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EUROCONTROL

EUROCONTROL Voluntary ATM Incident Reporting (EVAIR) Bulletin No 19

2012 – 2016

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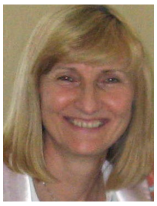
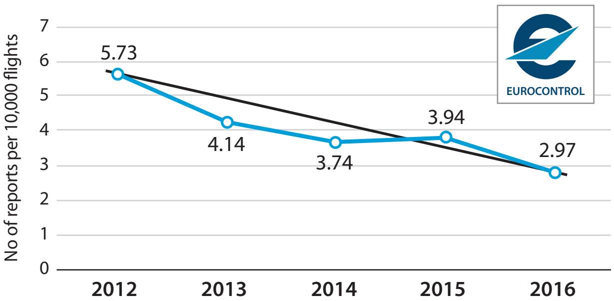


EVAIR Safety Bulletin No 19 provides ATM statistics for the period 2012-2016. Thanks to the EUROCONTROL and IATA STEADES cooperation, this is one of the few statistical bulletins which present ATM statistics and trends at European and global level. The trend line (Figure 1) for the last five years shows a gradual decrease in the number of reports.

Figure 1: *Incident data collection for 2012 - 2016*



Data collection

Some 14,000 ATM reports from Aircraft Operators and ANSPs were provided to EVAIR for the period 2012 - 2016. The main data providers are airlines and ANSPs. Over the last five years EVAIR worked with all European ANSPs and with almost 320 Aircraft Operators.

The channel for data provision has remained unchanged, i.e. the Aircraft Operators and ANSPs SMS. Data were mainly provided on a daily basis, although some providers submit them on a monthly basis.

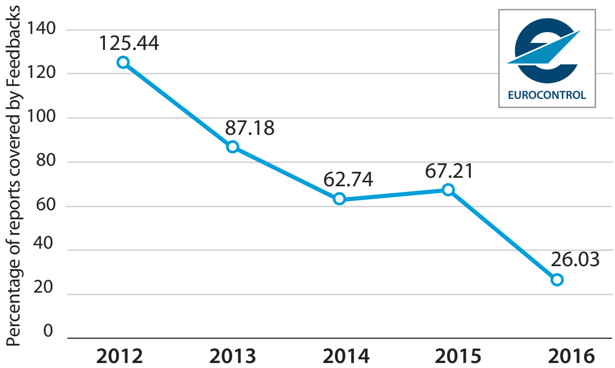
Besides pilot reports, EVAIR regularly receives reports from ANSPs. The reports received direct from ANSPs are Call Sign Similarity/Confusion, ACAS RAs and feedback on pilot reports. In the field of Call Sign Similarity/Confusion reporting we received about 15,000 reports from 21 ANSPs over the period 2012-2016. We would highlight the fact that the number of ANSPs has increased since the last Bulletin and we hope that this trend will continue.

Feedback – Reporting motivator and support for quick fixes

The feedback process facilitated by EVAIR, as well as the replies received either from ANSPs or the Air Operators remain the most important areas of EVAIR activity.

One of the indicators for the efficiency of SMSs is the time needed to perform investigations and prepare feedback on the occurrence report submitted. As shown in Figure 2, the participants in the EVAIR mechanism took great strides forward in 2016, reducing the number of days spent investigating reports from 67 days in 2015 to just 26 days in 2016 by keeping the high level of the investigation quality.

Figure 2: *Timeframe for the feedback on pilot reports, 2012 - 2016*



Main events

In this short summery we will provide a summary of the trends we regularly monitor in our Bulletin:

RPAS/drones – proliferation of small drones

The proliferation of small drones, which started in 2015, continued apace in 2016. The area most affected is final approach, although in the database there are reports of drones at higher altitudes. Some of the reports could be categorised as very serious, since vertical and horizontal separation was literally a few metres.

GPS outages

For the period 2012-2016, some 600 GPS outage reports were recorded. As for the previous years, the majority occurred within the politically sensitive area on the Black Sea-Caspian Sea axis. The only state to published a NOTAM warning on the problem was Turkey, although unfortunately many more countries are affected by the GPS outage problem.

ACAS RA data collection

After three years of more or less stable numbers of reports, in 2016 EVAIR recorded an increase in the number of ACAS RAs. The most notable were false TCAS RAs, which appeared for the first time a few years ago. The common factor in these false RA events is that the RA receiving aircraft is fitted with TCAS II with the hybrid surveillance function introduced to reduce active interrogations and radio-frequency pollution. The false RA is generated only in the 'front' aircraft against an aircraft that is 5 to 7 NM behind or parallel.

Laser interference

A survey of laser problems in conjunction with certain European states showed that the problem with laser interference persists. In order to cope with the problem in the most effective way possible, some of the states brought together the most important stakeholders (police, air carriers, ATC, manufacturers, media etc.) and set up permanent working groups.

Call sign confusion

Call sign confusions reported by pilots recorded an increase in 2016. The main contributor to call sign confusions remains 'Hear back omitted". The Call Sign Similarities/Confusions identified by ANSPs were down for the second year in a row. The data shows that the airlines using the EUROCONTROL Call Sign De-Confliction Tool (CSST) have on average 5-7 times fewer problems with similarities and confusions. This result is the best possible incentive for air operators not yet using the tool to start doing so.

Contributors to incidents

'Air-Ground communication' and 'Mistakes' have been recording higher trends versus others and both registered an increase in 2016. Furthermore, 'Lapses', 'Coordination' and 'Traffic and Airspace problems' were also up in 2016.

Stakeholders' Corner
IATA

The safety department at the International Air Transport Association (IATA) has, at the request of EUROCONTROL, conducted an analysis of selected topics related to Air Traffic Management (ATM) reports. This independent analysis enables EUROCONTROL to perform high-level comparisons of the data and information captured in the EUROCONTROL Voluntary ATM Incident Reporting System (EVAIR).

The analysis was conducted on the Air Safety Reports (ASR) 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 198 participating airlines throughout the world, with an annual reporting rate now exceeding 200,000 reports/year. The STEADES database incorporates a number of quality control processes that assure analysis results.

The scope of this analysis included research of ASRs for 2012 to 2016. During this period, a total of 966,811 reports were submitted and collated into STEADES. The airlines participating and submitting data to STEADES accounted for a total of 60,502,079 flights from 2012 to 2016. This is equivalent to approximately 31% 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:
dragica.stankovic@eurocontrol.int

ATM EVENTS AND SUPPORT TO 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 2012 - 2016*

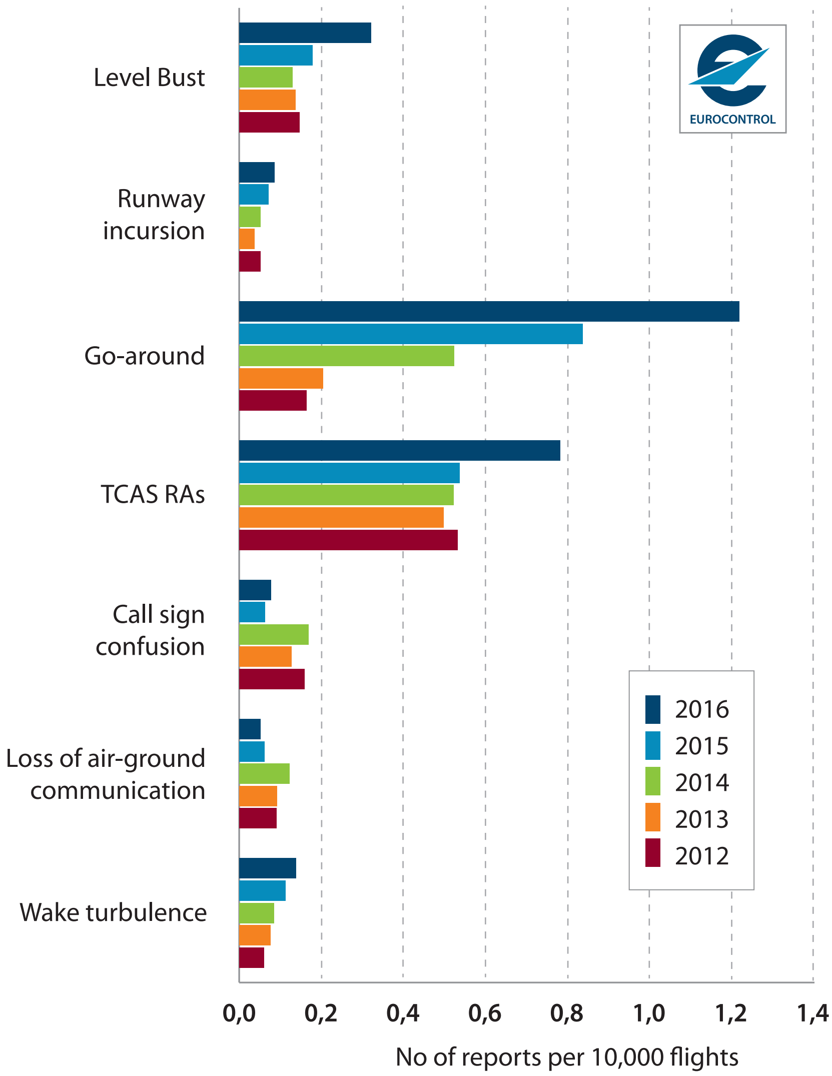
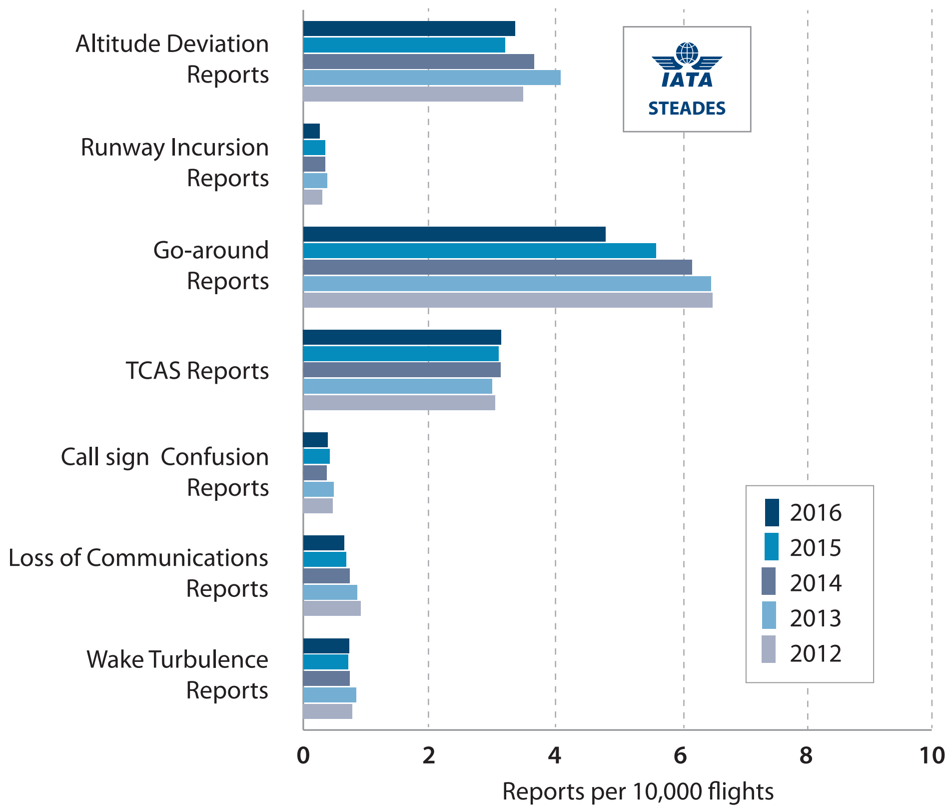


Figure 4: ATM events 2012 - 2016



Three areas which traditionally have a higher number of reports ('Go-Around', 'TCAS RA' and 'Level Bust'), recorded the same trends in both databases; 'TCAS RA' and 'Level Bust/ Altitude Deviation' were up, while 'Go-arounds' were down. 'Loss of Communication' also showed the same downward trend in both databases. However, other areas of concern moved in the opposite direction. 'Runway Incursions' in the EVAIR database were up, while globally IATA recorded a decrease. 'Wake Turbulence' at European level was down, while globally IATA recorded an increase. There is more information about each of these monitored areas in this document. The situation regarding 'Call Sign Similarity' is very interesting, as within Europe EVAIR collected more reports from the airlines than in 2015, while globally we saw a decrease. One of the reasons for this is that, since the efficiency of the Call Sign Similarity de-confliction tool is being monitored, EVAIR proactively promotes the collection of Similar Call Signs from Air Operators and Air Navigation Service Providers. The rate of reporting is always improved following promotion and reminder initiatives.

You can also find out more about each of the event types on 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

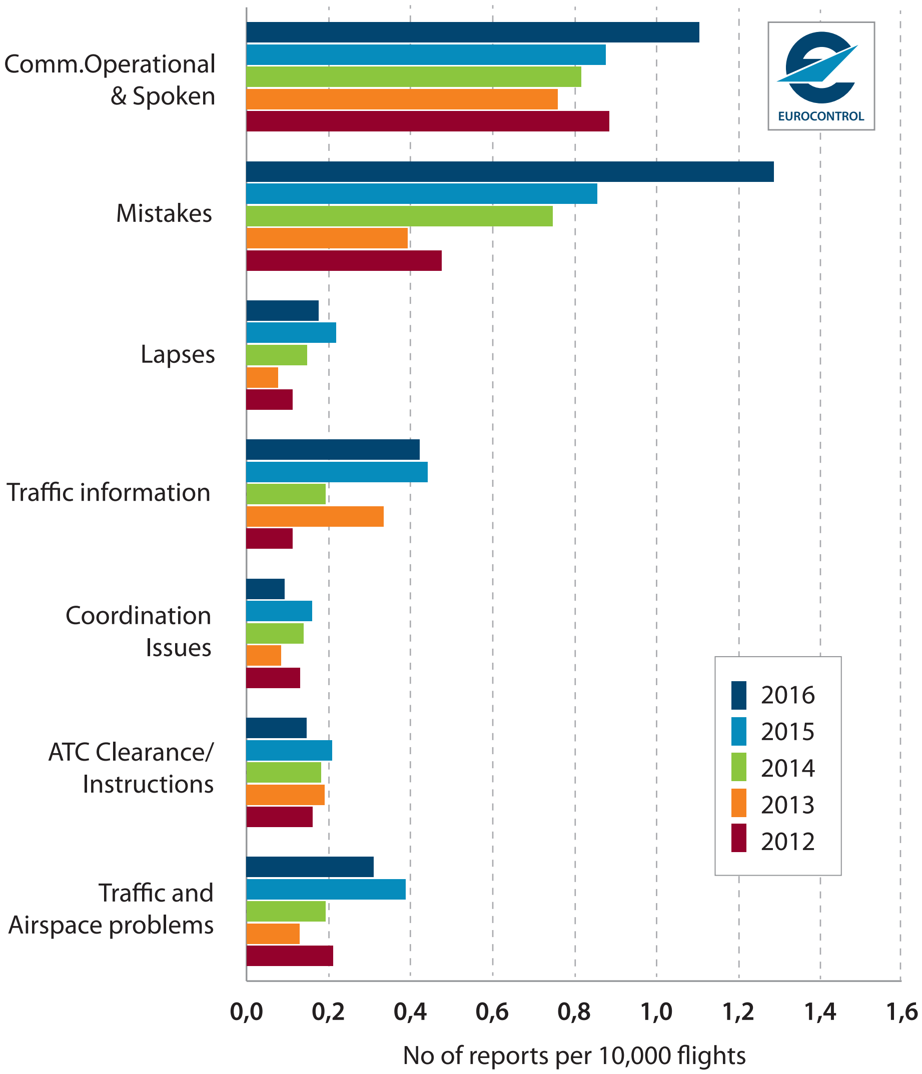
http://www.skybrary.aero/index.php/European_Action_Plan_for_the_Prevention_of_Runway_Excursions_(EAPPRE)

To learn more about STEADES, go to:

www.iata.org/steades

CONTRIBUTORS TO ATM OCCURRENCES 2012 - 2016

Figure 5: *Contributors to ATM incidents – all phases of flight 2012 - 2016*



Two of the seven main contributors, i.e. 'Operational/Spoken Communication', which is in fact air ground communication, and 'Mistakes' have been on the increase for a long time. In 2016 both contributors were up, while 'Lapses', 'Coordination' and 'Traffic and Airspace problems' were down.

