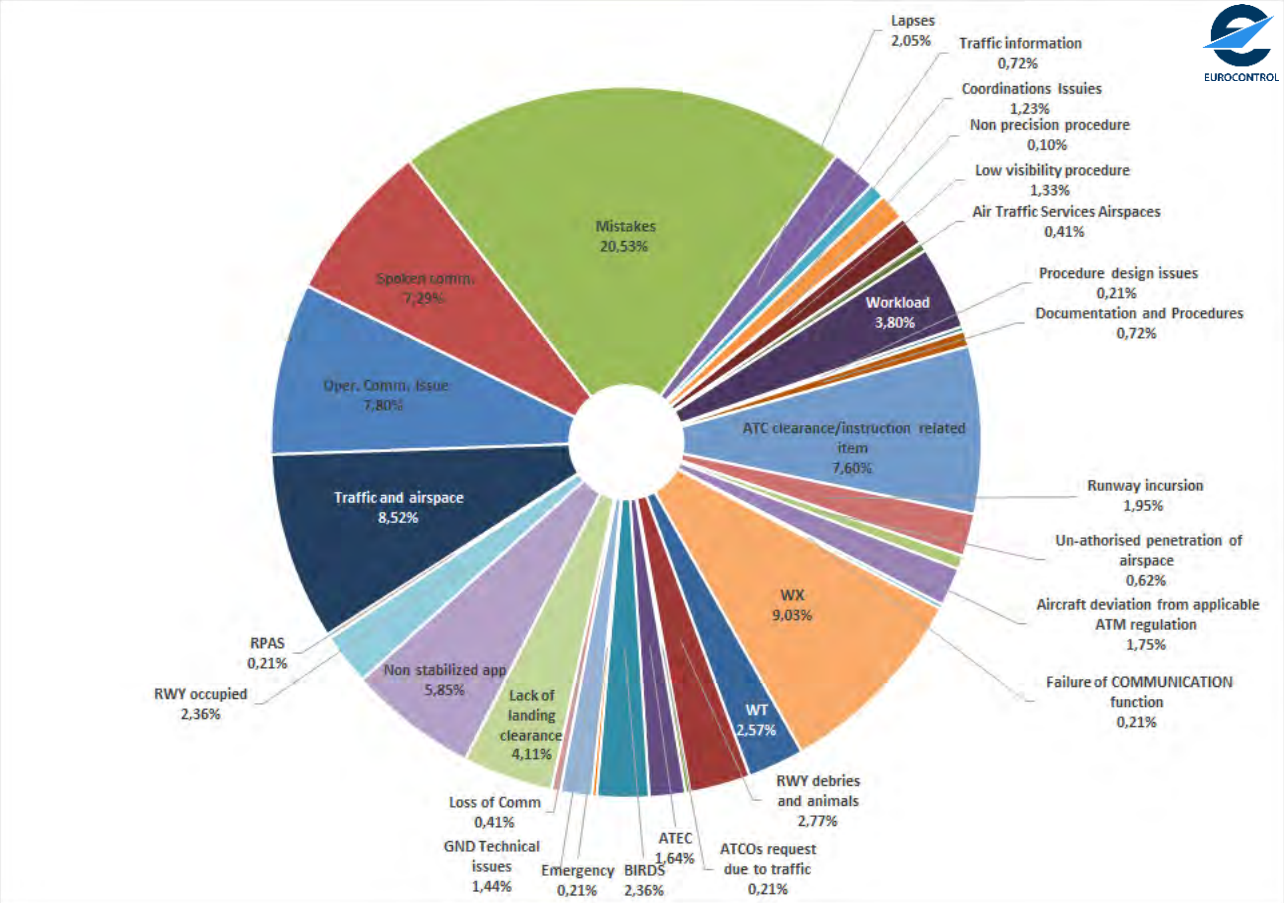


***Figure 8**: Go-around contributors in the period 2016-2020*

The EVAIR team conducted different searches in the EVAIR go-around database to identify as much as possible more go-around contributors. The outcome of these searches was the identification of more than 30 different safety problems associated with go-around (Figure 8). A certain number of the presented contributors associated with go-around could be broken down further; however, for the sake of graph readability we kept the search at this level. Among the causes, which are associated with go-around, there are those like mistakes, and spoken and operational communication, which over a longer period occupy high positions in the long list of identified go-around causes. Mistakes incorporate planning, judgment, decision-making, failure to monitor, etc.

Besides mentioned causes, higher percentages were recorded for: traffic and airspace, which include pilot familiarity with the airspace, traffic, and airspace complexity; and workload issues; late or incorrect traffic information; ATC clearance, which incorporates speed and route assignments as well as approach climb and descent instructions; weather, which encompasses low visibility and wind; lack of landing clearance; and non-stabilised approaches.

RUNWAY INCURSIONS IN THE PERIOD 2016-2020

For the period 2016-2020, runway incursions (RIs) made up 1.4% of the total number of occurrences in the EVAIR database. The percentage is very similar to the previous five-year period (2015-2019). Runway incursions belong to the high-risk areas for which an European Action Plan was developed and implemented by the Member States. EVAIR continues to regularly monitor the efficiency of such initiatives.

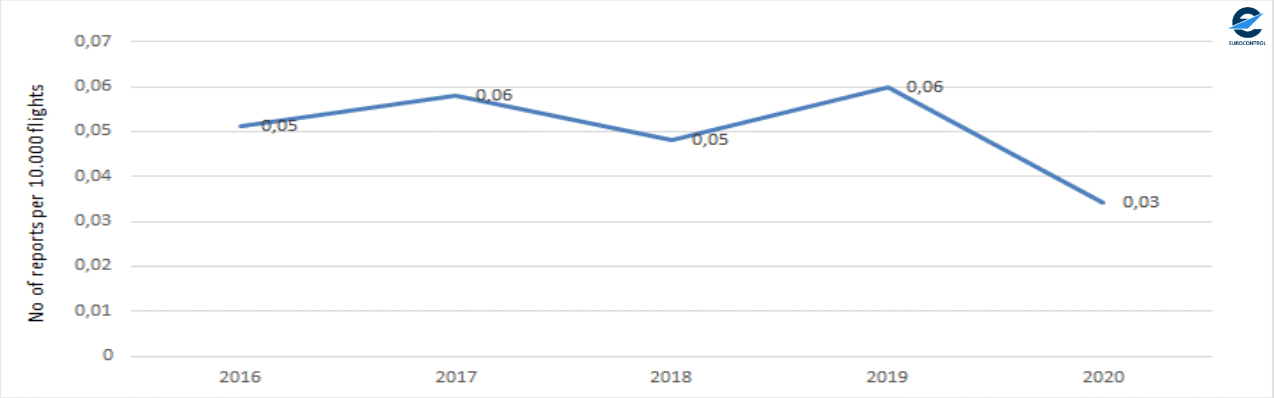


***Figure 9**: Runway incursions in the period 2016-2020*

After 2019, when RIs reached the highest trend within the five-year trends, RI reports recorded a significant decrease in 2020 owing to the COVID-19 pandemic and its impact on passenger traffic.

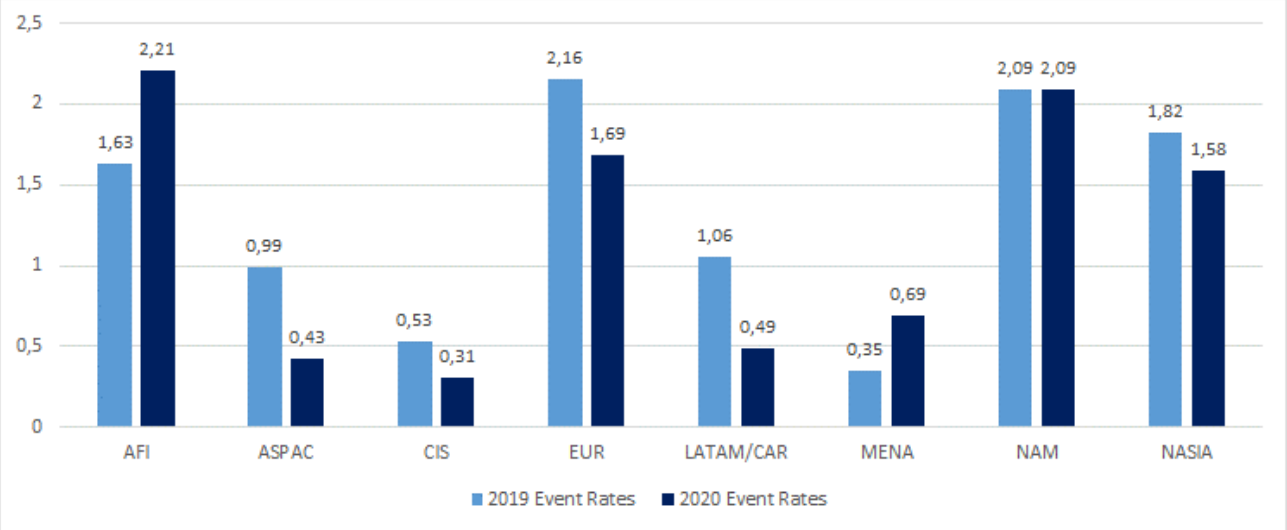


***Figure 10**: IATA global runway incursions in the period 2019-2020*

In 2020, IATA GADM provides a very interesting RI situation at global level.

In 2020, despite the severe impact on passenger traffic due to COVID-19 pandemic measures, some regions across the globe recorded an increased or similar number of RIs compared to those reported in 2019 (Africa, Middle East and North America). Other regions recorded a decrease in the number of RIs reported in 2020.

A higher decrease was seen within the Asia Pacific, Latin America, and Caribbean regions.

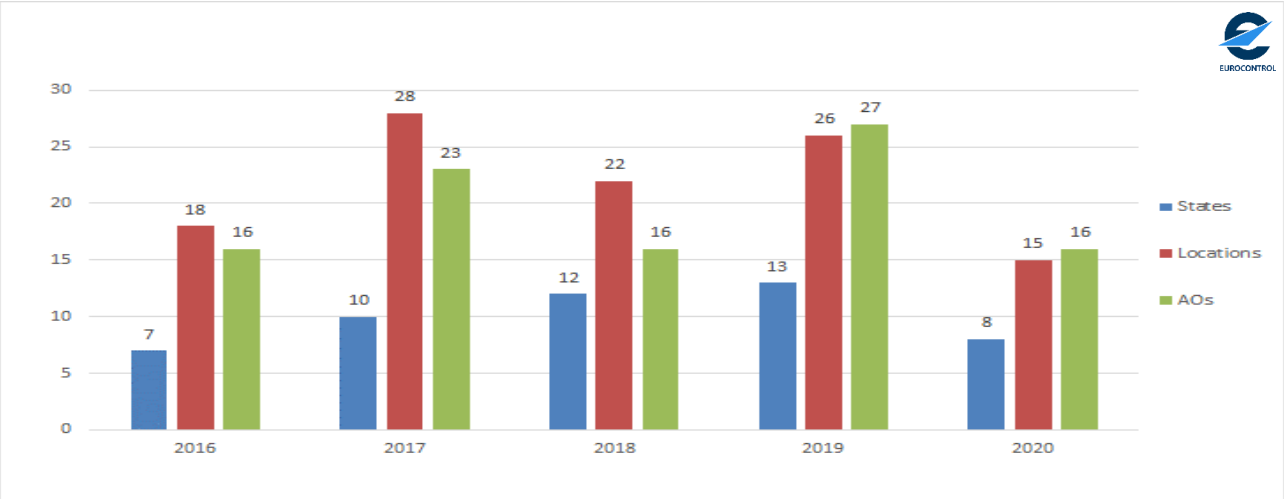


Figure 11: *Number of States, locations and AOs reporting runway incursions in the period 2016-2020*

In 2020, EVAIR recorded a significant decrease in the number of states, locations and AOs involved in RI.

In total, for the monitored period 2016-2020, EVAIR recorded 23 states, and 73 different locations, where RIs occurred. It is worth noting that despite the impact of the COVID-19 pandemic in 2020, EVAIR recorded two more states and three more locations for the period 2016-2020 compared with the previous five years.

RI is a Europe-wide problem. However, the majority of reports occurred within 3-4 states and in 5-8 different locations.

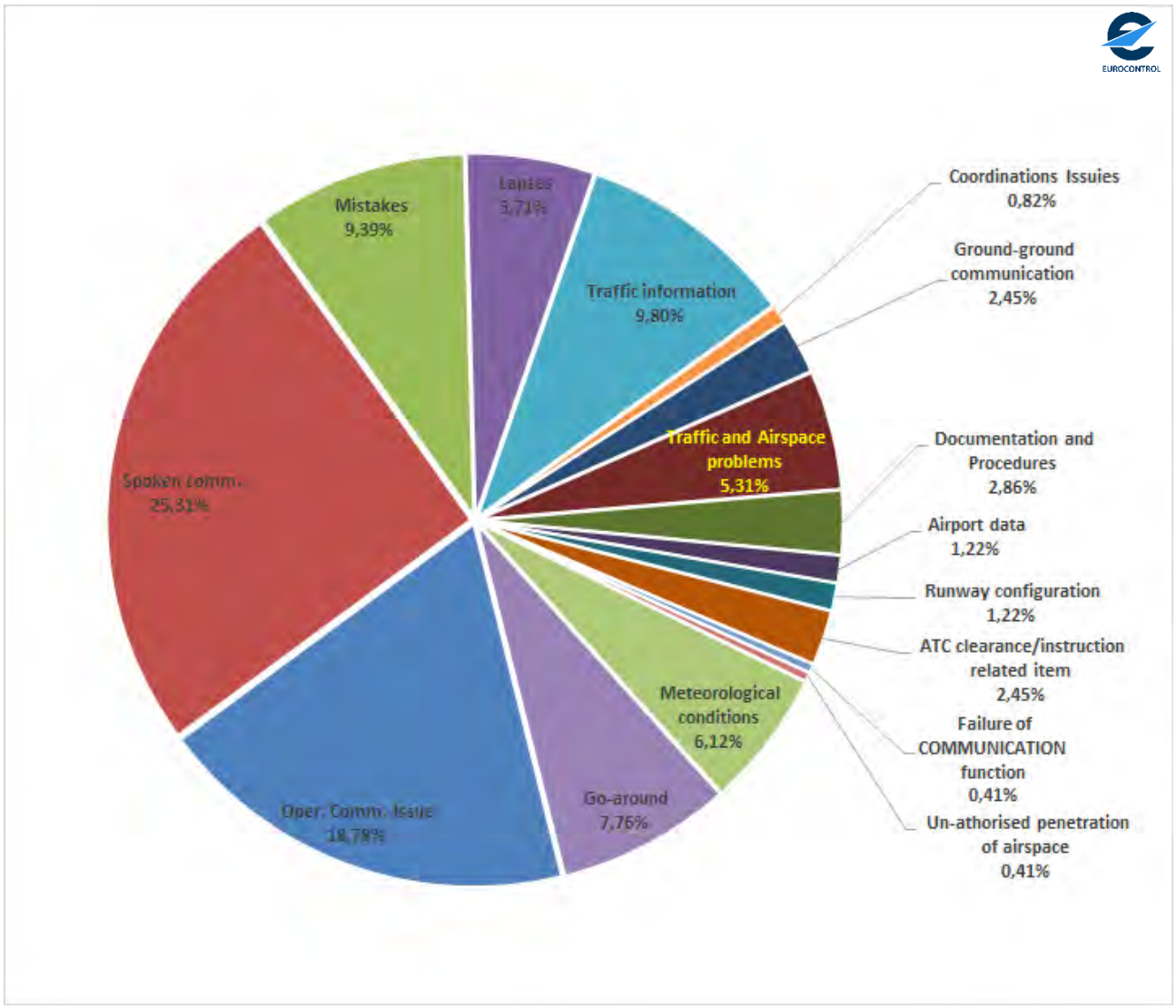


***Figure 12**: Contributory factors to runway incursions in the period 2016-2020*

As for the previous five-year period (2015-2019), an overview of the main causes of RIs in 2016-2020 shows that communication, which includes operational and spoken communication, was the top cause. A few other causes like traffic information, mistakes, lapses and traffic and airspace problems fall within contributors with a higher percentage.
RIs could be associated with other types of ATM events. Go-around is the most frequent. For the monitored period, 7.76% of runway incursions were followed by go-around. This is a few percentage points less than in the previous five-year period.

