EUROCONTROL

EVAIR Bulletin No 25

Years 2018-2022

CONSORTIUM COORDINATOR sesar DEPLOYMENT MANAGER

FOUNDING MEMBER sesar JOINT UNDERTAKING

NETWORK MANAGER

CONTENTS

EVAIR FUNCTION MANAGER'S PERSPECTIVE

Dear readers,
This EVAIR Bulletin covers the 2018-2022 period. We apologise for publishing it slightly later than usual. The reason for this is that EVAIR started using e-TOKAI as the main tool for uploading analysed incident reports in 2021/22. The shift to the new tool required a number of changes in procedures and data handling processes as well as adaptation of the tool to satisfy EVAIR requirements.

This is most probably the last EVAIR Bulletin in my capacity of EVAIR manager as I plan to retire in September 2024. The EVAIR work will be managed by my colleague Mr Razvan Ularescu who already started working within the team for over a year.

In contrast with our previous practice of issuing EVAIR bulletins twice a year, the plan is to provide statistics and trends for certain key areas online, whilst the paper bulletin is published on a yearly basis.

EVAIR Bulletin number 25, combines European EVAIR and global IATA findings, providing our readers with both European (EVAIR) and global (IATA) snapshots of ATM related issues.
The trends shown in Figure 1 cover the period 2018-2022.

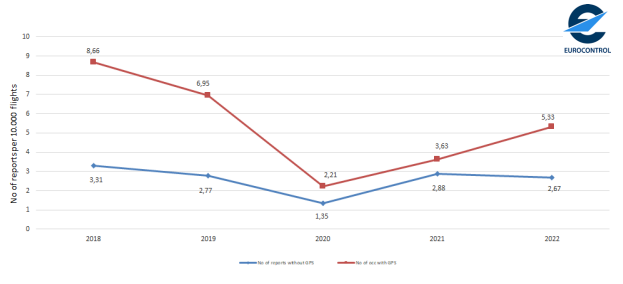


***Figure 1**: ATM occurrence trends in the 2018-2022 period*

Data collection

Between 2018 and 2022, aircraft operators and ANSPs provided EVAIR roughly with 25,700 reports. This is much more than for the 2017-2021 period. The reason for this increase in the number of reports provided is the traffic recovery since the lifting of COVID-19 measures and the subsequent increase in the number of incidents. Among these 25,700 reports, just over 9,000 were GPS reports and about 5,500 were CSS/C reports. The rest of the reports, i.e. just over 11,000, were pure ATM related incident reports.
More than 300 aircraft operators (AOs) flying within and to/from Europe provided their reports to EVAIR. For the five-year period analysed, these airlines carried out just over 34 million flights. We would like to highlight that for the 2018-2022 period, EVAIR cooperated with about 80 different ANSPs. Practically all European ANSPs were part of the EVAIR process, as were quite a high number of ANSPs outside Europe. The majority of ANSPs outside Europe which cooperate with EVAIR are based in the Middle East, North Africa, the former republics of the Soviet Union, South Africa, North America, and South America.

Feedback – reporting motivator and support for quick fixes

The feedback process facilitated by EVAIR remains the most important instrument enabling the exchange of ATM-related occurrence information and results of the investigations, performed in the framework of the SMS of AOs and ANSPs. The feedback process is by far the main motivation for stakeholders to continue providing EVAIR with their ATM-related occurrence reports and fixing or mitigating the safety issues identified at an early stage.

The list of safety contacts of ANSPs, AOs and airports is one of the tools used to facilitate the seamless and timely provision of feedback.

The early identification of risks through the handling of low-level severity occurrences allows for a proactive approach to be taken to managing safety.

Monitoring of feedback efficiency shows that the investigations conducted in the framework of AO/ANSP/Airport' SMS were completed in 19 days on average throughout 2022.

Conversations with EVAIR stakeholders about feedback suggest that the provision of feedback within two to three weeks is an acceptable timeframe, as within this period, reporters' memory of the event is still fresh.

The feedback provided helps to establish a full picture of the encounter. It also gives the opportunity to learn lessons and to see which measures were taken to mitigate or fix the problem. All of this motivates EVAIR stakeholders to continue reporting.

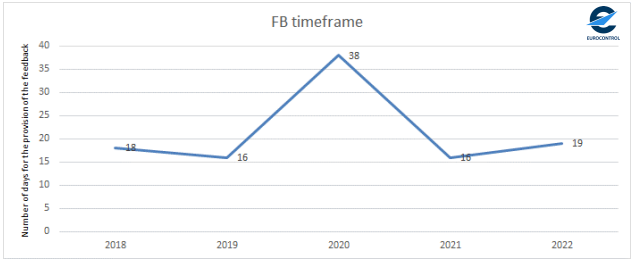


***Figure 2**: Timeframe for the provision of feedback in the 2018-2022 period*

Main events

RPAS/drones – figures same in 2019 and 2022

After reporting a significant increase in 2018, EVAIR recorded the same number of drone events in 2022 as in 2019. The approach phase is usually the most affected phase of flight. There were a few reports of events occurring at very high altitudes, which indicates the possibility of dealing with military drones. Every year, we notice a certain number of reports qualified by pilots as being very serious mainly because of drone close proximity to the civil flight.

GPS outages – regions with political issues the most affected

The first reports of GPS outages were sent to EVAIR in 2013/2014. From then, up until the end of 2022, EVAIR collected about 12,500 outage reports. It is to be noted that the location of these events is closely linked to politically disputed regions, such as the South-East Mediterranean, Black, Caspian and Baltic Sea. In 2022, GPS outage reports made up almost 50% of the overall data. When it comes to sharing the lesson learned from such occurrences, EVAIR cooperates closely with our colleagues from Eurocontrol NMD Integrated CNS Unit, while externally, information is shared with EASA, ICAO, and aircraft operator associations such as IATA, ERA, etc.

ACAS RA occurrences – pilot and controller mistakes

For the 2018-2022 period, ACAS reports accounted for 10.7% of the overall ATM reports provided by AOs to EVAIR. This is 5% fewer reports than in the previous five years. For a long period, the en-route phase has accounted for more reports than other flight phases in the EVAIR database. The situation was the same in 2022. From the ATC contributory perspective, higher percentages were recorded for pilot or air traffic controller mistakes. Among these mistakes, the number of mistakes linked to controller planning and judgement was highest.

Laser interference increase – upward trend

Laser threats accounted for 4% of the total number of EVAIR ATM occurrences recorded for the 2018-2022 period.
After COVID-19 measures were lifted and the traffic increased in 2022, laser events saw a significant increase, almost reaching the level of 2018, which was the highest recorded in the last five years. Big hubs continue to suffer more than other airports.

Call sign confusion

For the 2018-2022 period, airlines reported more than 800 instances of call sign confusion. A number of these reports indicated that there was a connection between call sign confusion and ACAS RAs, level bust and runway incursions. Another source of CSS/C reports is European ANSPs. In the same period, ANSPs provided more than 4,000 call sign similarity/confusion reports. In addition to its data collection activities, EVAIR continues to support the work of the Call Sign Similarity User Group and to monitor the efficiency of the Call Sign Similarity De-confliction Tool.

Contributors to incidents – contribution of A-G communication remains high

Air-ground communication generally records a higher rate of occurrences than other contributors. This was the case before, during and after the COVID-19 pandemic. In 2022, 'air-ground communication' accounted for 37% of the top seven contributors to ATM occurrences identified in the EVAIR database. The main areas of air-ground communication are: spoken communication, encompassing CSC, language/accent, misunderstanding/interpretation, high R/T workload, etc., and operational communication, covering handling of radio communication, hear-back omitted, phraseology, R/T monitoring sector and transfer of communication. Unlike previous years, in 2021 and 2022, the number of reports concerning operational communication were higher than for spoken communication.

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.

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 the EVAIR generic email address: evair@eurocontrol.int.

EUROCONTROL and IATA regularly provide the aviation community with 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.

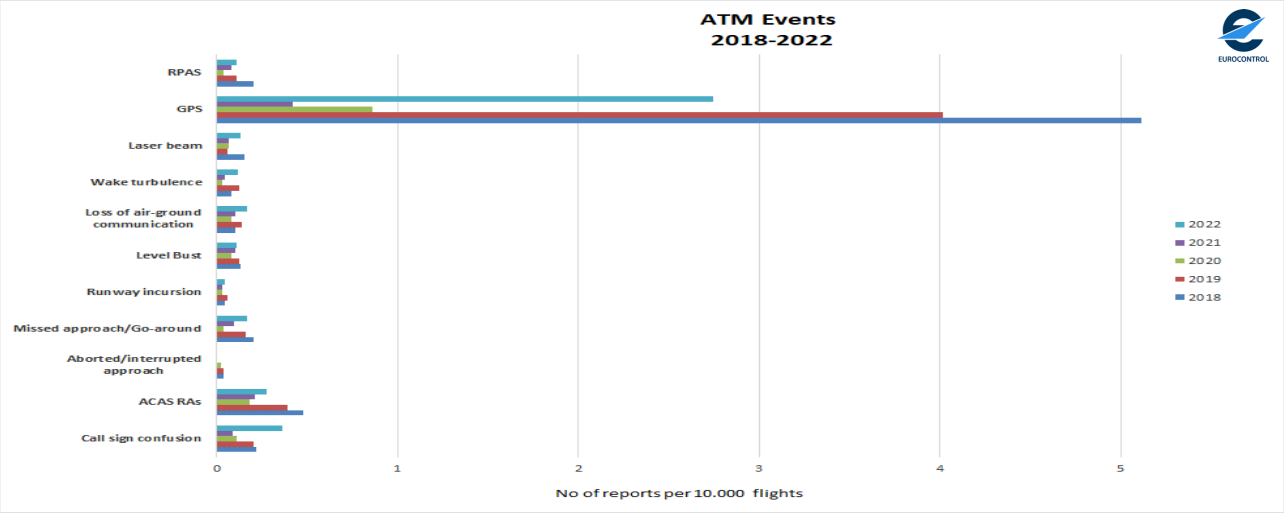


Figure 3: *European ATM events in the 2018-2022 period*

In 2020 and 2021, ATM event trends for EUROCONTROL and IATA were severely affected by the impact of COVID-19 measures. Indeed, there was a significant decrease in ATM events in comparison with 2019 and 2018.

In 2022, when these COVID-19 measures were no longer applicable, an increase in events was recorded by EVAIR across all monitored areas. Within IATA, in some areas such as go-around, altitude deviation (level bust) and loss of communication, a lower number of ATM events was recorded in 2022 than in 2021 and 2020, for example.

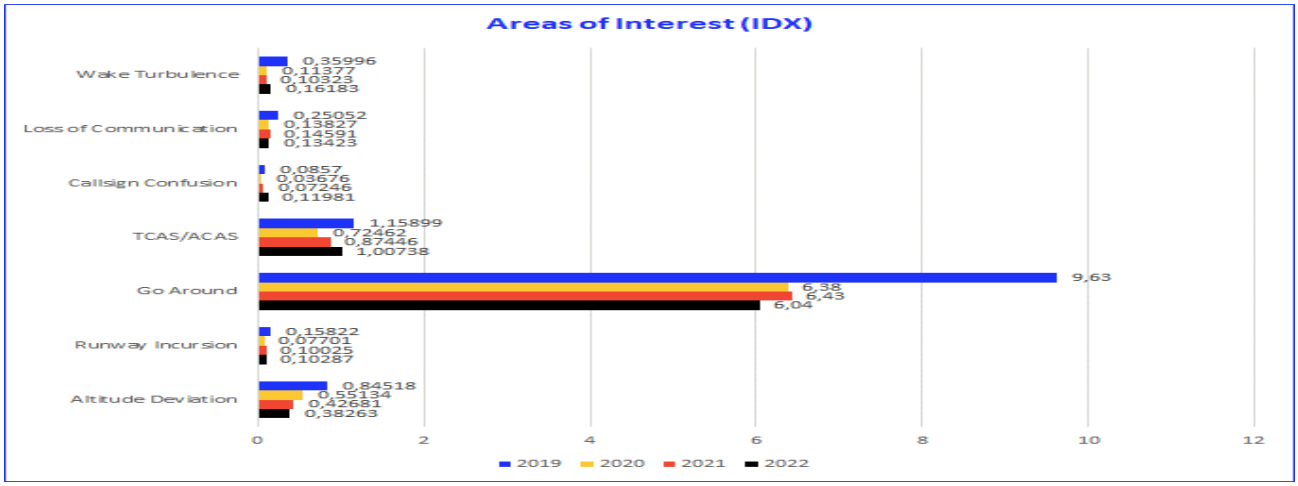


Figure 4*: IATA ATM events in the 2019-2022 period*

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 Global Aviation Data Management (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 2018-2022 PERIOD

The use of a taxonomy compatible with ICAO's ADREP 2000 and of additional taxonomies 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 occurrences, especially those presented in Figure 3.

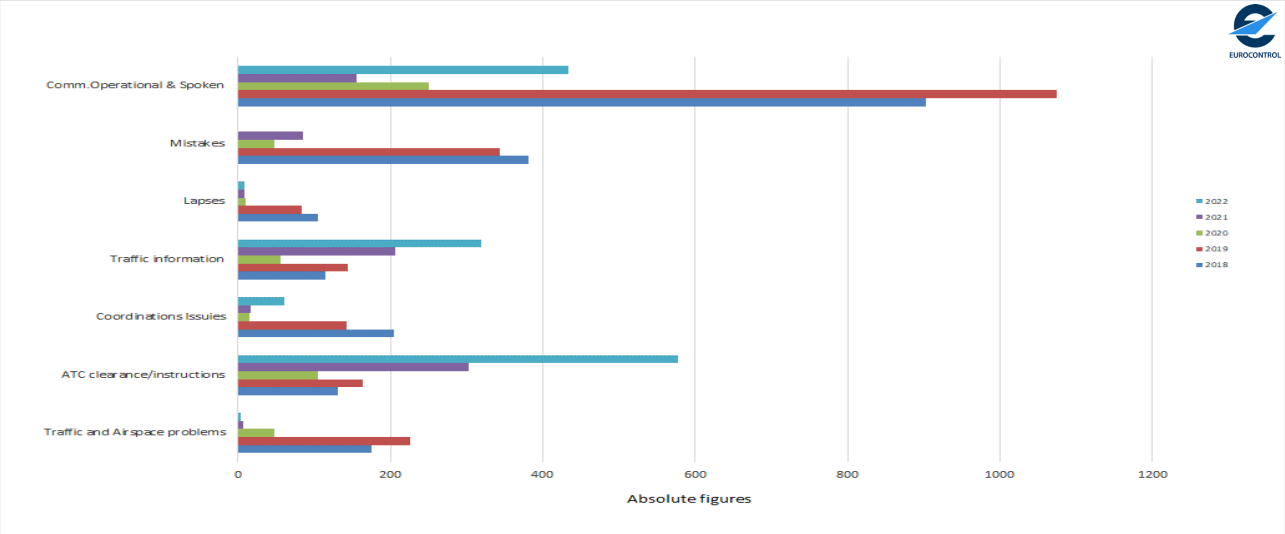


***Figure 5**: Contributors to ATM occurrences in the 2018-2022 period*

For those of you who are familiar with EVAIR statistics, we would like to inform you that due to a change of the tool used by EVAIR as well as a slightly different taxonomy, EVAIR is no longer able to continue monitoring the area "mistakes". This is the reason why we cannot provide the trends for this area for 2022. As far as trends relating to the other contributors are concerned, there was a drastic increase in the contribution of ATC clearance/instructions and traffic information to ATM occurrences compared with previous years.

"Mistakes" cover areas such as judgment, planning, decision-making, knowledge, experience, failure to monitor, misreads or insufficiently learned information, etc. It is notable that figures for "planning" and "judgment" mistakes are usually highest.