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

'Traffic Information' covers three areas: incorrect, late and no information provided.

'ATC Clearance/Instructions' addresses 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 cover': detection, destruction, forgetting, identification of information, loss of awareness, monitoring, perception of information, receipt of information, timing etc.

'Coordination issues' cover: external coordination, internal coordination, special coordination procedures with positions within ATC suite and with sectors same unit.

'Traffic & airspace' address: airspace problems, pilot problems, traffic loads/complexity and weather problems.

GO-AROUND 2012 - 2016

Within this chapter, we stress that although 'Go-around' is a normal phase of flight, EVAIR and IATA STEADES monitor these areas in order to identify safety issues associated with 'Go-arounds'.

Over the last three to four years, both data repositories, EVAIR and IATA's STEADES have recorded a decrease in 'Go-around' reports.

In the EVAIR database we recorded the same trend in 2016 as in 2015, while in IATA STEADES a decrease was recorded in 2016 too.

Besides a general reduction in the number of reports in 2016 versus 2015, the decrease in the number of reports coincides with activities initiated to identify the causes of Go-arounds and measures to mitigate the problems identified. The main stakeholders actively involved in this process are EUROCONTROL, FSF, ERAA and IATA through the Safety Forum and post-forum activities (http://www.skybrary.aero/index.php/Portal:Go-Around_Safety_Forum_Presentations).

The fact that Go-arounds occurred within the territory of 44 different states across Europe and 170 different locations proves that 'Go-arounds', with their associated safety issues, have always been a wider problem, with a pan-European dimension.

Figure 6: *Missed approach-Go-around 2012 - 2016*

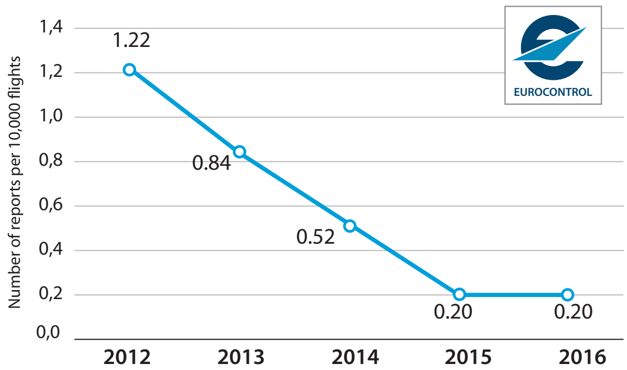
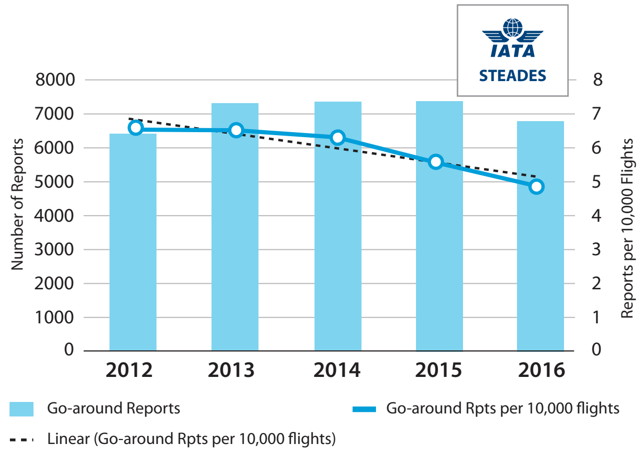
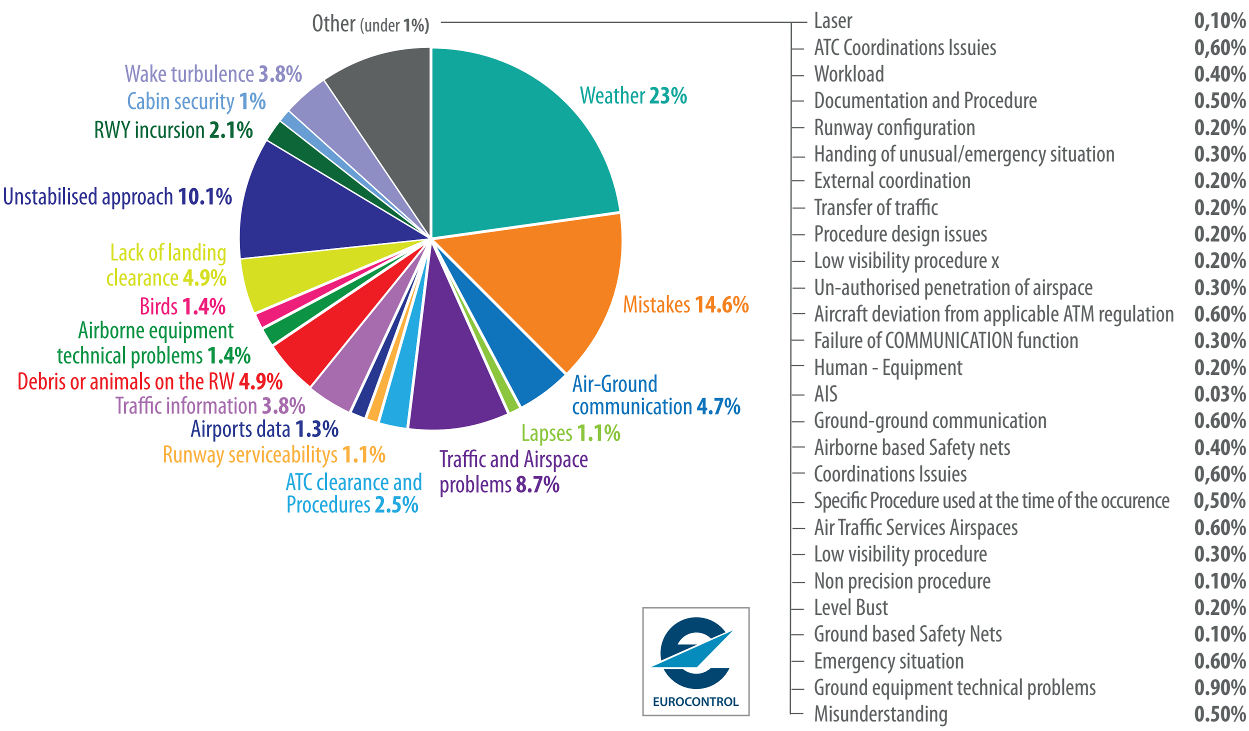


Figure 7: *Go-around reports 2012 - 2016*



In-depth analysis shows that pilot and air traffic controller training is crucial if further improvements are to be made regarding Go-arounds at pan-European level. Figure 8, which presents the causes of Go-arounds, could help decide where to focus training efforts.

Figure 8: *Go-Around contributors 2012 - 2016*



In its in-depth analysis of the causes of Go-arounds, 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 8 could be broken down into more areas for concern. Over a long period, 'Weather', 'Mistakes', 'Un-stabilised' and 'Traffic and airspace problems' account for more than one half 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 the following: airspace design and procedures, pilot problems, traffic load and complexity; 'Mistakes' includes decision-making, judgment, planning and workload.

De-identified 'Go-around' events recorded during summer 2016:

Airline report - Sep 2016

A flight was cleared by approach sector to intercept ILS for RWY 16L. When established, the pilot called ATC and was instructed to continue for approach. The a/c was configured early due to the reducing distance from preceding aircraft. As the preceding aircraft vacated the runway, at approximately 0.7 DME, the crew called approach ATC for clearance to land. The Approach sector gave the Tower frequency for further clearances. The Tower frequency was selected but the frequency was busy, and clearance to land was not given in time to make the landing. Go-around was initiated. The vectors for ILS 16L were given by ATC, and the crew gave the reason for the go-around. Fuel on landing was approximately 3,600 Kgs.

ANSP feedback facilitated by EVAIR

Approach control instructed the pilot to reduce speed, together with the frequency change. However, the pilot only read back the first part of the transmission (related to speed): The frequency change instruction given by the Approach controller was covered by the pilot's read-back.

Pilot report - Oct 2016

During the approach, other aircraft took off without clearance. The take-off started from an intersection on RWY 08R when our flight was approximately 3 NM on final. We noticed this and were about to question Tower control when the controller instructed us to go around. We went around at about 2 NM. Normal go-around was performed by F/O and we were vectored back for another approach for a normal landing. ATC informed us that they would file a report.

ANSP feedback facilitated by EVAIR

The ANSP investigation confirmed the descriptions provided in the pilot's report.

Pilot report - Aug 2016

ATIS information indicated ILS runway 25L for landing and 25R for departure. Vectors received from approach for ILS 25L, decelerated approach flown and LOC intercepted at around 11NM.

ATC confirmed runway 25L and gave right heading to intercept ILS 25R'. Crew was surprised as both pilots were sure that the clearance was for runway 25L. It was decided to fly a discontinued approach.

Levelling off was at 3000' to follow the standard missed approach and allow time for reprogramming and debriefing for 25R. ATC were informed of our intentions. Approach controller again offered 25R sidestep which was declined and missed approach flown.

Uneventful radar vectored approach flown to 25R. On landing, crew requested that TWR speak to Approach Controller to replay the recording to see whether it was crew confusion or ATC.

Approach Control Supervisor did not reply to the phone call.

ANSP feedback facilitated by EVAIR

1. The event is considered as a Specific ATM Occurrence due to the degradation of the ATS which resulted in an inadequate positioning on the final approach track for the approach to runway 25L which had been declared as closed and co-ordinated between Tower, the airport and the ACC. Crew received an incorrect clearance from Approach control for the ILS 25L.
2. The main causal factor for the incorrect clearance is identified as the lack of awareness by the Approach controller that runway 25R was the only runway in use, in spite of the fact that this information had been transmitted by the Tower controller and acknowledged by approach. As a consequence, the clearance for the ILS approach was incorrect.
3. Although the new single runway configuration was introduced into the system by the Tower controller, the ATIS continued to issue incorrect information for some time.
4. No other traffic was involved and the situation remained within acceptable safety parameters.

RUNWAY INCURSIONS 2012 - 2016

Runway Incursion accounts for 1.3% of the overall data within EVAIR for 2016. Although in general it is not a big proportion, the associated risks are unfortunately very high. It is widely accepted that Runway Incursion is still one of the main causes of accidents.

As presented in Figure 9, after three years of decrease, EVAIR recorded an increase in the number of runway incursions in 2016. We have noticed other type of events where after three to five years of decreases, they record an increase in the number of reports.

Figure 9: *Runway Incursion 2012 - 2016*

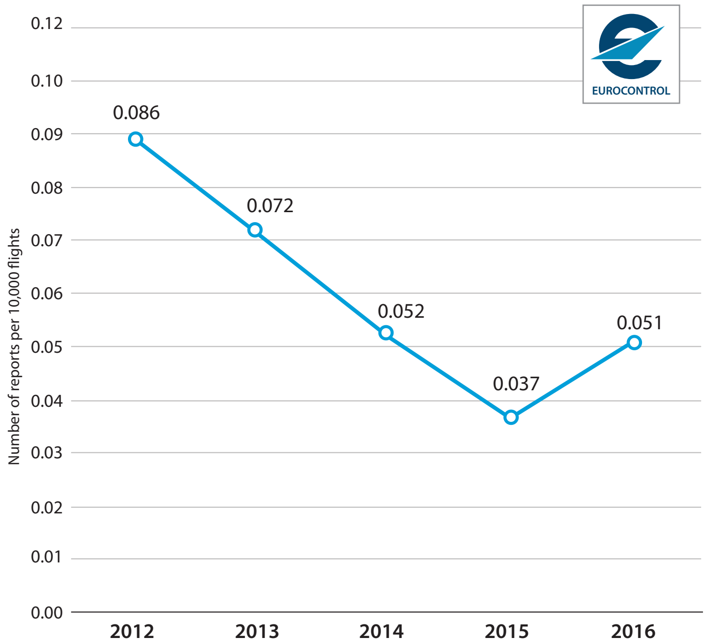


Figure 10: *Runway Incursion 2012 - 2016*

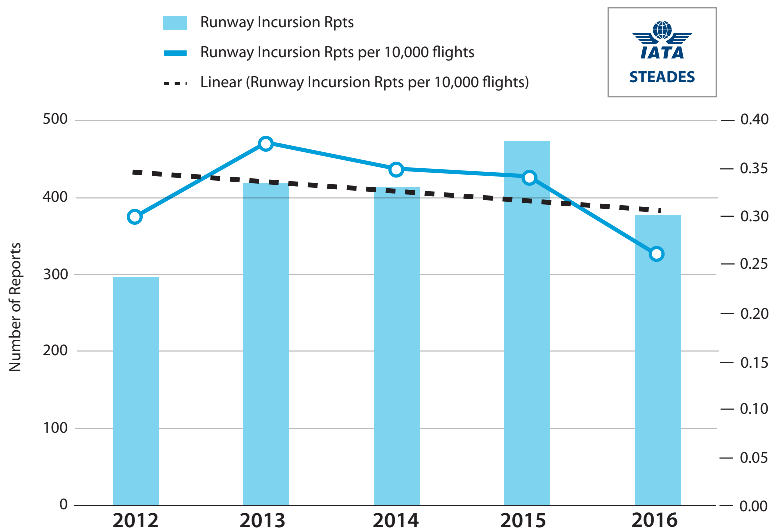
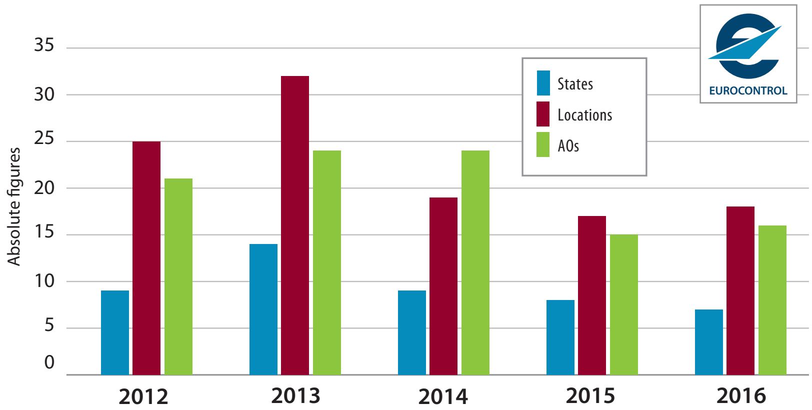


Figure 11: *Runway Incursions States, Locations & Air Operators (AO)s 2012 - 2016*



In 2015 and 2016 the number of States, locations and AOs participating in runway incursion incidents remained more or less the same. At the same time, these are more or less the same states and locations.

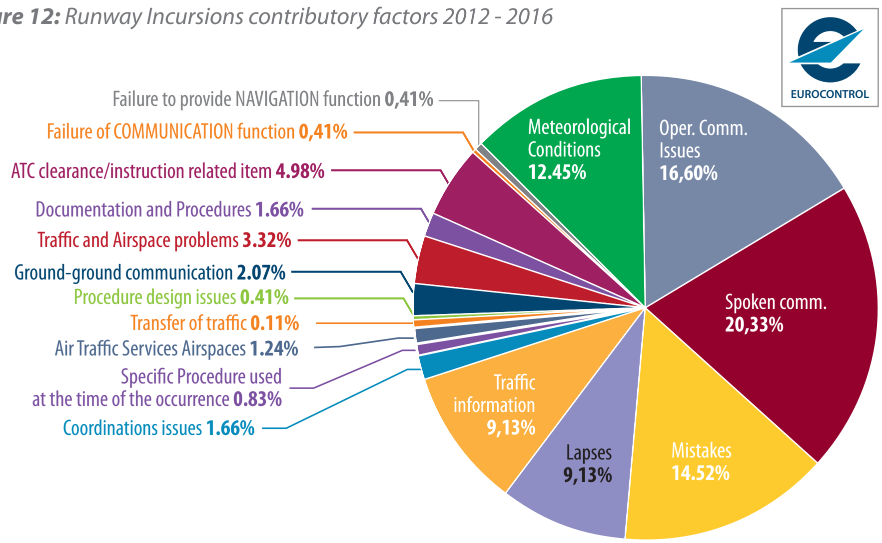
Further searches in the database showed that, for the period 2012-2016, two out of twenty States accounted for almost 60% of the Runway Incursion events. When the same approach was applied to the locations where the Runway Incursions occurred, it showed that eight locations accounted for slightly more than 50% of the Runway Incursion events.