More information about RI contributory factors, mitigating measures and recommendations can be found in the European Action Plans for the Prevention of Runway Incursions (and Excursions).
https://www.skybrary.aero/bookshelf/books/4093.pdf

LEVEL BUSTS IN THE PERIOD 2016-2020

Level bust occurrences accounted for 3.9% of all EVAIR reports during the period 2016-2020. This represents a 0.6% decrease compared with the 2015-2019 period. For the monitored period, TCAS RA played its role as a last barrier in 10.5% of "level bust" events, which is almost the same percentage as for the previous five-year period, 2015-2018. ATM contributed directly to level bust in 24.7% of cases while in 53.5% of cases, ATM was not involved. In the remaining 21.8%, ATM had an indirect contribution to the occurrence. Similarly to the other types of ATM-related occurrences, in 2020, the COVID-19 pandemic had an important impact on the decrease in the number of level bust occurrences (Figure 13).

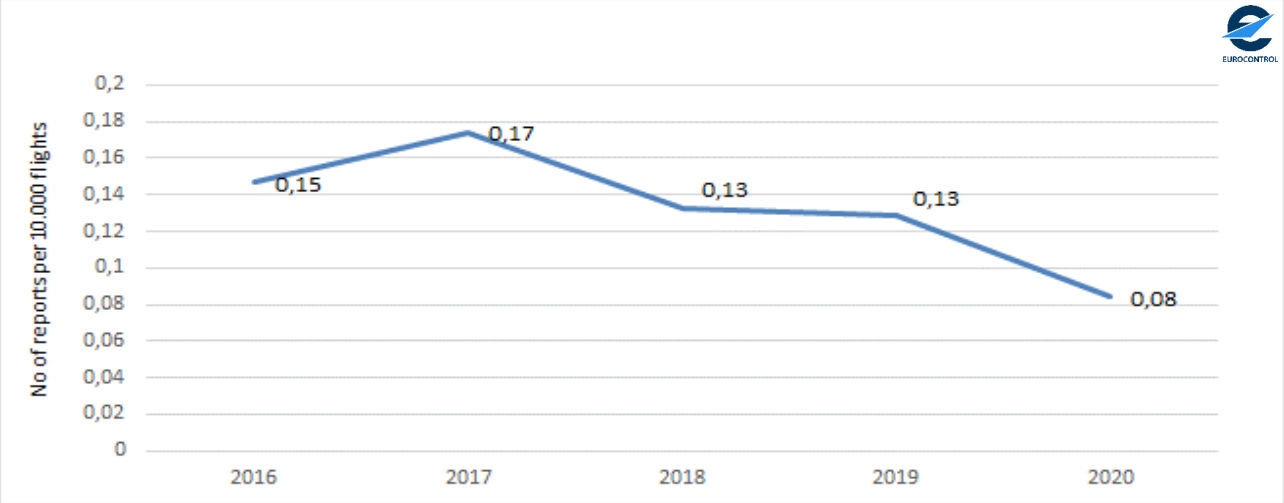


***Figure 13**: Level bust in the period 2016-2020*

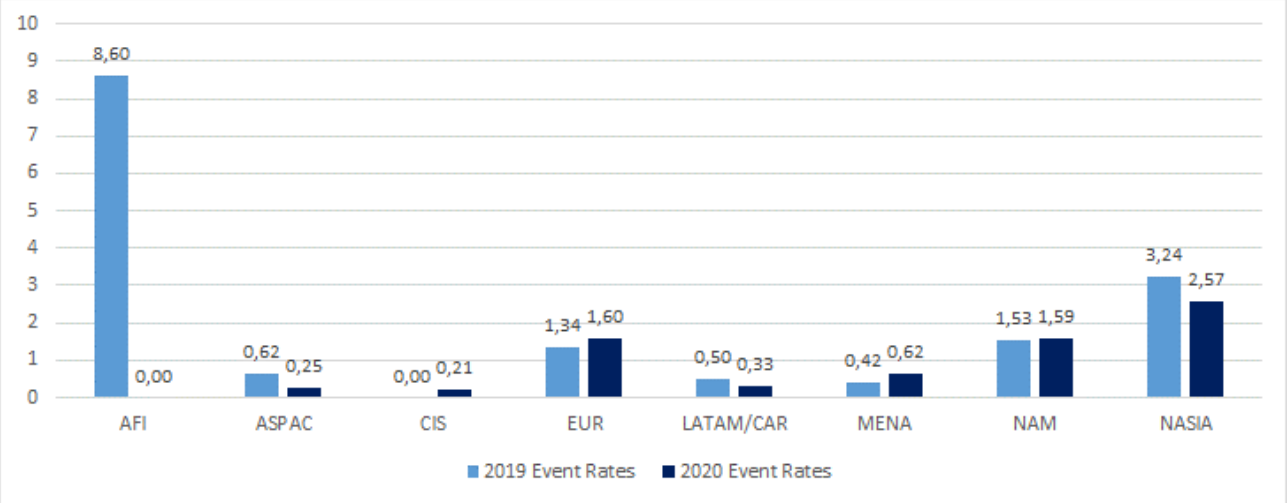


***Figure 14**: IATA global level bust in the period 2016-2020*

IATA GADM recorded situations across eight monitored regions. The AFI region which had the highest trend in 2019 versus other regions in 2020 was without reports. It is interesting that besides the impact of the COVID-19 pandemic on passenger traffic, and the significant reduction in traffic, the European region recorded a higher trend in 2020 than in 2019, and a similar trend was noted in the Middle East and North America (Figure 14).

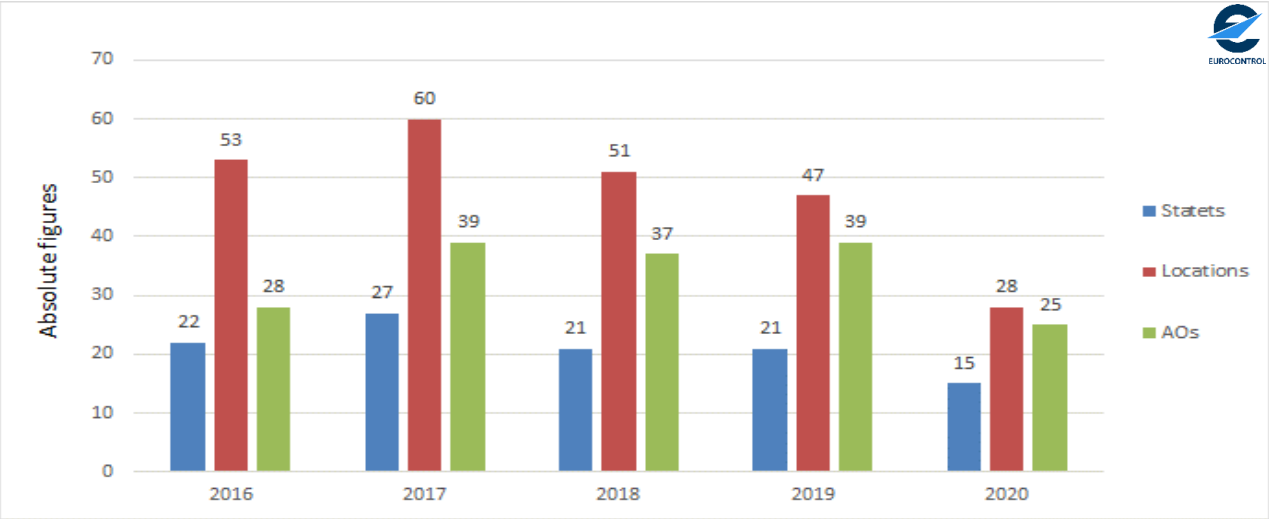


***Figure 15**: Number of states, locations and aircraft operators reporting level bust in the period 2016-2020*

Level bust is a Europe-wide problem. For the five-year period, level bust occurred in 50 different states and 127 locations. This is a slight fall in the number of states and locations when compared with the previous five-year period (2015-2019). Most level busts occurred in 507 different locations across Europe. This is the indicator on which to focus in order to mitigate the problem and potentially to further reduce the current level bust trend.

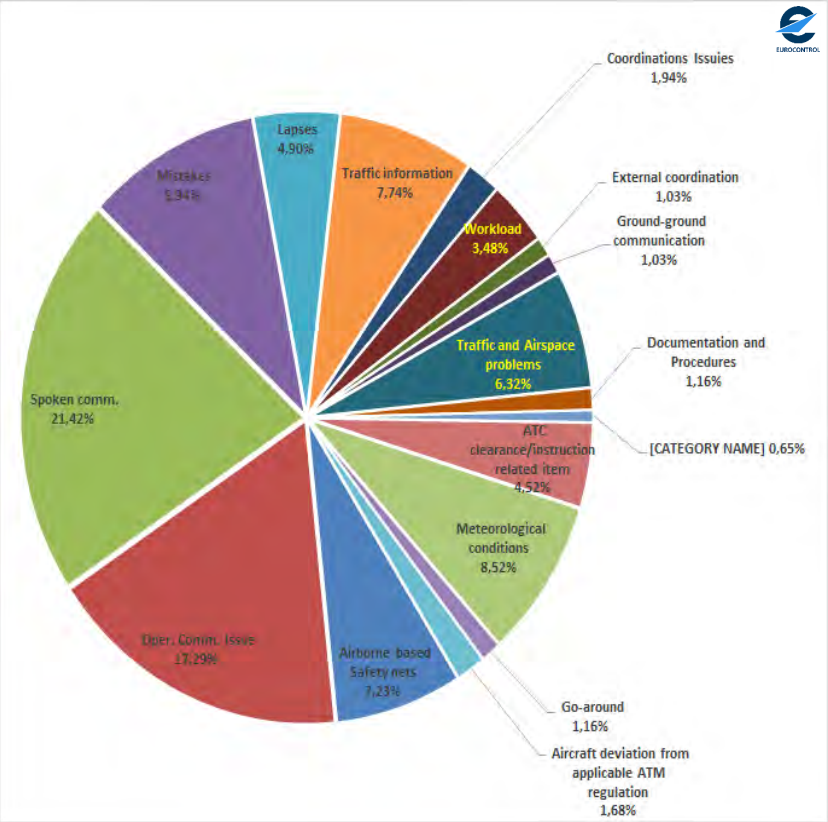


***Figure 16**: Level bust contributors in the period 2016-2020*

Within 2016-2020, as for the previous five-year period, air-ground communication, encompassing hear back omitted, misunderstanding, misinterpretation, phraseology, call sign confusion, language/accent, and poor/no coordination were the main causes of level bust (38.71%). Besides air-ground communication, mistakes and traffic information had higher percentages over this period. The figures are similar to the previous five-year period (2015-2019).

EVAIR SUPPORT FOR THE EUROCONTROL CALL SIGN SIMILARITY PROJECT

Following the request from the Call Sign Similarity User Group some years ago, EVAIR regularly monitors the effectiveness of the EUROCONTROL Call Sign Similarity De-Confliction Tool (CSST) and the associated CSS Service Level 1 (i.e. single aircraft operator de-confliction). The main objective of the monitoring is to record and, to a certain degree, analyse the call sign similarity and confusion (CSS/C) reports received from ANSPs and aircraft operators. There is a particular emphasis on data involving CSST user airlines, although the reports received of CSS/C events involving aircraft from non-CSST user airlines are also useful as they help provide a performance comparison between the two sets of operators. More importantly though, the information is also used to facilitate ad hoc mid-season changes to conflicting call signs, thus providing an ongoing safety benefit. Moreover, this activity does not concern only similarities within one airline's schedule but also works across airlines (irrespective of their CSST use status) and so provides a multi-AO dimension to the proceedings. EVAIR monitoring results are also used, inter alia, for CSST safety assessment and as a decision-making element to precede with Service Level 2.

EVAIR uses two data sources to monitor "call sign similarities" and "confusions"; one is from airlines and the other from ANSPs. The reports from the airlines relate mainly to confusions, while those from the ANSPs concern similarities and confusions.

After a break of a few years, the Call Sign Similarity User Group is re-establishing its work. The main aim will be further improvement of the CSST and the enlargement of the AO community using the Tool.

PILOTS' REPORTS – CALL SIGN CONFUSION IN THE PERIOD 2016-2020

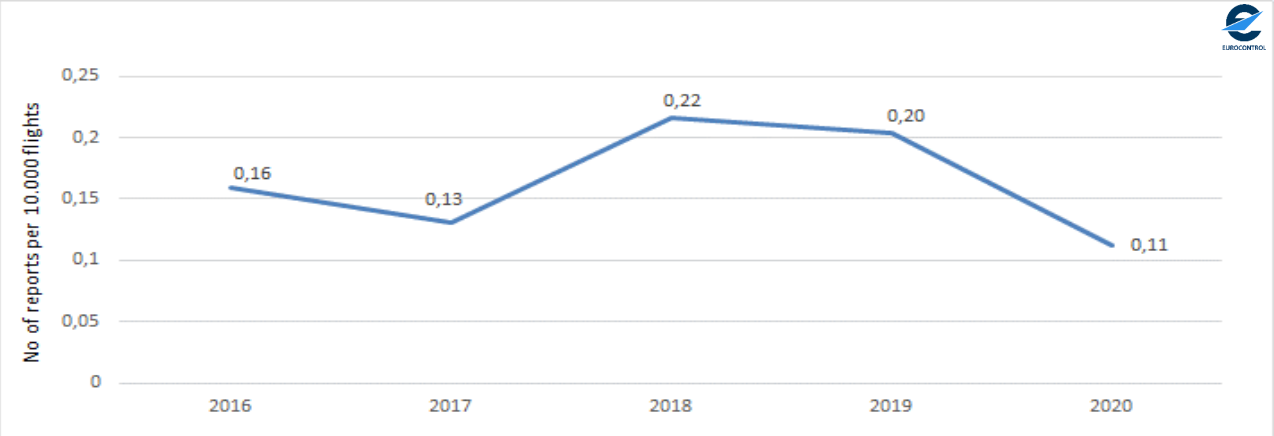


***Figure 17**: European call sign confusion reported by AOs in the period 2016 – 2020*

For the period 2016-2020, call sign confusion reports made up 6.4% of the total number of reports, which is 1.2% more than for the period 2015-2019. For the 2016-2020 period, 95 AOs provided their call sign confusion reports to EVAIR. Call sign confusions occurred on 100 locations within 42 different states.

After two years of higher levels of CSC reports, in 2020 the number of CSC reports went down significantly, owing to the impact of the COVID-19 pandemic, recording the lowest level since EVAIR started its monitoring.