"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 2018-2022 PERIOD

In every EVAIR Bulletin, we repeat that "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 reports to identify safety problems associated with this type of event.

For the 2018-2022 period, go-around reports made up 6.35% of the total ATM-related reports. About 60 different airlines provided reports of go-arounds occurring in European airspace in 2022. In 2022, EVAIR recorded go-around events associated with ATM safety problems in 15 different states across Europe and 5 outside of Europe. It is obvious that this type of occurrence represents a pan-European problem but not only. The number of go-arounds which were reported outside of Europe confirms that this is in fact a global problem. The best indicator of this are the statistics provided by IATA (Figure 7).

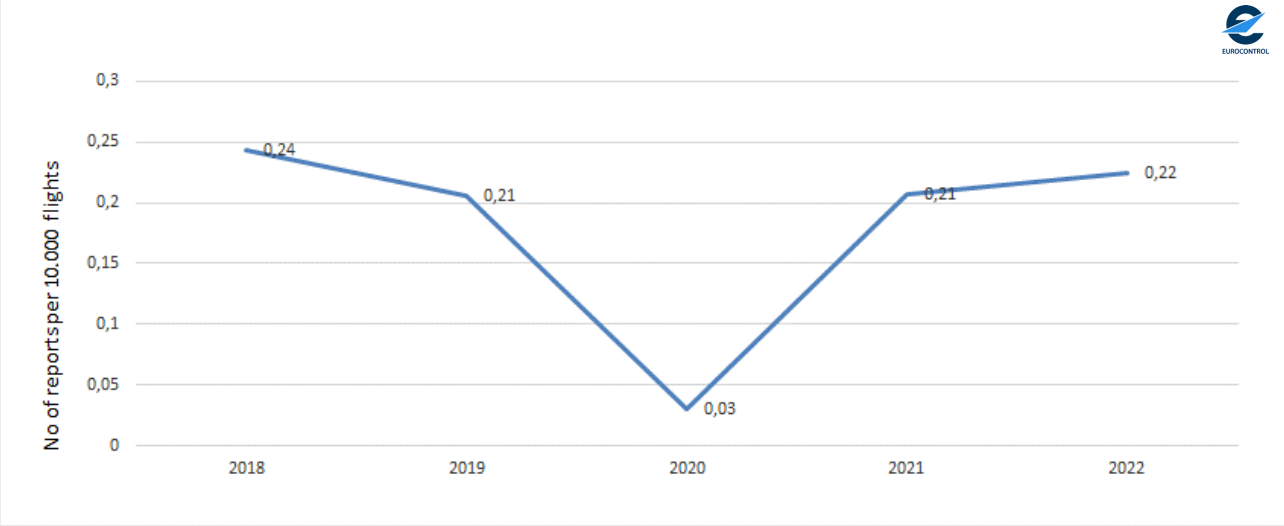


***Figure 6**: European go-arounds in the 2018-2022 period*

COVID-19 measures in 2020 and 2021 contributed significantly to the decrease in the number of go-around reports. However, once COVID-19 measures were lifted, traffic started to return, and the increase in go-arounds recorded was greater than before the implementation of COVID-19 measures (Figure 6).

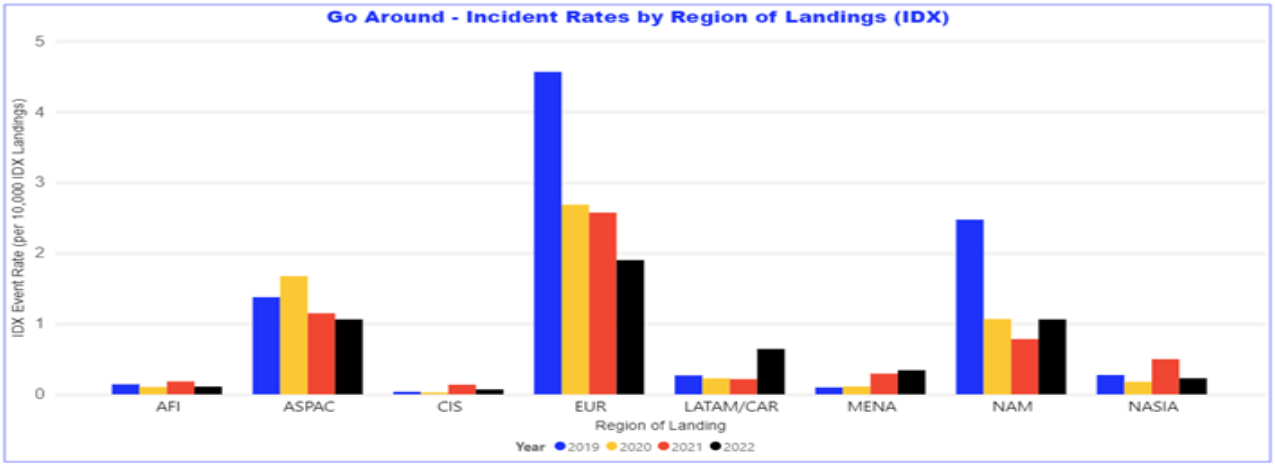


***Figure 7**: IATA global go-arounds in the 2019-2022 period*

IATA's GADM database provides go-around trends across eight geographical regions determined by the landing of flights reporting go-around. The following regions were 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, and NASIA – North Asia.

Over IATA's three-year monitoring period, the number of go-arounds recorded was higher in the European region than in others. However, despite the traffic increase in 2022, IATA recorded fewer go-arounds in 2022 compared with 2021, which is the opposite of what EVAIR recorded. One of the possible reasons for this difference could be traced back to the fact that the reporting culture differs considerable amongst EVAIR and IATA stakeholders.

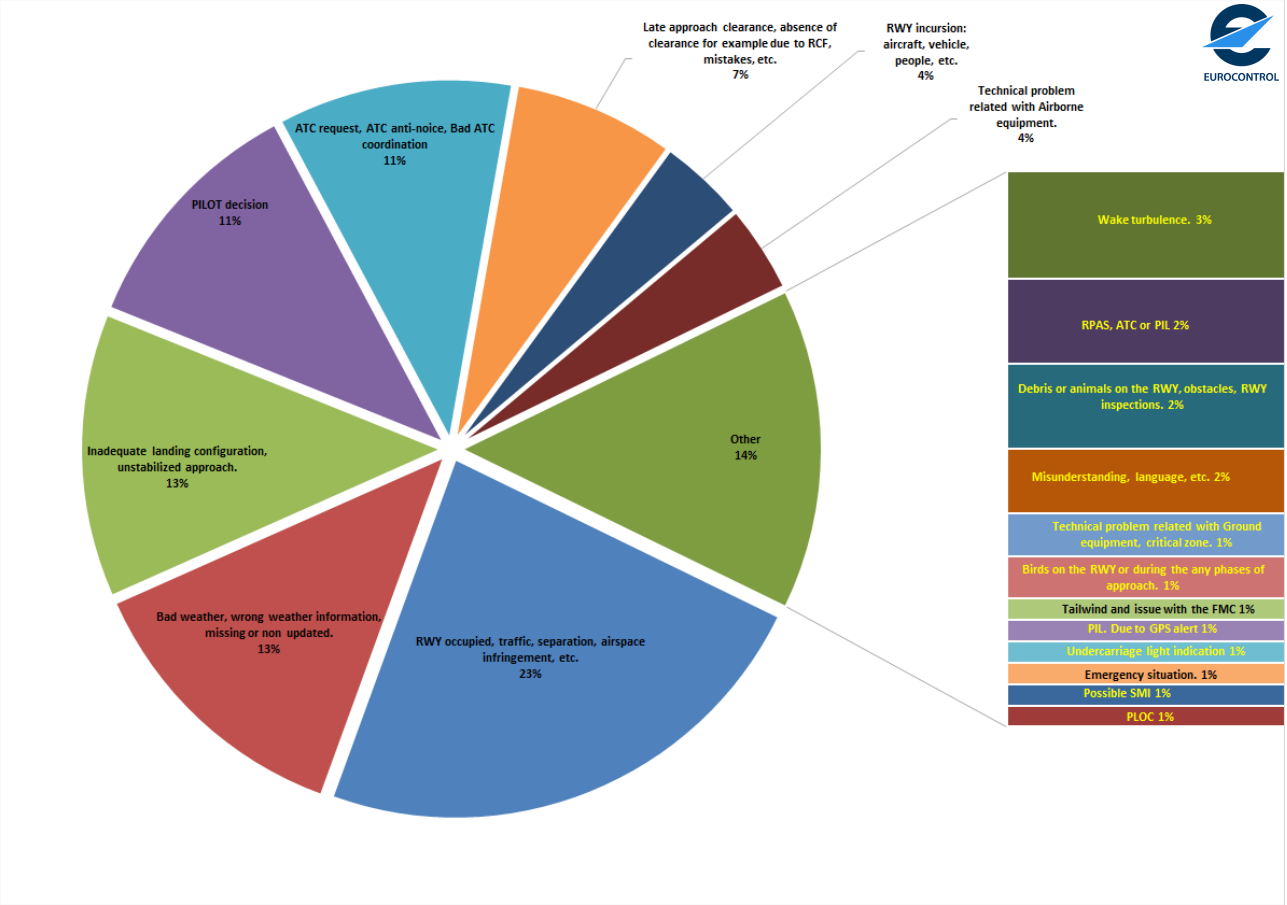


***Figure 8**: Go-around contributors in 2022*

In order to take account of the capabilities of the new e-TOKAI tool and especially the different taxonomy used, EVAIR has had to adapt its analysis accordingly. Future EVAIR bulletins and statistics will be slightly different. Using the wide spectrum of the tool's capabilities, the EVAIR team conducted different searches to identify as many go-around contributors as possible. The result of these searches was the identification of more than 20 different areas of concern associated with go-around (Figure 8). A number of the contributors associated with go-around could be broken down further; however, in the interest of readability, we kept the search at the level as presented in Figure 8. Among the causes associated with go-around and shown in Figure 8 is traffic (RWY occupied, traffic separation, airspace infringement, etc.), at 23%. Further drill down in this segment would show why, for example, the RWY was occupied, or separation was infringed. We hope that in the future we will have more space in EVAIR bulletins to show a breakdown of at least the areas with a higher percentage and to show the root cause. Indeed, this is very helpful in identifying potential corrective measures.

RUNWAY INCURSIONS IN THE 2018-2022 PERIOD

For the 2018-2022 period, runway incursions (RIs) made up 1.83% of the total number of occurrences reported in the EVAIR database. The percentage is slightly higher than the trends identified during the previous five-year period (2017-2021). Although the percentage of runway incursions compared with the total number of ATM related reports in the EVAIR database is not that high, this is a global, high-risk problem and requires continuous and regular monitoring.

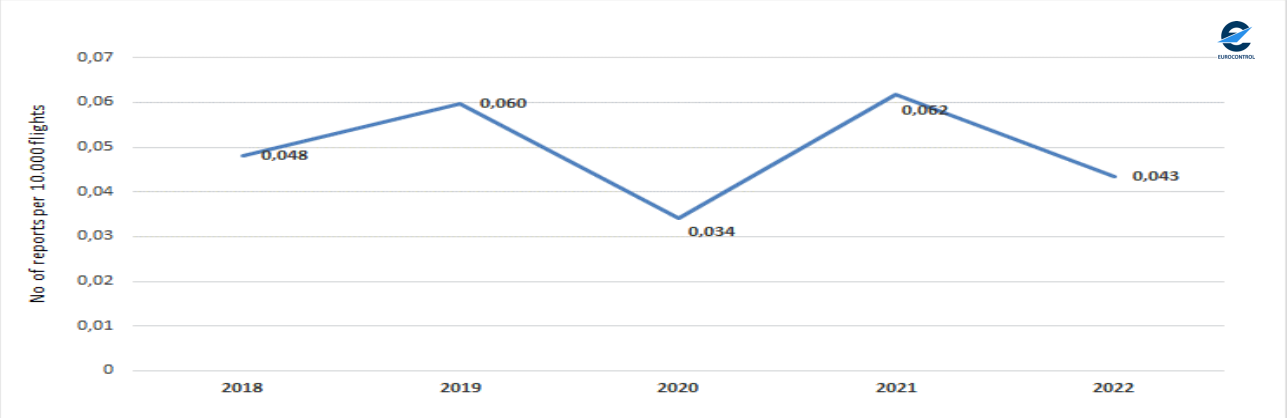


***Figure 9**: Runway incursions in the 2018-2022 period*

During the COVID-19 pandemic, EVAIR recorded a drop in the number of RIs in 2020; however, despite COVID-19 measures, in 2021 EVAIR recorded a higher number of RIs than in 2019 (one of the years with the highest rate). After the increase in 2021, EVAIR recorded a drop in 2022. Although not presented in this Bulletin, the EVAIR analysis of the RI trend over 10 years shows that the level of RI reports in 2022 is twice lower than in 2012.

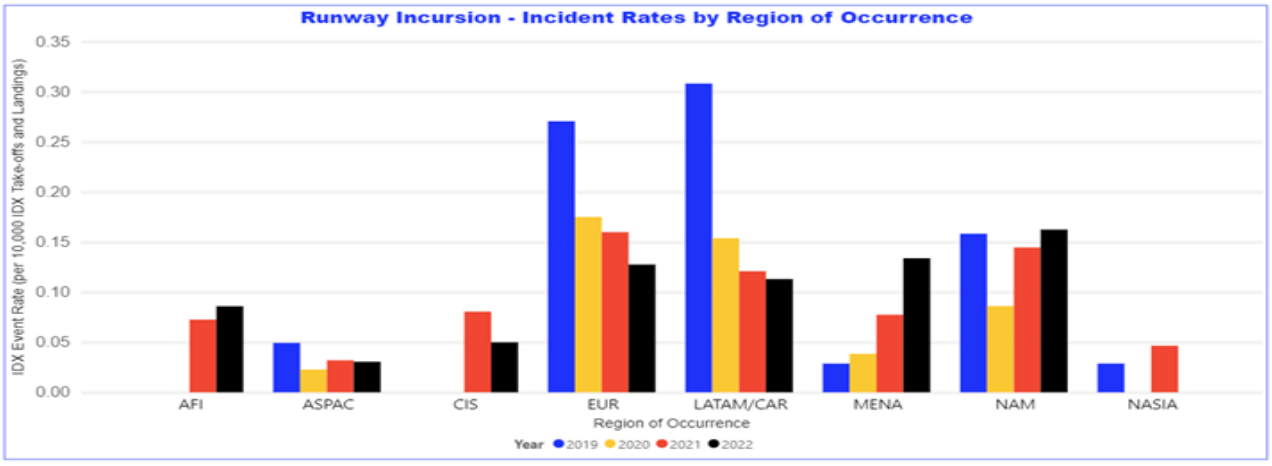


***Figure 10**: IATA global runway incursions in the 2019-2022 period*

IATA GADM provided EVAIR with a global overview of RIs in the four-year period from 2019 to 2022. The overview shows the trends across eight IATA regions. In 2022, the highest number of RIs was recorded in North America (NAM). In the same year, a very high increase compared with 2021 was recorded in the Middle East (MENA).

