EUROCONTROL

EVAIR Bulletin No 20

Summer seasons and full years 2013-2017

SUPPORTING EUROPEAN AVIATION

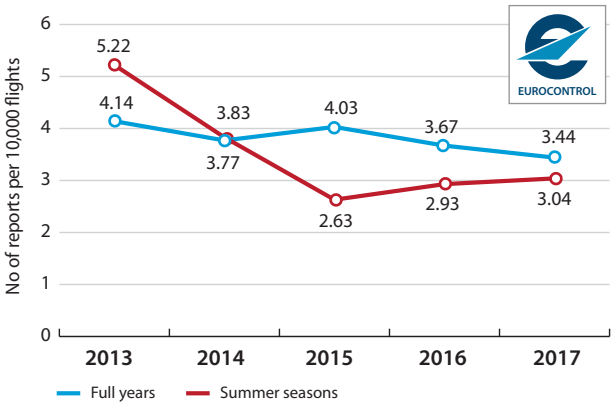
FOUNDING MEMBER SESAR JOINT UNDERTAKING

NETWORK MANAGER

CONTENTS

For the jubilee issue, EVAIR Safety Bulletin No 20, we have decided to publish in the same bulletin ATM statistics for the summers and full years of the period 2013-2017. As usual, in addition to EVAIR statistics, we will be publishing the IATA STEADES statistics on a selected number of ATM issues. Traditionally, we have always combined European and global findings, in order to give ATM experts the possibility to compare the European and global pictures.

Figure 1: *Incident data collection for the summer seasons and full years for the period 2013-2017*



Data collection

Between 2013 and 2017, aircraft operators and ANSPs provided EVAIR with some 13,000 ATM reports. During the summer seasons for 2013-2017, EVAIR collected 6,300 reports. Over the last five years, EVAIR has worked with all European ANSPs and with more than 320 aircraft operators.

Those data providers who wish to receive feedback on their initial reports send their ATM reports on a daily basis, and this is the absolute majority of data providers, while others submit their occurrences on a monthly basis.

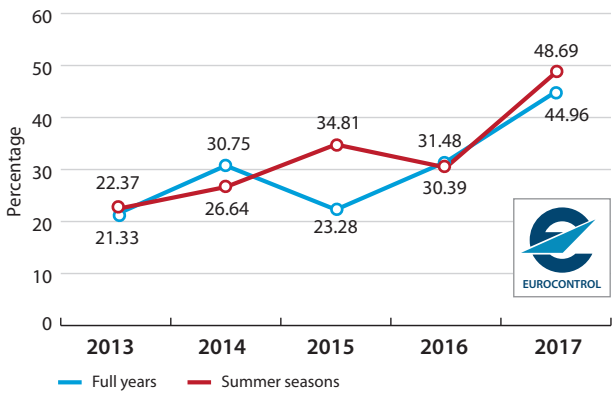
For the purposes of monitoring the Call Sign Similarity De-confliction Tool, 21 ANSPs provide call sign similarity/confusion reports on a daily or monthly basis. For the period 2013-2017, EVAIR received more than 15,000 reports, which means that in total for the whole period under review, EVAIR collected 28,000 reports.

Feedback – Reporting motivator and support for quick fixes

The feedback process facilitated by EVAIR allows connections between AOs and ANSPs safety managers, and the exchange of ATM occurrence information. The feedback process and SMS investigations received with information about actions taken remain the most important motivator for stakeholders to provide EVAIR with their occurrence reports.

One of the indicators for the efficiency of the feedback process, but also for SMS investigations, is the timeframe needed to carry out investigations and prepare feedback on the occurrence reports submitted. Twelve years ago when we started with the EVAIR feedback process, it took more than 60 days to get the feedback on the occurrence reports submitted, whereas in 2016 and 2017, it took on average 15-20 days to get the feedback. Provision of feedback, which is the product of SMS investigations by the AOs and ANSPs, makes the EVAIR database more complete. The percentage of the EVAIR database covered by feedback has shown a steady increase in the last five years. In 2017, the percentage was 44%, reaching 48% during the summer period (Figure 2).

Figure 2: *Timeframe for the feedback on pilot reports, 2013 - 2017*



Main events

In this short summary, we discuss the trends in the various events which we regularly monitor in our Bulletin.

RPAS/drones – proliferation of small drones

In 2017 the growth in the number of small drones continued. The data show that the part of the airspace most affected continues to be final approach, although there were reports of drones at higher altitudes/levels. The aircraft operators who provide EVAIR with their occurrence reports categorised about 10% of drone reports as airproxes. In a number of reports, vertical and horizontal separation was literally a few metres. Drones were so close to the aircraft that pilots were able to describe in detail their shape, colour and size.

GPS outages

In summer 2017 and for the full year, as in the previous seasons, the situation as regards the locations of GPS outages was very closely linked to politically disputed areas. The traffic most affected was Middle East-Europe, South-East Mediterranean-Europe, and Middle East-North America/Canada via the North Pole. Unfortunately, the majority of States affected by GPS outages failed to issue NOTAMs as an information and awareness message to pilots flying through the affected areas. Turkey and Cyprus were two of the few States to do so.

ACAS RA data collection

Over the last three to four years, the number of ACAS RAs has stabilised at between 0.5 and 0.6 occurrences per 10,000 flights. In the en-route phase, EVAIR recorded more reports than in other flight phases. Between December 2012 and the end of November 2017, 184 cases of false RAs caused by hybrid surveillance were reported. In all of these cases, there was no erosion of horizontal separation or possible risk of collision between the two aircraft at the time when the RA was issued, but from a pilot and controller perspective, these RAs were unexpected. Nevertheless, the pilots, quite properly, followed the RA instructions (with one exception, when there was no reaction to the RA).

Laser interference

Laser interference is still creating problems for pilots and controllers across Europe. However, it is encouraging to see that the number of cases of interference within the majority of the States affected is falling. One of the reasons for this is that the majority of States have prohibited the use of laser devices against aircraft or vehicles and have actually criminalised such incidents. States have also put in place procedures that oblige pilots and controllers to exchange information about laser attacks and to duly inform the police.

Call sign confusion

The main contributors to call sign confusions remain the same as for previous years, namely "hear back omitted" and "handling of radio communication failure/unusual situations". In 2017, there was a decrease in the number of cases of call sign confusion reported by pilots. There was also a downward trend in cases of call sign similarity/confusion identified by ANSPs. The data clearly show that airlines using the EUROCONTROL Call Sign Similarity De-Confliction Tool (CSST) on average have 2-7 times fewer problems with call sign similarity and confusion, which is a clear message to airlines to use the tool for similarity de-confliction in-house.

Contributors to incidents

"Air-ground communication" continues to be one of the contributors with the highest trends. For the second year in a row, EVAIR recorded an increase in the number of "air-ground communication" problems. In 2017, the contributor regarding the provision of "traffic information" by air traffic controllers showed a significant increase, as did lack of or problems with "ATC clearance/instructions".

Stakeholder Corner

IATA

As part of the ATM safety cooperation between EUROCONTROL and the International Air Transport Association (IATA), IATA's safety department conducted summer and full-year analyses of selected topics. These analyses allow high-level comparisons to be made between global and European ATM trends on selected topics.

The analyses were conducted on the air safety reports (ASRs) held in IATA's Global Aviation Data Management (GADM) Safety Trend, Analysis, Evaluation and Data Exchange System (STEADES) database. The STEADES database comprises de-identified safety incident reports from over 210 participating airlines throughout the world, with an annual reporting rate exceeding 200,000 reports a year. The STEADES database incorporates a number of quality control processes that guarantee the analysis results.

The scope of the analyses included research of ASRs for the summers and full years of the period 2013 to 2017. During this period, a total of 993,570 reports were submitted to and collated in STEADES. The airlines participating and submitting data to STEADES accounted for a total of 62,469,195 flights from 2013 to 2017. This is equivalent to approximately 32% of the world's flights during the period.

Security and Confidentiality

When collecting and processing data, EVAIR follows strict security and confidentiality arrangements. The safety data provided are properly safeguarded and de-identified, and the information is used only 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 general address: evair@eurocontrol.int

SUPPORT FOR THE MONITORING OF THE EUROPEAN SAFETY ACTION PLANS

EUROCONTROL and IATA regularly provide European and global ATM statistics for agreed areas: ACAS RAs, Call Sign Confusion, Level Bust, RWY Incursion, etc. Some of these areas also fall under EU Regulations 376/2014 and 1018/2015.

Figure 3: *European ATM events in the summer seasons 2013-2017*

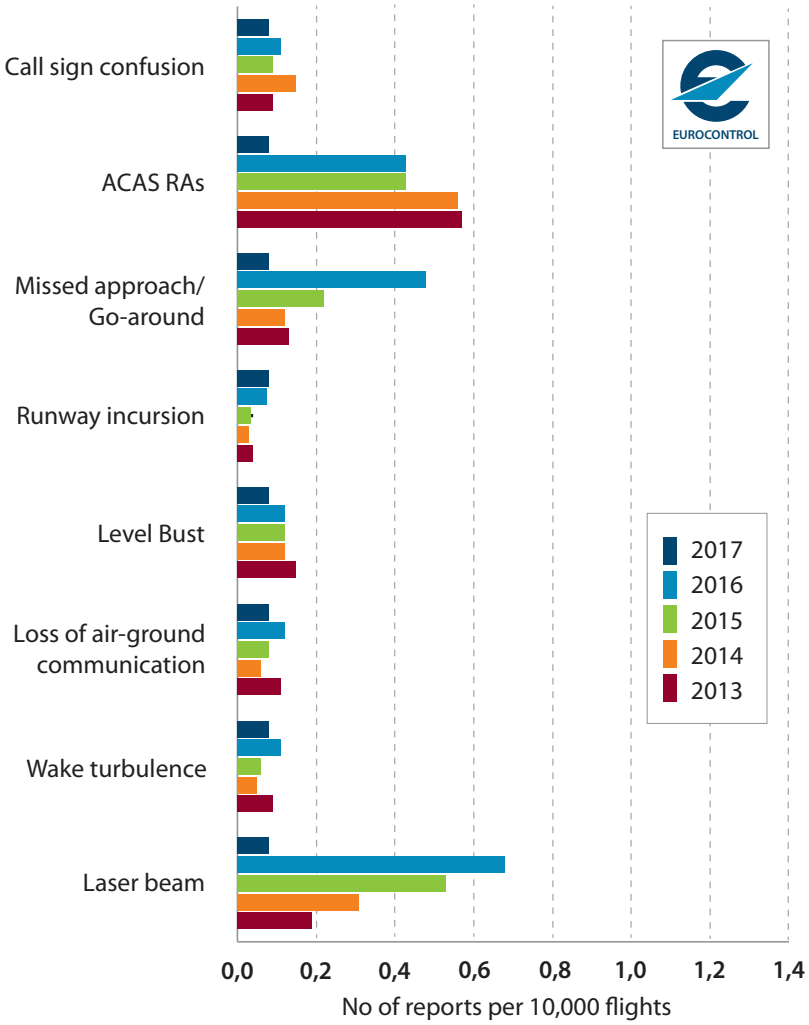
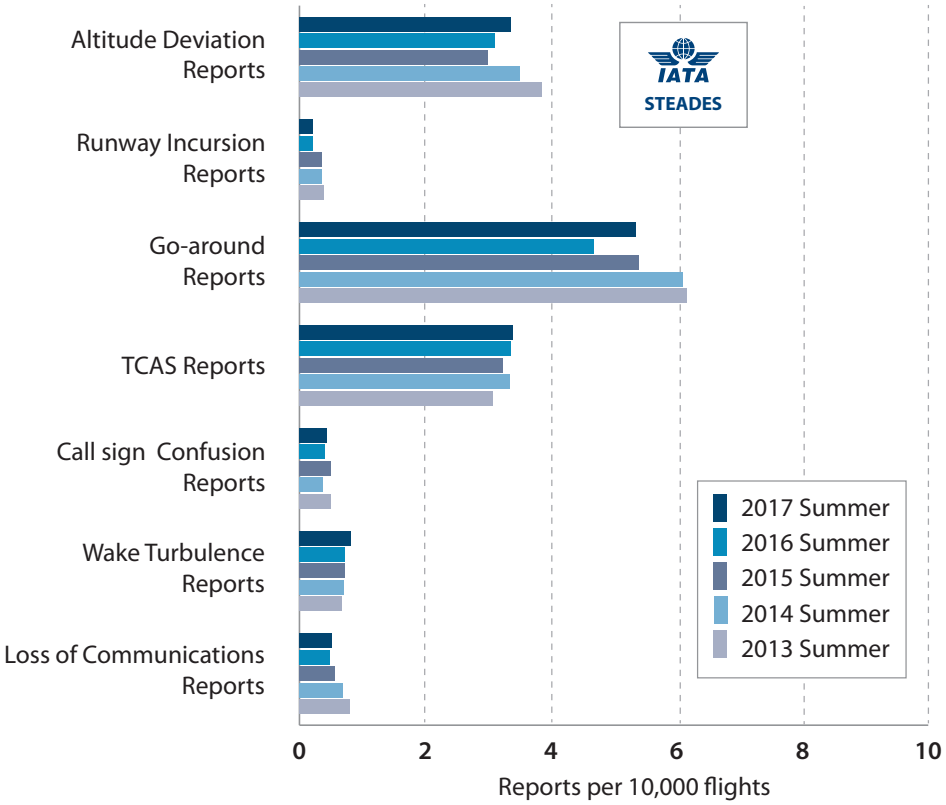


Figure 4: *IATA ATM events in the summer seasons 2013-2017*



The summer season trends for 2013-2017 in both the EVAIR and IATA STEADES databases show quite similar trends. With the exception of call sign confusion, which showed a decrease in the EVAIR database and an increase in the IATA STEADES database, all other areas showed increasing trends. It is interesting that some areas such as go-arounds have started showing an increasing trend following a few years of decreasing trends. This in a way proves the theory that those areas of concern where action has been taken at European level show a decrease between three and five years after that action, but following that period, the increase starts again. For EVAIR, this means that after three to five years, we revisit these areas by considering the need for new action or awareness.

Figure 5: *European ATM events in the period 2013-2017*

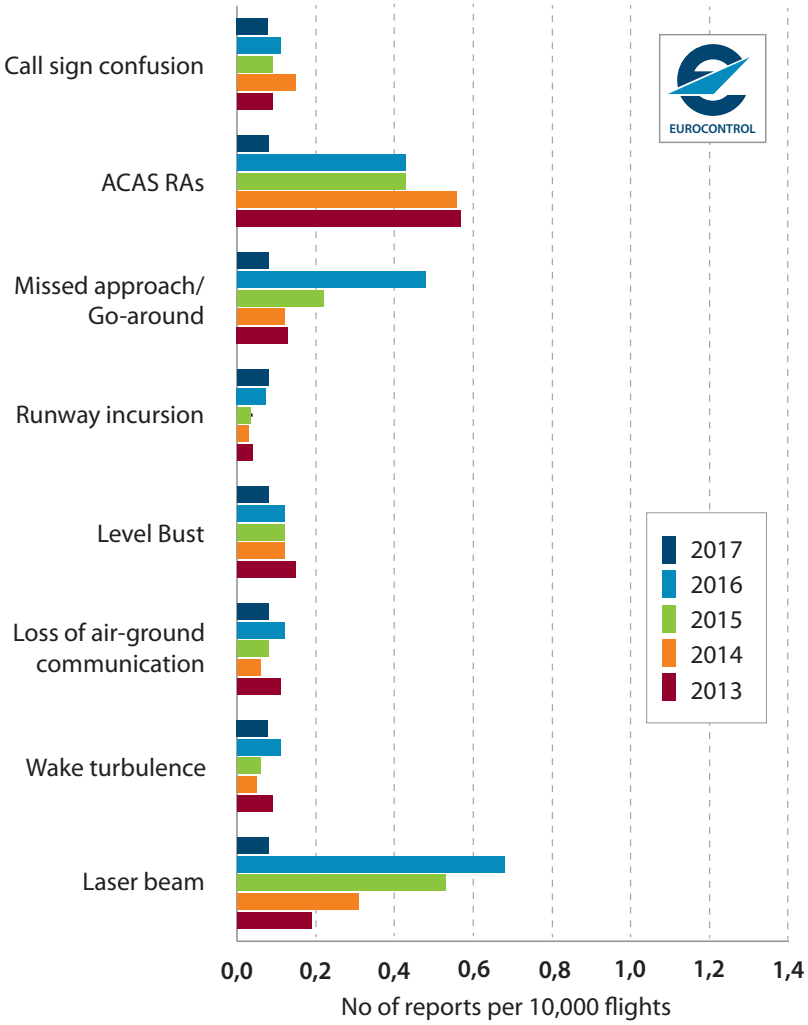
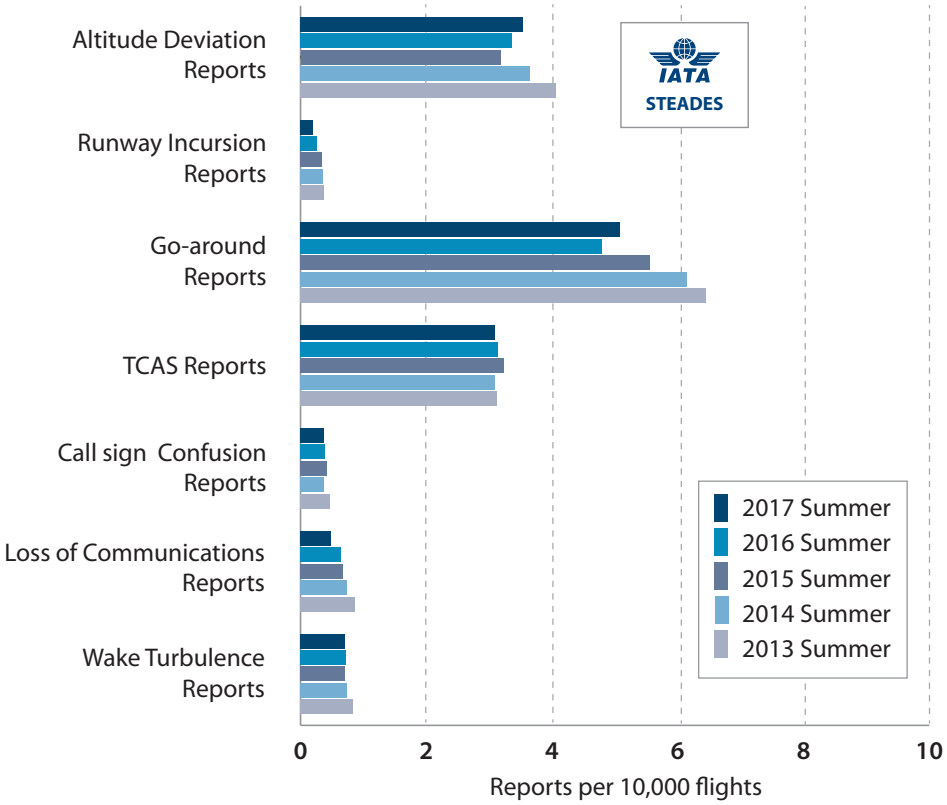


Figure 6: *IATA Global ATM events in the period 2013-2017*



Out of seven monitored areas, EVAIR and IATA STEADES in 2017 recorded three areas of concern with opposite trends: loss of communication, wake turbulence and runway incursions. The other four areas had the same trends in both data bases, namely an increasing trend for call sign confusion, go-arounds and level bust, and a decreasing trend for ACAS RAs. As regards ACAS RAs, it is important to note that the EVAIR database recorded significant reduction in the number of reports. We are monitoring the situation in order to better understand the reason for the significant decrease.