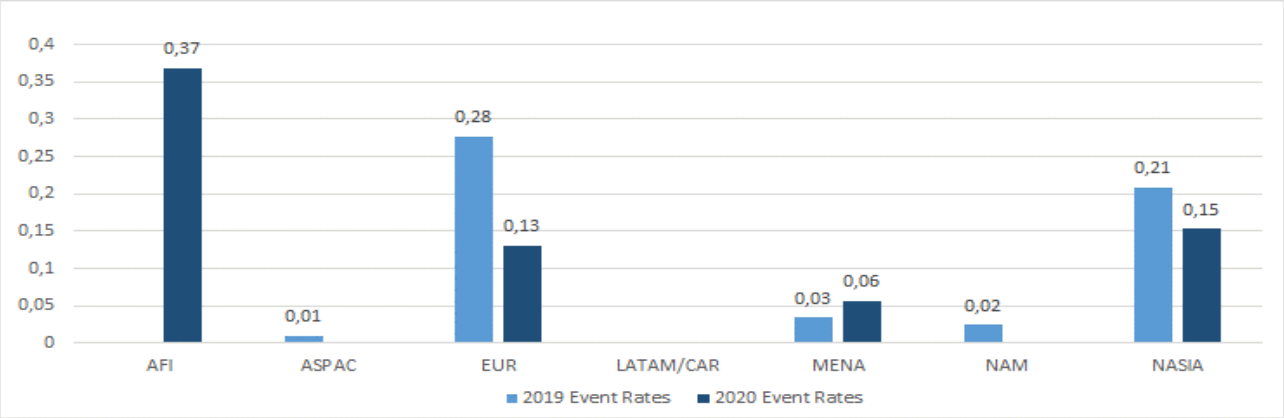


***Figure 18**: IATA Global call sign confusion in the period 2019 - 2020*

IATA global data recorded a decrease in call sign confusion in 2020 within the European and North Asia region, while in Africa and the Middle East the number of CSC increased in comparison with 2020. European carriers are the main users of the Call Sign Similarity De-confliction Tool, which could be one of the reasons why the European region has fewer CSCs than other regions.

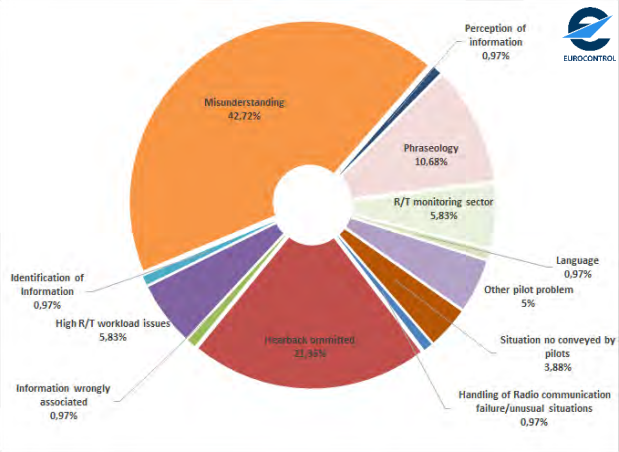


***Figure 19: Call sign ATM contributors** in the period 2016-2020*

For the period 2016-2020, the percentage of direct ATM system contributions is 21%, which is the same as it was for the period 2015-2019. For the same period, the ATM system was indirectly involved in 36% of CSCs, which is a few percent more than for the previous five years.
Within the period 2016-2020, CSC occurred in 42 states and in 10 different locations with 95 AOs involved. All these data are very close to the previous five years.

Among CSC contributors, misunderstanding (42.7%) and hear back omitted (21.3%) traditionally has a higher percentage, as does phraseology (10.6%). However, during the last two years we have noticed the impact of high R/T workload issues (5.8%) on the occurrence of CSC.

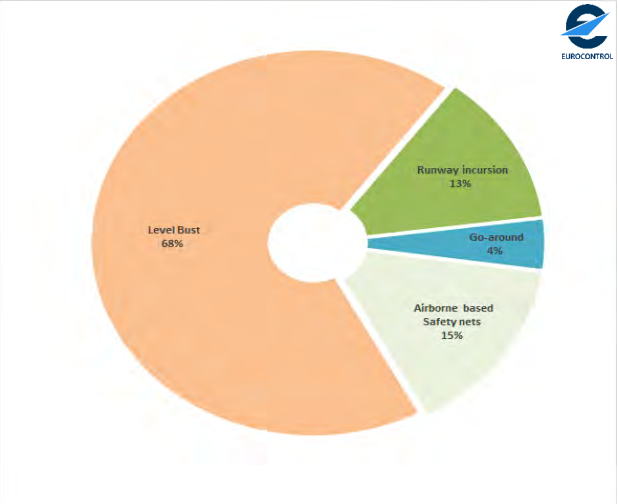


***Figure 20**: Events associated with call sign confusion in the period 2016-2020*

Four different events are most often associated with Call Sign Confusion. Among these events level bust (68%) is on the top for a longer period. The other three events are airborne bases safety nets (ACAS RA) (15%), runway incursion (13%) and go-around with 4%.

AIR NAVIGATION SERVICE PROVIDERS' CALL SIGN SIMILARITY AND CONFUSION DATA 2016-2020

EVAIR has two channels for the provision of the CSS/C data. One channel comes from the AOs and the other from ANSPs. AOs provide call sign confusions, while ANSPs provide both CSS and CSC. For the period 2016-2020, airlines provided more than 600 CSC reports while ANSPs (more than 20 of them, for the period 2016-2020) provided about 8,000 call sign similarity/confusion reports. EUROCONTROL's call sign similarity/confusion reporting, data collection, analysis, and monitoring mechanism also makes it possible to take ad hoc measures to resolve similarities. Management Cell Services help to resolve problems quicker, at least in the cases where AOs are willing to change their call signs on an ad-hoc basis before the end of the ongoing season. EUROCONTROL Call Sign Management Cell Services has been provided with the CSS/C daily; however, those AOs or ANSPs which do not need such assistance provide their data monthly.

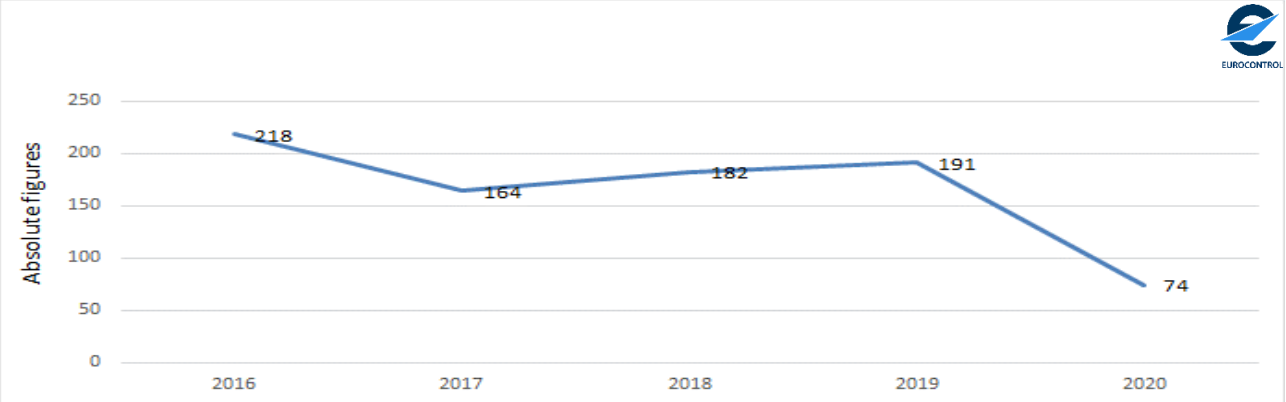


***Figure 21**: Call sign confusions as reported by AOs in the period 2016-2020*

Figure 21 shows the call sign confusions as reported by AOs. In 2019 EVAIR recorded a higher trend, which is linked to the overall traffic increase seen in 2019. In 2020, however, because of the COVID-19 pandemic, EVAIR recorded a significant decrease in "call sign confusions" .

In general, the most frequent events linked to the call sign confusions were: level bust (68%), activation of ACAS RA (15%), RWY incursions (13%) and go-around (4%).
As concerns the ATM contribution to the call sign confusions, in 43% of these events, ATM was not involved, in 36% ATM had an indirect impact and in 21% a direct impact.

EUROCONTROL recommends using the Call Sign Similarity De-Confliction Tool to reduce the number of call sign similarities and in that regard the number of confusions also. Now European carriers are the most frequent users of the tool, although the number of airlines from other regions interested in the tool and application of the CSS de-confliction rules is increasing. Among non-European airlines, those from the Middle East are particularly active.

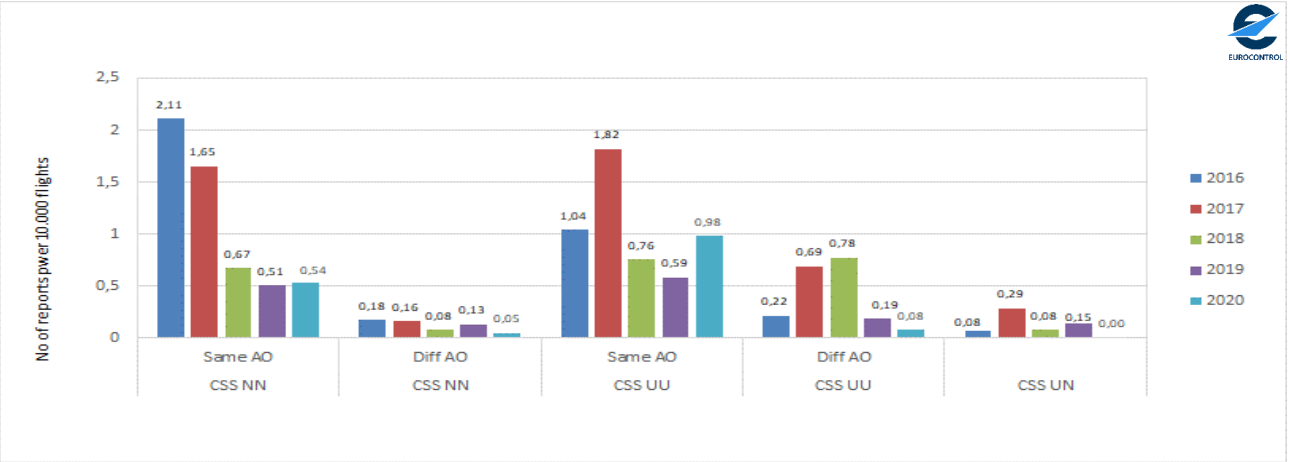


***Figure 22**: Call sign similarity among non-tool users and tool users in the period 2016-2020*

Call sign similarity statistics and EVAIR monitoring results show that in the longer term and in most cases the problem is within the single aircraft operator, regardless of whether it is a tool user or a non-tool user.
In the last few years, the trend in similarities occurring among tool users is slightly greater than among those who do not use the tool. One of the reasons is that since the beginning of the monitoring we have not managed to agree on the definition of call sign similarity or confusion. In that regard there are different understandings. E.g., in 2017 and the beginning of 2018 the problem was with one of the AOs who changed the R/T call sign by keeping the old three-letter designator, which was very close to the previous R/T call sign. It created a lot of misunderstandings, since controllers continued using the old R/T call sign. In provided reports these events were coded as similarities or confusions, although only one a/c was involved. Further monitoring and more in-depth analysis will be carried out in the future, and we hope that it will be possible to identify a reason for the current situation.

Explanation of abbreviations in Figures 22 and 23
CSS NN – Call sign similarity between airlines not using the tool
CSS UU – Call sign similarity between airlines using the tool
CSS UN – Call sign similarity between users and non-users
CSC NN – Call sign confusion between airlines not using the tool
CSC UU – Call sign confusion between airlines using the tool
CSC UN – Call sign confusion between airlines users and non-users of the tool

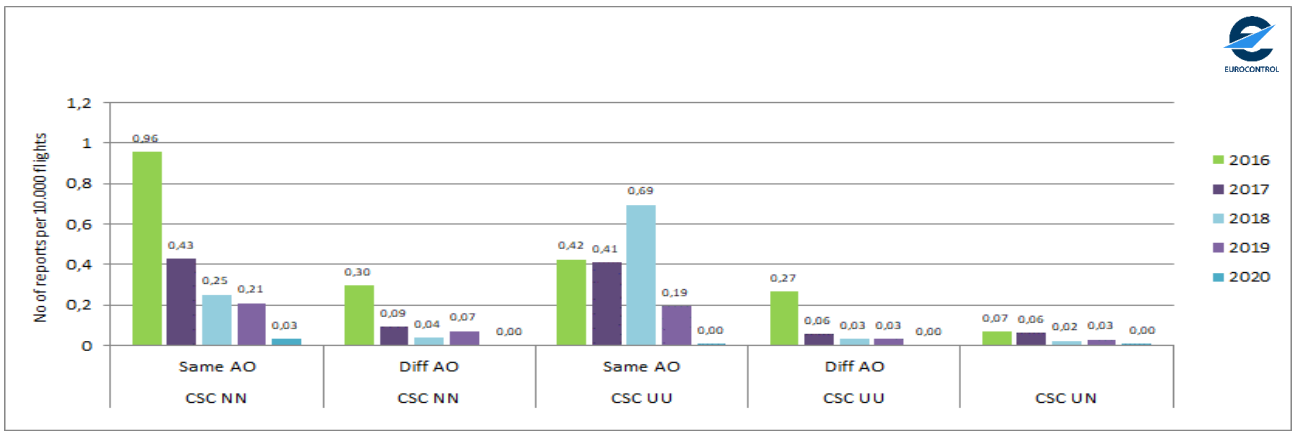


***Figure 23**: Call sign confusion among non-tool users and tool users in the period 2016-20200*

EVAIR figures show that most of call sign confusions occur among the single AOs. Trends shows that single AO tool users have fewer confusion problems compared with non-tool users. The exception was 2018. Digging through the data showed that the high increase in confusions among single AO tool users in 2018 was partially the problem of the lack of widely coordinated and accepted call sign similarity and confusion definitions. Namely, one of the AOs, with quite a high number of daily operations, decided to keep the ICAO three-letter call sign designator but to change the R/T call sign. This reported number of similarities and confusions were with only one participating aircraft. A meeting with this specific AO was initiated by EUROCONTROL. It was agreed to change the current R/T call sign to a new one which was closer to the three-letter designator. In addition to the issued NOTAM, EVAIR disseminated the new call sign as the awareness message to all European ANSPs. Continuous monitoring proved that the decision and awareness initiative yielded good results, as in 2019 EVAIR recorded a significant decrease in the number of confusions among single AOs tool users.

CSST access and additional tokens

New AOs continue to join the CSST users. As has been stated in previous bulletins, the prerequisite for using the CSST is to have an NM token. It is also important to be aware that the service can be added to the existing token or an additional token can be purchased for only €200. This is a small price to pay compared with the time saved by using CSST; once added, CSST access will be guaranteed for the remaining life of the token. The hope is that the fee will not discourage AOs from signing up to use the tool, as it represents good value for money.

To make things run more smoothly, AOs need to clearly identify the request for access to the CSST. To that end, AOs which apply for a new token or ask to extend an existing one must ensure that CSST is put in the Purpose of Request box. To extend an existing token, it will also be necessary to insert user ID (CCID).