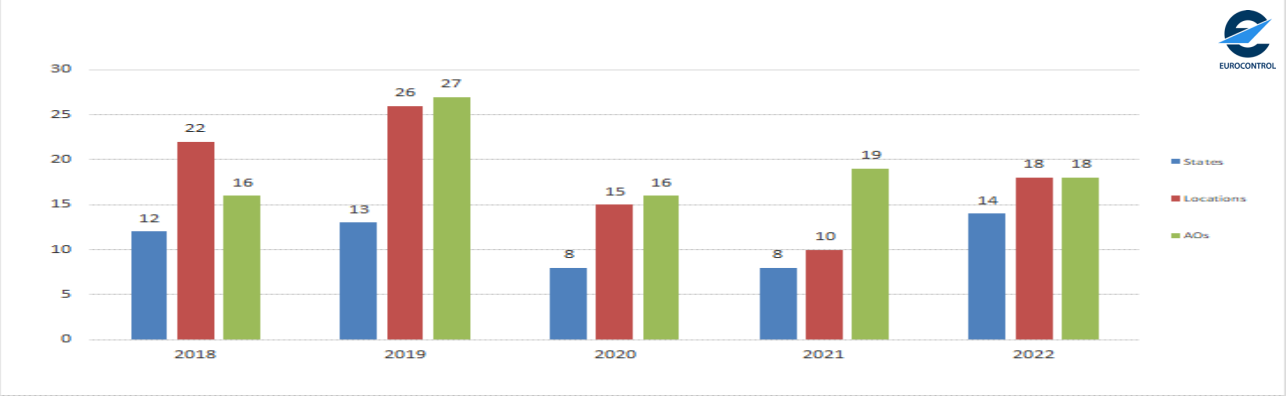


***Figure 11**: Number of states, locations and AOs reporting runway incursions in the 2018-2022 period*

In 2022, EVAIR recorded a significant decrease in the number of states and AOs involved in RIs compared with 2019, which was the year which saw the highest traffic levels as well as the highest number of reports.
Figure 11 shows that RIs occurred in 18 different states.

However, most occurrences recorded in the EVAIR database took place in four to five states. It must also be noted that the number of reports and the location of RIs are closely linked to the airlines which regularly report to EVAIR and their main hubs.

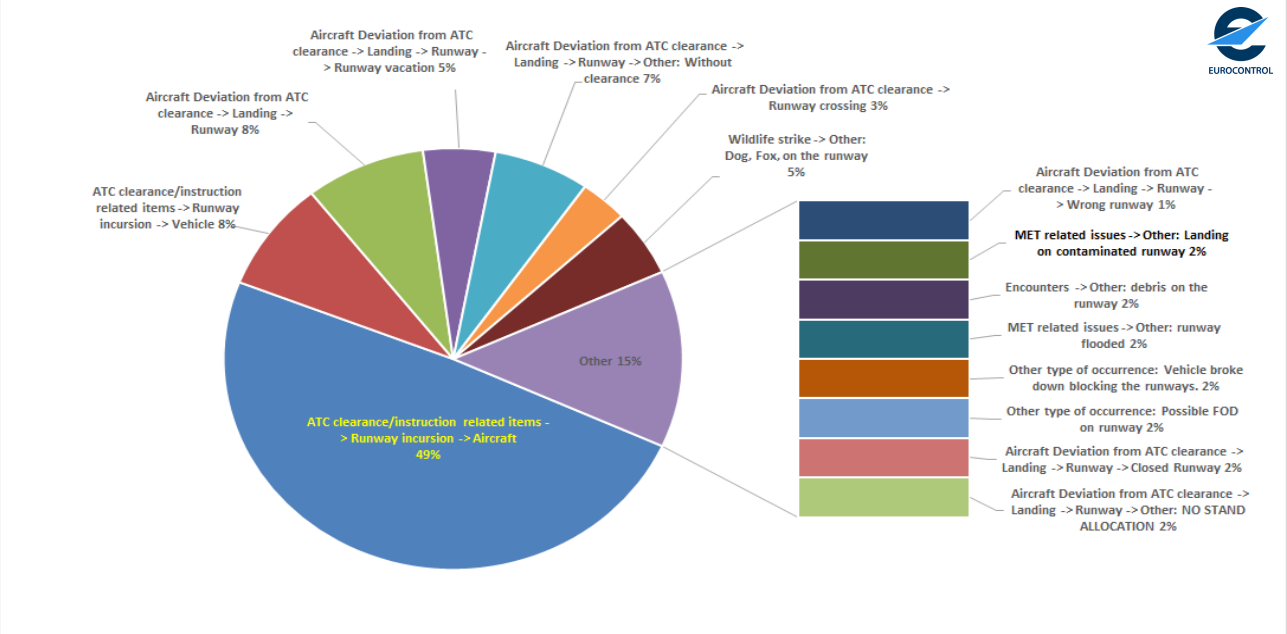


***Figure 12**: Contributory factors to runway incursions in 2022*

As already mentioned, EVAIR recently started using e-TOKAI. Therefore, the overview of the contributory trends is different to that presented in the past. The trend presented in Figure 12 shows that ATC clearance, at 29%, is the factor most often identified as contributing to RIs. It has very often been linked to the presence of an aircraft on the runway. The chart above presents the immediate causes of RIs. However, identifying the root of the problem requires additional analysis.

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,
as well as in the recently published Global Action Plan for the Prevention of Runway Incursions (6046.pdf (skybrary.aero)).

LEVEL BUSTS IN THE 2018-2022 PERIOD

During the 2018-2022 period, level bust occurrences accounted for 4% of all EVAIR ATM reports. As for the other types of ATM occurrences, GPS reports were not considered as ATM reports.

As a consequence of the measures during the COVID-19 pandemic, EVAIR recorded a drop in the number of level bust incidents in 2020. However, in 2021, although COVID-19 measures were still in place, EVAIR recorded an increase in the number of level bust events. It is interesting that in 2022, although COVID-19 measures had been lifted, EVAIR recorded a drop in the number of level busts down to 2020 levels (Figure 13).

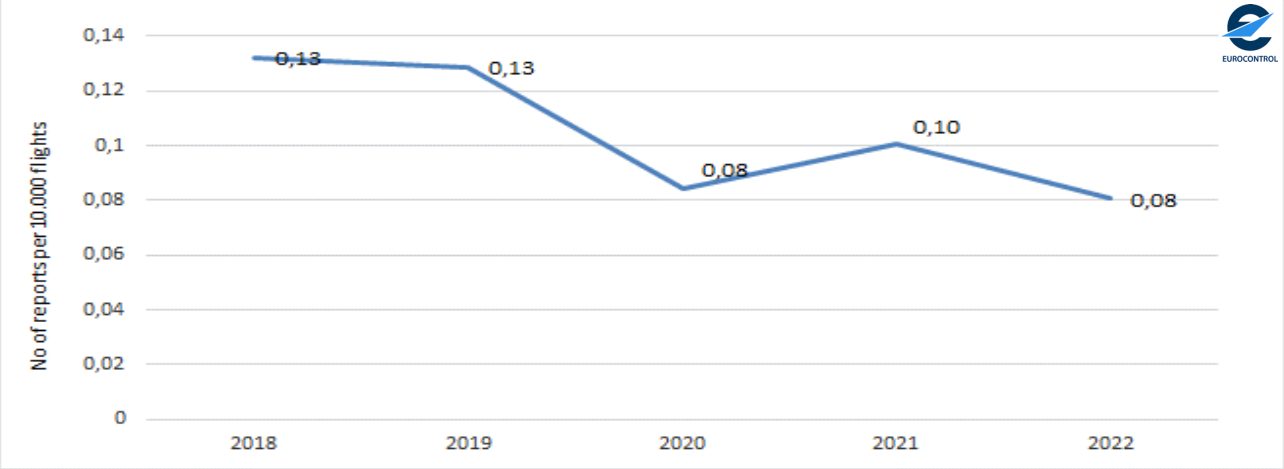


***Figure 13**: Level bust in the 2018-2022 period*

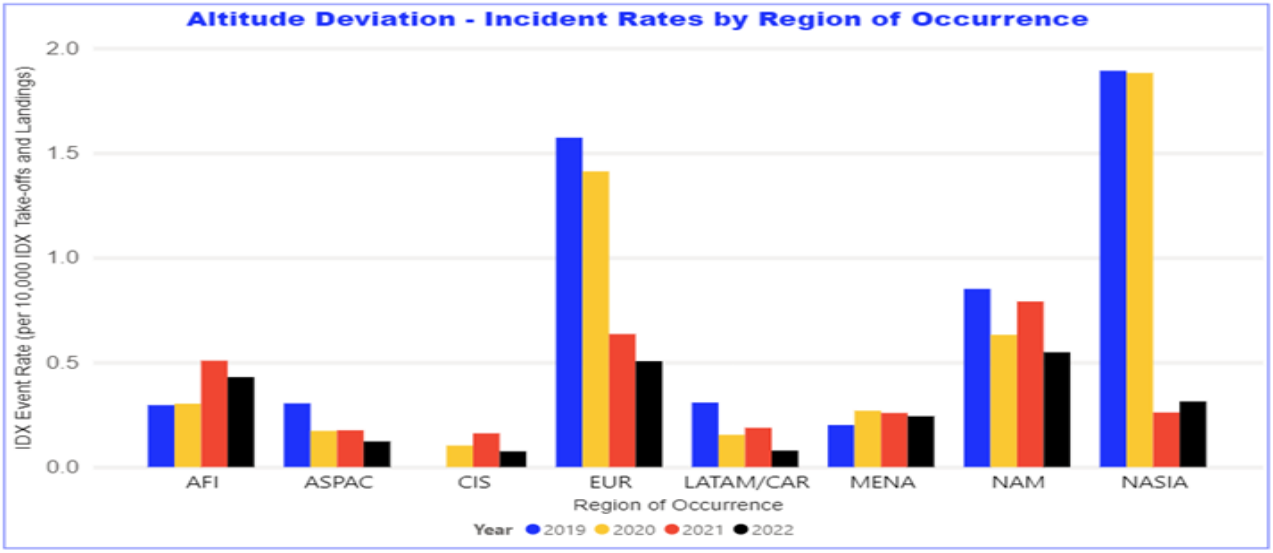


***Figure 14**: IATA global level bust in the 2019-2022 period*

Reports recorded in IATA's GADM over a four-year period across eight monitored regions show, to the same extent as EVAIR, that the European region (EUR) saw a decrease in the number of level bust events in 2022 compared with 2021. North Asia (NASIA) is the only region out of the eight which recorded an increase in level busts in 2022 compared with 2021 (Figure 14).

Europe, North America and North Asia are the three regions in which more level bust events are recorded than in other IATA regions.

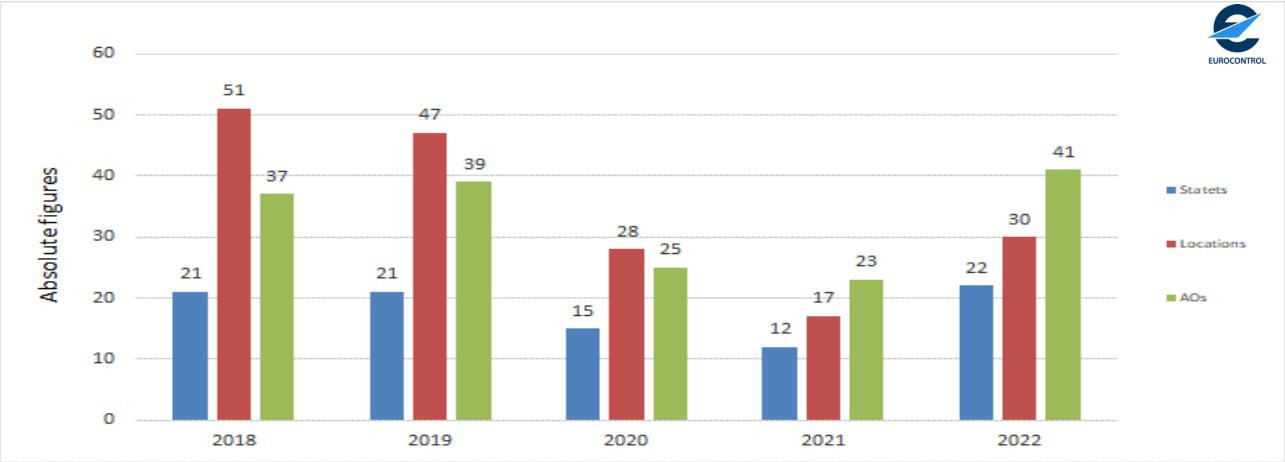


***Figure 15**: Number of states, locations and aircraft operators reporting level bust in the 2018-2022 period*

Level bust is often considered a Europe-wide problem, but in fact, IATA data show that it is a global problem. In 2022, the number of states and AOs reporting level bust was very close to the figures for 2019, when traffic levels were the highest, as were the number of level busts incidents (Figure 15).

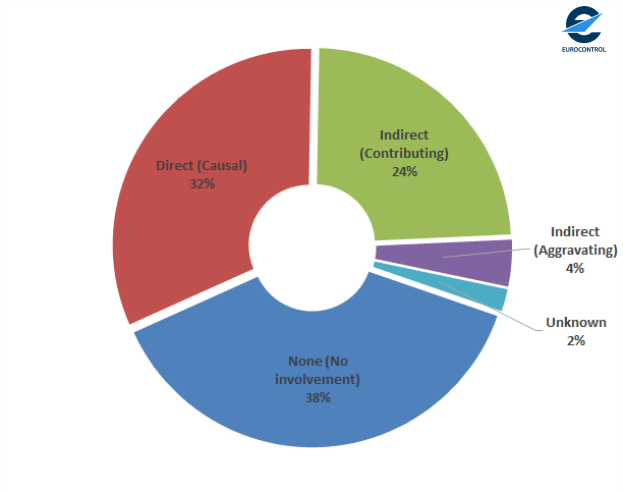


***Figure 16**: ATM contribution to level bust in 2022*

In 2022, in 38% of reports, ATM had no involvement in the level bust incidents reported. This implies that the problem was on the airborne side. However, the percentage of level bust incidents where ATM was reported as having a direct impact is quite high (32%). If we add to this the level bust incidents where ATM was reported as having an indirect/contributing impact (24%) and those where ATM was reported as having an indirect/aggravating impact (4%), there is good reason for ATM to look into potential additional activities to improve the current situation.

The main contributors to level busts in 2022 were aircraft deviation from ATC clearance and air-ground communication, encompassing call sign confusion and phraseology.

EVAIR SUPPORT FOR THE EUROCONTROL CALL SIGN SIMILARITY PROJECT

Following the request from the Call Sign Similarity User Group, 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 2018-2022 PERIOD

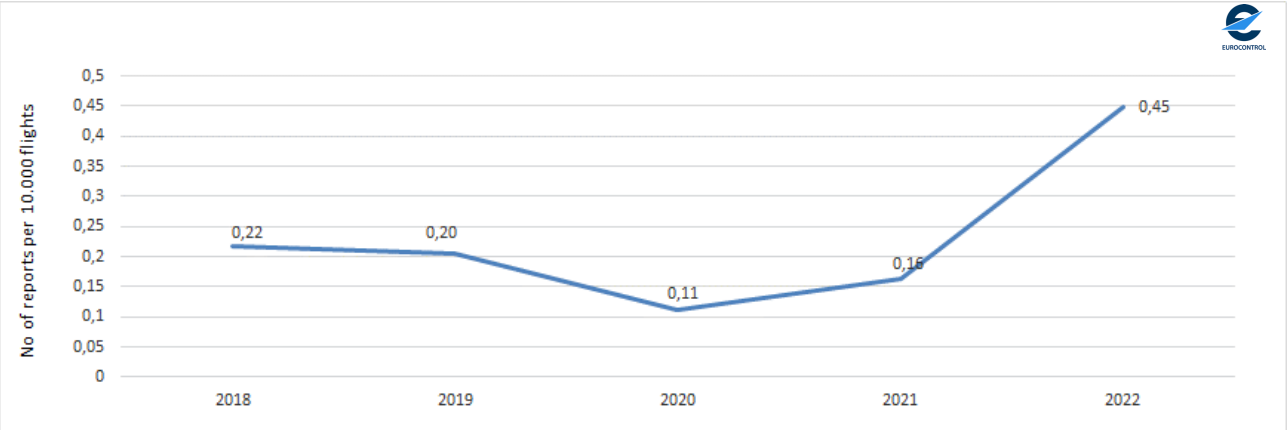


***Figure 17**: European call sign confusion reported by AOs in the 2018-2022 period*

For the 2018-2022 period, call sign confusion reports made up 9.2% of the total number of reports excluding GPS outages. This is a significant increase compared with the previous five years. The main reason for the sharp rise is the high number of call sign confusions reported in 2022 and EVAIR campaign among AOs and ANSPs to report call sig confusions. In 2022, EVAIR recorded the highest increase in the last 10 years. Additional analysis will be needed to determine if there were additional reasons for high increase.

