Annual Safety Review of Aviation in Ireland

2014

IAA

ATR 72-200F operated by Air Contractors Ltd
at Cork Airport

Photo by Paul Daly

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Night Scene Pier D Link - Dublin Airport

Photo by Michael Kelly

Foreword

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Welcome to the IAA's 2014 Annual Safety Performance Review.

The overall improving annual trends in Global Aviation Safety in terms of accident statistics continued in 2014. IATA reported that 2014 recorded the lowest global hull loss jet accident rate in history.

However 2014 will be mostly remembered for two extraordinary and tragic accidents - MH370 and MH17. Malaysia Airlines Flight MH370 disappeared without trace northwest of Penang in northwestern Malaysia on 8 March 2014, while flying from Kuala Lumpur to Beijing, and Malaysia Airlines Flight MH17 was shot down over the Ukraine while flying from Amsterdam to Kuala Lumpur, killing all 283 passengers and 15 crew on board, including one Irish citizen. The global community has been quick to address both of these rare and unusual accident types and plans are already in place to address the risks, including increased alerting and tracking of aircraft and enhanced risk mitigation strategies for conducting flights over conflict zones.

Closer to home there were no fatal accidents in 2014 involving Irish registered commercial aircraft, aircraft operated by holders of an Irish Air Operators Certificate (AOC) or aircraft flying within Ireland commercially or recreationally. This repeats the performance of 2013 and it is hoped that this achievement can be continued into 2015 and beyond. There were a small number of non-fatal accidents and serious incidents to commercial aircraft on the Irish register, aircraft engaged in general aviation activity in Ireland and at aerodromes within Ireland during 2014. Details of these occurrences are contained within this report.

The IAA will continue to use all available avenues to work with the aviation industry and general aviation to address the safety issues these occurrences have highlighted. The State Safety Plan identifies mitigation strategies to address the key risks to aviation in Ireland and this plan will be updated as necessary to reflect the lessons learned from the safety performance (ie National, European and Global) in 2014.

Notwithstanding the continuing improvements in aviation, fatal accidents still occur and we must continually strive to look for opportunities to improve safety and remain vigilant to potential safety risks. A fundamental tenet of the efforts to improve safety is the collection and analysis of safety data. In Europe, EU Regulation 376/2014 (Occurrence Reporting) becomes applicable on 15th November 2015, which enshrines existing national legislation on mandatory and voluntary occurrence reporting for commercial entities into EU law and includes mandatory reporting requirements for general aviation for the first time. This safety data will help States on a pan-European basis to identify the key safety risks and to co-ordinate risk mitigation strategies.

Executive Summary

General Statistics:

- There were 1188 aircraft on the Irish register on 31st Dec 2014 which is slight decrease (2%) since 2013. Most sectors saw a slight decrease in the number of registered aircraft, the exception being the microlight fleet which has increased by almost 10% to 148 aircraft since last year.

- The report reflects over 700,000 movements by the main Irish AOC Holders in 2014 which represents approximately 2% increase on last year.

- The IAA received over 7,200 mandatory occurrence reports in 2014, over 96% of which were low risk. The IAA has engaged with reporting entities to help eliminate unnecessary reporting under the mandatory scheme and consequently there was a 6% decrease in the amount of reports received since 2013. Irish operators have one on the strongest reporting cultures in the EU based on an occurrence reporting survey of EU operators in 2013.

- The number of arrivals and departures at aerodromes located within Ireland also rose during 2014. The flight hours and movements at the main Irish aerodromes licensed for public use both increased by approximately 15% since 2013.

Safety Performance Summary

- The State Safety Plan for Ireland identifies key Safety Performance Indicators for both Commercial and non-Commercial air operations in the State along with associated tier 1 (accidents and serious incidents) safety targets. The safety targets are that there would be no accidents or serious incidents due to the key safety risks identified for Commercial Air Transport Operators and that the number of accidents or serious incidents is reduced for General Aviation.

- The total number of accidents and serious incidents in 2014 involving commercial operators was 20, the same number as in 2013. In 2014 there were 9 accidents and 11 serious incidents in this sector, none of which resulted in fatalities or serious injury to persons and one of which resulted in minor injuries to passengers during disembarkation. The targets for accidents and serious incidents were achieved for all key risks identified in the State Safety Plan with the exception of Ground Operations (2 ground collision accidents in Ireland), Mid-Air Collision events (2 serious incidents) and Fire/Fumes related events (2 serious incidents).

- There were 11 accidents and 1 serious incident involving general aviation in 2014 over twice the number recorded in 2013. Six of these occurrences involved foreign registered aircraft. Four of the accidents involved operations from airstrips and three accidents and one serious incident involved power loss on take-off. Both of these risks are specifically targeted for improvement in the State Safety Plan.

- There were two non-fatal accidents involving commercial transport operations at the main Irish aerodromes licensed for public use. Both involved ground collisions and whereas no injuries were recorded substantial damage to aircraft occurred.

- Four year trends were established on key safety indicators for air operations based on mandatory reports submitted to IAA from all sources. The vast majority of these reports are classified as low severity with minimal or no affect on safety

  – Decreasing trends for occurrences categorised as loss of control in-flight and birdstrikes

  – Steady trends for occurrences categorised as controlled flight into terrain, mid-air collision and runway excursion

  – Increasing trends for occurrences categorised as runway incursion, ground operations and laser attacks.

Four year trends were also established for key safety indicators in the Air Navigation Services domain addressing occurrences at Irish public aerodromes involved in international flights:

  – Decreasing trends for separation minima infringements

  – Increasing trends for runway incursions, deviation from ATC clearance, level busts and airspace infringements

- During 2014 the three licensed parachuting clubs conducted over 13,000 jumps. A total of four parachutists sustained injuries (eg ankle injuries) during the landing phase that required medical attention.

Commercial Air Transport Accidents and Serious Incidents 2011-2014

22 accidents involving large commercial aeroplane transport between 2011 and 2014, the most common causes:

Ground Handling

Ground Collision

System Failure or Malfunction

82 serious incidents involving large commercial aeroplane transport between 2011 and 2014, the most common causes:

System Failure or Malfunction

Airprox or near mid air collision

OTHR

Other

No accidents or serious incidents for commercial air transport helicopters, corporate aircraft or commercial air transport light aircraft.

General Aviation Accidents and Serious Incidents 2011-2014

Parachute Jumping
27 Injuries

Aeroplanes Over 2,250kg
0 Fatal Accidents
1 Non Fatal Accidents
0 Serious Incidents

Aeroplanes Below 2,250kg
1 Fatal Accidents
15 Non Fatal Accidents
6 Serious Incidents

Helicopters Over 2,250kg
0 Fatal Accidents
0 Non Fatal Accidents
0 Serious Incidents

Helicopters Below 2,250kg
0 Fatal Accidents
2 Non Fatal Accidents
1 Serious Incidents

Microlight
0 Fatal Accidents
9 Non Fatal Accidents
2 Serious Incidents

Sailplanes and Powered Sailplanes
0 Fatal Accidents
0 Non Fatal Accidents
1 Serious Incidents

Gyroplanes
0 Fatal Accidents
1 Non Fatal Accidents
1 Serious Incidents

Balloons
0 Fatal Accidents
0 Non Fatal Accidents
0 Serious Incidents

Paragliders, Powered Paragliders and Powered Parachutes
0 Fatal Accidents
5 Non Fatal Accidents
1 Serious Incidents

MORs and the 5 Main Irish AOC Holders

21,380 occurrences reported between 2011 and 2014

The most commonly reported occurrences were:

System Failure or Malfunction

Birdstrike

Passenger Injury or Illness

The most common risk bearing occurrences were:

Human Factors Crew

Airprox or near mid air collision

Shining of Lasers at Aircraft

Irish Air Navigation Services

Between 2011 and 2014 there were six accidents and six serious incidents at the main Irish airports. There was one fatal accident in 2011 which tragically resulted in six fatalities.

In 2014, the IAA received 1,162 occurrence reports from Irish ATS providers. The most common reported occurrences were:

Shining of lasers at aircraft

Weather related go around

Deviation from ATC Clearance

The Key Safety Indicators for air traffic services at Irish Aerodromes

Airspace Infringements
Increasing trend: 31 in 2014

Deviations from ATC Clearance
Increasing trend: 127 in 2014

Level Busts
Increasing trend: 58 in 2014

Runway Incursions
Increasing trend: 30 in 2014

Separation Minima Infringement
Decreasing trend: 8 in 2014

Global Context for Annual Safety Performance Review

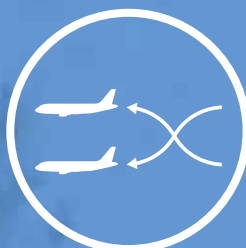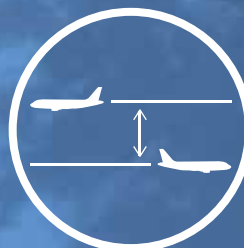Aviation is a global business and aircraft operators and passengers alike depend on multiple layers of co-ordination between States at regional and global levels to ensure that the same safety standards are applied throughout the world in those countries where passengers wish to fly.

ICAO is a specialised agency within the United Nations (UN) that was created in 1944 to promote the safe and orderly development of international civil air transport. It sets the global standards and regulations for aviation safety, security, efficiency and environmental protection. It also serves as the primary forum for cooperation in all fields of civil aviation among its 191 Contracting States. At the European level EASA is the European Aviation Safety Agency. It is tasked with keeping the air transport industry within Europe safe and sustainable. The EASA MS are the EU Member States as well as Iceland, Norway and Switzerland. There are of course other regional co-operation groups which include Ireland, such as the European Civil Aviation Conference of States (ECAC) and the ICAO EUR Regional Aviation Safety Group and these groups also have their own roles to play.

ICAO and EASA both issue Annual Safety Performance reviews and these reviews present safety information from a global and European perspective respectively. Whereas these reports do not deal with the level of detail available within individual States (ie they are mainly focused on analysis of accidents) they are useful in providing overview statistics for individual States to use for comparative purposes. The currently published reports for both ICAO and EASA address accident statistics up to end of 2013 and the main summaries are presented in the following paragraphs.