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

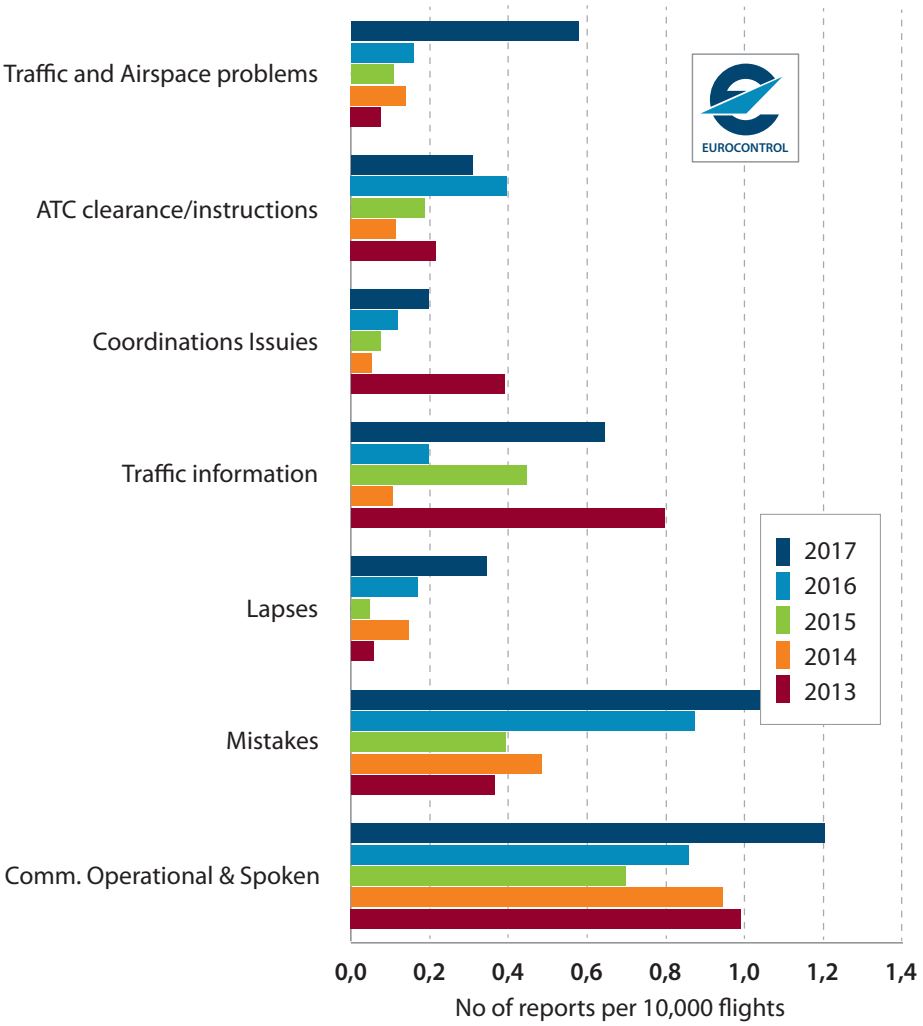
http://www.skybrary.aero/index.php/European_Action_Plan_for_the_Prevention_of_Runway_Incursions

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

To learn more about STEADES, go to:
www.iata.org/steades

CONTRIBUTORS TO ATM OCCURRENCES IN THE PERIOD 2013-2017

Figure 7: *Contributors to ATM incidents in the summer seasons 2013-2017*



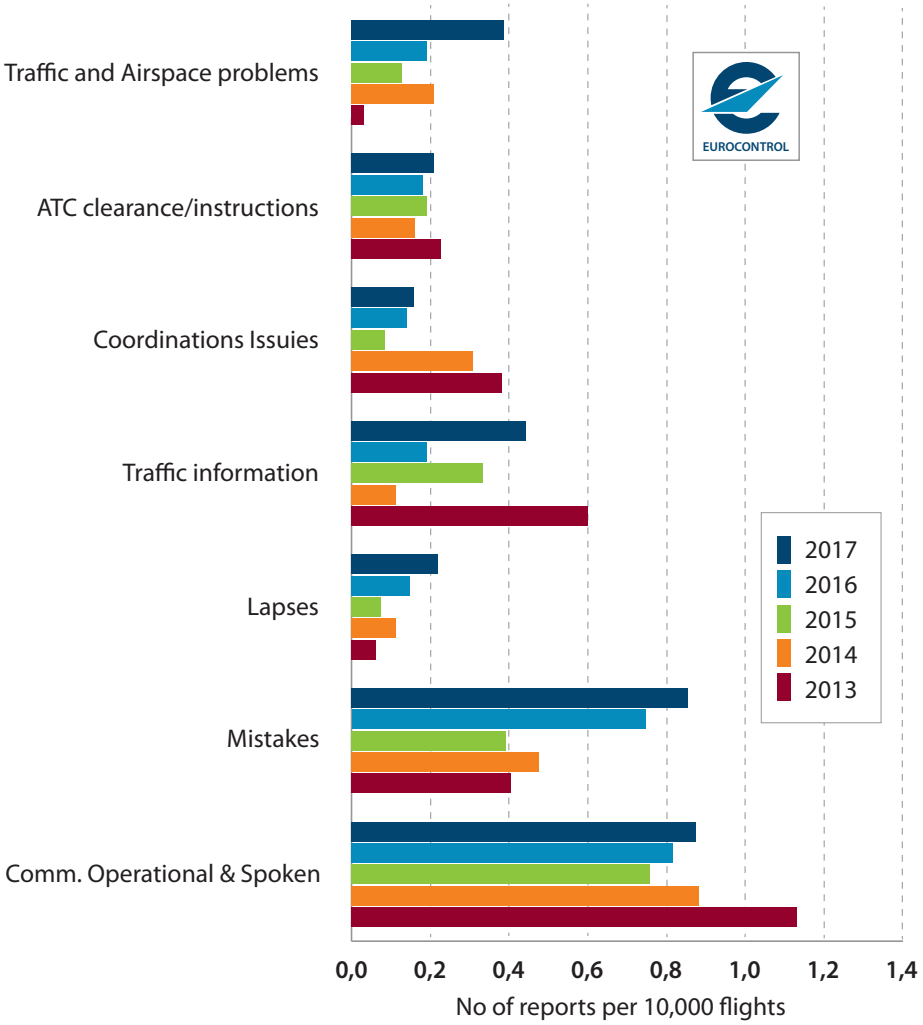
Thanks to use of a taxonomy compatible with ICAO's ADREP 2000 and EUROCONTROL's HEIDI for those areas where ICAO's ADREP is insufficient, EVAIR is capable of identifying in the analysis various levels of causal factors for different types of event.

Figures 7 and 8 show summer and annual trends for various contributors existing in most of the different types of occurrence, especially those presented in Figures 3 and 5.

In both the summer periods and the full years, a few contributors show quite high increases in 2017. These include provisions of "traffic information", "coordination problems" and "ATC clearance/instructions". It is worth mentioning that these are part of the air traffic controllers' basic responsibilities.

Further analysis of those areas with high increases identifies training as an area which requires more attention.

Figure 8: *Contributors to ATM incidents in the period 2013-2017*



Three of the seven main contributors, i.e. "mistakes" "lapses" and "traffic and airspace problems" showed a decrease in the summer seasons and full years.

"Mistakes" covers areas such as judgment, planning, decision-making, knowledge, experience, failure to monitor, misreads or insufficiently learned information, etc. Of these, "planning" and "Judgment" traditionally have the highest trends.

"Traffic Information" covers three areas: incorrect information 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" covers airspace problems, pilot problems, traffic load/complexity and weather problems.

GO-AROUNDS IN THE PERIOD 2013-2017

When presenting go-around statistics, we always stress that although a "go-around" is a normal phase of flight, EVAIR and IATA STEADES monitor these areas in order to identify safety problems associated with "go-arounds".

Over the last five summers and full years, both the EVAIR and IATA STEADES data repositories recorded a decreasing trend.

The EVAIR database identified go-around events with associated safety problems in more than 40 different States across Europe. This proves that the problem is not local but pan-European.

The main stakeholders other than AOs and ANSPs which are actively involved in this process are EUROCONTROL, the FSF, ERAA and IATA through the Safety Forum and post-forum activities (http://www.skybrary.aero/index.php/Portal:Go-Around_Safety_Forum_Presentations).

Figure 9: *Missed approach go-arounds in the summer seasons 2013-2017*

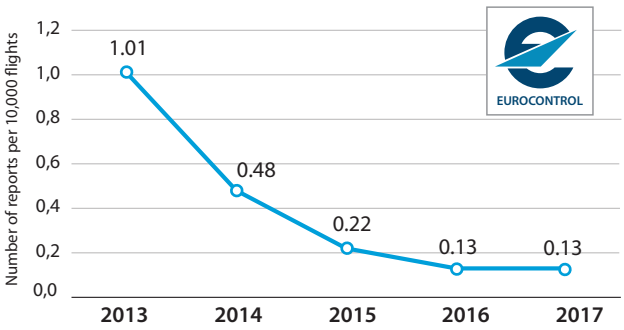


Figure 10: *Global go-arounds in the summer seasons 2013-2017*

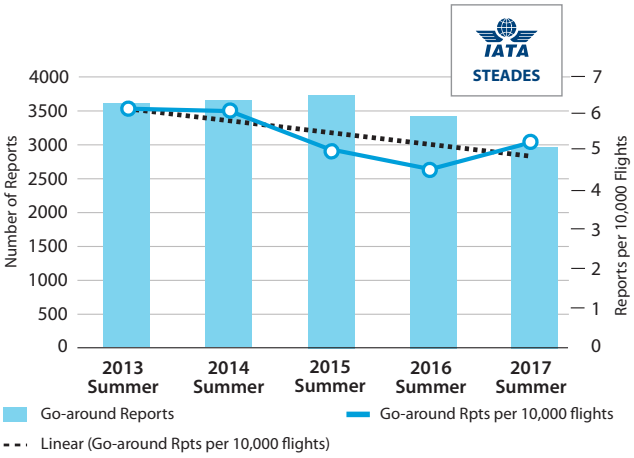


Figure 11: *Missed approach go-arounds in 2013-2017*

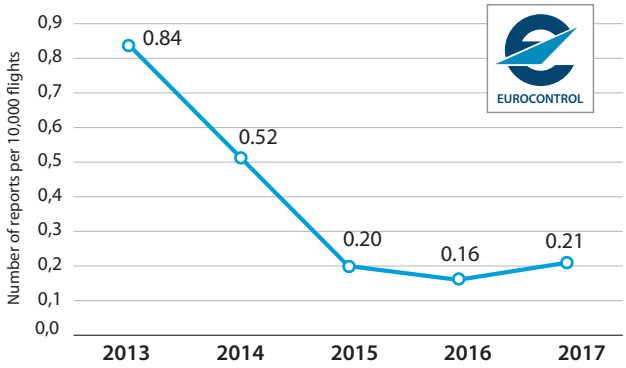
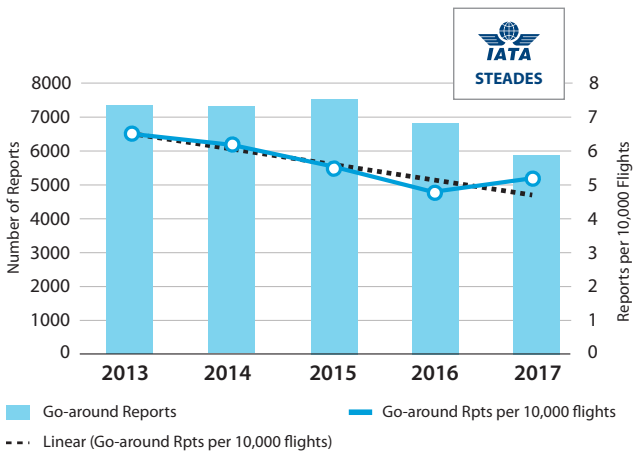


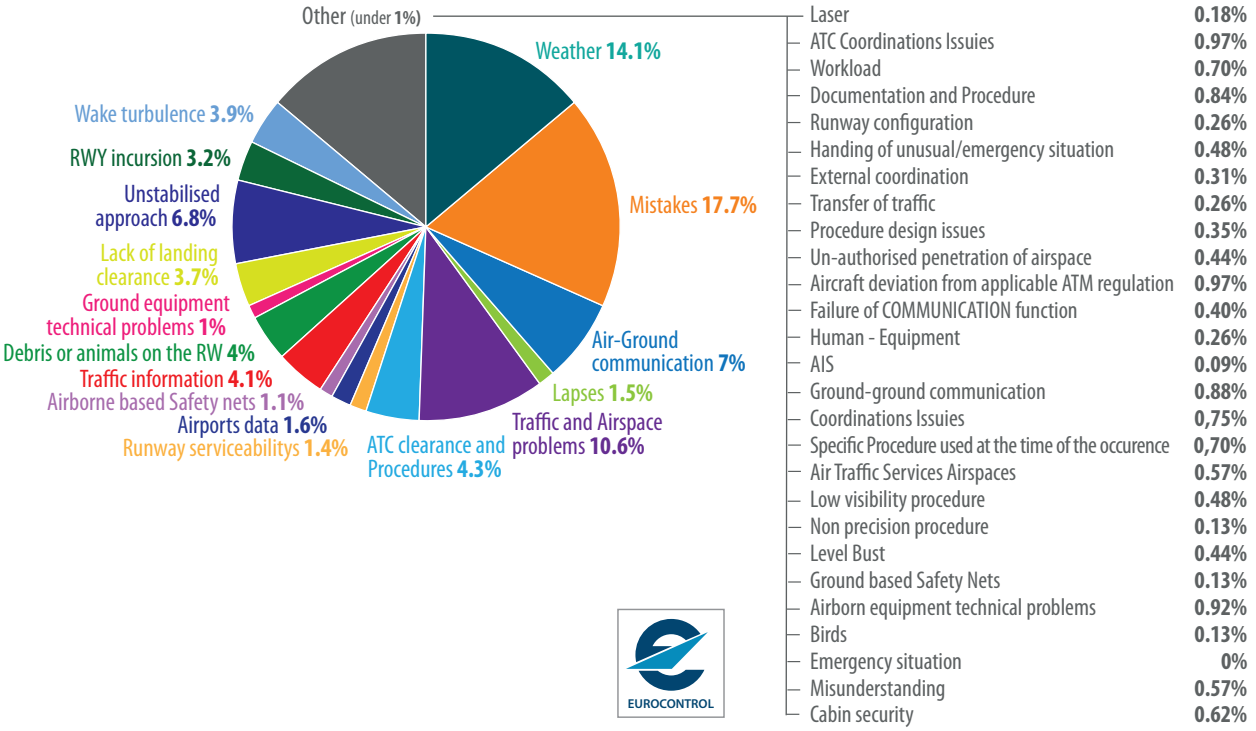
Figure 12: *Global go-arounds in 2013-2017-2017*



In-depth analysis showed that pilot and air traffic controller training is one of the crucial areas for further improvement of the go-around situation at pan-European level. Statistics for the causes of go-arounds could help decide where to focus safety efforts (Figure 13).

The full-year statistics in both the EVAIR and IATA STEADES databases in 2017 showed a slight increase in the number of reports. The same comment that we have made above for other areas of concern also applies to go-arounds, namely that after three to five years of the decreasing trends, we tend to see an increase in the number of reports.

Figure 13: *Go-around contributors in the period 2013-2017*



In its in-depth analysis of the causes of go-arounds, the EVAIR team always makes a number of different searches in order to identify as many go-around contributors as possible. Each of the contributors shown in Figure 13 could be broken down into more areas of concern. For the period 2013-2017, we identified more than 40 different causes. Over a long period, "weather", "mistakes", "un-stabilised approaches" and "traffic and airspace problems" accounted for 50% of the go-around contributors. "Weather" covers wind with wind gusts, wind shear, tail winds, head winds, low visibility, heavy rain and snow. "Traffic and airspace problems" incorporates airspace design and procedures, pilot problems, traffic load and complexity. "Mistakes" includes decision-making, judgment, planning and workload.

De-identified occurrence reports

ANSP report and investigation dated 8 December 2017

The controller had planned to issue a take-off clearance for a/c 1 after the landing of the arriving a/c 2 and before the landing of the inbound a/c 3. The controller issued a line up and wait clearance for a/c 1 behind the landing of a/c 2. The landed a/c 2 was slow to vacate the runway and the controller, being unable to issue a take-off clearance for a/c 1, instructed the arriving a/c 3 to execute a missed approach procedure for RWY12L. At that time RWY 12L was in use for departures and landings as RWY 12R was closed due to scheduled maintenance. The incident was classified, according to the RAT methodology, as category C1. The workload of the controller was medium. The incident was presented and discussed on a refresher course.

23 Jun 2017 Aircraft Operator report

Go-around was flown on ATC instruction. Unidentified light aircraft entered the radar zone. ATC could not guarantee separation so we were told to go around. Go-around flown. Light aircraft left the zone and we were vectored for another approach. We landed successfully.

ANSP Feedback

A special VFR did not follow ATC clearances to remain in separated SVFR-tracks while commercial a/c was approaching for ILS approach. Weather was below VFR minimum. TWR controller decided to initiate go-around because of the SVFR's unpredictable flying.

RUNWAY INCURSIONS IN THE PERIOD 2013-2017

After three years of decreases in the number of runway incursions, EVAIR recorded a very slight increase in the last two summer seasons. In a way, this adds weight to the EVAIR view that, in the majority of cases, after three to five years of decreases in certain types of event, we can expect to see once again increases.

In both databases, EVAIR and IATA, RWY incursions showed a downwards trend for the five-year period. However, in 2016 and 2017, EVAIR recorded an increase while IATA recorded a decrease.