The graph below shows that 'Air Ground Communication', comprising 'Spoken' and 'Operational Communication' accounts for slightly over one third of total Runway Incursion contributors. A further one-third of the problems fall within 'Mistakes', 'Lapses' and timely and full 'Provision of traffic information'. We think inclusion of these topics in the refresher courses could help mitigate Runway Incursion problems.

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

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

Figure 12: *Runway Incursions contributory factors 2012 - 2016*



De-identified occurrence reports

Airline report (a/c1 report) - Jul 2016

The event took place on 01/07/16 when a/c1 was instructed to abort its take-off from RWY 20 after acknowledging a clearance that was intended for another aircraft taking off from RWY 11R. The crew considers this to be a serious event. According to the crew, the sequence of events was as follows: Approaching holding point 20, a/c1 was instructed to hold short. While holding short, a/c1 was asked if ready for immediate take-off, which was accepted by the crew. A/c1 was cleared to line up and told to be ready for immediate take-off. This instruction was acknowledged by the crew. A/c1 was cleared for take-off, acknowledged by the crew. When the a/c1 started moving, ATC told the pilot to abort the take-off as the instruction was intended for a different aircraft taking off from RWY 11R.

Feedback from ANSP facilitated by EVAIR

- The event has been classified as a Runway Incursion.
- The pilot took a communication intended for another flight and more than once the crew does not repeat the full call sign in the readbacks.
- The Air traffic controller should have asked for the call sign from the station replying 'ready for an immediate'.
- There was a timely air traffic controller recovery action.

Airline report - Dec 2016

De-icing performed at station AD41. After completion, the radio frequency changed back to GND, who instructs the aircraft to taxi to CAT II holding point and listen to the TWR frequency. Aircraft moved forward to leave area clear for the next de-icing. TWR then calls to ask for an immediate stop, and orders an aircraft on final to go around.

Red CAT II stop bars are so close to the de-icing stop point that they were overrun by approximately 50 metres. Apologies to ATC.

LEVEL BUST 2012 - 2016

For the period 2012-2016, 'Level bust' occurrences accounted for 4.9% of all EVAIR reports; this is slightly higher than what we had for the previous period. Regarding the number of incidents, over the last two years we recorded slight increases on 2014. We can see that IATA's STEADES recorded an increase in 2016 too.

Figure 13: *Level Bust 2012 - 2016*

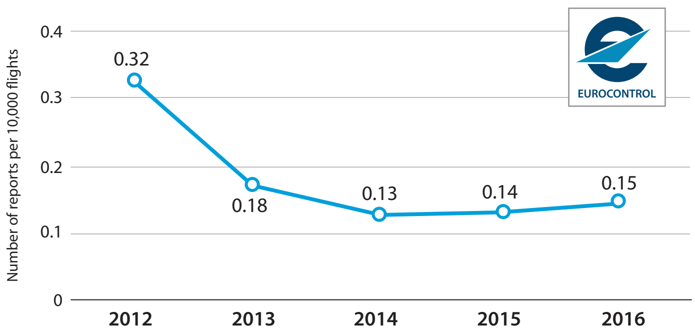


Figure 14: *Global Altitude Deviation 2012 - 2016*

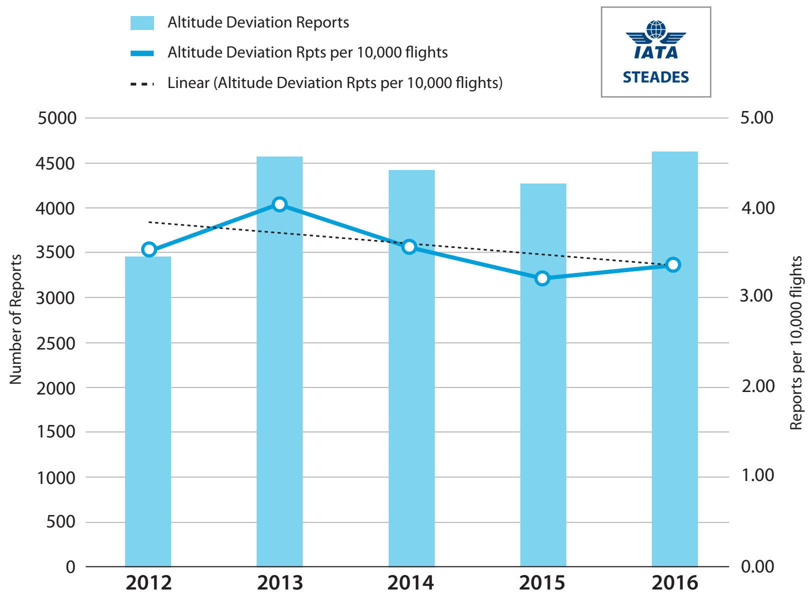


Figure 15: *Level Bust per States, Locations & Air Operators 2012 - 2016*

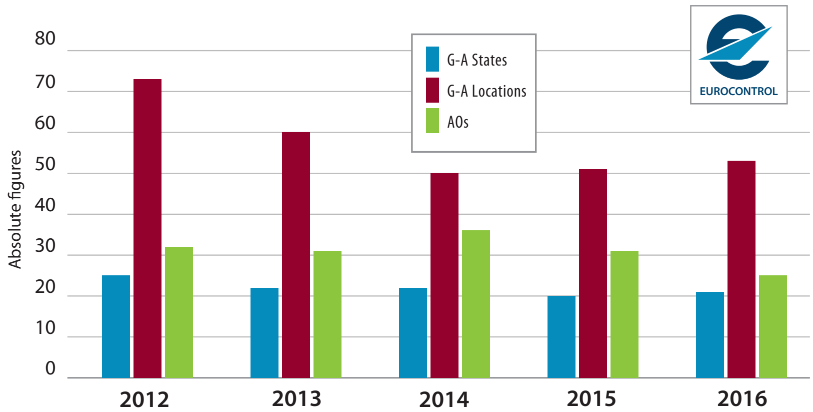
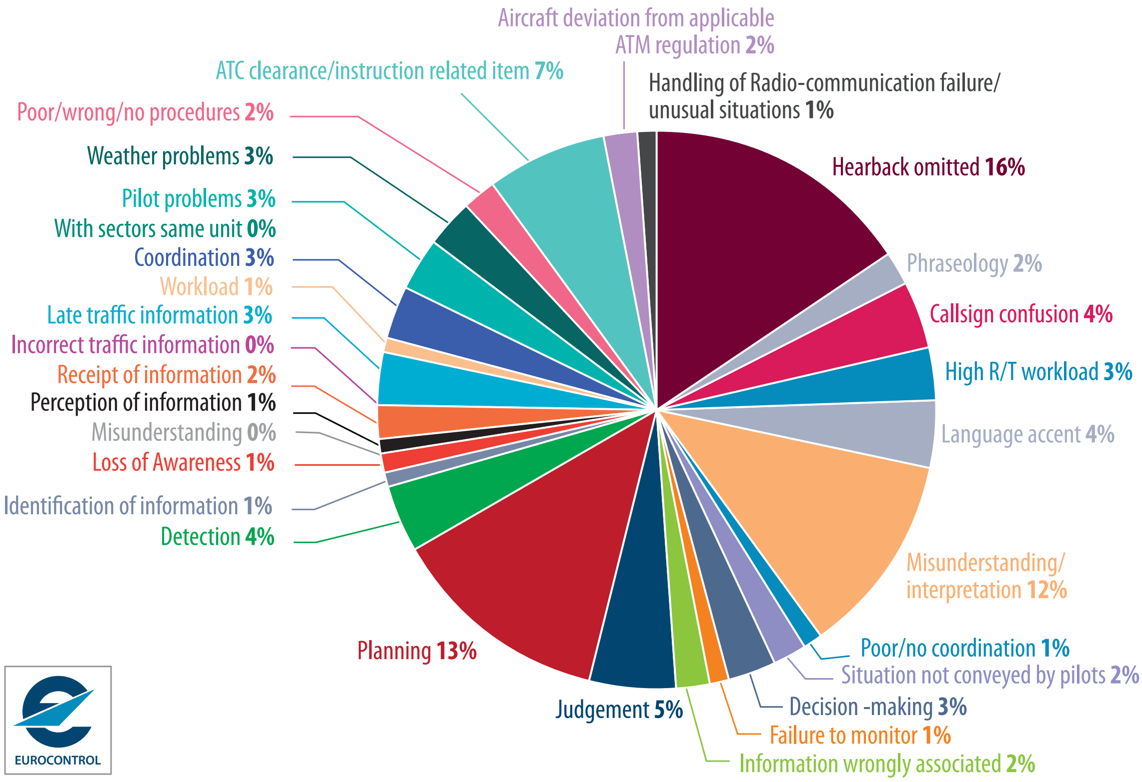


Figure 16: *Level Bust contributors cumulative figures 2012 - 2016*



Of the 29 contributors presented in Figure 16, three typical contributors (Hear-Back Omitted, Misunderstanding/ Misinterpretation and Planning) accounted for 41% of Level Bust events, which is higher than for the previous period. The findings show that these are contributors which should have priority when preparing refresher courses to decrease the risk of the Level Bust.

De-identified occurrence reports

Airline report - Aug 2016

The Pilot Flying (PF) briefed the SIROC 1L arrival. Upon checking in, the frequency was very busy and the a/c was cleared onto the SIROC 1B descending to 6000 on the QNH and then in accordance with the procedure. The pilot had to ask twice for confirmation of the arrival due to the quickly spoken clearance. 6000 was the MSA in this sector. Passing waypoint Z0501, ATC asked why the a/c was descending below FL90. The crew said that they believed the clearance was 6000. ATC said the clearance was to descend to 6000 in accordance with the procedure!

ANSP feedback facilitated by EVAIR

The Air traffic controller cleared the a/c to the SIROC 1B STAR P-RNAV and gave descend clearance in line with that procedure. The instructions and clearance were repeated twice. ASR is therefore consistent with ANSP recordings. The controller never cleared the a/c to the SIROC 1L, the procedure the pilots briefed for. In fact, SIROC 1L is a STAR rarely used in normal operational activities. Nevertheless, as similar events with SIROC 1L have occurred, it is necessary to check whether SIROC 1L is the STAR automatically assigned by the on-board system.

EVAIR SUPPORT TO EUROCONTROL CALL SIGN SIMILARITY PROJECT

EVAIR continues to monitor 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 this helps provide a performance comparison between the two sets of operators. More importantly though, the information is also used to facilitate ad hoc mid-season changes to conflicting call signs, thus providing an ongoing safety benefit. Moreover, this activity does not concern only similarities within one airline's schedule but also works across airlines (irrespective of their CSST use status) and so provides a multi-AO dimension to the proceedings. EVAIR monitoring results are also used, inter alia, for CSST safety assessment and as a decision-making element to proceed with Level 2.

CSST Operations Update

No major updates have been made to the CSST this year. The next big step will be to move CSST away from its standalone url and make it available on the NOP Portal; this is expected to be completed as part of the n-CONNECT project.

CSS User Group

The CSS User Group 14 meeting was held at EUROCONTROL HQ in Brussels in January 2017. There are no plans to hold the usual January meeting of the CSS UG in 2018 but a meeting may be held later in the year according to CSST developments and the appointment of a new CSS Project Manager.

Call Sign Similarity Service Level 2 (Multi AO De-confliction)

Due to resource constraints, the planned trial of the CSS Service Level 2 multi-AO operations clustering approach during Winter Season 2017/18 had to be postponed and the intention now is to conduct the trial in Spring 2018. In addition, as explained previously, it remains the intention to introduce some improvements to the CSST to facilitate the expansion of the task from single AO detection and de-confliction to a more multi-AO dimension.

CSST Access and Additional Tokens

It is pleasing to report that new AOs continue to join the CSST family. There is, however, still room for more, so new CSST users would be especially welcome. Please note that an NM token is required for access to CSST. 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 set against 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).

The application form can be found 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.

Learn More About Call Sign Similarity

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

CALL SIGN SIMILARITIES AND CONFUSIONS 2012 - 2016

To monitor 'Call Sign Similarities' and 'Confusions', EVAIR uses two data sources, one from the airlines and the other from ANSPs. Reports from pilots are mainly related to confusions, while those from ANSPs concern similarities and confusions.

PILOT REPORTS – CALL SIGN CONFUSION 2012 – 2016

***Figure 17:** Call Sign Confusion 2012 - 2016*

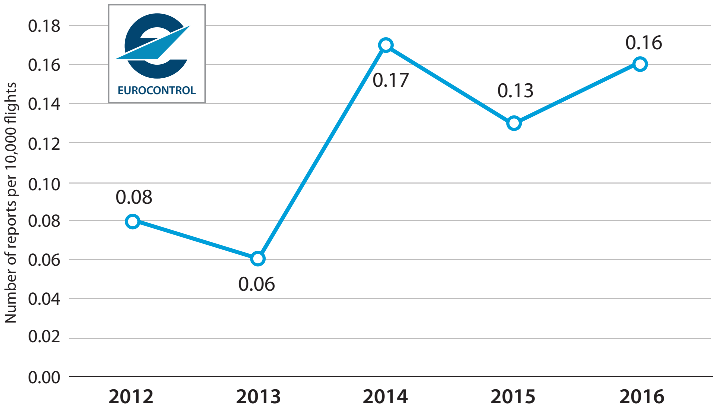
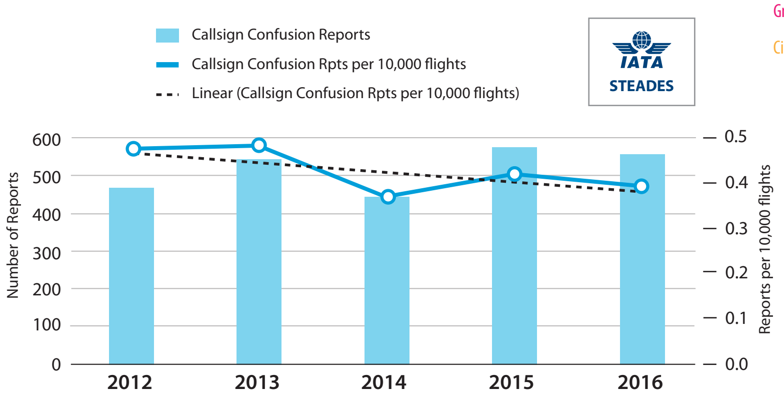


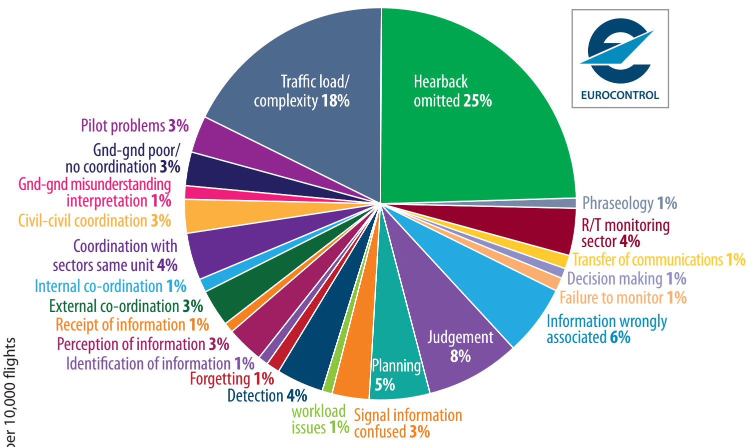
***Figure 18:** Call Sign Confusion 2012 - 2016*



Figures 17 and 18 represent the Call Sign Confusions reported by pilots. In 2016 EVAIR recorded an increase in the number of Call Sign Confusions compared to 2015. At the same time, in 2016 Call Sign Confusions recorded the highest percentage so far, 5.4% of the total number of reports. The IATA STEADES global data shows the reverse trends, after the increase in 2015 STEADES recorded a decrease in 2016. Repeated EVAIR invitations to airlines to report each and every Call Sign Confusion could be one of the reasons for the increase in the number of Call Sign Confusion reports within the EVAIR database. The reason for reminding Air Operators to report CSS/C is the monitoring of the effectiveness of the work of the Call Sign Similarity De-confliction tool.

