Network Manager
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EUROCONTROL

EVAIR Safety Bulletin
No 11

2008-2012

CONTENTS

Dear EVAIR Readers I am pleased to present to you EVAIR Safety Bulletin No 11. This issue covers the periods 2008-2012. The analyses are based on more than 8000 reports received from about 160 different airlines - our main data providers. Our data base also encompasses ANSPs' reports related to specific types of events e.g. 'Call Sign Similarity', 'ACAS RAs', 'Laser' etc. Our data set also includes ANSPs' feedback on the airlines occurrence reports. Feedback consists of narrative parts and in many cases of radar screen shots and voice records/transcripts. Having occurrence reports and feedback, gives the opportunity to EVAIR to reconstruct events and to identify their causes as one of the most important part of our analysis.

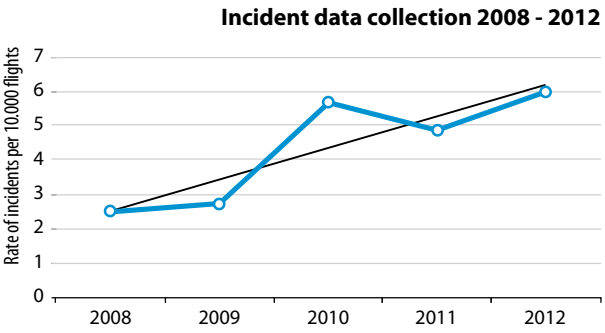


Figure 1: *Incident data collection for 2008 - 2012*

Data collection

The trend line for the period 2008 – 2012 (Figure 1) shows a steady rise in the number of reports received per 10.000 flights. After a small drop in 2011, the upward trend came back in 2012 with 6 reports per 10.000 flights. Translated into a daily level, it means that within ECAC airspace there were at least from 15-20 occurrences of a lower level severity.

For the periods 2008 - 2012 more than 190 different airlines submitted their ATM occurrence reports to EVAIR. Airlines providing the data to EVAIR come from all associations (IATA, IACA, ERAA ELFAA). They cover from 70% to 80% of the overall ECAC air traffic. We noted that in 2012 we had a decrease of the number of the airlines reporting to EVAIR. After a short investigation to find reasons behind we discovered that some of our data providers went bankrupt and a few of them merged into one airline and some of them changed safety managers so that the new safety manger was not familiar with the cooperation with EVAIR. This shows us that EVAIR needs to reinforce the promotion of our activities among the airlines.

Besides airlines, European ANSPs are equally important data providers to EVAIR . We also receive from ANSPs outside Europe. ANSPs data, especially feedback on the airlines occurrence reports give us the opportunity to close the loop of the specific report and to identify the major contributors to the incidents. At the same time this is a very important motivating driver for better reporting culture.

Verification of EVAIR data with IATA STEADES

In this EVAIR Safety Bulletin we continue with the practice to cross-check the robustness and quality of EVAIR data with the IATA STEADES[1]. In addition to the verification with IATA STEADES when making visits to specific regions we cross-check with ANSPs too.

Feedback – Reporting motivator and support to quick fixes

Feed back is the major motivating factor for the reporting facilitated by EVAIR and has been improving performance constantly. The feedback rate rose from 1.3% in 2009 to almost 26% in 2012. It is pleasing to say that feedback requests which until recently were coming almost only from the airlines, are now coming more and more from ANSPs. Feedback information could be from a few sentences up to a few pages providing explanations of the root of the problem. Explanations could be supported by the radar snap shots, voice records or transcripts.

In addition, feedback comes through meetings between Airlines and ANSPs. In that regard EVAIR and IATA engagement in supporting the organization of the safety and operational meetings which enable direct contacts between two major stakeholders are greatly appreciated by both of them. Trust

[1] *STEADES – Safety Trend Evaluation and Data Exchange System*

built during these meetings is one of the driving mechanisms in solving identified problems in an efficient way.

Main trends

Events – Four out of five monitored types of ATM safety events recorded an increase. The only one which recorded a decrease was 'Call Sign Confusion'. The reason behind this according to our monitoring may be the increased application of the alpha numeric Call Signs. Moreover, as of 2011, the use of the Call Sign Similarity de-confliction tool and established processes to identify similarity/confusion as well as the airlines willingness to change Similar Call Signs. Within the other four areas within EVAIR, 'Level Bust' with 66% and 'Runway Incursion' with 64% were the areas that recorded the highest increase in 2012 versus 2011 was

Contributors to incidents – Within the top seven contributors identified by EVAIR as common to the majority of ATM safety events, only two of them recorded a decrease. The contributor with the highest increase in 2012 was 'Mistakes' with an 85% increase versus 2011. Deeper analysis of 'Mistakes' shows that in 2012 'Planning and 'Judgement' of the traffic situation done by Air Traffic Controllers are in almost 90% main contributors to 'Mistakes'. This shows us where to pay attention and engage efforts to reduce the level of 'Mistakes'.

ACAS RA data collection

The trend of the ACAS incidents collected manually shows a more or less steady situation with about 0.7 ACAS events per 10.000 flights. From the automatic data collection perspective, since 2010 EVAIR records steady decrease of the events with valid ACAS RAs. However total figures - which include erroneous messages and complex RA events- show an increase from 2010 to 2012.

Laser Interference

After a significant increase in 2010, EVAIR recorded a decrease in the number of laser attacks in 2011 and 2012. We assume that one of the reasons for the decrease could be the fact that a certain number of European states introduced national regulation with the powers to punish the perpetrators who target aircraft with lasers. However, still we do not see any movement at the European level regarding the European regulation which would harmonize and cover the whole European region with one regulation. This action was one of the requests from the Laser seminar held in Oct 2011.

Callsign Confusion

For the last three years EVAIR has recorded a steady decrease in the number of 'Call Sign Confusions'. In our opinion this decrease may be attributed to: increased application of the alpha numeric logic for creating Call Signs as of 2010; the use of the 'Call Sign Similarity' De-confliction tool as of 2011 by volunteering airlines; and established processes for the change of the similar call signs and airlines willingness to change similar call signs at the request of ANSP or EUROCNTROL Call Sign Management Cell (CSMC). During 2008 – 2012, 'Call Sign Confusions' occurred on more than 50 different locations across Europe. In 72% of airlines 'Call Sign Confusions' report the confusion occurred between 2 or more aircraft from the same company.

Stakeholders' Corner - IATA

The IATA analysis for EVAIR Safety Bulletin No 11 was conducted on Air Safety Reports (ASR) held in IATA's Safety Trend, Analysis, Evaluation and Data Exchange System (STEADES) database. The STEADES database is comprised of de-identified safety incident reports from over 150 participating airlines throughout the world, with an annual reporting rate exceeding 130,000 reports per year. For the period 2008 - 2012 a total of 460,942 all type of airlines' reports were submitted and collated into STEADES. The airlines participating and submitting data to STEADES represent a total of 30,584,770 flights from 2008 to 2012. The nature of data collection within STEADES only allows for rates normalized by sectors flown to be calculated by region of operator (not region of event occurrence), as determined by the Air Operator Certificate

state of the airlines that submit data. The ASRs analyzed for this report were extracted from the STEADES database from approximately 150 participating airlines.

The reader should also bear in mind that the data and rates presented are based on events reported by flight and cabin crew and therefore influenced by airline reporting cultures and not covering only ATM field. The topics of Altitude deviation reports, Go-around reports, Aircraft / Traffic Collision Avoidance System reports, Call sign Confusion reports, Loss of communications reports and Wake turbulence reports are categorized in the STEADES database according to descriptors assigned at source by the STEADES participating airlines.

Considering the five year period, all categories showed an increasing trend for the rates from 2008 to 2012. These increases may be due to a number of factors including improved reporting cultures and new airlines joining STEADES. Of concern are Altitude Deviation reports, which increased year over year since 2009. The rate for Altitude Deviation reports is 4.5 times higher in 2012 compared to the rate in 2009. It is interesting to note that all five of these categories may be related to traffic density, meaning that occurrences are likely to increase as traffic (and pilot/controller workload) increases.

Security and Confidentiality

In collecting and processing data, EVAIR follows strict security and confidentiality arrangements. Safety data provided are properly safeguarded and de-identified and the information is only used for the promotion and enhancement of aviation safety.

EVAIR Suggestions/Improvements

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

INTRODUCTION TO EVAIR STATISTICAL DATA

EVAIR Safety Bulletin No 11 covers the period 2008-2012. For this period we analysed more than 8000 reports which were provided by more than 160 different airlines. Since EVAIR started with the data collection in 2006 we want to highlight that at the moment in the data base there are more than 13.000 reports provided by the airlines through their Safety Management Systems (SMSs).

EVAIR Safety Bulletin statistics are based on low level severity ATM occurrences. In some instances we receive just information about certain ATM safety deficiences not having the incident at whole. Our airlines data providers come from all airlines associations (IATA, IACA, ERAA, and ELFAA). As already highlighted in the EVAIR manager's brief our statistics are based on the data and feedback provided by the ANSPs.

The occurrence analysis is very much based on the subjectivity of pilots who were involved and who filed reports. However, through the improved feedback processes, the analysis is increasingly based on the replies provided to EVAIR by the ANSPs. We repeat that EVAIR statistics do not contain severity analysis, since the analysed reports are not officially investigated. There are a lot of reports where no incident actually occurred but where the potential for an incident existed. Therefore, in such cases there is no real requirement for a severity assessment. The best examples of this are reports related to 'Call Sign Similarities', wrong NOTAMs, confusing ground or air procedures, taxiway naming, deleted taxiway or runway lines etc. The statistics provide a general view and show some main trends in current operational safety.

Occurrence reports provided to EVAIR by member airlines and feedback provided by ANSPs cover the whole ECAC airspace as well as some neighbouring airspaces such as the Eastern part of the ICAO EUR region, Middle East, North Africa etc.

Notes :

1. In this EVAIR Safety Bulletin within the manual part of reporting, only relative figures are presented - i.e. the number of reported occurrences per 10,000 flights of the airlines participating in the reporting. Within the automated ACAS RA data collection sections, the data comprises absolute values.

2. The graphs which show a drill down through the database identifying causal factors could count the same incident more than once. The reason for that is that one incident could be associated with more than one causal factor and vice versa.

Definitions:

Definitions for the majority of elements contained in the graphs can be found in the Annex 2.

ATM EVENTS AND SUPPORT TO EUROPEAN SAFETY ACTION PLANS

EVAIR Safety Bulletin No 11 as the previous one shows trends for a selection of ATM event types which are addressed in various European safety action plans, studies or projects. By reading EVAIR bulletins our readers can have in one place a view on the European ATM incident trends represented by EVAIR data, and global trends as recorded by IATA STEADES.

Our intention is to provide our data providers and operational ATM safety experts with an additional ATM perspective arising from the data provided voluntarily by the airlines and ANSPs. This additional view is supposed to bring another piece to the operational ATM mosaic and assist in deciding about priorities which could be taken at a pan-European level.

This section of the Safety Bulletin as usual looks at 5 selected event types:

- Level Busts
- Runway incursions
- Missed Approach/Go around
- ACAS RAs
- Callsign confusion

Out of the five selected areas we present in this bulletin, four of them recorded an increase in 2012. The only one which recorded a decrease was 'Call Sign Confusion'. Regarding 'Call Sign Confusions' we have to bear in mind the ongoing Call Sign Similarity project led by EUROCONTROL. It includes ANSPs with their reports, volunteering airlines using the Call Sign Similarity de-confliction tool, airlines willingness to change similar call signs and established process to identify similarity/confusion as well as the process to change call signs. More detailed information is provided in the chapter 'EVAIR support to call sign similarity implementation project' on page 14. Out of the other four areas, the one which recorded the highest increase in 2012 versus 2011 was 'Level Bust' with 66%. A similar trend can be seen at the global level which can be seen on the IATA STEADES graph. We strongly suggest to ANSPs and airlines to have a

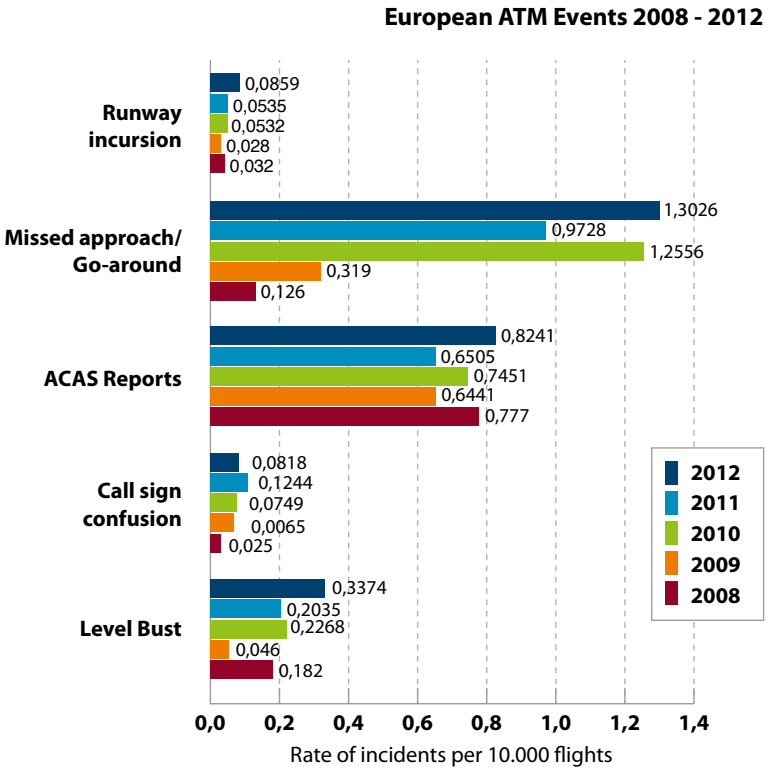


Figure 2: Incident data collection for 2008 - 2012

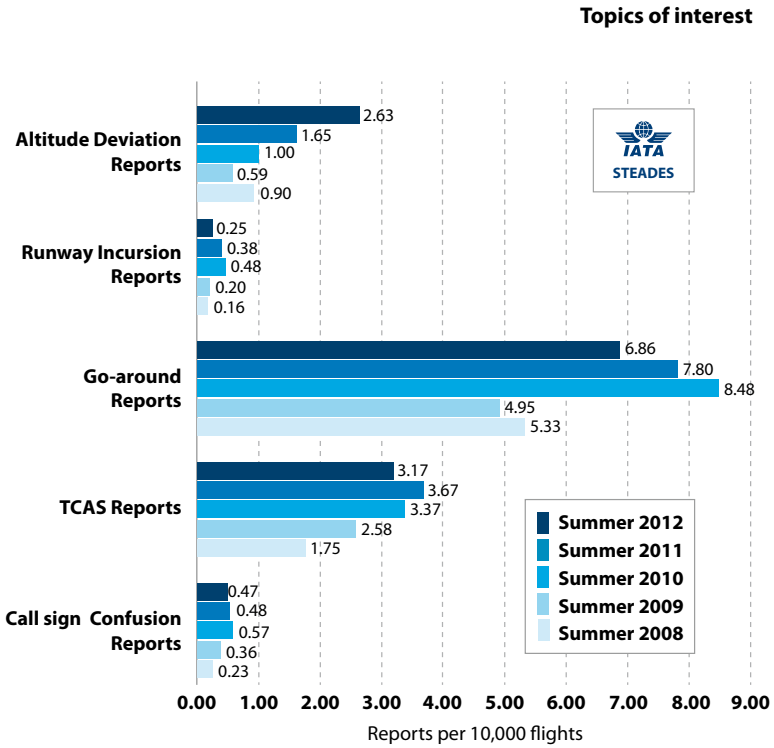


Figure 3: ATM events 2008 – 2012

look at the European Action Plans for the prevention of the Level Bust and Runway Incursion.

