EVAIR Safety Bulletin
No 6

Summer Periods
April - September

2008-2010 Evolution

EUROCONTROL

EUROCONTROL VOLUNTARY ATM INCIDENT REPORTING (EVAIR)

SUMMER PERIODS APRIL - SEPTEMBER 2008 - 2010 EVOLUTION

EXECUTIVE SUMMARY

EVAIR Safety Bulletin No 6 analyses the EVAIR safety data for the Summer periods (Apr – Sep) 2008 – 2010. At the request of stakeholders the data presented in the graphs (2008 - 2010 only) are the number of incidents per 10,000 operations rather than the 'absolute' figures shown in previous EVAIR Safety Bulletins.

As usual the statistics are based on the ATM/CNS incident reports collected manually from Aircraft Operators (now 70+) and ECAC Air Navigation Service Providers (ANSPs) who voluntarily share this data with us. Part of the Airborne Collision Avoidance System Resolution Advisories (ACAS RAs) data is collected automatically and in this bulletin we publish the RA data provided by one ANSP from 10 Mode S radar stations. ANSPs also provide feedback to airlines' incident reports, the ACAS RAs reports from Mode S radar stations and reports for Laser Interference and Call Sign Similarity/ Confusion events, which EVAIR is monitoring separately.

Data collection Increase

For the period June 2006 – September 2010 EVAIR collected approximately 5000 incident reports through the manual data collection process. The average yearly increase of reports was 52%; however, for the period Apr-Sep 2009 - 2010 the increase was almost 80%. The upward trend in reporting is a result of a constant promotion of the EVAIR activities. These include raising awareness and establishing permanent contacts with the Airlines' associations (IATA, IACA, ERA etc) and their members, as well as with the ANSPs. The focus is on highlighting the benefits of being part of the EVAIR processes. Our main stakeholders recognise and value EVAIR's ability to facilitate links between Safety Management Systems (SMSs) and the provision of feedback on submitted incident reports, which enables quick fixes to be made to identified problems. The time for the feedback to be provided varies from a few days to a few weeks; pleasingly, all ANSPs who have been approached to provide feedback have done so willingly. Despite the large increase of the ATM incident reporting the feeling is that, in general, the level of incident reporting is still sub-optimal. Therefore, additional commitment of all stakeholders is necessary to further continue to promote the safety benefits of a good reporting regime and work on the elimination of the obstacles which prevent people to report.

In 2010 automatic data recording increased and ACAS RA data was recorded from ten radars over a period of 11 months. From a total of 7165 RA downlink messages containing RA data, 3511 events were recorded with most of the events captured by multiple radars.

Increased interest in EVAIR statistics

Besides the interest in the feedback process, certain EVAIR data providers informed us that they use EVAIR statistics for making a cross check against their own ATM data.

Another area where the EVAIR data have been highlighted as being potentially useful is in the context of national accident and serious incident investigations. Very often contributors to the serious incidents or accidents that are the remit of national investigators are the same as or similar to the lower level severity incidents identified through voluntary reporting schemes such as EVAIR. Therefore, the use of a repository like EVAIR could provide additional information and the possibility to address more contributors than might be identified during a single and very specific accident or serious incident investigation.

Main trends:

Phases of flights – The EVAIR statistics for the Summer periods 2008 – 2010 show that the largest number of incidents (81%) occurred within the En-route and Approach phases. For the mentioned period there were 4.39 incidents per 10,000 flight operations.

Mistakes – 28% of the overall incidents in the EVAIR data base are caused by 'Mistakes'. 'Judgement' and 'Planning' within the 'Mistakes' category account for 86.7%. Besides 'Judgement' and 'Planning', 'Mistakes' incorporate: 'Knowledge', 'Decision-making', 'Experience', 'Workload', 'Violation of the rules', 'Not detected information', 'Assumption' and 'Failure to monitor'. A high percentage of 'Mistakes' and especially 'Planning' and 'Judgement', as the highest contributors, indicate that training is an area that might yield results to mitigate the situation.

Go-Around events – 'Go-Around' events, within which are 'aborted/interrupted' approach and 'missed approach', account for 16 % of the overall EVAIR reports. The main causal on the ATM part of the 'Go-Around' was 'Mistakes' ('Planning' and 'Judgement' are again the highest) and 'Communication' problems, especially 'Spoken language'.

Laser Interference – Reports of Laser Interference, 'attacks' on aircraft, and in isolated cases ATC control towers, continues to have the highest rate of growth. The probable reasons behind this high increase is the lack of national regulation in many states and the increased awareness of the threat and improved reporting of pilots and air traffic controllers. For Summer 2010 alone, the number of Laser Interferences received via EVAIR showed a seven-fold increase versus 2009 and accounted for 19% of reported data collected for that year. Stakeholders are increasingly concerned about the threats posed by Laser Interference and there is growing, widespread support for more concerted actions to be taken by all stakeholders to try and counter the negative impact on aviation safety.

Call Sign Confusion – EVAIR is monitoring reported call sign confusion events as part of EUROCONTROL Call Sign Similarity Project. Working with colleagues in the CFMU Call Sign Management Cell (CSMC), 32 airlines were identified with problems associated with Similar Call Signs. The identified airlines were informed and they have all reacted positively and several of them have taken actions to de-conflict similar call signs.

Volcanic Ash – EVAIR a central post flight volcanic data collection point

During Summer 2010, EVAIR continued to collect the investigation data related to the eruption of the Eyjafljallajoekull volcano. This work is helping with the sharing of lessons learned, and is supporting the improvement of the contingency guidance documents and procedures. After receiving the last results of the investigations the EVAIR database shows 187 volcanic ash reports.

Corner for our Stakeholders – IATA and Air Europa

Since the EVAIR Safety Bulletin No 4, IATA has been providing statistical information for certain categories of events thus enabling a cross check between global and European ATM trends. The IATA analysis were conducted on Air Safety Reports (ASR) held in IATA's Safety Trend Analysis, Evaluation and Data Exchange System (STEADES), a database comprised of de-identified safety incident reports from over 100 participating airlines throughout the world. The scope of the analysis included research of ASRs over the five year Summer periods from April 1st – 30 September 2006-2010. During this period a total of 127,563 reports were submitted to STEADES. Of these 6% (7,518) were coded in the database as ATM related reports. Additional analyses were conducted on topics captured outside the ATM coded reports, such as Altitude Deviations, ACAS, Go-Arounds, and Runway/Taxiway Incursions and Excursions.

Besides the cross check with IATA in this issue of Safety Bulletin we provide the overview of the SMS system of Air Europa, the Spanish carrier, part of the big EVAIR family of the voluntary data providers.

CONTENTS

EVAIR FUNCTION MANAGER'S PERSPECTIVE

We are pleased to announce that the reporting and number of stakeholders (Airlines and ANSPs) voluntarily providing ATM incident reports to EVAIR is constantly growing. Dialogue with key stakeholders indicates that they are keen to use the EVAIR statistics to cross check against their own data. Moreover, they use the EVAIR data base as a tool for identifying areas of safety concern and as a means to support and justify concrete safety activities. The Figure below shows the increase in absolute figures of manually reported incidents for the Summer seasons 2006-2010.

Incident data collection (absolute figures)

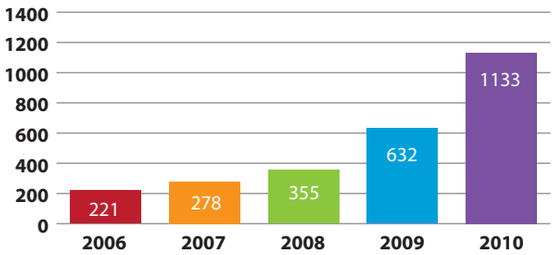


Figure 1 - Rate of incidents per 10.000 operations

Data providers

EVAIR's main asset is its data. However, there would be little or no data without trust achieved between EVAIR and its main stakeholders (Airlines and ANSPs) and we have worked hard to cultivate this level of trust so that more data providers are willingly supplying us with more of their safety data.

Indeed, it is pleasing to note that the number of airlines voluntarily supplying their reports is now more than 70. These airlines account for almost 60% of the overall European air traffic and so the data sibmitted can provide a reasonably accurate picture of the ATM risks in Europe. Data providers include several major European carriers as well as major airlines from other regions, USA, Africa, Asia and most recently from the Middle East and Russia.

The second source of data is from Air Navigation Service Providers (ANSPs). The ANSPs' main activity within EVAIR is the provision of feedback on reports sent to them for consideration. Pleasingly, all ANSPs who have been approached to provide feedback have done so willingly. Call Sign Similarity and Confusion reports and Laser Interference reports have also been submitted by ANSPs. One ANSP provides EVAIR with ACAS RAs automatically collected from Mode-S radars. Whilst this is a welcome development the fact that after four years of EVAIR activities there are no other data providers, indicates that we need to analyse why and identify the main obstacles that are hindering the provision of this data.

To allow comparison with previous years' values we continue to present statistics on ACAS RAs collected automatically from the single Mode-S radar. However, we hope that as of the next issue, EVAIR will start to publish data from 10 Mode-S radars. Statistics from both manually and automatically reported RAs have been prepared through an improved process of analysis, supported by an enlarged team of Mode-S and ACAS experts.

Facilitation

One of the EVAIR roles is the facilitation of contacts between aircraft operators and ANSPs. This contact improves trust and mutual understanding between the different stakeholders which has a positive impact on their Safety management Systems (SMS). These improvements also help to increase the motivation to report which in turn enables more facilitation of feedback leading to quick-fixes of identified problems.

Feedback – Support to quick fixes

The feedback process is improving on a daily basis. The latest monitoring indicates that for the period Jan - September 2010, 22% of the reports generated by EVAIR passed through the feedback process, which is more than double the percentage for the same period 2006 – 2009 (10%). In 2010 one third of the overall feedback provided was facilitated by EVAIR. In spite of the evident improvements, further common work between the main stakeholders is needed to learn more about the feedback process and to improve it.