Please find the application form at http://www.eurocontrol.int/network-operations/access-service-request-form

Call Sign Management Cell (CSMC) support

The CSMC (nm.csmc@eurocontrol.int) is also on hand and can provide limited help to AOs to navigate the application process. The CSMC prepares the CSST for the forthcoming season and is available to discuss AO training requirements. Subject to CSMC staff availability, CSST familiarisation sessions may be provided in Brussels or, upon request, at the AO's premises; both may be subject to UPP arrangements.

CSST operations update

No recent major updates have been made to the CSST.

Learn more about call sign similarity

Please contact the Call Sign Management Cell (CSMC) at nm.csmc@eurocontrol.int
You can find more information on the Call Sign Similarity Project at:
http://www.eurocontrol.int/services/call-sign-similarity-css-service

AIR-GROUND COMMUNICATION IN THE PERIOD 2016-2020

EVAIR bulletins within "air–ground communication" cover two main areas: "spoken" and "operational" communication. Both areas are part of and defined by the EUROCONTROL HEIDI taxonomy (**see definitions on page 34**).

In 2020, "air-ground communication" accounted for 53% of the top seven contributors to ATM occurrences identified in the EVAIR database; this is 3% higher than in 2019 showing a continued increase compared to 2018. Spoken communication, as part of air-ground communication, encompassing CSC, language/accent, misunderstanding/interpretation, high R/T workload, etc., traditionally has a much higher level than operational communication, which covers handling of radio communication, hear back omitted, phraseology, R/T monitoring sector and transfer of communication.

"Air-ground communication" continues to be the most frequent contributor to: "level busts", "runway incursions", "ACAS RAs" and "go-around".
Among the four events mentioned above, EVAIR recorded level bust as the most frequent outcome of the communication problem.

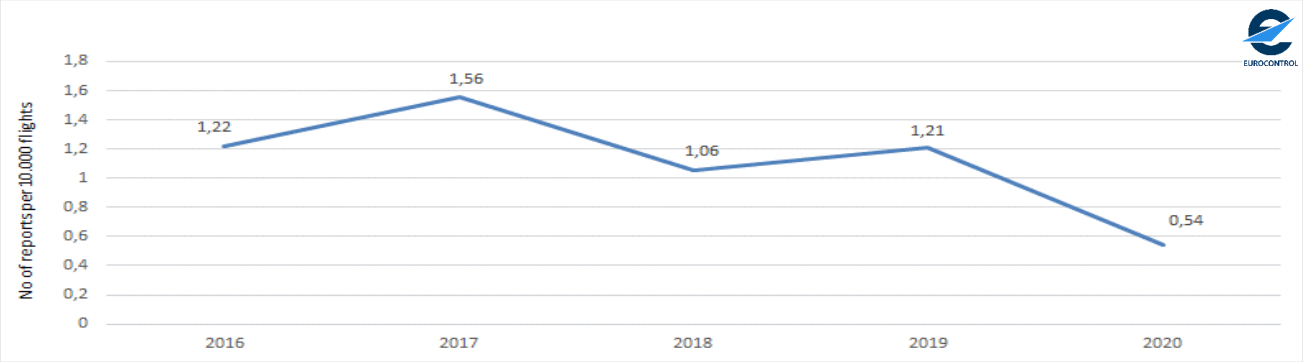


***Figure 24**: Air-ground communication in the period 2016-2020*

As for the other types of problems monitored within EVAIR, in 2020, owing to COVID-19 measures, we saw a significant decrease in air-ground communication. The decrease was by more than 50%, which is one of the highest monitored by EVAIR in 2020.

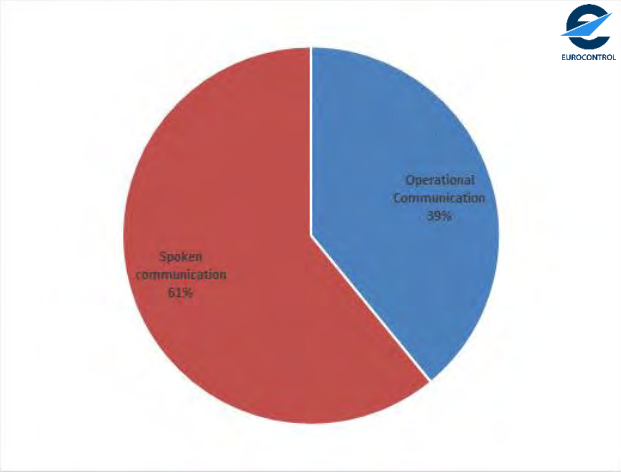


***Figure 25**: Spoken and operational communication in the period 2016-2020*

As presented in previous EVAIR bulletins, the percentage breakdown between "spoken" and "operational" communication within "air-ground" communication is in the long term in favour of spoken communication.

One of the main reasons for the higher percentages seen in spoken communication compared to operational communication, is very much related to the knowledge, understanding and interpretation of the English language.

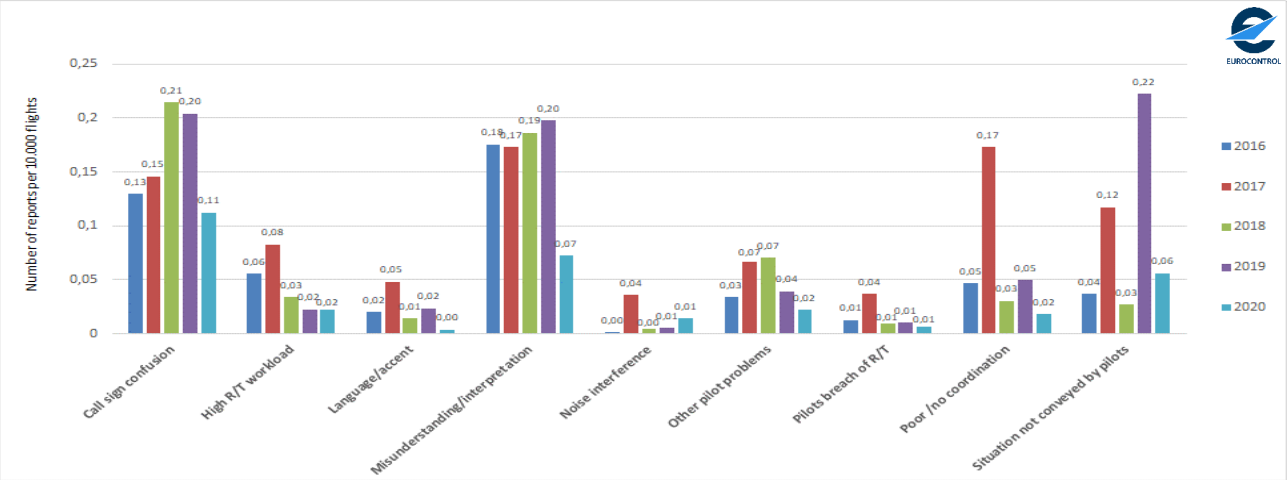


***Figure 26**: Spoken communication in the period 2016-2020*

Within "spoken communication", usually "misunderstanding/interpretation" shows higher trends. In 2020, owing to COVID-19 measures, this area recorded very high decrease, much higher than other areas. Call sign confusion is the area within spoken communication, which traditionally displays higher trends. The COVID-19 pandemic had an impact on call sign confusions in 2020. However, the decrease was not as high as it was with misunderstanding/interpretation.

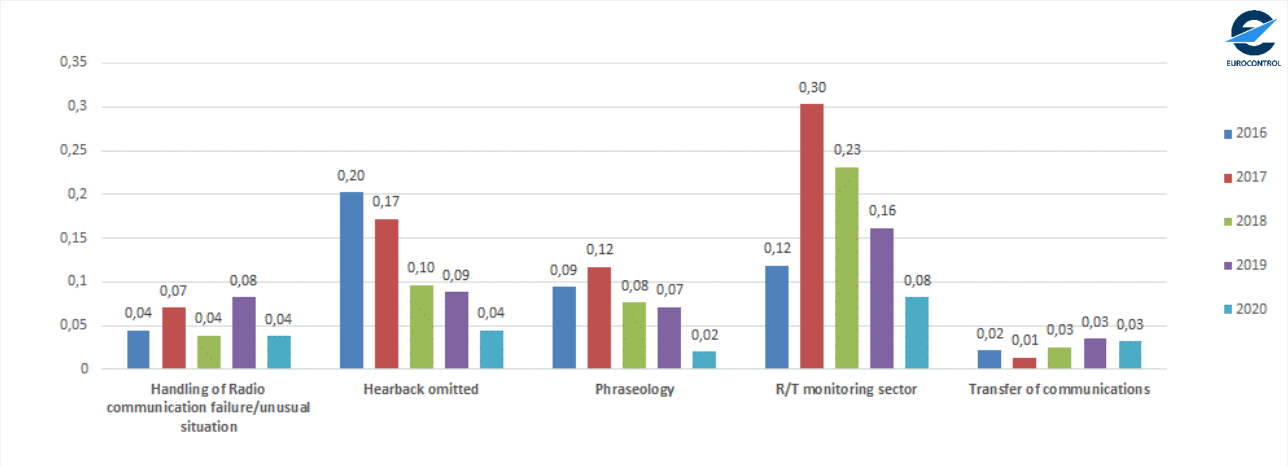


***Figure 27**: Operational communication in the seasons 2016-2020*

Within operational communication, a higher grouping of the reports are within the R/T monitoring sector, phraseology and hear back omitted. The impact of COVID measures, as for other areas, is obvious within operational communication too. However, it is worth noting that within transfer of communication, despite COVID-19 measures, there was no decrease in trends compared with the previous years. (Figure 27).

LOSS OF COMMUNICATION IN THE PERIOD 2016-2020

EVAIR (at European level) and IATA GADM (at global level) perform analyses in support of EUROCONTROL's project on the loss of communication.

For the period 2016-2020, loss of communication reports made up 4% of the total number of ATM reports in the EVAIR database, which is 0.4% more than for the previous five years (2015-2019). For the monitored five-year period, loss of communication occurred in 50 different states across Europe and 107 different locations, which is a bit less but very close to the previous five years. For the same period, the ATM system had a direct impact on loss of communication events in 13% of cases and had an indirect impact in 15% of cases. In 72% of cases, the ATM system was not involved. All percentages are very close to the previous five years (2015-2019), which means that relations between these three areas of concern are quite stable.

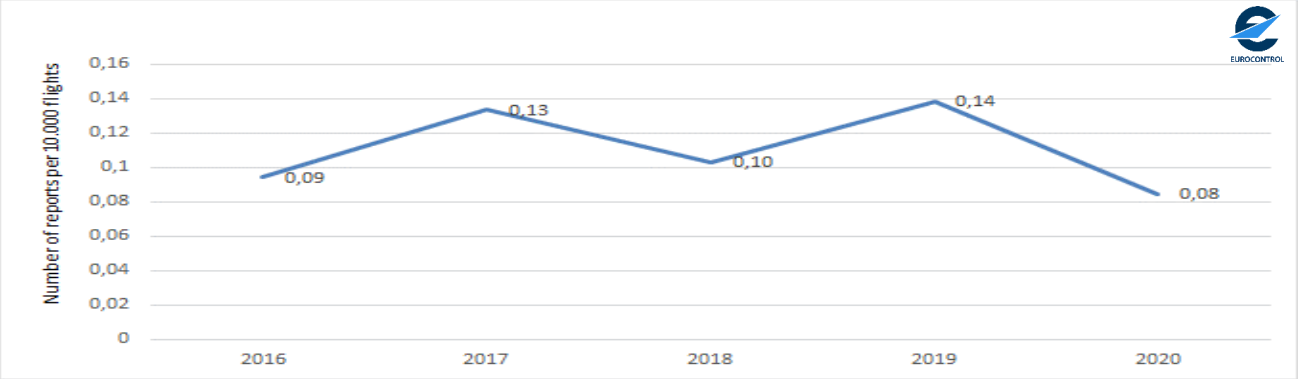


***Figure 28**: Loss of communication at European level in the period 2016-2020*

Owing to COVID-19 measures, loss of communication, having shown the highest trend in 2019 and over the last ten years, recorded a significant drop in 2020. Further monitoring will show whether loss of communication will go up or down. Namely, EVAIR sent the reminder message to the AOs to provide their loss of communication reports. The practice shows that after each reminder message we record an increase in reports.

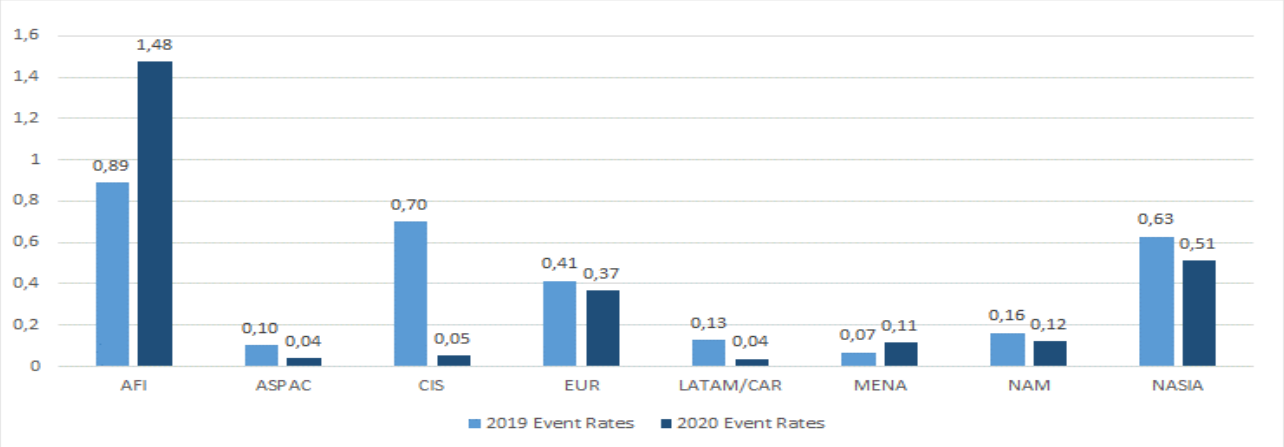


***Figure 29**: IATA global loss of communication in the period 2019-2020*

It is interesting that in IATA GADM during the COVID-19 pandemic two regions, Africa and the Middle East, recorded an increase in loss of communication events, while others had a reduction. The reduction in some regions was significant, like within the Commonwealth of Independent States, while in the others, e.g. in Europe, the drop was very low.

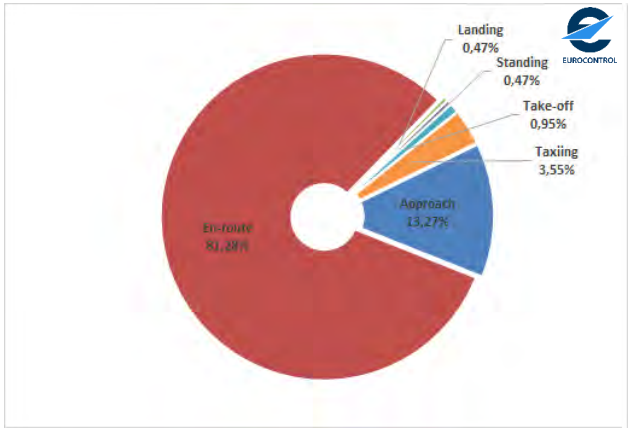


Figure 30: Loss of communication according to phase of flight in the period 2016-2020

The en-route phase is over a long period with a much higher number of reports than the other phases of flight. However, from the risk point of view, the approach phase of flight usually carries a higher degree of loss of communication risk.