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)

Through the whole period 2008-2012 the top two most reported types of the events in EVAIR and IATA STEADES are 'Go-around' and 'ACAS RAs. After decreasing in 2011 these two areas in 2012 within EVAIR recorded highest levels since 2008. 'Go-around' increased by 34% and 'TCAS RA' by almost 27%. The situation within IATA STEADES is slightly different. Last three years 'Go -around' recorded decrease, while 'TCAS' - except the increase in 2011 - recorded lower levels in 2012 and in 2010. The 'Go-around' forum organized in June 2013 gave a number of indications where to look in order to improve the performance. (http://www.skybrary.aero/index.php/Portal:Go-Around_Safety). We want to highlight that we always encourage pilots and controllers to go with 'Go-around' as one of the last safety barriers established to prevent potential safety problem.

CONTRIBUTORS TO ATM OCCURRENCES

Figure 4 presents the top seven high-level contributors common to the majority of different types of events presented in the EVAIR Safety Bulletins and certainly to those presented in the figure 2. The contributor 'Air-Ground communication' is examined further in the chapter Air-Ground Communication on page 18.

Within these top seven contributors only two of them recorded a decrease. The contributors with the highest increase are 'Mistakes' with 85% increase versus 2011. Indeed the number of 'Mistakes' is the highest since 2008. Deeper analysis of 'Mistakes' shows that in 2012 ' Planning and 'Judgement' of the traffic situation are in almost 90% of cases the main contributors to 'Mistakes'. 'Air-Ground Communication' with 47% is in 2nd place.

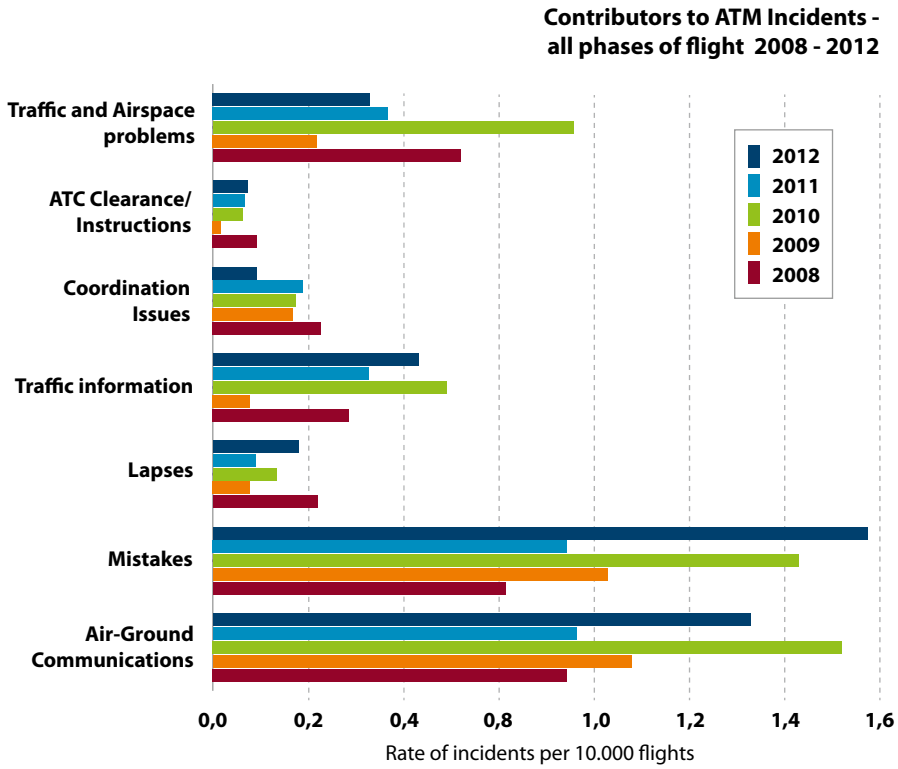


Figure 4: *Contributors to ATM incidents – all phases of flight 2008 – 2012*

GO-AROUND

We are repeating all the time when writing about 'Go-around' that although it is a normal flight phase it does not mean that there are no safety issues associated with it. This is one of the reasons that EVAIR and IATA STEADES monitor 'Go-Around'. EVAIR is doing that on the Pan-European field and IATA STEADES on a global level. The aim of the monitoring is to help to identify safety issues in terms of the safety barriers which failed and forced pilots to execute a 'Go-Around' manoeuvre or controllers to instruct pilots to make a 'Go-around'. The final objective of the monitoring is to assist in mitigating the situation and possibly eliminating the causes. Indirectly, mitigation or elimination of the safety issues related to the 'Go-Around' will also contribute towards improved flight efficiency, fuel saving and airspace capacity. Recently the Flight Safety Foundation in cooperation with EUROCONTROL and number of other organizations (ECAST, ICAO, IFATCA, UK CAA, BEA (France), UK NATS, IATA, ECA and DGCA (France) organized a very successful workshop (June 2013). EVAIR and IATA supported the workshop with the information and findings retrieved from our data bases. All presentations and conclusions can be found via this link: http://www.skybrary.aero/index.php/Portal:Go-Around_Safety_Forum_Presentations

In the past five years in both repositories, EVAIR and IATA STEADES trend lines have an increasing rate of the number of occurrences per 10.000 operations and only one year showed the small decrease. In IATA STEADES the year with the decrease rate was 2012, while within EVAIR it was year 2011.

Figure 7 shows EVAIR in-depth analysis of the 'Go-around'. The analyses identified a large number of contributors.

Missed approach - Go-around 2008-2012

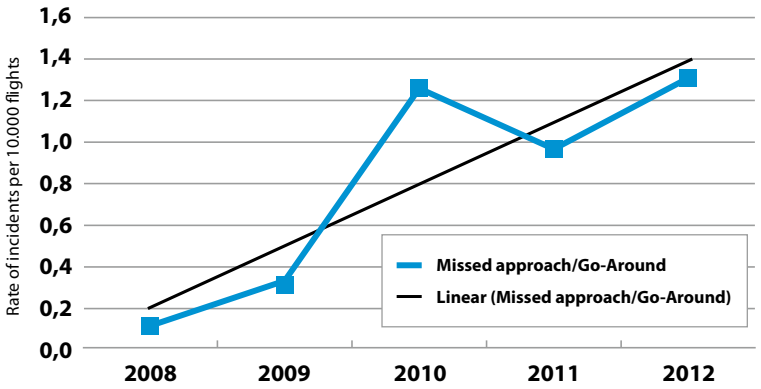


Figure 5: Missed approach-Go-around 2008-2012

Go-Around Reports

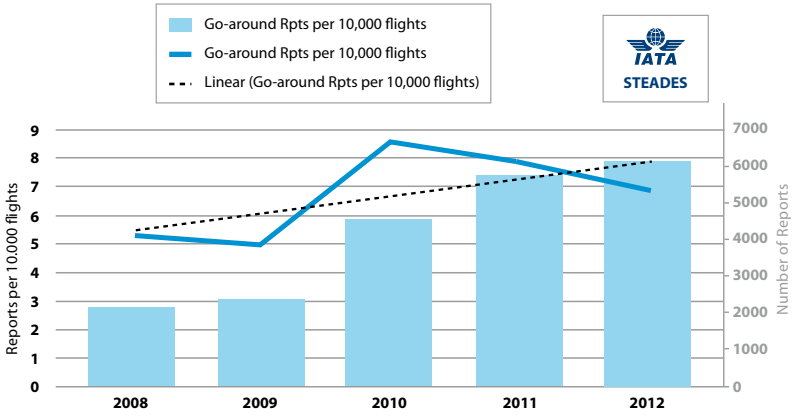


Figure 6: Go-around reports 2008-2012

Go-Around contributors 2008-2012

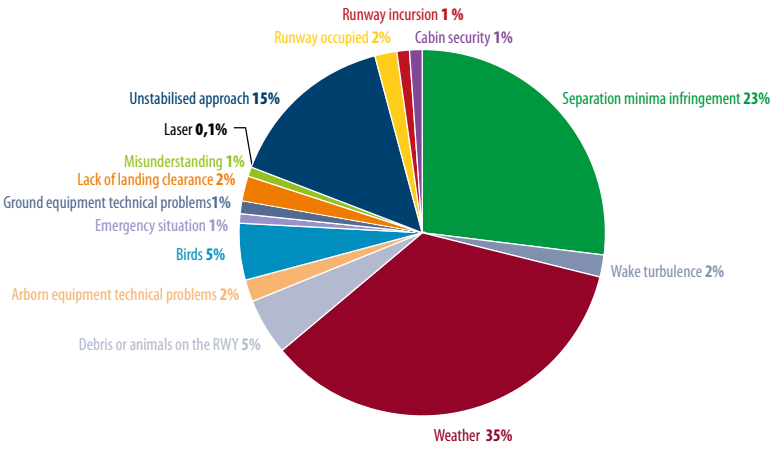


Figure 7: Go-Around contributors - summer seasons 2008-2011

RUNWAY INCURSIONS

The 'Runway Incursion' trend lines in both data repositories show an increase (Figures 8 & 9). Within In IATA STEADES the runway incursion rate shows an increase from 2008 to 2010, however, from 2010 onward the rate decreased steadily. The overall trend line is increasing. EVAIR continued with an increase, recording in 2012 the highest rate during the last five years. Within EVAIR data, 'Runway Incursion' occurred on 50 different locations across Europe and involved 27 different Air Operators. About 15% of the 'Runway Incursions' ended with a Go-around procedures while 6% of them had as one of the contributors a lack of the ATC landing clearance, which brings vey high risk. Although 'Runway Incursions' do not contribute a the large percentage to the EVAIR data base, about 1,5%, they have high a risk. Permanent monitoring and engagement of the safety experts, especially those from the airports' runway safety teams is required as well as better use of the existing studies and Action Plans which provide recommendations on how to mitigate or to solve some of the problems. In that regard we provide here the link to the European Action Plan for the Prevention of the Runway Incursions to help experts find faster ways to implement mitigations and solutions of the local Runway ATM safety problems.
http://www.skybrary.aero/bookshelf/books/151.pdf

All contributors related to the 'Runway Incursion' monitored by EVAIR recorded a significant increase in 2012. The highest increase was within the 'Traffic information'. In fact, 'late' or 'lack' of traffic information grew by more than 500%. 'Mistakes' with almost 400% were in 2nd place and 'Lapses' with about 180% increase were 3rd. 'Air-Ground Communication' traditionally generates the largest number of reports; however, this time there was a slow down in the rate but it is still

Runway incursions 2008-2012

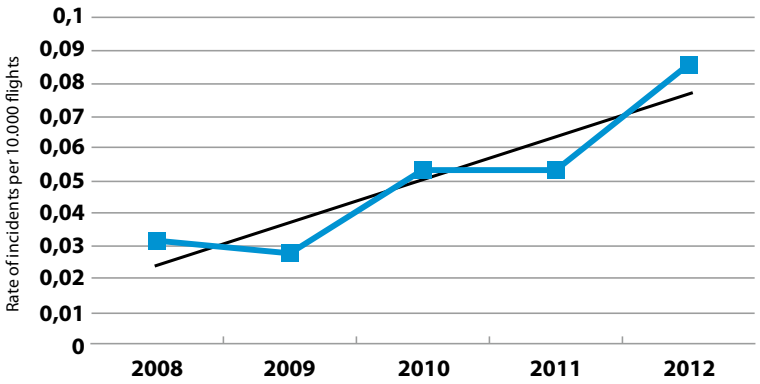


Figure 8: *Runway Incursion 2008-2012*

Runway incursions Reports

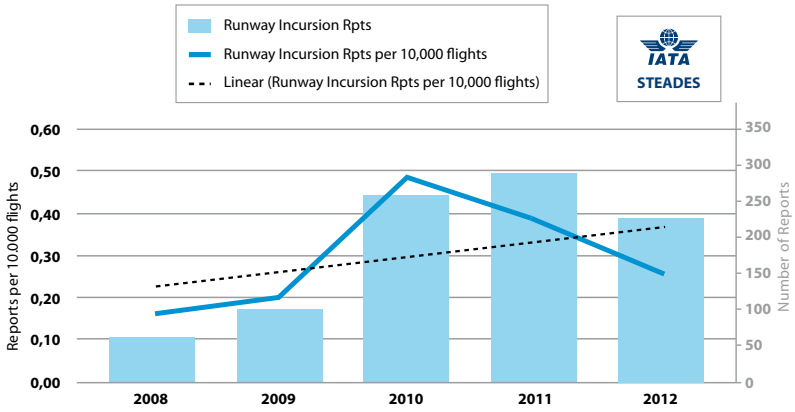


Figure 9: *Runway Incursion 2008-2012*

Runway incursions main contributors 2008-2012

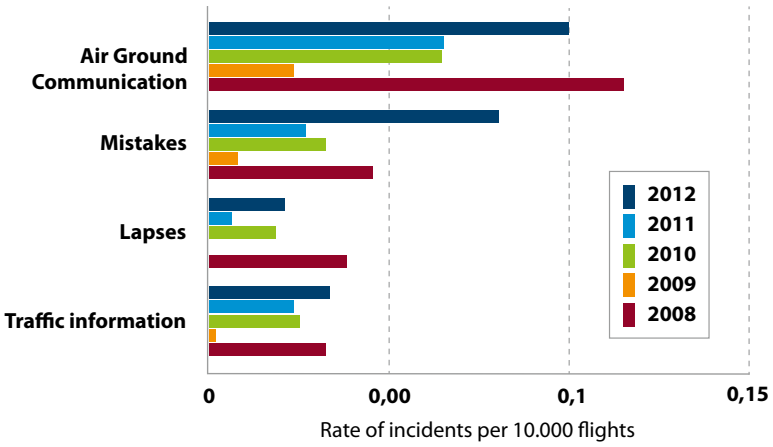


Figure 10: *Level Bust contributors 2008-2012*

quite high - about 130% up on previous data. A further drill down through the data shows sub categories of the above causes. For example, the most frequent sub-categories within ''Air-Ground communication' are 'Hear-back omitted' and 'Misunderstanding/Misinterpretation'.