Volcanic Ash – Continuation of activities

At the moment of preparing this Safety Bulletin, Mount Etna on Sicily has recently erupted which reminds us again of the potential for disruption of the air traffic network caused by these natural phenomena. Fortunately the eruption had only a minor impact around the affected area and traffic quickly returned to normal. At the same time, Agency activities related to the improvement of the

contingency measures is in progress. Lessons learned from the major Icelandic volcanic eruption of April 2010, as well as data collected during the volcanic activities and post investigation results, are being used to improve the definition of contingency procedures. This Bulletin presents the updates made in December 2010.

Laser Interference – Laser attacks on aircraft and in some instances ATC towers, which can cause temporary blindness of pilots or air traffic controllers, showed the highest increase within EVAIR data base. Reasons for the growth in numbers are the lack of the State regulation in a many countries, increased awareness and in that regard improved reporting. For the summer 2010, laser interference events showed a seven-fold increase versus the same period in 2009. Overall these laser events account for 19% of the total 2010 data base. Laser interferences have been identified at 74 different locations across Europe. At some locations they have occurred more than 100 times. The significant growth in the number of attacks, the lack of State regulation (regarding purchase, carriage and usage of certain types/categories of lasers that could be potentially harmful) highlight the need for concerted action across the spectrum of affected stakeholders to protect the safety and security risks/threats associated with laser interference. Together with the other EUROCONTROL Agency departments, EVAIR has initiated the first steps towards the organization of a European wide, multi-stakeholder Workshop. This would be dedicated to the identification of all laser problems and address the potential mitigation measures that are needed.

Call Sign Confusion – EVAIR is monitoring reported Call Sign Confusion events as part of EUROCONTROL Call Sign Similarity Project. Working with colleagues in the CFMU Call Sign Management Cell (CSMC), 32 airlines were identified with the problems associated with Similar Call Signs. The identified airlines were informed and they have all reacted positively and several of them have taken actions to de-conflict Similar Call Signs.

Main trends from the data provided manually:

Phases of flight - The statistics for the Summer periods 2008 – 2010 show that among six phases of flight ('Landing', 'Standing', 'Taxiing', 'Take-off', 'Approach' and 'En-route'), the largest number of incidents (81%) occurred within the 'En-route'(33%) and 'Approach' phases (48%). During the Summer period 2008 - 2010, EVAIR data indicates that there were 4.39 incidents per 10,000 flight operations.

Mistakes –Twenty eight percent (28%) of the incidents in the EVAIR data base are caused by 'Mistakes'. Within this category, 'Judgement' and 'Planning' accounted for 86.7%. Besides these two elements, 'Mistakes' incorporate: 'Knowledge', 'Decision making', 'Experience', 'Workload', 'Violation of the rules', 'Not detected information', 'Assumption' and 'Failure to monitor'. A high percentage of the 'Mistakes' and the type of elements which fall within 'Mistakes' indicate that training is an area that might yield results to mitigate the situation.

Go-Around events – 'Go-Around' events, within which are 'Aborted/Interrupted Approach' and 'Missed Approach', categories account for approximately 16 % of the overall reports within the EVAIR data base. Twelve per cent (12%) of 'Go-Arounds' occurred during poor meteorological conditions. According to EVAIR data the main 'Go-Around' contributors outside meteorological issues, were 'Mistakes' (with 'Planning' and 'Judgement' most prominent) and 'Communication' problems, in particular 'Spoken language'.

Stakeholders corner – IATA and Air Europa

EVAIR's cooperation with IATA and the ability for EVAIR to make a cross check of data trends against the IATA global STEADES – Safety Trend and Evaluation and Data Exchange System – continues. Both data bases represent officially non-investigated and voluntarily provided incident reports; EVAIR covering ATM within Europe and STEADES global aviation, including ATM. Both partners are aware of the advantages of doing this work together but also recognise the obstacles arising from the differences in the taxonomy, the level of data analysis and the way of counting incidents/reports. For instance, EVAIR ATM data are analysed by ATM experts and coded in the data base following ICAO ADREP taxonomy. STEADES on the other hand is comprised of pilot reports collected and coded by the airline as part of the airline's Safety Management System. In EVAIR multiple reports of the same event are correlated and counted once as a single incident, for example a single ACAS event reported to EVAIR by both airlines and the service provider involved in the incident is counted as one incident in EVAIR. STEADES, on the other hand, due to its de-identification practices, does not count number

of incidents, but rather counts number of reports received, for example a single TCAS event reported by two airlines is counted in STEADES as two reports. However, it should be noted that the instances of more than one report being submitted for a single event in STEADES is considered to be low. Making a cross checks between these two data bases gives additional opportunities to identify trends and in that regard common safety concerns in the ATM arena. Furthermore, it gives a better data-driven approach on where to allocate efforts and resources to improve safety.

For this Safety Bulletin, IATA STEADES prepared global information based on the safety incident reports from over 100 participating airlines throughout the world. The analysis included research of ASRs over the five Summer periods from April 1st 2006 to September 30th 2010, during which a total of 127,563 reports were submitted to STEADES. Of these, 6% (7,518 events) were coded in the database as ATM related. Additional analyses were conducted on topics captured outside the ATM coded reports, such as Altitude Deviations, ACAS, Go-Arounds, and Runway/Taxiway Incursions and Excursions.

In addition, in this Safety Bulletin we present information about the Safety Management System (SMS) of Air Europa, a Spanish carrier. Air Europa has also supported some earlier EUROCONTROL/IATA initiatives by participating on different local and regional safety activities and contributing to mitigate and solve some of the identified safety concerns.

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 STATISTICAL DATA

The statistics presented in EVAIR Safety Bulletins are based on incidents received from commercial aircraft operators and feedback data provided on some of them by ANSPs. Incident reports are very much based on the subjectivity of those who were involved and in the first place the pilots who filed the report and described the occurrence. **EVAIR statistics do not contain severity analysis**, since the analysed reports are not officially investigated or the official (airline/state) investigation is still waiting to be closed. Nonetheless, the statistics do provide a general view and show some main trends of the current operational safety acceptability.

EVAIR activity covers the whole ECAC airspace as well as some of the airspaces neighbouring with the ECAC region. In the same way, the airlines and ANSPs who participate in EVAIR come from across Europe and, indeed, some airlines based outside of Europe but who regularly fly through European airspace.

EVAIR Safety Bulletins are issued twice per year. One covers the whole year period whilst the other (such as this one) only the Summer season (April- September). Data are provided by 73 airlines. When solicited, all ANSPs have provided feedback to airline reports.

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 flight operations 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 the drill down through the data base 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.

Definitions: Definitions for each element contained in the graphs can be found in the Annex 2.

SECTION 1 - PHASES OF FLIGHTS

INCIDENTS PER PHASE OF FLIGHT: SUMMER PERIOD 2008 - 2010

Figure 2: Incident distribution per phases of flight - Summer 2008 - 2010

The largest number of incidents occurred within the 'Approach' phase, which in 2010 showed a higher increase than in previous years. The reasons behind this high increase are most likely the enlargement of the data providers and the higher motivation to report - which results from the improvements in the feedback process. In 2010, 3.7 incidents occurred within the 'Approach' and 'En-route' phases together, while all other phases accumulated about 0.7 incidents per 10,000 flights. This indicates where to focus the efforts to improve safety performance.

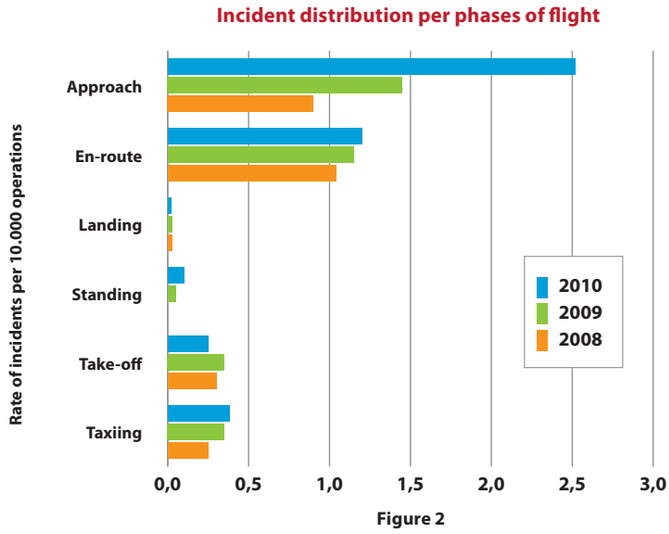


Figure 2

SECTION 2 - ATM EVENTS AND SUPPORT TO EUROPEAN ACTION PLANS

In this chapter, EVAIR presents some of the events which are already addressed in the European Action Plans or projects like Level Bust, Runway Incursion, ACAS, and Call Sign Similarity/Confusion. Analysis of EVAIR data helps to monitor the situation and draws attention to the negative trends which require corrective actions. It also assists in prioritising actions which could be taken on a pan-European level. 'Missed approach'/ 'Go-Around'type events are also included in this section for the first time. Given the high increase within EVAIR in the number of these reports during 2010, publication of the data serves as useful safety awareness material for the experts who read EVAIR Safety Bulletins.

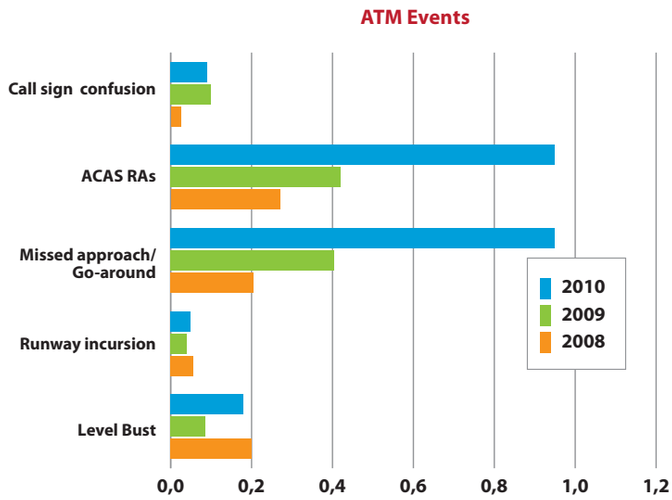


Figure 3 - Rate of incidents per 10.000 operations

Figure 3: ATM Events Summer 2008 - 2010

Among five types of events, 'Missed approach'/'Go-Around' and ACAS RAs have the highest level. There was a particularly marked increase of reported occurrences of these two events during the Summer 2010. ACAS RAs incorporate 'Useful', 'Nuisance' and 'Unclassifiable' RAs. During the Summer periods 2008-2010 the rate of ACAS RAs and 'Missed Approach'/'Go-Around' is very similar and much higher than the other 3 event categories. IATA STEADES data shows higher reporting rates in all five of these categories, and in a similar fashion to the EVAIR rates, the rates of reported ACAS RA and 'Go-Arounds' are higher than those related to Call Sign Confusion, Level Bust and RWY incursions.