Figure 14: *Runway Incursions summer seasons 2013 - 2017*

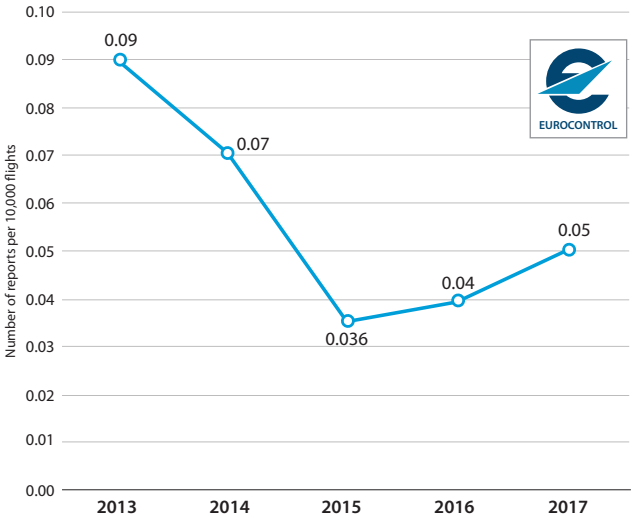


Figure 15: *Global runway incursions summer seasons 2013-2017*

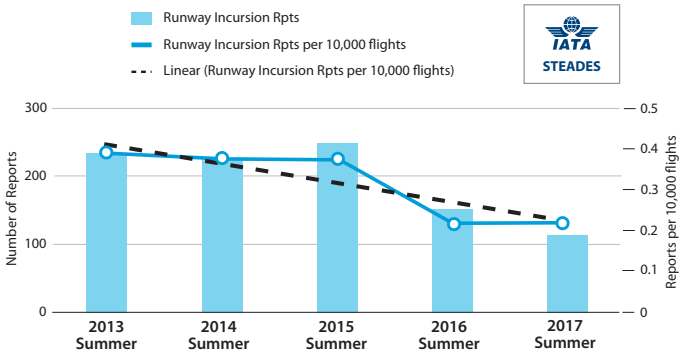


Figure 16: *Runway Incursions 2013 - 2017*

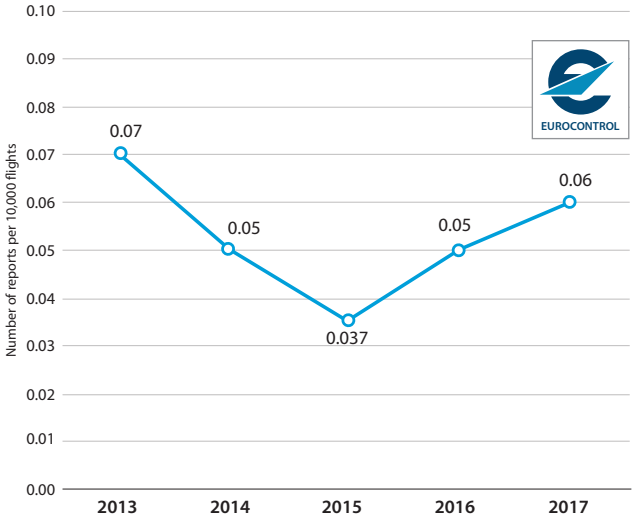


Figure 17: *IATA Global runway incursions 2013-2017*

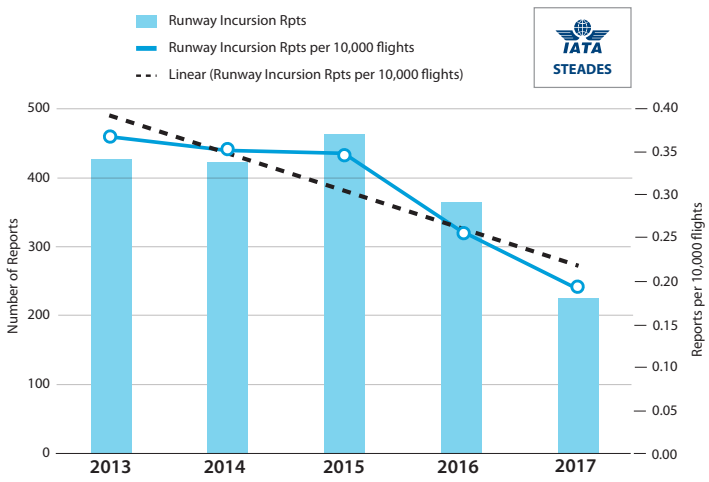
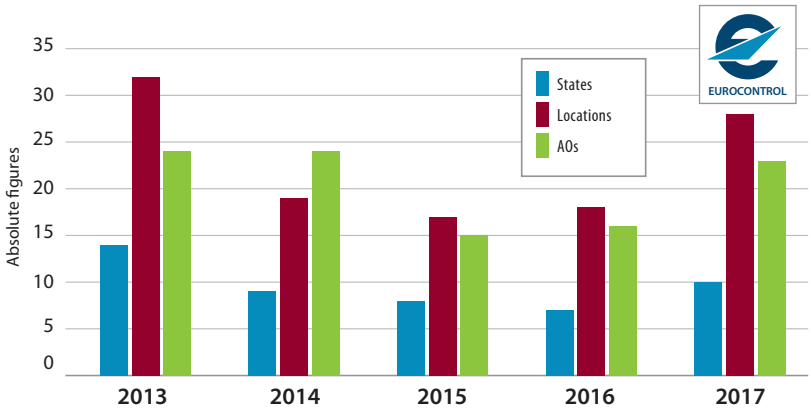


Figure 18: Runway Incursions States, Locations & AOs 2013-2017

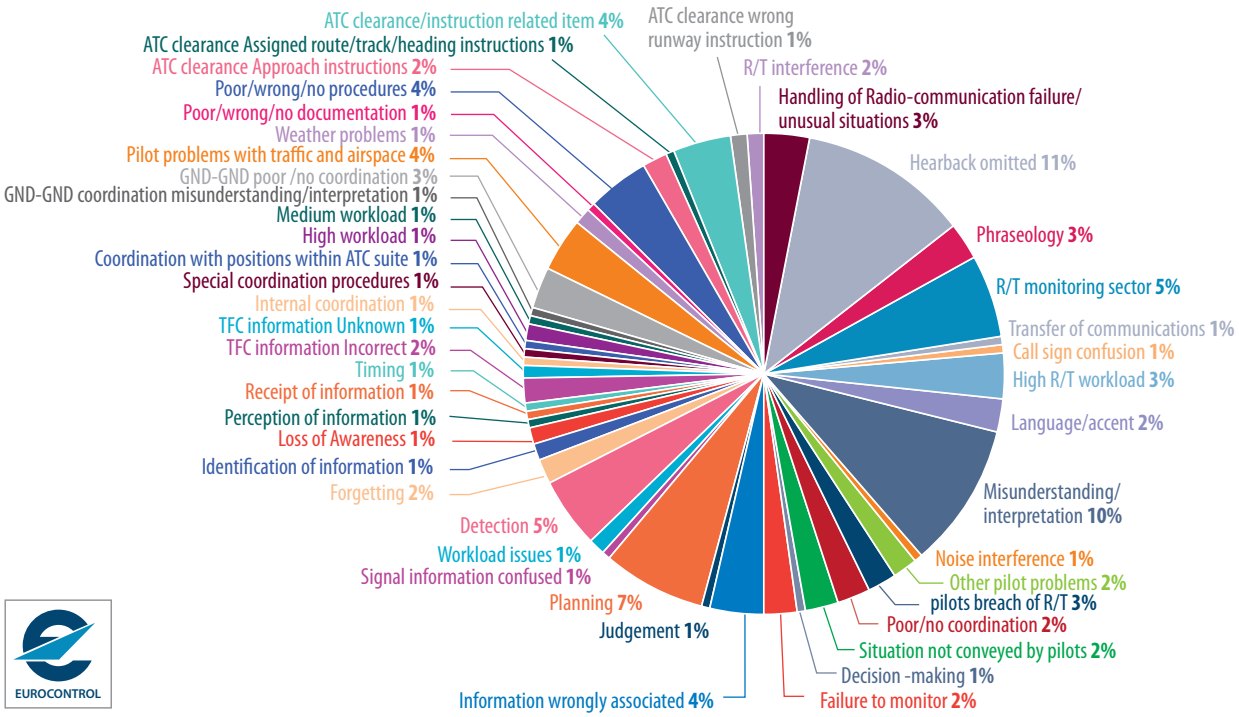


EVAIR figures show that for the periods 2013-2017 runway incursions accounted for 1.7% of the overall summer data and 1.5% for the year as a whole.

EVAIR yearly view on the number of states and locations where RWY Incursions occurred and number of AOs participated in the RWY Incursions, show that in 2017 there was the increase per each monitored area.

The number of states and locations indicates that the problem is Europe-wide, although some areas are more affected than others. Searches in the database showed that, for the whole period 2013-2017, four out of twenty States accounted for 77% of runway incursion events. When we applied the same approach to the locations, it showed that six of the sixty-five locations accounted for 43% of the runway incursion events.

Figure 19: Runway Incursions contributory factors 2013 – 2017



For the period 2013-2017, 14% of runway incursions were followed by Go-around, which was the last safety barrier. The most frequent reasons for the Go-around linked with runway issues were Aircraft on the runway (81.5%), Vehicle (14.8%) and Person (3.7%).

More details about contributory factors, as well as mitigating measures and recommendations in the European Action Plans for the prevention of Runway Incursions (and Excursions).

https://www.skybrary.aero/bookshelf/books/4093.pdf

De-identified occurrence reports

07 Oct 2017 airline report

On final to runway 16L, we were switched over to tower frequency 120.9, but did not check in. After landing, the controller asked if we had checked in earlier, we could not recall if we had. We concluded that we must have landed without a landing clearance (no other aircraft was on the runway or taxiway close to the runway in use).

Feedback from ANSP facilitated by EVAIR

An incident occurred during landing on RWY 16L.

In fact, an a/c landed on runway 16L without any clearance. There was no conflict with other traffic.

09 Apr 2017 ANSP report and investigation

A/c was performing a visual approach for RWY12 in contact with the APP controller, who instructs the crew to contact TWR. The handover of the traffic was done at 4 NM from the touch-down.

Crew failed to contact TWR, who tried to establish radio contact with them; a/c landed without clearance and only after repeated calls from the TWR, the crew said that they had not been able to change frequency.

22 May 2017 Airline report

ATC asked the crew to taxi on closed taxiway twice. Taxied off stand, heading east for RWY22R departure via F. Instructions changed to join northerly taxiway via E, which was closed by NOTAM and had cones across it. Refused and repeatedly queried the instruction. Crew advised that it was unable due to closure, at which point the ground controller admitted that this was an error. A safe taxi route followed after the crew had refused the first ATC instruction. The flight took off without incident. Fortunately, this took place on a sunny day, not at night.

Feedback from ANSP facilitated by EVAIR

1. This incident was classified as a specific ATM occurrence because it was a near-collision on taxi between an aircraft and an obstacle.
2. The main causal factor identified in the investigation was the loss of attention paid by the air traffic controller to zones closed to traffic at the airport.
3. The main contributing factor identified is the high number of Works in Progress (WIP) at the movement area and, consequently, the continuous changes in taxiways closures.
4. The pilot was instructed to taxi via gate F towards holding point of RWY 22R. In the following communication, an a/c arriving for RWY 22L was instructed to taxi via Link and gate F, with a warning that it had to stop to give way to a/c 1.
5. ATC identifies a potential taxi conflict at gate F and changes the taxi gate to a/c 1, now via gate E, forgetting that gate E had been closed by NOTAM.
6. A/c 1 asks for confirmation of air traffic controller instructions. At this moment, ATC realizes that the instruction was incorrect. The a/c left the platform via gate F, uneventfully.
7. There is no complaint on the frequency by a/c1 about the event and the controller apologizes for his error.

LEVEL BUSTS IN THE PERIOD 2013-2017

For the period 2013-2017, 'level bust' occurrences accounted for 4.3% of all EVAIR reports. Over the last two years, for summer and whole years, both repositories, EVAIR and IATA STEADES, recorded slight increases. In the EVAIR database in 11% of all 'level bust' events ACAS RA played its role as last barrier preventing more serious incidents and the erosion of separation minima.

Figure 20: *Level Bust summer seasons 2013-2017*

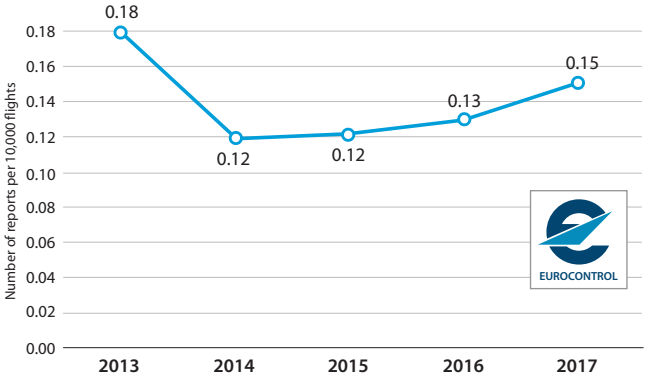


Figure 21: *Global Altitude Deviation summer seasons 2013-2017*

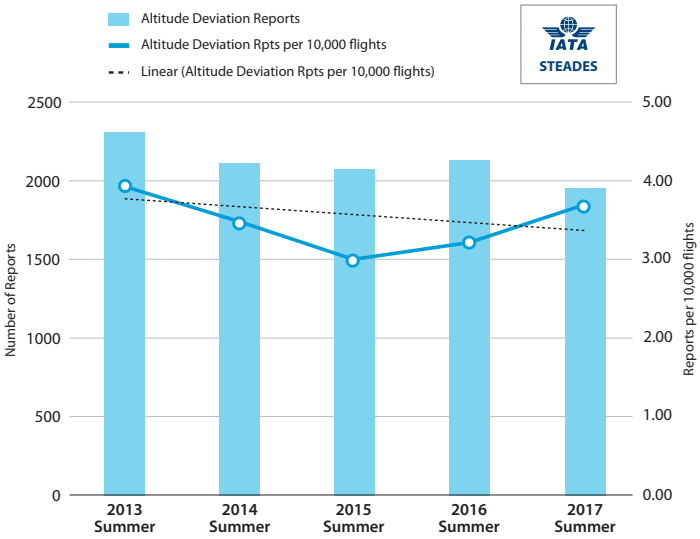


Figure 22: *Figure Level Bust 2013-2017*

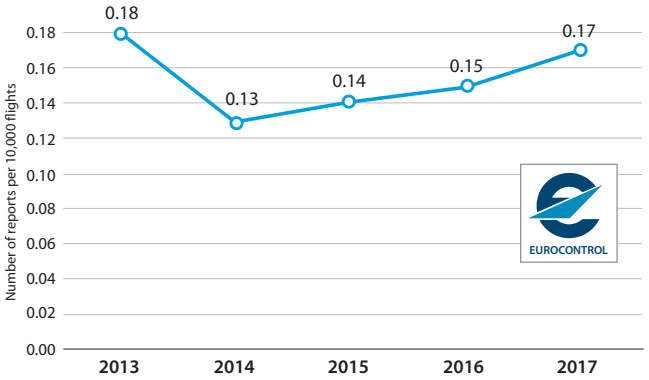


Figure 23: *Global Altitude Deviation 2013-2017*

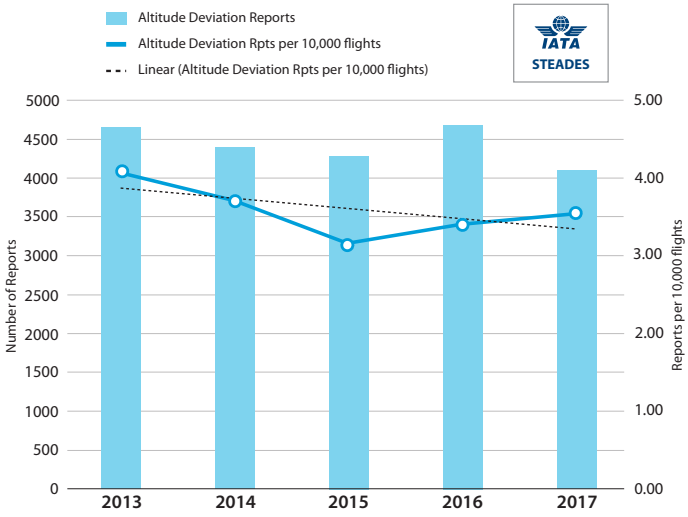


Figure 24: Level Bust per States, Locations & Aircraft Operators 2013-2017

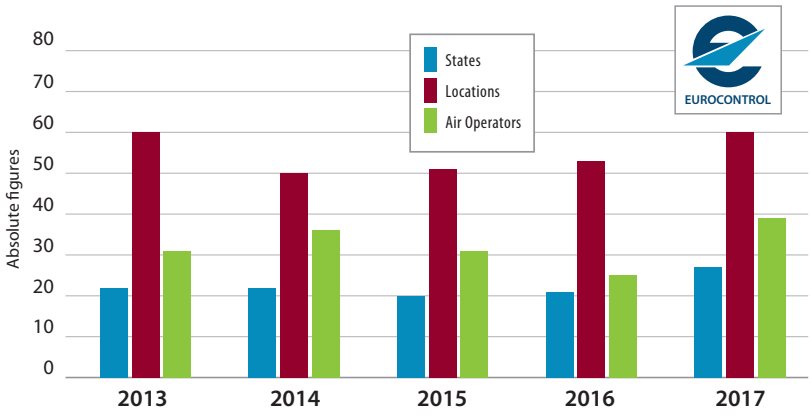
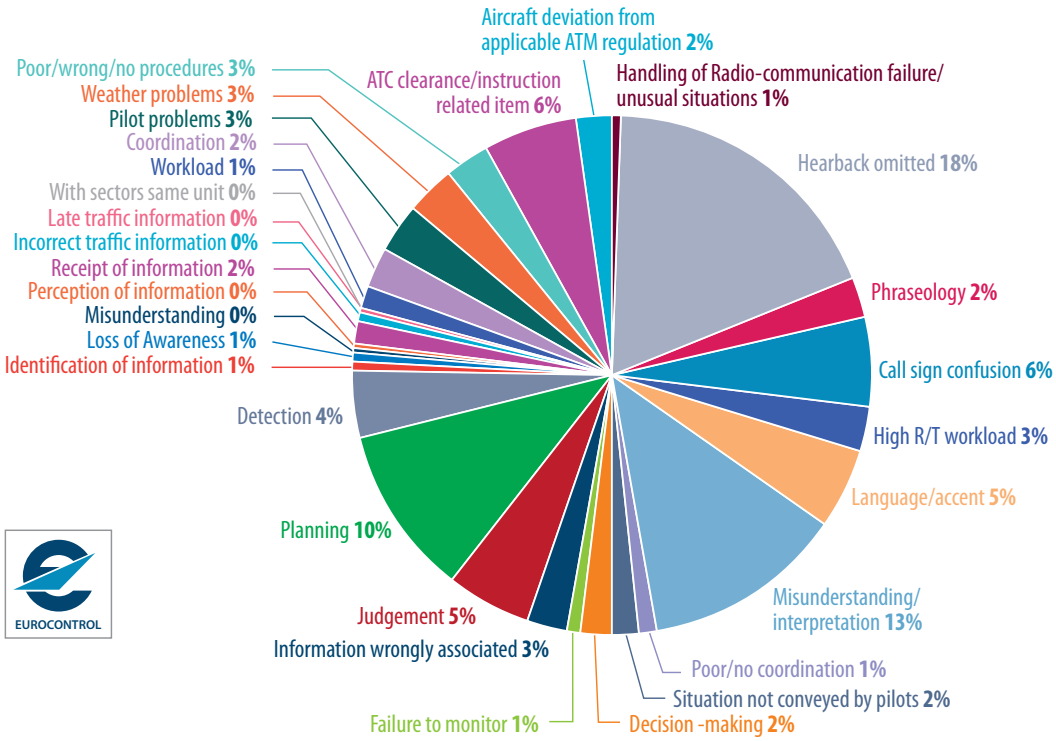


Figure 24 with 2017 yearly trend of the number of States (27) and Locations (60) where Level Bust occurred shows that Level Bust is European wide problem. Number of AOs (39) participating in Level Bust events is also quite high.

Within the level bust contributors, air ground communication, which encompasses hear back omitted, misunderstanding/ misinterpretation, phraseology, call sign confusion, language/ accent, poor/no coordination is the main contributor. Because it accounts for 47% of the overall contributors. Planning and judgment, typical air traffic controllers' duties, were identified as contributors in 10% and (5%) respectively in the reports.

Figure 25: Level Bust contributors 2013 – 2017



De-identified occurrence reports

19 Sep 2017 Airline report

We got an en-route clearance to climb to FL350. This was read back and entered in the FCU (Flight Control Unit) ALT (Altitude) window. Passing through FL345, we were experiencing light turbulence and asked for climb to our planned cruise altitude of FL380. We were then notified that our clearance limit had been FL340.We reselected FL340 and descended quickly back down to the authorized level.