Is this the consequence of better reporting since EUROCONTROL re-established the Call Sign Similarity Working Group and made a large airline community familiar with the work, or has the problem of call sign confusion really grown? Monitoring is continuing and we hope that next year will provide us with some answers to our questions.

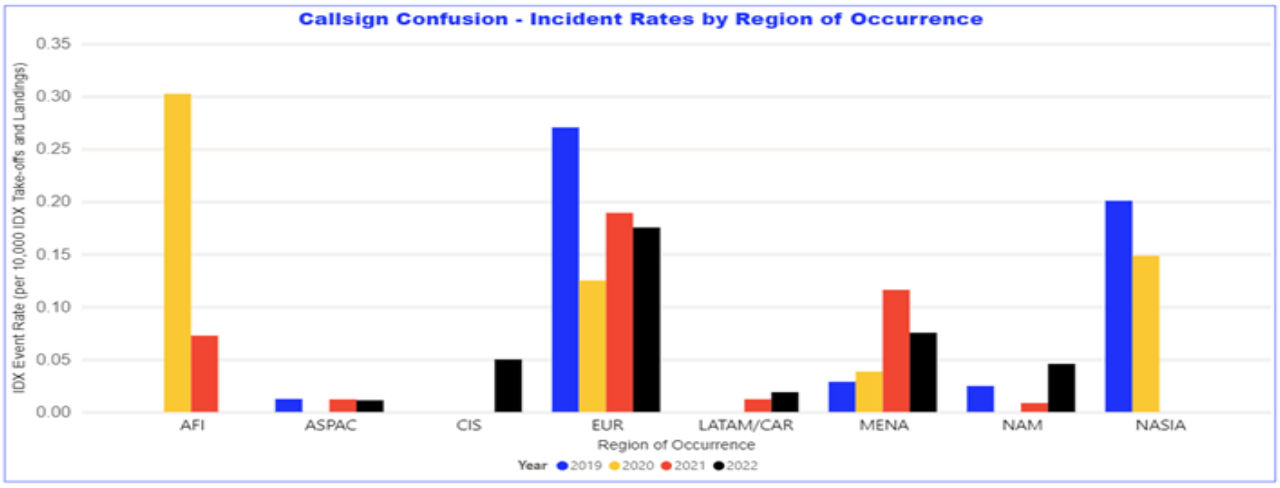


***Figure 18**: IATA global call sign confusion in the 2019-2022 period*

In 2022, IATA global data recorded a decrease in call sign confusion within Europe, the Middle East and the Asia Pacific, while in Africa and North Asia no CSCs were reported. The three regions which saw an increase were North America, Latin America and the Caribbean as well as the Commonwealth of Independent States. It is interesting that for the European region, the trends recorded by EVAIR and IATA are almost the opposite of each another: EVAIR recorded a significant increase while IATA recorded a slight decrease in 2022 compared with 2021.

Since reporting is on a voluntary basis, the question is always who is doing the reporting and whether there is a strong reporting culture.

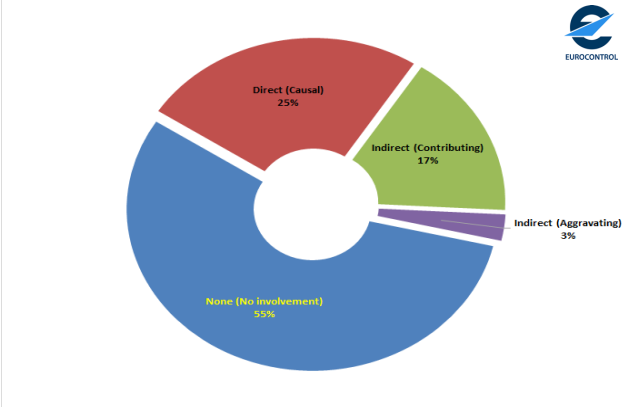


Figure 19: ATM system contribution to call sign confusion in 2022

In 2022, ATM was not involved in 55% of the call sign confusion incidents recorded in the EVAIR database. This implies that the problem was on the airborne side.

Direct ATM system contribution to call sign confusion incidents stood at 25%, indirect (contributing) contribution at 17% and indirect (aggravating) contribution at 3%.

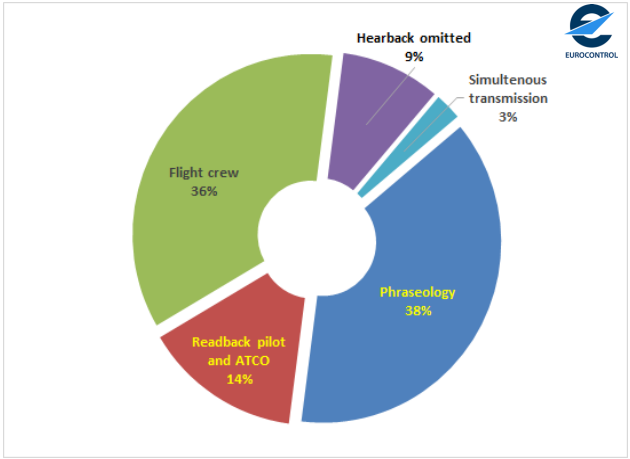


***Figure 20**: Call sign confusion contributors in 2022*

In 2022, EVAIR recorded five different events, most of which were associated with call sign confusion, encompassing the following areas: flight crew (36%), phraseology (38%), pilot and ATCO readback (14%), hear-beck omitted (9%), and simultaneous transmission (3%).

As far as the flight crew contributor is concerned, some of the problems were related to the ATC instructions being received by the wrong flight with a similar call sign. There are also examples of problems with the display of the call sign on the pilot's screen, e.g. call sign ending in 5 which looks like an S on the screen. In most cases, call sign confusions resulted in TCAS RA and level bust, and in some cases in prolonged loss of communication (PLOC).

AIR NAVIGATION SERVICE PROVIDERS' CALL SIGN SIMILARITY AND CONFUSION DATA 2018-2022

EVAIR has two channels for the provision of the CSS/C data. One channel is provided by AOs and the other by ANSPs. AOs provide call sign confusion reports, while ANSPs provide both CSS and CSC reports. For the 2018-2022 period, airlines provided more than 800 call sign confusion reports, while over 20 ANSPs provided more than 4,000 of them. EVAIR often receives archived data from some ANSPs or AOs, or from new data providers. Once updated, trends for the past years presented in previous EVAIR bulletins may be different from the trends presented in this Bulletin. EUROCONTROL's call sign similarity/confusion reporting, data collection, analysis and monitoring mechanism make it possible to take ad hoc measures to resolve similarities.

Call sign similarity management cell services supported by EVAIR help to resolve problems quicker, especially in the cases where AOs are willing to change their call signs on an ad hoc basis before the end of the ongoing season. EVAIR is provided with CSS/C reports daily; however, those AOs or ANSPs which do not need such assistance provide their data monthly.

EUROCONTROL recommends using the Call Sign Similarity De-Confliction Tool to reduce the number of call sign similarities as well as the number of confusions. Please find the application form at: http://www.eurocontrol.int/network-operations/access-service-request-form

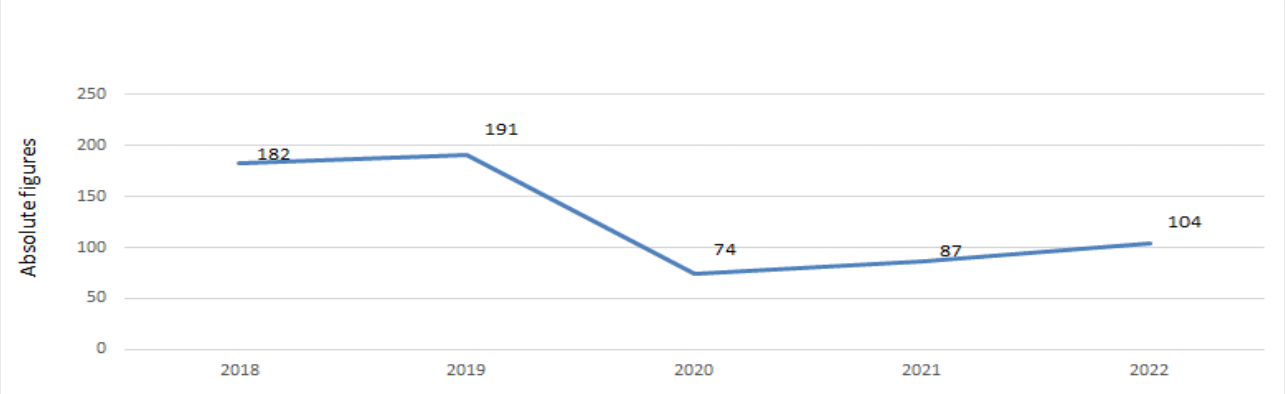


***Figure 21**: AOs identified with CSS/C in 2018-2022*

Figure 21 shows the evolution of AOs which have been identified by ANSPs as having CSS/C problems. As with the other issues, after the COVID-19 pandemic, EVAIR recorded an increase in the number of AOs facing problems with CSS/C. It is worth noting that the figure for 2022 is much lower than the figures recorded by EVAIR in 2018 and 2019.

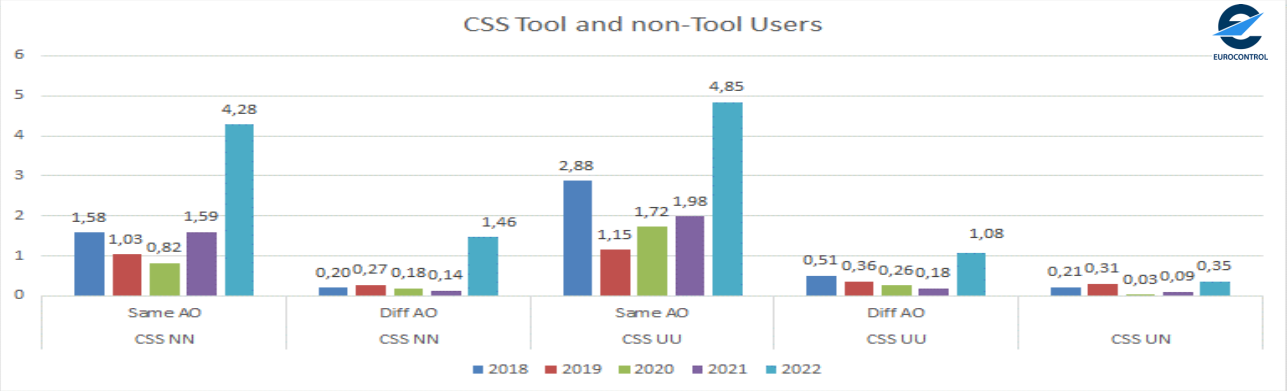


***Figure 22**: Call sign similarity among non-tool users and tool users in the 2018-2022 period*

Call sign similarity statistics and EVAIR continuous monitoring show that in the longer term and in most cases, the problem of call sign similarity still lies with single aircraft operators, regardless of whether or not they are tool users. The best indicators of this are the very low figures for call sign similarity among different AOs, whether or not they are tool users.

The five-year figures show that the number of call sign similarity incidents occurring among tool users (CSS UU) is slightly greater than among those who do not use the tool (CSS NN). One of the reasons for this is that since we began monitoring, we have not succeeded in agreeing on the definition of call sign similarity or confusion with our stakeholders. Indeed, there are different understandings of these concepts. There is also another point we would like to highlight, namely that as the number of tool users continues to increase, there will be fewer and fewer AOs not using the tool. In this regard, we will have to find, together with our stakeholders and under the umbrella of the Call Sign Similarity User Group, slightly different criteria for measuring the efficiency of the CSS De-Confliction Tool.

In general in 2022, EVAIR recorded an increase in similarities across all monitored areas, which in a way is understandable considering the significant increase in traffic after the lifting of the COVID-19 measures, resulting in an increased number of similarities.

Explanation of abbreviations in Figures 22 and 23

CSS NN – Call sign similarity among airlines not using the tool
CSS UU – Call sign similarity among airlines using the tool
CSS UN – Call sign similarity among tool users and non-users
CSC NN – Call sign confusion among airlines not using the tool
CSC UU – Call sign confusion among airlines using the tool
CSC UN – Call sign confusion among airlines using and not using the tool

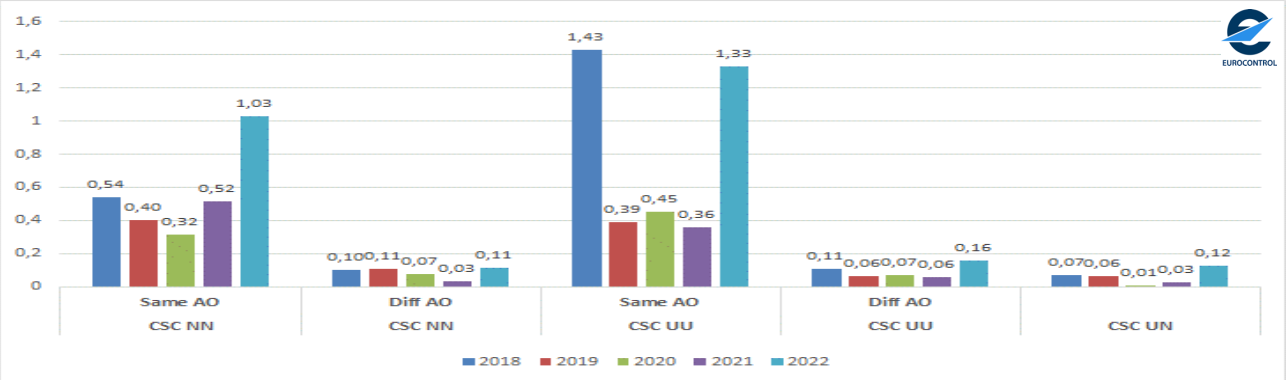


***Figure 23**: Call sign confusion among non-tool users and tool users in the 2018-2022 period*

As in the case of call sign similarities, in 2022, EVAIR recorded an increase in the number of confusions across all monitored areas, which is the consequence of the removal of COVID-19 measures. The recovery of traffic in 2022 resulted in an increase in call sign confusions. Like in the previous five years, EVAIR figures for 2022 show that most instances of call sign confusion occur among single AOs. Unlike in the previous period, trends in 2022 show that single AO tool users face more confusion problems compared with non-tool users. As is the case for call sign similarities, one of the issues is the lack of a commonly agreed definition and thus the adoption of different approaches by ANSPs or AOs when coding confusions. On the other hand, as has been said for call sign similarities, an increase in the number of tool users could have an impact on the upward trend. Monitoring continues and we expect to be in a

better position to identify the reason for the increase in call sign confusions among tool users compared with non-tool users.

CSST access and additional tokens

New AOs continue to join the ranks of CSST users. 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 EUR 200. This is a small price to pay compared with the time saved by using the 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.

AOs must clearly state whether they are requesting access to the CSST, a new token or an extension of an existing token.

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 seasons 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 2018-2022 PERIOD

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 38****).**

In 2022, "air-ground communication" accounted for 37% of the top seven contributors to ATM occurrences identified in the EVAIR database. The main areas of air-ground communication are spoken communication, encompassing CSC, language/accent, misunderstanding/interpretation, high R/T workload, etc., and operational communication, covering handling of radio communication, hear-back omitted, phraseology, R/T monitoring sector and transfer of communication. Generally, the levels recorded for spoken communication are higher than those for operational communication, however in 2021 and 2022, the levels for operational communication were higher.