TRAINING - A MITIGATION FOR CONTRIBUTORS

The identified and presented contributors are spread across all phases of flights and have the highest levels within our data base. Among them ATC Clearance/Instructions/Information/Advice and Mistakes are the contributors with the highest level within Summer periods 2008 – 2010. Our data driven approach, analysis and cross-check with other experts: air traffic controllers, pilots, ATM and airlines safety managers, airlines associations, show that more work should be done on the training arena and to adapt it to mitigate or overcome high-lighted concerns following a data driven approach. In the next issue of EVAIR Safety Bulletin we will try to elaborate in more details, and support with examples our position that training is one of the mitigations to improve ATM safety.

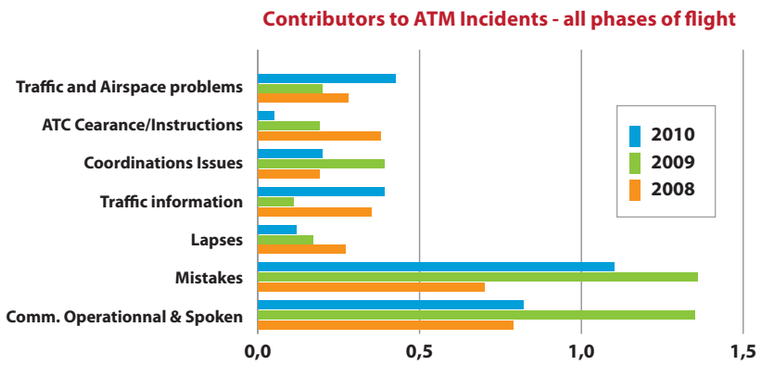


Figure 4 - Rate of incidents per 10.000 operations

GO-AROUND

In this EVAIR Safety Bulletin we prepared the first time statistics about Go-Around events, which have a very high trend in the EVAIR and IATA STEADES data base. Within EVAIR data base Go-Around make 16% of the overall data. To understand the differences we will continue to monitor the situation.

Figure 5: Go-Around 2008-2010

Summer 2008-2010

Go-Around events in the EVAIR data base show a steady rise. The reason behind the high increase rate could be related to the motivation of pilots to report more when they are provided by the feedback which is one of the EVAIR most important pillars.

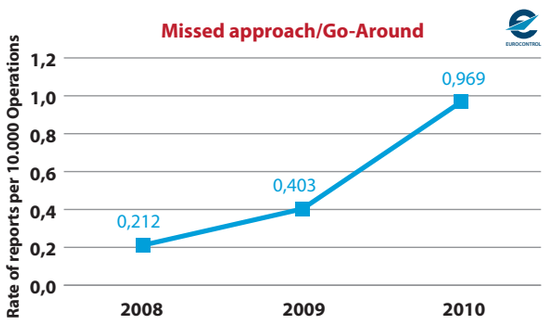


Figure 5

Figure 6:

Go-Around Contributors - 2008-2010

According to the EVAIR data base in 2010 the largest number of Go-Arounds occurred due to weather conditions. Constantly with the high rate among ATM contributors are Mistakes within which 'Planning' and 'Judgment' are the highest. In 2010 the majority of identified contributors had a very high increase. It is interesting that the 'Communication' contributors and among them 'Operational' and 'Spoken Communication' decreased.

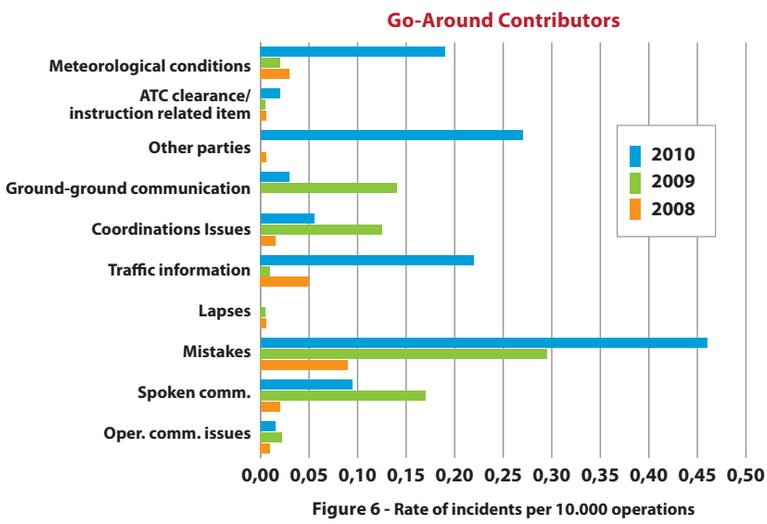


Figure 6 - Rate of incidents per 10.000 operations

RUNWAY INCURSIONS

The EVAIR data base shows that among five major categories of events presented in this Safety Bulletin, RWY incursion reported by pilots has the lowest rate. Summer 2008 had the largest number of RWY incursions. After a decrease in 2009, the 2010 EVAIR figures show an increase having approximately one RWY incursion every 8-9 days.

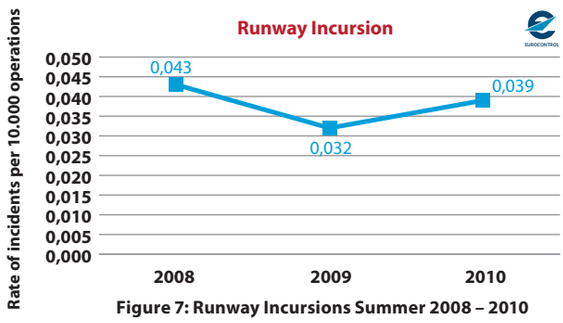


Figure 7: Runway Incursions Summer 2008 – 2010

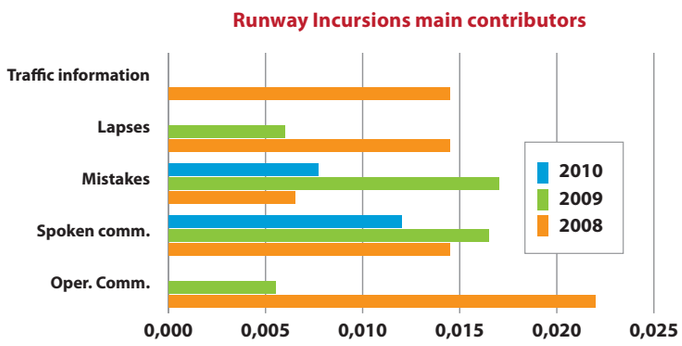


Figure 8 - Rate of incidents per 10.000 operations

Figure 8: Runway Incursions main contributors Summer 2008 – 2010

A drill down through the EVAIR RWY Incursions data shows five various contributory factors during the Summer periods 2008-2010. Interestingly during Summer 2010, only two of them, 'Mistakes' and 'Spoken Communication' were identified and in addition were lower than in the Summer 2009. Monitoring continues.

LEVEL BUSTS

In terms of the number of incidents per 10,000 operations, the Level Bust rate is lower than other events presented in this Bulletin (Go-Around, ACAS) but higher than RWY Incursions. Through all phases of flight during Summer 2010 EVAIR data shows that there were 2 incidents within three to four days of European operations. The highest number of Level Busts was in 2008. After a decrease in Summer 2009, the number of Level Busts in Summer 2010 increased and almost reached the same level as 2008. The IATA STEADES data base during the period 1 Apr to 30 Sep 2006-2010 in absolute figures identified on a global level 757 Level Bust reports in the data base. For the same period in absolute figures EVAIR identified for the European region 123 events. Therefore we continue to monitor this area.

Figure 9: Level Bust distribution per phases of flight - Summer 2008-2010 EVAIR

According to EVAIR data the largest number of Level Busts occurred within the 'En -route' phase, 1.2 incidents per 100,000 flights. This is approximately one Level Bust within European en-route airspace every third day. After a decrease during Summer 2009, the number of Level Busts almost achieved the level it had in summer 2008. It is interesting that within the 'Approach' phase the number of Level Busts decreased. IATA STEADES global data show constant decrease of Level Bust reports after 2007 but in 2010 the decrease almost stopped and is very close to the 2009 rate.

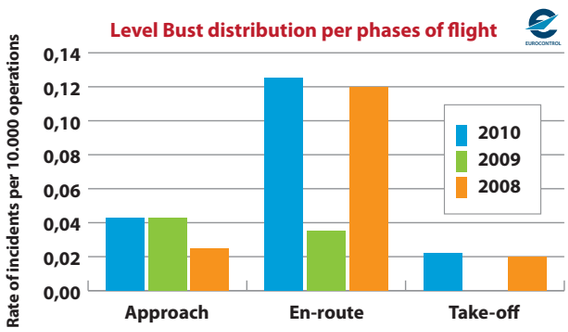


Figure 9

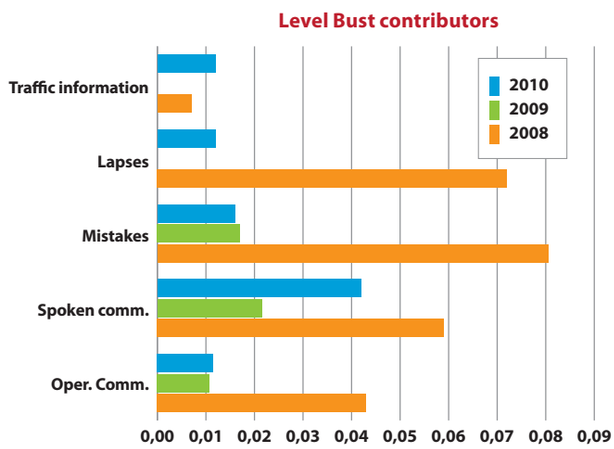


Figure 10 - Rate of incidents per 10.000 operations

Figure 10: Level Bust contributors Summer 2008-2010

Almost all contributors showed an increase in summer 2010 versus summer 2009 but they are still much lower than in 2008. Prime among them was 'Spoken Communication' which had the highest increase. 'Traffic information' as a contributor, which was not identified in 2009 appeared in the Summer 2010 It was even higher than summer 2008.