Yearly data shows that in 90% of the 'Runway Incursions' the landing clearance was issued when the other aircraft was still occupying the runway. When compared with the EVAIR summer seasons' data the situation is slightly better since during the summer seasons this figure is 94% of cases where 'Runway Incursion' occurred when the other aircraft was still occupying the runway.

In-depth analysis shows a large numbers of different contributors. The number of contributors would be even bigger than those presented in the Figure 11 since our data base allows another level of drill down. Those factors with the highest percentage are sub categories of the 'Air-Ground Communication' ('Misunderstanding Interpretation' 21%, 'Hear back omitted ' 12%, 'Phraseology' 2%, 'Call Sign Confusion' 2%, 'Handling of radio communication' 4%) Other areas with high percentages are controllers' 'Planning', 'Judgment' and 'Monitoring' activities. These contributors combined with the level of the risk they have, show where to look to mitigate or to solve some of the problems.

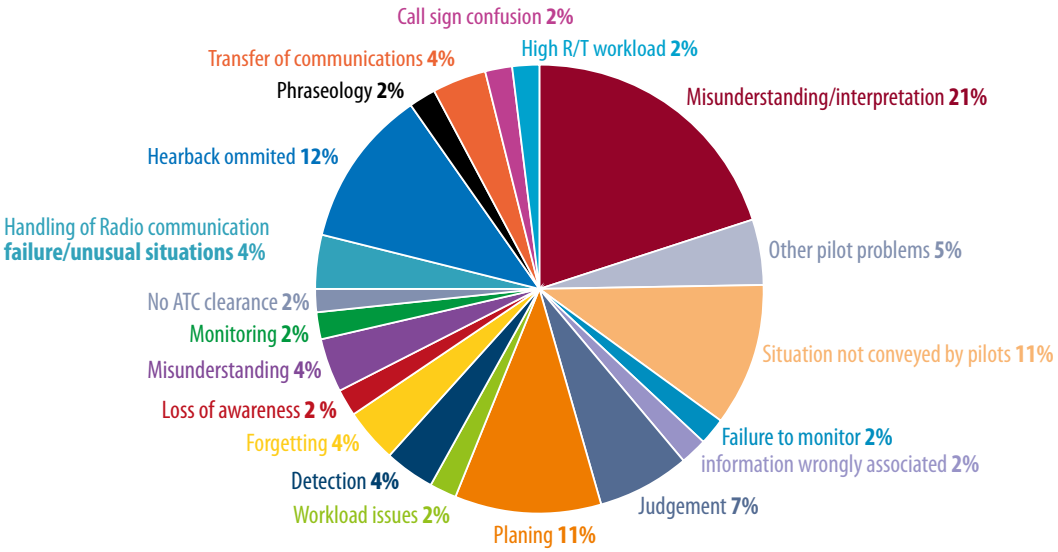


Figure 11: *Runway Incursions in-depth analysis cumulated figures 2008 – 2012*

LEVEL BUST

'Level Busts' occurrences make about 5% of the overall EVAIR reports for the period 2008-2012. Of these, 61% occurred during the en-route phase which is less than the summer periods 2008 - 2012 when 64% of the 'Level Busts' occurred during the en-route phase. TCAS as the last airborne safety barrier, acted in 11% of the 'Level Busts'. The trend lines in both, EVAIR and IATA repositories show an increase (Figures 12 & 13). After a small decrease in 2011, EVAIR recorded a very high increase in 2012 while within IATA STEADES since 2009 there is a constant increase of the 'Level Busts'.

High level contributors to 'Level Busts' as presented on the Figure 14 show that all monitored contributors recorded an increase in 2012 versus 2011. The highest increase was recorded within 'Lapses' and 'Mistakes' - almost 200%.

Levek Bust 2008-2012

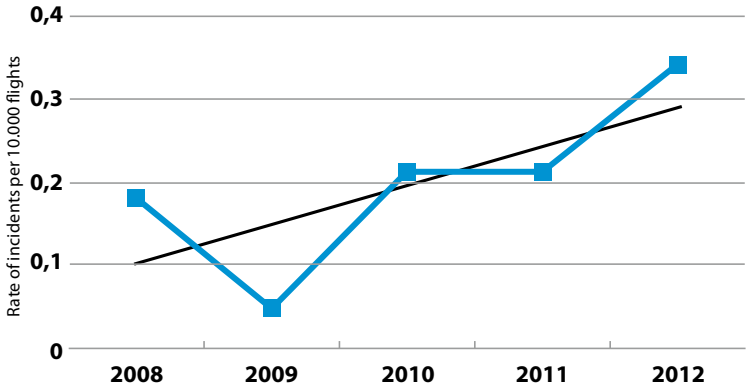


Figure 12: *Level Bust 2008-2012*

Altitude Deviation Reports

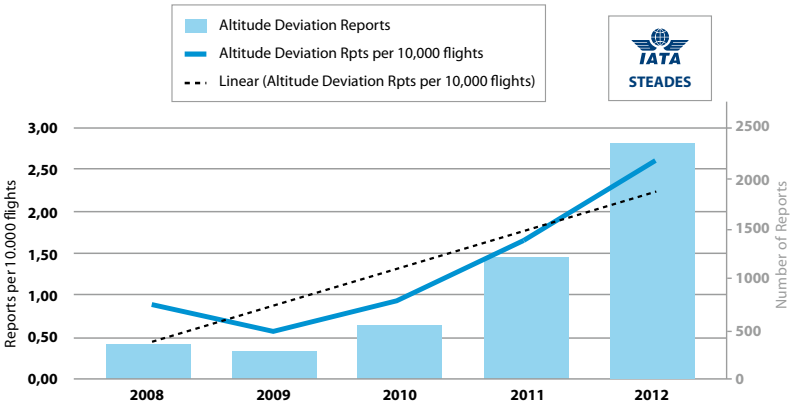


Figure 13: *Altitude Deviation 2008-2012*

A drill down through the high level contributors as presented on the figure 14 provides a more detailed analysis and shows that there are many more contributors. Among them, those with the highest percentages are: Controllers' issues related to 'ATC Planning' 18%; 'Air-Ground Communication' issues related to the 'Hear back omitted' 13%, 'Misunderstanding/ Misinterpretation' 13% and 'Call Sign Similarity/Confusion' with 7%. 'Pilot problems' with 11% also feature strongly.

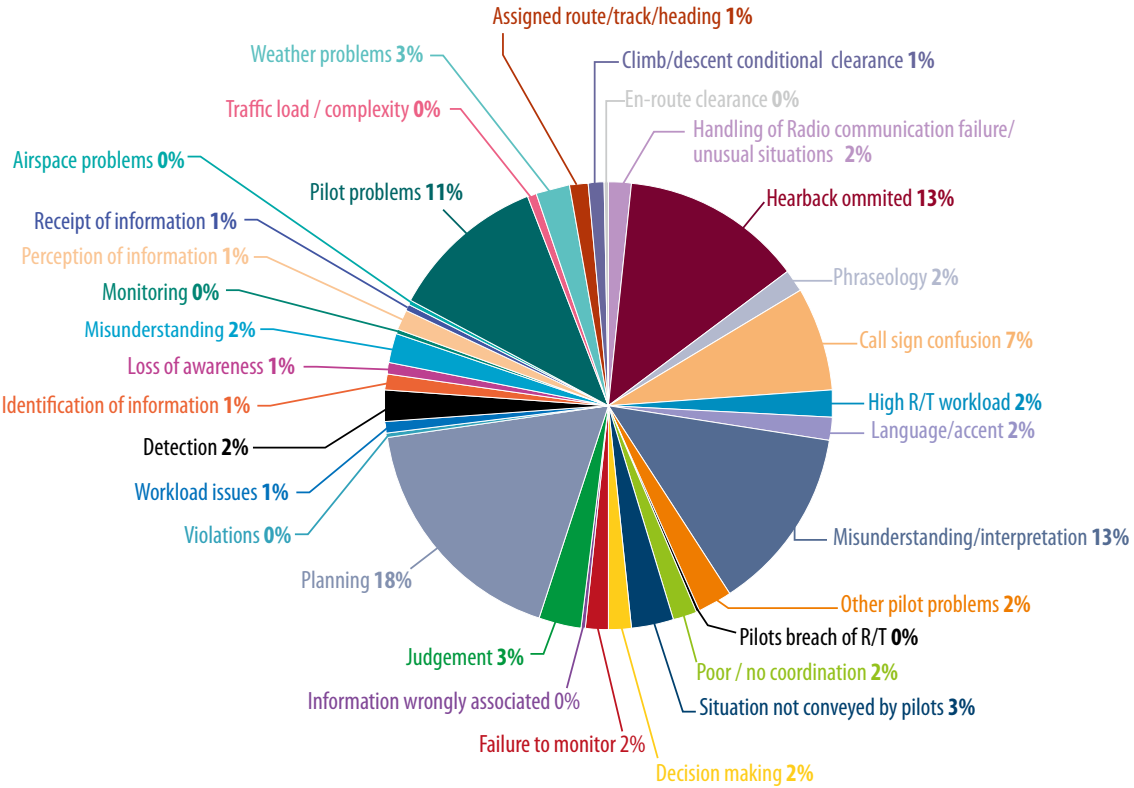


Figure 14: *Level Bust contributors cumulative figures 2008 - 2012*

EVAIR SUPPORT TO CALL SIGN SIMILARITY IMPLEMENTATION PROJECT

As reported previously EVAIR is monitoring the use and effectiveness of the EUROCONTROL Call Sign Similarity Tool (CSST) and the associated CSS Service Level 1, namely, the detection and de-confliction of similar callsigns in a single Aircraft Operator's schedule.

CSST Operations Update

Over the summer months further refinements have been made to the Tool and these came into effect with the NM 17.5 software release in October 2013. So it is now possible for AOs to upload their schedules using the xlsx format. In addition, further refinements have been made to some of the CSS 'rules' so that the CSST is now better able to detect (and de-conflict) the types of similarity reported by controllers and pilots and ignore some of the more theoretical ones that rarely occur.

Those Aircraft Operators (AOs) who have not yet started using the CSST are invited to join the 18 AOs who already used the CSST to partially or fully de-conflict their Winter 2013/14 schedules. Our data shows us that the average deconfliction rate for AOs using the Tool this winter is just over 90%. This is in line with previous seasonal figures and is well above expectations. The really good news is that this success rate is also reflected in 'live' operations. As will be shown in the later graphs in this section, the absolute number and rate of CSS/C events for CSST Users is very small in particular when compared with non-CSST Users. So at this stage of the CSS Project we can say that the Tool is working as envisaged – the number of similarities and confusions (at least for Tool Users, is down) which is good news for safety. Simultaneously, there have been efficiencies in the de-confliction process.

It is also pleasing to report that through the CSST performance monitoring regime – supported by EVAIR – we also continue to contact many AOs who are not using the Tool but who are willing to make ad hoc mid-seasonal changes to known (reported) conflicts. This is also a major success for the Project; of course we would like more CSST Users (see below) but this random cooperation is better than doing nothing as was often the case in the past.

However and notwithstanding these successes, we cannot rest on our laurels. There is still a large number of AOs who we would like to see make the transition from interest in the CSST to actually using it. Furthermore, there are many more airlines that have not shown any interest in CSST and it's our job to reach out and encourage them to join us. Globally there is a lot of interest in what we are doing and we continue to receive enquiries from the Middle and Far East as well as North America and Africa. So, if you are reading this and you're not sure if your airline is using CSST then please go and ask; likewise, if you're a controller and not sure if your ANSP is sending Call Sign Similarity/Confusion data to EVAIR then please ask the appropriate person. The data we receive helps us understand how effective the CSST is in live ops and as explained many times before, EVAIR is happy to facilitate contact and feedback between AOs and between AOs and ANSPs to resolve Call Sign Similarities/Confusions and other operational issues.

CSST Access and Additional Tokens

As reported in the EVAIR Bulletin No 10, the Director Network Manager (DNM) User Relations department has kindly agreed to offer 'free' additional Network Manager (NM) Tokens to access the Tool as an extra incentive for AOs to use the CSST. The offer is valid until April 2014. This means that the additional Tokens already issued will be extended and any new ones issued from now on will also be valid until then. After that, AOs who have a 'free' Token will have a choice to pay the €200 fee to keep it or to have it cancelled. If preferred, AOs can still add CSST free of charge to an existing NM Token. In this case access to the Tool will continue for the remaining life of the Token.

User Relations also gave priority to requests for additional CSST enabled Tokens or extensions to existing ones in the run up to the start of the 2013 IATA summer season and winter 2013/14 season. This process can normally take several weeks, but with this new priority the time was shortened considerably. We will continue to lobby for this preferential treatment for future seasons.

To make things run more smoothly, AOs need to clearly identify the request for the access to the CSST. To that end, AOs who are applying for a new Token or asking 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 https://www.eurocontrol.int/network-operations/access-service-request-form

AOs applying for the CSST will be contacted by NM Customer Support during the process to validate credentials and complete the service agreement.

Call Sign Management Cell (CSMC) Support

The CSMC (nm.csmc@eurocontrol.int) is also on hand to help the AOs to pass through the application process. The CSMC prepares the CSST for the forthcoming season and is available to discuss AOs' training requirements. Familiarization sessions can be provided in Brussels or, if requested and subject to CSMC staff availability, may be provided on-site at the AOs' premises.

Learn More About Call Sign Similarity

If you are interested in learning more about the CSS Project then please contact the CSS Project Manager and co-chair of the CSS User Group, Mr Richard Lawrence, at: richard.lawrence@eurocontrol.int or via callsign.similarity@eurocontrol.int

You can also contact the Call Sign Management Cell (CSMC) at nm.csmc@eurocontrol.int

And find more information on the Call Sign Similarity Project please at:
http://www.eurocontrol.int/services/call-sign-similarity-css-service
The latest Call Sign Similarity/Confusion data reported to EVAIR and the comparison with IATA STEADES data is shown below.