Global Accident Analysis

ICAO latest Annual Safety Report 2014 l(www.icao.org) shows that 2013 was one of the safest years for commercial scheduled flights with the number of accidents and the number of fatalities down on previous years. The current global accident rate quoted by ICAO is 2.8 accidents per million flights.

EASA's latest Annual Safety Review 2013 (www.easa.eu.org) also reflects a reducing trend for accidents involving commercial transport in Europe.

EASA also reported accident data concerning general aviation. Due to the variety of individual aircraft types involved the EASA analysis is not reproduced here however the details are referenced in the analysis of general aviation accidents and serious incidents in Ireland discussed later in this report. The general trend for fatal accidents, accidents and fatalities in the European general aviation sector is downwards with reduction of 10%, 16% and 21% respectively.

Year	Number of Accidents	Number of Fatalities
2009	102	655
2010	104	626
2011	118	372
2012	99	388
2013	90	173

Accidents Records: 2009–2013 Scheduled Commercial Flights

Source: EASA Annual Safety Review 2013

The International Air Transport Association (IATA) is the trade association for the world's airlines, which represents some 250 airlines or 84% of total air traffic, is also heavily invested in Safety Data Management and Analysis activities. IATA published recent safety data for 2014 which shows continued downward trend in accident statistics with a global jet hull-loss accident rate of 0.23 per 1 million flights or 1 hull-loss accident per 4.4 million flights. Sadly, IATA reported 12 fatal accidents involving all aircraft types in 2014 with 641 fatalities.

Overview of the Number of Commercial Air Transport Accidents, Fatal Accidents and Fatalities for EASA MS Operators. Source: EASA Annual Safety Review 2013

Aeroplanes				
Period	Total Number of Accidents	Number of Fatal Accidents	Number of Onboard Fatalities	Number of Ground Fatalities
2002–2011 (average)	24.6	2.3	59	0.2
2012	33	1	0	1
2013	18	0	0	0

Helicopters				
Period	Total Number of Accidents	Number of Fatal Accidents	Number of Onboard Fatalities	Number of Ground Fatalities
2002–2011 (average)	12.8	3.4	14.1	0.1
2012	12	2	8	0
2013	7	3	10	1

As well as providing analysis of the number and rate of accidents ICAO and EASA also analyse the cause of accidents. From this causal analysis key safety indicators are developed, and are used by all States to ensure appropriate risk mitigation strategies are adopted by the aviation industry in that State, even if the State itself has never experienced an accident of this nature.
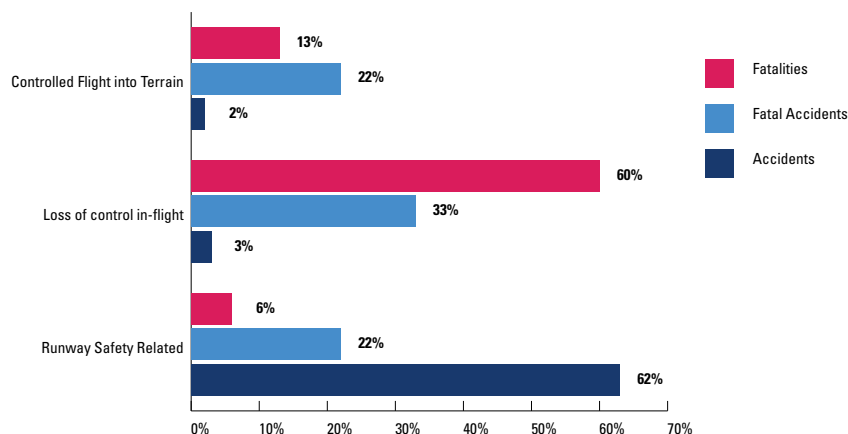
Based on analysis of historic accident data ICAO has identified three high risk accident occurrence categories, runway safety, loss of control in-flight and controlled flight into terrain. The figure below provides a comparison of the distribution of accidents, fatal accidents and fatalities involving scheduled commercial air transport related to these three high-risk occurrence categories in 2013. ICAO analysis revealed the following:

- Runway safety related accidents have resulted in a relatively low number of fatalities, despite having the highest percentage of accidents.

- While the loss of control in-flight, and controlled flight into terrain, represent only a small percentage of all accidents, these categories are of significant concern also as they result in a disproportionate rate of fatal accidents and fatalities.

The EASA Annual Safety Review also identifies the main causal factors associated with the accidents in their annual report. Risk mitigation strategies for the key risks identified from this analysis are published in the European Aviation Safety Plan by EASA.

The main safety information provided in the IAA review are based on the occurrences involving Irish approved organisations, including air operators wherever they fly, air navigation service providers, maintenance organisations, airport authorities, as well as occurrences involving foreign air operators flying in Ireland. The information presented in this report includes:

- Analysis of Accidents and Serious Incidents by aviation sector

- Analysis of occurrence reports

- Trend analysis of key safety performance indicators

Distribution of accidents due to three high risk factors involving scheduled commercial air transport 2013.
Source: ICAO Safety Report 2014

Aer Lingus A320 landing in gusty conditions at Dublin Airport

Photo by Michael Kelly

Sikorsky S92A operated by CHC Ireland Ltd at Cork Airport

Photo by Paul Daly

1 Irish Commercial Air Transport Aeroplanes and Helicopters

The Irish Aviation Authority (IAA) is a limited liability company wholly owned by the Irish State. The Safety Regulation Division (SRD) of the IAA is responsible for Ireland's regulatory and safety oversight functions within the civil aviation industry. As part of its role as a regulator IAA SRD analyses and monitors the safety of organisations and aircraft under its remit. This section provides information relating to occurrences defined under International Civil Aviation Organization (ICAO) Annex 13 as an accident or serious incident which involved Irish registered commercial air transport aircraft.

Accidents and Serious Incidents

The definition of an aviation accident and serious incident is set out in ICAO Annex 13: It states an accident or serious incident can only take place between the time the first person boards the aircraft with the intention of flight and the time all such persons have disembarked.

In brief Annex 13 defines an accident as an occurrence associated with the operation of an aircraft in which a person is fatally or seriously injured as a result of being in the aircraft or in direct contact with any part of the aircraft. Annex 13 also defines an accident as any occurrence where the aircraft sustains damage or structural failure which adversely affects the structural strength, performance or flight characteristics of the aircraft and would normally require major repair or replacement of the affected component. Finally Annex 13 specifies that an accident has occurred if the aircraft is missing or completely inaccessible.

Annex 13 defines a serious incident as an occurrence involving circumstances indicating that an accident

nearly occurred. It states the difference between an accident and a serious incident lies only in the result.

The purpose of safety investigations is not to apportion blame but to identify the cause(s) so that other, similar, occurrences will be prevented. Once the investigation is complete the Investigation Report is published and made publicly available. Within Europe the investigation of such occurrences is governed by European Union (EU) Regulation 996/2010 which incorporates the Standards and Recommended Practices (SARPS) of Annex 13 into EU law.

Within Ireland the Air Accident Investigation Unit (AAIU) is the designated Safety Investigation Authority (SIA) and is required by legislation to investigate occurrences in Irish Airspace involving any aircraft, whether registered in Ireland or abroad. Similarly, foreign Accident Investigation Authorities may investigate occurrences involving an Irish AOC holder or an Irish registered aircraft if they occur outside Ireland or they may delegate the investigation, fully, or in part to the AAIU. In all cases the AAIU appoints an Accredited Representative to assist foreign investigations involving Irish Registered aircraft or Irish AOC Holders. Formal notification processes ensure the States and operators involved are informed of the investigation so these accidents and serious incidents are included in this report even if the investigation itself is not completed and the formal investigation report is not yet published.

During the investigation it may transpire that the occurrence was not as serious as it first appeared and under these circumstances the investigating authority (AAIU or foreign equivalent) may change the classification from an accident to a serious incident or from a serious incident to an incident or indeed

the classification may be revised upwards. Such re-classifications are rare and where they do occur they will appear as inconsistencies between consecutive Annual Safety Performance Reviews and will be identified as such.

The statistics on accidents and serious incidents provided within this document have been complied using the accident and serious incident data kindly provided by the AAIU.

Irish Commercial Air Transport: Aeroplanes

The Irish commercial transport industry includes two types of commercial organisations involved in this sector; operators who hold an Air Operators Certificate (AOC) issued by the IAA and organisations with aeroplanes on the Irish register which they lease to an Operator that holds an AOC issued by a foreign State and for which Ireland retains airworthiness oversight responsibility under Art 83 bis of the Chicago Convention (hereafter referred to as the "Irish lease fleet").

The Irish AOC holders who provide large aeroplane transport are Aer Lingus, Air Contractors, CityJet, Norwegian Air International (since February 2014), Ryanair and Stobart Air (formally Aer Arann). Collectively these six airlines conducted 700,382 flights in 2014 (an increase of almost 14,000 flights on 2013, marking over 13 years of consistent growth for this sector of the Irish aviation industry). All the Irish AOC holders operating aeroplanes over 2,250kg have placed their aircraft on the Irish aircraft register.

Number of accidents and serious incidents
Table 1.1 shows the number of aeroplanes on the Irish register at the end of each year as well as the

number of Annex 13 accidents, fatal accidents and serious incidents to Irish registered aeroplanes over 2,250kg involved in commercial air transport. One accident in 2013 was downgraded by the United Kingdom Air Accident Investigation Board (UKAAIB) during the course of its investigation in 2014 and this change from 3 accidents to 2 accidents in the 2013 data is reflected in the table.

Between the Irish lease fleet and the Irish AOC holders there were 719 large commercial aeroplanes on the Irish aircraft register on the 31st December 2014, approximately 3% reduction from 2013, largely due to removal of stored aircraft from the Irish register.

Over the four years considered, none of the aeroplanes in the Irish lease fleet or those operated by an Irish AOC holder have been involved in an accident which resulted in a fatality.