SECTION 3 - EVAIR SUPPORT TO CALL SIGN SIMILARITY IMPLEMENTATION PROJECT

Previous EVAIR Safety Bulletins have featured the monitoring activity involving the EUROCONTROL Call Sign Similarity (CSS) project launched in 2008. This project aims to reduce the incidence of Call Sign Similarity/Confusion by establishing pan-European CSS solutions centred on a coordinated Call Sign Similarity service and tool provided by the Call Sign Management Cell (CSMC) established in EUROCONTROL's Directorate Network Management (formerly CFMU).

Call Sign Similarity Rules A key element in reducing the number of Call Sign Similarities is having an understanding of what actually constitutes a 'similarity'. The Call Sign Similarity User Group (CSS UG) formulated some general rules for detection of similarities and these were published in April 2010. The Rules also included some basic principles that describe the acceptable formats for the creation or correction of ATC Call Signs. The General Call Sign Similarity Rules can be found at http://www.cfmu.eurocontrol.int/cfmu/public/standard_page/cfmu_programmes_css.html.

Aircraft operators actively engaged or wishing to engage in the prevention of call sign similarities are strongly encouraged to apply, in so far as possible, the General Call Sign Similarity Rules described within their operating schedules. The Rules may also be accessed via the Air-Ground Communication – Call Sign Confusion article found on SKYbrary at www.skybrary.aero.

Call Sign Similarity Tool Development of the EUROCONTROL Call Sign Similarity Tool is ongoing and at the time of writing it is anticipated that a first version of the Tool will be made available to a selected number of aircraft operators who have volunteered to test and trial it for their 2011 IATA Summer season schedules. Thereafter, it is planned that a second version of the Tool, featuring fully automatic detection and de-confliction of Similar Call Signs, will be available for all aircraft operators who wish to use it from September 2011 in time to de-conflict schedules for the 2011-12 IATA Winter season.

Call Sign Similarity Tool Monitoring As the CSS project progresses, it is foreseen that it will be necessary to monitor the effectiveness of the CSS Tool by those aircraft operators that will use it in 'live' operations. To that end, the CSS UG has agreed that the existing EVAIR communications channels should be used for the transmission of Call Sign Similarity/Confusion reports to EUROCONTROL. Namely, as with other air safety reports, these can be sent to mailbox, Dragica.stankovic@eurocontrol.int.

Pleasingly, some EVAIR members are playing an active role in the CSS UG. Furthermore, many EVAIR colleagues are already contributing Call Sign Similarity/Confusion reports to us - see the 2008-10 data below. For those of you who are already doing this, we thank you. For those of you who are not, there is an open invitation to begin sending us such data now ahead of the formal roll-out of the CSS Tool later this year.

Important Reporting Note: It is requested that **ALL** reports sent to EVAIR use the **ATC Call Sign or operational Flight Identification** rather than the Commercial Flight Number (CFN) (unless they are the same) as this helps the EVAIR staff process the data more easily and efficiently.

If you are interested in learning more about this developing safety initiative 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

CALL SIGN CONFUSION SUMMER 2008 – 2010 TREND

In this EVAIR Safety Bulletin we are in the position to compare Call Sign trends at the European and global level thanks to the information provided by IATA from the STEADES data base. During Summer 2010 both the European and global level data show that there was a decrease of reported call sign confusion events. The global figures are much higher than those at the European level with 2.8 Call Sign Confusion reports per 100.000 flights globally compared with 0.8 incidents per 100,000 flights in Europe as recorded by EVAIR, which is approximately one Call Sign Confusion incident every four days. It is too early to tell whether the EUROCONTROL CSS Project and publication of the Similarity Rules and their application by airlines is responsible for this decline. More data is required and the monitoring process set up between EVAIR and the Call Sign Management Cell should help us have a better understanding of the effects of the CSS Tool and application of the Similarity Rules over time.

Figure 11: Call Sign Confusions summer 2008 - 2010

The data show slight decrease on European and global level in 2010 vs 2009 however, it is too early to tell though if this is due to the application of the Similarity Rules and the procedure established between EUROCONTROL, ANSPs and the airlines for the quick fix of the identified Confusion/Similarity. Global IATA data show that in 2010 there were three times more Call Sign Confusion reports per 10.000 operations. In absolute figures 313 reports were found in the STEADES data base and 50 in EVAIR reported by airlines. It is difficult to declare that better European results come from the fact that Europe has started a few years ago with the project for the mitigation of this problem. We believe that 2010 regional and global results are connected with these activities since some non-European airlines joined Call Sign Similarity/Confusion activities too. EVAIR will continue to monitor the situation.

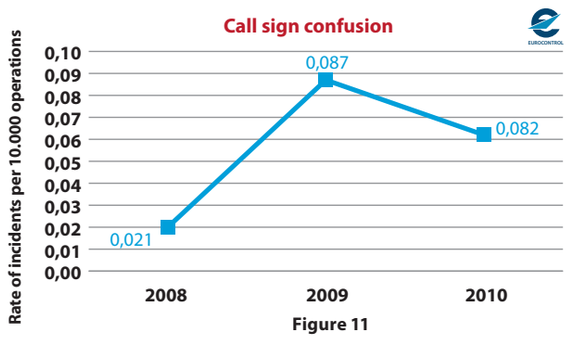


Figure 11

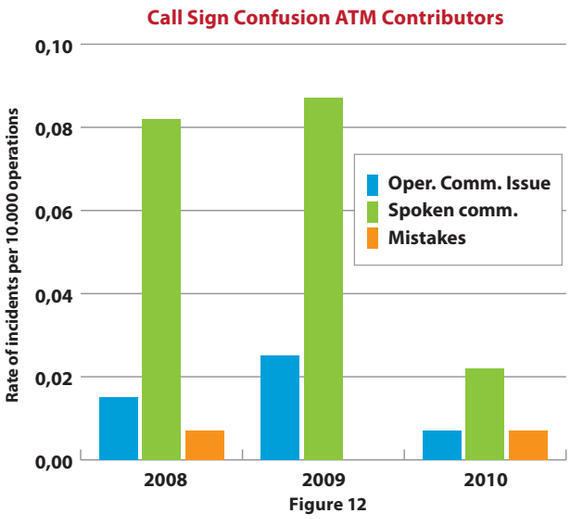


Figure 12

Figure 12: Call Sign Confusion ATM Contributors summer 2008 – 2010

'Spoken Communication' through the monitored period has the highest rate. After an increase in 2009 it went slightly down in 2010. It is interesting that 'Mistakes' which were not identified in 2009 appeared in 2010 with a bit more reports than in 2008.

AIR EUROPA AIRLINE

OUR SAFETY MANAGEMENT SYSTEM

In the absence of a national State Safety Program (SSP) AEA decided to proceed with the implementation of its Safety Management System (SMS) on Jan 1st 2009. The implementation is following ICAO Doc 9859, SMS Manual, and we have anticipated a 2 to 4 year period to have it completed. Some key points are:

- Before 2009, Safety was mainly the preserve of the Flight Safety Department. However, this has been changed for the better and now all company directorates as well as the Management Board are engaged in SMS activities.

- Traditionally Safety in AEA was reactive (we received an Air Safety Report, found its cause, and tried to prevent a reoccurrence). Now though we are taking a much more proactive approach. Tools like Flight Data Monitoring (FDM), allow us through statistical analysis of flight data to take action before something (unwanted) happens. One of the important steps and key enabler which had to be taken was the creation of a database that includes all possible threats and their corresponding risks in order to be able to decide a safe course of action. Data is the lifeblood of the SMS and without it and the ability to store and analyse it the SMS will wither and die.

- Our next steps include development of a positive **safety culture** right across the organisation. "Just Culture" is part of this and in that regard we are seeking to address the non-punitivity of the "honest mistake". However, this does not mean that people will have a free ticket; there will be no amnesty for intentional or gross negligence which should not be tolerated.

- SMS helps to **better optimise resources** throughout the company, which in the end will lead to efficiency and productivity gains for the company within the acceptable level of safety.

RISK ANALYSIS

A key AEA objective within the framework of our SMS is the development of a risk analysis tool that allows anticipation of the consequences of an action that hitherto would not necessarily have hitherto considered as "dangerous".

Risk Analysis should help us carry out systematic analysis and help us the better understand and deal with problems such as "jetbridge operation in Warsaw"; "radio communication in Rome"; "the weather in the middle of the Atlantic"; "50 minutes turnaround in Scandinavia, in winter"; or "handling personnel shift during a turnaround". The essence of this method is not to discard any possible danger no matter how small it may seem, as we aim to anticipate any undesired situation in which a danger or a threat could lead. Risk analysis is not only about preventing accidents/serious events but also looks at the minor events that are often the precursors of the headline grabbing catastrophes. In this sense, we very much support the EVAIR scheme which has similar objectives.

Our risk analysis is performed in depth using the TEM (Threat and Error Management) method. We aim to explore all possible aspects of each hazard, and then try to define the generic danger and its specific component of which there may be several.

The risk analysis tool will be made available to all our Directorates who will devote exclusive resources to it in order to exploit to the inherent value it adds to our safety processes.

GAP ANALYSIS AND PROJECT PLAN

Gap Analysis and Project/Implementation Plan are two important pillars in our project.