With regard to the ATM contributions to the Call Sign Confusion report, the analyses show that in 74% of the confusions there was no ATM contribution. The contribution was 'Direct' in 14% of cases and 'Indirect' in 12% of cases.

***Figure 19:** Call Sign Confusions: ATM contributors 2012 - 2016*



A more detailed search through the database (Figure 19) shows that 'Hear back omitted' and 'Traffic load/complexity' make up one third of all contributors to Call Sign Confusions reported by pilots. Both contributors are related to the work of air traffic controllers and are known to be significant contributors. We would stress that addressing 'Hear back omitted' as well as other contributors related to ATCOs in the controller refresher courses could help further improve performance in the field of 'Call Sign Similarity'.

AIR NAVIGATION SERVICE PROVIDERS' CALL SIGN SIMILARITIES AND CONFUSIONS

For the period 2012-2016, EVAIR received around 15,000 Call Sign Similarity/Confusion reports from 17 European Air Navigation Service Providers. EUROCONTROL's Call Sign Similarity/Confusion reporting and data collection makes it possible to take ad-hoc measures to resolve similarities. ANSPs who want 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 and before the end of the season.

Figure 20: *Number of AOs with the CSS/C as identified by ANSPs 2012 - 2016*

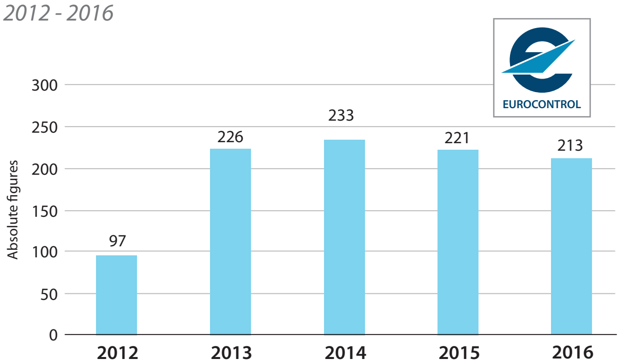
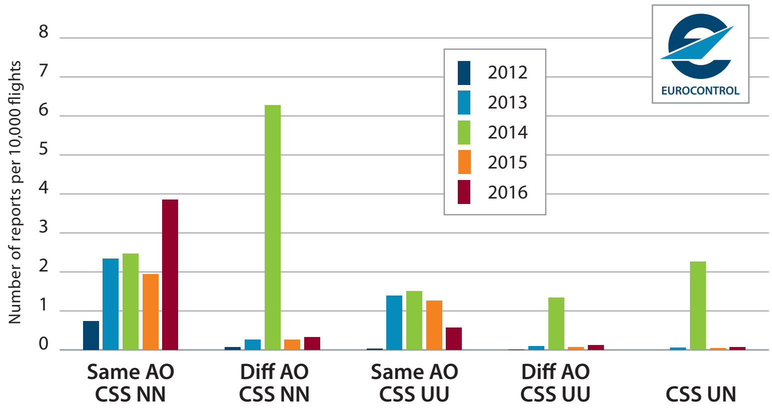


Figure 20 shows the number of AOs who had a problem with 'Call Sign Similarities and Confusions'. Over the last two years EVAIR recorded a decrease in the number of AOs with 'Similar Call Signs'. The reduction in the number of AOs with the Call Sign/Confusion problems coincides with the constant promotion of the Call Sign Similarity De-confliction tool and the use of alphanumeric call signs. Besides European carriers, a number of Middle East airlines are also actively involved in Call Sign Similarity/Confusion activities and implementation of the agreed rules.

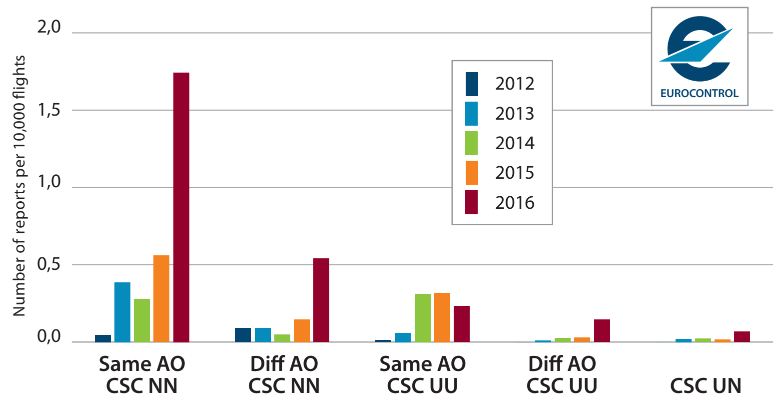
Call Sign Similarity statistics show that, throughout the period monitored the problem is mainly within the same Air Operator (AO), whether or not it is a user of the Call Sign Similarity De-confliction tool (Figure 21). Most CSSs occurred in same AO (non-tool users). In addition, in 2016 same AO (non-tool users) recorded the highest increase so far. As regards same AO (tool users), the trend shows a significant decrease in 2014. This

Figure 21: *Call Sign Similarity non-tool users and tool users 2012 - 2016*



clearly shows that use of the tool helps to significantly reduce the problem of Call Sign Similarity. The invitation to use the tool remains open and the link for the detailed information is given on the page 18.

Figure 22: *Call sign confusion: non-tool users and tool users 2012 - 2016*



In general the situation with Call Sign Confusions is similar to that for Call Sign Similarities. Same AOs (non-tool users) recorded a significant increase in confusions compared to 2015, amounting to over a threefold increase on 2015.On the other hand same AOs (tool-users) recorded a further decrease in the number of reports in 2016. It is very interesting that for the first time after five years of CSS/C monitoring EVAIR recorded numerous confusions between different AOs (non-tool users), as shown in Figure 22.

De-identified occurrence reports

Airline report - Oct 2016

Call sign confusion between two a/c of same airline, AAA9901 and AAA901.

Departure clearance: RWY heading, climb 3000'. After initial climb, ATC gave clearance to fly RWY heading and climb 5000'. Further climb clearance was 11000' and then FL200 MUVLA point. All instructions were read back with call sign AAA 9901. Finally ATC cleared to climb FL340, which was confirmed by pilot;" RWY heading climb FL340". ATC then cleared to MUVLA. Pilot asked for the initial HDG to MUVLA. ATC then asked: "who cleared you to climb FL340?" and asked the pilot to return to previous control. ATC explained that the clearance was for AAA901.

September 2016

ATC sector No 4 instructed BBB62GM (at FL380) to contact ATC sector No5.

Aircraft never answered this and following calls (including 121.5).

Approx. 3 minutes later ATC sector No 6 observed BBB62GM leaving the level.

It has been found that BBB62GM:

- Contacted ATC sector No6
- Did not make any initial call
- Took the clearance intended for BBB62HL (at FL370) to descend FL340.
- Read back that clearance but when ATCO immediately asked for confirmation of the last 2 letters (Confirm H-L?) no answer arrived. In doubt, ATC sector No6 restated the clearance for: "BBB62 HL "I say again descend FL 340 rate 15 hundred or greater". After one minute and a half BBB62GM made a call: "BBB6-2 GM?" Eh… ok we are confirming, descending at FL 340 BBB 62 GM.

At this point ATC sector No6 clarified the situation, instructed the flight to regain FL380 and then handed it over again to ATC sector No5.

Even though ATC sector No5 tried to recover the situation by providing avoiding actions, the call sign confusion led to 2 separation minima infringements.

During the descent BBB62GM slightly conflicted with opposite direction GWM1YY and significantly with converging KSS706. Both were advised of the essential traffic and both reported the traffic in sight. No ACAS activation was reported on frequency either for Sector 5 or Sector 6.

ANSP classified the event as a separation minima infringement with no ATM contribution.

Remark – The call signs were changed for reasons of confidentiality.

AIR-GROUND COMMUNICATION 2012 - 2016

According to EUROCONTROL's HEIDI taxonomy, 'Air–ground communication' covers two main areas: 'Spoken' and 'Operational' communication (see definitions on page 40).

As presented in Figure 23 'Air-Ground communication' consisting of 'Spoken' and 'Operational' communication accounts for 34% of the top seven contributors to ATM occurrences identified within the EVAIR database. Spoken communication is a much bigger contributor than operational communication (Figure 24).

Traditionally the most frequent types of occurrence where 'Air-ground communication' has been identified as one of the contributors are: 'Runway and Taxiway Incursions', 'Level Busts', 'Call sign Confusion', 'ACAS RAs', 'Go-around', etc.

Figure 23: *Top seven contributors to ATM occurrences: cumulative figures 2012 - 2016*

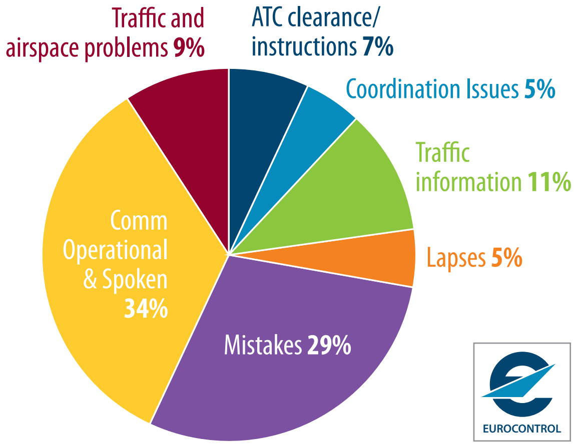


Figure 24: *Two major air-ground communication areas: cumulative figures 2012 - 2016*

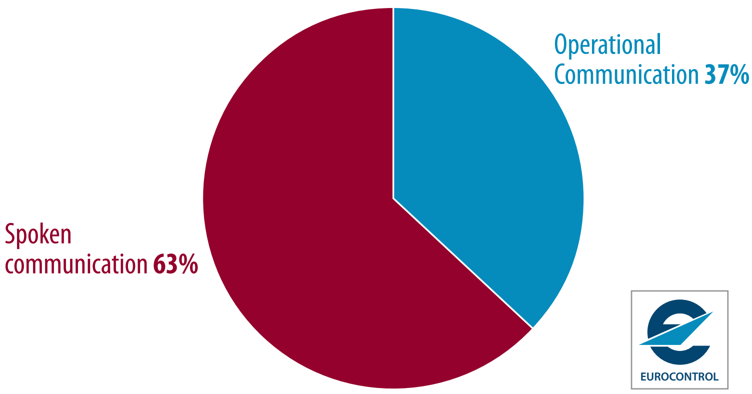
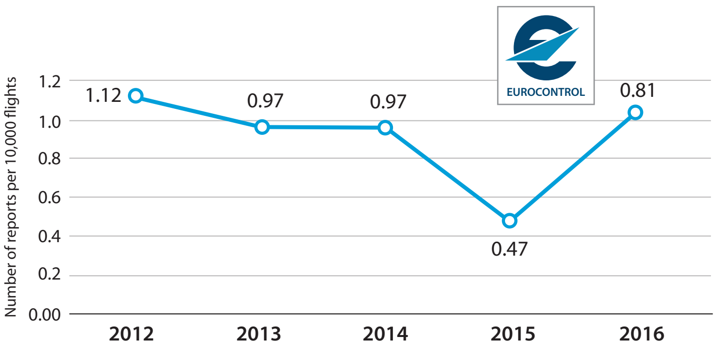


Figure 25: *Air Ground communication trend 2012 - 2016*



The annual trend for Air-Ground communication (Figure 25) shows that, after a drop in 2015, EVAIR recorded a significant increase in 2016. Figures 26 and 27 give more detailed information on which elements of Air Ground communication contributed more to the general increase in 2016.

'Misunderstanding/Interpretation' is the area with the highest contributions to 'Spoken communication' (Figure 26). In 2016, this area recorded a significant increase versus 2015. Also, the 'Call Sign Confusions' recorded by pilots contributed more than the other areas to the general increase in overall 'Air Ground Communication' in 2016. It is interesting that almost all 'Spoken communication' areas of concern rose in 2016.

Within 'Operational communication', 'Hear-back omitted' is the area which traditionally contributes more than the other areas of concern. This area also rose in 2016, but a further two areas within 'Operational communication' also recorded an increase in 2016, namely 'Phraseology' and 'Transfer of communications'.

It is interesting that 'Handling of radio communication failure/unusual situations', a major contributor in the past, continued increasing. This sub-category includes pilots forgetting to turn on the loudspeakers after taking off their headsets; incorrect frequency selection; problems communicating with ATC; frequency blocked by other aircraft; frequency range of the ground stations and readability problems; use of the second transmitter and forgetting to change it back to the working frequency, etc.

Figure 26: *Spoken communication 2012 - 2016*

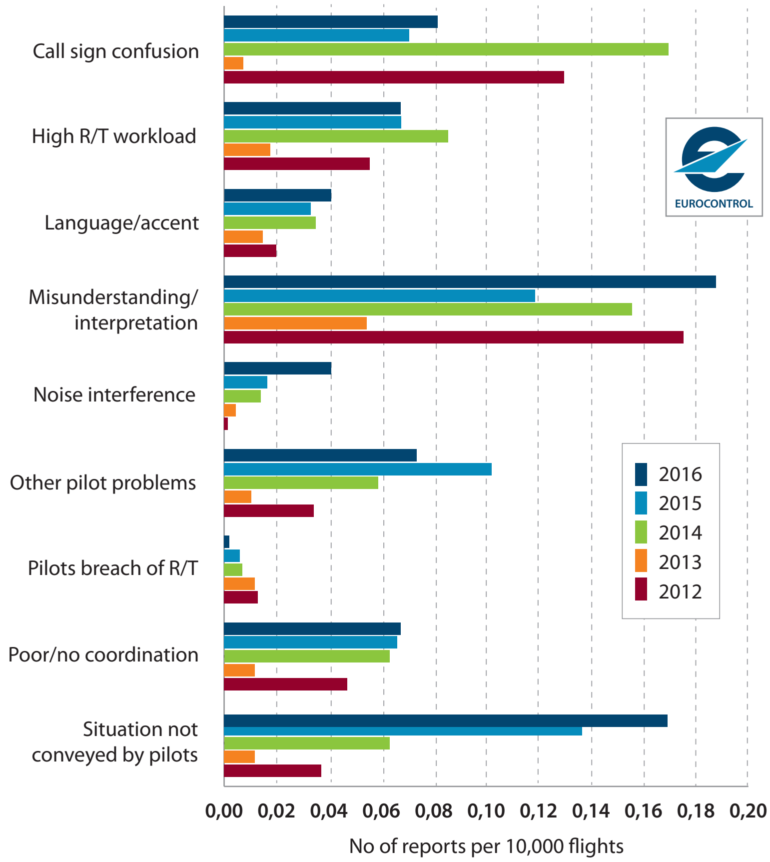
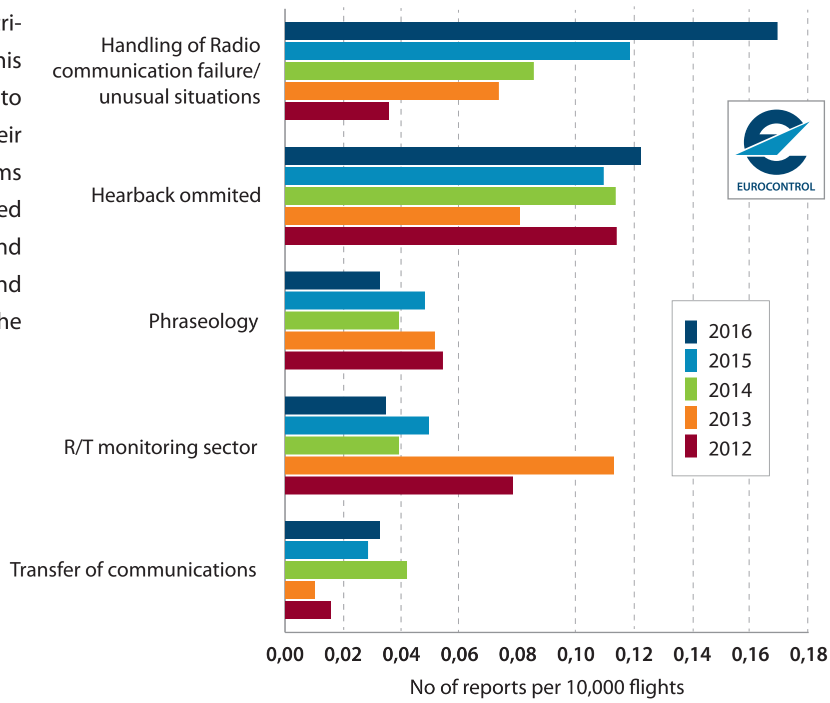


Figure 27: *Operational communication 2012 - 2016*



De-identified occurrence reports

Airline report (a/c1) - Oct 2016

Risk of conflict with other aircraft on TWY. A/c1 had received taxi instructions: From gate D29, TWY A,Q, hold short of RWY 35D at W5. Taxiing commenced but had to slow down and stop due to a/c2 very slow to enter A4W. Once the a/c2 started to enter the apron, we recommenced taxi, but had to brake sharply due to a/c3 crossing in front of us (a/c1) at speed at A4 to enter A4W.We informed ATC that we had to yield, and were told that we had been instructed to do so. Neither pilot heard or read back any instruction to give way. The conflict happened at low work load, no distraction from other tasks or unnecessary conversation. Both pilots were sure that there were no instructions to give way to a/c3. Fortunately, taxi speed less than 5kts and collision risk was low, but ATC instructions had been unclear.