According to EVAIR data, air-ground communication contributes the most often to level busts, runway incursions, ACAS RAs, and go-around.

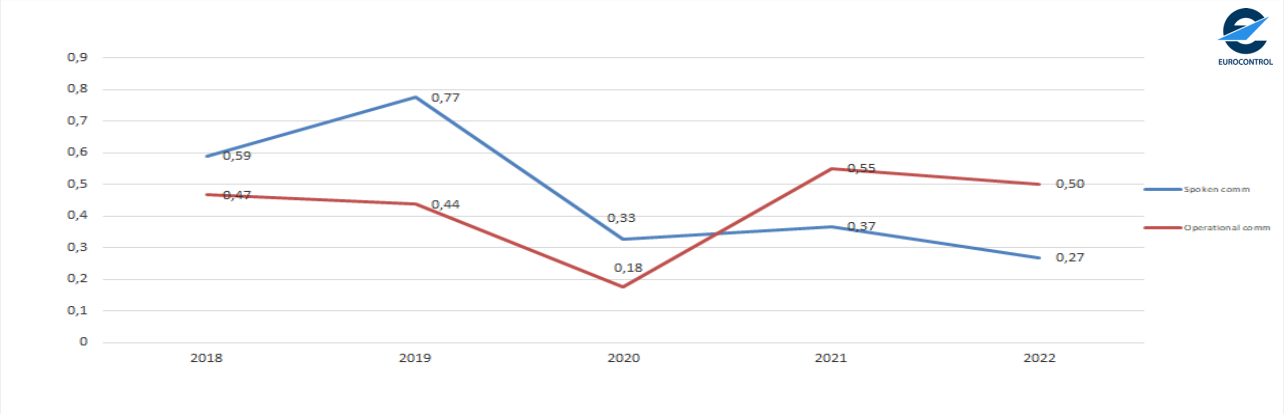


***Figure 24**: Air-ground communication in the 2018-2022 period*

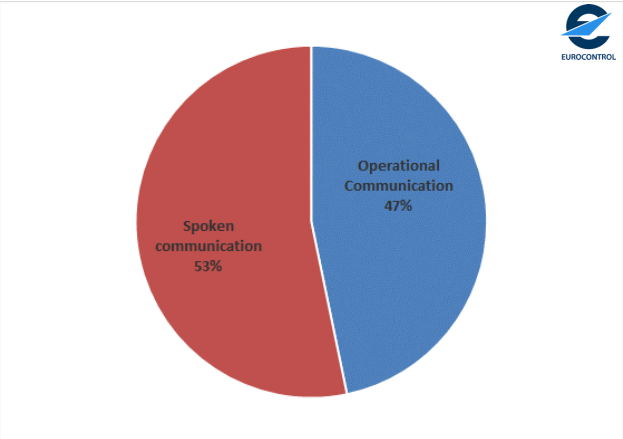


***Figure 25**: Spoken and operational communication in the 2018-2022 period*

The percentage breakdown between "spoken" and "operational" communication in the long term has been in favour of spoken communication.

The difference in percentage between spoken and operational communication has never been extremely high. The higher percentage recorded for spoken communication is very much related to knowledge, understanding and interpretation of the English language, as well as to the speed of speech and different kinds of noises on the frequency.

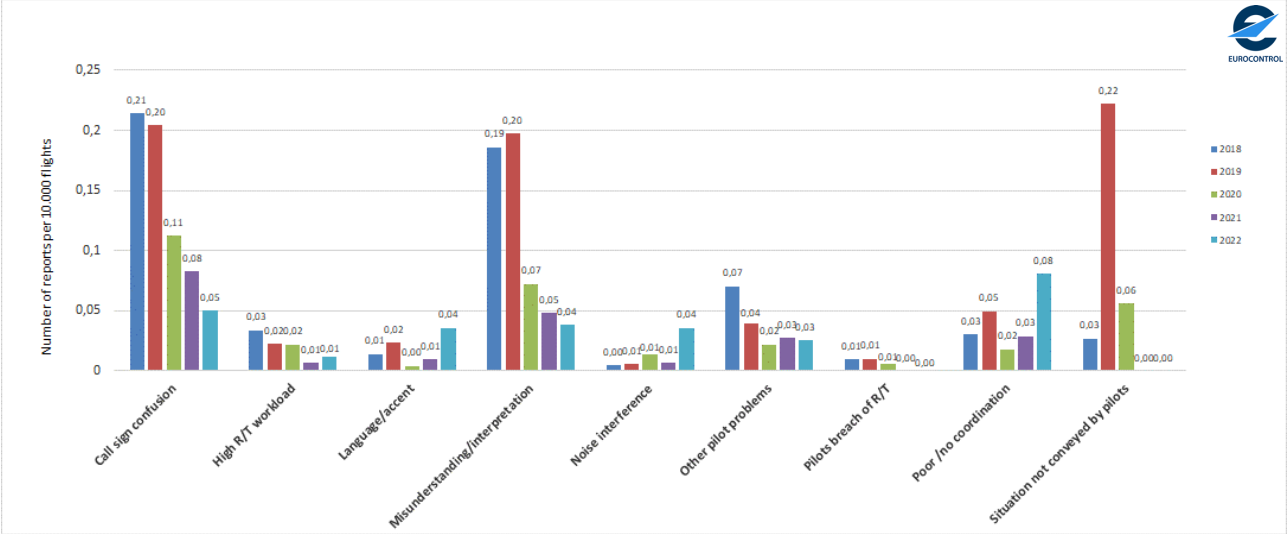


***Figure 26**: Spoken communication in the 2018-2022 period*

Call sign confusion has been seeing higher trends for a long period. There has also been a higher number of reports of misunderstanding/interpretation problems compared with the other areas covered by spoken communication. It is interesting that in 2020, owing to COVID-19 measures, the area "situation not conveyed by pilots" saw an extremely high number of reports. It is difficult to say what the main reason for this was. One of the aspects which could be looked into is the fact that during the COVID-19 pandemic, the only traffic for which an increase in such occurrence reports was recorded was cargo.

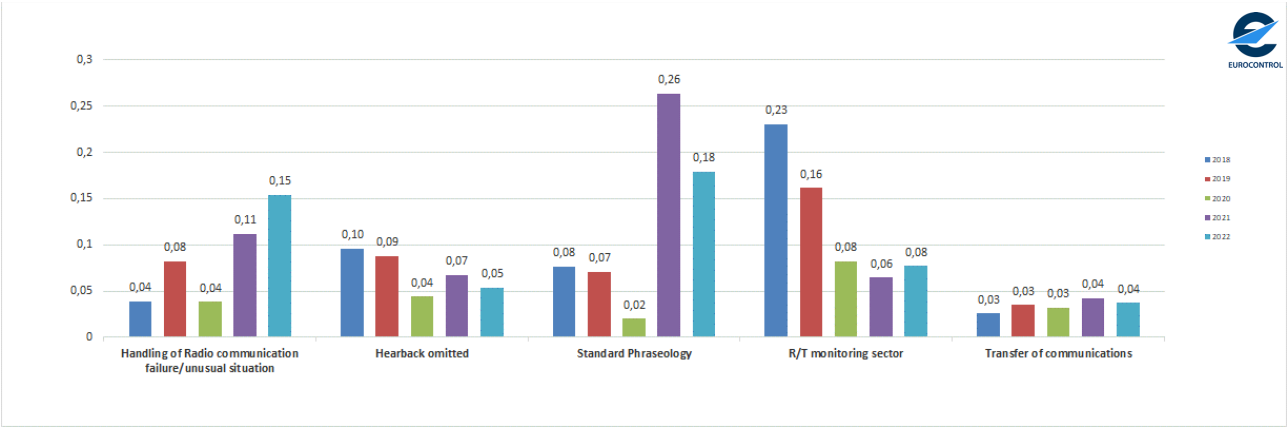


***Figure 27**: Operational communication in the 2018-2022 period*

Within "operational communication", the areas "standard phraseology" and "handling of radio communication failure/unusual situation" saw a significant increase in 2021 and 2022. This is closely linked to the end of the COVID-19 measures. Indeed, after the COVID-19 measures were lifted, traffic increased significantly, as did the number of operational communication issues.

LOSS OF COMMUNICATION IN THE 2018-2022 PERIOD

Statistics regarding loss of communication issues are provided in this Bulletin by EVAIR (at European level) and IATA GADM (at global level).

For the 2018-2022 period, loss of communication reports made up 4% of the total number of ATM reports in the EVAIR database, which is close to the percentage recorded for the previous five years (2017-2021). For the monitored five-year period, loss of communication occurred in 50 different states across Europe and 94 different locations.

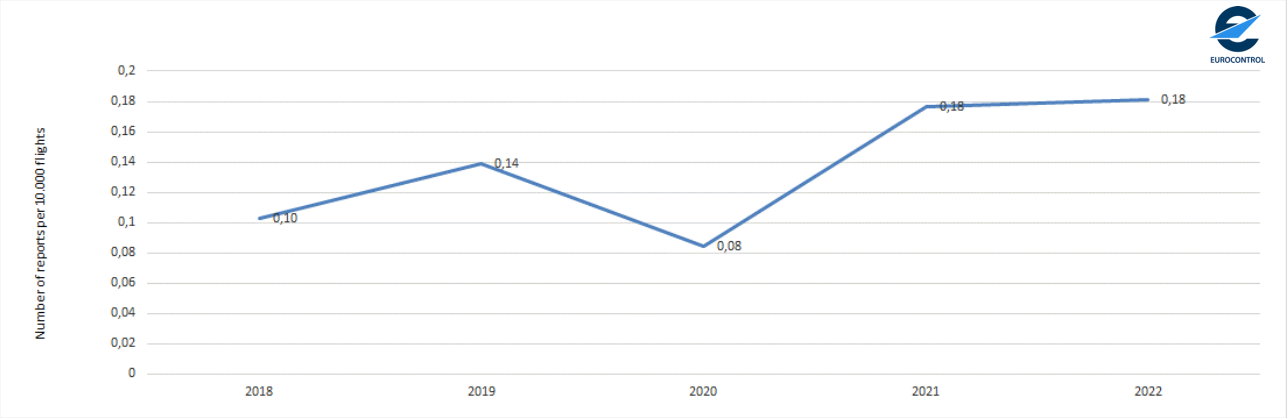


***Figure 28**: Loss of communication at European level in the 2018-2022 period*

After the COVID-19 restrictions, which had drastically reduced traffic, were lifted, traffic came back in 2022 and accordingly, there was an increase in the occurrence of different types of incidents, including loss of communication. It is interesting to note that in 2022, EVAIR recorded a higher rate of occurrence of loss of communication incidents than in 2019, when traffic levels were at their highest in the last five years.

One of the reasons for the higher rate of loss of communication occurrences in 2022 could be the fact that for two years, the workload of controllers and pilots was very low, which may have encouraged more relaxed behaviour.

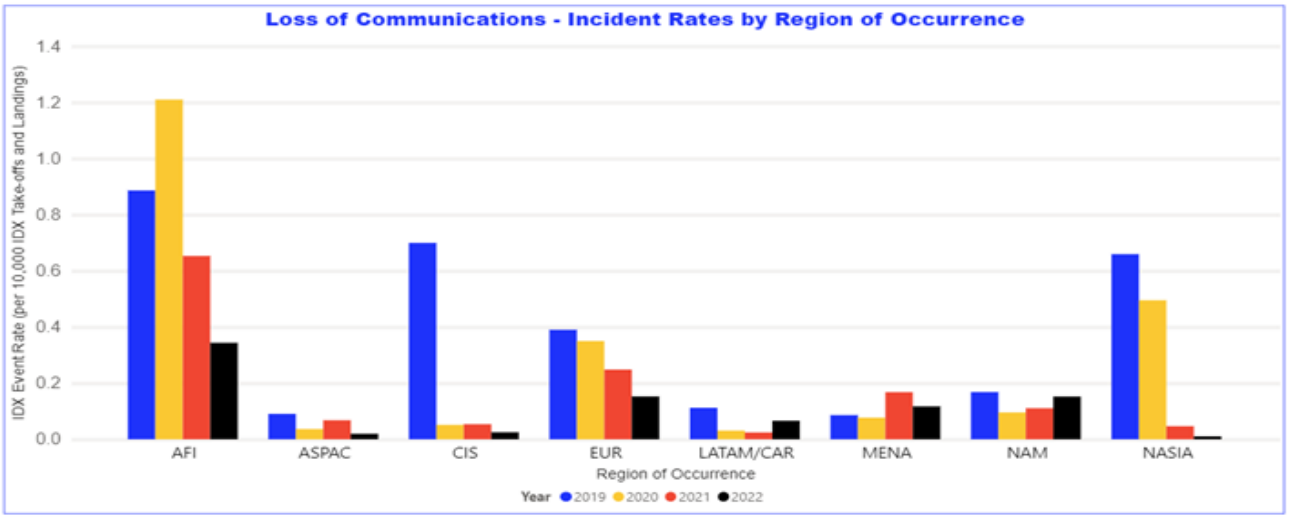


***Figure 29**: IATA global loss of communication in the 2019-2022 period*

In 2022, the trend recorded by IATA GADM for loss of communication in the European region was different to that recorded by EVAIR: EVAIR recorded an increase whereas GADM recorded a decrease. One of the possible reasons for this difference is that airlines with an excellent reporting culture report to EVAIR but not to IATA because they are not IATA members. In the majority of the geographical regions covered by the GADM analysis, a drop in loss of communication occurrences was recorded. Only a few of

these regions recorded an increase, i.e. LATAM/CAR and NAM.

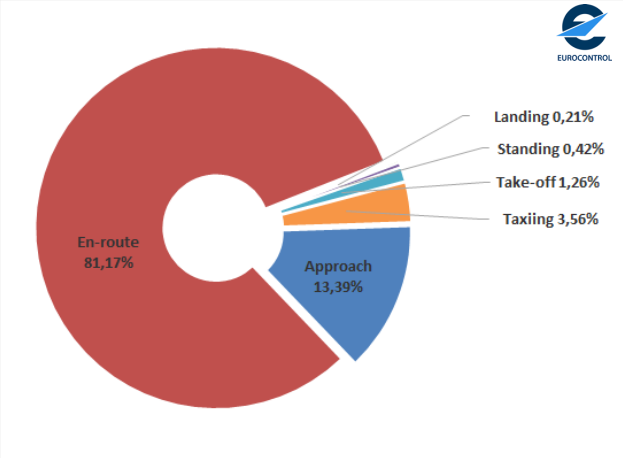


***Figure 30**: Loss of communication by phase of flight in 2018-2022*

For a long time now, a higher number of loss of communication reports has been recorded in the en-route phase. EVAIR has also recorded more military interceptions in the en-route phase than in other phases of flight. However, according to pilots' statements and based on what we see in their reports, from a risk point of view, the approach phase carries a higher degree of loss of communication risk.