EVAIR uses two tracks to monitor Call Sign Similarities and Confusions: One from the airlines and the other from ANSPs. Reports coming from pilots are mainly related to the confusions, while those coming from ANSPs are similarities and confusions.

PILOTS' REPORTS – CALL SIGN CONFUSIONS

Figures 15 and 16 represent EVAIR and IATA STEADES Air Operators (AOs) reports on Call Sign Confusion events. In the both repositories the trend lines for the overall period 2008 – 2012 show an increase; however after 2011 including 2011, there are slight differences. Namely, in STEADES the reporting rate is constant since 2011 while the EVAIR rate shows a decrease. We would like to highlight that by the end of 2013 we expect to have 18 airlines using the EUROCONTROL Call Similarity Tool. The slight decrease in 'Call Sign Confusions' in 2012 could be linked to a number of things: firstly, the increased application of the alphanumeric logic for creating call signs from 2010; the use of the CSST as of 2011 by volunteering airlines; and the established process for the mid-season change of the similar call signs and airlines willingness to change similar call signs when requested by the ANSP or EUROCONTROL Call Sign Management Cell (CSMC). We will continue to involve AOs and ANSPs in the monitoring process to check if the alphanumeric logic and CSST delivers the expected benefit as it was planned when the Call Sign Similarity project started; the initial results are encouraging.

During 2008 – 2012 'Call Sign Confusion' occurred at more than 50 different locations across Europe. The largest number of CSC events (67%) occurred during the en-route phase while only 22% were recorded during the approach phase. The remaining events were during take-off, taxing and standing. It is worth stating that, during 2008 - 2012, in 72% of airline reported cases, the confusion occurred between 2 or more aircraft from the same company; the remaining 28% involved aircraft from different companies. The majority of 'Call Sign Confusions' are between two aircraft (97%) while between three and more aircraft are 3%. 'Call Sign Confusion' was the cause of 5.5 % of the level busts and 'Runway Incursions'.

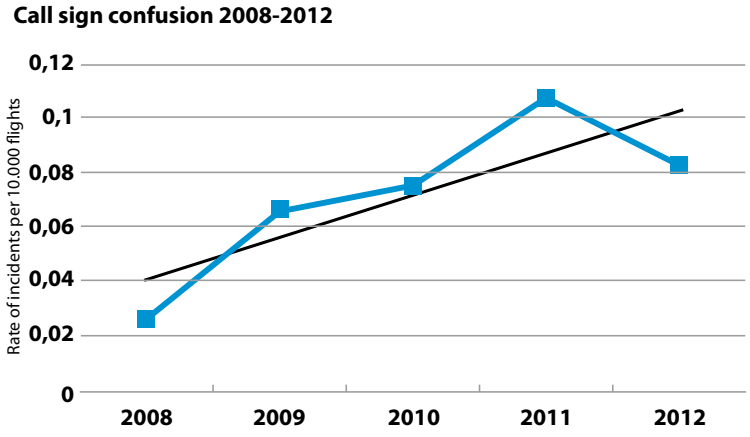


Figure 15: *Level Bust 2008-2012*

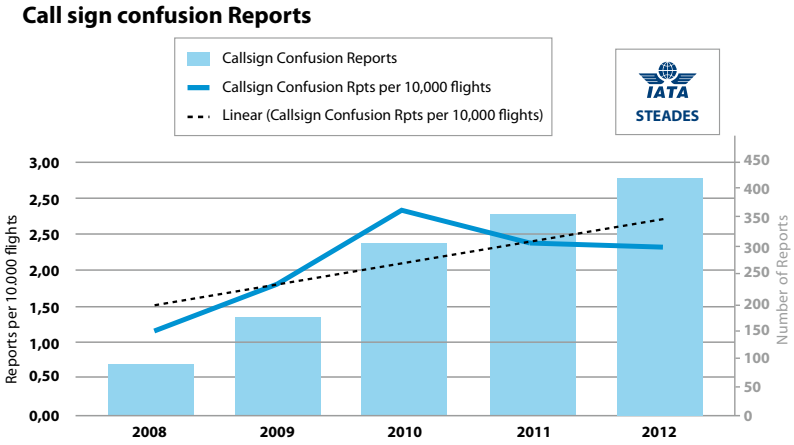


Figure 16: *Altitude Deviation 2008-2012*

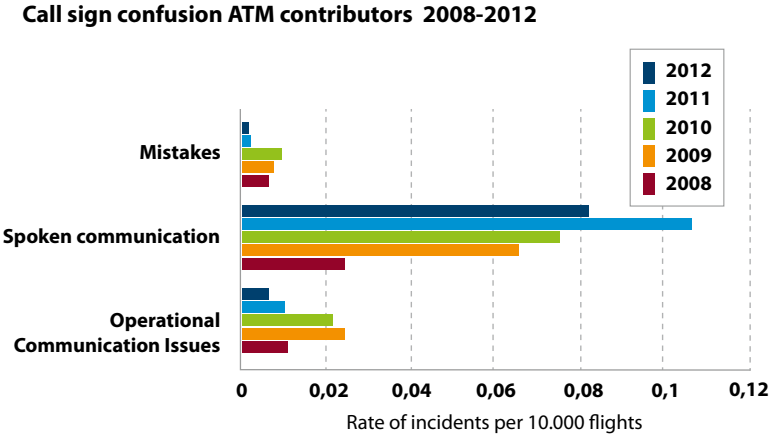


Figure 17: *Level Bust contributors 2008-2012*

AIR NAVIGATION SERVICE PROVIDRS' CALL SIGN SIMILARITIES AND CONFUSIONS

Statistics from data provided by the ANSPs give a much bigger data set and wider view in some areas. We are very glad to see that from year to year we have and increase in the number of ANSPs providers sharing their data. It is of a great importance for the EVAIR task to monitor the Call Sign Similarity/Confusion project in terms of the efficiency of the CSS de-confliction algorithm and tool. For this Safety Bulletin the data came from 12 ANSPs. About 1300 CSS/C reports have been received and more than 20 million flights were covered for this period by these ANSPs. In 2012, ANSPs identified 92 airlines with the similarities. It gave the opportunity for them to act quickly by informing the airline and asking for a change of the similar call sign. Assistance was provided by CSMC and EVAIR whenever it was asked. The reactions of the airlines were generally very positive. There were only a very small number of negative replies stating that the airline didn't want to or could not change the call sign. The other main issue concerned the timeframe of when the airline would be ready to change call signs. In a lot of cases they were able to change it within a few days or possibly weeks, while in other instances the AO prefers to wait for the preparation of the new season schedule before effecting a change.

Figure 19 illustrates the situation between the number of 'Call Sign Similarities' and 'Call Sign Confusions' between CSST users and non-users. Non-tool users recorded a non-comparable higher number of 'Call Sign Similarities' per 10.000 flights especially for the period 2011-2012 when the first volunteering airlines started using the CSS Tool. The same situation exists with 'Call Sign Confusions'. However, it is important to highlight that the number of the 'Call Sign Confusions' since 2010 shows a steady decrease among non-tool users. The main reasons behind the stats are good reporting which enabled efficient identifications of the Call Sign Similarities' as well as the process established to chase the airlines to change similar call signs. EUROCONTROL CSMC as well as EVAIR support this process by providing airlines contacts or when asked by ANSPs contacting the airlines directly and asking for a call sign change. The situation with the 'Call Sign Similarities' and 'Call Sign Confusions' among the airlines using the CSST shows literally a few 'Call Sign Similarities' and 'Call Sign Confusions' in 2012 and confirms that the use of CSST helps to reduce, significantly, the number/rate of the 'Call Sign Similarity' and 'Call Sign Confusion ' occurrences.

CSS & CSC Total (Users and Non Tool Users) 2009-2012

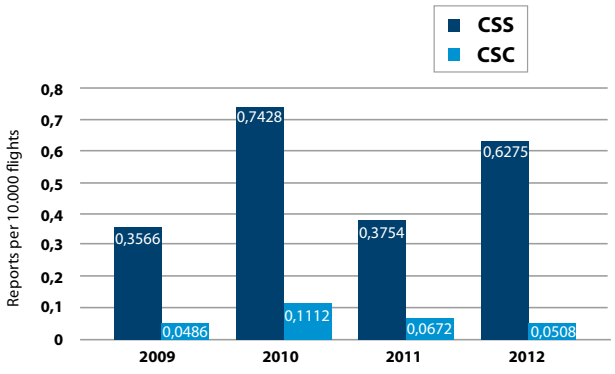


Figure 18: *Call Sign Similarities/ Confusions by ANSPs 2009 – 2012*

CSS/C Users and Non Tool Users 2009-2012

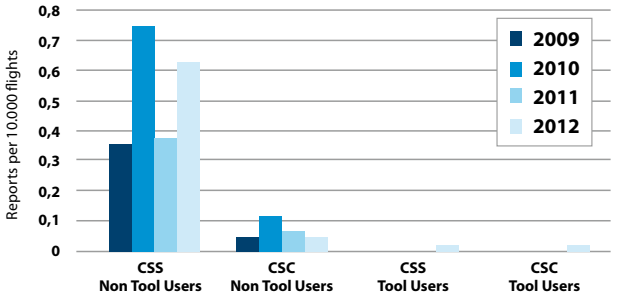


Figure 19: *Call Sign Similarities/Confusions – De-confliction tool users and non-users 2009 - 2012*

AIR-GROUND COMMUNICATION

'Air–ground communication' according to the EUROCONTROL HEIDI taxonomy consists of two main areas: 'Spoken' and 'Operational' communication.

Figure 20 shows seven ATM contributors which are common to the majority of the different types of ATM events. Among these seven contributors 'Air-Ground communication' with 31% together with 'Mistakes' provides the highest percentage. It contributes e.g. to the 'Runway Incursions', Level Busts', ACAS RAs', Call Sign Similarities/Confusions', 'Go-Around' etc.

Figure 21 shows that within the area of 'Air-ground communication', 'Spoken Communication' with 68% is much higher than 'Operational communication'.

'Spoken communication' covers 'Human/human communication' encompassing 'Air-ground' and 'Ground-ground' communications. Subsets of 'Air-ground' and 'Ground-ground' 'Spoken' communication are: 'Language/accent', 'Situation not conveyed by pilots', 'Pilot's breach of radio telephony (R/T)', 'Workload', 'Misunderstanding/Misinterpretation', 'Other pilot problems' and 'Poor/no coordination'.

Figure 21 shows that within the area of 'Air-ground communication', 'Spoken Communication' with 68% is much higher than 'Operational communication'.

Contributors to ATM Incidents cumulative figures2006-2012

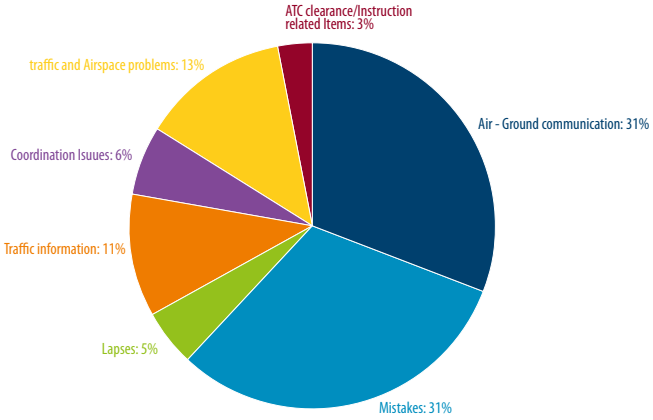


Figure 20: *Contributors to ATM Incidents cumulative figures 2006 - 2012*

Air - Ground communication cumulative figures2006-2012

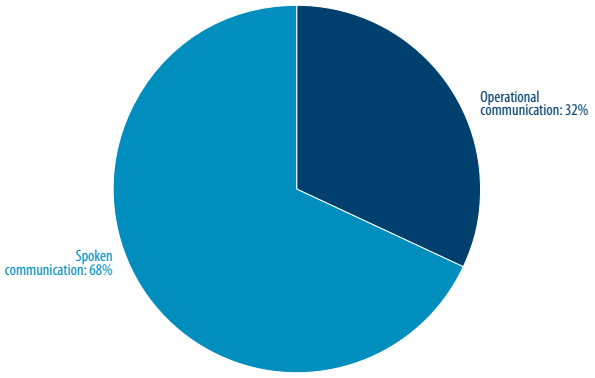


Figure 21: *Air-Ground communication cumulative figures 2006 - 2012*

Within 'Operational Communication' (Figure 22) among five different contributors, four of them recorded an increase in 2012. 'Hear back omitted' and 'Handling of radio communication failure/unusual situations', areas which already had high levels, recorded very high increases in 2012 too. Also the area with a high increase is 'R/T monitoring sector'. According to our more in-depth analysis the end effect of these contributors is in the majority of cases, temporary loss of communication.

When examining 'Spoken communication' EVAIR data identified nine different contributors. Five of them recorded an increase in 2012. 'Misunderstanding/Misinterpretation' has the highest increase. It went above the level of 'Situation not conveyed by pilots', which previously has had the highest levels.

A drill down through 'Misunderstanding/Misinterpretation' and 'Situation not conveyed by pilots' shows that these contributors are generated by a number of factors including: the use of two languages (i.e. English and a national language) on the same frequency; pilots' lack of the familiarity with the area where they fly; 'hear-back read-back'; 'loss of communication'; and ambiguous or very poor instructions by air traffic controllers and lack of the request for clarification from pilots.