ANSP feedback facilitated by EVAIR

Two landing runways in use (RWY 05 and RWY 35R), one departure runway (RWY 35L). Visibility is good, after sunset. A/c1 at stand D29 receives taxi-instruction from Ground towards runway 35L. Routing is via TWY A, Q and W5. At S4, a/c2 A320 leaves RWY 05 and receives taxi instructions from Ground towards C08. As there is a push-back in progress on that apron, the A320 is instructed to use the A4W line to enter the apron. Probably not familiar with the airport, as the A320 is first holding in S4 and thereafter on taxiway A not clear of A4. Behind the a/c2 A320, an a/c3 A321 is landing on RWY 05, also vacating via S4. After vacating, the a/c3 checks in with Ground.

First, the ground controller issues the instruction to a/c1 to give way to the a/c3 from the left at A4. However, this instruction is not read back by a/c1, and furthermore not re-issued by the ground controller. Instead, ground issues an instruction to the a/c2 A320 to continue taxi as it is still blocking TWY A. Thereafter, the a/c3 is instructed to taxi to stand B15 as number 1, therefore implying that it has the right of way over a/c1.

As a consequence, a/c3 A321 is continuing via A4 to taxiway A and therefore a/c1 had to brake to give way.

Airline report - Aug 2016

ATC cleared ac for the RNAV approach but with further descent from 5000ft 'shortly'. Co-pilot (PF) heard the initial part of the text but not the altitude part; PF therefore armed the approach and a/c started descent. Capt (PM) intervened immediately and ordered VS zero and climbed to original altitude. A/c had descended 300ft below cleared alt. PF had not heard the ATC instruction for 'further descent shortly' partly due to the language difficulty and partly due to the preceding part of the instruction being "cleared for the approach'. Hence he armed the approach assuming that full clearance had been issued. The aircraft started an immediate descent. PM noticed immediately and prompted PF to level off and return to original cleared altitude. The aircraft had descended 300ft before returning back to 5000ft ATC issued a confusing clearance telling a/c that they were cleared for the approach but with a non- standard call of 'further descent shortly'. Only PM identified the altitude clearance hence intervened immediately when the a/c started descent in FINAL APP mode. ATC subsequently cleared the a/c to descend immediately after the a/c returned to 5000ft. There was no confliction with other traffic and ATC did not mention anything about the altitude excursion.

ANSP feedback facilitated by EVAIR

- After an initial vectoring for ILS, pilot asked ATCO for an RNAV approach;
- ATCO provides a vectoring towards the IAF and simultaneously authorizes the flight with the RNAV procedure to IAF, informing pilot to expect further descent after 3 NM ("I'll call you back for lower in 3 miles") since flight was still in an area where the radar minimum was 5000ft.
- As soon as flight entered the area where the radar minimum is 2500ft – before reaching the final segment of the procedure – it was authorized for descent and then again for the procedure.

LOSS OF COMMUNICATION 2012 - 2016

In support of EUROCONTROL Agency projects, EVAIR performs 'Loss of Communication' analyses. Like for the previous five years, some 300 reports were collected each year for the period 2012–2016. In 2016 there was an increase in the number of states and locations where there was 'Loss of Communication'. In 2016 'Loss of Communication' occurred at 35 different locations across Europe (Figure 28).

It is interesting that the EVAIR and IATA trends for 2012-2016 are moving in different directions. EVAIR recorded an increase whereas IATA noted a downward trend. IATA looks at the global picture while EVAIR analyses the situation in Europe.

Figure 28: *Loss of communication States & Locations 2012 - 2016*

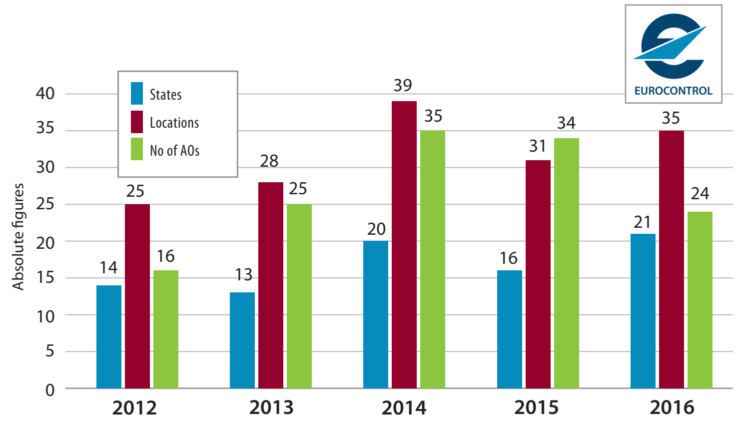


Figure 29: *Loss of communication 2012 - 2016*

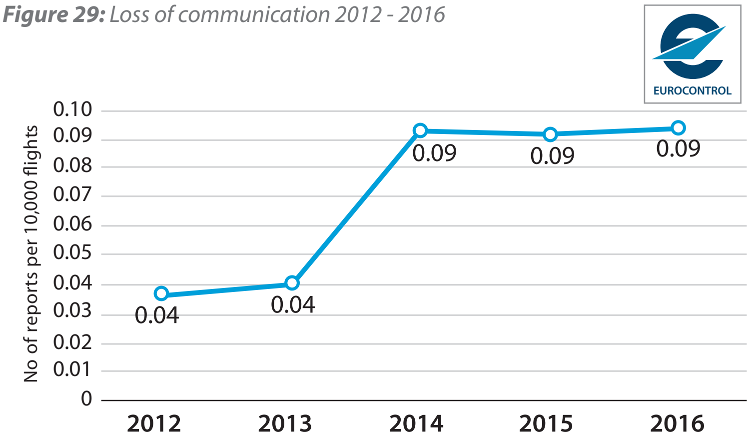
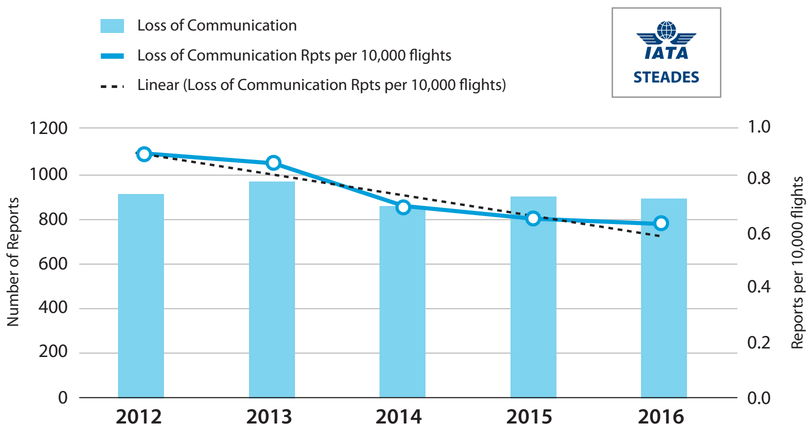


Figure 30: *Global Loss of communication 2012 - 2016*



Most 'Loss of communication' incidents (i.e. 75%) occur during the en-route phase (Figure 31). The most frequent cause of 'Loss of Communication' within the en-route phase was ATC forgetting to instruct pilots to change the frequency or incorrect frequency setting by pilots. From the risk point of view, en-route 'Loss of Communication' is usually less severe than when 'Loss of communication' occurs during approach within complex traffic and when the flight could culminate in a landing without clearance, causing further problems on the ground ('Runway Incursion').

It is encouraging to see that the 'Direct contribution' to the overall 'Loss of communication' is relatively low (16%) (Figure 32). 'No involvement' in 71% of cases means that ATM was not a contributor in any way and that the problem lay on the airborne side.

In 2016 the most frequent airside problems are not much different from those in previous years: low speaker volume, incorrect selection of frequency, ground frequency coverage, Data Link instability, ATC hand-over between neighbouring sectors, non-operating on-board VHF etc.

Figure 31: *Loss of communication – Phases of flight 2012 - 2016*

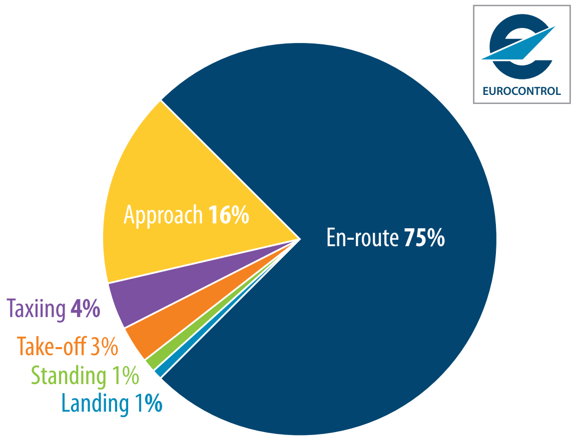
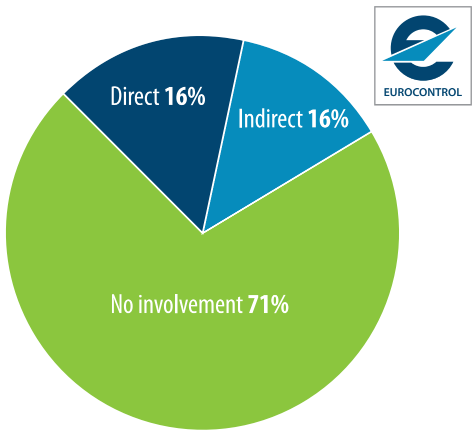


Figure 32: *Loss of Communication – ATM system contribution 2012 - 2016*



The main contributor to 'Loss of communication' is 'Handling of radio communication failure/ unusual situations', which accounted for almost 35% of cases. Taken together, 'Failure of communication function' and 'R/T monitoring' both with 10.2%, grouped with 'Handling of radio communication failure/unusual situation', account for more than 50% of 'Loss of communication' cases. This is a useful insight into the areas which might be addressed to mitigate the problem.

Loss of communication' is never an isolated event, it is very often associated with other types of ATM event. Figure 34 shows that the most frequent events associated with 'Loss of communication' are Go around and Runway Incursions , which between them account for 58% of the reported associated events.

De-identified occurrence reports

ANSP report on the loss of communication - Nov 2016

At 13.15 the controller of the Sector 1 was informed by Sector 2 that they had lost radio communication with a/c 1, A320 at FL380. The controller of Sector 1 tried to establish contact with a/c1 on emergency frequency 121.5, he also tried SELCAL and informed all aircraft in the vicinity to call a/c1. Sector 1 informed the national Air Defence. At the same time Sector 2 informed neighbouring radio. The national Air Defence informed the supervisor of Sector1 that they were going to scramble two fighters to intercept the flight. Sector 1 went on Alert Phase. At 14.11 UTC a/c1 established contact with Sector 1. When asked by the controller, the captain reported that he had not been told to change frequency and he heard on the emergency frequency to call Sector 1. The captain also reported that he had been alerted by the two fighters and declared operations normal. At 14.13 the Alert Phase of Sector 1 was terminated. A/c1 followed flight plan route and did not squawk RCF in the aircraft transponder. In accordance with RAT the incident was categorized as 'C'.

Figure 33: *Loss of communication general contributors 2012 - 2016*

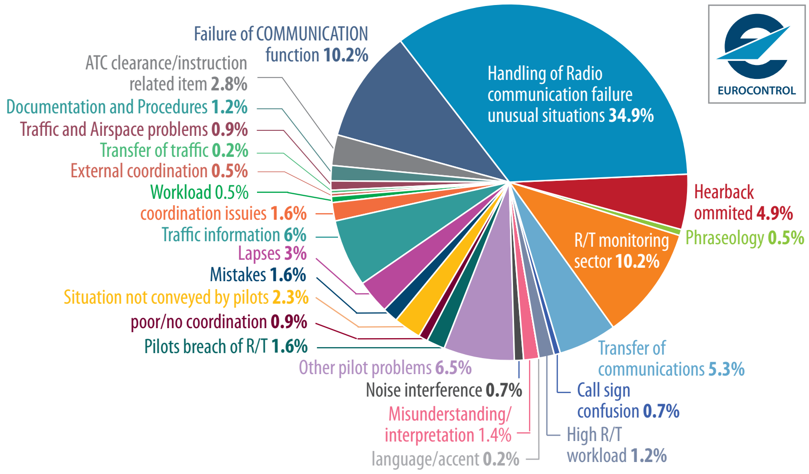
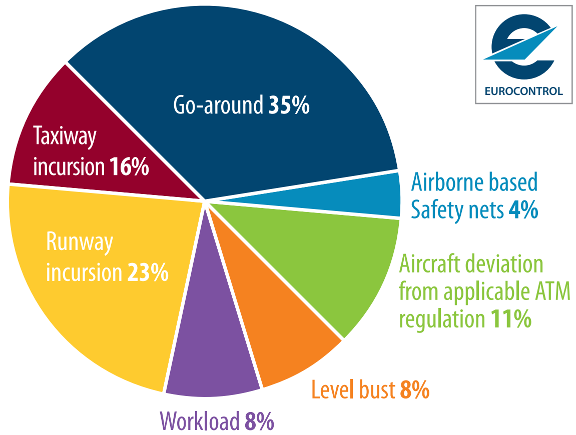


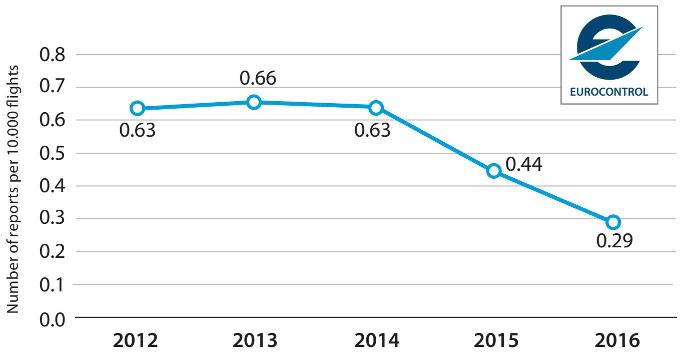
Figure 34: *Associated events with Loss of Communication 2012 - 2016*



SPECIFIC EVENTS - LASER THREATS ACROSS EUROPE 2012 - 2016

This is the third year in a row that 'Laser threats' fell (Figure 36). Given the findings across Europe in other databases, it seems that this problem nevertheless remains high. Some states have even set up permanent working groups with the participation of the most important stakeholders, i.e. police, air carriers, ATC, manufacturers, media etc. in order to analyse the problem and prepare mitigation measures. In order to check what is going on the national level, we made additional searches for those states where these activities were concentrated and found that in one of the States where traditionally there had been a high number of laser reports, there was a significant decrease in laser interferences. It seems that this approach gives positive results and could be an example to others on how to combat the problem.

Figure 35: *Laser interference 2012 - 2016*



Since the very beginning, 'Laser threats' have been concentrated in the approach phase (Figure 37). This is due to the characteristics of the devices used and the need of the perpetrators to have visual contact with the approaching aircraft. In some reports we read that the perpetrators of such attacks usually go to areas in the vicinity of the final approach and wait for the appearance of aircraft in approach to target them with their laser beams.

Unfortunately there is still no European regulation on laser abuse, just national regulations. Discussions at various meetings have shown that the wide range of national regulatory solutions is possibly one of the reasons why the misuse of laser devises is not being effectively combatted.