ANSP feedback facilitated by EVAIR

10.36.06 crew got clearance to climb to FL340 direct to BOGAT with correct read back.

10.52.16 crew requested to climb to FL380 due to light turbulence at FL340.

Air traffic controller observed that a/c busted the cleared FL340 and instructed to descend to FL340 due to converging traffic at FL360 and due to opposite traffic at FL350.

10.53.05 Controller confirmed to maintain FL 340.

The occurrence was classified as a level bust with no other correlated events.

15 Dec 2017 Airline report

Altitude bust by 380 ft. During the missed approach, ATC re-cleared us to altitude 5000 ft instead of FL 70 as the aircraft was approaching 4500ft. We selected 5000ft in MCP (Mode Control Panel), but the Flight Officer who was the pilot flying selected ALT hold to reduce the closure rate. Aircraft overshot 5000ft then descended to try to capture the altitude at which the ALT hold had been selected. Simultaneously there was a frequency change and a heading change, which caused a distraction, resulting in the aircraft descending to 4620ft before recovery was made back to 5000ft.

ANSP feedback facilitated by EVAIR

From the ATC point of view, the altitude deviations, as captured by the radar were not significant (a 200 feet overshoot followed by a 400 feet undershoot before levelling at 5000 feet).

Nevertheless, we reckon that re-clearing to 5000 feet when the aircraft is reaching 4500 feet does not constitute good ATC practice, especially considering that no other aircraft affected the aircraft making the missed approach. In this respect, the APP ATC will be reminded not to issue tight altitude/flight level re-clearances.

EVAIR SUPPORT FOR THE EUROCONTROL CALL SIGN SIMILARITY PROJECT

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 important 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 proceed with Service Level 2.

CALL SIGN SIMILARITIES AND CONFUSIONS IN THE PERIOD 2013 – 2017

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

PILOTS' REPORTS – CALL SIGN CONFUSION IN THE PERIOD 2013 – 2017

Figure 26: *Call Sign Confusion summer seasons 2013 - 2017*

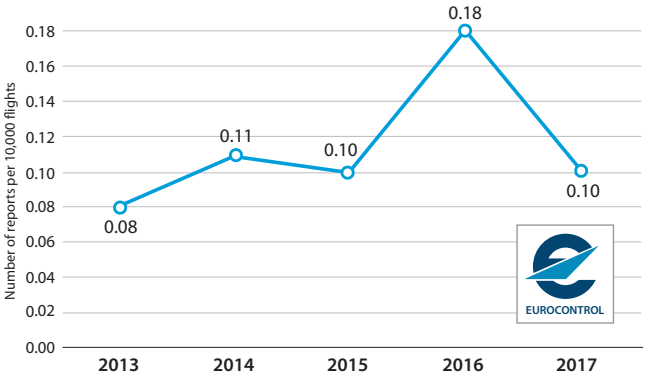


Figure 28: *Call Sign Confusion 2013 - 2017*

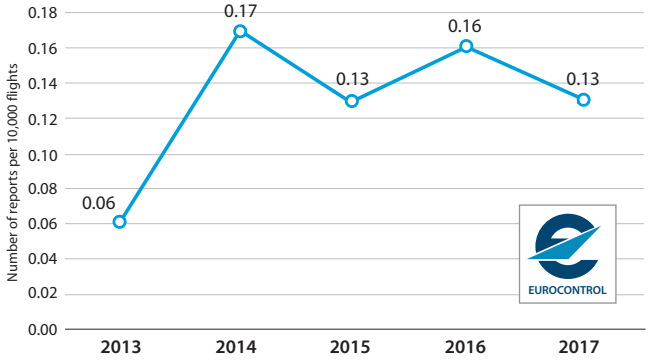


Figure 27: *Global Call Sign Confusion summer seasons 2013-2017*

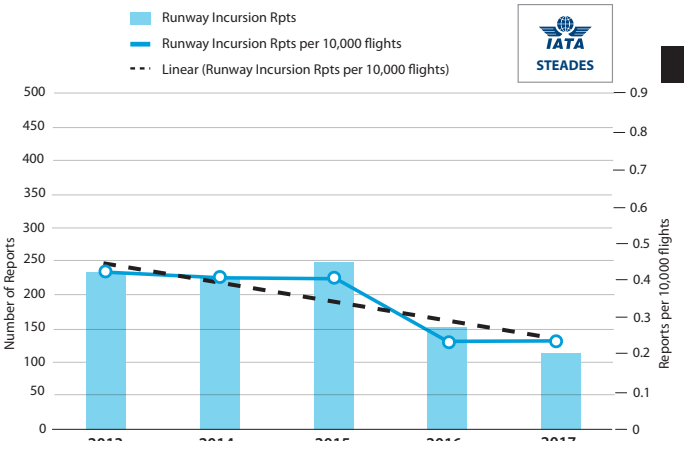
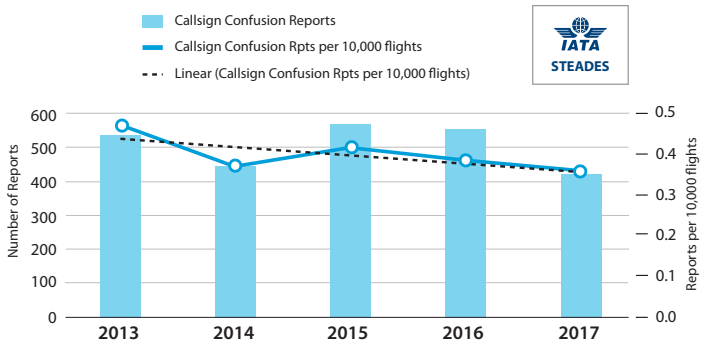


Figure 29: *Global Call Sign Confusion 2013-2017*



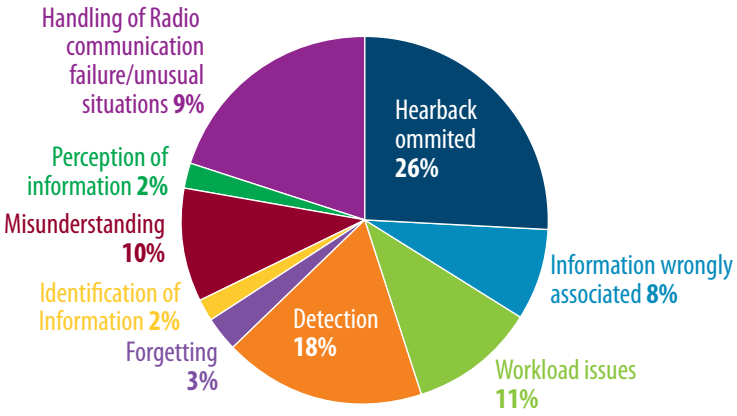
For summer 2017, call sign confusion reports provided by airlines' Safety Management Systems (SMSs) account for 3.1% of reports (4% for 2017 as a whole) in the EVAIR database.

EVAIR and IATA STEADES global data for 2017 showed the same trend, with both recording a reduction. However, for the period 2013-2017, the trend lines have different orientations; upwards for EVAIR because of significant increases in 2014 and 2016, and downwards for IATA STEADES.

For the period 2013-2017, there was no ATM contribution in 77% of the reports, indicating that the problem rests with the airborne side.

Within 23% of 'direct' and 'indirect' ATM contributions, 'hear back omitted' was the most frequent contributor. (Figure 30)

Figure 30: *Call Sign ATM contributors 2013 – 2017*



AIR NAVIGATION SERVICE PROVIDERS' CALL SIGN SIMILARITY AND CONFUSION DATA 2013-2017

For the period 2013-2017, EVAIR received about 20,000 call sign similarity/confusion reports from 18 European Air Navigation Service Providers. EUROCONTROL's call sign similarity/confusion reporting and data collection mechanism makes it possible to take ad-hoc measures to resolve similarities. ANSPs wishing to benefit from the support of the EUROCONTROL Call Sign Management Cell Services provide the data on a daily basis; however, those who do not need such assistance provide their data on a monthly basis. The EUROCONTROL Call Sign Management Cell Services help to resolve problems quicker, at least in cases where AOs are willing to change their call signs on an ad-hoc basis, before the end of the season.

Figure 31: *Number of AOs with the CSS/C as identified by ANSPs 2013 – 2017*

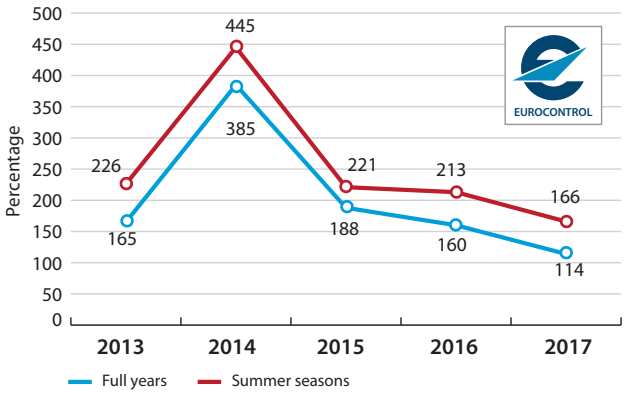
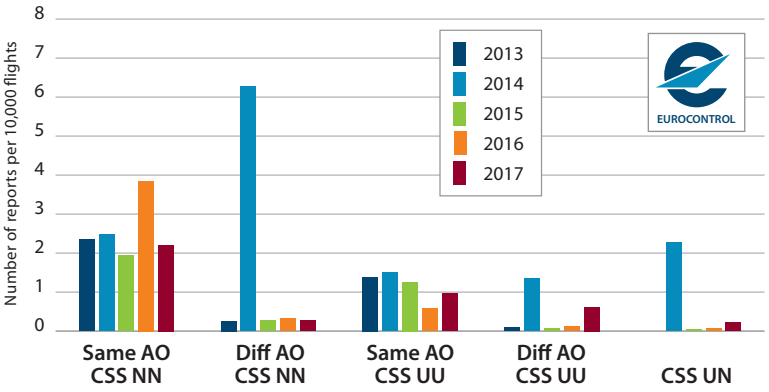


Figure 31 shows the number of AOs who had a problem with 'call sign similarities and confusions'. Over the last three years, EVAIR recorded a decrease in the number of AOs with 'similar call signs'. In 2017, the recorded decrease was 22% versus 2016. The reduction in the number of AOs with the call sign/confusion problems coincide with the constant promotion of the Call Sign Similarity De-confliction Tool and its use, as well as the use of alphanumeric call signs. Different airline associations, including the biggest one, IATA, are promoters of call similarity/confusion activities and in that regard the use of the Call Sign Similarity De-confliction Tool. European carriers are the most involved, however a number of airlines from other regions are interested in the tool and application of the CSS de-confliction rules is increasing. Among non-European airlines, those from Middle East are particularly active.

Figure 32: *Call Sign Similarity non-tool users and tool users 2013 – 2017*

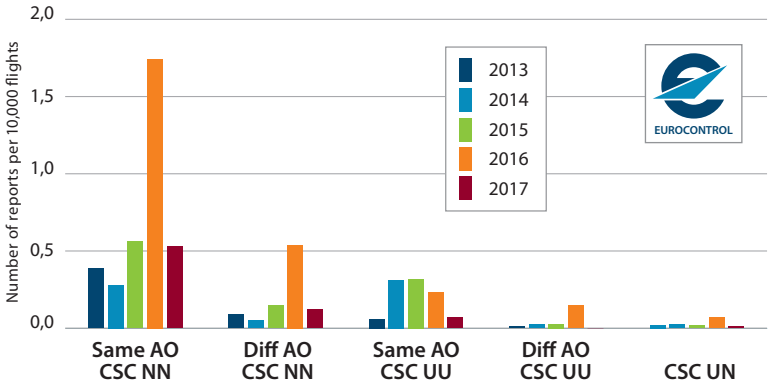


Call sign similarity statistics show that the problem is still mainly with the individual Aircraft Operator (AO), regardless of the use of the Call Sign Similarity De-confliction Tool (Figure 32). However, the trend in similarities occurring among non-tool users is much greater than among those who use the tool.

Explanation of abbreviations on the Figures 32 and 33

- **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.

Figure 33: *Call Sign Confusion non-tool users and tool users 2013- 2017*



The situation with call sign confusion trends is similar to that for call sign similarities. Tool users recorded significantly lower trends throughout the five-year period (Figure 33) and still the main confusion problems are with the individual AO.

CSST Access and Additional Tokens

It has been very pleasing to note that new AOs continue to join the CSST family. A 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 who 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, if requested, provided on-site 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

De-identified occurrence reports

01 Jan 2017 ANSP report

AAA341 proceeded to PABUI established at FL370. Another flight of the same company with the call sign AAA431A proceeded to TABAX established at FL350. Both aircraft were within the same sector. When AAA341 was 36 NM north of handover point, the controller instructed the crew to contact the neighbouring sector. However, AAA431A, 100 NM north of handover point, the crew read back this instruction and the controller did not detect it. When AAA431 was near PABUI point, the controller from sector 1 called the crew on 121.500 and provided the aircraft with the correct frequency. Regarding AAA431A, the sector 2 controller instructed the crew several times to contact sector 1 and, of course, did not receive any answer. Finally, he tried on 121.500 and AAA431A answered and reported that there was already contact with sector 1.

3 Aug 2017 – Airline report

The crew of AAA43A started an initial descent to FL290. After a short period, ATC called to instruct a descent to FL280 as heard by the crew and read back by the First Officer. The aircraft descended to FL280. Again, after a short period, ATC queried the FL and stated the clearance was only to FL290. No further issues.

ANSP feedback facilitated by EVAIR

Aircraft involved AAA43A and RRR413A
07:49 AAA43A, direct point GARUL descending to FL290, establishes radio contact with controller and is cleared direct POT;
07:51 Controller clears RRR413A to climb to FL280. Read-back is covered by a "blocked transmission". Controller repeats the clearance specifying that instruction is intended for RRR413A; RRR413A correctly reads back.
Occurrence was classified as call sign confusion.

11 Dec 2017 ANSP report

Call sign confusion between same company flights TTT572C and TTT752.

20h37: TTT572C calls ATC but ATC answers to TTT752 giving direct DIREF and TTT572C says "thank you, "direct DIREF", then TTT572C requests confirmation of the route and advises ATC that maybe there was a mistake with the call sign .TTT572C is transferred to the correct frequency.

20h38: TTT752 calls for the direct to SILOM. ATC clears direct to DIREF.

A confusion from ATC, fortunately detected by the crew.

AIR-GROUND COMMUNICATION IN THE PERIOD 2013-2017

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 57).

In 2017 'air-ground communication' consisting of 'spoken' and 'operational' communication accounts for almost 40% of the top seven contributors to ATM occurrences identified in the EVAIR database, and is 5% higher than in 2016. Spoken communication is a much bigger contributor than operational communication.

'Air-ground communication' continues to be the most frequent contributor to: 'runway and taxiway incursions', 'level busts', 'call sign confusion', 'ACAS RAs' and 'go-around'.

Air-Ground communication in terms of the number of occurrences per 10,000 flights for summer and full years is not so different. In 2017 EVAIR recorded a slightly lower summer season trend versus full year. Trend lines have a slightly different orientation. The summer trend shows a very small decrease while the full-year trend line shows a small increase.

Figure 34: *Air Ground communication summer seasons 2013-2017*

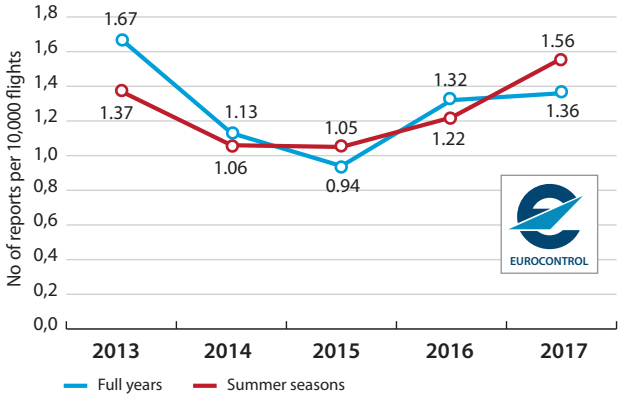


Figure 35: *Two major air-ground communication areas cumulative figures Summer seasons 2013 - 2017*

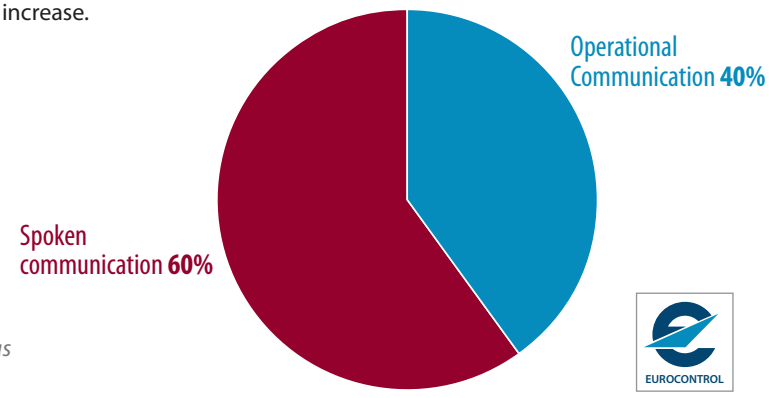
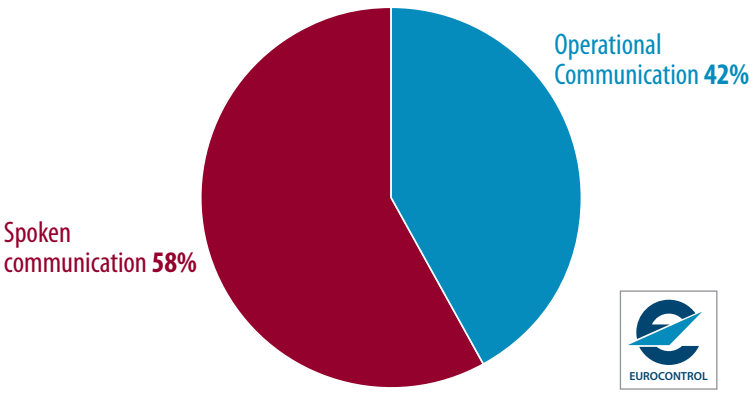


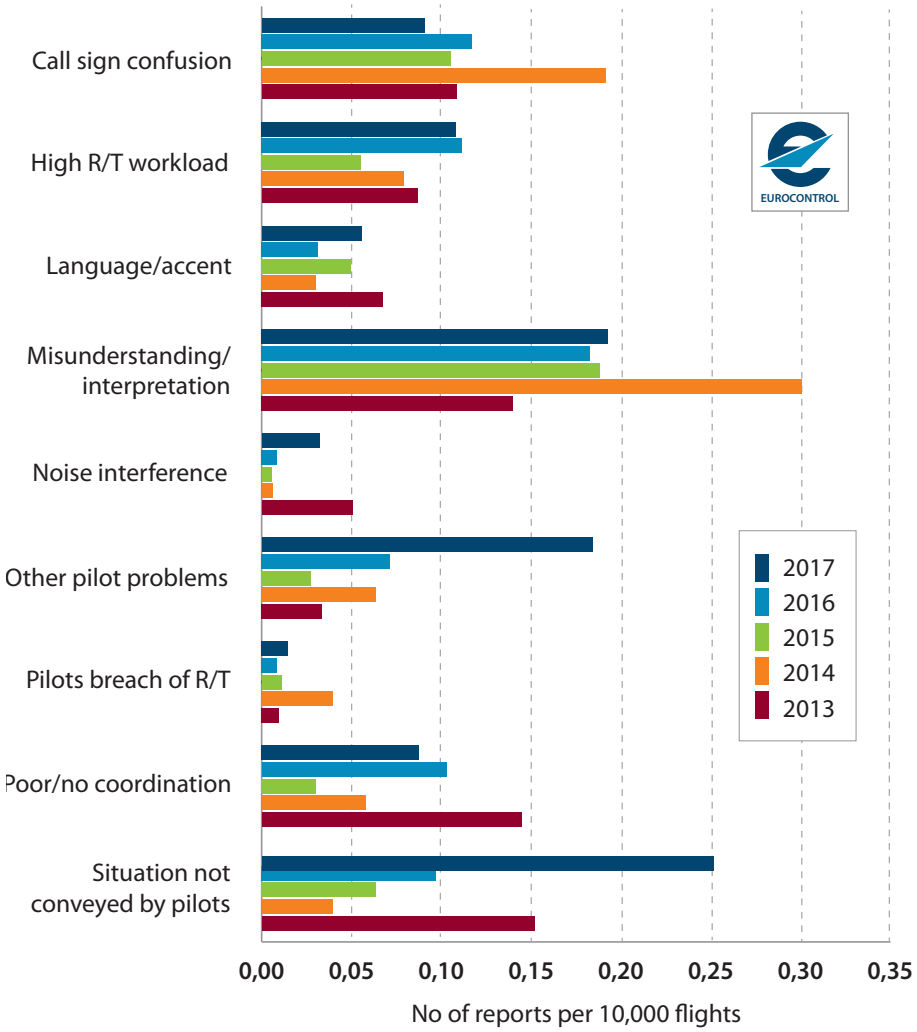
Figure 36: *Two major air-ground communication areas cumulative figures seasons 2013 - 2017*



The percentage breakdown between 'spoken' and 'operational' communication within 'air-ground' communication during summer seasons and whole years is very similar. 'Spoken communication', which is very much related to knowledge of the English language, understanding and interpretation of the communication, call sign confusion and workload, is always higher than 'operational communication'.