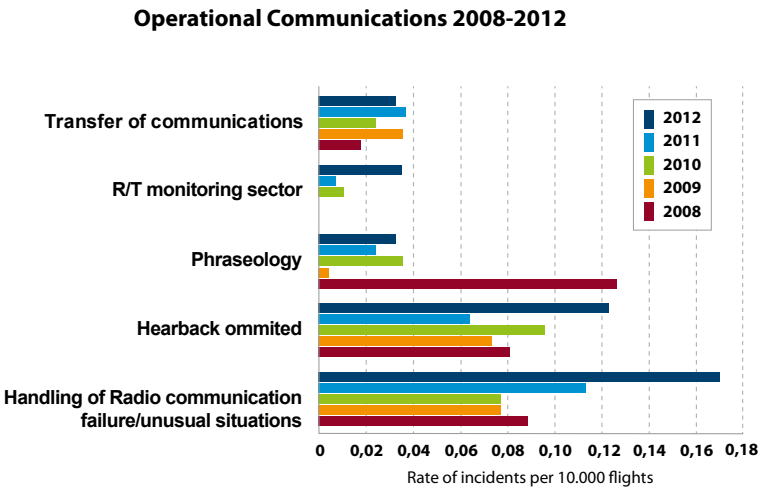


Figure 22: *Operational communication 2008-2012*

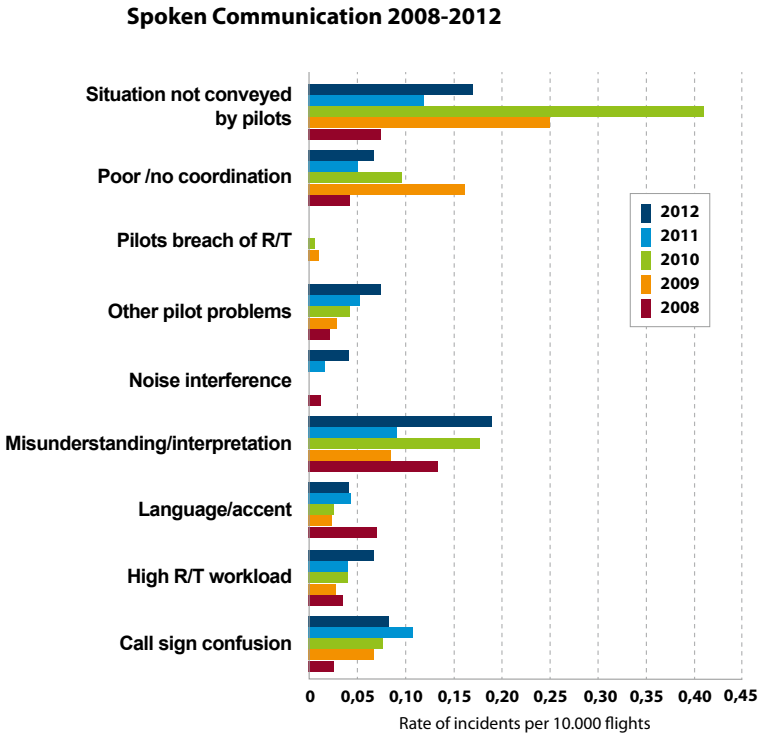


Figure 23: *Spoken communication 2008-2012*

LOSS OF COMMUNICATION 2008 - 2012

EVAIR continues to produce high level analysis related to the temporary 'Loss of communication' on request from our customers. For the period 2008-2012, more than 280 'Loss of communication' occurrences were recorded; they were experienced by almost 40 different airlines.

EVAIR and IATA trend lines show different trends per 10.000 flights. EVAIR data shows an upward trend. Year 2012 recorded EVAIR data shows the highest increase, whereas IATA data shows a downward movement per 10.000 flights. Meanwhile, in absolute figures the number of communication losses has steadily increased from 2008 to 2012.

Within the EVAIR repository, 'Loss of Communication' occurred in about 30 European states at almost 80 different locations. Almost 70% of events occurred within 5 different states. In absolute figures the number of occurrences per state varies from 1 to 56.

In terms of phases of flight, almost 70% of the temporary 'Loss of Communication' occurred within the en-route phase which shows where to focus the attention while deeper investigating causes of the problems. (Figure 26).

Our analyses related to the involvement of ATM in temporary 'Loss of communication' show that in 47% of cases ATM was not involved; while in 18% ATM had a direct impact.

The most frequent problems generated by the ATM direct involvement were: 'Technical failures involving the VHF ground system'; 'R/T Interferences', 'Air Traffic Controller forgot to instruct the aircraft to change the frequency', 'High R/T Workload' and 'wrong frequency provided to the pilot'.

The 'No ATM involvement' (40%), means that the problem could have originated in the air. The most frequent reasons are: technical problems with the on-board VHF, stuck cockpit transmitter, wrong frequency setting by pilots and R/T interferences, e.g. during thunderstorms.

Some of the 'Loss of communication' events were associated with the other types of ATM events such as: 'Call sign Confusion', 'Level Bust', 'Runway incursions'; 'Un-authorized penetration of the airspace'.

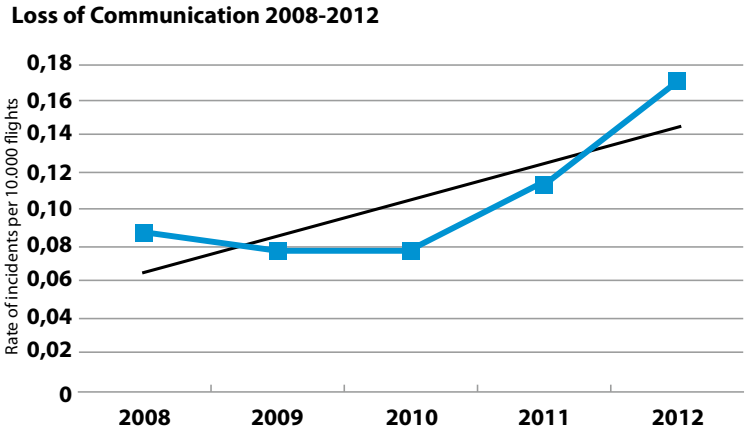


Figure 24: *Loss of communication 2008 - 2012*

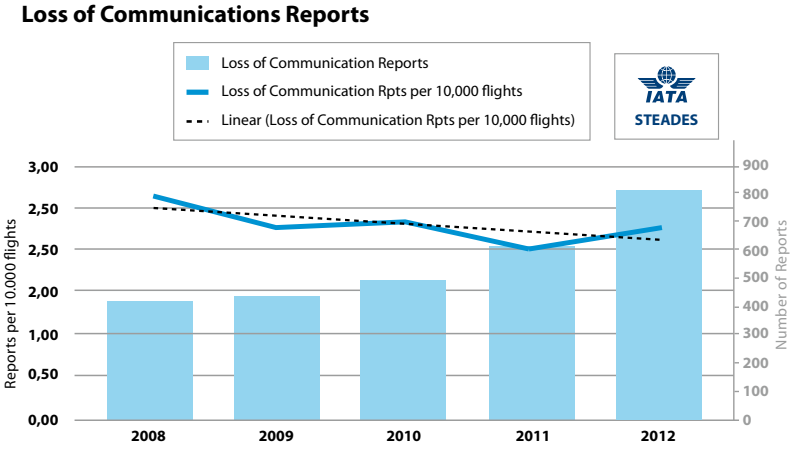


Figure 25: *Loss of communication 2008 - 2012*

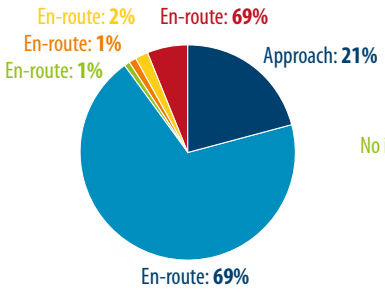


Figure 26: *Loss of communication – Phases of flight 2008 - 2012*

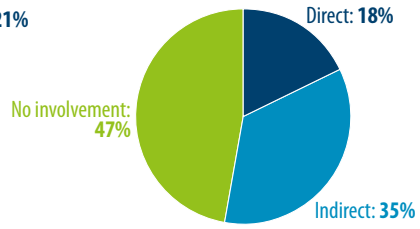


Figure 27: *Loss of communication – ATM system contribution 2008 - 2012*

SPECIFIC EVENTS - LASERS THREATS ACROSS EUROPE

The laser threats trend line still shows an increase for the period 2008 – 2012. However, for 2011 and 2012 EVAIR data base recorded a decrease in the number of reports per 10.000 flights. As expected, the most affected phase of the flight is 'Approach'.

After a significant increase in 2010, a decrease was recorded in 2011 and 2012 in both the number of laser attacks and in the number of affected locations, from 115 in 2011 to 67 in 2012. The same occurred with the number of affected carriers. In 2011 there were 64 while in 2012 there were 22. According to our information one explanation for the decrease of laser attacks could be because a number of European states have put in place national regulation, including punitive measures, which is discouraging attacks against aircraft.

In the EVAIR Safety Bulletin No 9, we announced that for the first time we had received reports concerning the use of blue lasers. These devices are potentially more harmful on the eyes than the green and red ones. Pleasingly in 2012 we didn't receive any reports about blue laser. We are in contact with EASA regarding laser interferences and support them in their role of the European aviation regulator. However so far there haven't been any moves towards the development of the European regulation related to the abuse of laser, laser manufacturing, selling etc.

EVAIR continue to monitor all type of laser interferences. As for the other types of the ATM occurrences, please send your reports to: Dragica.stankovic@eurocontrol.int

Further information about lasers and aviation is available on SKYbrary (www.skybrary.aero).

Laser 2008-2012

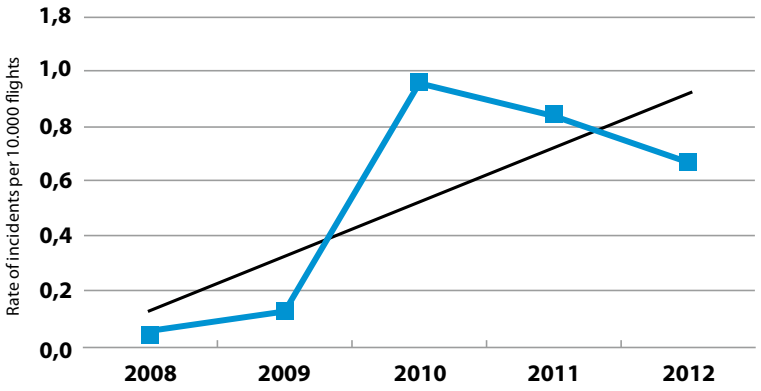


Figure 28: *Laser 2008-2012*

Laser occurences per phase of flight 2008- 2012

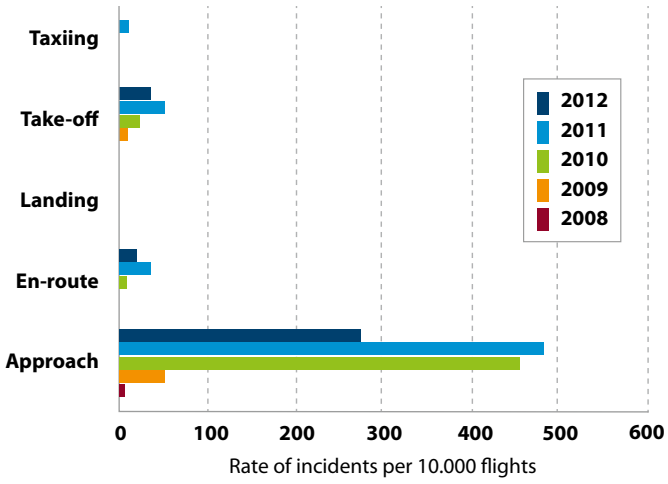


Figure 29: *Laser 2008-2012*

Laser interference N° of locations and N° of affected carriers 2009 - 2012

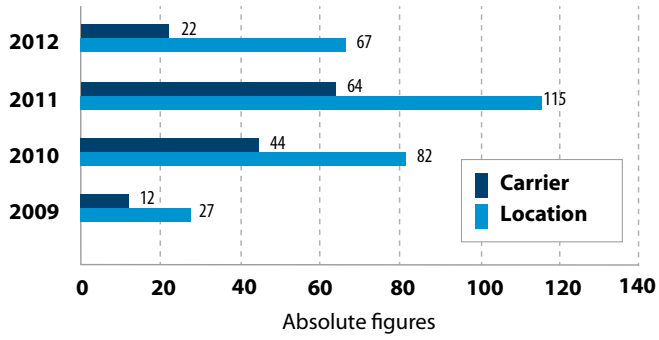


Figure 30: *31 Laser interferences No of locations and No of affected carriers 2008-2012*

ACAS REPORTING

EVAIR is a part of the ACAS monitoring. The aim is to support the continued safe and effective operation of ACAS by identifying and measuring issues associated with Resolution Advisories (RAs) and their trends and taking preventive measures where necessary.

ACAS is the generic term for Airborne Collision Avoidance Systems, of which TCAS II is the only implementation so far. ACAS is intended 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 and procedural and operational deficiencies. In the coming years the monitoring will also focus on TCAS II version 7.1 equipage and performance which will be mandated in European Union airspace on all civil aircraft over 5700 kg MTOM or 19 passengers seats as of December 2015.

ACAS data have been collected either automatically via the Automated Safety Monitoring Tool (ASMT) developed by EUROCONTROL, or manually thanks to airlines and Air Navigation Service Providers(ANSPs) reporting.

It should be noted that some number of ACAS/ TCAS statistics from manual reporting rely on pilots' and air traffic controllers' perceptions and memories of the events rather than measured or calculated values. However others are supported by the ANSPs feedback based on the operational investigation which includes radar and voice records. In any case, care is needed when comparing manually collected data and data that are captured automatically. Messages about typical performance should generally be taken from the Automatic recording of events. Manual reporting tends to emphasise the more significant events and gives insights into perception of the ACAS II system.

MANUAL ACAS REPORTING

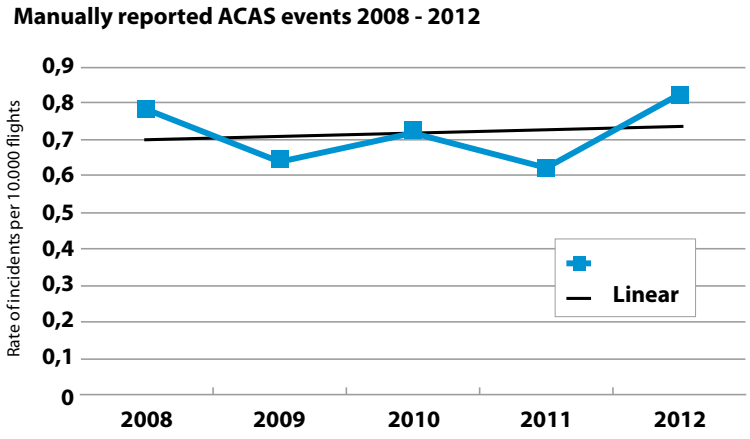


Figure 31: *Manually reported ACAS incidents 2008 – 2012*

The trend of the ACAS incidents collected manually shows a more or less steady situation with about 0.7 reported ACAS events per 10.000 flights. Year 2012 recorded a bit higher level with 0.82 events per 10.000 flights. Translating this situation on a daily level it means that in 2012 when within ECAC airspace there were on average a bit more than 26.000 flights daily there were at least 2 ACAS RAs reported manually across European airspace.