Laser interference versus total number of EVAIR reports

As a rule, laser interferences are events which are high on the list of EVAIR events, coming immediately after TCAS RAs, which are top. Laser interferences have maintained this prominent position for a good number of years. However, over the last two years 'Laser interferences' recorded a decrease in terms of the percentage they represent of the total number of EVAIR reports.

Figure 36: *Laser phase of flight 2012 - 2016*

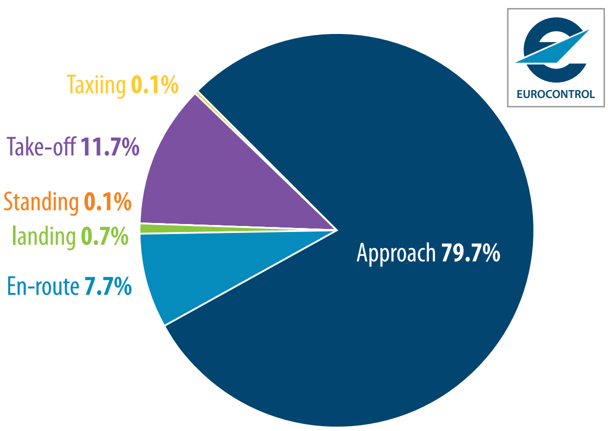


Figure 37: *Percentage of Laser reports vs total number of EVAIR reports 2012 - 2016*

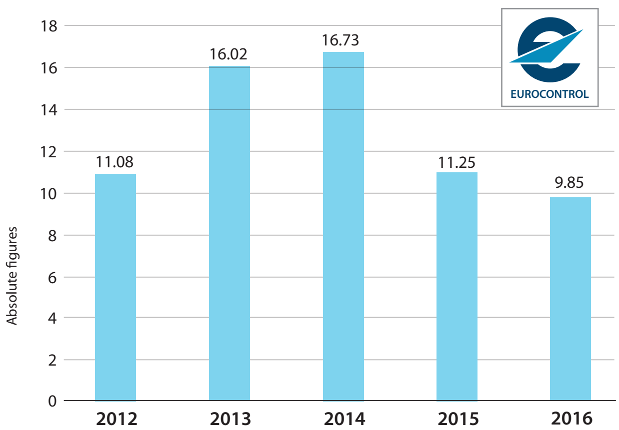
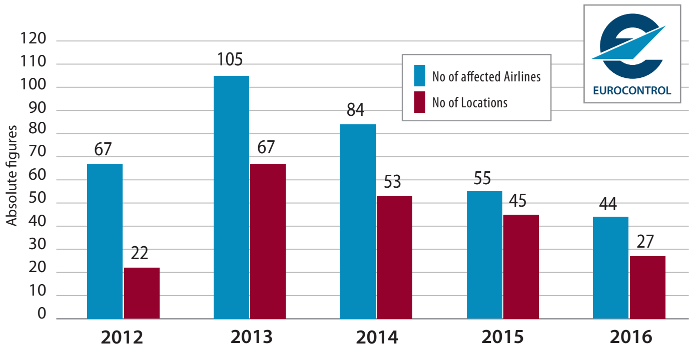


__Figure 38:__ Laser interference, no. of locations and no. of affected carriers 2012 - 2016



The trend over the last three years (Figure 39) shows a steady decline in the number of locations and number of carriers affected by laser interferences, which is in line with the general decrease in the number of laser interferences in the EVAIR database. We will continue to monitor the situation to see how 'Laser interference' will evolve at European level.

Our data providers can send reports to:
dragica.stankovic@eurocontrol.int

More information about lasers is available on SKYbrary (www.skybrary.aero).

De-identified occurrence reports

Airline report - April 2016

During approach to runway 09L the crew was attacked by a green laser beam multiple times from the north side of a town located about 10 nm final. Tower was informed. After landing, local police came on board and a report was filed. The First officer who was pilot flying ducked under the glare shield for a while. The second pilot was able to make a detailed report of the position of the laser beam. An uneventful landing was made. No one was injured by the light.

September 2016

Green laser targeted aircraft on base leg for the RWY in use. A/c was 4.4NM south of centreline heading 360 degrees approximately, 12NM range from the threshold. Captain noticed green laser flashing across flight deck from the 8 o'clock position relative to the a/c. Laser movement made it obvious that it was handheld and was intentionally targeting the aircraft. Captain was PM. FO did not see the laser and was not affected. Captain has brief laser glare in left eye, but focused on instruments and resisted temptation to look out of window. ATC was informed and flight continued. After passenger disembarked, Metropolitan Police attended aircraft and Captain completed a CAA/Met Police laser reporting form.

RPAS – REMOTELY PILOTED AIRCRAFT SYSTEMS (DRONES) 2012 - 2016

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

In the EVAIR repository we have reports concerning drones, which mainly fly at low altitudes. However, EVAIR recorded small drones at higher altitudes too. In certain pilot reports they spotted small drones even at FL 140. Since 2011, when EVAIR recorded the first 'Drone' reports, we have seen an explosion in the number of reports, particularly in 2016 (Figure 41). The distances between the aircraft and drones were so close that pilots were able to describe the shape and colour of the drones in detail. The most common drone was the four-rotor model. Separation minima were from 0ft vertically up to a few metres horizontally and vice versa, i.e. 0 meters horizontally and 50-100ft vertically. In some of the reports pilots stated that evasive action was impossible. The air misses largely occurred on the final approach when aircraft was ILS established.

After making regular cross-checks with open aviation forums and newspapers articles, we found that these events are not the same as those reported to EVAIR. This leads us to the conclusion that many events have not been reported to EVAIR. The EVAIR team regularly checks open aviation forums and newspapers articles for drone encounters and it was noted that there were many other additional drone events. This leads us to believe that many events have not been reported to EVAIR.

From an ATM point of view, little can be done at a tactical level since there is no advance warning to controllers of drone plans and intentions. Those measures which have been taken by controllers are similar to taken to combat laser interferences. In the absence of small drone regulations, pilots are requested to report occurrences to controllers so that they can inform other traffic which could be affected, the police and the national authorities. We repeat that it is very important to have as precise as possible a location for the occurrence so that police can respond. Pilots have also been requested to stay vigilant and avoid flying objects wherever possible. In VMC this approach is sometimes feasible but in IMC conditions it is impossible. We have also identified cases where pilots had to make go arounds.

As shown in Figure 41, the most affected phase of flight is approach, accounting for almost 80% of cases. In fact the most serious occurrences were when aircraft were on ILS, or immediately after take off. Only 7% occurred en-route, which confirms that the vast majority of drone occurrences are at low-level altitudes.

Figure 39: *RPAS trends 2012-2016*

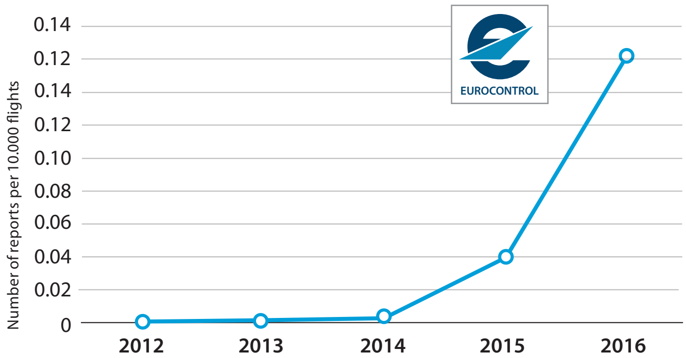
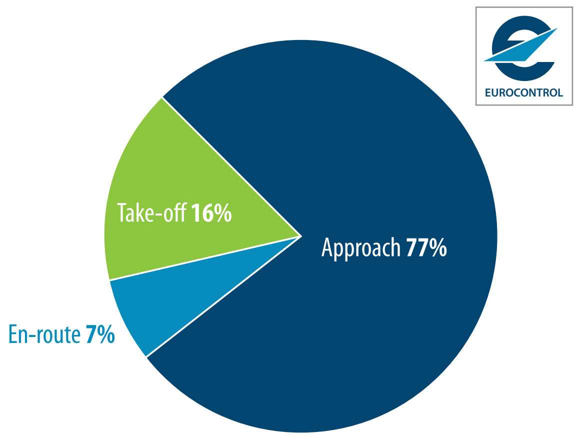


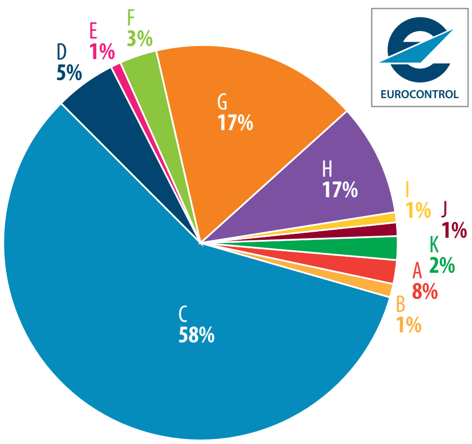
Figure 40: *RPAS Phases of flight 2012 - 2016*



Drones – States and Locations across Europe

The number of states with drone issues after the last data search increased from eight to eleven for the monitoring period 2012-2016. Two states accounted for 75% of the total number of drone reports in our repository. One of the reasons for the high incident rate is good reporting on the side of Air Operators and ANSPs.

Figure 41: *Drone spread across European States 2012 - 2016*

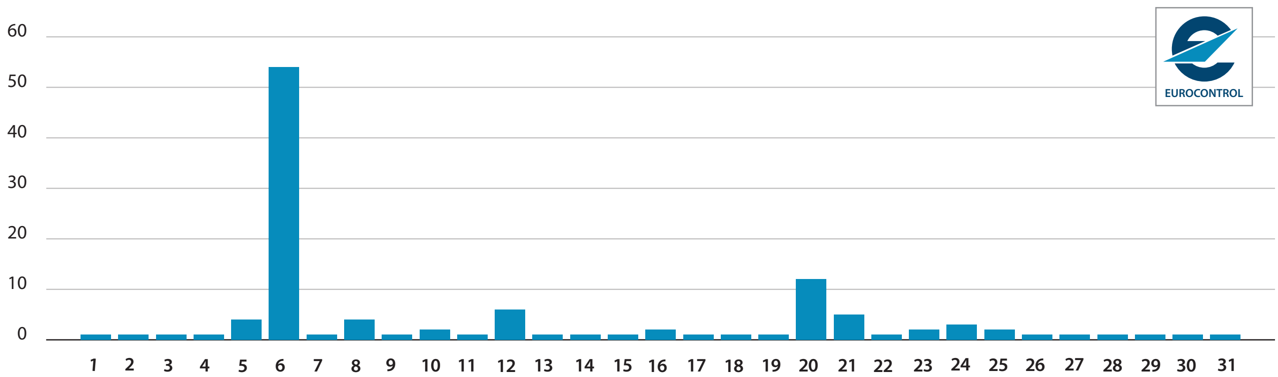


For the period 2013-2016, we identified 31 locations as compared to the 13 identified for the previous period, which is a clear indication of the significant escalation of the drone problem. The locations are, as previously, concentrated around the busiest airports in Europe, which further increases the risk of a serious incident or accident. Although at EVAIR we do not carry out severity risk analyses, we have seen reports which can certainly be deemed very serious, since vertical or horizontal separation was only a few metres.

As for the altitudes where the aircraft were located during their proximity with drones, the lowest altitude was 300 feet and the highest was FL 140. This confirms our previous statement that small drones do not fly only at low altitudes – they can access high flight levels.

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

Figure 42: *Drones: locations across Europe 2013 - 2016*



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

Airline report - October 2016

During the intermediate approach from the holding pattern, a large drone was spotted by the crew. The drone was moving from the forward left to the rear left relative to the aircraft. It was assessed to have passed within 100ft (20m) of the aircraft, and possibly within the wingspan. The drone itself was blue and disc-like in structure, with a single rotor and approximately 50cm in diameter. There was a possibility of damage if a collision had occurred. ATC was immediately informed. Police met the aircraft upon arrival in order to draft a crime report.

GPS OUTAGES 2013-2016

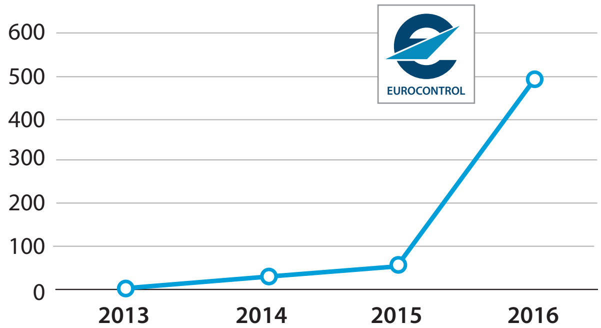
The GPS analysis and statistics provide a general overview of ECAC airspace for 2013-2016. The analyses start from 2013 because this was the year the first GPS outage events were recorded.

For the aforementioned period, EVAIR received a total of around 13,500 reports, of which 563 were GPS outages, representing 4% of overall EVAIR reports.

The yearly trend, as presented in Figure 43, is upwards across ECAC and neighbouring airspace. It should, however, be borne in mind that, together with the airline associations IATA and ERAA, we did on several occasions prompt Air Operators to provide us with their GPS outage reports, which was not the case for other types of event. Whenever we ask Air Operators to report specific types of the event, we see an increase in the number of reports of the requested type of event. In the light of the reports provided, it would seem that pilots are becoming more familiar with the problem and are much better prepared to cope with it. Problems are especially present within PBN airspace and airports where the SID/STAR procedures are based on satellite navigation. Due to the vulnerability of satellite navigation, Airspace Operators have been asking for a re-think of plans to de-commission ground navigational aids.

Recently we learned about the GPS jamming problem caused by the so-called PPD-Personal Privacy Device. The device was operating in one of the cars parked at a public airport car park, very close to one of the airport's aircraft parking positions.

Figure 43: *Number of GPS reports 2013-2016*

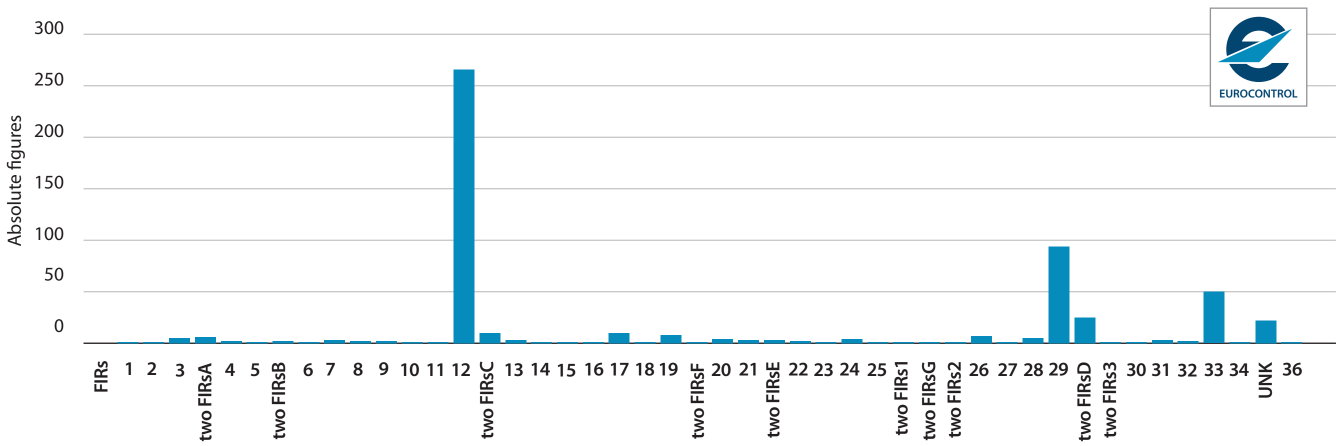


The emission of the PPD created GPS interference on several parked aircraft. Pilots were not able to initialize the GNSS receivers during pre-departure checks and to establish satellite navigation. As a consequence, they had to change gate, causing departure delays.

The airport operator contacted the aviation authority, which in turn contacted the national radio frequency regulator. With support from the police, the PPD was confiscated from a passenger who had left the car parked with the PPD transmitting. The passenger using the PPD was fined 2,000 EUR. The maximum fine is much higher and may include jail too. One of the reasons that the fine was so small was because only the aviation authority and airport operator pressed legal charges, without claiming damages.