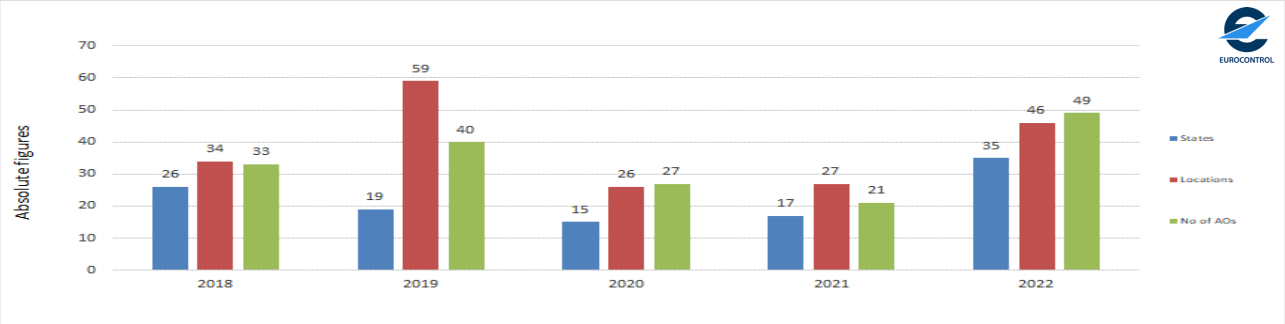


***Figure 31**: Number of states, locations and AOs reporting loss of communication in the 2018-2022 period*

In 2022, after COVID-19 measures across all three monitored areas were lifted, the number of states, locations and AOs reporting loss of communication to EVAIR increased compared with 2020 and 2021.

In addition, of the three monitored areas, only one (locations) recorded a downward trend in 2022 compared with 2019.
It is interesting to note that very often, loss of communication occurs between two FIR boundaries.

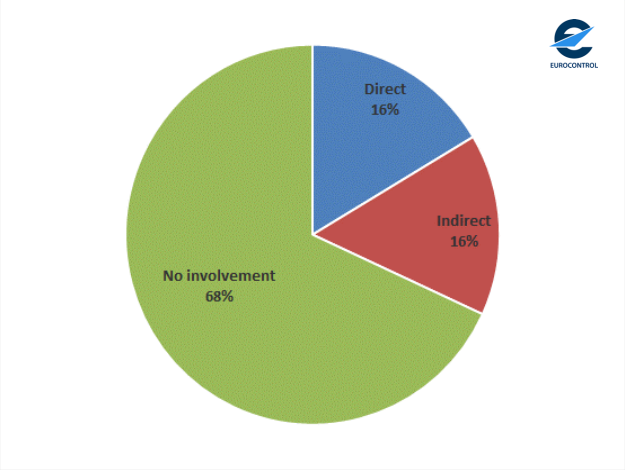


***Figure 32**: ATM system contribution to loss of communication in 2018-2022*

For the last five years, the direct contribution of ATM to loss of communication has stood at 16%, as has its indirect contribution.
It is important to note that in 68% of cases, there was no ATM involvement. This means that the problem in most cases was on the airborne side.

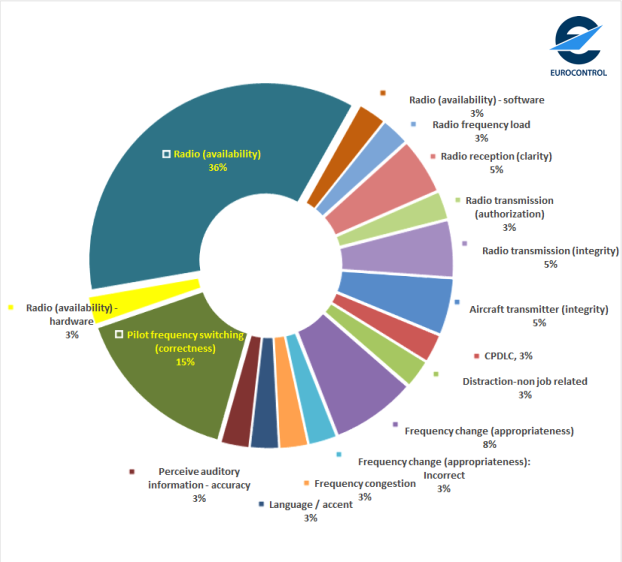


***Figure 33**: Explanatory factors for loss of communication in 2018-2022*

A breakdown of the explanatory factors for loss of communication shows that radio availability problems (software, hardware or other issues) represent the highest percentage (42%).
In second place are frequency change problems (correct switching, frequency change appropriateness, incorrect or frequency congestion) (32%).

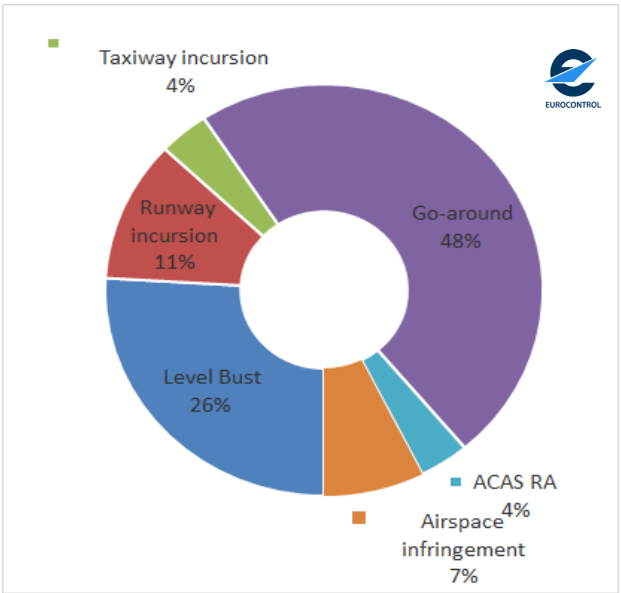


***Figure 34**: Events associated with loss of communication in the 2016-2020 period*

Go-around, at 48%, is the event most frequently associated with loss of communication. Usually, this happens during final approach when landing clearances are not provided due to loss of communication.

SPECIFIC EVENTS
LASER THREATS ACROSS EUROPE IN THE 2018-2022 PERIOD

Laser threats accounted for 4% of the total number of EVAIR ATM occurrences recorded for the 2018-2022 period. This is 1.5% lower than in the previous five-year period (2017-2021). After COVID-19 measures were lifted and traffic increased in 2022, laser events saw a significant increase, almost reaching the level of 2018, which was the highest in the last five years.

Big hubs continue to suffer more than other airports. According to the reports, after being victims of laser attacks for so many years, pilots have become very familiar with the procedures for protecting themselves against laser beams and for reporting the events to ATC the moment they occur.

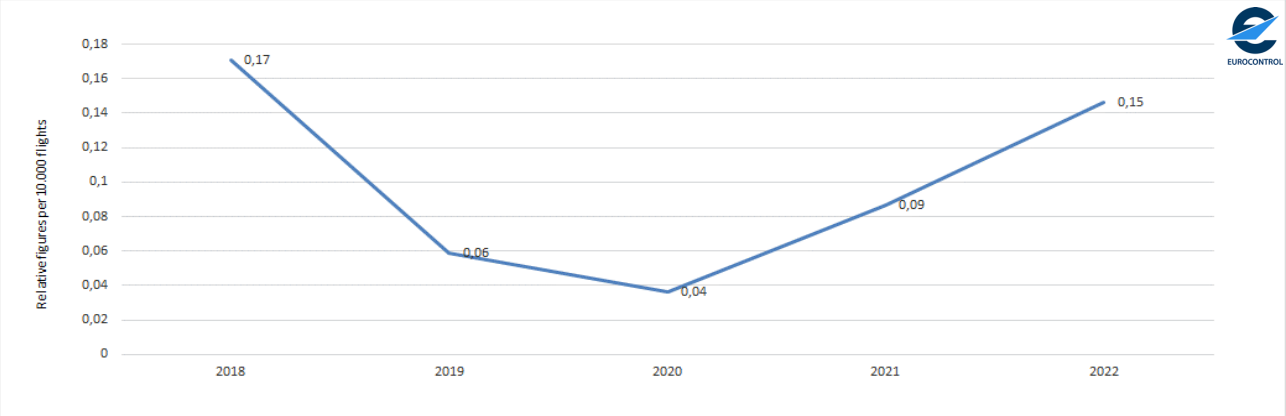


***Figure 35**: Laser interference in the 2018-2022 period*

As usual, the most affected phase of flight was approach. For example, in 2022, only 10% of laser interferences occurred during the en-route phase or at higher altitudes. The remaining 90% occurred during approach and even on the ground. Final approach saw the highest percentage (45%), followed by initial approach (23%), initial climb (15%) and then base leg (5%) and take off (2%). As has already been said, 10% of laser attacks occurred en-route and some occurred during cruising, while the majority occurred during climb or descent.

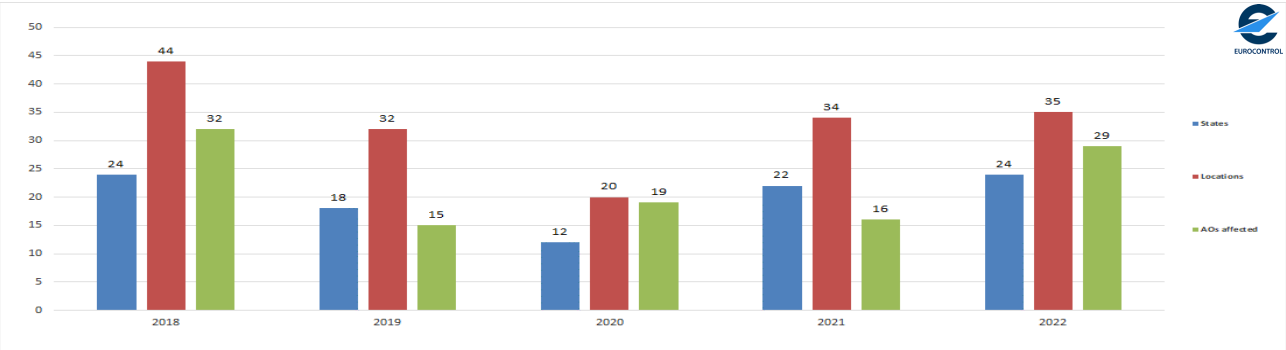


***Figure 36**: Number of states, locations and AOs reporting laser interference in the 2018-2022 period*

In 2022, with the traffic recovery, the number of states and locations affected by laser interference increased compared with 2019, despite traffic being lower than in 2019.

Those who would like to share their laser interference reports can send them to evair@eurocontrol.int.
More information about laser interference is available on SKYbrary: www.skybrary.aero.

RPAS – REMOTELY PILOTED AIRCRAFT SYSTEMS (RPAS)/DRONES IN THE 2018-2022 PERIOD

RPAS/drone statistics, like most other statistics, are based on ATM incident data provided by commercial aircraft operators (AOs), business jets and European air navigation service providers (ANSPs), including a few air navigation providers from neighbouring regions. Most reports come from aircraft operators.

In 2022, the same trend for RPAS occurrences was recorded as in 2019. RPASs made up 6.7% of the total EVAIR reports, which is 2% more than for the previous five-year period.

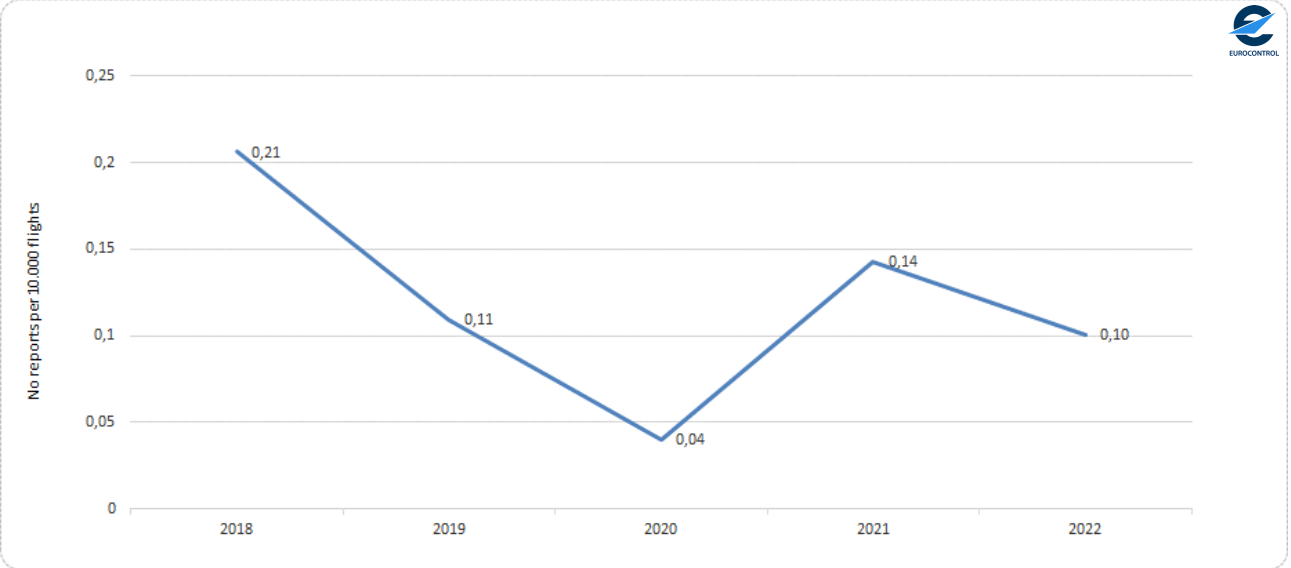


***Figure 37**: RPAS evolution in the 2018-2022 period*

Over a long period, the majority of RPAS/drone events were recorded at low altitudes. In many pilots' reports, RPAS/drone encounters were described in a lot of detail, suggesting that such occurrences took place during VMC and in close proximity.

Whenever possible, we take the opportunity to invite pilots and controllers to report RPAS/drone encounters.

Having RPAS/drone encounters reported to controllers on the frequency helps to raise awareness among pilots flying in the same airspace. Moreover, it gives controllers the opportunity to inform the police, who can then start their investigations.

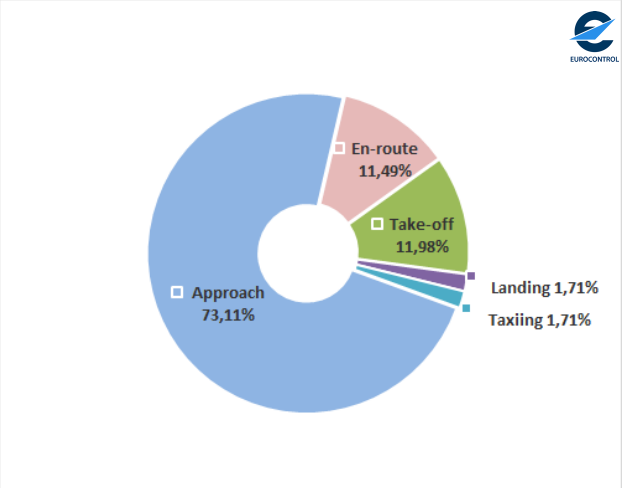


***Figure 38**: RPAS by phase of flight in the 2018-2022 period*

As has already been said, many RPAS/drone encounters were reported at low altitudes. However, within every five-year period, there are a few reports of RPAS occurring at high altitudes. For the most part, these were events involving military drones caused by a lack of proper civil-military coordination. In many cases the commercial pilots were lacking awareness of the military activities undertaken in the vicinity of the flown routes.

Number of states and locations reporting RPAS/drones

Within the 2018-2022 period, in the three areas monitored (states, locations and AOs), drone spread was recorded as being highest in 2018 across two of the areas (locations and AOs). The highest drone spread across states was recorded by EVAIR in 2022.