Aeroplanes operated by Irish AOC holders and aircraft in the Irish lease fleet have been involved in 22 accidents over the last four years, 9 of which occurred in 2014. There is a sharp rise in the number of accidents in this category in 2014. In three cases in 2014 there were reported injuries to persons on board the aircraft and this followed abrupt aircraft manoeuvring in turbulent conditions or injuries during disembarkation. The majority of the accidents in 2014 involved low speed ground collisions of an aeroplane with another aeroplane, a ground vehicle or ground facilities. There were no reported injuries in relation to these collisions; however, they did result in substantial damage to the aeroplanes involved.

This category of aeroplane has been involved in 82 serious incidents over the last four years, 11 of which occurred during 2014. This is a reduction on the number reported during 2013 and the table shows a continuing downward trend since 2012.

Year	Total Registered in Ireland	Accidents			Serious Incidents
		Non-fatal	Fatal	Total	
2011	670	4	0	4	24
2012	739	7	0	7	29
2013	745	2	0	2	18
2014	719	9	0	9	11
Total	-	22	0	22	82

Table 1.1: No of accidents (fatal and non-fatal) and serious incidents involving Irish registered aeroplanes over 2,250Kg engaged in commercial activities.

Categorisation of Accidents and Serious Incidents

The AAIU or a foreign Accident Investigation Authority assigns common taxonomy category to Annex 13 accidents and serious incidents to assist in identifying safety issues. In some cases the categories do not indicate the cause of the event, rather the end result in a chain of events. Figure 1.1 summarises the categories assigned to the 22 accidents and 82 serious incidents that took place between 2011 and 2014.

From Figure 1.1 it is clear that the most common causes of accidents were 'Ground Handling' and Ground Collisions'.

'Ground handling' was associated with six accidents. It describes a wide variety of occurrences that may take place during or as a result of ground handling operations. Accidents classified as such include collisions that occur while servicing, boarding, loading or manoeuvring the aeroplane or occurrences that cause serious or fatal injuries to people from propeller / fan blade strikes or jet blast.

There were five 'Ground collision' accidents. This describes a collision while taxiing to or from a runway which is in use. Collisions that occur on the runway are not included in this category. The collision can involve two aeroplanes or involve one aeroplane and a person, animal, ground vehicle, obstacle, building or structure.

The most common causes of serious incidents were 'System failure or malfunction', 'Airprox / Loss of separation' and 'Other'.

'System failure or malfunction' describes the failure or malfunction of components on-board the aeroplane that were not associated with the engine. There were also two accidents attributed to this category and these were due to Landing Gear failure. A Landing Gear failure that results in the aircraft departing the runway surface is categorised under the more critical category of Runway Excursion. EASA do not publish data on of serious incidents however they identified "System failure or malfunction" as a factor in 40 accidents between 2003 and 2012, making it the third most frequently assigned taxonomy to accidents.

An 'Airprox or near mid-air collision' occurs when there is a significant loss of separation between two or more airborne aeroplanes. Occurrences of this nature that escalate into an accident are very rare within Europe and Irish AOC holders have never been involved in an accident caused by an Airprox. Commercial aircraft operating within Europe must be fitted with advance warning systems that alert the flight crew when there is a loss of separation between their aircraft.

'Other' describes any occurrence that is not covered under an alternative category (eg flight crew incapacitation, obscured windscreen, fumes in cockpit) .
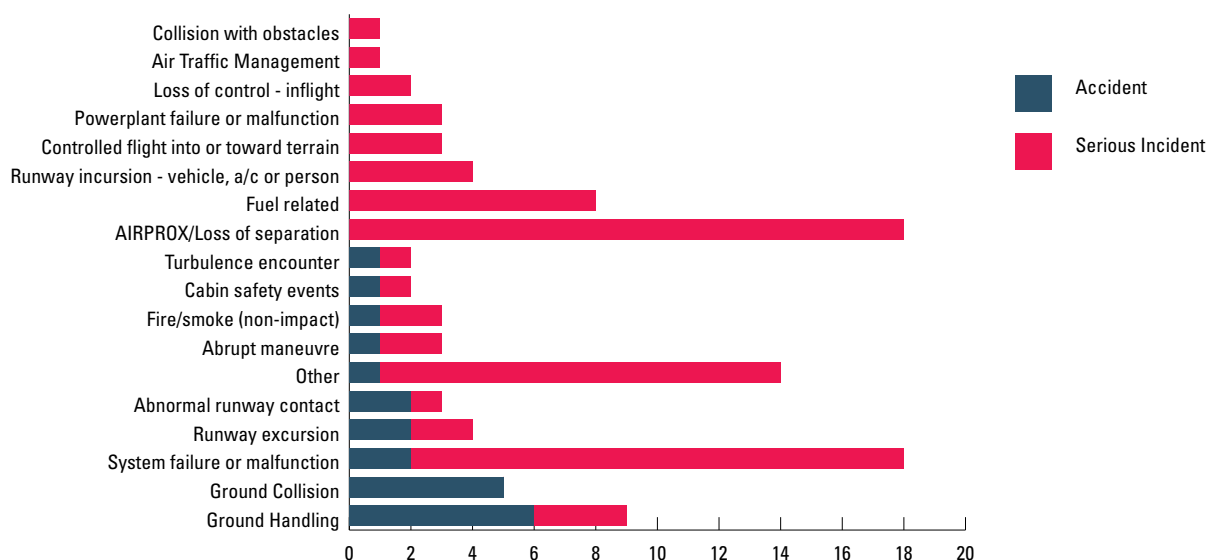

Figure 1.1: AAIU classification of the Annex 13 occurrences (2011-2014) involving commercial air transport aeroplanes

Irish Commercial
Air Transport: Helicopters

Another significant sector of the Irish aviation industry is helicopter Operators who hold an IAA issued AOC. This sector consists of Bond Air Services Ireland, CHC (Ireland), Executive Helicopters, Irish Helicopters Limited and Starlite Aviation Ireland. They conduct commercial air transport operations and aerial work operations. CHC also conduct Search and Rescue (SAR) operations.

Number of accidents and serious incidents
Table 1.2 provides statistics on the five helicopter Operators who hold an AOC issued by the IAA. The IAA also oversees commercial helicopter activity carried out in Irish territory when the Operator holds an AOC issued by a foreign National Authority. Data for these Operators is not included.

Table 1.2 indicates that on the 31st December 2014 there were a total of 13 helicopters on the Irish aircraft register engaged in commercial air transport or other commercial activity. This is a reduction on the number of helicopters on the 31st December 2013.

The number of flights is also provided in the table. A helicopter flight has been defined as a departure and a landing irrespective of where they took place. Hence a helicopter departing an airfield and landing on an off shore oil rig is considered to be one flight and a subsequent flight to another oil rig or the return flight to the airfield is an additional flight. During 2014 these AOC holders conducted almost 10,000 flights.

Over the period considered the helicopters operated by the five AOC holders have not been involved in any accidents or serious incidents.

Year	Total Registered in Ireland	Number of Flights	Accidents			Serious Incidents
			Non-fatal	**Fatal**	**Total**	
2011	11	10,416	0	0	0	0
2012	11	9,177	0	0	0	0
2013	15	9.514	0	0	0	0
2014	13	9,974	0	0	0	0
Total	-		0	0	0	0

Table 1.2: No of accidents (fatal and non-fatal) and serious incidents involving Irish Helicopter AOC holders

Irish Commercial Air Transport: Corporate Aviation

Another sector of the commercial air transport industry are AOC holders who provide corporate aviation services aimed at the business community. There are currently two Operators who hold an IAA issued AOC to provide this type of service; Airlink Airways and WestAir Aviation. Both Operators have a number of different types of aircraft within their fleet.

Number of accidents and serious incidents
Table 1.3 provides the number of aircraft on the Irish aircraft register engaged in providing corporate aviation services as well as the number of accidents and serious incidents.

Table 1.3 indicates on the 31st December 2014 there were a total of eight aircraft on the Irish aircraft register engaged in providing corporate aviation

services. Over the period considered the aircraft operated by these AOC holders have not been involved in any accidents or serious incidents.

Irish Commercial Air Transport: Light Aircraft

The other Irish AOC holders are Aer Arann Islands and the National Flight Centre. These Operators provide passenger and cargo transport using fixed wing aircraft. There are currently ten Irish registered light aircraft engaged in this activity and some of these aircraft may also be used for non-commercial activities. They were not involved in any accidents or serious incidents during commercial operations over the period considered.

Year	Total Registered in Ireland	Accidents			Serious Incidents
		Non-fatal	**Fatal**	**Total**	
2011	9	0	0	0	0
2012	6	0	0	0	0
2013	8	0	0	0	0
2014	8	0	0	0	0
Total	-	0	0	0	0

Table 1.3: No. of accidents, fatal accidents and serious incidents involving Irish AOC holders who provide corporate services

AVRO RJ-85 operated by Cityjet

Photo by Joe Heeney

2 Mandatory Occurrence Reporting by Irish AOC Holders

Under S.I. No. 285 of 2007 European Communities (Occurrence Reporting in Civil Aviation) Regulation 2007 "persons involved in Commercial Air Transport must report any occurrence which affects, or is likely to affect, the safety of the aircraft to the relevant oversight authority". European Union Regulation (EC) 376/2014 supersedes this SI when it becomes applicable on 15th November 2015 . The report submitted is called a Mandatory Occurrence Report (MOR) and Operators submit reports to the IAA via the Safety Occurrence Tracking System (SOTS). The MOR's provide an account of what happened as well as other relevant details such as the weather and phase of flight at the time of the occurrence.

The IAA has received approximately 7500 reports on average per year over the past four years from all sectors of the aviation industry, over 95% of which describe incidents where the safety barriers were effective and there was no credible scenario in which an accident could occur. This section provides an analysis of the MOR reports submitted by Irish AOC holders according to the following two types of aircraft: aeroplanes and helicopters.

Categorisation and classification of MORs

Once an MOR is submitted to the IAA an SRD Inspector uses the CAST/ICAO occurrence reporting taxonomy to categorise the report. This taxonomy enables the grouping of events (including accidents, serious incidents and incidents) under globally standardised accident outcome based common descriptors to improve the aviation community's capacity to focus on common safety issues.