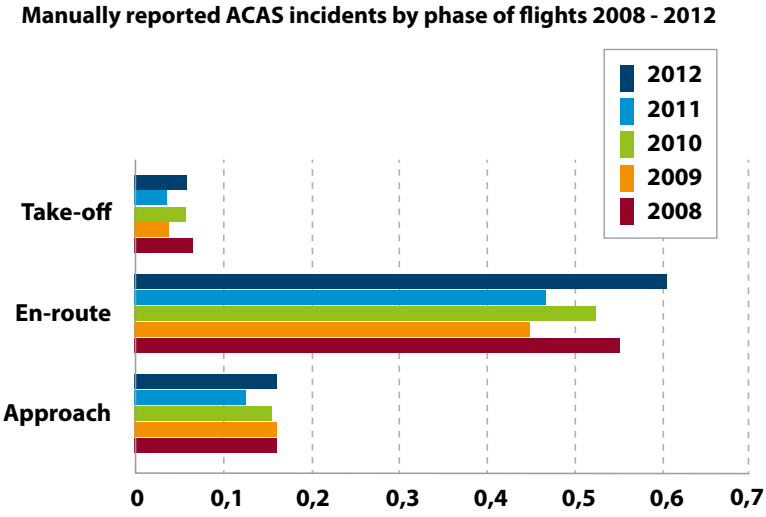


Figure 32: *Manually reported ACAS incidents by phase of flights 2008 – 2012*

Within the manual reporting, the highest number of RAs occurs within En-route phase, which contrasts to the data collected automatically, which shows that the most RAs occur within TMAs. After decrease of the number of RAs recorded in 2011 versus 2010, year 2012 recorded the increase across all phases of flights. It could be related to the upgrade of ACAS Version from 7.0 to 7.1. Namely the history shows that each ACAS upgrade was followed with the increase of the number of RAs reported. Further monitoring should give the answer on this question.

The increase of the number of RAs in 2012 is linked with the increase of the number of states where RA events occurred. From 2009 – 2011 the number of states where the TCAS RAs occurred was more or less steady with about 30 different states. However in 2012 there were more than 60 states where TCAS RAs occurred. The same situation is with the number of locations. In 2012 TCAS RAs occurred on 117 locations versus 102 in 2011. However number of carriers generating TCAS RAs in 2012 reduced from 52 in 2011 to 45 in 2012. Less carriers reported more TCAS RAs.

ICAO ADREP definitions of types of RAs 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 would have been a risk of collision between the aircraft.

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

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

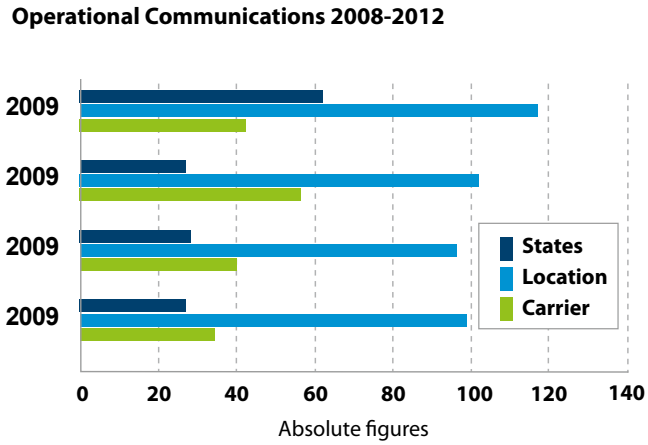


Figure 33: *Manually reported ACAS incidents per states, locations & carriers 2008 - 2012*

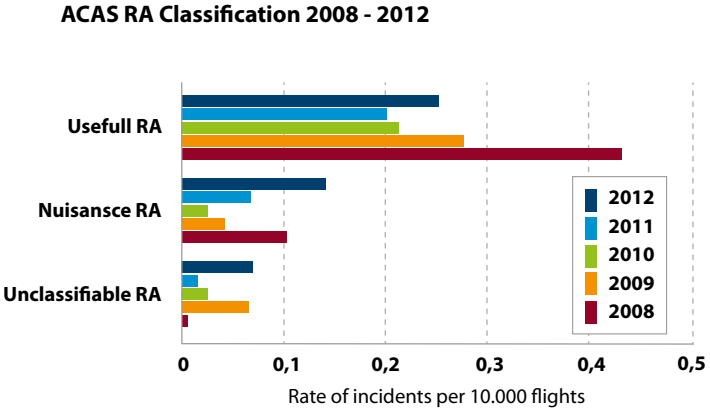


Figure 34: *ACAS RA Classification 2008 - 2012*

As usual the majority of ACAS RAs were reported as 'Useful RAs' and were followed by flight crew. Year 2012 recorded the increase of the 'Useful RAs' of 25.5%. The percentage of the 'Nuisance and Unclassifiable RAs' increased even more. In 2012 there were 106% more 'Nuisance RAs and almost 340% of 'Unclassifiable RAs'. Deeper analysis of Nuisance RAs show that the most frequent reason behind is high vertical rate.

ACAS RA INSTRUCTIONS 2008 -2012

ACAS RA instructions show that the highest number of ACAS RAs occurred due to high vertical rate, which is typically followed by the TCAS instruction 'Adjust vertical speed adjust'. This is directly linked with the increase of 'Nuisance RAs'. By the way the new TCAS version 7.1 replaced the previous instruction with 'Level off level off'.

ACAS RA Instructions 2008-2012

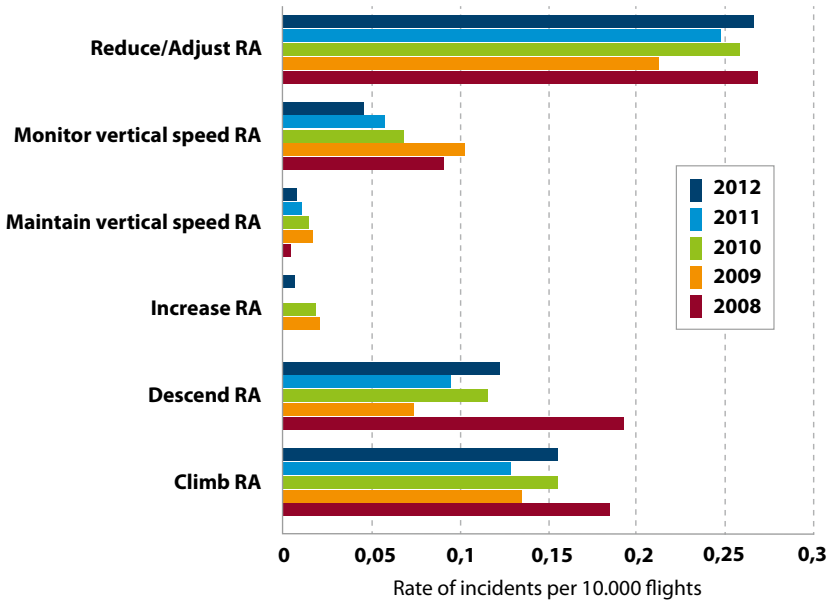
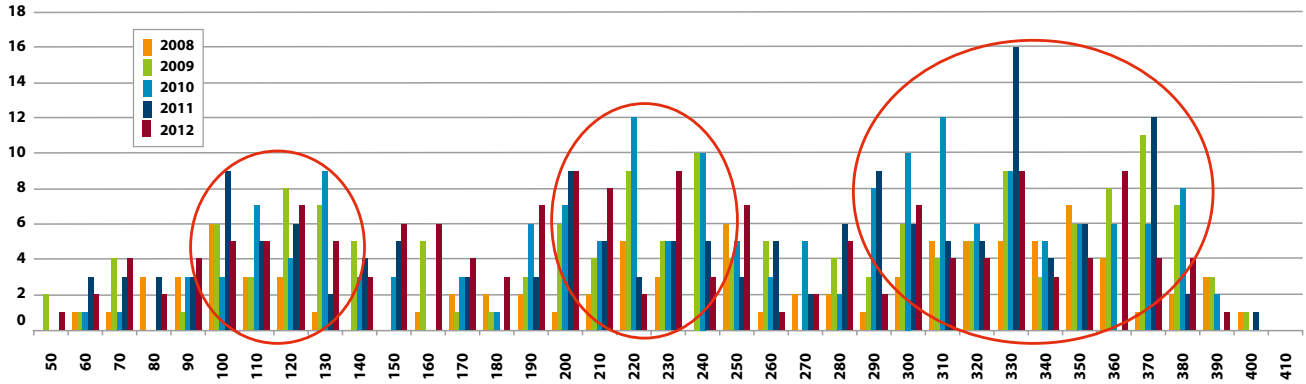


Figure 35: *- ACAS RA Instructions 2008-2012*

ACAS FL DISTRIBUTION

ACAS flight Level Distribution 2008-2012



Periods 2008 – 2012 (absolute figures) show that ACAS RAs are distributed in three main clusters: i.e. between FLs 100 - 140; FLs 200 – 250; and FLs 290 - 380. More or less this distribution is characteristic for the whole monitored period.

Figure 36: *- ACAS Flight Level Distribution 2008-2012 absolute figures*

ACAS RAS COLLECTED AUTOMATICALLY FROM MODE-S RADAR

Automatic monitoring of ACAS RA downlink messages collected the data in January-December 2012 from 12 radars in Europe. The procedures for monitoring use the Automated Safety Monitoring Tool (ASMT) to monitor Radar Local Area Network (LAN) recordings rather than being connected on line. Standard radar LAN recordings are transferred to ASMT on a daily basis and the detection process in ASMT is run once for each Mode S radar source storing detected events in a dedicated radar community database. This process is now used by two ASNP's and radar coverage being monitored obviously extends beyond the FIR boundaries.

The total numbers of RA downlink events recorded by ASMT attached to 12 radars in Europe is shown below. These are events recorded and do not represent the numbers of RAs which occurred.

All radars

Year	Events with valid RA	Events with Erroneous RA messages	Complex RA events	Totals
2010	8152	18589	203	26944
2011	5547	21496	113	27156
2012	4973	23964	104	29041

Events with valid RA messages = RA downlink messages which a valid RA downlink code.

Events with erroneous RA messages = RA downlink messages which are empty or contain only a stop bit.
Complex RA events = Events where more than two different RAs are detected for one aircraft during the encounter.
Note: many of the events including erroneous messages are seen by up to 7 radars and this results in multiple recordings.

Although there are many erroneous downlink messages these appear to be generated by a small number of aircraft that continuously report RAs. One group is fitted with TCAS units and Enhanced Mode S transponders manufactured by a known manufacturer while another group of aircraft are military exhibiting the same problem. These messages can be easily recognised as erroneous by ground systems and excluded from processing. There is a much larger group of aircraft that generate a downlink message with only the RA stop bit set. With these aircraft it is a set of three erroneous messages sent once or twice per flight and we have not found a common factor.

Detection and correction of RA downlink anomalies is now being handled by the Mode S monitoring team.

DOWNLINK ANOMALIES

In summary, a small number of aircraft are non-compliant with the SARPS and 'pollute' the RF environment. Corrective action is underway with the operators and manufacturers concerned however any corrective action taken has not affected the avionics installed on the affected aircraft.

AIRCRAFT REPORTING RAS

For the 12 radars the graph below indicates the number of aircraft reporting RA downlink to one or more radars. Some military aircraft actually flew through the coverage of more than one radar and reported RAs in different geographic locations and possibly on different days see Figure 37 Radars Detecting RAs. The numbers here are filtered using Mode S code and therefore represent a clearer picture of total events but still include duplicate counts for coordinated events;

Aircraft reporting to radars 2012

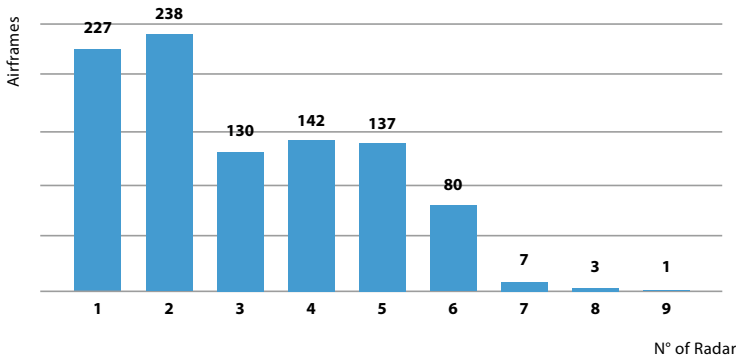


Figure 37: *Radars Detecting RAs*

AIRCRAFT REPORTING DAYS

Data from the year 2012 was analysed and some aircraft were detected as reporting a valid RA on more than one occasion, the Mode S address was looked at for those reporting on multiple days and all reporting on 4 or more days were identified as military. It appears that it is very unlikely that commercial airframes will get more than one RA in a year.

Figure 38 'Days reporting by airframe' provides a graphic presentation of the number of times an airframe automatically reports an RA to the ground radar.

Days airframes reported 2012

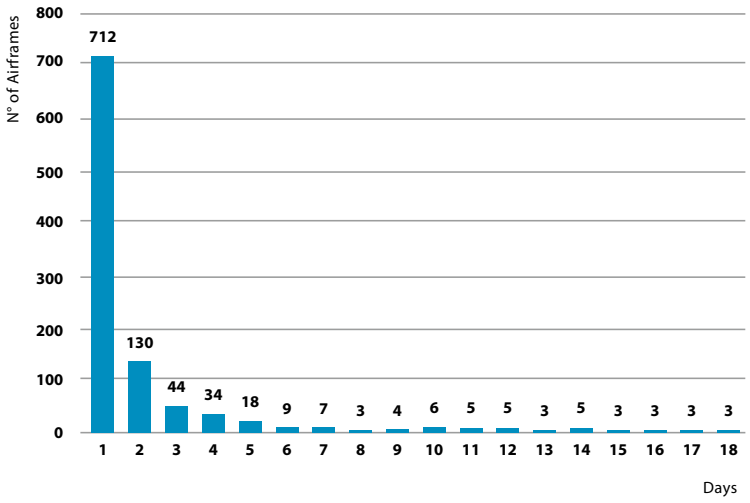


Figure 38: *Days reporting by airframe*

EVENTS BY HOUR

Data from the year 2012 was analysed and some aircraft were detected as reporting a valid RA on more than one occasion, the Mode S address was looked at for those reporting on multiple days and all reporting on 4 or more days were identified as military. It appears that it is very unlikely that commercial airframes will get more than one RA in a year.