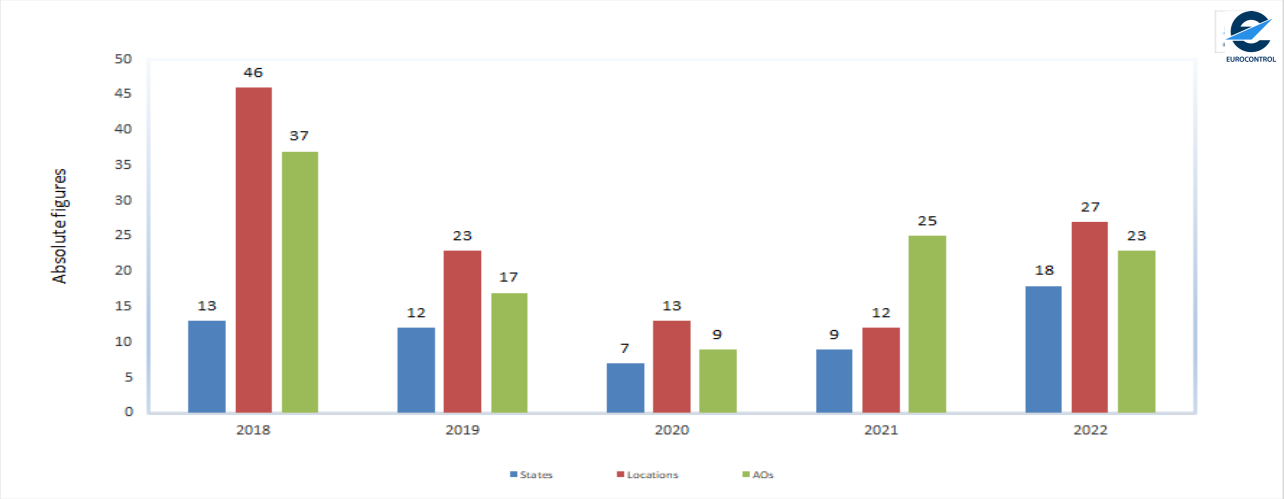


***Figure 39**: Drone spread across European states, locations and AOs in the 2018-2022 period*

You can find out more about RPAS via 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 2018-2022 PERIOD

From 2013/2014, when EVAIR started to receive GPS outage reports, until the end of 2022, EVAIR collected about 12,500 records. Locations of such events are closely linked with the political crises around the Black Sea, the Caspian Sea, the South-East Mediterranean, and the Baltic Sea. From the very beginning, EVAIR has alerted the whole aviation community to the problems identified.
EVAIR has regularly collected, analysed and monitored such data, closely cooperating with EUROCONTROL navigation and surveillance experts as well as with external stakeholders, ICAO, EASA, aircraft manufactures, ANSPs and IATA.

The number of GPS outage reports within the total number of EVAIR reports, expressed in percentage, has fluctuated from a few percent in 2015 to 60% in 2018, 59% in 2019, 38% in 2020, 21% in 2021 and 50% in 2022.

The main providers of GPS reports are aircraft operators who fly to/from European airspace and through the affected areas. In the period measured, about 290 aircraft operators provided all types of ATM reports, including GPS outage reports.

GPS de-identified reports and analyses are used to provide support for internal EUROCONTROL activities, of which GNSS activities are among the most important. EVAIR conducts GPS customised analysis at the request of our main stakeholders, AOs, ANSPs and international organisations.

There are more GPS reports than other types of reports, as these are linked to PBN airspace and airports where departure and arrival procedures are based on satellite navigation.
Due to the vulnerability of satellite navigation, aircraft operators are asking ANSPs to retain sufficient terrestrial navigation aids in order to support continuity of operations and contingency procedures, as appropriate.

Since problems with GPS began to emerge, EVAIR has continuously raised awareness among different stakeholders, particularly among aircraft operators and ANSPs as they are the most affected by the negative consequences of the loss of GPS.

EASA, supported by different stakeholders, including EUROCONTROL, has issued a Safety Information Bulletin (SIB) on this subject: https://ad.easa.europa.eu/ad/2022-02R2 .

In addition, ICAO, EUROCONTROL, EASA, IATA and other aviation stakeholders have made their pleas to states to issue NOTAMs warning about potential problems with GPS signals. It has been recognised that issuing NOTAMs for the airspace over international waters can be very challenging.

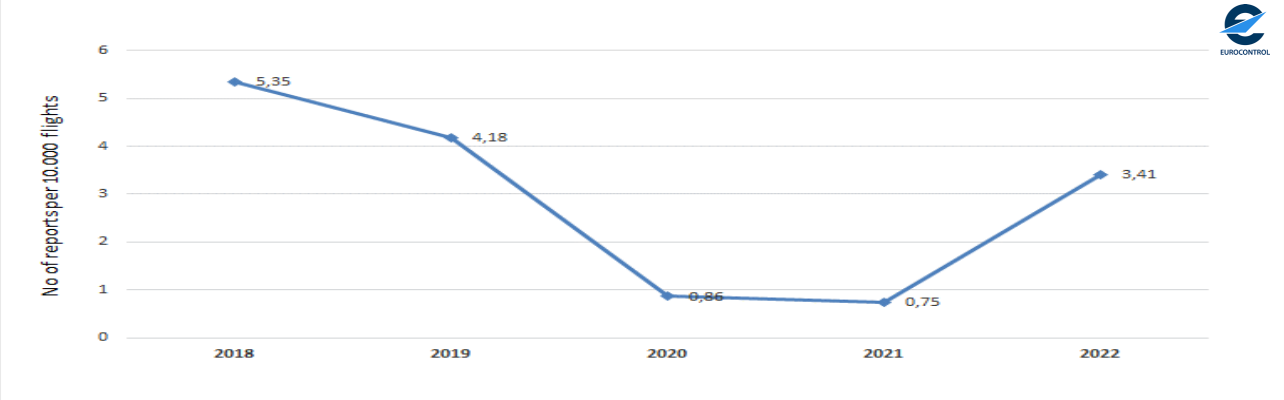


***Figure 40**: GPS outages in the 2018-2022 period*

For the 2018-2022 period, in absolute figures, EVAIR received 11,113 GPS outage reports, which is almost 2,000 reports more than for the 2016-2020 period. This increase in the number of GPS reports was recorded immediately after the COVID-19 measures were suspended. Within the 2018-2022 period, EVAIR identified about 60 FIRs where GPS outages were located. The South-East Mediterranean and FIRs around the Black and Caspian Sea are more affected than the others. The high number of GPS outages reports is very closely linked to political tensions in these regions. After much analysis and cooperation with other aviation stakeholders as well as with the ITU, there is no doubt that loss of GPS over wide areas is closely related to interference with the satellite signal.

Besides the regions mentioned, EVAIR monitors the situation over the core area of European airspace. We regularly receive a smaller number of GPS outage reports (less than one percent) over the core area of European airspace.

Besides massive interference within the regions mentioned, other interference could come from personal privacy devices (PPD) used to illegally disturb satellite signals reception. These devices can cause loss of satellite signal during the approach phase of flights or can disable initialisation of GNSS receivers during pre-departure checks when establishing satellite navigation.

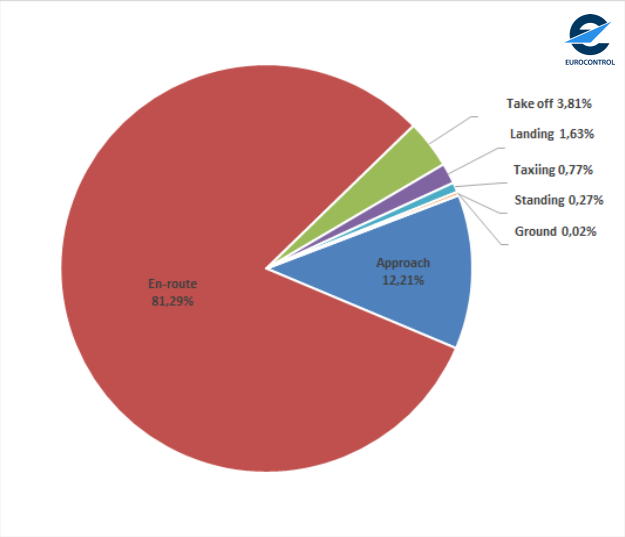


***Figure 41**: GPS outages by phase of flight in the 2018-2022 period*

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 to the areas affected and the type of traffic flying through the affected regions. Within the most affected regions (the 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.

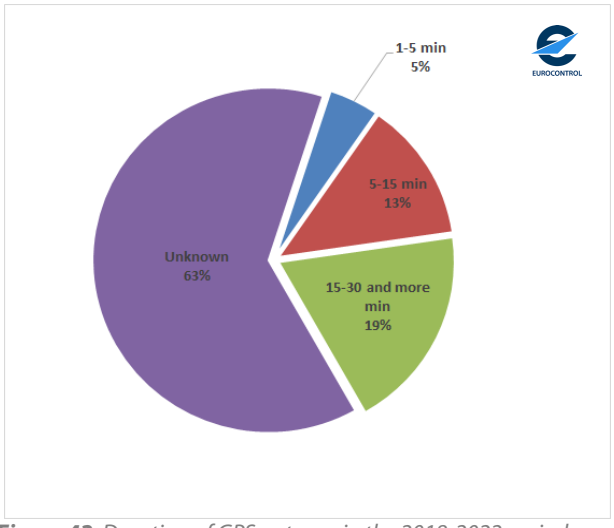


***Figure 42**: Duration of GPS outages in the 2018-2022 period*

The duration of the lost GPS signal indicates the size of the area affected. When analysing the duration of GPS outages, we set the time spans for lost signals at 1-5 minutes, 5-15 minutes, 15-30 minutes and above (see Figure 42).

As shown in Figure 42, in 63% of the reports, we did not have this information. However, in reports where this information was available, out of the three timespans defined for lost signal, a higher percentage was recorded for 15-30 minutes and above than the other two time spans put together. Bearing in mind that the duration of the lost signal indicates the size of the area affected, as said above, and that the aircraft type most frequently flown in the most affected regions flies on average at a speed of 8 kts per minute, the flights affected could have had a problem with lost GPS signal in a few FIRs during the flight and some didn't recover until the end of the flight.

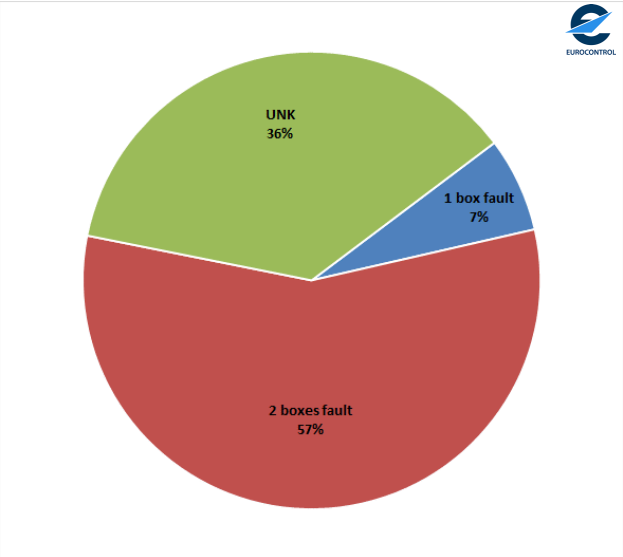


***Figure 43**: GPS loss in the 2018-2022 period*

According to the reports received, when a problem with the GPS signal occurs, in most cases there is a total loss of the GPS signal (57%), whereas in only 7% of cases do pilots report the loss of only one GPS box. 36% of the reports received do not provide EVAIR with information on whether there was total GPS loss or loss of only one box.

The aircraft most affected by GPS issues are those which fly the most frequently through the areas affected. Besides all versions of B777 and A380 which accounted for most GPS outages, EVAIR recorded high number of GPS reports related to different versions of A320.

ACAS REPORTING IN THE 2018-2022 PERIOD

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

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. Since then, EVAIR has been focusing its monitoring on the performance of this version of TCAS.

ACAS RA statistics are the outcome of the incident 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 2018-2022 PERIOD

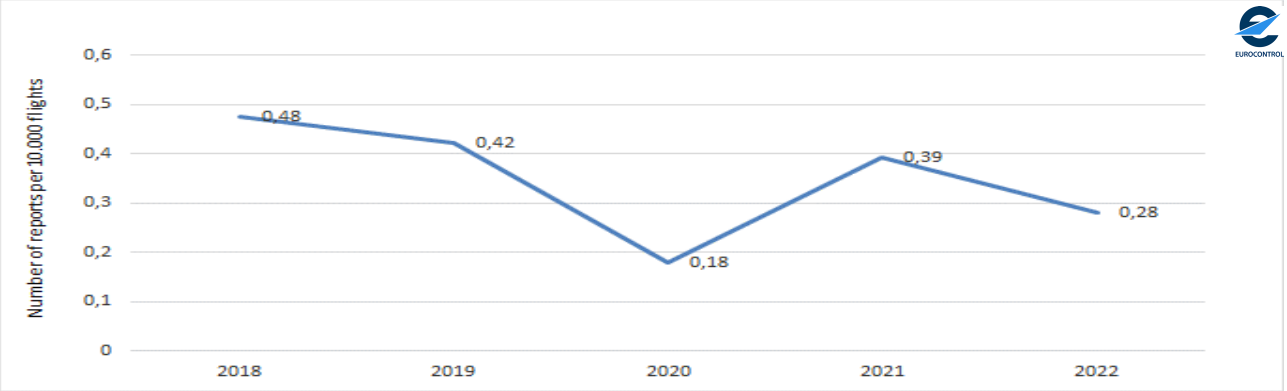


***Figure 44**: Airlines' ACAS incidents in the 2018-2022 period*

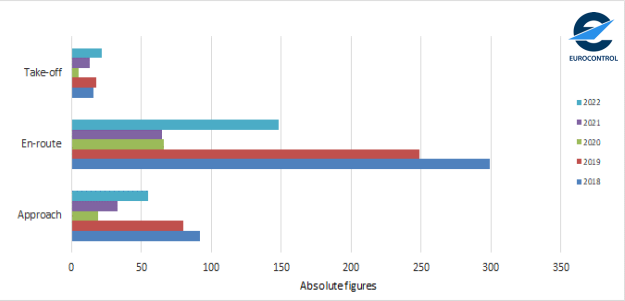


***Figure 45**: Airline ACAS RAs by phase of flight in the 2018-2022 period*

In 2022, EVAIR recorded 0,28 ACAS RAs per 10,000 flights. This is a decrease of 28% compared with 2021.
For the 2018-2022 period, ACAS reports made up 10.7% of the overall ATM reports provided by AOs, which is 5% fewer than for the previous five years (2017-2021). As with the other types of ATM events, for the 2020-2021 period, COVID-19 measures had an obvious impact on ACAS RA reports too.

For a long time now, the en-route phase has accounted for more reports in the EVAIR database than other flight phases. The situation is the same in 2022.
More about ACAS can be found on: https://www.skybrary.aero/index.php/Airborne_Collision_Avoidance_System_(ACAS)

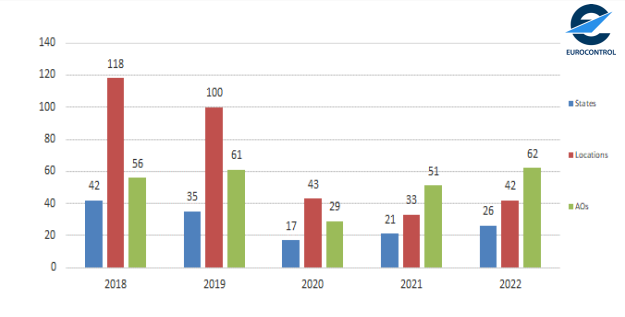


***Figure 46**: Number of states and locations where ACAS RAs occurred and number of AOs reporting ACAS RAs in the 2018-2022 period*

The absolute figures for ACAS RAs per the number of AOs experiencing them, and the number of states and locations in which they occurred (Figure 46), show that the figures were highest in the period before the COVID-19 pandemic across all three monitored areas. In 2022, all three monitored areas saw an increase compared with the years affected by the COVID-19 pandemic (2020 and 2021). The reason behind this is the normalisation of traffic after the COVID-19 pandemic.