In addition the Airline Risk Management Solutions (ARMS) methodology is used to assess the safety risk associated with the incident. The purpose of this is to identify occurrences associated with an elevated safety risk so that the area may be targeted. The ARMS risk matrix assigns a risk score by assessing the effectiveness of the remaining barriers between what transpired and the most credible accident outcome if the incident had escalated. All types of potential outcomes are considered, from those with no potential injury to those onboard and no damage to the aircraft to multiple fatalities and the loss of the aircraft.

The risk matrix assigns 1 of 13 risk scores between 1 and 2,500 to the occurrence. Figure 2.1 demonstrates how a score is assigned. Further information on ARMS can be found on Skybrary at www.skybrary.aero/index. php/ARMS_Methodology_for_Risk_Assessment

Question 2			
What was the effectiveness of the remaining barriers between this event and the most credible accident scenario?			
Effective	Limited	Minimal	Not Effective
50	**102**	**502**	**2500**
10	**21**	**101**	**500**
2	**4**	**20**	**50**
1			

Question 1	
If this event had escalated into an accident outcome, what would have been the most credible outcome?	
Catastrophic Accident	Loss of aircraft or multiple fatalities (3 or more)
Major Accident	1 or 2 fatalities, multiple serious injuries, major damage to aircraft
Minor Injuries or Damage	Minor injuries, minor damage to aircraft
No accident outcome	No potential damage or injury could occur

Figure 2.1: The ARMS Risk Matrix quantifies the risk associated with individual occurrences

MORs and Irish AOC Holders Operating Aeroplanes

The six largest Irish AOC holders operating aeroplanes are; Aer Lingus, Air Contractors, CityJet, Norwegian Air, Ryanair and Stobart Air. The Norwegian Air International data is not included in the following analysis as they only began operations under an Irish AOC in February 2014 and a full year's data is not available. Table 2.1 summarises the number of MORs these Operators submitted annually over the past four years, the number of flights flown each year and the annual reporting rate per 1,000 flights.

The reporting rate during 2014 decreased slightly to 7.87 reports for every 1,000 sectors flown.

The IAA conducted a survey of MOR reporting rates of European Operators who hold an AOC in 2013, with the support of the EASA Network of Analysts. The results of the survey indicated that Irish AOC's have a strong reporting culture. The reporting rate of 7.87 per 1000 sectors should be seen in a positive light as it indicates a strong reporting culture, one of the main indicators that Irish Operators have mature Safety Management Systems (SMS) in place.

Between 2011 and 2014 the main Operators conducted over 2.7 million flights and the number of flights they operated annually rose from 663,375 to 700,084. Over the same period they submitted 21,380 MORs; 5,512 of which related to occurrences that took place during 2014. This may seem like a large number however less than 1% of flights were the subject of an MOR and 96% of the MORs described incidents where all the safety barriers were effective and there was no credible scenario in which an accident could occur.

Year	2011	2012	2013	2014	Total
No. Reports	4,420	5,477	5,971	5,512	21,380
No. Flights (Sectors)	663,375	674,062	686,399	700,084	2,723,920
Reporting rate per 1,000 sectors	6.66	8.13	8.70	7.87	7.85

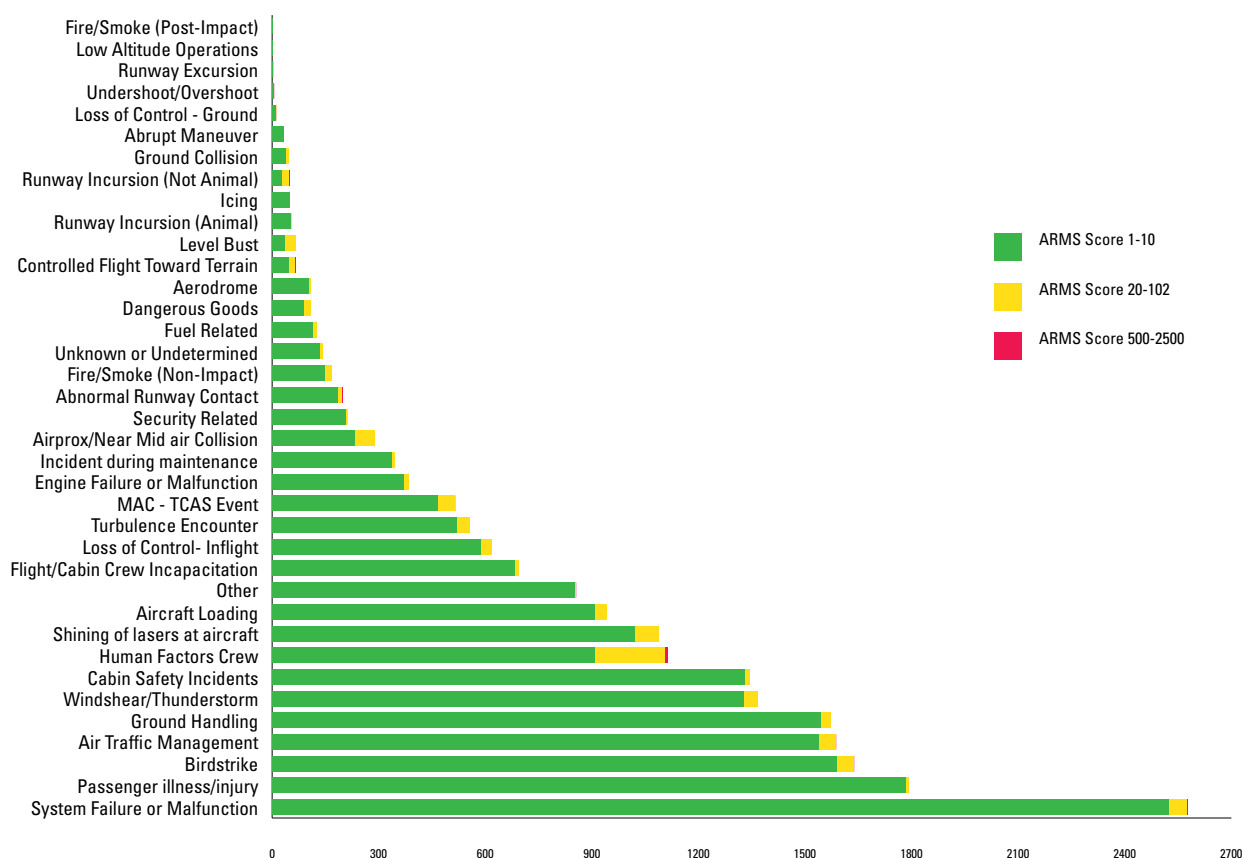**Table 2.1: Statistics on MORs submitted by the five main Irish AOC holders who operate aeroplanes**

Occurrence Types Reported between Jan. 2011 and Dec. 2014

Figure 2.2 shows the categories and associated classification (ARMS score) assigned to the MORs submitted between Jan. 2011 and Dec. 2014. From Figure 2.2 it is clear the most common reported occurrences were 'System Failure or Malfunction', 'Passenger illness or injury' and "Birdstrike".

The most common type of occurrence reported was 'System Failure or Malfunction', which describes the failure or malfunction of components on-board the aircraft that were not associated with the engine. Approximately 98% of these reports were assigned an ARMS score of 10 or less indicating there was a low safety risk to the aircraft or those aboard.

The second most commonly reported type of occurrence was 'Passenger illness or injury'. 99.5% of these events were classified as lower risk, indicating that minor illness or injuries occurred. Higher risk events (0.5%) include cases where more serious illness or injury occurred. These types of incidents do not jeopardise the overall safety of the aircraft.

The third most common type of occurrence was 'Birdstrike'. This category captures the possible or actual collision of an aircraft with one or more birds. Birdstrikes usually occur either on approach to, or takeoff from, an airport and can cause a great deal of damage. Birdstrike is one of the key Safety Performance Indicators included in the State Safety Plan discussed later in this chapter.

Figure 2.2: Summary of occurrence reports 2011 to 2014 for the 5 main Irish AOC Holders. The five main AOC Holders conducted over 2.7 million flights during this period.

Occurrence Types Reported during 2014

During 2014 the five largest Irish AOC holders reported 5,512 MORs through the IAA SOTS system. Figure 2.3 summarises the categorisation and classification (ARMS score) assigned to these MORs.
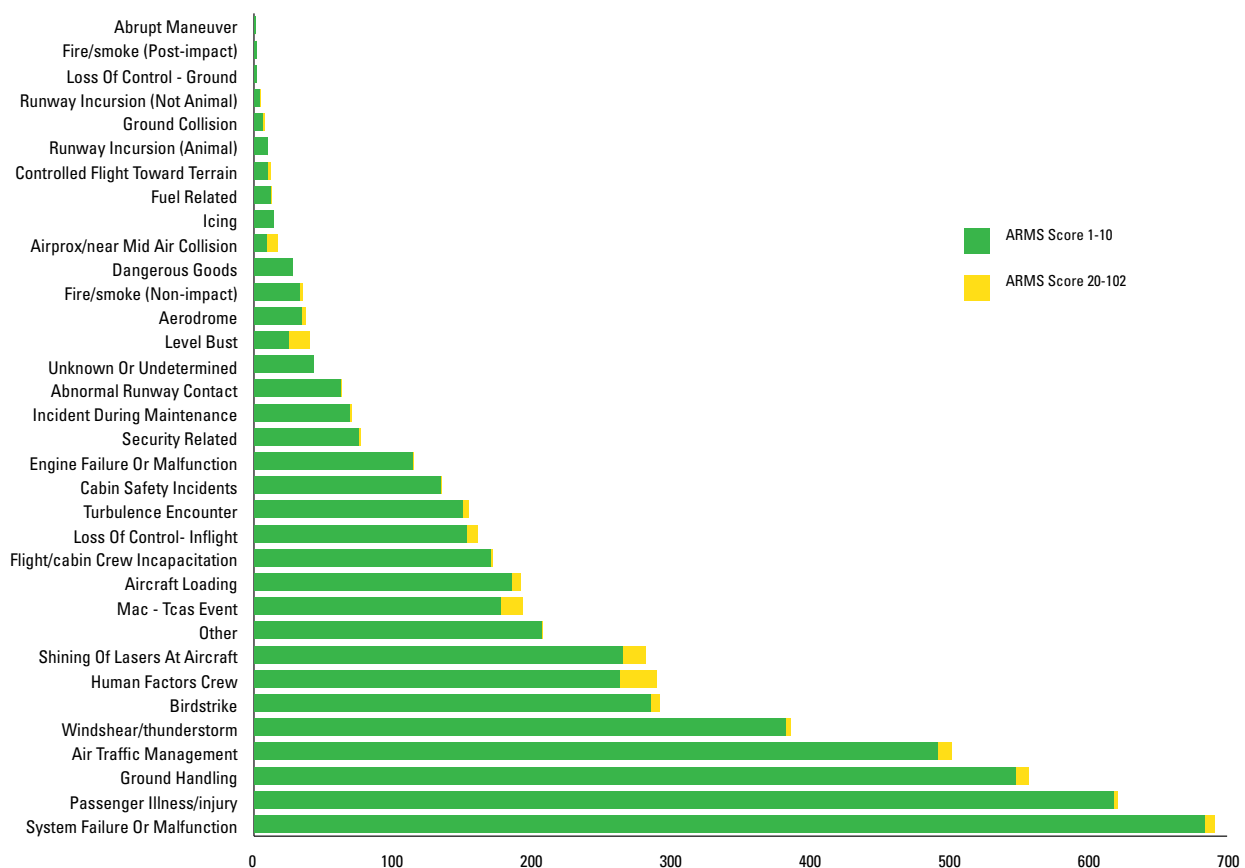
When MORs for 2011 - 2014 were categorised the three most commonly reported occurrences were 'System failures or malfunctions', 'Birdstrikes' and 'Cabin safety incidents'. During 2014 the three most commonly reported occurrences were 'System failures or malfunctions', 'Passenger illness or injury' and 'Ground Handling'.