Regardless of the season within 'spoken communication', 'misunderstanding/interpretation' is the area with the highest grouping of reports. In 2017, there was a significant drop, which obliges us to monitor the situation and see whether this trend continues in 2018. We will also keep an eye on 'situation not conveyed by pilots' and 'poor/no coordination', since they recorded increases in summer 2017.

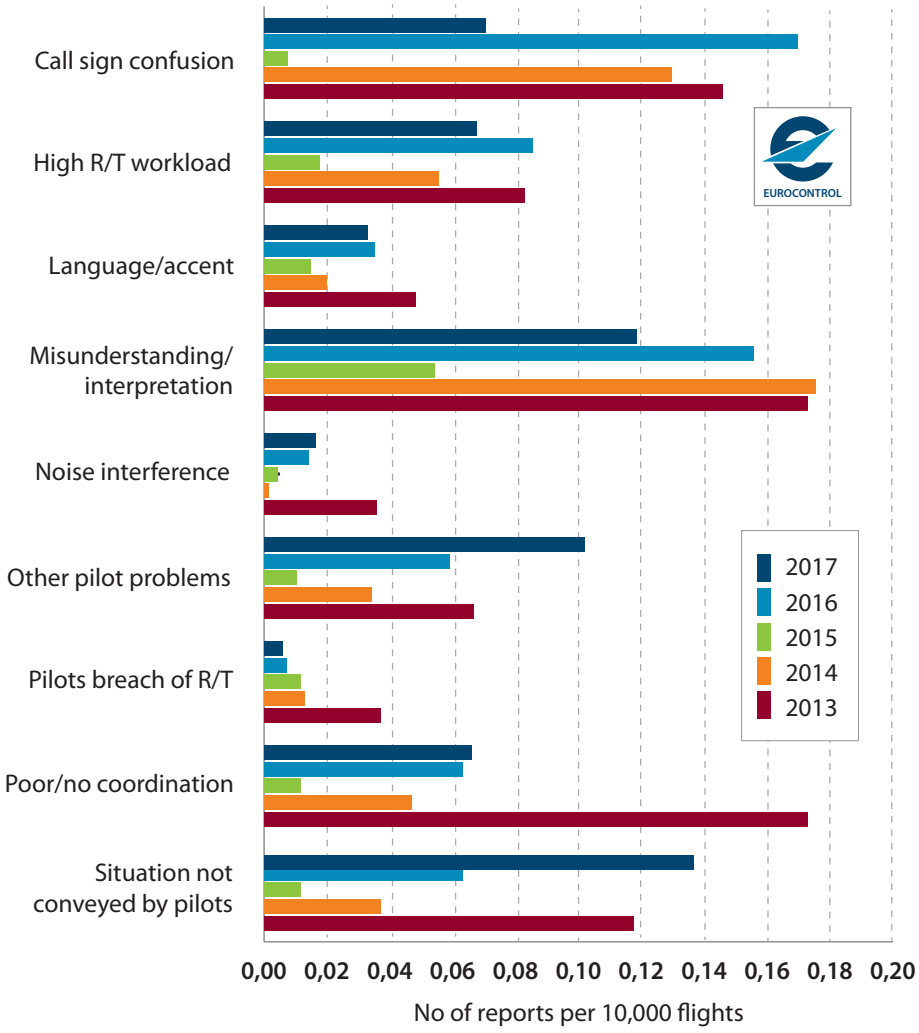
Figure 37: *Spoken communication summer seasons 2013-2017*



According to the EVAIR statistics, 'spoken communication' trends per 10,000 flights are much higher during summer seasons.

It is understandable having in mind that during the summer seasons traffic complexity in terms of variety of AOs, destinations, number of operations etc. is much higher.

Figure 38: *Spoken communication 2013-2017*



The last five summer periods 'hear back omitted' recorded higher trends than other areas. However, in 2017 'hear-back omitted' as well as 'transfer of communication' recorded a decrease while all other areas recorded an increase in the number of reports per 10,000 flights.

The difference between summer and full-year trends per 10,000 flights within 'operational communication' are not as big as within 'spoken communication'. Study of the database showed that there is a link to the higher number of different airlines flying during the summer season and the number of different destinations.

Figure 39: *Operational communication summer seasons 2013-2017*

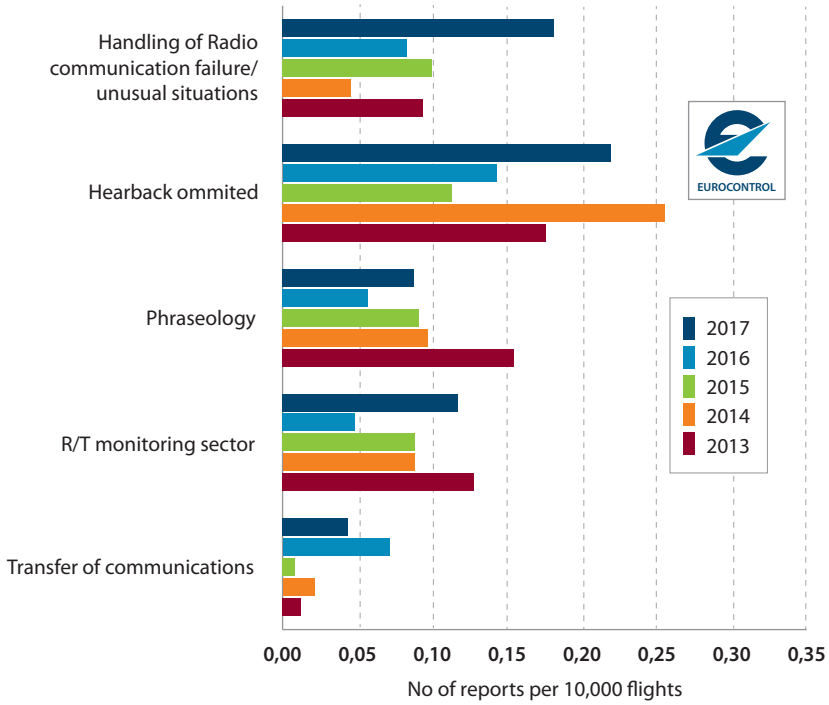
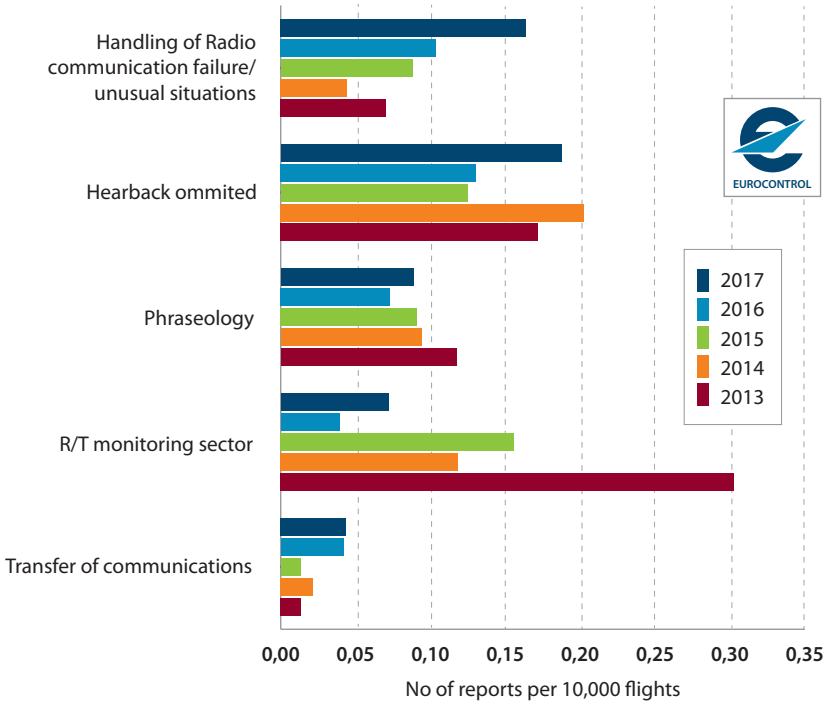


Figure 40: *Operational communication seasons 2013-2017*



De-identified occurrence reports

25 Jan 2017 Airline report

We were cleared for line up initially on runway 07L. After lining up we were cleared for take-off. According to our procedure, we set 50% of power before releasing the brake. At the moment the F/O PM released the brake the tower controller says "start rolling" but I understood and the 2nd pilot understood the same, namely "stop rolling". I then ordered a stop. The tower immediately understood the misunderstanding and confirmed we had been cleared for take-off. We then took off. The tower did not use the right words and we misunderstood what was wanted. He should have asked us if we were ready for an immediate take off, provide traffic information and remember that the take-off clearance is valid for 1 min. After the take-off clearance they should not have said "abort take off'.

ANSP feedback facilitated by EVAIR

The expression by the controller was misleading. The proper phrase should have been: **hold position cancel take-off** or **stop immediately** instead of the non-standard phrase "abort take-off".

Airline report 22 Jan 2017

ATC requested if we were ready for immediate departure, which we confirmed. After take-off at about 1000 feet, the tower controller asked us if we had heard the take-off clearance cancellation. We answered "no" (no messages received between T/OFF thrust and rotation, we assume that this message was weakly formulated by the controller and never repeated because it was silent throughout the take-off roll) We didn't make any power-up on brake but a rolling take-off. The controller from the tower told us that they found our take-off slow.

ANSP feedback facilitated by EVAIR

A/c1 was cleared for take-off. After 42 seconds, TWR cancelled the take-off. Pilot's read back was not received. After having being airborne, TWR asked if the crew received the take-off cancellation. The answer was that the crew received only the clearance for an immediate take-off. Tower said that their take-off roll took too long. This resulted in a separation minima infringement between a/c1 departing from RWY25 and a/c2 arriving for RWY 16R.

Closest point of approach was 1.5NM, whereas minima is 3NM.

The following issues emerged:
From the recording, it appears that a/c1 and TWR were convinced that a clearance for an immediate take off was issued, but immediate take-off must have been cleared and executed in only one manoeuvre starting from the holding point with no line-up.

The phraseology used by ATC to cancel take off was not fully standard, read-back was not received and soon TWR realized that a/c1 was not stopping but still rolling at high speed.

In this scenario, the controller judged that it would have been too risky to stop the take-off roll at high speed.

LOSS OF COMMUNICATION IN THE PERIOD 2013-2017

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

Figure 41: *Loss of communication summer seasons 2013 – 2017*

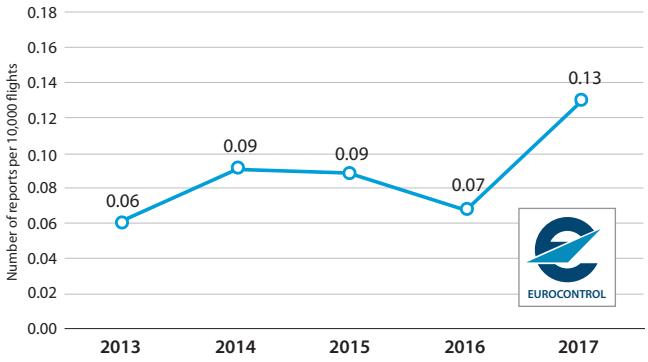


Figure 43: *Loss of communication 2013 – 2017*

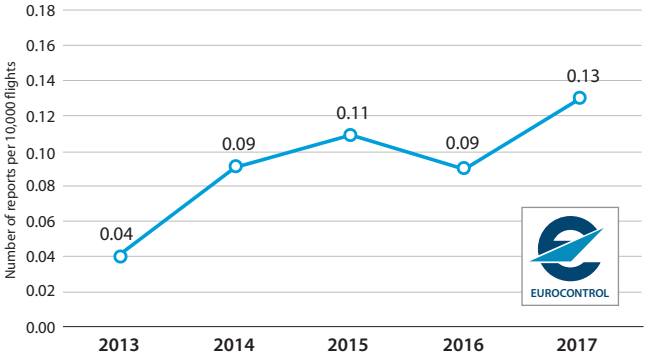


Figure 42: *Global Loss of communication summer seasons 2013-2017*

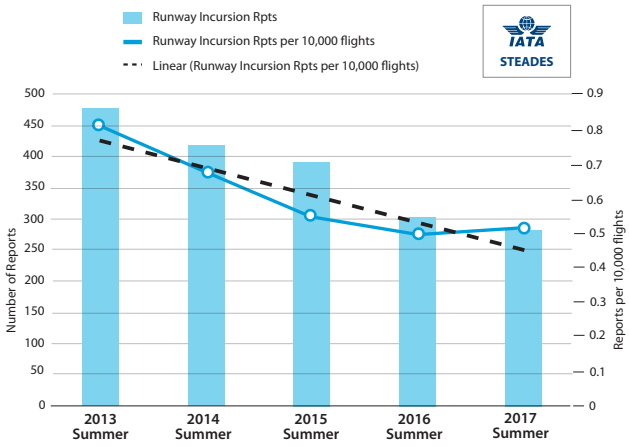


Figure 44: *IATA Loss of communication 2013-2017*

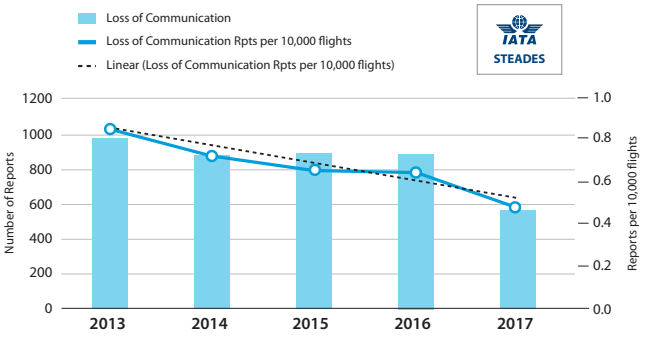
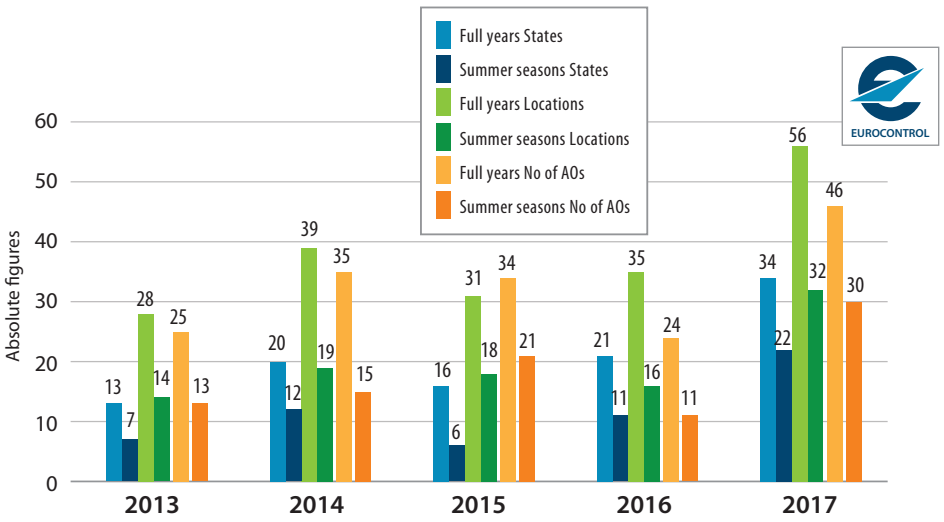


Figure 45: *Loss of communication States & Locations Full years and Summer seasons 2013-2017*



In 2017 EVAIR recorded increase with respect to 2016 in all elements: Locations, States and AOs.

Figure 46: *Loss of communication phases of flight summer seasons 2013-2017*

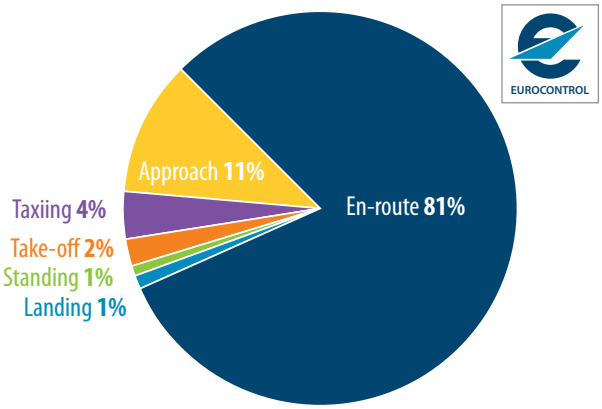
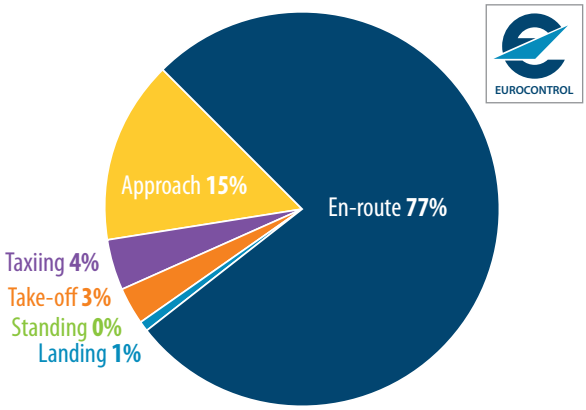


Figure 47: *Loss of communication phases of flight seasons 2013-2017*



Most 'loss of communication' incidents (i.e. between 77 and 81%) occurred during the en-route phase (Figures 46 and 47). The most frequent causes of 'Loss of Communication' within the en-route phase were incorrect frequency selection, lack of ATC instruction to change frequency and emergency frequency used for other purposes.