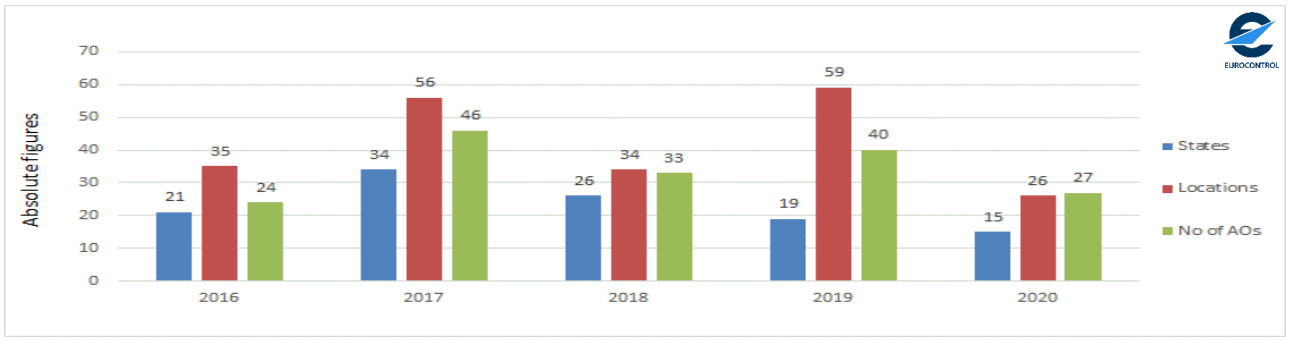


Figure 31: Number of states, locations and AOs reporting loss of communication in the period 2016-2020

COVID-19 measures had an impact on the significant reduction in the number states, locations and No of a/c affected. The number of states had a smaller decrease than the others.

The data show that most of loss of communication occurred within the same states as it had done in the past. It is also worth noting that most loss of communication for the last five years occurred within 10-12 states.

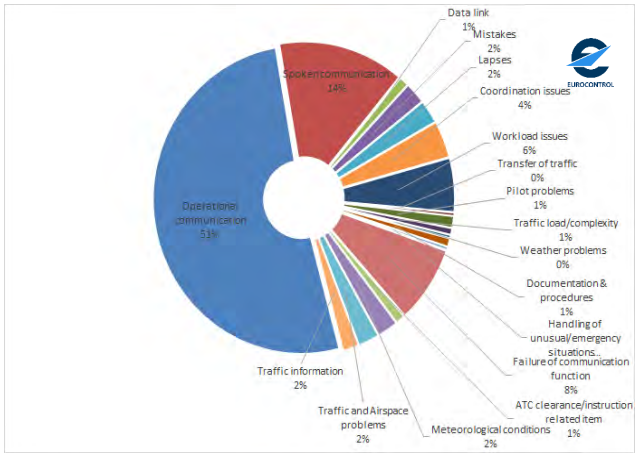


Figure 32: Loss of communication contributors 2016-2020

As has been well known, over a long period, air-ground communication, consisting of operational and spoken communication, has recorded higher percentages (65%) than other contributors. Besides air-ground communication the area with a slightly higher percentage is failure of communication function (8%) and workload issues (6%). Figure 32 shows the breakdown of operational communication contributors.

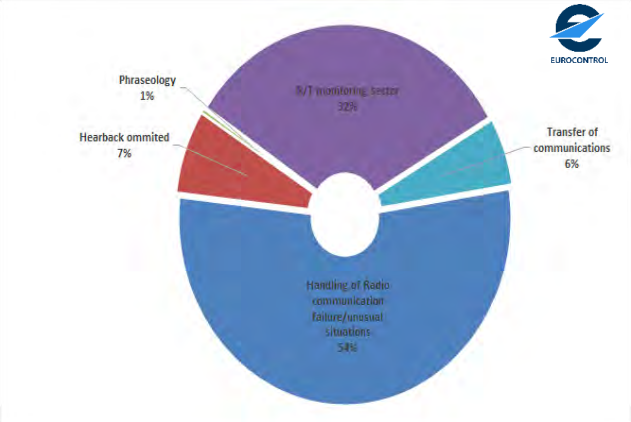


***Figure 33**: Loss of communication operational contributors in the period 2016-2020*

"Handling of radio communication failure/unusual situations", over a longer period has a higher percentage than the other operational contributors. During 2016-2020 this percentage was10% higher than in the previous five years (2015-2019). "Handling of radio communication failure/unusual situations" encompasses wrong frequency selection, forgetting to change the frequency, lack of ATC instruction to change the frequency, etc.

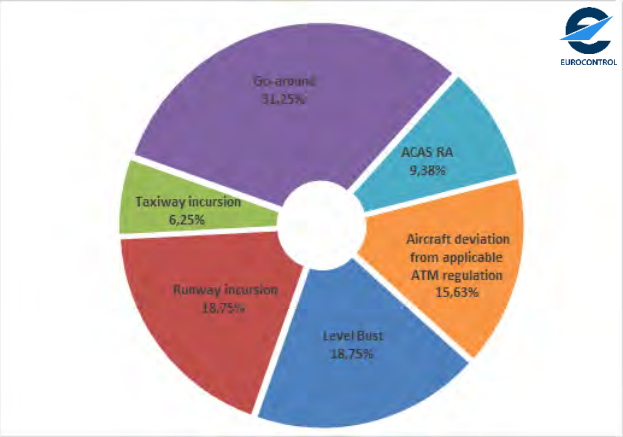


***Figure 34**: Events associated with loss of communication in the period 2016-2020*

In 2016-2020, go-around (31%) took the first position within the group of events associated with loss of communication. Go-around has held this position for a long period. A few others, like Runway incursion (18.75%) and Level bust (18.75%), usually take second and third positions.

SPECIFIC EVENTS
LASER THREATS ACROSS EUROPE IN THE PERIOD 2016-2020

Laser threats account for 5.6% of the total number of EVAIR ATM occurrences recorded for the period 2016-2020.
In spite of COVID-19 measures, laser events is the only monitored area which recorded a slight increase in 2020. One of the reasons for the increase in 2020 could be the fact that a few ANSPs started providing us with laser reports regularly, alongside other ATM reports.

Big hubs suffer more than other airports. In the majority of laser interferences, luckily, there were no direct contacts of the laser beam with the pilots' eyes. According to the reports, pilots are very familiar with the procedures on how to protect themselves against the laser beam. In addition, they correctly follow procedures regarding the reporting to the ATC about laser interference and description of the location from where the beam came.

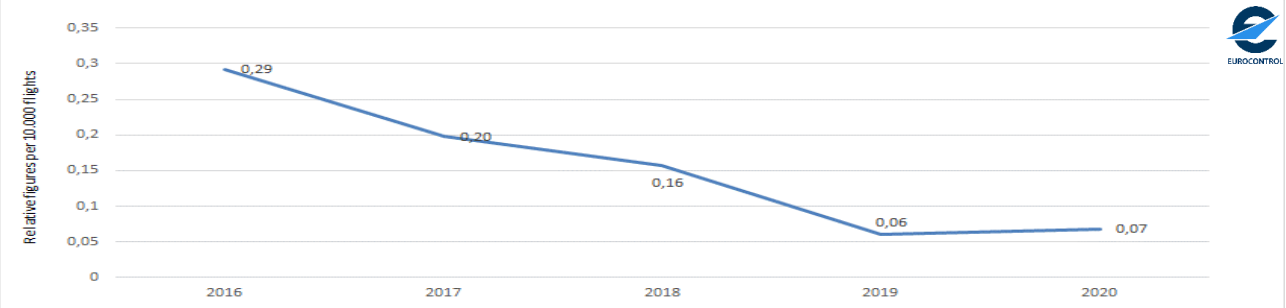


***Figure 35**: Laser interference in the period 2016-2020*

Over a long period, the most affected phase of flight was approach, with a rate of 77%. Within the approach phase, final approach is the most affected. It is worth saying that in the database, we found that 9% of laser threats occurred during the en-route phase, some of them even above FL 300. This leads us to conclude that these were very powerful laser devices. Quite a lot of high-level laser interferences occurred within South East Europe, including the South-East Mediterranean.

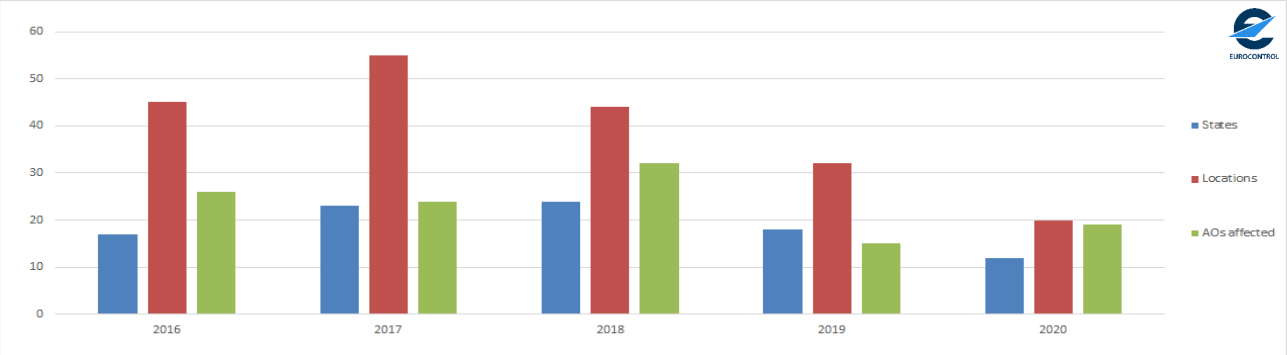


***Figure 36**: Number of states, locations and AOs reporting laser interference in the period 2016-2020*

The number of states, and locations affected by laser interferences decreased in 2020 compared to 2019. However, the number of AOs affected increased. Therefore, besides the increased number of ANSPs who provide laser reports to EVAIR, we saw an increased number of AOs in comparison with 2019.

Reports can be sent to evair@eurocontrol.int
More information about lasers is available on SKYbrary www.skybrary.aero

RPAS – REMOTELY PILOTED AIRCRAFT SYSTEMS (RPAS)/DRONES IN THE PERIOD 2016-2020

EUROCONTROL Voluntary ATM Incident Reporting (EVAIR) RPAS/drone statistics are based on ATM incident data provided by commercial aircraft operators (AOs) and European air navigation service providers (ANSPs), including a few air navigation providers from neighbouring regions. Most reports come from aircraft operators.
RPAS occurrences account for 4.7% of the total EVAIR reports, which is one percent more than for the period 2015-2019.

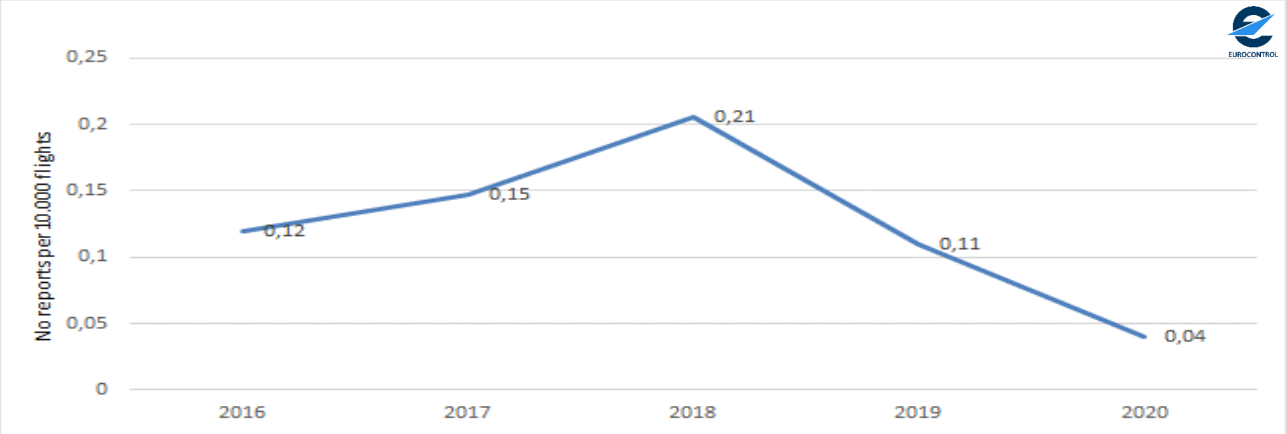


***Figure 37**: RPAS trends in the period 2016-2020*

Monitoring of RPAS/drones shows that over a long period the majority of reports were recorded at low altitudes and only a smaller percentage at higher altitudes. The majority of occurrences took place during good visibility conditions.

EVAIR regularly receives, besides simple drone descriptions, also detailed description in terms of their shape, size and colour. Every year we see pilots' reports that in a certain number of occurrences the distance between commercial flights and drones was literally a few metres vertically or horizontally.

It is very important to highlight the importance of pilots reporting drone encounters to ATC whenever they observe them. In a certain number of reports, it was found that after being informed by ATC, the local police also took their part through the collection of additional information from pilots after their landing.

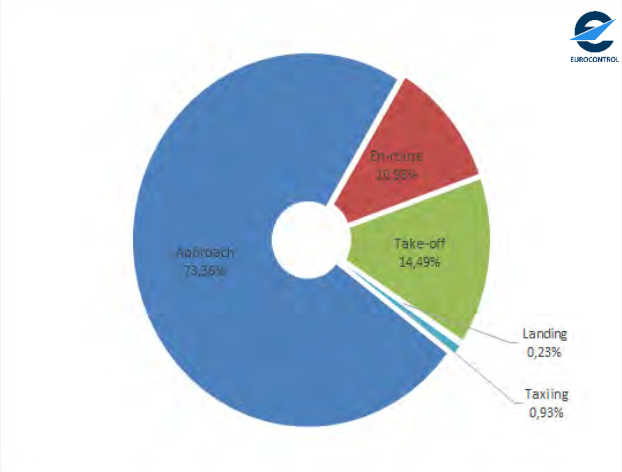


***Figure 38**: RPAS phases of flight in the period 2016-2020*

As presented in Figure 38, the largest number of drone occurrences occurred at low altitudes (approach phase) either during arrival or departure.
EVAIR recorded almost 11% of encounters in the en-route phase, which is 2% more than for the previous five years (2015-2019).
We noted that within this five years period, as for the previous one, some drone encounters at high altitudes occurred in politically disputed areas.

Number of states and locations reporting RPAS/drones

Owing to COVID-19 measures, EVAIR recorded a further reduction of states and locations affected by drone occurrences in 2020 compared to 2019. For the entire period 2016-2020, EVAIR recorded drones/RPAS encounters in 74 different locations and 26 states. Five-year period figures are similar to those for the period 2015-2019.