Indeed, the entire SMS process began with us undertaking a detailed Gap Analysis so that we understood the scale of the task in front of us. It also helped us assess our priorities and set the general direction of the SMS implementation that followed. As a guide to do this, there was a form of 101 points, which were assessed from the point of view of each of the four main directorates involved in our operations (Quality, Operations, Maintenance and Handling).

SAFETY AND COST REDUCTION

Our SMS costs money and time. Nevertheless, we are convinced that an efficient SMS, which uses accumulated data, statistics and trends from each directorate, will not only reduce our overall costs by minimizing damages caused by minor accidents, but will also reduce "ir-regular" costs such as the cost of repairs.

SMS CHAMPIONS

For the successful implementation of SMS and achievement of the associated safety objectives whilst at the same time reducing costs, it is necessary to have the **full commitment of all who are within the system including the top management**. These people are our SMS 'champions' and without their active engagement and support the SMS would still be paper ideas rather than a tangible living entity within the company.

DO WE BELIEVE WE ARE BETTER THAN WE ARE?

Reporting and reporting culture is often not given the importance that it should have within SMSs. The reporting culture in general is not as it should be, especially in southern Europe. We used to believe it was an obligation, and each person "interprets" the obligation as he or she wants. Therefore, the result is a very low level of reporting. In our opinion northern European based airlines are much better in reporting than their southern counterparts and we should make efforts to improve the reporting since more information enables more reliable trends and statistics.

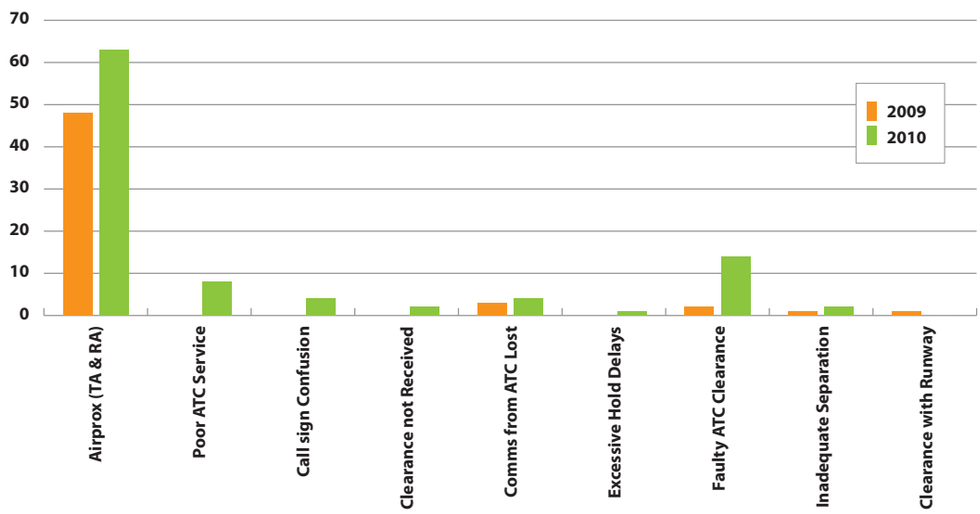


Figure 13

SECTION 4 - SPECIFIC EVENTS

VOLCANIC ASH

In this section of the Safety Bulletin we take a look at EVAIR data received on 'third party' incidents that are not directly attributable to ATC but which can have serious aviation safety consequences. The 'third party' data in this Bulletin include:

- Volcanic Ash etc.
- Lasers (improper illumination of aircraft and ATC towers).

VOLCANIC ASH AVIATION SAFETY DATA COLLECTION

Following the mandate given by FABEC states (France, Germany, Swiss, Belgium Netherlands, Luxembourg) and UK, EVAIR continued to receive volcanic ash information long after the major eruption in Iceland during April 2010. The latest reports which EVAIR received are the investigation results of the reported volcanic occurrences. In this section we present absolute figures. The reason for not showing relative figures is the lack of necessary information, e.g. on the first place the name of the reporting airlines is missing.

During the Volcanic ash crises EVAIR was provided by 1253 reports of which at the beginning there were 207 containing volcanic ash information. Following the receipt of the investigation results, 20 events could be discarded because they did not show any volcanic ash information leaving a total of 187 reports in the data base.

Figure 14: Volcanic occurrence per phase of flight - April-May 2010

According to the pilots' reports the largest number of the observed volcanic events occurred within the 'En-route' phase with more than 80 reports. 'Approach', 'Descent' and the 'Ground' had about 20 reports each.

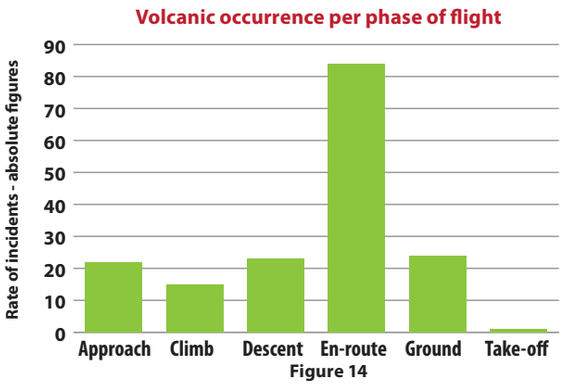


Figure 14

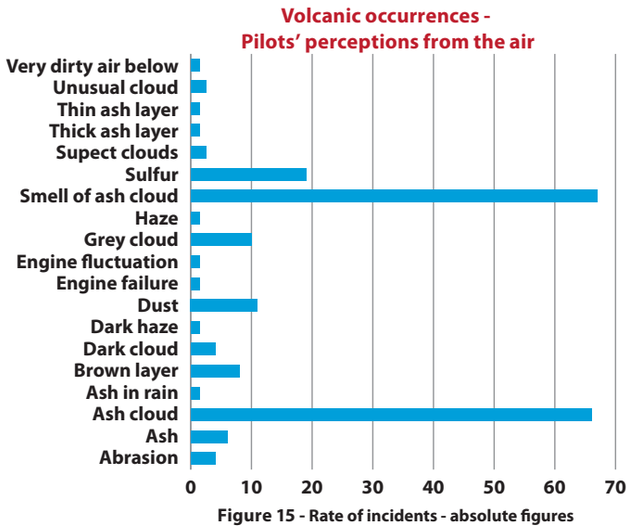


Figure 15 - Rate of incidents - absolute figures

Figure 15: Volcanic occurrences - Pilots' perceptions from the air - April-May 2010

The lack of a volcanic taxonomy made pilots to use descriptive language to explain and report their observations. EVAIR experts tried to classify pilots' observations and Figure 14 is the outcome of the classification. 'Smell of ash cloud' and 'Ash cloud' are two observations with the highest levels. 'Smell of sulfur' is in 3rd position, but is three times lower than the first two.

LASERS THREATS WIDESPREAD ACROSS EUROPE

The previous two EVAR Bulletins have highlighted the growing menace to aviation caused by the misuse of hand-held laser devices which are being used to 'target' aircraft and sometimes ATC facilities. Currently in the EVAIR data base the laser problem has been identified at 74 different locations within 24 states.

Data gathered through the EVAIR process continues to show that this threat is widespread across Europe. There are no universal solutions but some countries have been strengthening their legislative frameworks to counter the menace. This has led to a number of successful prosecutions against the perpetrators in some states which will hopefully act as a deterrent. Other mitigation actions by some air navigation service providers include issuing NOTAMs to alert crews to known laser 'hotspots' and/or including a message on aerodrome ATIS, warning pilots that they may be targeted. Of course such actions in themselves will not prevent the 'attacks' from happening.

For this to happen, concerted and coordinated effort is needed by aviation stakeholders working in conjunction with local authorities, laser manufactures (who can place warning notices on their devices) police, prosecutors and law makers. To that end, a proposal was submitted to joint session of the EUROCONTROL Safety Team and Safety Regulation Commission in June 2010, which described some options on how EUROCONTROL could initiate a European-wide, all stakeholder, safety initiative to tackle this hazard.

In this regard the agreement was achieved to organise "Laser" Conference from 10-11 October 2011. The Conference will be held in EUROCONTROL premises.

In the meantime, EVAIR will continue to monitor the situation and welcomes additional reports concerning the misuse of lasers against aviation assets. As ever please send report to: Dragica.stankovic@eurocontrol.int

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

Figure 16: Laser – Period 2008 - 2010 per 10.000 operations

After publication of the EVAIR Safety Bulletin 3 and the request for more reports, the number of reported Laser incidents significantly increased in 2010 and from a few reports in 2007 by Oct 2010 we had received almost 500.

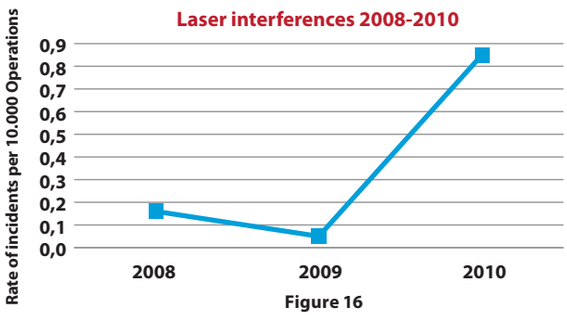


Figure 16

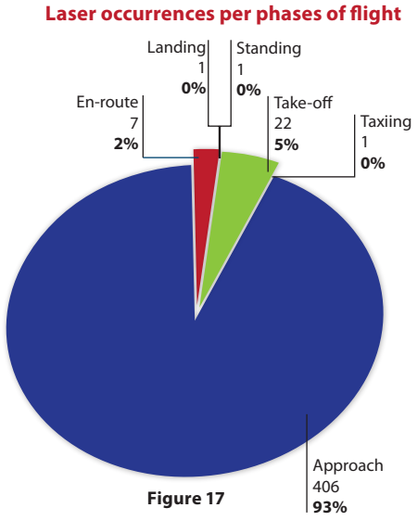


Figure 17

Figure 17: Laser per phases of flight – Period 2008 – 2009 per 10.000 flight operations

The most affected phase of flight by laser is 'Approach' with 93%. The number of Laser incidents in 2009 had a higher rate per 10,000 operations than Level Busts and Runway Incursions combined. It indicates that action is required to combat this growing threat to aviation safety.