Figure 48: *Loss of Communication - ATM system contribution summer seasons 2013- 2017*

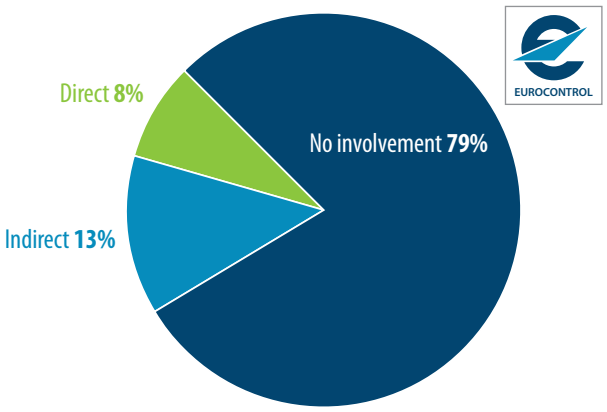
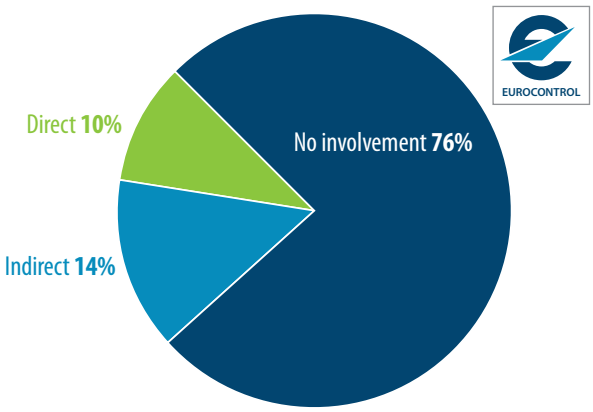
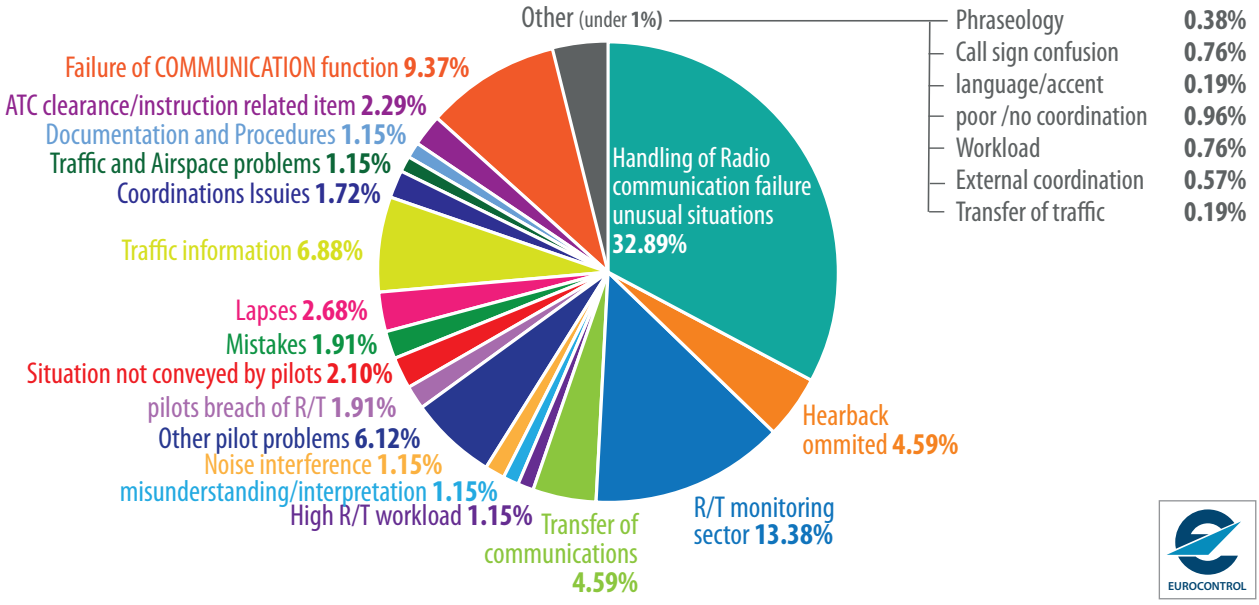


Figure 49: *Loss of Communication - ATM system contribution seasons 2013- 2017*



In the majority of events, ATM did not have the contribution. Direct ATM involvement varies from 11-14%, depending on the season summer or full year.

Figure 50: *Loss of communication Contributors*



As for the previous seasons, the main contributor to 'loss of communication' is 'handling of radio communication failure/unusual situations', which accounted for almost 33% of cases. '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. The Figure 50 gives a useful insight into the areas, which might be addressed to mitigate the problem.

Loss of communication' is very often associated with other types of ATM events. Go-arounds and runway incursions are the most frequent (Figures 51 and 52).

De-identified occurrence reports

Airline report 2 Nov 2017

5 minutes before TZB a/c1 crew checked the ACP (selection and volume) as the crew was expecting a transfer to the next sector. All was ok. Just before TZB a/c2 called on 121.5 and advised us to contact the sector PUA, which is what the crew did. 1 min after a/c1 received same request from the airline dispatch office via ACARS. The crew does not know what happened. Headsets were on and radio checked. Did we miss something?

ANSP feedback facilitated by EVAIR

Considering the information available, it is concluded that the event constituted a deviation from ATM procedures and classified it as an air traffic incident, severity C.

The cause of the incident was loss of communication for around 20 minutes, involving three different sector's frequencies (MUZ, DUG and PUA).

a/c1 was in contact with MUZ frequency. When MUZ was going to transfer a/c1 communications to DGU Sector, the aircraft did not answer. MUZ did not detect the loss of contact (maybe because ATC started, just a few seconds after the transfer, a coordination about another aircraft not involved in the incident).

Figure 51: *Associated events with Loss of Communication summer seasons 2013-2017*

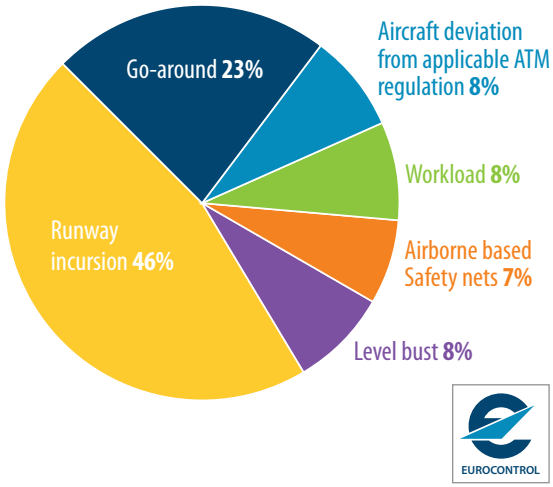
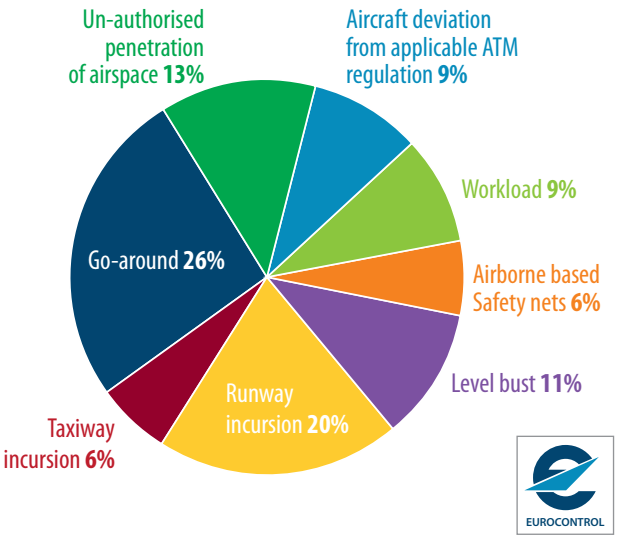


Figure 52: *Associated events with Loss of Communication seasons 2013-2017*



A few minutes later, other company a/c called on DUG frequency. DUG ATC instructed this aircraft to fly LUSEM". Company a/c2 tried to confirm that the instruction was for them ("Confirm calling a/c2") but DUG ATC did not answer that request. However, a few seconds later, a/c2 again asked DUG ATC who, in that case, answered "a/c2 radar contact". That situation could have had an influence on the detection of incorrect read-back by DUG ATC.

DUG instructed a/c1 contact on PUA sector frequency, but there was not any read-back. Since then, both DUG and PUA sectors tried to contact a/c1 on their own frequencies as well as on guard frequency, without success.

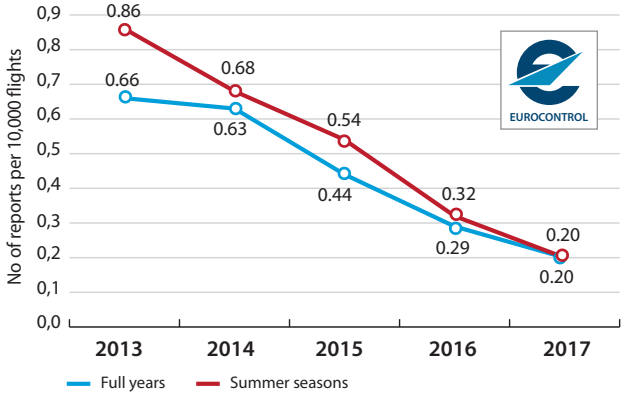
PUA sector informed the neighbouring ACC about the loss of communication and asked other company aircraft to try to contact a/c1.

Finally, a/c1 re-established communication with the neighbouring ACC airspace, around TBZ.

SPECIFIC EVENTS - LASER THREATS ACROSS EUROPE IN THE PERIOD 2013-2017

Fourth year in a row summer seasons and full years of 'Laser threats' recorded decreasing trend. However, problems still exist and some states keep taking number of different measures to address the laser problem. The most important stakeholders, i.e. police, air carriers, ATC, manufacturers, media etc. are supposed to work together in order to be able to cope with the problem in the most efficient way. Moreover, The different stakeholders working together (hand-in-hand) and sharing of lessons learned is important to establish a harmonised way of dealing with laser problems on the regulatory and operational field.

Figure 53: *Laser interference Full years and summer seasons 2013-2017*

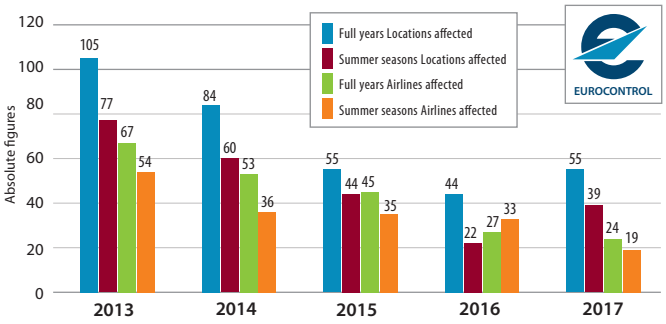


Laser interference during summer seasons was at a slightly higher level than for full years. Normally, the final approach phase is the most affected. However, during summer seasons more reports were concentrated in the final approach of the airports on the coast, where traffic during summer is much higher. It is interesting that in a few cases laser interference was recorded at very high altitudes, which raises concerns about the power of the laser equipment used in such occurrences.

The duration of the laser illumination recorded in 2017 was from a few seconds to more than a minute. Longer durations of laser illumination means that perpetrators could have used additional equipment such as laser holders, which help them to be more precise and keep the illumination of aircraft longer than when the laser is hand held.

Yearly trends of locations and aircraft affected by laser interference show that, in spite of the general decrease of the number of laser interferences, an increased number of affected locations was recorded in 2017 by EVAIR. Thus, the

Figure 54: *Laser interference, no. of locations and no. of affected carriers 2013-2017*



geographical area affected is much larger than in 2016. On the other hand, in 2017, there was a lower number of reports than in previous years. We suspect that the reason for the lower number of reports is that pilots became familiar with laser issues and reported them immediately to ATC on the frequency.

Reports can be sent to dragica.stankovic@eurocontrol.int
More information about lasers is available on the SKYbrary (www.skybrary.aero).

De-identified occurrence reports

9 Aug 2017 Airline report

Laser shone at a/c. On departure a bright green laser was shone into the flight deck from a position estimated one NM north of the a/c position. We were careful not to look at it. Laser reported to ATC. No ill effects on flight crew. Police informed by ANSP.

15 Jul 2017 Airline report

Captain noticed a green laser approximately 20 miles left of aircraft coming from a location a few miles east of a town. The laser was deliberately aimed at the aircraft. ATC informed.

ANPS feedback facilitated by EVAIR

The ANSP has set up a hot line between ATS and the police for immediate reporting of laser and drone issues. Upon receiving the pilot's report, ATC informed the police immediately. The event was also reported immediately to the National Investigation Board and to the CAA.

Unfortunately, the number of laser disturbances has been increasing this year.

RPAS – REMOTELY PILOTED AIRCRAFT SYSTEMS (RPAS)/DRONES IN THE PERIOD 2013-2017

EUROCONTROL Voluntary ATM Incident Reporting (EVAIR) drone statistics are based on ATM incident data provided by commercial airspace users and European Air Navigation Service Providers (ANSPs), including a few Air Navigation Providers from neighbouring regions. The clear majority of reports come from Aircraft Operators.

Most of the reports concerning RPAS/drones were recorded at low altitudes. However, a few events were recorded at higher altitudes/levels, up to FL350.

In many cases, pilots were able to describe the shape, size and colour of the drones, indicating that the distances between the aircraft and drones were very small. In 2017, according to airline reports, horizontal and vertical separations were between a few metres up to a few hundred metres.

The absolute majority of drone occurrences occurred during the approach phase, either during arrival or departure. When encountering drones, pilots usually asked ATC if they had any information about the drone presence in the sector. In the majority of cases, ATC did not have prior information about drone presence. In the cases where the ATC had such information, it was from the pilots who had already flown through the sector. Pilots provided the drone information to ATC when there were VMC conditions.

Almost 14% of RPAS/drone encounters pilots assessed as AIRPROXES. According to the severity assessments made by the airlines, AIRPROXES need to be treated as serious occurrences.

Data show that summer season rates are higher than full-year rates. In a way, this is to be expected, bearing in mind that those who are using/abusing drones do so more often during good weather conditions. Since 2013, when EVAIR received the first drone reports, until 2017 there has been a steady increase in the number of drone occurrences. EVAIR continues to monitor the situation.

Figure 55: *RPAS trends summer seasons 2013-2017*

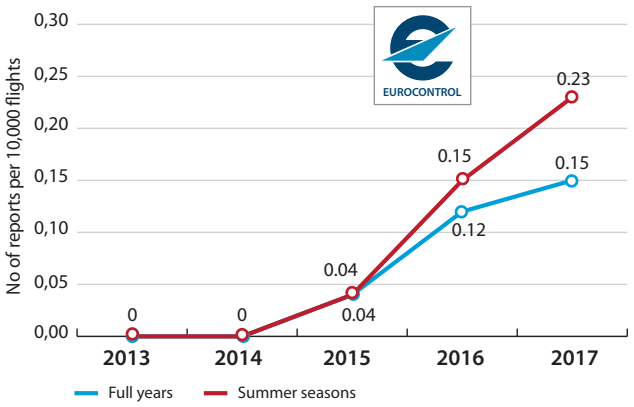
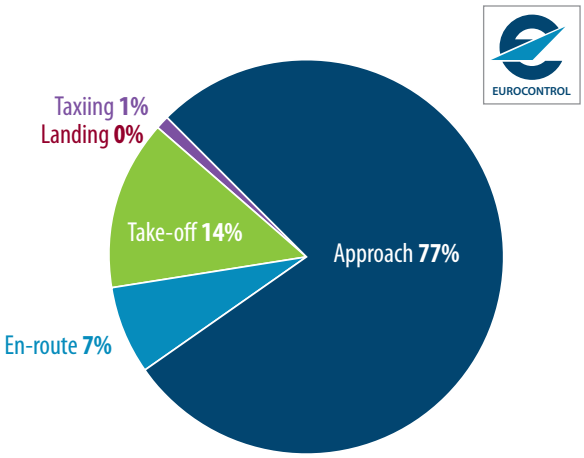


Figure 56: *RPAS Phases of flight 2013-2017*

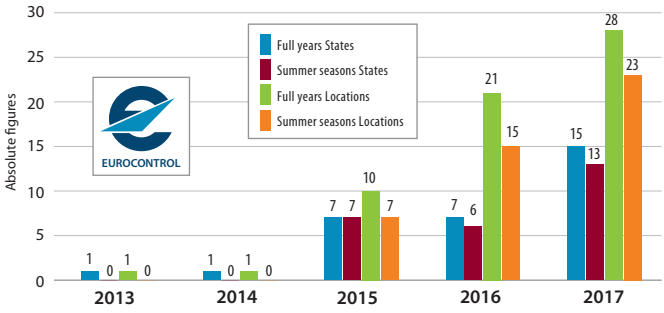


The above graph confirms that the majority of the encounters occurred at low-level altitudes. Only 7% of the drone occurrences happened at higher-level altitudes. Among such reports, there were a few instances with military drones where there was a lack of civil-military coordination leading to separation minima infringement.

RPAS/Drones per State and Location

EVAIR recorded a continuous increase in the number of states and locations affected by RPAS/drone non-coordinated activities. It is important to highlight that 59% of events were recorded within four states out of twenty where drones/RPAS were recorded. The number of reports and therefore the percentage is very much linked to the main hubs, where our best reporters operate.

Figure 57: *Drone spread across European States 2013-2017*



For the overall period 2013-2017, EVAIR recorded drones/RPAS at 48 different locations versus 32 for the previous period. Taking into consideration the yearly trends in the number of drone/RPAS encounters, the expectation is that the number of states and locations will be increasing in the future.

EUROCONTROL is cooperating with all European aviation stakeholders in activities aimed at safely integrating UAS. You can read more about EUROCONTROL involvement in the RPAS field here: http://www.eurocontrol.int/uas

The following links contain further information on RPAS/ drones, published by various international organisations:

ICAO 'Manual on RPAS' (Doc 10019) http://cfapp.icao.int/tools/ikit/rpasikit/story.html;

EUROCONTROL is cooperating with all European aviation stakeholders in activities aimed at safely integrating UAS.
You can read more about EUROCONTROL involvement in the RPAS field here:
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The following links contain further information on RPAS/ drones published by various international organisations:

- *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/

De-identified occurrence reports

19 Sep 2017 Airline report

Drone spotted close to aircraft. At 2.5 nm, short final to RWY 27R, the F/O saw what looked like a drone about 200 ft below and slightly to the right of the aircraft path. Approach and landing continued uneventfully. Drone reported to ATC on first sighting. Police attended the arrival gate and a statement was given by the flight crew. Object sighted had an orange vertical "body" with a white frame about 50cm across but hard to judge size. It was hovering in one position. I do not consider there was a risk of collision where the object was positioned.

24 Sep Airline report

Drone sighting. Flying at FL110 approaching the holding point we sighted a drone passing down our left side, same level, approximately a few hundred metres away. Crew reported the occurrence to ATC, who subsequently warned other proximate traffic.

24 Sep Airline report

On arrival at 3000 ft on the radial 240, we crossed a four-propeller blue drone under our plane's left side. I am unable to indicate the vertical spacing. But I saw the blue colour and the yellow strips on the blades.