The most common type of incident reported was 'System failures or malfunctions', which describes the failure or malfunction of components on-board the aircraft that were not associated with the en-

gine. Over 99% of these MORS were lower risk and assigned an ARMS score of 10 or lower.

The second most commonly reported type of incident was 'Passenger illness or injury'. Again in 2014 over 99.5% of these occurrences were minor in nature.

The third most commonly reported occurrence was 'Ground Handling'. These events include a variety of ground handling related events; including ground damage, occurrences during aircraft towing, undetected/unreported aircraft damage, de-icing problems etc. "Ground Handling" is a subset of the more generic "Ground Operations" which includes ground handling, ground collision and aircraft loading events. Ground operations is one of the key Safety Performance Indicators included in the State Safety Plan discussed later in this chapter.

Figure 2.3: Summary of occurrence reports for 2014 for 5 main Irish AOC Holders. The five main Irish AOC Holders conducted over 700,000 flights during this period

Risk bearing occurrences from 2011 to 2014
Between Jan. 2011 and Dec. 2014 the five main AOC holders conducted over 2.7 million flights and submitted 926 MORs which were assigned an elevated risk ARMS score of 20 or greater. Figure 2.4 summarises the categorisation and classification (ARMS score) assigned to these MORs.
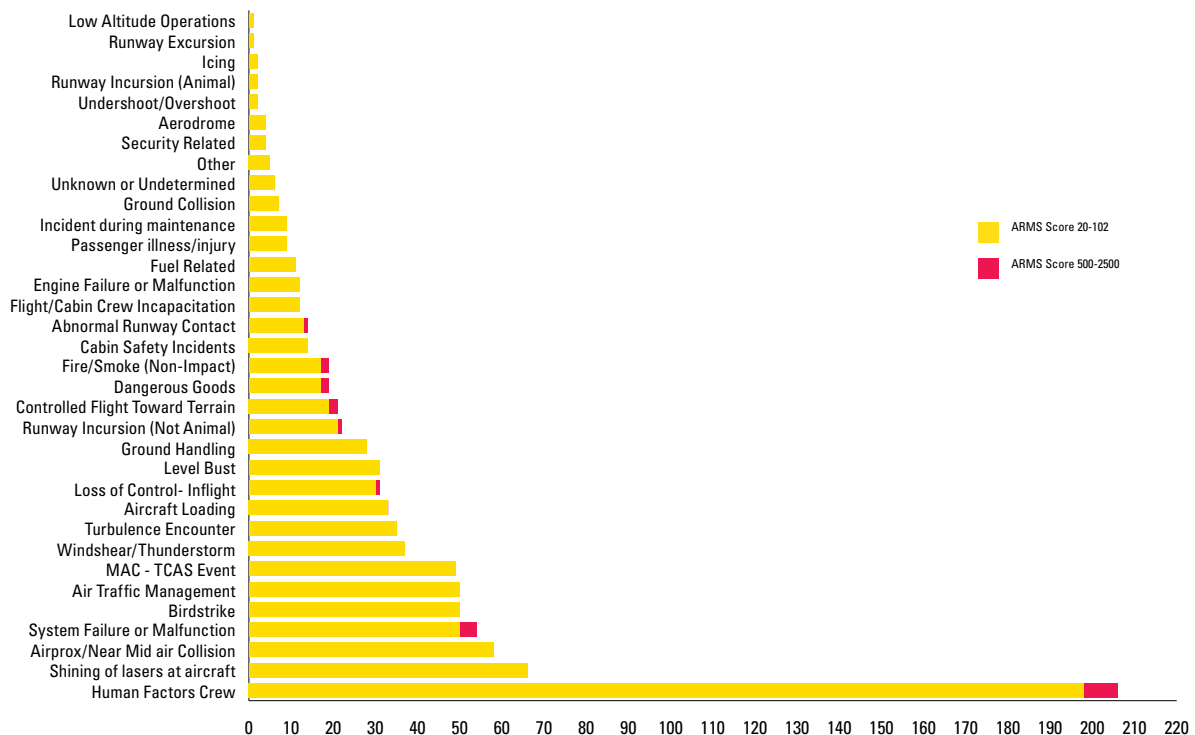
From Figure 2.4 it is clear the most common types of risk bearing occurrences were 'Human Factors Crew', 'Airprox/Loss of separation' and 'Shining of lasers at aircraft'.

The most regularly occurring risk bearing occurrence was 'Human Factors Crew'. This category describes occurrences that were initiated through crew error, for example entering information incorrectly into the Flight Management System (FMS) or crew late or incorrect selections of manual inputs. 'Human Factors Crew' occurrences have been identified as one of the main safety concerns within the EU and further afield. During 2013 the IAA conducted an extensive analysis of all risk bearing human factors occurrences that occurred during 2012 and involved the main Irish AOC holders. The analysis identified the main reasons for the occurrence were poor execution, breach of cockpit procedures, crew / technology interface and a lack of communication between the cockpit crew. Full details have been communicated to the Irish AOC holders through IAA SRDs Flight Operations Depart-

ment. All Irish Operators have integrated Human Factors Principles into their crew training programmes.

The second most regularly occurring risk bearing occurrence was 'Shining of lasers at aircraft'. These are optical devices that produce a very highly concentrated beam of light in a single colour. The more serious side-effects reported by pilots' include flash blindness, glare and being distracted. Laser attack is one of the key Safety Performance Indicators included in the State Safety Plan discussed later in this chapter.

The third most common risk bearing occurrence was 'Airprox/Loss of separation'. This occurs when there is loss of separation between two or more aircraft. Occurrences resulting in actual mid-air collision are very rare within Europe and Irish AOC holders have never been involved in one that escalated into an accident. Most commercial aircraft (ie maximum certified take-off mass greater than 5,700Kgs or maximum operational passenger seating configuration greater than 19) are now fitted with electronic collision avoidance equipment (TCAS) which provide alert and guidance to crews to help avoid traffic conflicts. Airprox/loss of separation when combined with TCAS warning events make up the MAC occurrence group which is one of the key Safety Performance Indicators included in the State Safety Plan discussed later in this chapter.

Figure 2.4: Summary of risk bearing occurrences for 5 main Irish AOC holders 2011-2014. The five main AOC holders conducted over 2.7 million flights during this period.
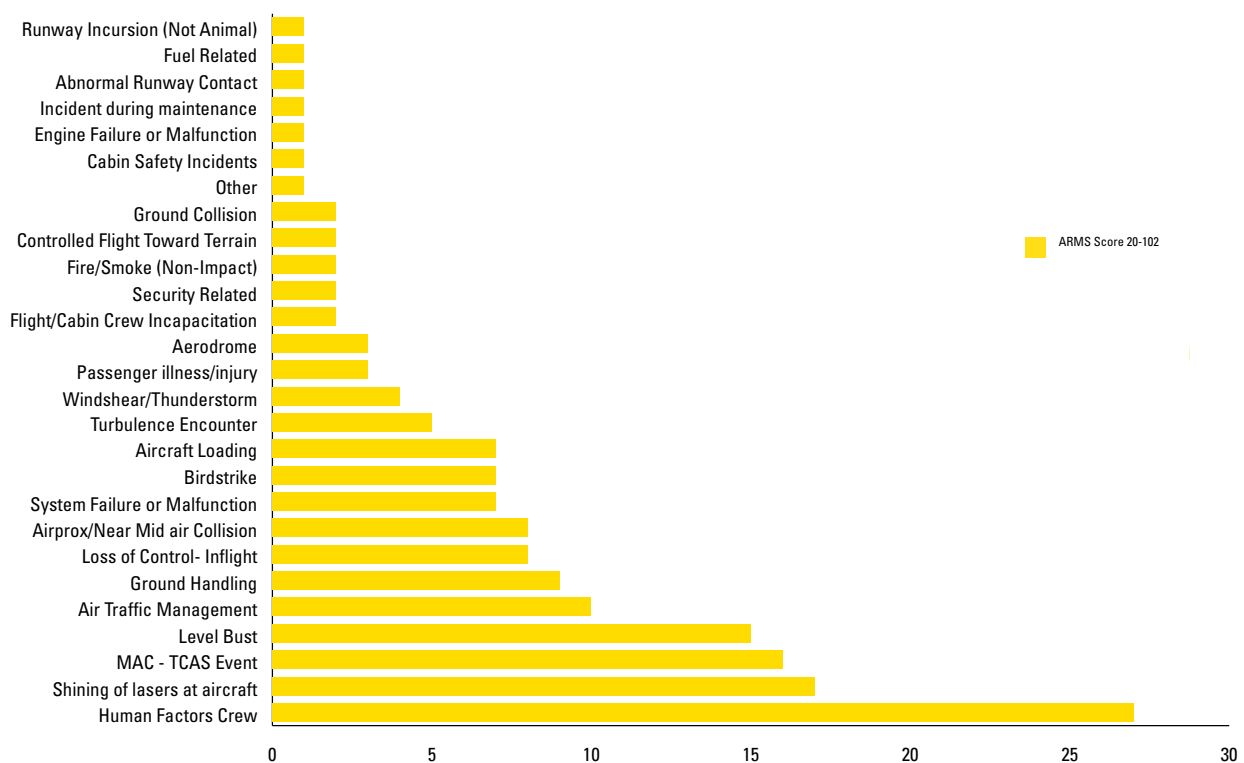
2014 risk-bearing occurrences

During 2014 a total of 164 occurrences reported by the five main AOC holders were allocated an ARMS score of 20 or greater. Figure 2.5 summarises the categorisation and classification (ARMS score) assigned to these occurrences.