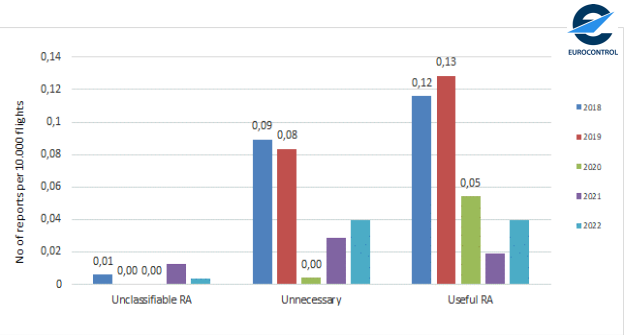


***Figure 47**: ACAS RA classification in the 2018-2022 period*

"Useful RA" and "unnecessary RA" are the areas in which more reports from pilots were received than "unclassifiable RA". In 2022, almost the same trend was recorded for "unnecessary" and "useful RA".

Unnecessary RAs are, in the majority of cases, related to ACAS RAs triggered by high vertical rates. One of the reasons that pilots considered them to be "unnecessary" is that ATC instructions were fully in line with the traffic situation and pilots correctly confirmed that they had received instructions. However, due to the higher vertical rate than it is recommended by ICAO they experienced ACAS RA.

The ICAO ADREP definitions of the different 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 2018-2022 PERIOD

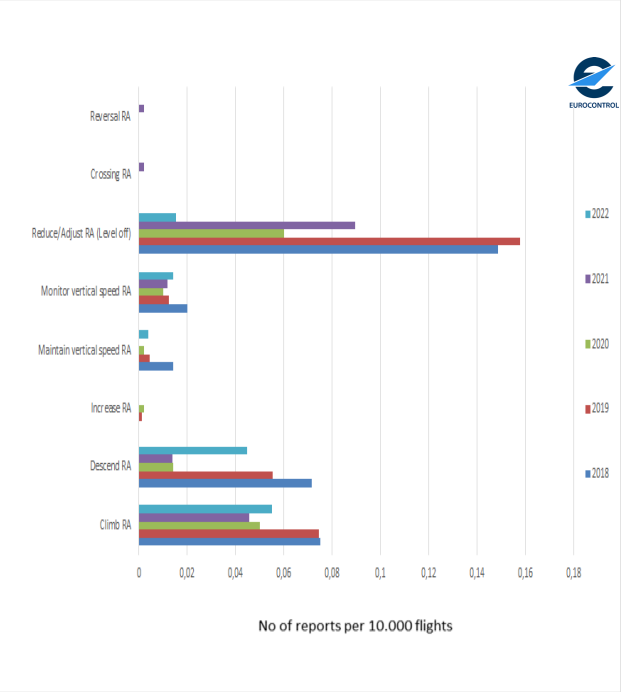


***Figure 47**: ACAS RA instructions in the 2018-2022 period*

In 2022, a significant drop in the number of level off RA (formerly reduce/adjust RA) reports was recorded. This is the lowest level in the last 10 years.

Descend RAs on the other hand saw a significant increase in 2022 compared with the previous year.

In this Bulletin, as in previous editions, we reiterate 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 2018-2022 PERIOD

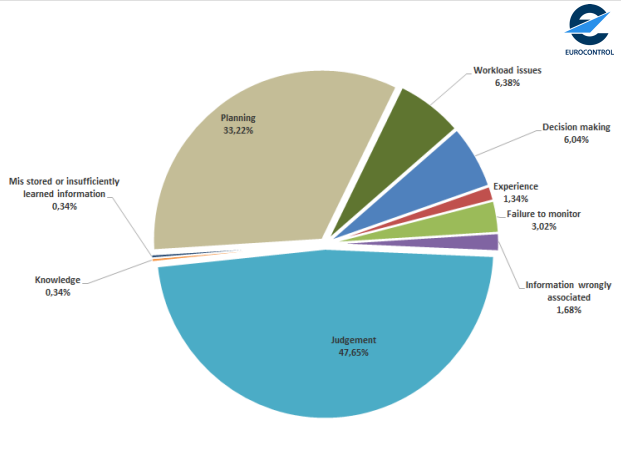


***Figure 48**: Mistakes associated with ACAS RA in the 2018-2022 period*

From an ATC perspective, mistakes have always accounted for high percentages. Controller planning and judgement mistakes (Figure 48) made up more than 80% of the mistakes associated with ACAS RA in the 2018-2022 period.

Workload issues and mistakes in decision making are the other areas with higher percentages compared with the rest of the contributors.

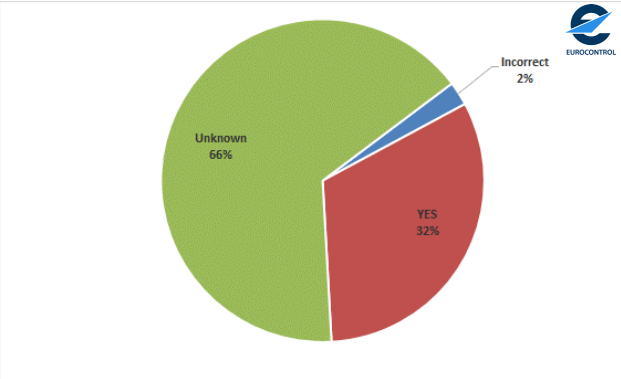


***Figure 49**: Traffic information issues associated with ACAS RA in the 2018-2022 period*

In 66% of reports, it was not known whether traffic information was provided. The scenario where the traffic information is incorrect is the most critical when it comes to traffic information issues (recorded at 2% in the 2018-2022 period) (Figure 49).

WAKE TURBULENCE 2018-2022 PERIOD

The aim of EVAIR wake turbulence (WT) data collection and monitoring is to support various Agency internal and external wake turbulence (WT) activities.
For the 2018-2022 period, wake turbulence occurrences accounted for 2.85% of all ATM reports in the EVAIR database.

From a severity point of view, the majority of wake turbulence occurrences were classified as low severity, although in some cases there were WT reports with a higher severity level.

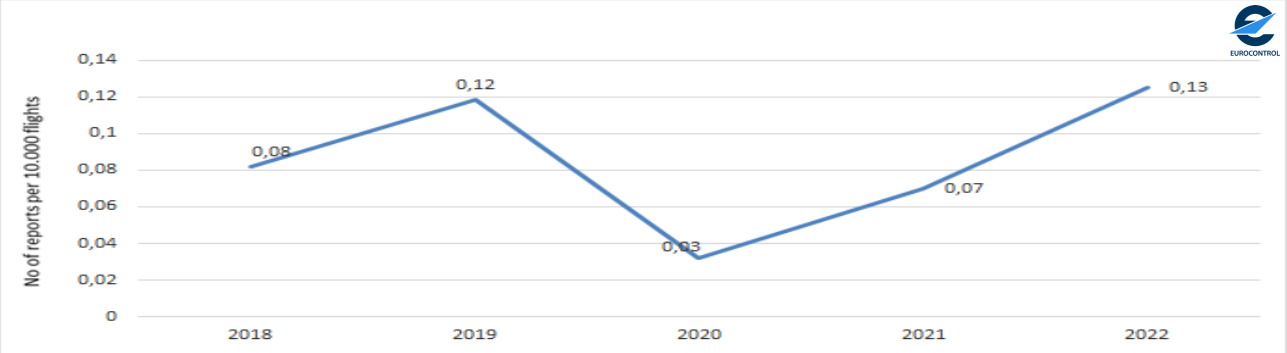


***Figure 52**: Wake turbulence in the 2018-2022 period*

After COVID-19 pandemic in 2020, EVAIR recorded an increase in the number of wake turbulence reports in 2021 and 2022. This increase in the number of incidents followed the increase in traffic after the COVID-19 pandemic. In 2020, despite the COVID-19 measures, a continuous increase in such incidents was recorded for cargo traffic.

The feedback sent to EVAIR by some European ANSPs reported that a certain number of WTs were linked to the increase in cargo traffic which, during the COVID-19 pandemic, flew in regions which had not been flown in regularly before the health crisis.

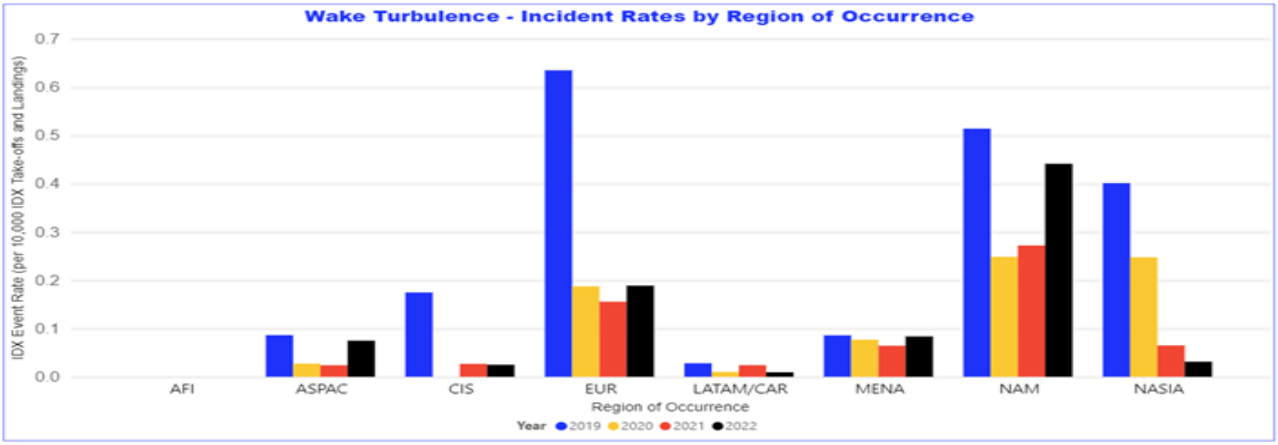


***Figure 53**: IATA global wake turbulence in the 2019-2022 period*

IATA global data show the spread of wake turbulence occurrences at global level. The period covered is 2019-2022 and the figures show the number of occurrences per 10,000 flights. In general, increasing trends are recorded in three regions: Europe,

North America and the Middle East. In 2022, the increase in such occurrences was significant in North America whereas a decrease was recorded in North Asia, despite the traffic increase since the COVID-19 pandemic.

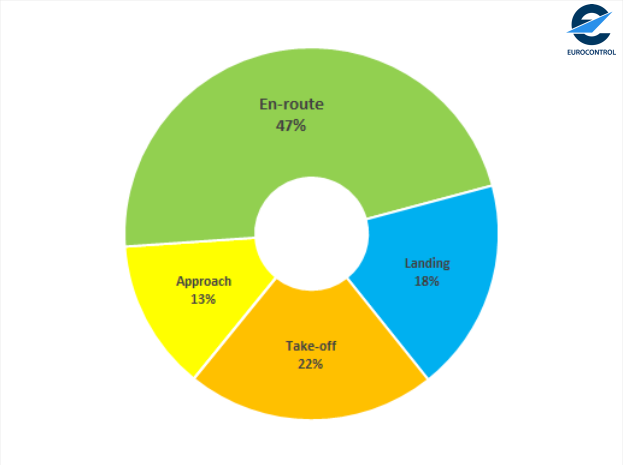


***Figure 54**: Wake turbulence by phase of flight in the 2021-2022 period*

EVAIR data show that for a lengthy period, WT incidents have occurred more frequently during the en-route phase (47%).

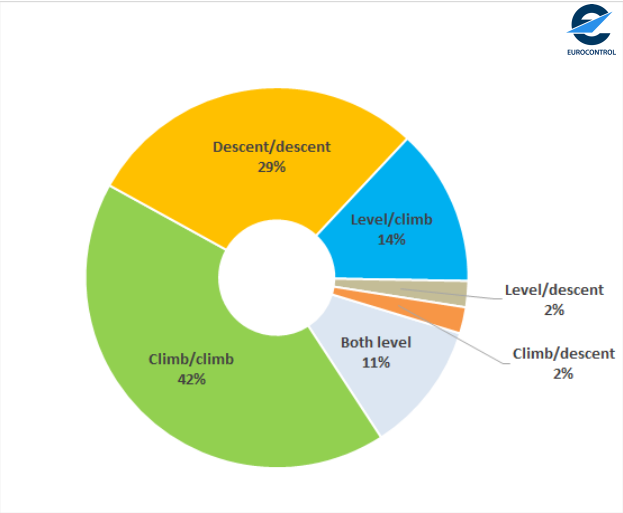


***Figure 55:** Wake turbulence by vertical profile in the 2021-2022 period*

WT in the vertical profile occurs most often during initial climb, when both aircraft are climbing.

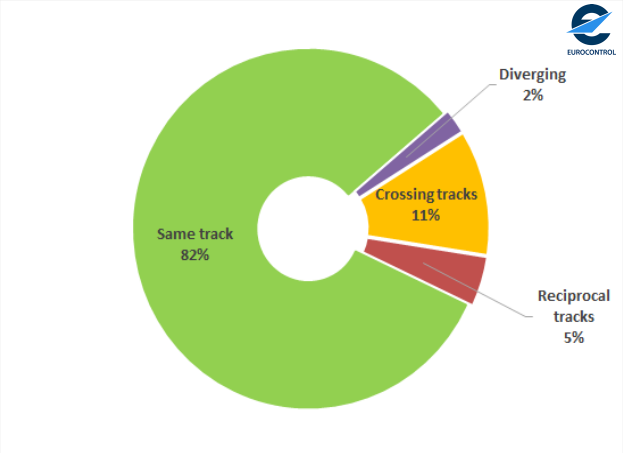


***Figure 56**: Wake turbulence horizontal relative movements in 2021-2022*

WT in horizontal relative movements occurs most often when both aircraft are on the same track. However, this does not mean that they are both on the same FL. Very often, the aircraft generating WT is on the higher FL. It is important to highlight that WT can be combined with stronger wind streams on FLs where WT occurs.

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 in 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) is developing 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)

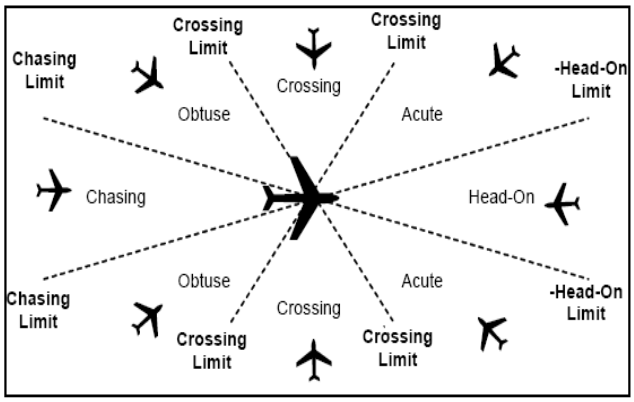
Mental/emotional/personality issues (HERA): these include the following items:

- Mental capacity: loss of picture or safety awareness
- Confidence in self, in others, in information, in equipment, in automation
- Complacency
- Motivation/morale
- Attitudes towards others
- Personality traits: aggressiveness, assertiveness, lack of confidence, risk-taking
- Emotional status: stress, post-incident stress
- 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 omission, 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 communication 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**, encompassing 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 weather (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 for the other aircraft and about which information has to be provided.

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

ANNEX 3 – ABBREVIATIONS AND ACRONYMS

ACAS	Airborne Collision Avoidance System
ADREP	Accident/Incident Data Reporting
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
CIS	Commonwealth of Independent States
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
EVAIR	EUROCONTROL Voluntary ATM Incident Reporting
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
FL	Flight Level
HEIDI	Harmonisation of European Incident Definitions Initiative for ATM
HERA	Human Error in European Air Traffic Management
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
LB	Level Bust
MENA	Middle East and North Africa
NM	Network Manager
RA	Resolution Advisory
RI	Runway Incursion
RPAS	Remotely Piloted Aircraft Systems
TCAS	Traffic Collision Avoidance System
TA	Traffic Advisory

SUPPORTING
EUROPEAN
AVIATION

www.eurocontrol.int