25 Mar 2017 Airline report

Sighting of two objects approximately 200' below the aircraft on our SID track. Both objects small and could be described as dinner plate in size. Objects spaced approximately 100m apart. The object seen to the left side of the aircraft was white. The object seen on the right side was shiny blue.

5 Apr 2017 Airline report

During the approach for the RWY 26R, just after intercepting the glide path at 3000ft, a rectangular black drone observed directly in front of aircraft at same height. Drone passed just to the left of aircraft approximately ten seconds after first being observed.

10 Apr 2017 Airline report

During final approach RWY 35L at approximately 2500ft QNH (1800ft AGL) the flight crew noticed a drone of large dimensions (approx. 1 m of diameter) which passed approximately 100ft below the right wing and approx. 30 m to the right of the right wing. The a/c on approach continued to land. ATC were advised. Police met the crew to take statements.

Feedback provided by ANSP

The occurrence had already been reported by ATC. On the same day another crew reported to ATC another drone encounter at 17:35 at the same location.

GPS OUTAGES IN THE PERIOD 2013- 2017

GPS analysis and statistics provide a general overview for the period 2013-2017 within ECAC and the neighbouring airspace. EVAIR received first GPS outages report in 2013. EVAIR team identified it as a new type of events within the database and informed interested stakeholders, AOs, ANSPs, including IATA and EASA, trough the internal and external information exchange process. Since then, EVAIR continues informing our main stakeholders about GPS outages issues.

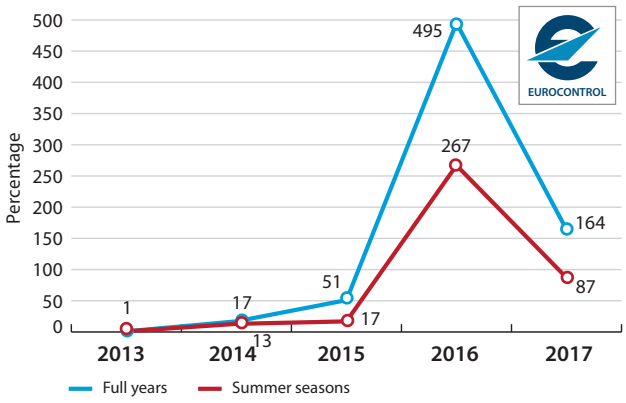
Between 2013 and 2017, GPS outages accounted for 6.3% of the total data in the EVAIR database.

It should be highlighted that the number of reports provided very often depended on the requests and reminder messages sent from time to time to data providers in order to obtain a better data sample for analysis. Figure 58, which shows summer and full-year GPS trends, confirms our observation on the reporting rates. Since 2016 we sent out reminders and asked the Aircraft Operators to submit their GPS reports to EVAIR. Our request for data resulted in an increased number of reports as compared to 2015. In 2017, we did not send reminder messages to aircraft operators, which could have led to a downward trend. Information obtained from different meetings attended by Aircraft Operators and ANSPs about GPS outages indicated that the problem was still being encountered frequently. EVAIR regularly monitors the situation and expects that in 2018 we could again see an increase because we have reminded on several occasions our data providers to report their GPS outages events to EVAIR.

GPS problems are reported more within PBN airspace and airports where SID/STAR procedures are based on satellite navigation. Due to the vulnerability of satellite navigation, Aircraft Operators have been asking ANSPs to reconsider the plans to decommission ground navigational aids.

AO operational and safety experts, IATA, EUROCONTROL, EASA and ICAO initiated awareness activities with the aim of alerting pilots and the wider aviation community familiar about the GPS outage problems, to be better prepared to cope with them.

Figure 58: *GPS outages full years and summer seasons 2013-2017*



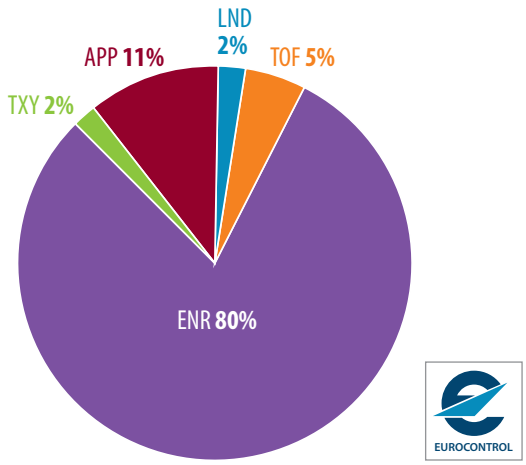
In 2017 EVAIR identified 44 FIRs affected by GPS outages versus 36 for the previous period. For some FIRs, we received from 150 to 300 reports. From a geographical point of view, the most affected regions were the Black Sea-Caspian Sea axis and Eastern Mediterranean. More detailed analysis of the distribution of GPS events shows that the majority of events occurred within the area of political tensions, which may indicate that one of the potential causes of such outages could have been intentional interference.

Personal Privacy Device (PPD) could also be the cause of GPS jamming. These devices can be easily installed in vehicles to avoid being tracked by satellite. When PPD equipped vehicles pass airport zones, final approaches or near airport gates, the devices could create GPS interference for parked aircraft or those in final approach. Additionaly, PPDs could lead to aircraft losing the satellite signal during approach or not being able to initialize GNSS receivers during pre-departure checks and establish satellite navigation.

Besides radio interference with the satellite signal, on-board GPS equipment failure, solar storms, military exercise and the configuration of satellite constellations could lead to the loss of the GPS signal. 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 there were none of the listed causes, then the most probable cause was Radio Frequency Interference (RFI).

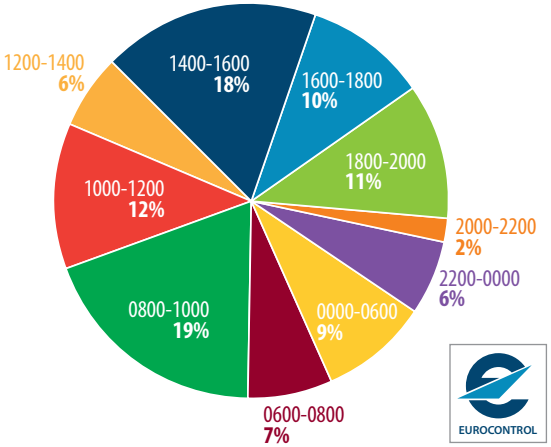
Figure 59: *GPS outages per phases of flight 2013-2017*



In all analyses the most affected phase of flight by GPS outages was the en-route phase. (Figure 59) However, in 2017 we noticed a decrease of the en-route phase percentage and an increase in the number of reports per other phases of flight, especially approach.

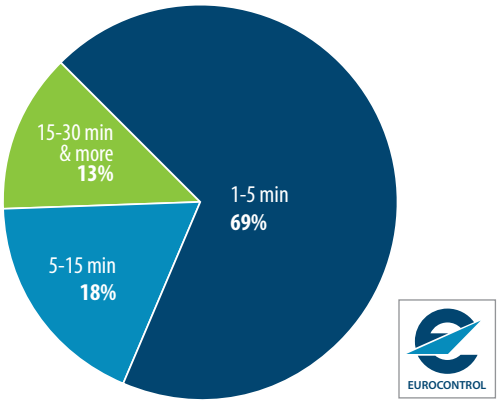
Looking at reports where the UTC time of occurrences were provided we noticed that before 2017 the most affected time windows were from 1400-1600 and 2200-0000. For the period 2013-2017, we still have the time window from 1400 to 1600 with higher percentage but the time window from 0800 to 1000 recorded a higher number of reports than the tie window 2200-0000. This is very much linked with the crisis in the Eastern Mediterranean and affected traffic flows, which connects Eastern Mediterranean and Europe. Before that, the most affected was the traffic from Middle East via Black Sea – Caspian Sea axis to Europe and vice versa.

Figure 60: *UTC Time of GPS outages 2013-2017*



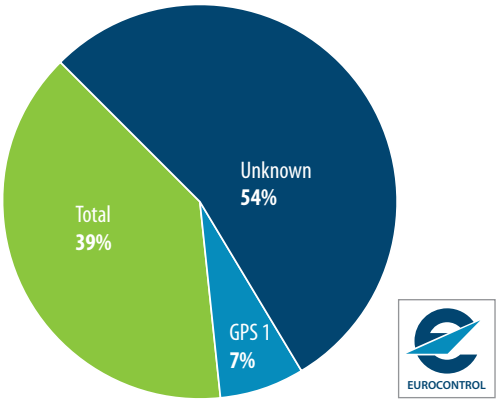
For the analysis of the duration of GPS outages, we set the time spans for lost signals at 1-5 min; 5-15 min; 15-30 min; and 30 min to 3 hours.

Figure 61: *Duration of the GPS outage – 2013-2017*



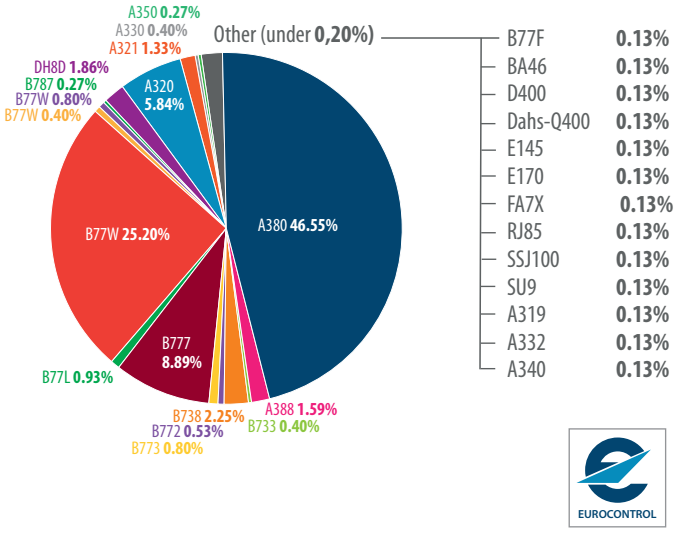
As shown on the figure 61, out of three defined time spans of the lost signal, the span from 1-5 minutes had almost 70% of reports, which is much more than before 2017 when the spread of reports was quite similar across all three-time spans.

Figure 62: GPS Loss 2013-2017



In the period 2013-2017, for 54% of GPS reports, there was no information as to whether one or both GPSs boxes had failed. However, in almost 40% of GPS reports there was a total loss of GPS signal. Raising awareness among Aircraft Operators and ANSPs about the potential loss of GPS signal is very important in order to be prepared to switch to other types of navigation. Certain Aircraft Operators issued internal NOTAMs to their pilots alerting them to potential problems with GPS signals. In this regard, IATA, EUROCONTROL as well as EASA as EU regulator have been raising awareness among Aircraft Operators and ANSPs.

Figure 63: Type of a/c affected by GPS failure 2013-2017



According to the reports, the most affected type of aircraft were the A380 and B777, the more frequently flown type of aircraft within the affected areas.

As has already mentioned in a previous EVAIR bulletin, the areas most affected by GPS outages were Southeast Mediterranean, Black Sea-Caspian Sea axes and Mid-East-Canada and USA via North Pole through Russian airspace.

In this Bulletin, we reiterate that, in accordance with the ICAO GNSS Manual (Doc 9849) ANSPs, which identify GNSS interferences, must issue an appropriate NOTAM must be issued. However, so far, few States have issued NOTAMs even though the areas in question are very wide and many States have been affected. The issue of NOTAMs is crucial for Aircraft Operators in order to be properly prepared when flying through the regions affected.

De-identified occurrence reports

11 Jun 2017 Airline report

Several times our crews reported GNSS signal problems in LLL airport. Last report was on 11/06/17. Report was the following: 15nm from LLL DME on LLL SID and passing FL90, the crew got the message: NAV INTEGRITY and POSITION UNCERTAIN. A/C maintained the track. GPS constellation checked - zero satellites in sight. 25nm from LLL DME and passing FL145 satellite constellation came back to normal. No effect on the flight. This situation is happening for every departure from LLL.

11 Jun 2017 Airline report

Several times our crews reported GNSS signal problems in LLL airport.

ANSP feedback facilitated by EVAIR

The GNSS signal problem around LLL is known.

04 Oct 2017 Airlines report

Loss of GPS signal reduced our navigation to Inertial with the EICAS (Engine Indication and Crew Alert System) alert, checklists for GND Proximity System and information that RNP NAV is Unable on arrival and departure from MMM airport. No technical fault found with aircraft after landing.

04 Sep 2017 Airlines report

At 0904 UTC on a flight planned route FMC (Flight Management Computer/Control) lost both GPS signals and ANP (Actual Navigation Performance) and started to drift slowly. In order to stay with our RNP, crew disabled RAD NAV INHIBIT. ATC was advised and asked if GPS jamming was in place or reported. At 0913 UTC, we received in slow sequence TERR POS, GPS, RWY POS EICAS messages. Operational centre was informed. At around 0945 UTC, both GPSs came back, STATUS messages disappeared and NAV was back to normal. After asking ATC if they had already reported GPS problems, they confirmed that they had received similar reports about GPS blocking. Flight continued normally.

24 Oct 2017 Airlines report

During both sectors, from the home base to the destination and on the way back, within the same area was experienced complete loss of GPS signal. ATC was informed. It was noticed that four other aircraft notified the ATC of the same problem.

ACAS REPORTING IN THE PERIOD 2013-2017

In accordance with earlier agreements and requests from our stakeholders, EVAIR monitors the operational, procedural and technical elements of ACAS. The activity forms part of the obligation taken over following the successful implementation of the mandatory carriage of ACAS II. The aim of the 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).

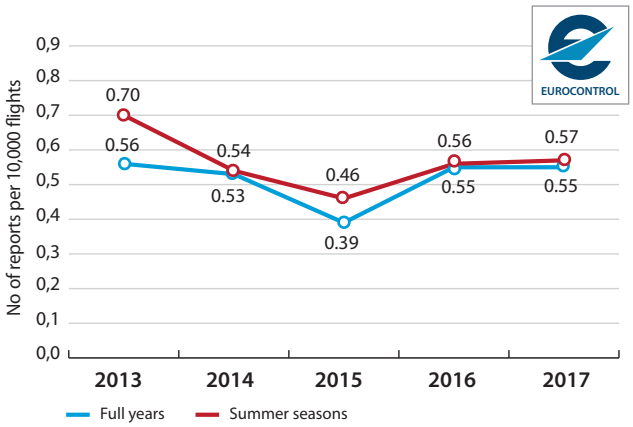
ACAS is the generic term for Airborne Collision Avoidance Systems, of which TCAS II is the only system implemented to date. The purpose of ACAS is to improve air safety by acting as a 'last-resort' method of preventing mid-air collisions or near collisions between aircraft. Although ACAS II implementation 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 European Union airspace on all civil aircraft over 5,700 kg MTOW or 19 passenger seats as of December 2015 and EVAIR's monitoring is focused on the performance of the new 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 which 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 2013-2017

Figure 64: *Airlines' ACAS incidents summer seasons 2013 – 2017*



The above graph shows summer and full-year trends for 2013-2017. Summer trends (number of reports per 10,000 flights) are as expected slightly higher than full-year trends. In general, during summer seasons, there are more traffic movements and traffic complexity is higher than during winter seasons.

In 2016 and 2017, there was a very small summer increase versus the full year trend in 2016 and 2017.

Longer-term statistics generated internally show that once the recommendation from the action plan, workshop and safety forum recommendations are in place we see a reduction in the number of reports from three to five years after listed events. After that the trend starts to move upwards again. Some of the stakeholders with whom we have regular contacts and exchange

Figure 65: *Airlines' ACAS RAs by phase of flight summer seasons 2013 – 2017*

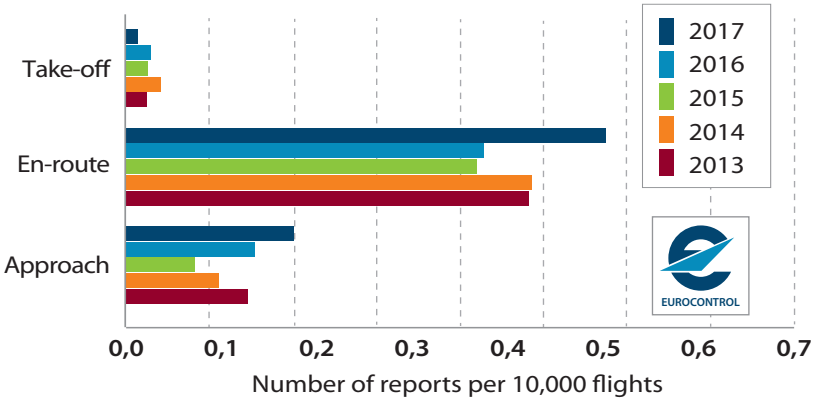
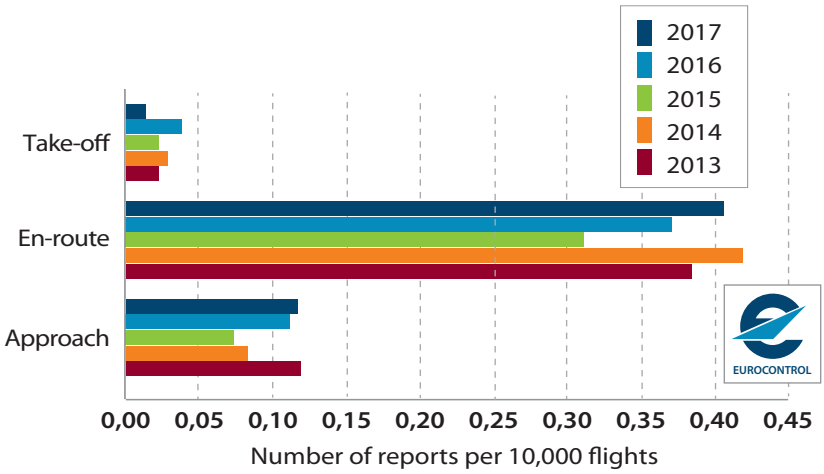


Figure 66: *Airline ACAS RAs by phase of flight for the period 2013-2017*

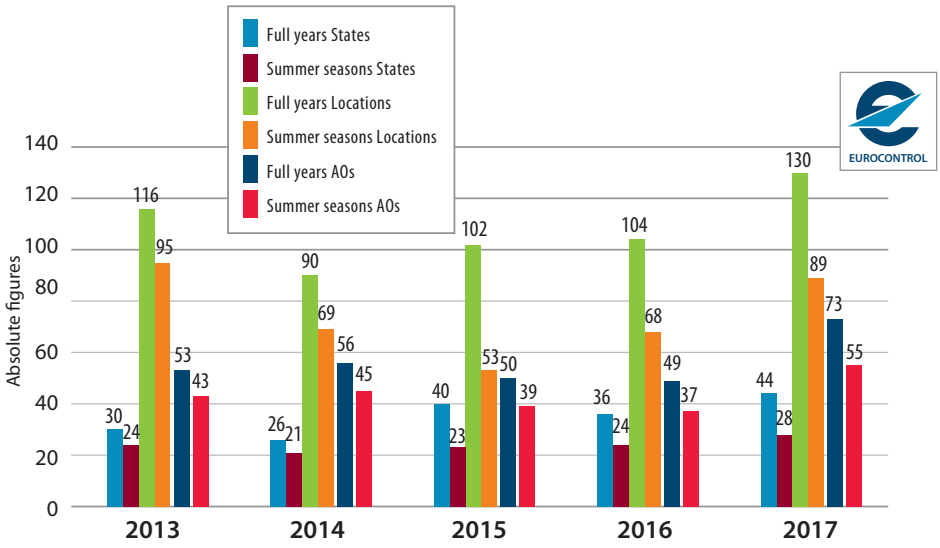


of information confirmed this EVAIR observation. Similar trends were noticed in the other areas that EVAIR monitors regularly. The discussion with our stakeholders on this periodical increase and decrease in the number of reports indicate that one of the reasons is staff move after three to five years not always followed with a transfer of knowledge to successors.