When MORs received during 2011-2014 were pooled the most commonly reported risk bearing occurrences were 'Human factors crew', 'Airprox / Loss of separation' and 'Shining of laser at aircraft'. The most commonly reported risk bearing occurrences during 2014 were 'Human factors crew', 'Shining of laser at aircraft' and 'MAC-TCAS events'.

The first and second regularly occurring risk bearing occurrence during 2014 was consistent with the four year review discussed above.

The third most common type of risk-bearing occurrence reported by Irish AOC holders was 'MAC-TCAS events'. As stated above most commercial aircraft are equipped with electronic collision avoidance systems and these systems trigger alerts and guidance on avoiding actions to flight crews to help resolve traffic conflicts. Both aircraft involved in the conflict must be suitably equipped and this is not always the case (eg conflicts between commercial and general aviation aircraft). The Airprox/Loss of separation events discussed above are normally associated with occurrences where the TCAS system was in-effective in resolving the conflict. Over 87% of all MAC-TCAS events reported in 2014 were in the lower risk category indicating that there was no safety impact associated with the alert (eg marginal breaches of the alert threshold). The higher risk events reflect cases where more aggressive flight crew intervention was required to resolve the conflict. These events are included in the MAC key Safety Performance Indicator discussed later in this chapter.

Figure 2.5: Summary of risk bearing occurrences for 5 main Irish AOC holders in 2014. The five main AOC Holders conducted over 700,000 flights during this period.

MORs and Irish AOC Holders
Operating Helicopters

Occurrence reports during 2014

The five Irish AOC holders providing helicopter transport services are Bond Air Services Ireland, CHC (Ireland), Executive Helicopters, Irish Helicopters and Starlite Aviation Ireland. Table 2.3 summarises the number of MORs they submitted and flights they conducted over the last four years as well as the associated reporting rate per 1,000 flights.

Table 2.3 indicates the helicopter AOC holders submitted 270 occurrence reports and conducted 38,811 flights over the four year period considered. The helicopter AOC holders submitted a much smaller number of MORs than aeroplane AOC holders. This reflects the number of helicopter flights is much smaller and the operating environments differ significantly. Over the four year period considered the occurrence reporting rate increased steadily, from 1.97 to 10.42 MORs per 1,000 flights.

Occurrence Types Reported during 2014

Figure 2.6 shows the number of MORs and associated categories and classification submitted by Irish Helicopters AOC holders in 2014.

The most common classification assigned to MORs which took place during 2014 was 'System failure or malfunction', which captures the failure or malfunction of components on-board the helicopter that are not associated with the engine. None of these occurrences received an ARMS score of greater than 10, indicating they were low risk occurrences and there were no circumstances under which the system failure could jeopardise the safety of the aircraft or those on board.

The second most common classification assigned to the MORs was 'Other'. This classification captures occurrences that do not fit under an alternative category. None of the thirteen occurrences that were categorised as 'Other' describes situations which posed a safety risk to the helicopter or those on-board.

The third most common type of classification was 'Engine failure or malfunction' which described the failure or malfunction of components associated with the engine. Most of the occurrences detailed the illumination of a warning light in the cockpit associated with the operation of the engine. In most cases the warning was spurious and the engine was operating normally.

Year	2011	2012	2013	2014	Total
No. Reports	20	46	100	104	270
No. Flights (Sectors)	10,146	9,177	9,514	9,974	38,811
Reporting rate	1.97	5.01	10.51	10.42	6.96

Table 2.3: Occurrence reporting rate per 1,000 sectors flown by the main Irish helicopter AOC holders
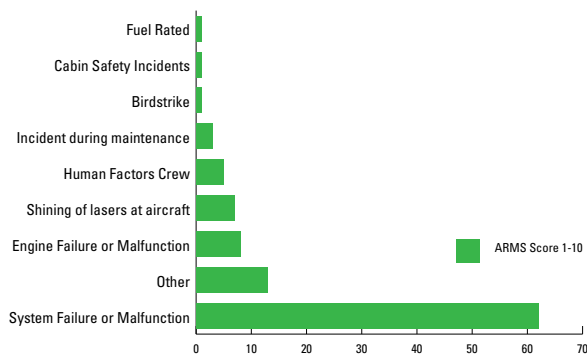
MORs and Irish AOC Holders Providing Corporate Aviation Services

Occurrence reports during 2014
The Irish AOC holders providing corporate transport services are Airlink Airways and WestAir Aviation. During 2014 these AOC holders submitted 16 MORs. The relatively low number of MORs reflects the small number of aircraft operating within this sector of the Irish aviation industry.

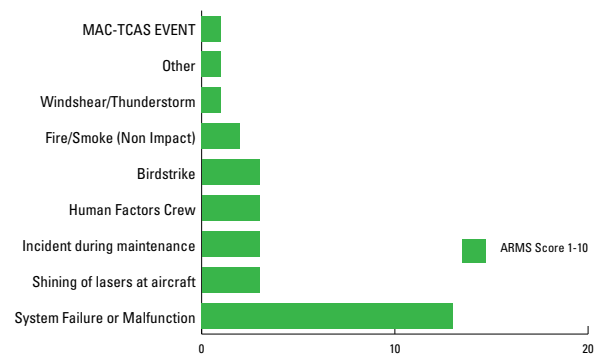**Occurrence Types Reported during 2013 and 2014**
Because of the relatively low numbers of reports Figure 2.7 summarises the types of occurrences that took place during both 2013 and 2014 along with the associated ARMS score. From the graph it is clear none of the MORs were assigned an ARMS score of greater than 10.

From Figure 2.7 it is clear the most common occurrences were 'System failure or malfunction', which captures the failure or malfunction of components on-board the aircraft that are not associated with the engine. None of these occurrences received an ARMS score of greater than 10, indicating they were low risk occurrences and there were no circumstances under which the system failure could jeopardise the safety of the aircraft, or those on board.

The second to fifth most regularly occurring risk bearing occurrence during 2013-2014 was 'Laser attack', "Birdstrike", "Human Factors Crew" and "Incidents during Maintenance". Lasers attacks, human factors crew and birdstrikes have the same meaning as discussed earlier in this report. The classification "Incident during maintenance' includes damage or critical system failures found during maintenance, or occurrences relating to the performance of maintenance, including Maintenance Human Factors issues.

Figure 2.6: Summary of occurrences for AOC Holders operating helicopters in 2014

Figure 2.7: Summary of occurrences for corporate AOC holders (2013-2014).

Boeing 737-800 now operated by Norwegian Air International
on Irish AOC

Photo by Joe Heeney

Key Safety Performance Indicators in the State Safety Plan for Ireland

The safety performance analysis that underpins the Annual Safety Performance Review also helps inform the actions included in the State Safety Plan for Ireland. The State Safety Plan identifies key safety issues and associated actions at the State level that will help to mitigate against the risks to aviation safety. The analysis of safety data in Ireland, coupled with the similar analysis at EU level (via EASA) and world level (via ICAO) provides the basis for the actions included in the State Safety Plan for Ireland.

The IAA monitors the reporting trends for certain higher risk key safety performance indicators identified in the State Safety Plan for Ireland. These safety performance indicators are:

- CFIT – Controlled Flight Into Terrain
- LOC-I – Loss of Control - Inflight
- MAC – Mid Air Collision
- Ground Operations - Events occurring at the ramp (including ground collision, ground damage, loading errors etc)
- RI – Runway Incursions (ie by aircraft, vehicle, person or animal)
- RE – Runway Excursion
- Birdstrikes
- Laser Attacks

Human factors issues represent a common cause factor in many safety occurrences. For the purposes of the analysis in this section the relevant Human Factors Crew occurrences have been re-distributed to the appropriate indicators listed above.
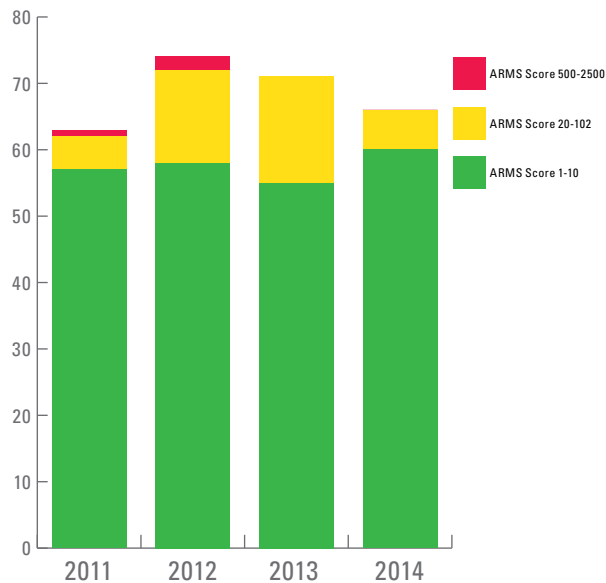
The following figures show the reporting trends for each of these indicators as reported to the IAA from all sources under the Mandatory Occurrence Reporting system over the past four years and also the classification of these events in accordance with the ARMS event risk classification scheme. The ARMS risk classification scheme facilitates the ranking of the events in order of severity and for the purposes of this review the ranking is grouped in colour coded bands, using green, amber and red to signify increasing risk. These events reflect occurrences on Irish registered aircraft" whether they fly in Irish airspace or abroad.