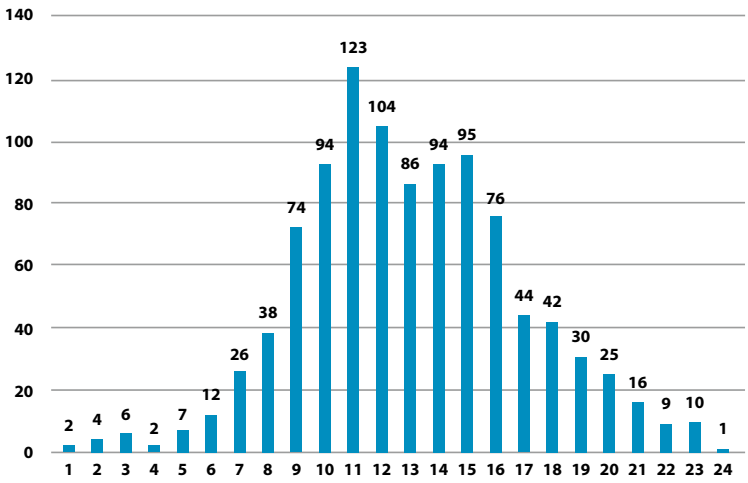


Figure 39: *RA's by Hour*

RA DISTRIBUTION BY FLIGHT LEVELS

There is a large proportion of RAs between FL10 and 30. They are mostly against VFR traffic outside controlled airspace. (Figure 40 ACAS equipage in Encounters below shows the high number of Mode C Intruders at these levels).

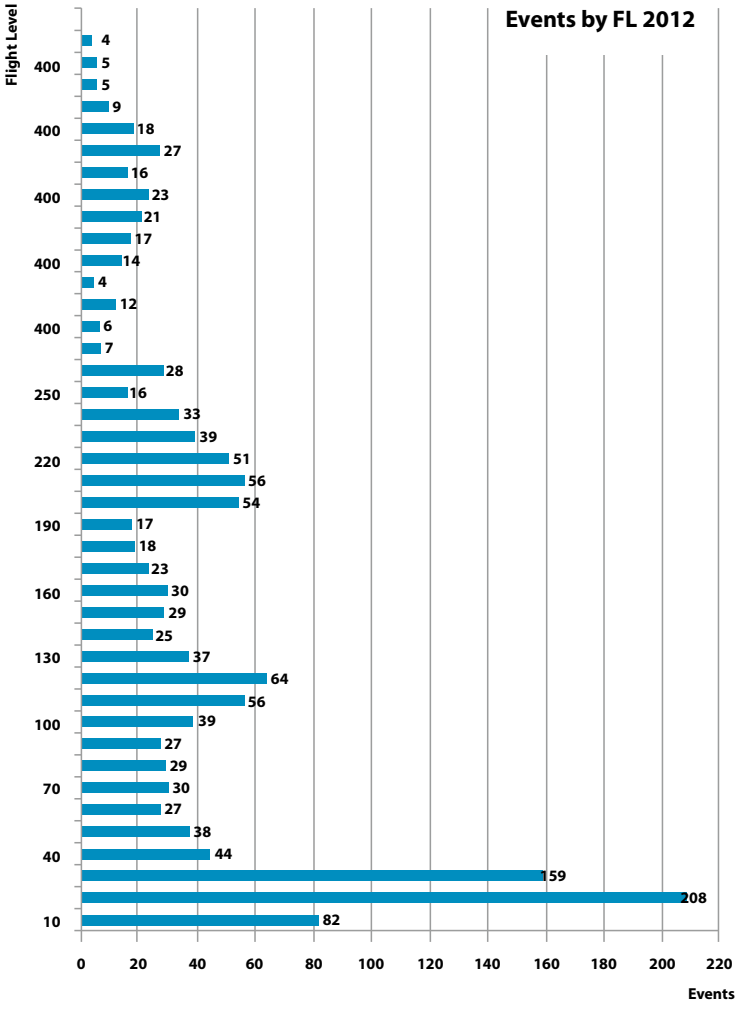


Figure 40: *Advisories by Flight Level*

INTRUDER EQUIPAGE BY FLIGHT BANDS.

The diagram below shows the number of RAs events recorded on both aircraft and the number of events where only one aircraft reported an RA.

Events shown as an RA with a Mode S intruder are to a very large extent ACAS equipped. ACAS does not symmetrically generate RAs. There are many events where only one aircraft receives an RA, even though both are ACAS equipped. In 2012 both aircraft reported an RA in 9% of the recorded events however in the flight band FL100-FL180 both aircraft reported an RA in 20% of recorded events. RAs with intruder Mode C are confirmed as Mode C intruders by the Own RA downlink. Below 3000ft 57% of recorded events were identified as Mode C and 40% percent identified as Mode S intruders. The reduction in Mode C intruders may be due to the increase in the number of General Aviation aircraft fitting Mode S transponders.

At lower flight levels, the majority of RAs are against Mode C intruders, whereas at higher levels, most RAs are against intruders with Mode S or are coordinated ACAS encounters. A significant reduction of level off RAs in upper flight levels is possibly due to the increased use of 25ft reporting Mode S transponders.

Intruder Equipage by Flight Band 2012

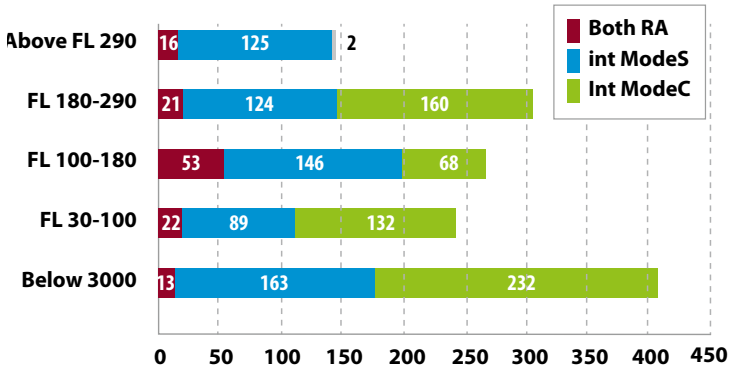


Figure 41: *ACAS equipage in Encounters*

Event Geometry

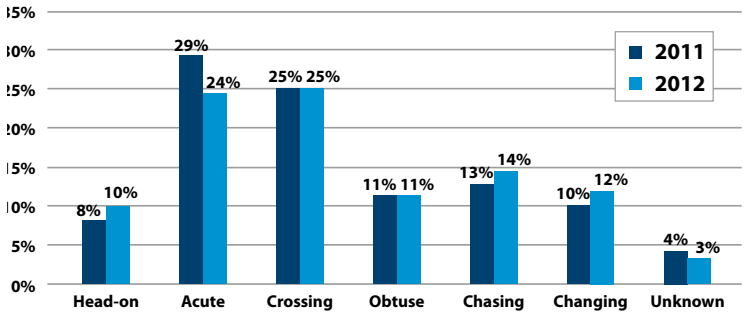


Figure 42: *Horizontal Geometry*

HORIZONTAL GEOMETRY

Definitions of geometry are included in Annex 2.
As expected this shows that the majority of RAs occur with acute and crossing tracks with 49% of events in this period a decrease of 5% on 2011. The low number of head on geometry could be due to the fact that head on traffic is not normally climbing or descending, to within 1000ft in close proximity, when on the same airway in opposite directions. However it is usual to have aircraft aiming for 1000ft separation at airway crossing points. The unknown are events where ASMT has been unable to determine the horizontal geometry possibly due to intruder being out of radar coverage.

PILOT RESPONSE 2012

The method used by ASMT to calculate response is not 100% reliable and is less reliable for short RA's. For an RA that does not change for at least 2 radar cycles, i.e. 10 seconds, ASMT automatically calculates compliance with the RA. We see that 82% of pilots have adequately responded to the RA. There were 77% achieving the requested vertical rate and 5% exceeding the requested rate. 17% of responses were not satisfactory from a safety perspective with 11% either having a slow response or failing to achieve the requested rate and 7% were calculated to have made opposite responses. These are similar numbers to 2011shown here and for 2010 where analysis was for one radar. The numbers shown here are for all RA's from the 12 radars and include those from Military training and transport aircraft. Most of the military will fall in the short RA sample in the diagrams below.

For short RAs (434 events – 38%), where the RA is observed to change or cease after one radar cycle (changes in less than 10 seconds), compliance with the RA is not as good, even though ACAS expects a quicker response from pilots. The ACAS logic expects an initial response to an RA in 5 seconds and only if the RA exists for less than 6 seconds do the responses here appear to be reasonable.

The high level of opposite responses to changing RAs is a cause for concern and re-emphasizes the need for pilots to be trained to follow the full sequence of RAs that they receive.

VERTICAL RATES AT THE TIME OF THE RA

Figure 45 shows how high vertical rates (above 1500 fpm) are predominant in the Adjust vertical speed advisories. This highlights the importance of the PANS–OPS change in 2008.

On 20th November 2008 PANS-OPS was changed to include the following recommendation:

"Pilots should use appropriate procedures by which an aeroplane climbing or descending to an

Response to standrd RA

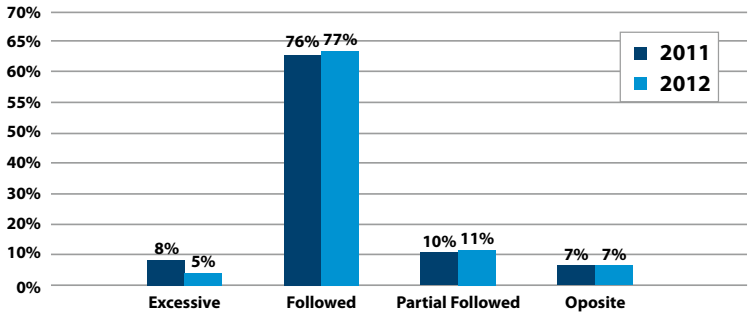


Figure 43: *Responses to Standard RAs*

Response to short RAs

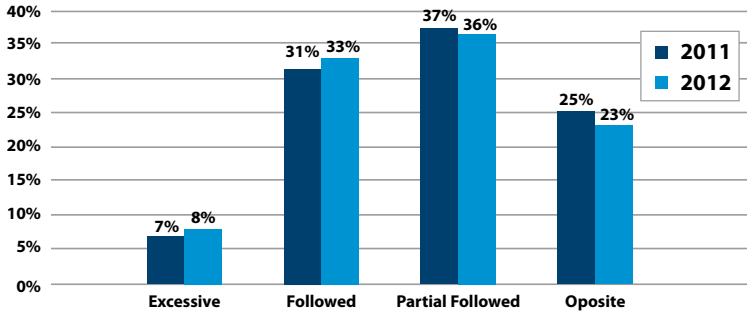


Figure 44: *Response to short RAs*

Vertical rate and Advisory 2012

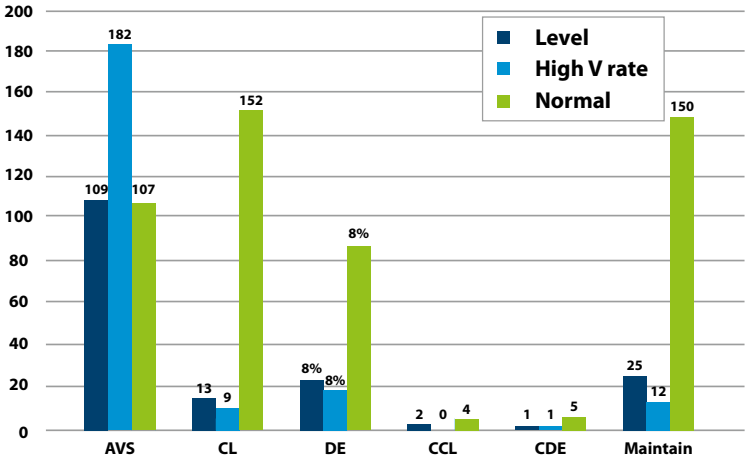


Figure 45: *Own vertical Rates before the first RA*

assigned altitude or flight level, especially with an autopilot engaged, may do so at a rate less than 8 m/s (or 1500 ft/min) throughout the last 300 m (or 1000 ft) of climb or descent to the assigned altitude or flight level when the pilot is made aware of another aircraft at or approaching an adjacent altitude or flight level, unless otherwise instructed by ATC. These procedures are intended to avoid unnecessary airborne collision avoidance system (ACAS II) resolution advisories in aircraft at or approaching adjacent altitudes or flight levels. For commercial operations, these procedures should be specified by the operator."

At the time of the first RA reports, 2012 analysis shows 26% of aircraft had a vertical rate exceeding 1500fpm. This is similar to 2010.

Pilots should be reminded of the provision in PANS-OPS shown above.

ADVISORIES ISSUED

The table below shows the breakdown of advisories issued in percentages over 4 years of monitoring one radar and two years monitoring multiple Radars. The main difference is the increase in Climb RAs and decrease in the Monitor Vertical Speed data.

Tabel 1: *Advisories*

		One Radar			13 Radars	12 Radars
Code	**Advisory**	**2008**	**2009**	**2010**	**2011**	**2012**
AVS	Adjust Vertical Speed	40%	38%	39%	39%	43%
MVS	Monitor Vertical Speed	23%	25%	23%	17%	21%
CL	Climb	21%	23%	20%	27%	18%
DE	Descent	12%	12%	12%	13%	14%
KVS	Maintain Vertical Speed	1%	1%	2%	1 %	1%
ICL	Increase Climb	0,5%	1,5%	0,5%	0,4%	0.2%
ICD	Increase Decent	0,6%	1,1%	1%	0,3%	0.3%
RCL	Reversal Climb	0,0%	0,7%	0,9%	0,1%	0.1%
CCL	Crossing Climb	0,4%	0,4%	0,6%	0,8%	1%
RDE	Reversal Descent	0,3%	0,3%	0,6%	0,1%	0.3%
CDE	Crossing Descent	1,0%	1,0%	1%	1%	1%
MUL	Multiple	0,0%	0,1%	0%	0%	0%

The reduction in the number and percentage of MVS (monitor vertical speed) RAs is probably due to the increased use of Mode S by general aviation aircraft at lower flight levels.

The ACAS advisories AVS and MVS do not require deviation from ATC clearance unless ATC requests a specific vertical rate. They correspond to 62% of RAs in 2010 similar to 2008 and 2009 but a drop of 4% from 2007.