SECTION 5 - ACAS REPORTING

EVAIR ACAS monitoring aims to ensure the continued safe operation of ACAS by identifying and measuring issues associated with 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 example of 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 phase 2 of the ACAS II implementation has been completed, ACAS monitoring continues to improve safety by identifying technical and procedural deficiencies.

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

For Summer periods 2006-2010 EVAIR collected through manual reporting 576 ACAS RA reports for the whole ECAC airspace. It should be noted that ACAS / TCAS statistics from manual reporting rely on pilots' and controllers' perceptions and memories of the events rather than measured or calculated values. Therefore 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 give emphasis to more significant events and insights into perception of the ACAS II system. IATA STEADES data base for the period 1 Apr- 30 September 2006-2010 identified 2090 TCAS reports.

Through the automatic data collection from ten radars a total of 3511 events were recorded in the EVAIR data base with most of the events recorded by multiple radars, from a total of 7165 RA downlink messages containing RA data. Data from one of the radars covering a busy airspace is compared with previous years. The reason to compare previous period for only one radar is because the other 9 were not included in the system. It is unfortunate that monitoring for that radar was not continuous for the whole period in 2010 which has approximately one month worth of data missing.

PART ONE - MANUAL ACAS REPORTING

Figure 18: Manually reported ACAS incidents by phase of flights summer 2008 – 2010

Through all phases the trend of manually provided ACAS RAs decreased. In total in summer 2010 there were about 6 reports per 100.000 operations comparing with almost 9 reports per 100.000 operations in 2009. As usual the largest number of RAs occurred within 'En-route' phase.

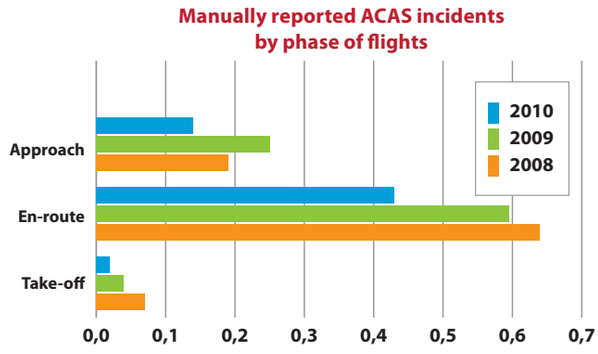


Figure 18 - Rate of incidents per 10.000 operations

- **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 the manual report contained insufficient data.

The extent to which pilots and controllers correctly follow these classifications when filling out their reports is unknown. The assessment of events (e.g. severity, usefulness) is based on subjective assessment of those who were involved. Nevertheless, these values arguably provide a general measure of the current operational acceptability of ACAS.

Figure 19:
ACAS RA Classification summer 2008 - 2010
All three types of the RA incidents for the summer 2010 decreased versus the summer 2009. The majority of RAs that occurred during the summer 2010 have been classified by pilots as 'Useful' RAs making a rate of about 0.2 incidents in 2010.

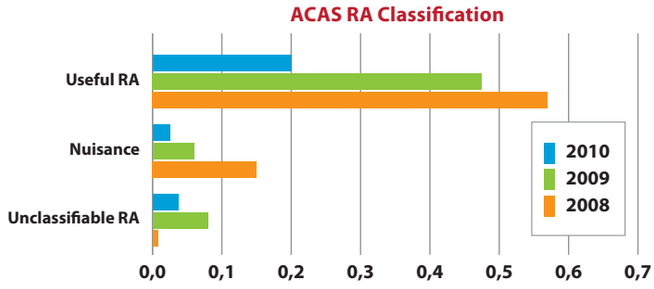


Figure 19 - Rate of incidents per 10.000 operations

RA INSTRUCTIONS Summer 2008-2010

Within EVAIR the trend of the manually collected ACAS reports has decreased since 2008. 'Reduce/Adjust' RA is in general the RA instruction with the highest rate. In Summer 2010 the 'Reduce/Adjust' RA decreased by 19%. The 2nd highest RA instruction is 'Climb' RA, which decreased by 28%. The area for improvement is within training and continuous awareness of pilots about this problem and how to avoid it.

Within IATA STEADES data since 2008 the trend is quite stable although a slight increase was been identified in Summer 2010. It is interesting to note that trend of the ACAS RA instructions within EVAIR and STEADES have been different. Reduce/Adjust RA has always been the highest within EVAIR while within IATA STEADES it is in the second position. Within STEADES TCAS climb is generally the highest.

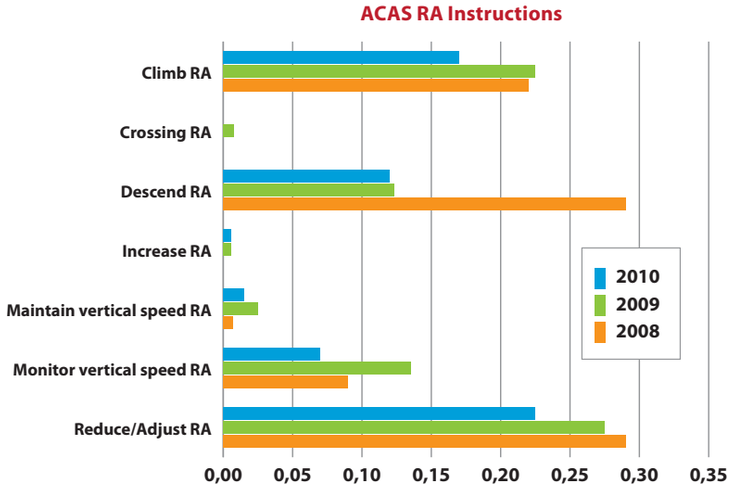


Figure 20 - Rate of incidents per 10.000 operations

ACAS FL DISTRIBUTION

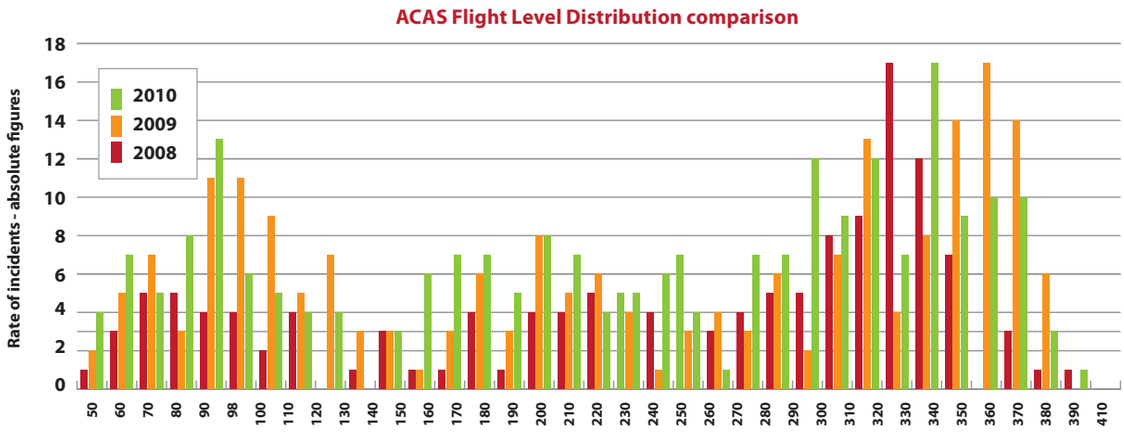


Figure 21

Statistics related to the FL distribution of the manually collected ACAS incidents show that the ACAS incidents are located in clusters of FLs. For the Summer period 2008 – 2010 absolute figures, the TCAS RAs are grouped in 3 big areas. FLs between 70-150; 180 – 270; and 310-380. The largest number of RAs occurred between FL 310 – 380. In the Summer 2010, FLs 180, 290, 310 and 350 had the highest increase. Geographical location of incidents and comparison with the route network structure as well as sectorisation could give more information whether some of these incidents have been generated by the airspace and sectorisation structure of the European network.

PART TWO - ACAS RAs COLLECTED AUTOMATICALLY FROM MODE S RADAR STATION

Tim Baldwin
Analysis of Automatically provided ACAS RAs
Tim.baldwin@eurocontrol.int

Garfield Dean
ACAS Expert
Garfield.Dean@eurocontrol.int

The Automated Safety Monitoring Tool (ASMT) is being used to record and analyze all ACAS advisory messages down linked by a number of Mode S radars in European airspace. This set of statistics has been assembled from data that has been collected between 01 March and 30 September in 2008, 2009 and 2010.

Availability of data

During 2007 the monitoring was not continuous due to radar maintenance and a change of ASMT monitoring machine. In 2008 automatic filtering of erroneous messages from selected airframes was also introduced. During 2009 automatic monitoring was transferred from monitoring one radar on line (in busy airspace) to processing recorded radar LAN data from 10 radars. However the data presented here shows information from the original single radar source to enable suitable comparison of statistics over the three years period. In 2010 additional filtering of erroneous messages was introduced and recording was interrupted for approximately one month.

Number of events recorded (From one Mode S Radar, March-September 2008-2010)

Year	Events with valid RA	Events with Erroneous RA messages	Complex RA events	Totals
2010	598	935	8	1541
2009	668	3032	19	3719
2008	937	3393	24	4354

Events with valid RA messages = RA downlink messages which are not empty or do not contain only the stop bit.
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 RA alerts are generated for one aircraft during the encounter.

The figures show a significant drop in the number of RAs over the three Summer periods.

Note: Since 2010, EVAIR has recorded automatic data collection from ten Mode S radars.
A total of 3511 events were recorded with most of the events captured by multiple radars, from a total of 7165 RA downlink messages containing RA data.

Downlink anomalies

In 2008 there were 198 airframes detected that incorrectly issued downlink requests, and 69 were detected 10 or more times during the 12 month period. From the 6425 Erroneous Message events, in 2008/9, 5116 were from this set of 69 airframes; and 4014 of these erroneous messages were from 21 airframes. In 2010 the majority of messages still come from the same 21 airframes.