The spread of ACAS RA reports show that the en-route phase at pan-European level has more reports than the other flight phases. The only phase of flight where we recorded increase in the number of reports in 2017 regardless of the season was the approach phase.

The absolute figures for ACAS RAs per 'Carrier', 'State' and 'Location' (Figure 67) show that in 2017 EVAIR recorded an increase of between 25-35% for all three categories (Air Operators, States and locations) when compared with the 2016 figures.

Figure 67: *Airline ACAS RA occurrences per State, location & carrier for the period 2013-2017*

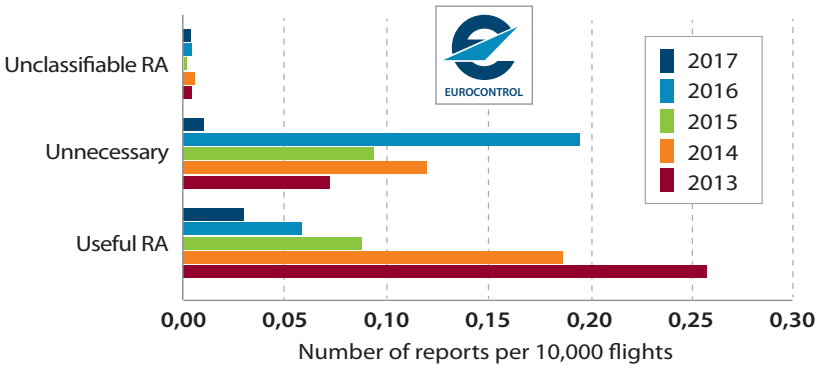


ICAO ADREP definitions of types of RA are shown below.

- **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.

Full-year trends show that over the last five years EVAIR recorded a continuous decrease in 'Useful RAs' and a significant decrease in 'Unnecessary RAs'. In the previous EVAIR bulletin, we promised to endeavour to find the reason behind the decrease in the number of 'Useful RAs'. A search through the database showed that in the majority of cases the AOs use general reporting forms, which do not require such information. The only way of finding information about 'Useful RAs', and Unnecessary RAs' from the general reporting form is to read the narrative part of the report. However, if pilots made no such report, the information will be lacking.

Figure 68: *ACAS RA Classification seasons 2013 - 2017*



ACAS RA INSTRUCTIONS IN THE PERIOD 2013 - 2017

In 2017, only two areas of the ACAS RA instructions recorded an increase ('Climb RA' and 'Monitor vertical speed RA'). EVAIR analysis historically shows that from the very beginning of EVAIR monitoring of ACAS RAs one of the main causes of unnecessary RAs has been high vertical speed.

Figure 69: *ACAS RA Instructions summer season 2013-2017*

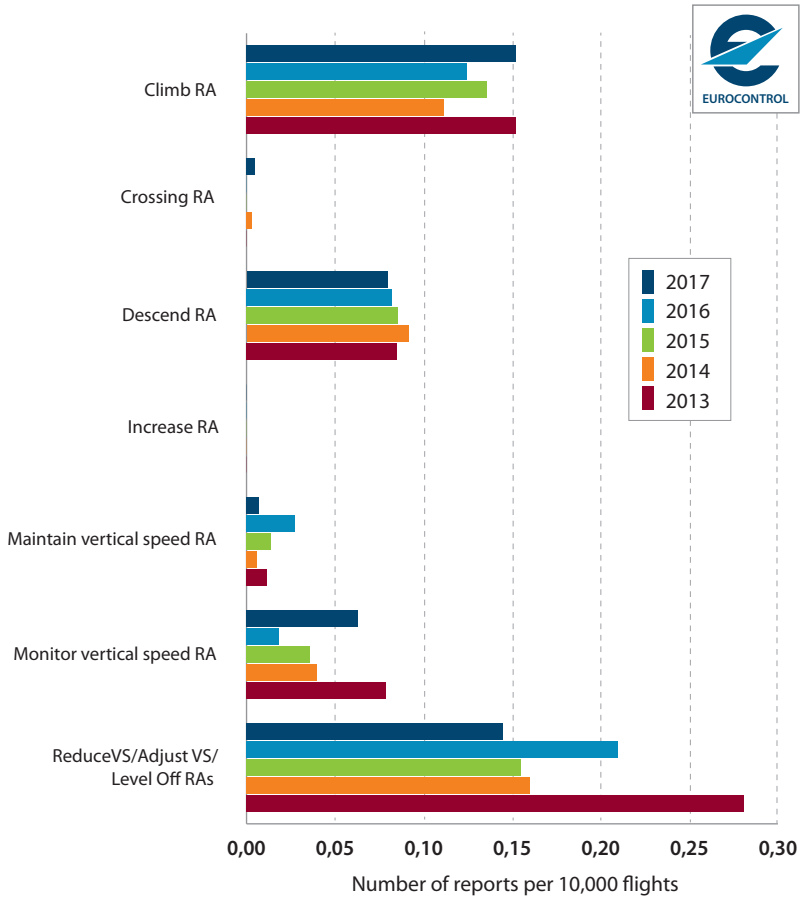
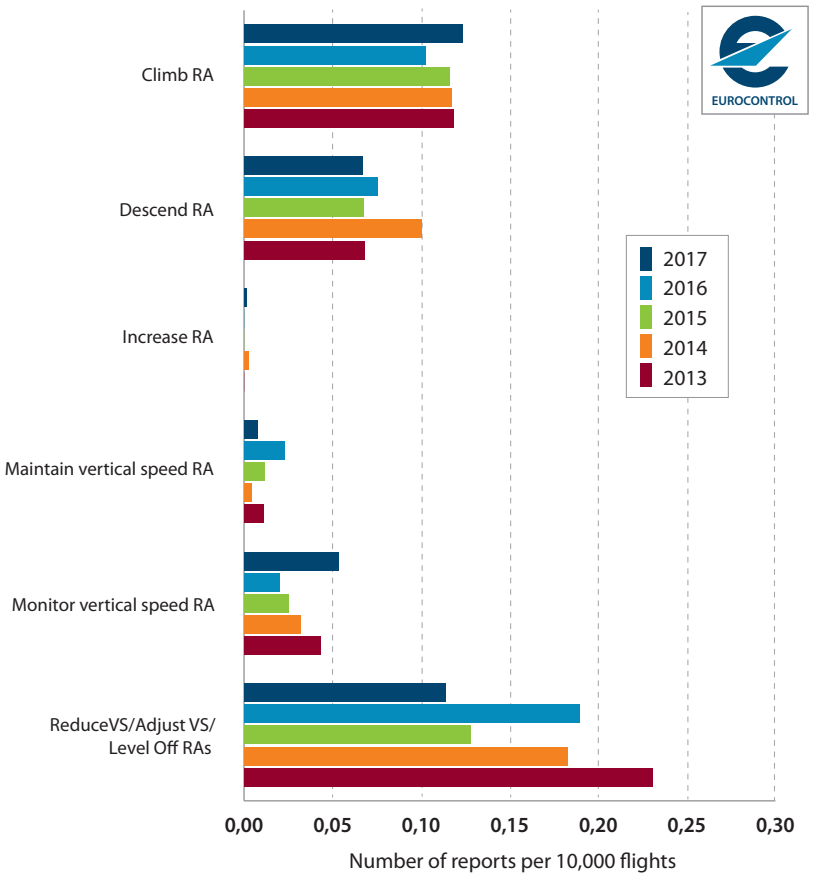


Figure 70: *ACAS RA Instructions season 2013-2017*



ACAS RA CONTRIBUTORS IN THE PERIOD 2013-2017

Introduction of the provision of 'traffic information' into the list of potential ACAS RA contributors, showed that for the last five years 'traffic information' has had higher trends than 'mistakes', which historically were the area with higher trends than the other contributors. 'Traffic information' and 'mistakes' made up more than 50% of the overall contributors. We are of the opinion that focusing on these two areas could help reduce the number of TCAS RAs, i.e. the occurrences that increase the workload of pilots and air traffic controllers and have a negative impact on stress and traffic complexity.

Figure 71: *ACAS RA contributors 2013 - 2017*

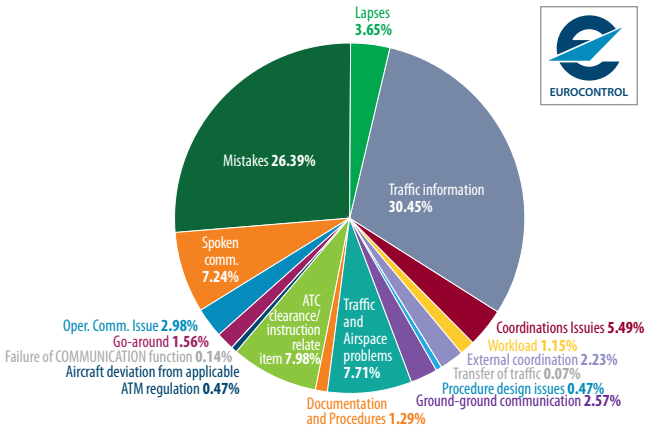
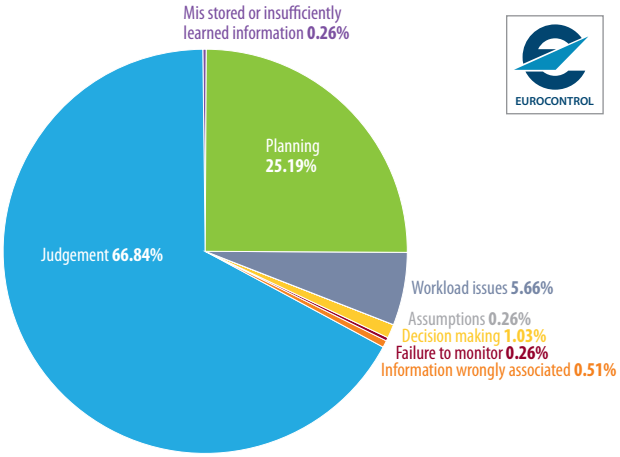
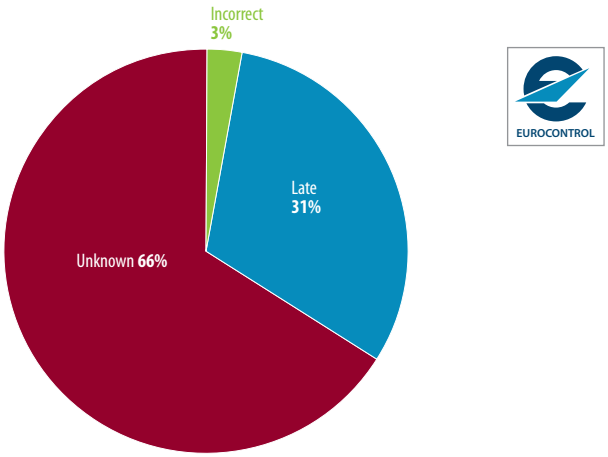


Figure 72: *Mistakes asssociated with ACAS RAs 2013 -2017*



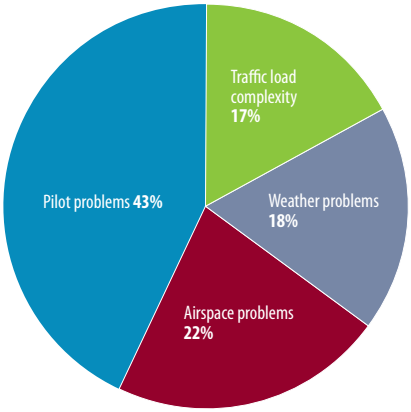
Within 'mistakes', 'judgment' and 'planning' account for more than 90%. These are contributors directly related to controller work and very often linked with a need for additional training.

Figure 73: *Traffic information issues with ACAS RA 2013 - 2017*



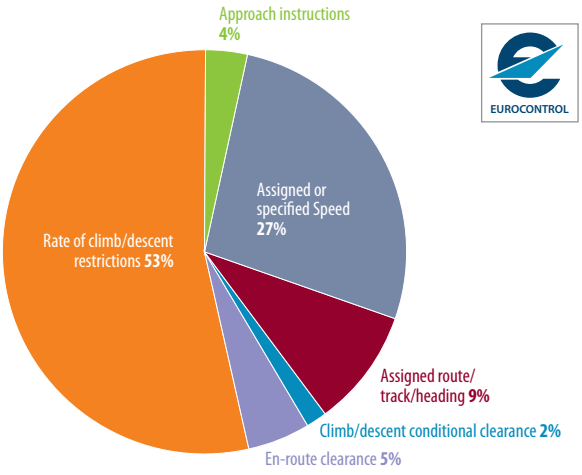
Within the reports where it was possible, to identify problems related to 'traffic information' the main one was 'late' provision of traffic information, the item that relates directly to the controllers work.

Figure 74: Traffic and Airspace associated with ACAS RAs 2013 - 2017



Within 'traffic and airspace issues associated with ACAS RAs', 'pilots problems' have the highest percentage. The most frequent issues related to 'pilots problems' is the familiarity with the airspace and in that regard with SID and STAR procedures.

Figure 75: ATC clearance instructions associated with ACAS RAs 2013 - 2017



Within the 'ATC clearance instructions associated with ACAS RAs' the proper information about potential restrictions of rate of climb or descent provided to pilots by controllers could help in reducing unnecessary ACAS RAs.

FALSE RAs CAUSED BY HYBRID SURVEILLANCE TRACKING ANOMALY

Since late 2012, the EUROCONTROL Network Manager Safety Unit has recorded the appearance of false TCAS RAs through its work with ANSPs and air operators.

As previously explained, the common factor in these events was that the RA receiving aircraft was fitted with TCAS II with the hybrid surveillance function. The hybrid surveillance function was introduced together with version 7.1 in order to reduce active interrogations and radio-frequency pollution.

The false RAs[1] were triggered when two aircraft crossed at the same level, or in vertical convergence, and the conditions for RA generation were not met because ATC standard horizontal separation was provided. The false RA was generated only in the 'front' aircraft against an aircraft that is 5 to 7 NM behind or parallel.

From December 2012 to the end of November 2017, a total of 184 cases of false RAs were reported. In all of these cases, there was no erosion of horizontal separation or possible risk of collision between the two aircraft at the time when the RA was issued; hence, from a pilot and controller perspective the RAs were unexpected. Nevertheless, the pilots, quite properly, followed the RA instructions (with one exception, when there was no reaction to the RA).

In two cases when losses of separation occurred, an aircraft responding to a false RA climbed through a level of a third aircraft, causing a loss of ATC separation without generating an RA with this third aircraft becasue the horizontal spacing between the aircraft was large enough not to trigger an RA. Nevertheless, these events alerted the regulators to the need to expedite the work to introduce a fix.

In the reported events, the average vertical deviation from the cleared level was 650 ft and the maximum deviation was 3000 ft. On average, a false RA lasted 32 seconds, with single events lasting over 60 seconds. 75% of hybrid surveillance false RAs happened to aircraft in level flight, 10% to climbing aircraft and 15% to descending aircraft. Two-thirds of the events occurred above FL360.

This anomaly affected only a number of Airbus single aisle and wide-body aircraft. On 19 May 2017 the European Aviation Safety Agency (EASA) issued Airworthiness Directive No. 2017-0091 (subsequently amended as 2017-0091R2 on 2 June 2017) requiring all effected aircraft (the A320, A330 and A340 series) to have a fix implemented by 1 June 2018.[2] Aircraft Operators have deployed the fix and since November 2017 no new cases of false RAs caused by the hybrid surveillance anomaly have been reported.

The case of hybrid surveillance false RAs clearly illustrates the need for systematic monitoring and investigation of underlying RA causes which, in the case of technical issues, can be brought to the attention of regulators and/or manufacturers for rectification.

AO report 24 12 2017

Fully stabilized ILS 23 and just below 1000'AAL, VFR light aircraft on LEFT DOWNWIND for runway 23, appeared level with us on TCAS as proximate traffic, in an 11 o'clock position at approx. 2.5 nm range. Light aircraft then began to turn base on a constant bearing to ourselves. I immediately advised ATC. ATC issued avoiding action in local language to the light aircraft, which turned right to re-establish on the downwind.

Simultaneously, a Traffic Advisory was generated (no RAs are generated below 900' in descent). The closest point of conflict was the light aircraft at +300' and less than 2nm separation relative to ourselves. Approach continued as normal to a normal landing. AIRPROX reported to ATC.

ANSP Feedback facilitated by EVAIR

Analysis:

This event took place in the CTR, class "D", where separation between VFR and IFR is ensured via traffic information. Light a/c was in VFR and received traffic information about an A321 on final, he answered "traffic in sight". Controller ordered light a/c to make a 360° to the right, in order to be number 2 behind the A321. The VFR pilot performed his 360 too close to the

[1] *TCAS II MOPS (EUROCAE ED-143) define a false RA as an advisory caused by a false track or a TCAS malfunction.*

[2] *The full text of the EASA Airworthiness Directive can be found here: https://ad.easa.europa.eu/ad/2017-0091R2*

axis of 23, probably for environmental reasons (very sensitive subject here!), but maintained visual with the A321.

We think that traffic information to A321 would have prevented its crew from being surprised by this light aircraft (amplified by TCAS).

We will use this event as an example to insist on the fact that 360 abeam Tower is safer than continuing downwind. We will also remind controller that traffic information must be issued to both aircraft, not only to the VFR.

The Flying Club will also use this event as an example to raise pilot awareness of the fact that safety is more important than environment. I also attach a National Security Bulletin (published on 21/12/2017) by Civil Aviation Authorities, which explains how TCAS works and how to prevent IFR/VFR issues at low altitude (in local language). We distributed this bulletin to all controllers.

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

RReducing 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)

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 V3.0 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 totally 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 issues. Analysis of ATC-reported events shows that 4% involve incidents where CSS is involved.

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 (3 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:

HEIDI: http://www.eurocontrol.int/articles/esarr-2-reporting-and-assessment-safety-occurrences-atm

HERA: http://www.eurocontrol.int/services/human-error-atm-hera

DEFINITIONS

ATC clearance/instruction (HEIDI): related to incorrect or wrong 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 easing 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: Reception 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).

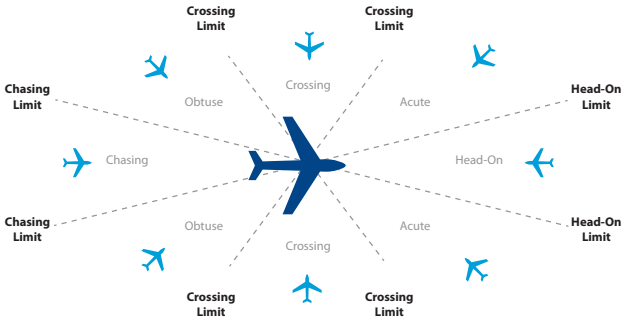
Mental/Emotional/Personality issues (HERA):
include the following items:

- 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 Mindset.

Operational communication (HEIDI): Air-Ground, Ground-Ground and Use of Equipment for verification testing. Air-Ground communication encompasses hearback omitted, pilots' 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 radio telephony (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 & Airspace problems (HEIDI): there are four set of causal factors under this heading:

- **Traffic load & 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.

www.eurocontrol.int