Advisories 2012

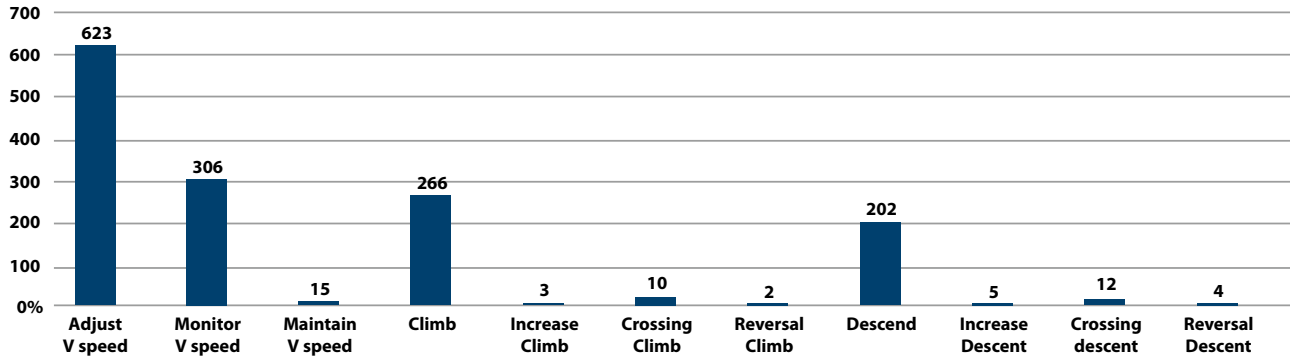


Figure 46: *Distributions by RA Type*

Due to the method of extracting the statistics, the results here represent the number of events rather than the number of RA's covering four years.

TIME OF RA DOWNLINK BEFORE HORIZONTAL CPA

Times were extracted for one of the radars to get an estimate of warning time that a controller might expect from RA downlink. The measurement was taken from receipt of first downlink received from the airframe to calculated Horizontal Closest Point of Approach (CPA) and is shown in 10 second bands up to one minute.

Downlink time before CPA 2012

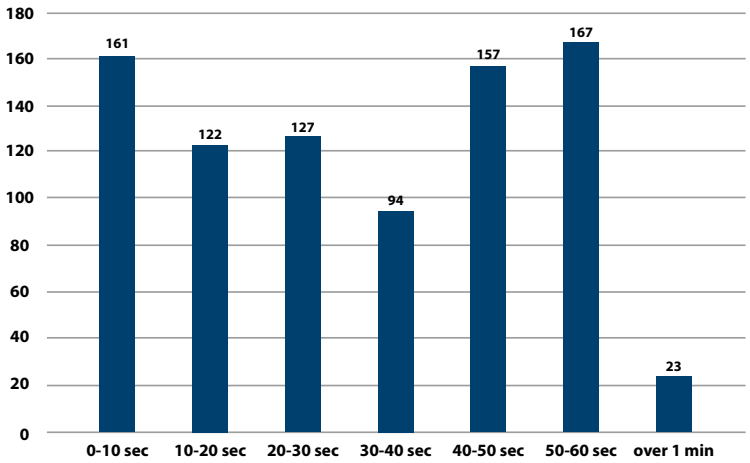


Figure 47: *RA downlink to Horizontal CPA*

Table 2 of times by Flight Band this shows the shorter warning times at lower levels

***Table 2:** 2 Times by flight bands*

Band	Below 2350ft	FL 23.5 - 50	FL 50 - 100	FL100-200	Above FL200
0-10sec	40	36	25	24	36
10-20sec	39	26	15	26	16
20-30sec	14	21	16	37	39
30-40sec	8	4	14	27	41
40-50sec		2	19	76	60
50-60sec		2	14	55	96
Over 1 min		2	2	9	10

From the statistics we have identified 36 events where the RA downlink occurred less than ten seconds before CPA in events above FL200. This seems unusual and a brief analysis of the 36 events show that only 8 of these were not military and did not have stop bit set.

Example of Long duration Resolution Advisory

In this case the two aircraft that were vertically separated had negligible horizontal separation for a long time.
TCAS generated a Level Off RA for the descending aircraft (shown in red) due to high vertical closure. The RA remained active when the aircraft leveled off 1000 feet above the intruder and clear of conflict only when the aircraft had a slant range of more than 1.1 NM.

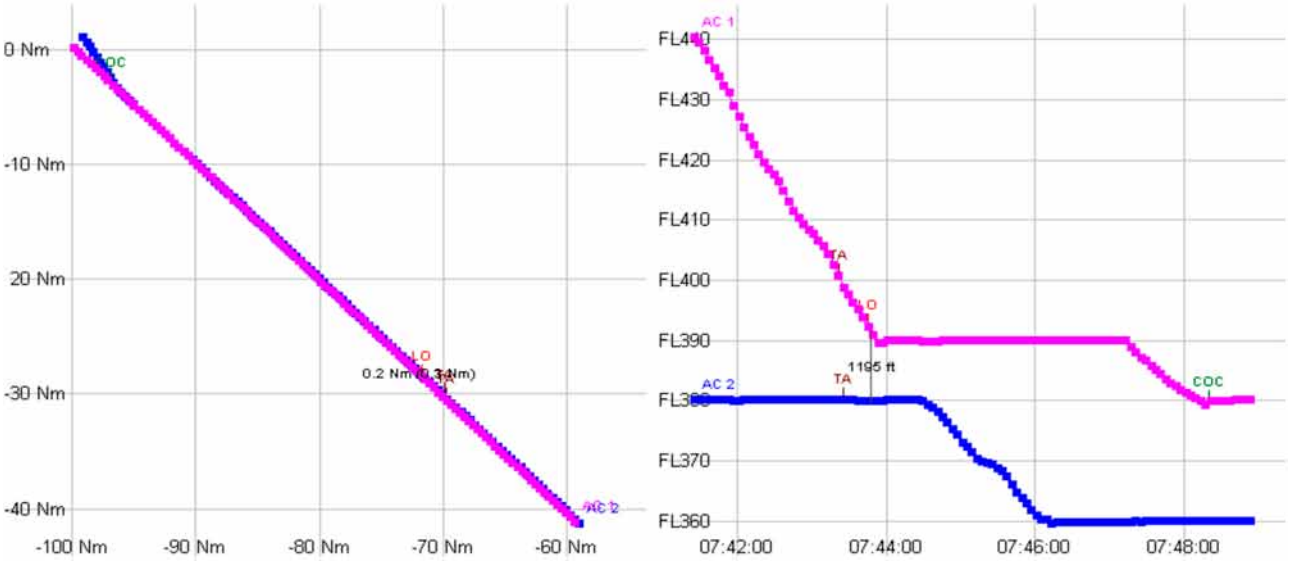


Figure 48

Simulation from the radar trajectories suggest TCAS logic would provide an initial RA to Level off occurred at 07:43:45 and continued until 07:48:20 when clear of conflict would have been given. This is a total of 4 min 35seconds.

Analysis of the event

The trigger of the Level off RA in the circumstances appears normal with AC 1 descending on top of AC 2 at 1800fpm.

The RA remains active with AC 1 exactly above AC 2 form 07:43:45 until 07:46:45 based on RA downlink information a total of 3 minutes. FDR recording from AC 1 confirms the RA downlink that a TCAS advisory "do not descend" was active for 3 minutes.

The pilot reported that the intruder was not displayed on board. This was possibly due to the intruder being directly below and only detected by the non directional bottom antennae.

AC 1 IVSI from simulation showing intruder at 07:45:46 which shows position of the intruder however simulation has bearing information to display the intruder.

ANNEX 1 – EUROPEAN ACTION PLANS

EUROPEAN ACT ION PLAN FOR AIR-GROUND COMMUNICATIONS SAFETY

The Air-Ground Communication (AGC) Safety Improvement Initiative was launched by the EUROCONTROL Safety Team in 2004, and is addressing communications issues identified in the Runway Incursion and Level Bust Safety Improvement Initiatives as well as other issues of the 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 series of workshops, and established a Level Bust Task Force to define the recommendations and to formulate an action plan to reduce Level Busts.

The Level Bust action plan is the product 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 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.eurocontrol.int/services/level-bust

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

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

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

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

The organisations that contributed to this action plan are 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.eurocontrol.int/articles/runway-safety

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 incidences where CSS is involved. Some aircraft operators are trying to find solutions; the only known ANSP actively operating a service to de-conflict call signs is France's DSNA.

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 pay back of investment (3 years). More importantly, it is calculated that it will eliminate over 80% of the CSS incidences and thus improve safety.

http://www.eurocontrol.int/services/call-sign-similarity-css-service

ANNEX 2 – DEFINITIONS

Following definitions are extracted from the HEIDI and/or HERA Taxonomies.

HEIDI

(Harmonisation of European Incident Definitions Initiative for ATM) intends to finalise a harmonised set of definitions (taxonomy) for ATM related occurrences.

More information can be found at:
http://www.eurocontrol.int/articles/esarr-2-reporting-and-assessment-safety-occurrences-atm

HERA

(Human Error in European Air Traffic Management) develops a detailed methodology for analysing human errors in ATM, including all error forms and their causal, contributory and compounding factors.

More information can be found at:
http://www.eurocontrol.int/articles/esarr-2-reporting-and-assessment-safety-occurrences-atm

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):

A 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):

Cover incorrect, late or absence of decision

Failure to Monitor (HERA):

Failure to monitor people, information or automation

Judgement (HERA):

Mainly associated to 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 different level than 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
- Miss-stored or insufficient learned information
- Planning: insufficient, incorrect or failed
- Recall of information: ailed, inaccurate, rare information, past information
- Violations: routine, exceptional

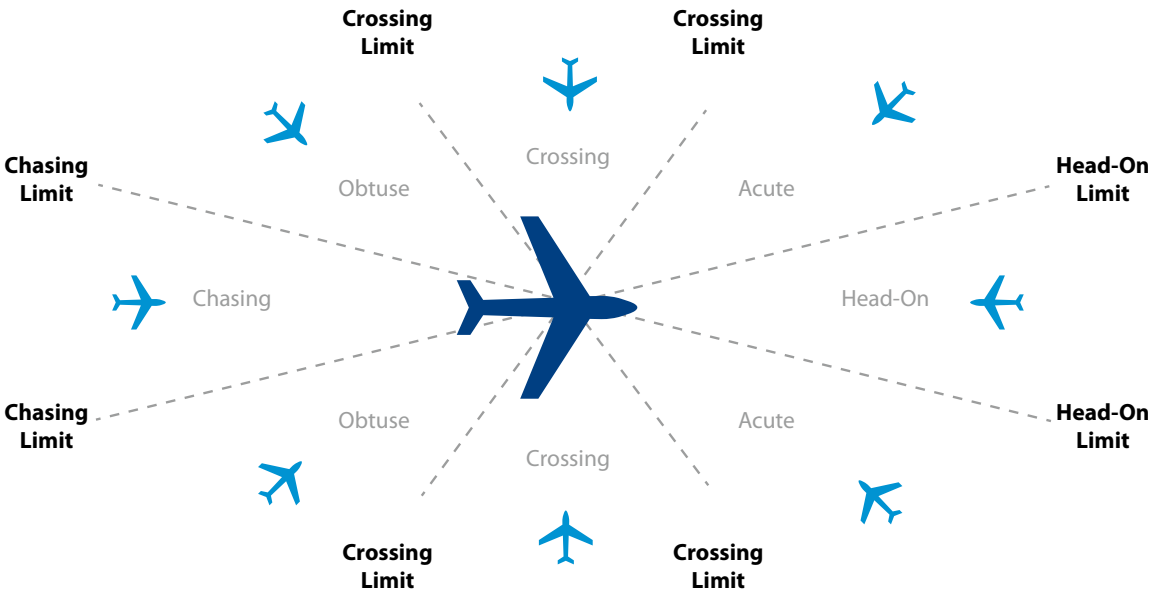
Mistakes (HEIDI):

Psychological issues encompassing: Information wrongly associated, Workload issues, Information not detected, Failure to monitor, Recall of information, Misunderstanding or insufficiently learned information, Judgement, Planning, Decision making, Assumptions and Mindset.

Operational communication (HEIDI):

Air-Ground, Ground-Ground and Use of equipment verification testing. Air-Ground communication encompasses hear back omitted, pilots' read back, standard phraseology, message construction, R/T monitoring including sector frequency monitoring and emergency frequency monitoring, handling of radio communication failure, unlawful radio communications transmission. Ground-Ground communication refers to the standard phraseology, speech techniques, message construction, standard use of equipment like, 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 occurrence unauthorized 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 element

- **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 signs confusion.

- **Airspace problems** composed of flights in non controlled and controlled air space, 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, law cloud, thunderstorm, wind shear)

- **Pilot problems** concerning language, culture and experience aspects.

Traffic Information (HEIDI):
Essential and local traffic information provided by an air traffic controller to the pilot. Essential information is related to the provision of traffic information containing:

a) direction of flight of aircraft concerned;

b) type and wake turbulence category (if relevant) of aircraft concerned;

c) cruising level of aircraft concerned; and

d) estimated time over the reporting point nearest to where the level will be crossed; or

e) relative bearing of the aircraft concerned in terms of the 12-hour clock as well as distance from the conflicting traffic; or

f) actual or estimated position of the aircraft concerned.

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

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

ANNEX 3 – ACRONYMS

ACAS	Airborne Collision Avoidance System
ANSP	Air Navigation Services Provider
AO	Aircraft Operator
ASMT	ATM Safety Monitoring Tool
ASR	Air Safety Report
ATC	Air Traffic Control
ATM/CNS	Air Traffic Management/Communication, Navigation, Surveillance
CSC	Call Sign Confusion
CSS	Call Sign Similarity
CSST	Call Sign Similarity Tool
ECAC	European Civil Aviation Conference
ELFAA	European Low Fare Airlines Association
ERAA	European Regional Airlines Association
EVAIR	EUROCONTROL Voluntary ATM Incidents Reporting
FL	Flight Level
GSIC	Global Safety Information Centre
HEIDI	Harmonisation of European Incident Definitions Initiative for ATM
HERA	Human Error in European Air Traffic Management
IACA	International Association of Charter Airlines
IATA	International Air Transport Association
LAN	Local Area Network
Mode C	Altitude Reporting Mode of Secondary Radar (ICAO)
Mode S	SSR selective mode of interrogation
OPS	Operations
PAN-OPS	Procedures for Air Navigation - Operations
RA	Resolution Advisory
RF	Radio Frequency
SARPS	Standard And Recommended Practices
SISG	Safety Improvement Sub-Group
STEADES	Safety Trend Evaluation and Data Exchange System
TCAS	Traffic Collision Avoidance System
WT	Wake Turbulence

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