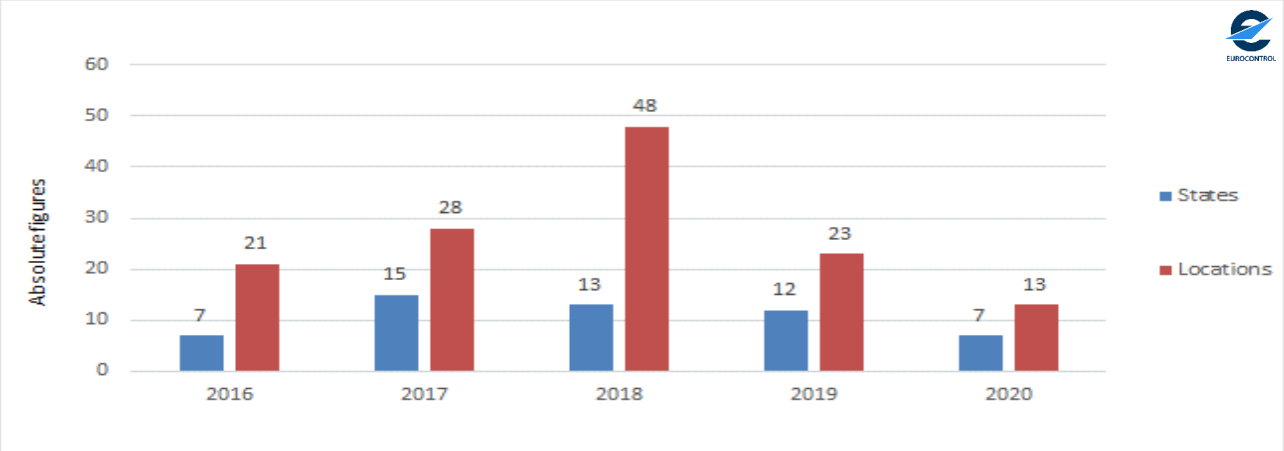


***Figure 39**: Drone spread across European states in the period 2016-2020*

You can find out more about RPAS in the links provided below.

EUROCONTROL publications and activities:
http://www.eurocontrol.int/uas

ICAO 'Manual on RPAS' (Doc 10019):
http://cfapp.icao.int/tools/ikit/rpasikit/story.html;
EC 'Roadmap for the integration of civil RPAS into the European aviation system:
www.ec.europa.eu/transport/modes/air/news/2015-03-06-drones_en.htm;

EASA 'Concept of operations for drones:
https://www.easa.europa.eu/system/files/dfu/204696_EASA_concept_drone_brochure_web.pdf;
https://www.easa.europa.eu/newsroom-and-events/news/partners-step-efforts-address-integration-drones-european-airspace

Joint Authorities for Rulemaking on Unmanned Systems
http://jarus-rpas.org/

GPS OUTAGES IN THE PERIOD 2016-2020

The first GPS reports were provided to EVAIR in 2013/4 when the big crisis within the Black Sea region started. EVAIR alerted the whole aviation community about identified problems. Since then, EVAIR regularly collects, analyses, monitors, and closely cooperates with EUROCONTROL navigation and surveillance experts as well as with external stakeholders, ICAO, EASA, aircraft manufactures, IATA and others interested in this problem, including ITU, the International Telecommunications Union, and other radio regulatory authorities. In coordination with EUROCONTROL, the ITU did issue a circular on the topic. https://www.itu.int/hub/2022/08/warning-harmful-interference-rnss/

The total number of GPS reports in the EVAIR database expressed as a percentage is closely linked with the EVAIR requests to AOs to provide their GPS reports, the increase or decrease in the traffic and the increase in political tensions in the politically disputed regions, the South-East Mediterranean and Black and Caspian Sea, or pandemic measures. Fluctuation of GPS outages within the total number of EVAIR reports, expressed in percentage goes from a few percent in 2015 to 60% in 2018, 59% in 2019 and 38% in 2020.
Well established EVAIR processes for data collection and analysis included, for the period 2016-2020, besides all European ANSPs (a certain number of which border the European region) about 170 AOs from the whole world flying to/from Europe. The reports provided are used to publish different types of EVAIR analysis and to share them with the widest aviation community possible, including EASA and ICAO. GPS de-identified reports and analysis are also used to provide support to internal EUROCONTROL activities, of which GNSS is the most important. At the request of our main stakeholders, AOs, ANSPs and also international organisations, EVAIR conducts GPS customised analysis.
A general characteristic of GPS reports is that they are, more than the other types of reports, among others linked with PBN airspace and airports where SID/STAR procedures are based on satellite navigation. In this regard, as explained earlier, we saw more reports in the South-East Mediterranean airspace and Black Sea because of the serious political crisis within these two regions. Due to the vulnerability of satellite navigation, aircraft operators continuously repeat their requests to ANSPs to reconsider their plans to decommission ground navigational aids.

We repeat that raising awareness among aircraft operators and ANSPs about the potential loss of GPS signal within certain regions is extremely important. It helps pilots to make necessary preparations and be ready to switch to other types of navigation. In this regard, IATA, EUROCONTROL as well as EASA, as the EU regulator, made their pleas to states to issue NOTAMs warning about potential problems with GPS signals. Some states such as Turkey, Cyprus, and Ukraine have already done it.
However, in some cases, RFI can be very intermittent and diverse in location (such as over open international water) that describing the RFI impact in a NOTAM can be challenging.

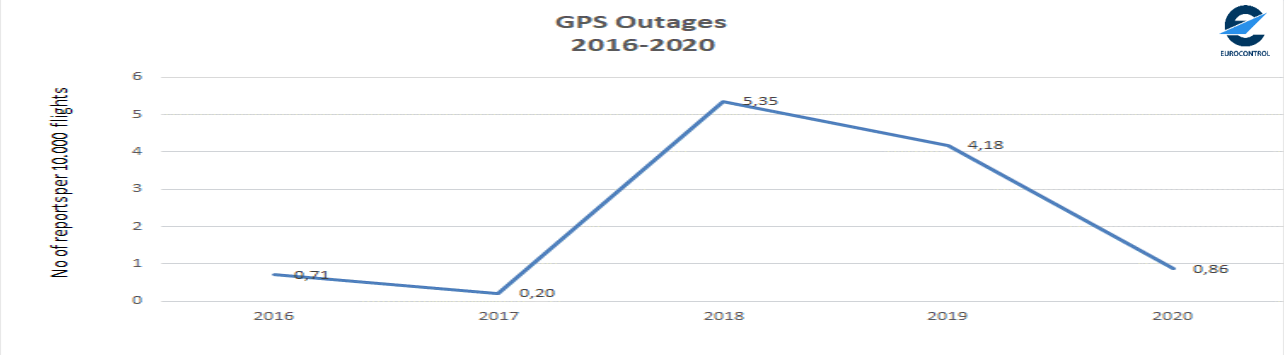


Figure 40: *GPS outages in the period 2016-2020*

For the period 2016-2020, in absolute figures, EVAIR received 9,365 GPS outage reports. A significant decrease occurred in 2020 due to COVID-19 measures and a significant drop in traffic. Within this period, EVAIR identified more than 60 FIRs where GPS outages were located. We see a continuous increase of the FIRs affected by GPS outages. For a longer period, the most affected were FIRs in the South-East Mediterranean and those around the Black and Caspian Sea. In summary, as already mentioned, most GPS events were in the airspace which is around politically disputed areas and the areas where drones were used extensively for military purposes. In cooperation with our NAV and SUR colleagues and certain ANSPs, and their investigations, we came to the conclusion that one of the main causes of GPS outages in politically disputed regions is the interference with satellite signals.

In addition to the mentioned regions, EVAIR regularly sees smaller numbers of GPS outages (less than one percent) in the core area of the core European airspace. Besides potential technical problems with the GPS equipment, according to the available information, a potential cause of the GPS jamming/outage could have been so-called personal privacy devices (PPD), used to avoid tracking by satellite. If close to aerodromes and passing by, these devises can cause loss of satellite signal during approach or disable initialisation of GNSS receivers during pre-departure checks when establishing satellite navigation.

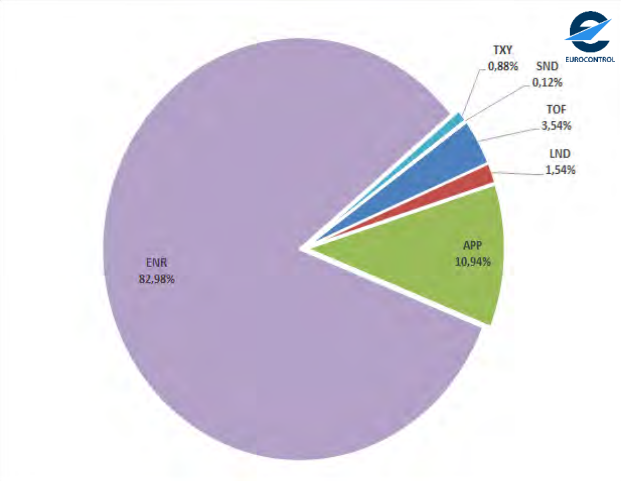


***Figure 41**: GPS outages according to phases of flight in the period 2016-2020*

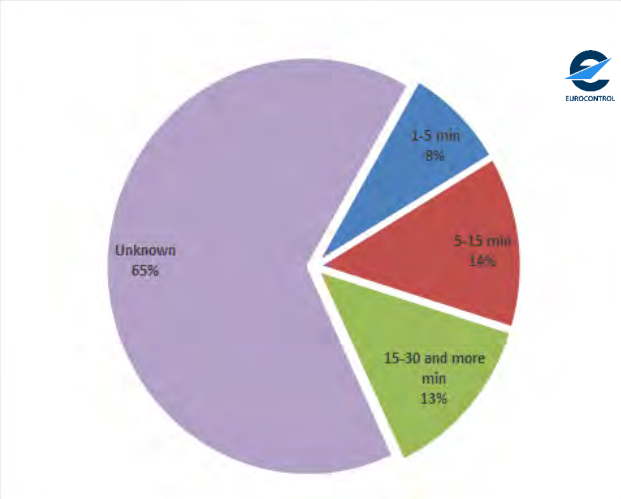


***Figure 42**: Duration of GPS outages in the period 2016-2020*

EUROCONTROL GNSS and NAV experts have applied an elimination methodology to the reported events in order to identify the likeliest cause of the outage. The elimination methodology for the identification of the GPS outages includes different potential causes such as space weather, receiver problems, military testing, and satellite constellation. If none of the listed causes was present, then the most probable cause was Radio Frequency Interference (RFI).

So far, in all analyses, the phase of flight most affected by GPS outages has been the en-route phase (Figure 41). This is closely linked with the areas affected and the type of traffic flying through the affected regions. Within the most affected regions (South-East Mediterranean and Black Sea) most of the traffic is overflying, which is the main reason why for the last seven to eight years the en-route phase of flight has been the most affected.

For the analysis of the duration of GPS outages, we set the time spans for lost signals at 1-5 min, 5-15 min, 15-30 minutes and above (see Figure 42).

As shown in Figure 42, in 65% of the reports we did not have this information. However, within reports where this information was available out of the three timespans defined for lost signal, the span 5-15 and 15-30 minutes and above had almost the same percentage and happened more frequently than 1-5 minutes. In 2020, EVAIR recorded a few cases with almost 90minutes of lost signal. Bearing in mind that the aircraft type most frequently flown in the most affected regions flies on average at a speed of 8 kts per minute, we saw that when GPS signal is lost, a few FIRs were affected at the same time.

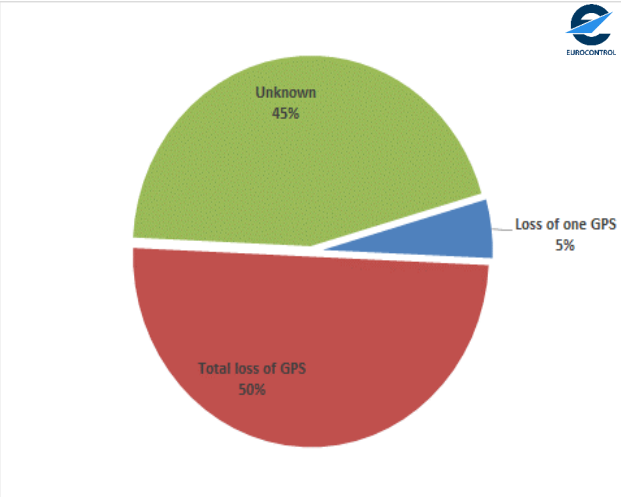


***Figure 43**: GPS loss in the period 2016-2020*

It is interesting that in the period 2016-2020, the percentage of lost signal is identical to the period 2015-2019.
Namely, for 45% of GPS reports, there was no information on whether one or both GPS boxes had failed; in 50% of GPS reports there was a total loss of GPS signal, and in 5% of GPS reports there was loss of signal within one box.

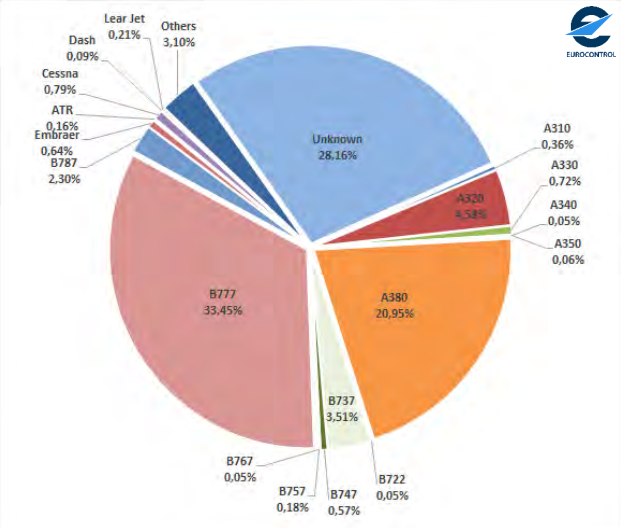


***Figure 44**: Type of aircraft affected by GPS failure in the period 2016-2020*

In a bit more than 28% of the reports there was no information about the type of the aircraft. Within the group of "Others" there were types of aircraft which were seen only once. In most cases that was business aviation.

The most affected aircraft as recorded by EVAIR were the B777 and A380. It is also important to highlight that for a long period these two types of aircraft have also been the most frequently flown aircraft in the affected areas. Therefore, having a higher percentage for them is normal.

ACAS REPORTING IN THE PERIOD 2016-2020

EVAIR monitors the operational, procedural and technical elements of ACAS following requests from our stakeholders. The activity forms part of the obligation taken over following the successful implementation of the mandatory carriage of ACAS II. The aim of such monitoring remains unchanged: to support the continued safe and effective operation of ACAS by identifying and measuring trends and issues associated with resolution advisories (RAs).

ACAS is the generic term for Airborne Collision Avoidance Systems, of which TCAS II is the only system implemented to date. The purpose of ACAS is to improve air safety by acting as a 'last-resort' method of preventing mid-air collisions or near collisions between aircraft. Although ACAS II implementation was completed in 2005, ACAS monitoring continues to improve safety by identifying technical, procedural and operational deficiencies. TCAS II version 7.1 was made mandatory within European Union airspace on all civil aircraft over 5,700 kg MTOW or 19 passenger seats as of December 2015 and since then EVAIR has been focusing its monitoring on the performance of this version of TCAS.

ACAS RA statistics are the outcome of the data provided by safety managers at airlines and air navigation service providers (ANSP).

We wish to point out that some of the ACAS/TCAS reports that were not followed by feedback from the ANSPs rely on pilot and air traffic controller perceptions and memories of the events rather than measured or calculated values. A significant number of the ACAS RA reports are supported by ANSP feedback based on operational investigations, including radar and voice records.