Thanks to the data collected, all the main stakeholders, i.e. Air Operators and their associations, as well as ANSPs, EASA, as the European regulator, and ICAO were informed about GPS outages trends and main problems related to them.

Figure 44: *GPS failure by FIR 2013 - 2016*

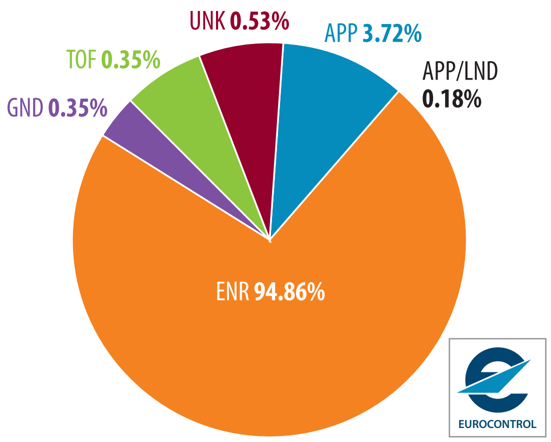


Analyses of GPS outages identified 36 different FIRs where GPS problems occurred at least once times (Figure 44). In some FIRs, the problem was repeated more than 250 times. Some of the GPS events occurred on the boundary between two or three different FIRs. As for the previous period, the majority of the reports are within politically sensitive areas. The Black Sea-Caspian Sea axis remains the most affected area.

We repeat something we have already said, and this is that one of the most likely reasons for the outages could be radio interference with the satellite signal, although there could be others, such as on-board GPS equipment failure, solar storms, military exercises, satellite constellations, etc. To arrive at the above conclusion, the EUROCONTROL GNSS and NAV experts have applied the elimination methodology to the reported events in order to identify the likeliest cause of the outage. The elimination methodology includes different potential causes such as space weather, receiver problems, military testing and satellite constellation. If none of the listed causes was confirmed, then the most probable cause is Radio Frequency Interference (RFI).

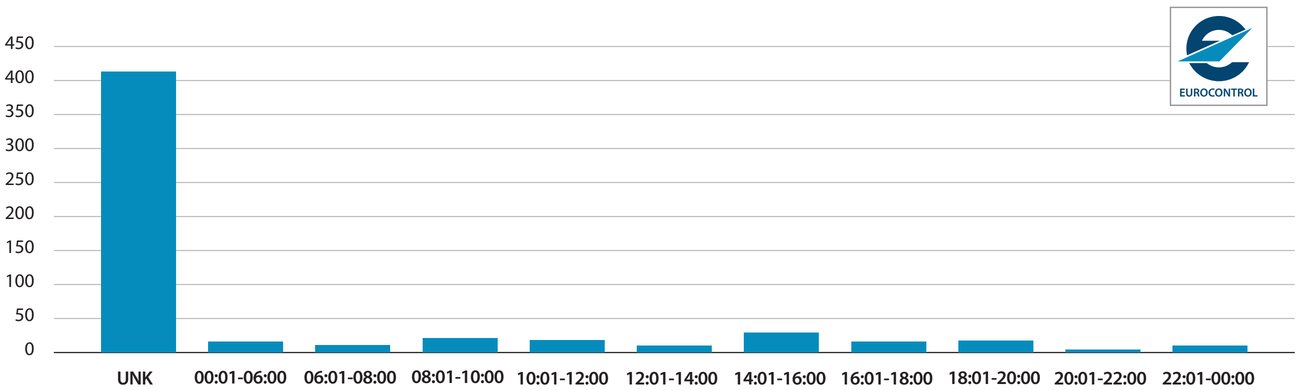
As shown in Figure 45, the most affected phase of flight is the en-route phase.

Figure 45: *GPS outages per phases of flight 2013 - 2016*



Looking at the UTC time when the GPS outages occurred for those reports where we had such information (Figure 46), there were more reports for this period from 14.00 to 16.00. However, in the case of earlier reports, most occurred during night, between 22.00 and 00.00, which means that the time of the outage is not stable.

Figure 46: *UTC Time of GPS outages 2013 - 2016*



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

As shown in Figure 47, the spread of the events across three of the four defined time spans is more or less similar, from 12%-13% (1-5 min; 5-30 min & 15-30 min), whereas for the time span 30 mins to 3 hours it is 4%. Lost signal reports where the duration is known indicate that the affected area was substantial.

The taxonomy for the GPS outages has not yet been defined at global level. The taxonomy used by pilots in the reports submitted was: GPS 1 lost, GPS 1 and 2 lost or both GPSs lost. In our analyses we used the taxonomy GPS 1 lost and total loss. Total loss means that if one or two GPS boxes were on board, both failed to work. GPS 1 lost means that the second box still was operational.

43% of reported GPS losses indicated that pilots experienced 'Total loss' of GPS function (Figure 48). After experiencing loss of GPS, certain Air Operators issued internal NOTAMs to their pilots alerting them to the potential problem with the GPS signal and preparing them to use other navigational equipment.

According to the reports, the most affected type of aircraft was the A380 and B777. These two types of aircraft are the most affected because long-haul traffic is predominant within the area concerned and these types of aircraft are the most flown.

Figure 47: *Duration of the GPS outage – 2013 - 2016*

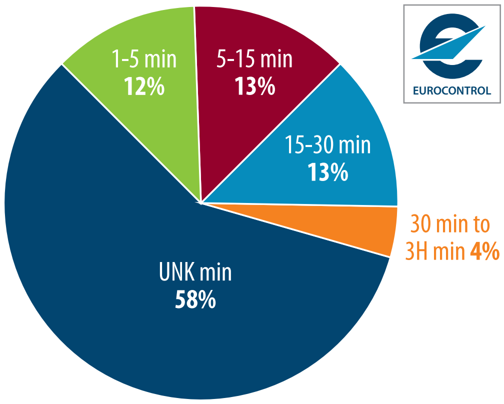


Figure 48: *GPS Loss 2013 - 2016*

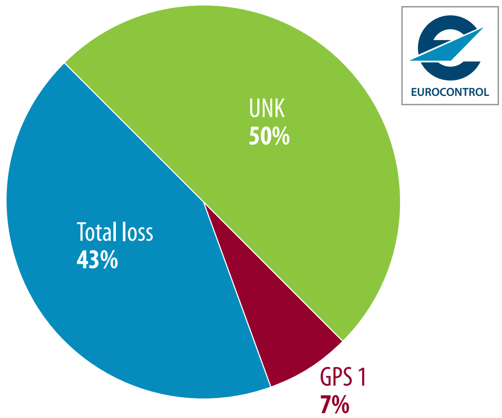
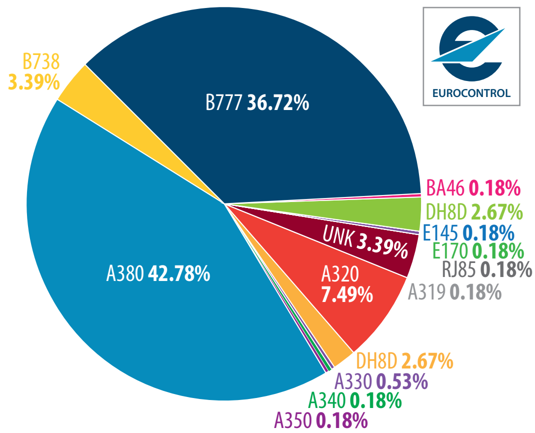


Figure 49: *Type of a/c affected by GPS failure 2013 - 2016*



Looking at the spread of GPS outages (Figures 50 and 51) ECAC airspace is more affected than non-ECAC airspace. In this regard, we would point out that most of the ECAC outages occurred within the ECAC states on the boundary with non-ECAC states. A certain number of reports occurred exactly on the boundary, but for some reports we were unable to identify the location.

We would like to highlight the fact that, in accordance with the ICAO GNSS Manual (Doc 9849) ANSPs which identify GNSS interference must issue an appropriate NOTAM. So far, from the affected regions only one NOTAM was issued, by the Turkish authority, which did so following a surge in GPS outages. We take the opportunity to invite ANSPs to issue NOTAMs if they identify GPS outage problems, with a description of the affected areas. This information is crucial if Air Operators are to be properly prepared when they fly through the affected regions.

Figure 50: *GPS outages- spread within ECAC and non-ECAC regions 2013 - 2016*

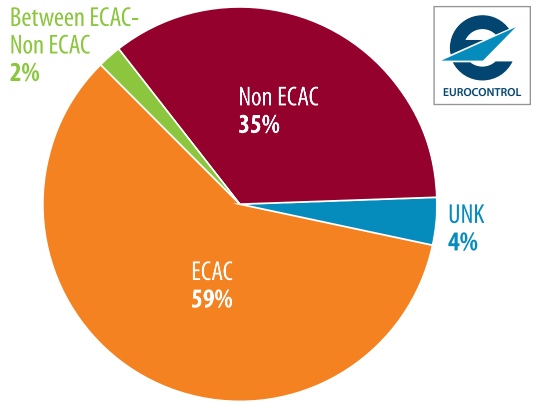


Figure 51: *spread of GPS outages - ECAC and non-ECAC area*

De-identified occurrence reports

Airline report - January 2016

We lost both GPSs. So we were in inertial navigation. The ANP started degrading, and increased to 1.4. We set the RAD NAV INHIBIT to off, and resumed DME-DME navigation with ANP 0.4. EICAS, GPS, GROUND PROX SYS, RUNWAY SYS AND TERR POS displayed. Checklists opened and actioned. STATUS, RUNWAY SYS, GROUND PROX SYS, GPS L, GPS R appeared and all systems went back to normal. The rest of the flight continued without any issues.

March 2016

EVENT AND CAUSE TERR POS EICAS caution - checklist actioned. We noticed 'inertial' on navigation display, with ANP increasing. No GPS signal indicated. Shortly afterwards we had NAV UNABLE RNP EICAS caution and checklist actioned. ANP increased to over 6.0. We checked the aircraft position by radio aids. Inertial worked normally. Another aircraft on the same route, 2000ft above, reported the same problem. After about 2 hours GPS signals began to return, but significantly different.

ACTIONS AND RESULTS

Flight continued using inertial and radio updating, so operating normally.

OTHER INFORMATION AND SUGGESTIONS FOR PREVENTATIVE ACTION

After approximately 3 hours, both GPSs began to work normally, although ANP was up to 7.6 (RNP 4.0). Cross-checking with ATC radar ensured the a/c was tracking correctly. After considerable research the GPS NAV was restored. Flt Tech dispatch was informed through ACARS. There is obviously a significant issue for a/c navigation in this area. The SFOs are to be commended for their technical knowledge in getting the problem resolved.

ACAS REPORTING 2012 - 2016

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).

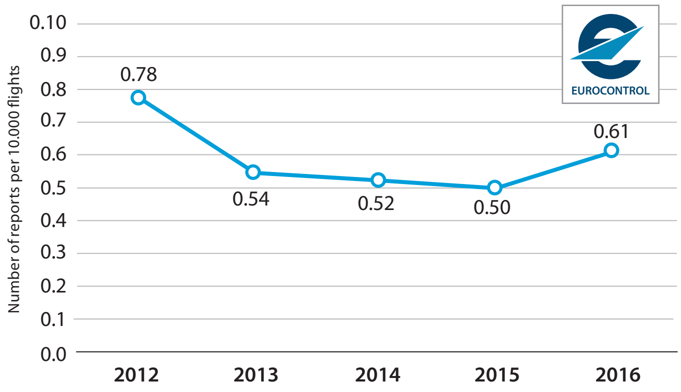
ACAS is the generic term for Airborne Collision Avoidance Systems, of which TCAS II is the only system implemented to date. The purpose of ACAS is to improve air safety by acting as a 'last-resort' method of preventing mid-air collisions or near collisions between aircraft. Although ACAS II implementation 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 2012 - 2016

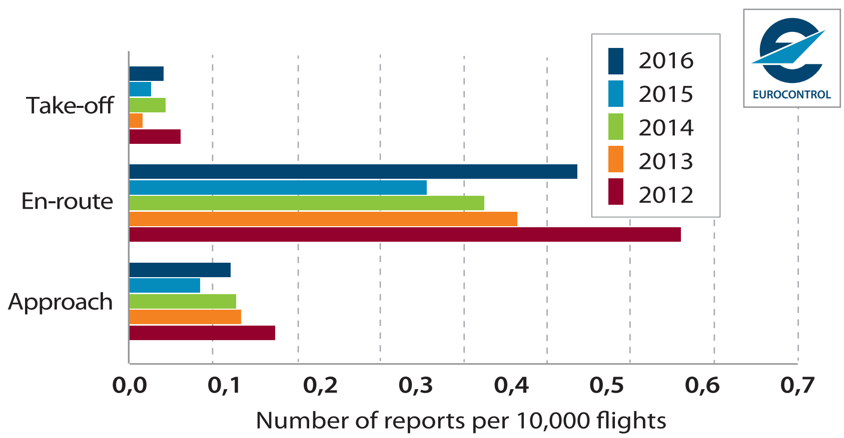
***Figure 52:** Airlines' ACAS incidents 2012 – 2016*



After three years of little change in the number of reports, just a very slight decrease, in 2016 EVAIR recorded an increase in the number of ACAS RAs per 10, 000 flights. Our longer-term statistics show that, following initiatives in the form of action plans, workshops, safety forums, etc. we are seeing a reduction in the number of reports from three to five years after listed events. However, after this period the line starts creeping up again. We will continue with this type of monitoring to see whether there is a timescale for re-emergence of the problem.

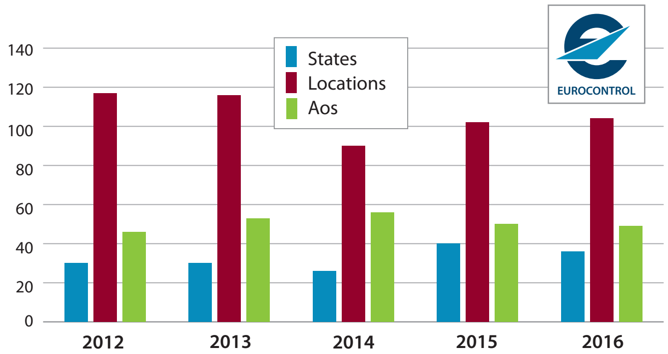
The en-route phase at pan-European level traditionally has more reports than the other flight phases. However, it is important to point out that in some States, especially with major hubs, EVAIR recorded far more ACAS RAs during the approach phase than during the en-route phase.

***Figure 53:** Airlines' ACAS RAs by phase of flight 2012 - 2016*



After three years of decrease, in 2016 EVAIR recorded an increase within all phases, which is in line with the overall increase in ACAS RA reports.

Figure 54: *Airlines' ACAS RA occurrences per State, location & carrier 2012 - 2016*



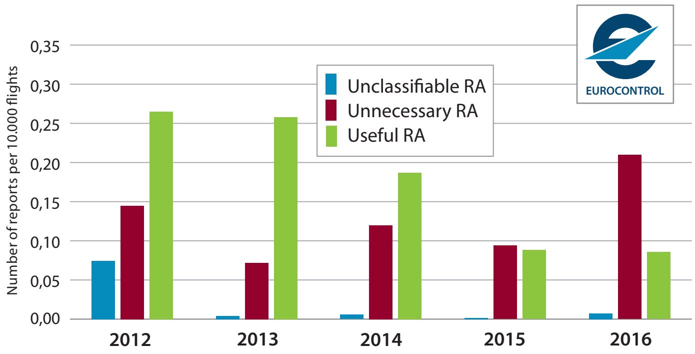
The absolute figures for ACAS RAs by 'Carrier', 'State' and 'Location' (Figure 54) show that in spite of the increase in the number of reports, we have more or less a stable number of Air Operators who reported ACAS RAs, and a stable number of States and locations where occurrences occurred.

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.

In 2016 'Unnecessary' RAs recorded a significant increase. One of the main reasons that pilots stated that the ACAS RA was unnecessary was not that separation minima were infringed

Figure 55: *ACAS RA Classification seasons 2012 - 2016*



but that the ACAS RA was triggered due to high vertical rate or problems with the Hybrid surveillance.