In the next chapter we will examine some of these key safety risks again based on analysis of reports from Irish ATS service providers concerning occurrences in Irish airspace and Irish aerodromes only, involving aircraft registered both in Ireland and abroad.

Thankfully the level of actual accidents due to these key Safety Performance Indicators is very low, however in order to monitor these occurrences we focus on the lower level events that could lead to an accident or serious incident given the wrong set of circumstances. The CAST/ICAO occurrence reporting taxonomy enables the aviation community to group a wide variety of occurrence reports into accident outcome based headers, which we can then monitor and help reduce, even if the particular events by themselves did not, or could not, on their own, lead to an accident or serious incident.

The numbers and trends shown in the following figures can be considered as indicative only. These figures are based on the subjective assessment of the initial occurrence reports only and do not consider the effect of the follow-up investigations with the operators involved which could lead to re-categorisation or re-classification of occurrences. Also they do not make any attempt to rationalise multiple reports of the same occurrence (eg by the airline, the ATS unit or the aerodrome).
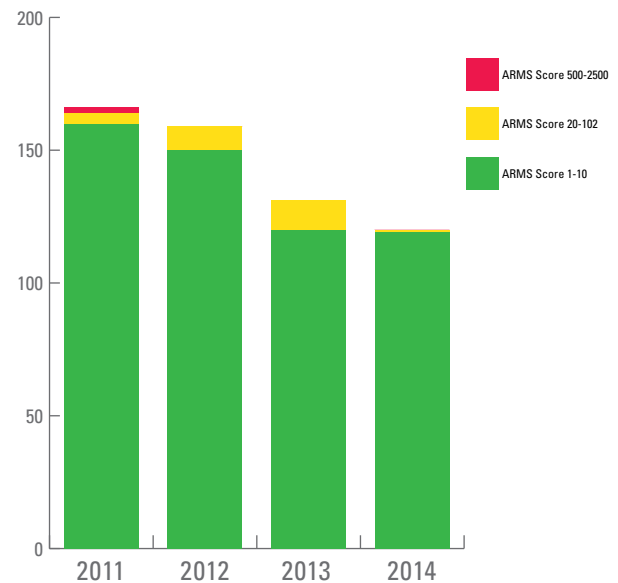
It should be noted that mandatory reporting of occurrences for General Aviation is not required until 15th November 2015. Therefore the data included in this section is based on reports received from air operators, air navigation service providers and airport authorities and may not include the general aviation accidents and serious incidents discussed later in this report.

Fig 2.8 Summary of CFIT MOR Occurrences

Figure 2.9 Summary of LOC-I Events

ICAO and EASA have identified Controlled Flight Into Terrain (CFIT) as one of the main contributory causes to fatal and non-fatal accidents across all sectors of civil aviation. Although CFIT accidents are thankfully rare in aviation, when they do happen they may result in large numbers of fatalities and for this reason CFIT is one of the key Safety Performance Indicators for Ireland. Investigation of CFIT accidents in the past has identified a number of common precursor events that normally have no safety effect but in certain circumstances or in combination with other events could lead to an accident. Figure 2.8 includes precursor events to a CFIT accident as reported to the IAA and includes for example warnings from on-board ground proximity warning systems (eg TAWS Warnings - Terrain, Sink Rate, Pull-up). In all cases the flight crews involved were able to correctly respond to the warnings without loss of control of the aircraft, albeit three of these events led to serious incidents in 2011 and 2012 (ref also Chapter 1 above).
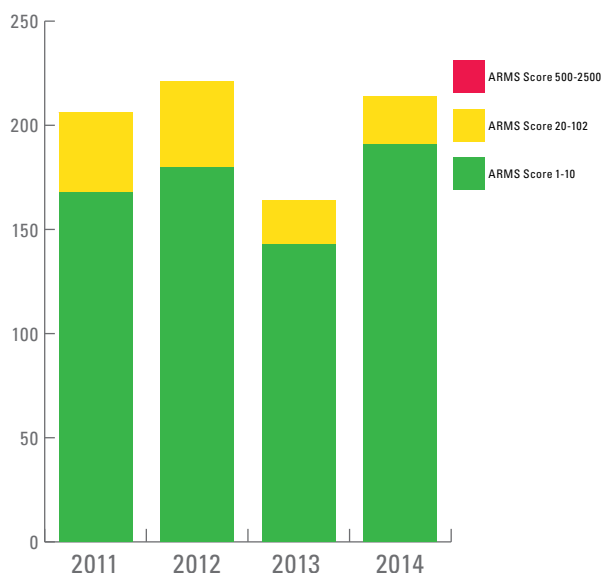
The level of CFIT occurrences reported to the IAA is relatively low and the trend has remained steady over the past four years with perhaps a slight downward trend since 2012. The vast majority of reported events are in the green low risk band.

Studies of accident data worldwide over the past 10 years (ie by ICAO/EASA), have shown that although the loss of control of an aircraft in flight (LOC-I) is a relatively rare event, the highest proportion of accidents that resulted in fatalities were attributed to LOC-I events across many different sectors in aviation. For this reason LOC-I is one of the key Safety Performance Indicators for Ireland. Investigation of LOC-I accidents in the past has identified a number of common precursor events that normally have no safety effect but in certain circumstances or in combination with other events could lead to an accident. Figure 2.9 includes precursor events to a LOC-I accident as reported to the IAA and includes for example reports of warnings of speed deviations (underspeed/overspeed), stick shaker or stall warning events or unstable approaches. In all cases the flight crews involved were able to correctly respond to the warnings without actual loss of control of the aircraft, albeit two of these events led to serious incidents in 2012 (ref also Chapter 1 above).
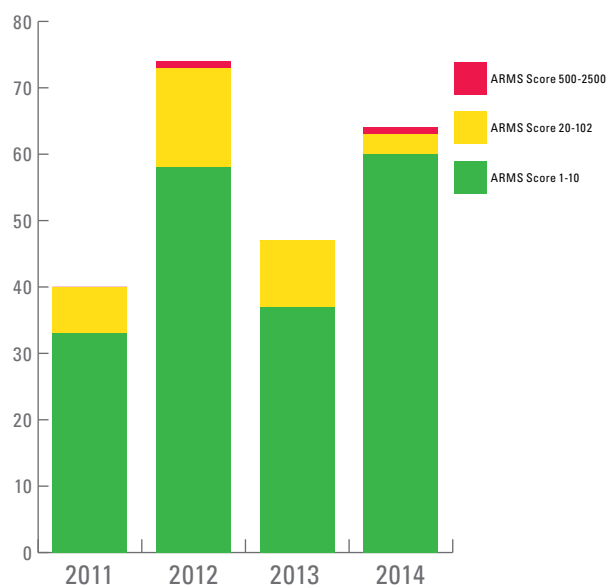
The trend for LOC-I occurrences reported to the IAA in the past four years is downwards as is the trend for higher risk events (amber band) with only one event classified as higher risk in 2014. This indicates that some of the actions of the State Safety Plan (eg enhanced focus on crew training) may be having a measurable effect

Fig 2.10 Summary of MAC MOR occurrences

Fig 2.11 Summary of RI MOR occurrences

Mid-Air Collisions (MAC) are accidents where two or more aircraft come into contact with each other in the air. While the likelihood of an event is low the consequences of any event are extremely high (major loss of life) and consequently MAC is one of the key Safety Performance Indicators for most ICAO States. Most aircraft now carry collision avoidance equipment (eg TCAS) to improve their traffic situational awareness and provide conflict resolution advisory information to the flight crews. ATS providers have equivalent proximity warning systems (eg STCA). Figure 2.10 includes reports of TCAS RA or STCA events as well as unauthorised penetration of airspace events (including light/sports general aviation aircraft). These occurrences include MAC events in Irish airspace as well as MAC events reported by Irish operators in foreign airspace.
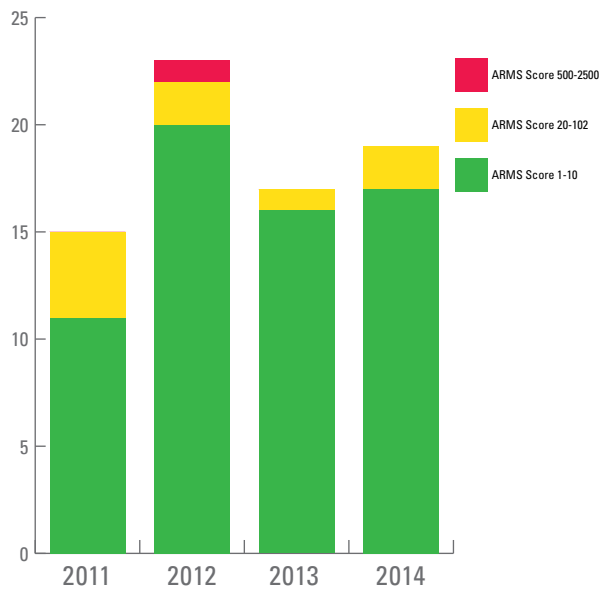
The level of MAC occurrences reported to the IAA has remained steady over the past four years with perhaps a slight upward trend in 2014. Whereas the vast majority of reports were of lower risk (green band) reflecting traffic density issues rather than safety concerns, MAC remains one of the main causes of serious incidents for Irish operators (ref also Chapter 1 above).