AIRLINES' ACAS REPORTING IN THE PERIOD 2016-2020

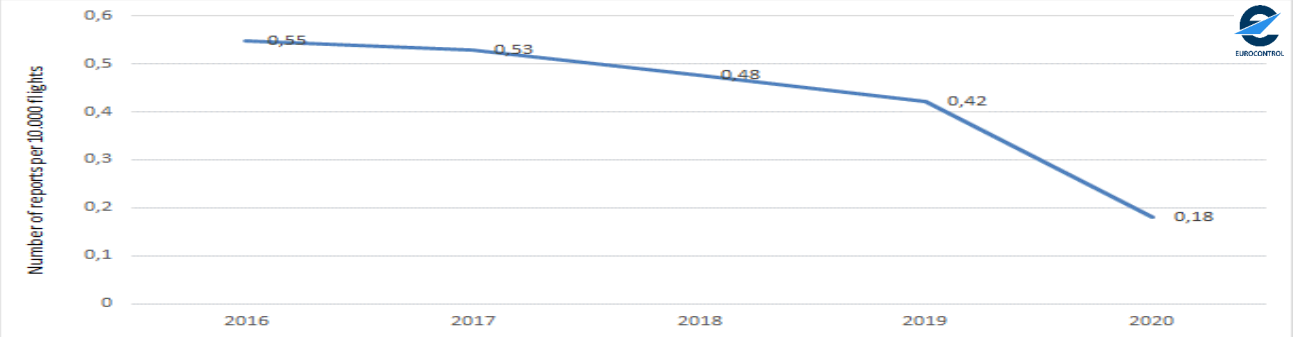


***Figure 45**: Airlines' ACAS incidents in the period 2016-2020*

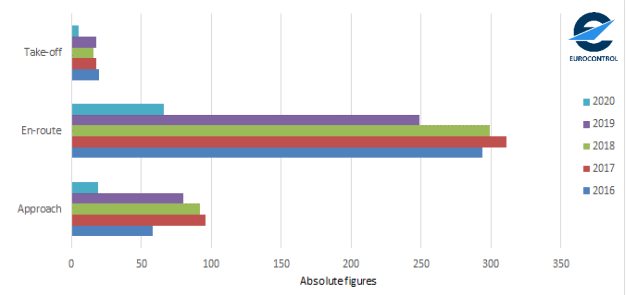


***Figure 46**: Airline ACAS RAs by phase of flight in the period 2016-2020*

In 2020, EVAIR recorded 0.18 ACAS RAs per 10,000 flights, which is the lowest level in the past ten years.
ACAS reports make up 16.1% of the overall ATM reports provided by AOs. As for the other type of ATM events, the impact of COVID-19 measures is obvious on ACAS RA reports too. EVAIR recorded a significant drop in the number of reports in 2020.

Over a long period in the EVAIR database, the en-route phase at pan-European level has accounted for more reports than other flight phases. The situation is the same in 2020.
More about ACAS can be found on: https://www.skybrary.aero/index.php/Airborne_Collision_Avoidance_System_(ACAS)

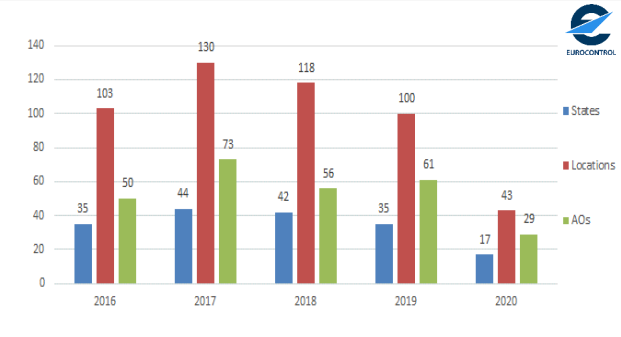


***Figure 47**: Number of States, locations and AOs reporting ACAS RAs in the period 2016-2020*

The absolute figures for ACAS RAs per the number of AOs experiencing it, and number of states and locations affected (Figure 47), show that in 2020 there was a significant decrease. The reason behind this, as for the other type of events, was the impact of the COVID-19 pandemic and in that regard the significant traffic decrease.

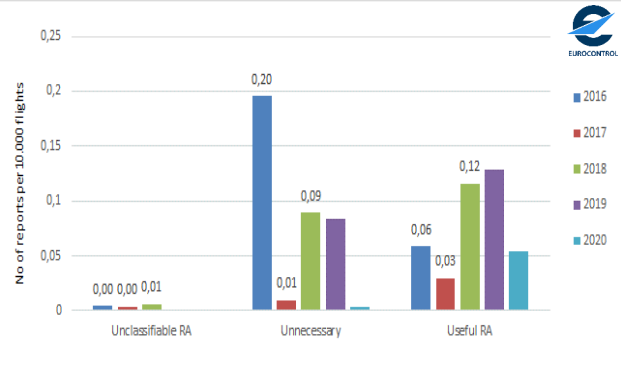


***Figure 48**: ACAS RA classification in the period 2016-2020*

Despite a significant drop in traffic and in that regard the number of ACAS RAs, 2020 showed that the trend of "useful RA" is far above "unnecessary RA". This is very encouraging and assures us that pilots have full confidence in ACAS RA instructions.

ICAO ADREP definitions of types of RA are shown below.

- **Useful RA** - The ACAS II system generated an advisory in accordance with its technical specifications in a situation where there was, or might have been, a risk of collision between aircraft.

- **Unnecessary (Nuisance) RA** - The ACAS II system generated an advisory in accordance with its technical specifications in a situation where there was not, and could not have been, a risk of collision between aircraft.

- **Unclassifiable RA** - The ACAS II system generated an advisory that cannot be classified because of insufficient data.

ACAS RA INSTRUCTIONS IN THE PERIOD 2016 – 2020

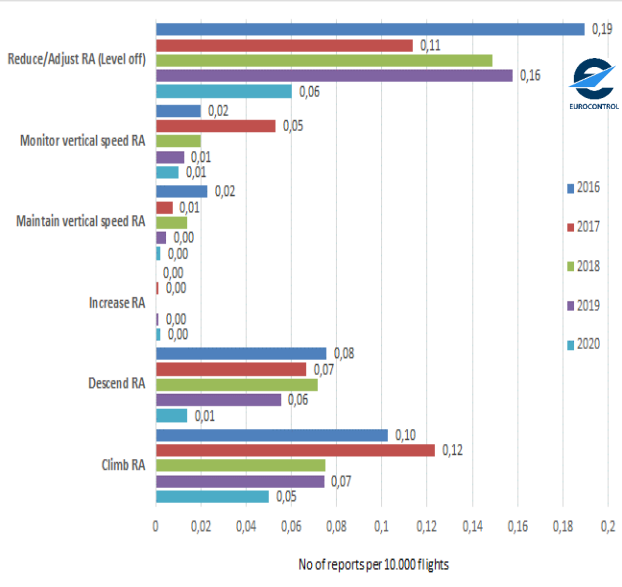


***Figure 49**: ACAS RA instructions in the period 2016-2020*

Out of six monitored areas of ACAS RA instructions, not a single one recorded an increase in 2020. The reason is the same as for other monitored areas of concern, COVID-19 measures and a significant drop in traffic. In 2020, "Reduce/Adjust RA" (old taxonomy)/ "Level off, level off" (new taxonomy) recorded a higher trend than others. Over a long period, this is the area which records the highest number of reports. The problem is closely linked to the high vertical rate. We repeat in this Bulletin as in previous ones that the vertical rate should be 1,500 ft/min or less throughout the last 1,000 ft of climb/descent as recommended by ICAO.

ACAS RA ATM CONTRIBUTORS IN THE PERIOD 2016-2020

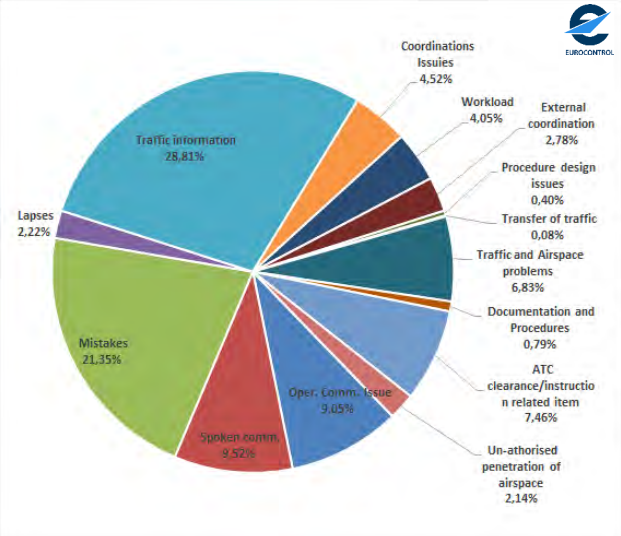


***Figure 50**: TCAS RA ATM contributors in the period 2016-2020*

The situation in 2016-2020: the trend of ATM contributors is similar to that in the previous five years (2015-2019). Over a longer period, we see that percentages and mutual relations between different contributors is similar.

Provision of "traffic information" by air traffic controllers to pilots (28.81%) and air traffic controllers' "mistakes" (21.35%) account for 50.16% of the overall percentage of monitored areas of concern. A further breakdown of these two areas of concern is provided in Figures 51 and 52.

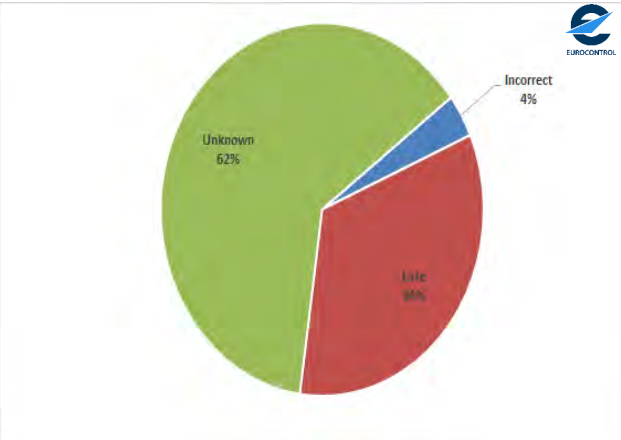


***Figure 51**: Traffic information issues associated with ACAS RA in the period 2016-2020*

In reports where it was possible to identify problems related to "traffic information", the main problem was "late" provision of traffic information. A smaller percentage was related to "incorrect" information.

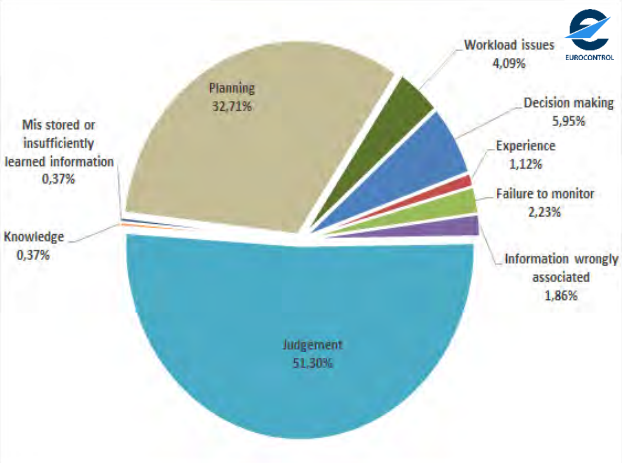


***Figure 52**: Mistakes associated with ACAS RA in the period 2016-2020*

Mistakes relate directly to the controllers' work. Within mistakes, "judgment" and "planning" contributors for a long period record a much higher percentage than the others. For the period 2016-2020 they accounted for 84%, which is very close to the previous five years (2015-2019) when it was 85%.

WAKE TURBULENCE

The EVAIR mechanism continues to be involved in the various internal and external wake turbulence (WT) activities, supporting them with data provided to EVAIR by the main data providers, AOs and ANSPs.

For the period 2016-2020, wake turbulence occurrences accounted for 2.7% of all reports. This is not too high a percentage, yet from the severity point of view they can be treated as very severe.

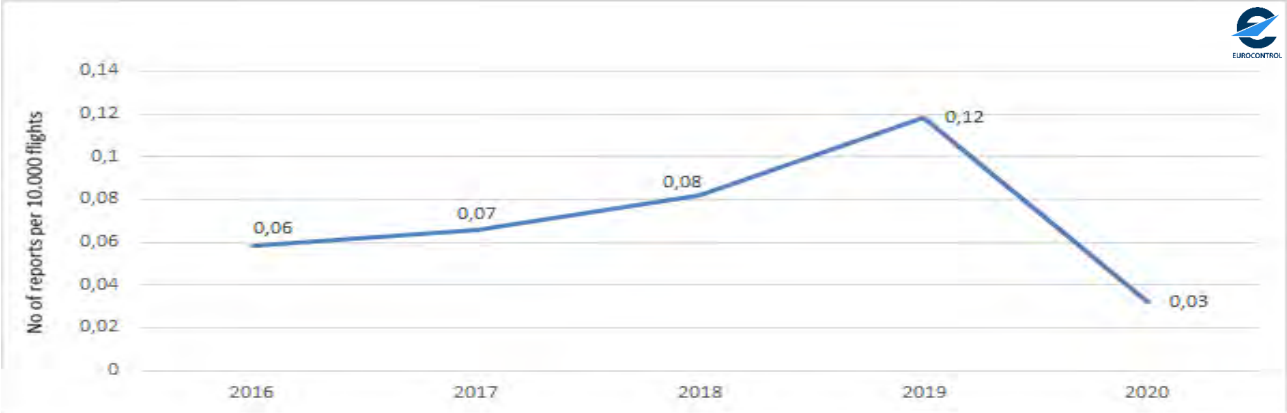


***Figure 53**: Wake Turbulence in the period 2016-2020*

As with the other types of occurrences, the impact on wake turbulence of the COVID-19 pandemic is obvious. After the peak reached in 2019, EVAIR recorded a significant decrease in 2020. In fact, in 2020, wake turbulence reached the lowest level ever recorded by EVAIR.

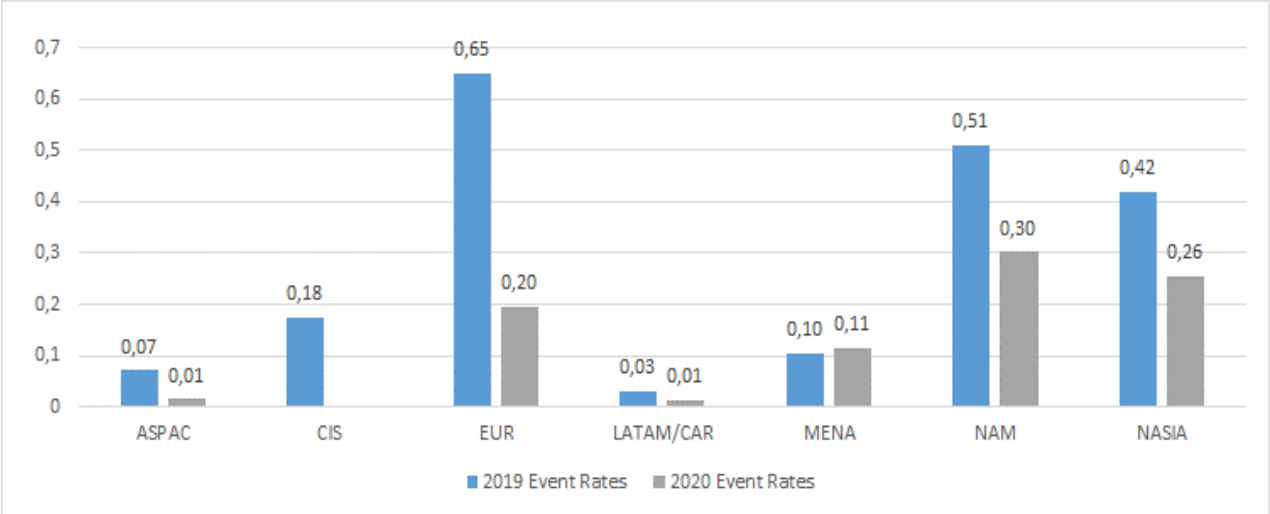


***Figure 54**: IATA Global Wake Turbulence in the period 2019-2020*

IATA global data show the spread of wake turbulence occurrences at global level. The covered period is 2019-2020 and the figures show the number of occurrences per 10,000 flights. In general, three regions record higher trends, Europe, North America, and North Asia. In 2019, European regions had the highest trend, while during the COVID-19 pandemic in 2020, North America was a bit higher than the other three.