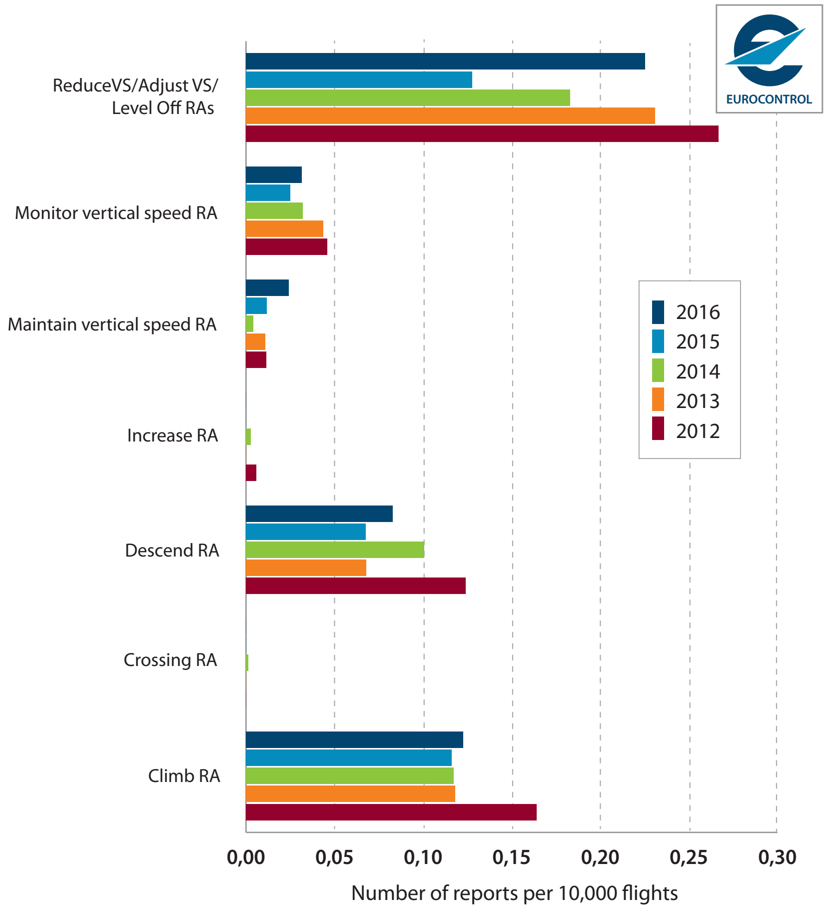
'Useful RAs' recorded a decrease in 2016 for the fourth year in succession. We do not have enough information to explain the reasons for this decrease, but will endeavour to remedy this situation through further monitoring. We hope that the reason is not a loss of confidence in ACAS.

ACAS RA INSTRUCTIONS 2012 - 2016

Almost all types of ACAS RA recorded an increase in 2016.

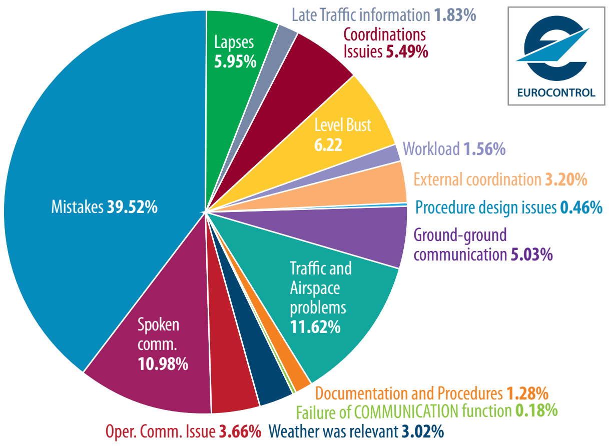
The 'Reduce/Adjust vertical speed RA' (announced as 'Level off Level off' in version 7.1), historically the RA most frequently recorded, rose in 2016 after three years of successive decreases. The main cause is a high vertical rate in the last 1000ft of climb or descent and the lack of ATC traffic information on any traffic which might be below or above.

Figure 56: *ACAS RA Instructions 2012 - 2016*



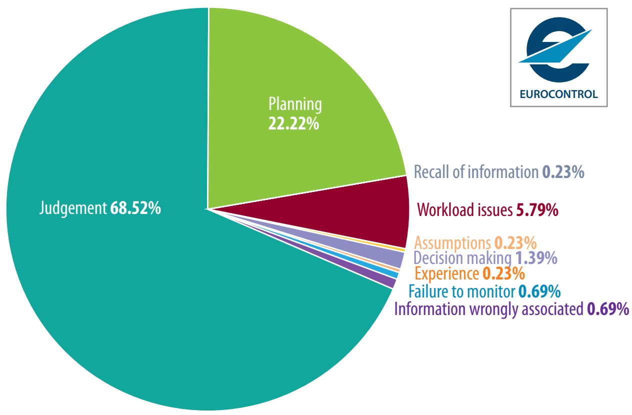
ACAS RA CONTRIBUTORS 2012 - 2016

Figure 57: *TCAS RA contributors 2012 -2016*



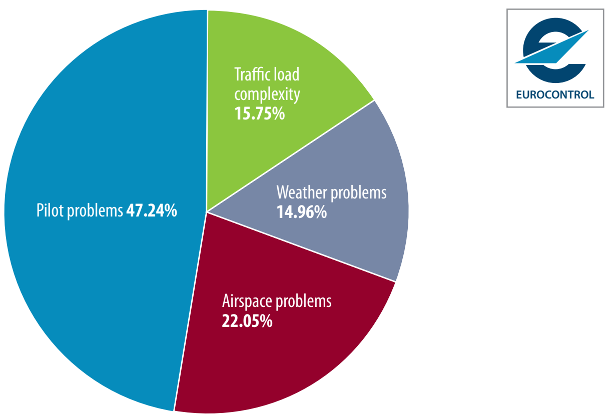
EVAIR analyses show that 'Mistakes', at almost 40%, are the major contributor to ACAS RA reports. 'Traffic and Airspace problems', at almost 12% and 'Spoken Communication', at almost 11%, are among the top three contributors. Within the EVAIR database, we identified 15 main contributors, which are presented in the above pie chart.

Figure 58: *Mistakes asssociated with TCAS RA 2012 -2016*



Within 'Mistakes', 'Judgment' and 'Planning' accounts for slightly over 90%. These are contributors directly related to controller work and very often linked with a need for additional training.

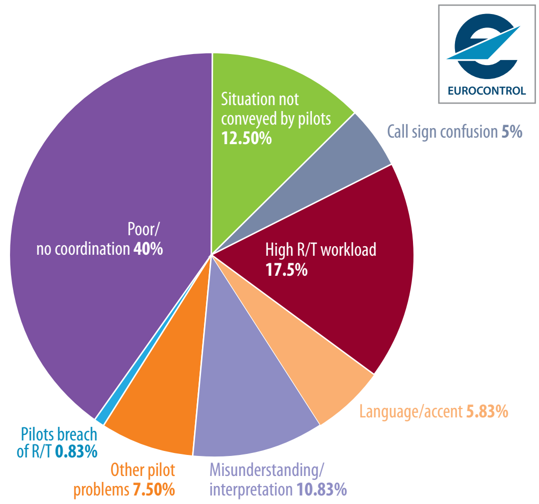
Figure 59: *Traffic and Airspace Problems asssociated with TCAS RA 2012 -2016*



Pilot problems make up almost 50% of 'Traffic and Airspace Problems'. The most frequent problem in this regard is high vertical rate during climb or descent. 'Airspace problems' are most often related to airspace design, especially SID and STAR routes.

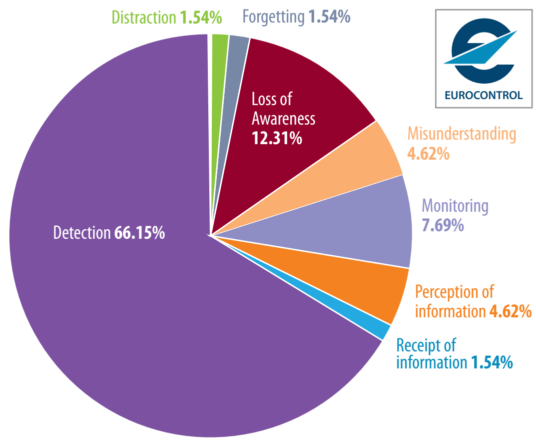
Spoken communication', which makes up some 11% of the main 15 ACAS RA contributors, has eight areas, of which, 'Poor/no coordination' with 40% is the most frequent problem. The coordination problem is mainly related to external coordination.

Figure 60: *Spoken communication asssociated with TCAS RA 2012 -2016*



'Lapses' is fourth of the 15 main contributors. Within 'Lapses' associated with ACAS RAs, EVAIR identified eight main contributors, of which 'Detection', with 66%, is the most frequent. 'Detection' is the area of concern directly linked with the controller's work.

Figure 61: *Lapses asssociated with TCAS RA 2012 -2016*



FALSE RAs CAUSED BY HYBRID SURVEILLANCE TRACKING ANOMALY

Over the last few years, the EUROCONTROL Network Manager Safety Unit has recorded the appearance of false TCAS RAs over the last few years through its work with the ANSPs and air operators

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

It is important to note that the false RAs are triggered when two aircraft cross at the same level, or in vertical convergence, but that the conditions for RA generation have not been met and ATC standard horizontal separation is provided. The false RA[1] is generated only in the 'front' aircraft against an aircraft that is 5 to 7 NM behind or parallel. Once an RA has been declared, the TCAS logic will not terminate the RA until the range between the aircraft diverges significantly.

Since December 2012 through to the end of November 2017, a total of 184 cases of false RAs have been 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). Whilst this is correct, from an air traffic management viewpoint the manoeuvres disrupt the flow and increase cockpit and ATC workload; they may also precipitate follow-on conflicts, especially in congested airspace when adjacent flight levels are often occupied.

In two cases when losses of separation occurred, an aircraft responding to a false RA climbed through a level of a third party aircraft causing a loss of separation but no RA, as the horizontal spacing between the aircraft was large enough not to trigger an RA. Nevertheless, this event alerted the regulators to expedite the work on the introduction of a fix.

Example: Loss of separation due to a hybrid surveillance RA

An Airbus 320 (Aircraft 1) on a southwest track was cruising at FL360, while another Airbus 320 (Aircraft 2) on a northwest track was crossing behind climbing to FL360. The predicted minimum horizontal separation between the two was over 6 NM. The standard ATC radar separation is 5 NM horizontally or 1000 ft vertically. The climbing A320 had been instructed to maintain its heading for separation.

At the same time, an Airbus 321 (Aircraft 3), on a southeast track was cruising at FL370. While vertical ATC separation was ensured between Aircraft 2 and 3, their tracks were expected to cross with a horizontal spacing of just over 3 NM. Aircraft 3 was not a factor for Aircraft 1, as they were flying almost parallel with a spacing of over 8 NM and 1000 ft apart.

Aircraft 2 received a Climb RA against Aircraft 1. At the time of the RA, Aircraft 2 was passing through FL355, crossing 8.0 NM behind (at the 8 o'clock positon). The Aircraft 2 crew responded to the RA, initiating a climb. The RA lasted 25 sec. during which Aircraft 2 climbed 1400 ft. Although the Aircraft 2 crew response to the RA was stronger than nominally expected, that had no influence on the loss of separation (owing to horizontal spacing between the aircraft).

Once Aircraft 2 started to climb, the loss of separation with Aircraft 3 was inevitable and occurred 8 sec. after the RA and lasted 55 sec. Aircraft 2 and 3 both received a TA against each other but no RAs were generated.

Conclusion: The Climb RA on Aircraft 2 is believed to be caused by the hybrid surveillance tracking anomaly as neither TA nor RA generation criteria against Aircraft 1 have been met. The subsequent loss of separation between Aircraft 2 and Aircraft 3 was caused by the former departing from its ATC clearance responding to the Climb RA against Aircraft 1.

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 singular events lasting over 60 sec. The hybrid surveillance false RAs in 75% of cases happened to aircraft in level flight, 10% to climbing and 15% to descending aircraft. Two-thirds of the events occurred above FL360.

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

This anomaly has so far 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 that all effected aircraft (the A320, A330 and A340 series) have a fix implemented by 1 June 2018[2]. Aircraft Operators have commenced deployment of the fix and the number of false RAs decreased sharply in the second half of 2017.

Pilots are reminded that all RAs must be followed promptly as it cannot be determined in real time whether or not the RA is false (this is possible only during post-event analysis). Any deviation from ATC clearance must be reported without delay.

ANSPs and aircraft operators who suspect that they have experienced false RAs are requested to provide details to EUROCONTROL and EASA.

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

ANNEX 1 – EUROPEAN ACTION PLANS

EUROPEAN ACTION PLAN FOR AIR-GROUND COMMUNICATIONS SAFETY

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

http://skybrary.aero/index.php/Solutions:ALLCLEAR

THE EUROPEAN ACTION PLAN FOR THE PREVENTION OF LEVEL BUST

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

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

The Action Plan contains recommendations for Air Traffic Management, Air Traffic Controllers, and Aircraft Operators. It is designed to reduce the frequency of Level Busts and reduce the risks associated with Level Busts. Implementation of the Action Plan will be monitored by the Task Force monitoring group reporting to the EUROCONTROL Safety Improvement Sub Group (SISG).

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

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

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

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

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

The organisations which 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)

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 5% 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).

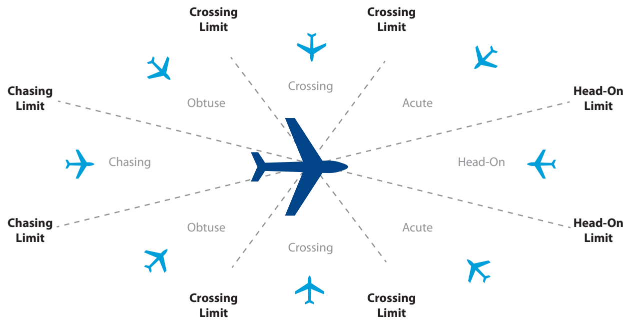
Mental/Emotional/Personality issues (HERA):
include the following items:

- 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;
d) estimated time over the reporting point nearest to where the level will be crossed;
e) relative bearing of the aircraft concerned in terms of the 12-hour clock as well as distance from the conflicting traffic;
f) actual or estimated position of the aircraft concerned.

Local traffic in this context consists of any aircraft, vehicle or personnel on or near the runway to be used, or traffic in the take-off and climb-out area or the final approach area, which may constitute a collision hazard to the other aircraft and about which the information has to be provided.

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

ANNEX 3 – ACRONYMS

ACAS	Airborne Collision Avoidance System
ACARS	Aircraft Communications Addressing and Reporting System
ADREP	Accident Data Reporting
AGC	Air Ground Communication
ANSP	Air Navigation Services Provider
AO	Aircraft Operator
ASMT	ATM Safety Monitoring Tool
ASR	Air Safety Report
ATC	Air Traffic Control
ATM	Air Traffic Management
AUA	ATC Unit Airspace
CPDLC	Controller-Pilot Data Link Communications
CSMC	Call Sign Management Cell
CSC	Call Sign Confusion
CSS	Call Sign Similarity
CSST	Call Sign Similarity Tool
CSS UG	Call Sign Similarity User Group
EASA	European Aviation Safety Agency
EC	European Commission
ECAC	European Civil Aviation Conference
ERAA	European Region Airlines Association
EVAIR	EUROCONTROL Voluntary ATM Incident Reporting
FSF	Flight Safety Foundation
GADM	IATA's Global Aviation Data Management
GPS	Global Positioning System
GNSS	Global Navigation Satellite System
EAPRE	European Action Plan for Prevention of Runway Excursions
EAPRI	European Action Plan for Prevention of Runway Incursions

ERAA	European Regional Airlines Association
FIR	Flight Information Region
FL	Flight Level
HEIDI	Harmonisation of European Incident Definitions Initiative for ATM
HERA	Human Error in European Air Traffic Management
ILS	Instrument Landing System
IAF	Initial Approach Fix
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
LB	Level Bust
NM	Network Manager
NOP	Network Operations Portal
RA	Resolution Advisory
RNAV	Area Navigation
RPAS	Remotely Piloted Aircraft Systems
STEADES	Safety Trend Evaluation and Data Exchange System
TCAS	Traffic Collision Avoidance System
TA	Traffic Advisory
THR	Threshold
UTC	Coordinated Universal Time

EUROCONTROL

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