In summary, a small number of aircraft are non- compliant with the SARPS and 'pollute' the RF environment. Further corrective action is needed with the operators concerned, manufactures and possibly regulators.

RA distribution by flight levels

Figure 22 shows the number of RAs by Flight Level for each of the years 2008 - 2010. All recorded RAs with a valid downlink message (not blank and not stop only) have been counted even if the intruding aircraft has not been identified. FL in this report are rounded to the nearest FL.

There is a large proportion of RAs between FL10 and 30. They are mostly the result of VFR traffic in uncontrolled airspace. (Figure 22 below shows the high number of Mode C Intruders at these levels, but note at lower flight levels the increased proportion of Mode S equipped intruders over time, suggests a greater proportion of GA aircraft are now fitted with Mode S transponders).

Intruder equipage by flight bands

The diagram below shows the number of events recorded with RAs 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. RA intruder Mode C are confirmed as Mode C intruders by the Own RA downlink. Since 2008 in the lower levels there is an increased percentage of aircraft identified as Mode S intruders and a reduction in Mode C intruders which may be due to the increase in the number of General Aviation aircraft fitting Mode S transponders this is more significant in 2010 than 2009.

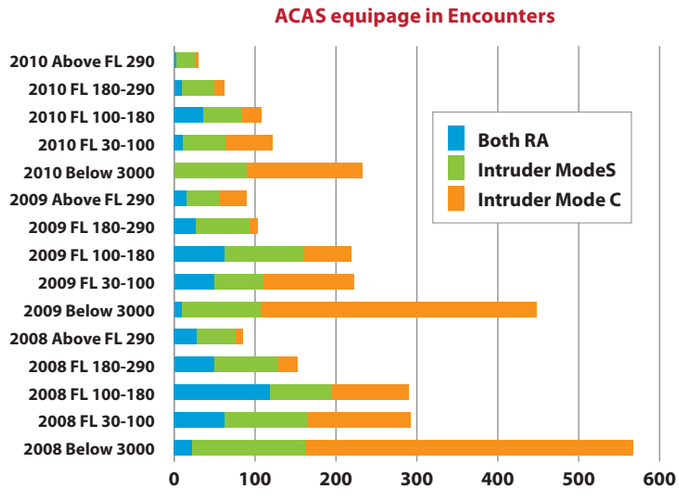


Figure 22 - Rate of incidents per 10.000 operations

Note: The number of events at each level is lower than the number of RAs because more than one RA can exist for each event.

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.

Hot Spots

Plotting XY distributions of RAs at different altitude ranges allows "RA hotspots" to be identified. Frequently these are related to airspace design and airspace classification issues, e.g. where climbing aircraft level off just below a flight level where descending aircraft level off too. An example hot spot diagram is shown below. A better conclusion can be drawn when the route network is also shown, however, due to confidentiality principles agreed with our data providers, we are unable to disclose the location.

Example of Hot Spot Diagram using Summer 2010 data

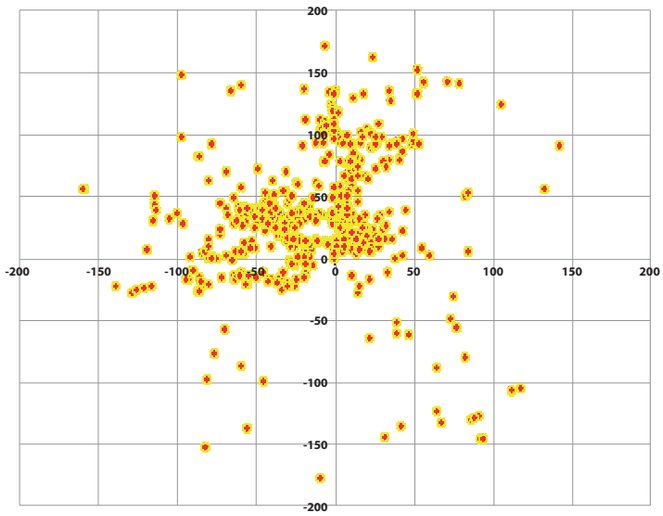


Figure 23

Pilot response 2009

For an RA that does not change for at least 2 radar cycles, i.e. 10 seconds (445 events - 57%), we see that there were 75% achieving the requested vertical rate, 8% exceeding the requested rate and 9% either slow or failing to achieve the requested rate. However 8% were calculated to give opposite responses and by observation most of these incidents involved only military aircraft.

Response to RAs

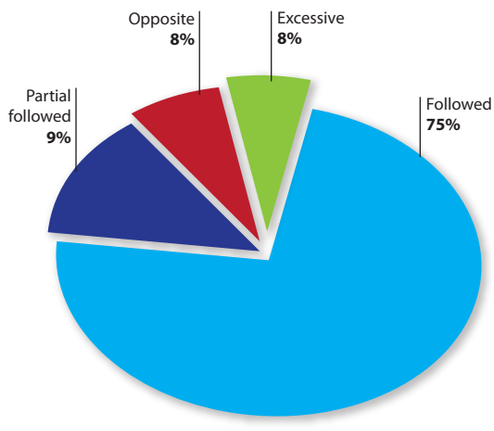


Figure 24

Response to changing RAs

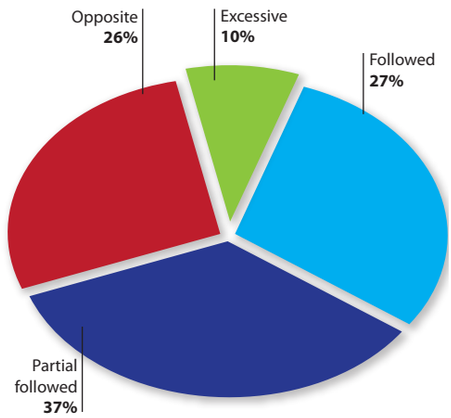


Figure 25

For changing RAs (336 events - 43%), where the RA is observed to change 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 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

Pilots should be aware of the following provision in PANS-OPS that is in force from 20th November 2008:
"Pilots should use appropriate procedures by which an aeroplane climbing or descending to an assigned altitude or flight level, especially with an autopilot engaged, may do so at a rate less than 8 m/s (or 1 500 ft/min) throughout the last 300 m (or 1 000 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."

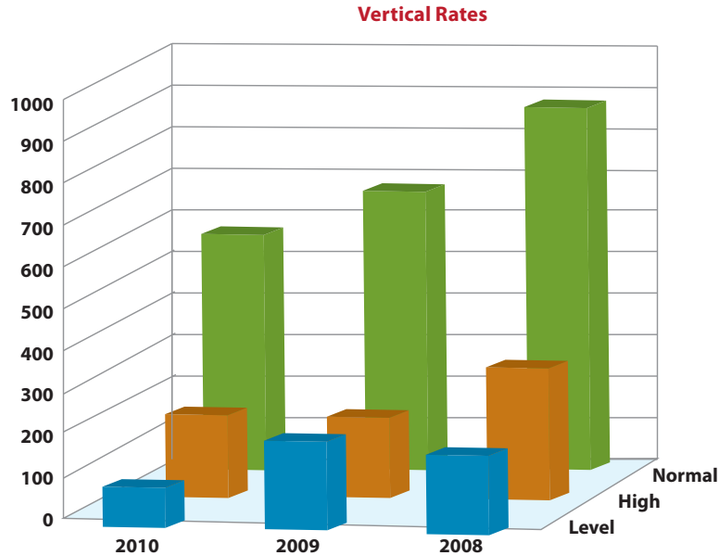


Figure 26

Figure 26 shows the distribution of estimated vertical rates at the time of the first RA reports. The associated table shows these results as percentages. 66% % of aircraft had a vertical rate below 1500fpm; this proportion has steadily increased over the past three years. It is hypothesised that both this change and some of the reduction in RA numbers may be attributed to greater awareness and use of the PANS OPS provision stated above.

	2008	2009	2010
Normal	63%	62%	66%
High	23%	18%	24%
Level	14%	20%	11%

ADVISORIES ISSUED

The number of RAs is greater than the number of events for two reasons: more than one RA can be issued to an aircraft during an event; and both own aircraft and intruder can issue an RA. The table below shows the breakdown of advisories issued in the collected data.

The reduction in the number and percentage of AVSA RAs is probably due to the recommendation to reduce vertical rate below 1500fpm in the last 1000ft when approaching a cleared level.

Code	Advisory	2008	2009	2010
AVS	Adjust Vertical Speed	40.50%	34.00%	38.02%
MVS	Monitor Vertical Speed	22.40%	24.00%	20.93%
CL	Climb	22.10%	22.00%	21.05%
DE	Descent	11.10%	12.40%	13.26%
KVS	Maintain Vertical Speed	1.70%	2.00%	1.51%
ICL	Increase Climb	0.60%	2.40%	0.47%
ICD	Increase Decent	0.70%	1.40%	0.47%
RCL	Reversal Climb	0.60%	0.50%	0.81%
RDE	Reversal Descent	0.00%	0.00%	1.28%
CCL	Crossing Climb	0.00%	0.00%	0.81%
CDE	Crossing Descent	0.20%	0.00%	1.40%

The majority of ACAS advisories are AVS or MVS. They do not require deviation from ATC clearance unless ATC requests a specific vertical rate.

They correspond to 59% of RAs in 2010 similar to 2009.

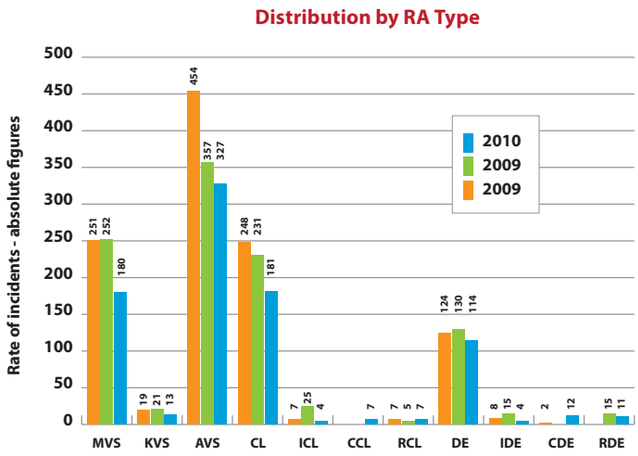


Figure 27

From 2010 data

Analysis of RA due to modes intruder indicating 25ft reporting but reporting 100ft increments.