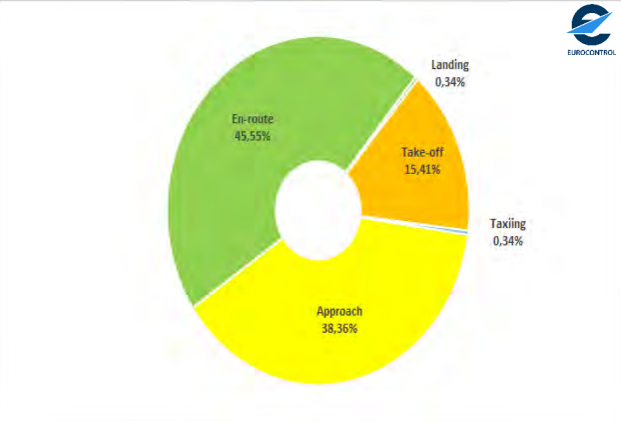


***Figure 55**: Wake turbulence phases of flight 2016-2020*

The phases of flight monitored by EVAIR show that among wake turbulence occurrences, for the period 2016-2020, most occurred within the en-route (45.5%) and approach phases (38.3%)

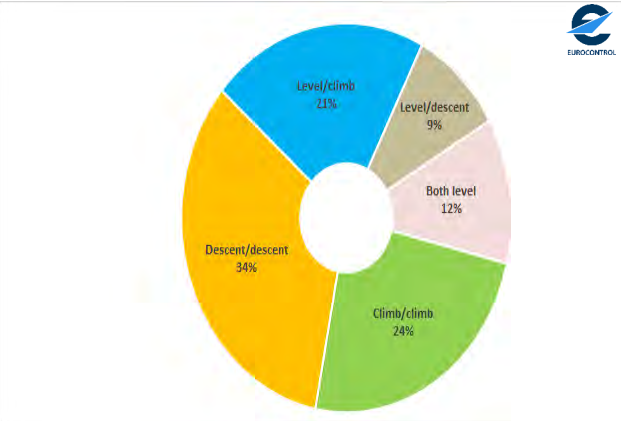


Figure 56: Wake Turbulence by vertical profile 2016-2020

Vertical profiles of the wake turbulence show that highest percentage of wake turbulence events occurs when both aircraft are in descent (34%); a bit lower is when both aircraft are climbing (24%).

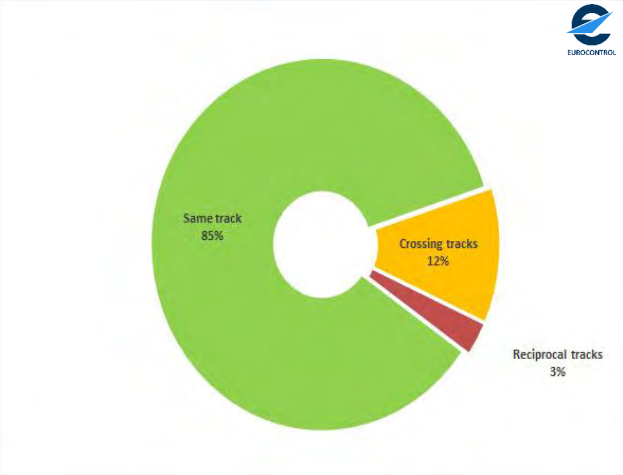


***Figure 57**: Wake turbulence horizontal relative movements 2016-2020*

Horizontal relative movements of the wake turbulence have a few situations; same track, crossing track and reciprocal tracks. The majority of wake turbulence events occur when both aircraft have the same track (85%). In several cases wake turbulence is followed with banking on the right or left side. In some cases the banking could be from 40-60 degrees.

ANNEX 1 – EUROPEAN ACTION PLANS

EUROPEAN ACTION PLAN FOR AIR-GROUND COMMUNICATIONS SAFETY

The Air-Ground Communication (AGC) Safety Improvement Initiative was launched by the EUROCONTROL Safety Team in 2004, and addresses communications issues identified in the Runway Incursion and Level Bust Safety Improvement Initiatives as well as other issues of concern, such as call sign confusion, undetected simultaneous transmissions, radio interference, use of standard phraseology, and prolonged loss of communication. Communication between air traffic controllers and pilots remains a vital part of air traffic control operations, and communication problems can result in hazardous situations. A first step towards reducing the incidence of communication problems is to understand why and how they happen. The Action Plan is available on the ALLCLEAR Communication Toolkit http://skybrary.aero/index.php/Solutions:ALLCLEAR

THE EUROPEAN ACTION PLAN FOR THE PREVENTION OF LEVEL BUST

Reducing level busts is one of EUROCONTROL's highest priorities. EUROCONTROL began raising awareness of the level bust issue in 2001, organised a series of workshops, and established a Level Bust Task Force to define recommendations and to formulate an action plan to reduce level busts.

The Level Bust Action Plan is the outcome of work carried out by EUROCONTROL's cross-industry Level Bust Task Force, which was set up in 2003. The Task Force reviewed the evidence available, identified the principal causal factors, and listened to the air navigation service providers and aircraft operators with experience in reducing level busts.

The Action Plan contains recommendations for air traffic management, air traffic controllers, and aircraft operators. It is designed to reduce the frequency of level busts and reduce the risks associated with level busts. Implementation of the Action Plan will be monitored by the Task Force monitoring group reporting to the EUROCONTROL Safety Improvement Sub Group (SISG).

http://www.skybrary.aero/index.php/European_Action_Plan_for_the_Prevention_of_Level_Bust

THE EUROPEAN ACTION PLAN FOR THE PREVENTION OF RUNWAY INCURSIONS (EAPPRI)

The number of runway incursion reports is rising. Accidents continue to take place on runways. Findings from the incident and accident reports have been used to determine the new recommendations contained in the updated European Action Plan for the Prevention of Runway Incursions.

The increasing availability of runway incursion incident reports is a positive indication of the commitment of organisations and operational staff to prevent runway incursions and runway accidents by learning from the past accidents and incidents and sharing this information across Europe.

The new recommendations contained in the Action Plan are the result of the combined and sustained efforts of organisations representing all areas of aerodrome operations.

The organisations that contributed to this Action Plan are fully committed to enhancing the safety of runway operations by advocating the implementation of the recommendations that it contains. These organisations include, but are not limited to, aerodrome operators, air navigation service providers, aircraft operators, and regulators.
http://www.skybrary.aero/index.php/European_Action_Plan_for_the_Prevention_of_Runway_Incursions_(EAPPRI)

THE EUROPEAN ACTION PLAN FOR THE PREVENTION OF RUNWAY EXCURSION (EAPRE)

European Action Plan for the Prevention of Runway Excursions (EAPPRE) Edition 1.0, published in January 2013, provides recommendations and guidelines for ANSPs, aerodrome operators, Local Runway Safety Teams, aircraft operators and manufacturers, AIS providers, regulators and EASA.
https://www.skybrary.aero/index.php/European_Action_Plan_for_the_Prevention_of_Runway_Excursions_(EAPPRE)

CALL SIGN SIMILARITY (CSS)

The European Action Plan for Air Ground Communication Safety (conceived inter alia by EUROCONTROL, aircraft operators (AOs) and the Flight Safety Foundation) identified call sign similarity (CSS) as a significant contributor to air-ground communication problems. Analysis of events reported by ATC shows that 5% are incidents involving CSS. Research and CBA studies show that the most cost-efficient way of providing a long-lasting, Europe-wide solution is to create a central management service to de-conflict ATC call signs. This strategy provides economies of scale and rapid payback on investment (three years). More importantly, it is calculated that it will eliminate over 80% of CSS incidents and thus improve safety.
http://www.eurocontrol.int/services/call-sign-similarity-css-service

ANNEX 2 – DEFINITIONS

The following definitions are extracted from the HEIDI and/or HERA taxonomies.
HEIDI (Harmonisation of European Incident Definitions Initiative for ATM) is intended to finalise a harmonised set of definitions (taxonomy) for ATM-related occurrences.
HERA (Human Error in European Air Traffic Management) develops a detailed methodology for analysing human errors in ATM, including all types of error and their causal, contributory and compounding factors.
More information can be found at:

DEFINITIONS
ATC clearance/instruction (HEIDI): related to incorrect aircraft action. Authorisation for an aircraft to proceed under conditions specified by an air traffic control unit and deviations from the clearance which cause runway incursions, taxiway incursions, apron incursions, level bust, unauthorised penetration of airspace, etc.

Coordination (HEIDI): internal coordination encompassing coordination with sectors within the same unit, and sectors within the ATC suite; external coordination, civil/civil and civil/military; and special coordination, covering expedite clearance, prior permission required, revision and other special coordination.

Contributory factors (HEIDI): part of the chain of events or combination of events which has played a role in the occurrence (either by facilitating its emergence or by aggravating the consequences thereof) but for which it cannot be determined whether its non-existence would have changed the course of events.

Decision-making (HERA): covers incorrect, late or absence of decisions

Failure to monitor (HERA): failure to monitor people, information or automation

Judgment (HERA): mainly associated with separation

Lapses (HEIDI): psychological issues encompassing: receipt of information, identification of information, perception of information, detection, misunderstanding, monitoring, timing, distraction, forgetting and loss of awareness.

Level bust (HEIDI): any unauthorised vertical deviation of more than 300 feet from an ATC flight clearance (departing from a previously maintained FL, overshooting, undershooting, levelling-off at a level other than the cleared level).

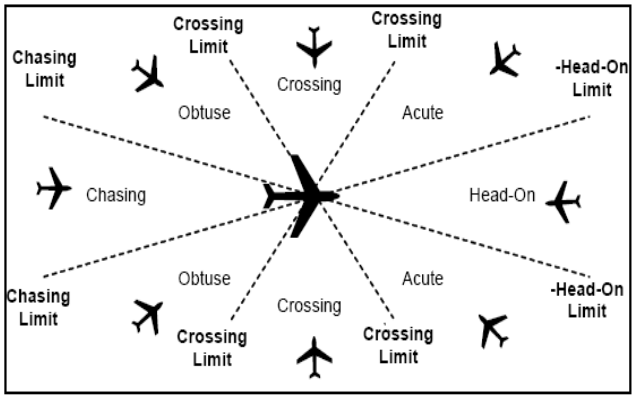
Mental/emotional/personality issues (HERA): include the following items:

- Mental capacity: loss of picture or safety awareness
- Confidence in self, in others, in information, in equipment, in automation
- Complacency
- Motivation/morale
- Attitudes to others
- Personality traits: aggressive, assertive, under-confident, risk taking
- Emotional status: stressed, post incident
- Mis-stored or insufficiently learned information
- Planning: insufficient, incorrect or failed
- Recall of information: failed, inaccurate, rare information, past information
- Violations: routine, exceptional

Mistakes (HEIDI): psychological issues encompassing: Information wrongly associated, workload issues, information not detected, failure to monitor, recall of information, misunderstanding or insufficiently learned information, judgment, planning, decision-making, assumptions and mind set.

Operational communication (HEIDI): Air-ground, ground-ground and use of equipment for verification testing. Air-ground communication encompasses hear-back omitted, pilot read back, standard phraseology, message construction, R/T monitoring including sector frequency monitoring and emergency frequency monitoring, handling of radio communication failure and unlawful radio communications transmission. Ground-ground communication refers to standard phraseology, speech techniques, message construction, standard use of equipment, radio frequency, telephones, intercoms, etc.

RA geometry between two aircraft (ASMT)



Runway incursion (ICAO): any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for the landing and take-off of aircraft.

Spoken communication (HEIDI): human/human communication encompassing air-ground and ground-ground communications but also call sign confusion, noise interference and other spoken information provided in plain language. Air-ground communication refers to language/accent, situation not conveyed by pilots, pilot's breach of radiotelephony (R/T), workload, misunderstanding/misinterpretation, and other pilot problems. Ground-ground communication refers to misunderstanding/misinterpretation, poor/no coordination.

Taxiway incursion (HEIDI): any unauthorised presence on a taxiway of an aircraft, vehicle, person or object that creates a collision hazard or results in a potential loss of separation.

Traffic and airspace problems (HEIDI): there are four sets of causal factors under this heading:

- **traffic load and complexity**, encompassing excessive and fluctuating load, unexpected traffic demand, complex mix of traffic, unusual situations (emergency, high-risk, other), abnormal time pressure, under load and call sign confusion;
- **airspace problems** composed of flights in uncontrolled and controlled airspace, airspace design characteristics (complexity, changes, other) and temporary sector activities (military, parachuting, volcanic activity, training);
- **weather problems** such as poor or unpredictable (snow, slush, ice, fog, low cloud, thunderstorm, wind shear);
- **pilot problems** concerning language, culture and experience aspects.

Traffic information (HEIDI): essential and local traffic information provided by an air traffic controller to the pilot. Essential information is related to the provision of traffic information containing:
a) direction of flight of aircraft concerned;
b) type and wake turbulence category (if relevant) of aircraft concerned;
c) cruising level of aircraft concerned; and
d) estimated time over the reporting point nearest to where the level will be crossed; or
e) relative bearing of the aircraft concerned in terms of the 12-hour clock as well as distance from the conflicting traffic; or
f) actual or estimated position of the aircraft concerned.
Local traffic in this context consists of any aircraft, vehicle or personnel on or near the runway to be used, or traffic in the take-off and climb-out area or the final approach area, which may constitute a collision hazard to the other aircraft and about which the information has to be provided.

Workload issues (HERA): concern both minimal and excessive workload.

ANNEX 3 ACRONYMS

ACAS	Airborne Collision Avoidance System
AGC	Air-Ground Communication
ANSP	Air navigation services provider
AO	Aircraft Operator
ASMT	ATM Safety Monitoring Tool
ASR	Air Safety Report
ATC	Air Traffic Control
ATM	Air Traffic Management
AUA	ATC Unit Airspace
CIS	Commonwealth of Independent States
CPDLC	Controller-Pilot Data Link Communications
CSMC	Call Sign Management Cell
CSC	Call Sign Confusion
CSS	Call Sign Similarity
CSST	Call Sign Similarity Tool
CSS UG	Call Sign Similarity User Group
EASA	European Aviation Safety Agency
EC	European Commission
ECAC	European Civil Aviation Conference
EVAIR	EUROCONTROL Voluntary ATM Incident Reporting
FSF	Flight Safety Foundation
GADM	IATA's Global Aviation Data Management
GPS	Global Positioning System
GNSS	Global Navigation Satellite System
EAPRE	European Action Plan for Prevention of Runway Excursions
EAPRI	European Action Plan for Prevention of Runway Incursions
ERAA	European Regional Airlines Association
FL	Flight Level
HEIDI	Harmonisation of European Incident Definitions Initiative for ATM
HERA	Human Error in European Air Traffic Management
ILS	Instrument Landing System
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
LB	Level Bust
MENA	Middle East and North Africa
NM	Network Manager
NOP	Network Operations Portal
RA	Resolution Advisory
RPAS	Remotely Piloted Aircraft Systems
STEADES	Safety Trend Evaluation and Data Exchange System
TCAS	Traffic Collision Avoidance System
TA	Traffic Advisory
THR	Threshold

EUROCONTROL

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