Aircraft 1 was level at FL230; Aircraft 2 was level at FL 220 and crossing under the path of a/c 1 at about 45 degrees. Aircraft 2 had a transponder that reported altitude in 25ft increments but only ever gave values that changed by 100ft. Just as a/c 2 passed directly below a/c 1 it climbed very slightly and reported being 100ft higher. ACAS algorithms interpreted this as a sudden climb maneuver by a/c 2 and generated a nuisance climb RA on a/c 1. This case shows that it is important to detect and correct transponders that incorrectly state the precision of their altitude reporting as they can be a source of nuisance RAs.

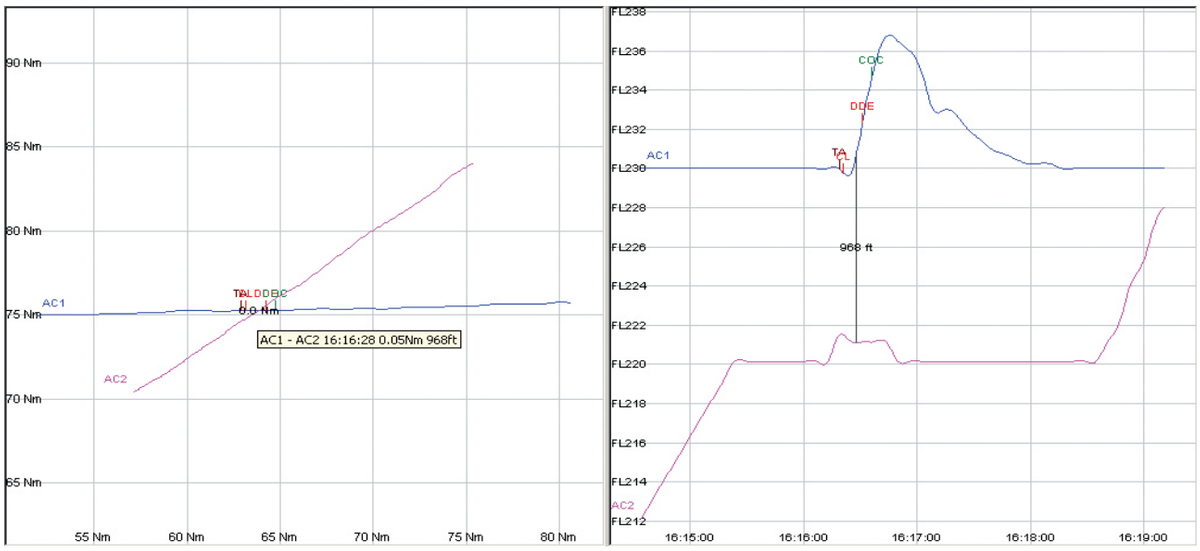


Figure 28

Timing distribution of RA downlinks before CPA.

		Downlink Time before CPA in Sec							
Sensitivity Level	**Own Altitude**	5	10	15	20	25	30	35	40
2	**<1000ft**	3		1					1
3	**1000-2350ft**	107	98	9	1	1	1	1	
4	**2350-5000ft**	125	135	18	11	4		3	
5	**5000-10000**	76	52	16	5	5	3	2	3
6	**10000-20000**	110	118	28	18	6	13	4	8
7	**20000-42000**	90	60	22	8	8	12	5	4

ASMT calculated the time of closest approach (CPA) for 1195 RAs between February 2009 and October 2010. The timing of the first down linked message on a single Mode S radar was subtracted from each RA. The results are shown in the table above. The table gives an indication of the distribution of warning times prior to CPA that might be available from RA downlink using a single Mode S radar.

It should be noted that very few, if any, of these cases would correspond to very close encounters, and therefore the warning times shown here may differ from those that will occur in safety critical cases. Nevertheless, they should be representative of what would be most frequently observed in such a system.

ANNEXES

ANNEX 1 - EUROPEAN ACTION PLANS

THE EUROPEAN ACTION PLAN FOR THE PREVENTION OF LEVEL BUST

Reducing Level busts is one of EUROCONTROL's highest priorities. EEUROCONTROL 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/safety/public/standard_page/Level_bust.html

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

Although runway safety includes issues such as foreign objects, debris and wildlife straying onto the runway and other technical deficiencies, this action plan specifically addresses the subject of runway incursion prevention.

EAPRI is the result of the combined efforts of organisations representing all areas of aerodrome operations that are totally committed to enhancing the safety of runway operations by advocating the implementation of the recommendations that it contains in the ECAC area. The ICAO secretariat has lent its strong support to the work of this group and urges all States to fully implement the ICAO provisions relevant to runway safety.

The 56 recommendations it contains, when implemented, will enhance runway safety by the consistent and harmonised application of existing ICAO provisions, improving controller - pilot - vehicle driver communications and working procedures at the aerodrome, and by the subsequent increase in situational awareness.
http://www.eurocontrol.int/runwaysafety/public/subsite_homepage/homepage.html

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/safety/public/standard_page/Callsign_Similarity_project.html

ANNEX 2 - DEFINITIONS

Ffollowing 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.
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:
HEIDI: http://www.eurocontrol.int/src/public/standard_page/esarr2_heidi.html
HERA: http://www.eurocontrol.int/humanfactors/public/site_preferences/display_library_list_public.html#5

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

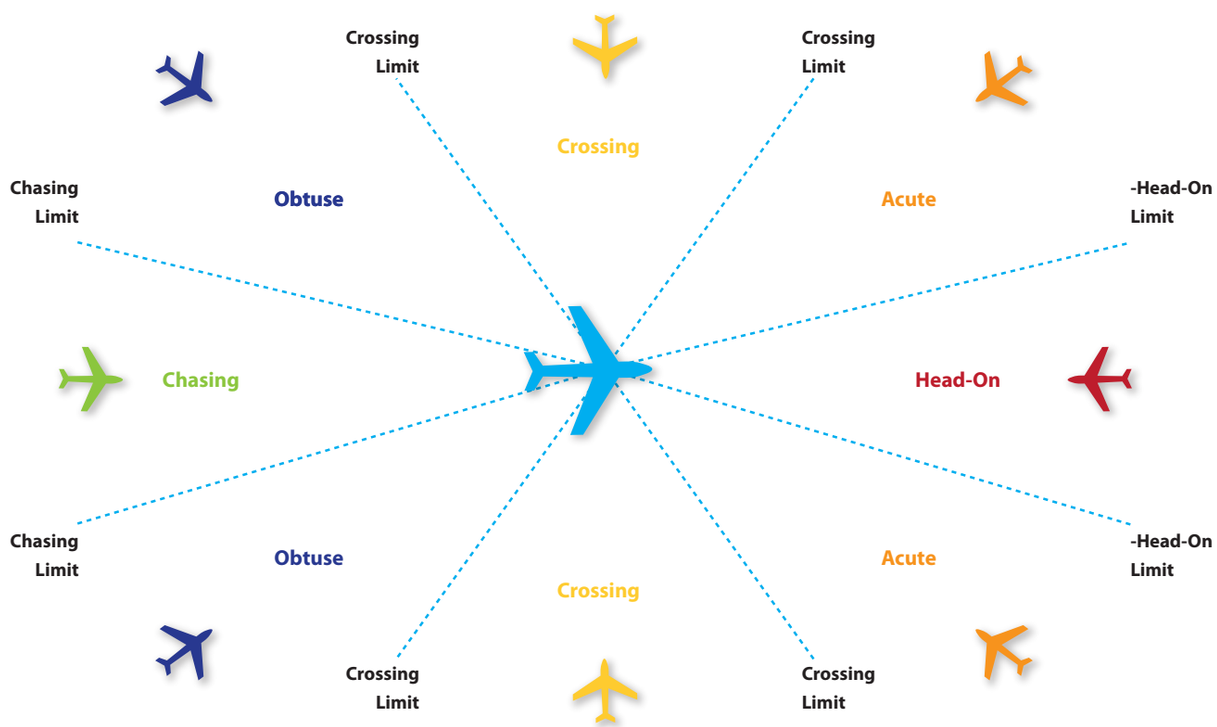
- Mental capacity: loss of picture or Safety Awareness;
- Confidence in self, in others, in information, in equipment, in automation;
- Complacency;
- Motivation/Morale;
- Attitudes to others;

- 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, underload 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
AEA	Air Europa
ANSP	Air Navigation Services Provider
AO	Aircraft Operator
ASMT	ATM Safety Monitoring Tool
ATC	Air Traffic Control
ATM/CNS	Air Traffic Management/Communication, Navigation, Surveillance
CFMU	Central Flow Management Unit
CSS	Call Sign Similarity
CSMC	Call Sign Management Cell
ECAC	European Civil Aviation Conference
EVAIR	EUROCONTROL Voluntary ATM Incident Reporting
FL	Flight Level
GA	General Aviation
GAT	General Air Traffic
HEIDI	Harmonisation of European Incident Definitions Initiative for ATM
HERA	Human Error in European Air Traffic Management
IATA	International Air Transport Assocation
LAN	Local Area Network
Mode C	Altitude Reporting Mode of Secondary Radar (ICAO)
Mode-S	SSR selective mode of interrogation
NATS	National Air Traffic Services (UK)
NOP	Network Operations Portal
OPS	Operations
PAN-OPS	Procedures for Air Navigation - Operations
RA	Resolution Advisory
RF	Radio Frequency
RWY	Runway
SARPS	Standard And Recommended Practices
SISG	Safety Improvement Sub-Group
SSR	Secondary Surveillance Radar
TCAS	Traffic Collision Avoidance System

www.eurocontrol.int