Runway Incursion (RI) accidents are also quite rare but there has been a noticeable upward trend (EU/worldwide) in number of serious incidents due to RI and for this reason RI is one of the key Safety Performance Indicators for most ICAO States. The runway incursion events included in Fig 2.11 include the incorrect presence of an aircraft, vehicle, person or animal on the runway protected area and these include occurrences reported both at Irish airports and foreign airports used by Irish operators.
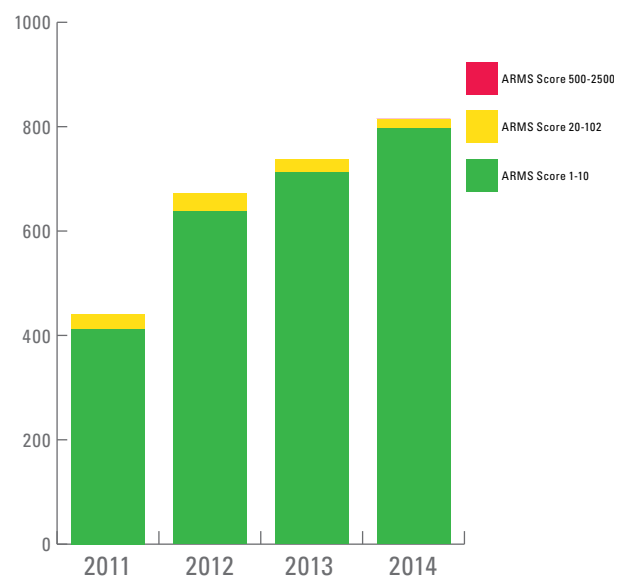
There is an increasing trend in the number of RI occurrences reported to IAA over the past four years with the improvement of 2013 reversed in 2014. The majority of RI occurrences were in the low risk band and represent minor excursions by aircraft beyond taxiway holding points or minor stopbar violations, where there was no actual intent to enter the runway area.

Fig 2.12 Summary of RE MOR occurrences

Runway Excursions (RE) have been identified by both ICAO and EASA as one of the most common causes of accidents reported annually, in the European region and worldwide. Whereas it is very rare to have an RE accident resulting in fatalities, they nonetheless can cause injury or severe distress to passengers (eg emergency evacuations), substantial damage to aircraft and severe disruption to air traffic movements. Investigation of RE accidents in the past has identified a number of common precursor events that normally have no safety effect but in certain circumstances or in combination with other events could lead to an RE accident. Figure 2.12 includes reports of deep/long landings, baulked landings, RE related unstable approaches (eg below glideslope/high speed).
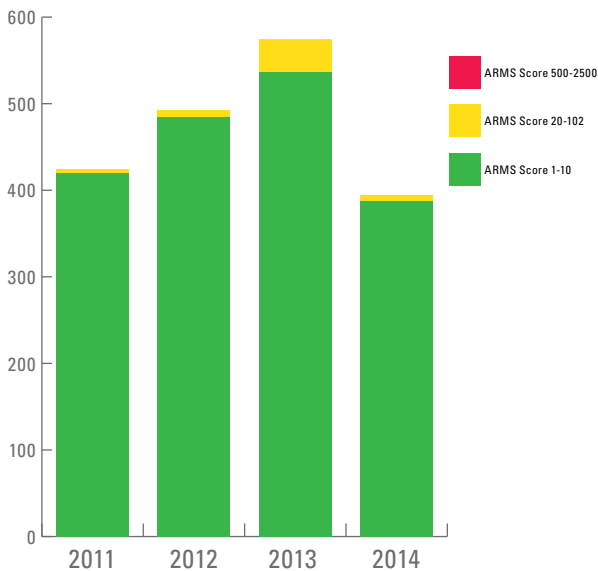
The level of RE occurrences reported to the IAA has remained relatively low over the past four years with perhaps a slight increasing trend in 2014. Whereas the vast majority of reports were of lower risk (green band), there were four RE accidents and two serious incidents (2011-2013), which thankfully did not result in fatalities or injuries to persons on board (ref also Chapter 1 above).

Fig 2.13 Summary of Ground Operations MOR occurrences

Analysis of global accidents has shown that there has been a steady rise in accidents caused either during or as a result of ground operations. EASA has reported that this is the second highest category for accidents involving commercial aircraft between 2003 and 2012. There is relatively low risk to persons on board an aircraft from ground related accidents or serious incidents as the aircraft is usually either stationary or travelling at low speed (eg during push back). The ground operations events reflected in Fig 2.13 include a variety of ground handling related events; ground collisions, ground damage, loading error, undetected/unreported aircraft damage, de-icing problems etc. These occurrences include ground operations events that occur at Irish aerodromes as well as those events reported by Irish operators in foreign aerodromes.

There is a continuous increasing trend in the number of Ground Operations occurrences reported to IAA over the past four years. The vast majority of the occurrences are low risk (green band) and the figure may reflect increased reporting of Ground Operations related occurrences due to the heightened focus in this area over the past few years rather than deterioration in safety of ground operations. Nevertheless ground operations is the highest cause of accidents reported in Chapter 1 above and efforts will continue to help identify and address the main causes.

Fig 2.14 Summary of BIRD MOR occurrences

Fig 2.15 Summary of LASER MOR occurrences

Birdstrikes may cause significant damage to an aircraft structure or flight controls, and aircraft engines (especially jet-engines) are vulnerable to the loss of thrust which can follow the ingestion of birds into engine air intakes which may lead to an accident. An Irish operator suffered a hull loss in a non-fatal accident in 2010 following loss of both engines due to bird ingestion, during approach to an airport in Italy. Figure 2.14 includes reports of birdstrikes reported to the IAA whether these events occurred at Irish aerodromes or abroad.

The increasing trend of Birdstrike occurrences reported to the IAA appears to have been reversed in 2014. The vast majority of birdstrikes reported were low risk (green band) and there were no accidents or serious incidents due to birdstrikes in the past four years (ref also Chapter 1 above).

There has been a noticeable increase of malicious laser attacks on aircraft pilots both in Ireland and across Europe and the rest of the world. More serious laser attacks can cause eye injury to pilots or flash blindness in the cockpit thereby endangering the pilot's ability to properly operate an aircraft during critical flight phases. The laser attack events reflected in Fig 2.15 include events that occur at Irish aerodromes as well as those events reported by Irish operators in foreign aerodromes.
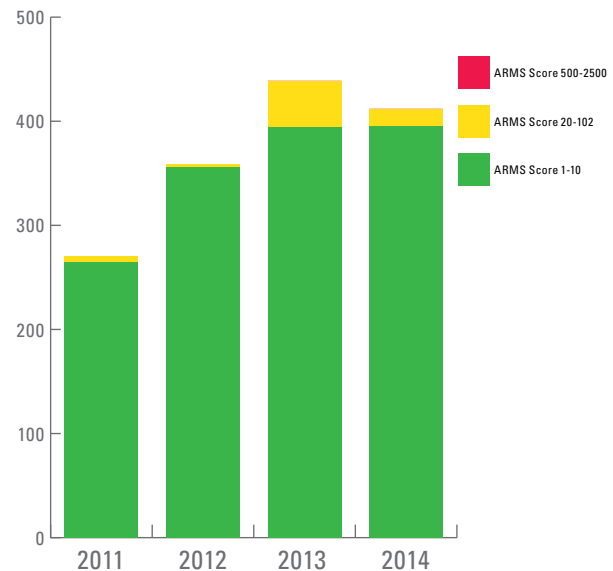
The continuous increasing trend in the number of laser attacks reported to IAA over the three year to 2013 were halted and reversed in 2014. Irish legislation was introduced in 2014 making it an offence, punishable by fines or imprisonment, for any person to deliberately attempt to dazzle aircraft flight crews with lights of any kind (including lasers). The vast majority of the occurrences are low risk (green band) reflecting the fact that in most cases the attack caused a minor distraction to the flight crew. There have been no reported accidents or serious incidents in Ireland due to laser attacks.

Aer Lingus A330-300 aircraft at JFK International Airport,
New York

Photo by Michael Kelly

3 Irish Aerodromes and Air Navigation Services

There are two types of aerodrome in Ireland, those that are licensed for public use and those that are licensed for private use. Aerodromes Licensed for private use accept aircraft engaging in aerial work and other aviation activities, such as general aviation flight training, but not aircraft engaged in commercial air transport. Aerodromes licensed for public use accept aircraft engaged in commercial air transport operations as well as aircraft engaging in aerial work and other aviation activities such as general aviation flight training.

Safety requirements for aerodromes are not based around the type of licence held; instead they are in proportion to the type of aircraft that use it and other considerations (such as whether night or low visibility operations are permitted there). The principal difference between the two types of aerodromes is those with a licence for public use must be available to all aircraft on equal terms and conditions and must be open during promulgated hours, whereas using a private aerodrome is subject to the prior permission of the licensee. There are 28 licensed aerodromes in Ireland, 13 for private use and 15 for public use. This section provides information on the principle aerodromes that were licensed for public use between the 1st January 2011 and 31st December 2014. These were Cork, Donegal, Dublin, Galway, Ireland West, Kerry, Shannon, Sligo and Waterford aerodromes.

Accidents and serious incidents

The Irish AAIU uses ICAO Annex 13 to determine if an accident or serious incident has occurred within Ireland. Further information on the definitions of both types of event and the AAIU is provided in chapter one above.

Table 3.1 summarises the number of accidents and serious incidents involving commercial air transport at the principal aerodromes licensed for public use in Ireland, as well as the number of flight hours and aircraft flights the aerodromes recorded since 2011. Accidents and serious incidents involving commercial aircraft that are on the Irish aircraft register or a foreign aircraft register, held an AOC issued by the IAA or by a foreign Aviation Authority are included in the table. Consequently some of the events included here are also included in the section on Irish Commercial Air Transport. Accidents and serious incidents involving aircraft engaged in general aviation are not included (unless there was a second aircraft, engaged in commercial air transport, involved in the same occurrence). Details regarding General Aviation are provided in Chapter 4 below.

Year	Number of Flight Hours	Number of Flights	Accidents			Serious Incidents
			Non-fatal	Fatal	Total	
2011	207,586	261,671	1	1	2	2
2012	207,192	263,974	1	0	1	2
2013	229,983	267,860	1	0	1	2
2014	239,766	276,582	2	0	2	0
Total	-	-	5	1	6	6

Table 3.1: Airport flights and flight hours as well as accidents, fatal accidents and serious incidents to commercial air transport at the main Irish aerodromes licensed for public use

Airport flights describe the number of aircraft that land and depart at an aerodrome. Flight hours for each aircraft that enters Irish airspace are calculated from the flight plan as the difference between the aircrafts entry and exit time in the controlled airspace of the flight trajectory. En-route traffic which passes through Irish airspace but does not land (overflight traffic) as well as aircraft that land or depart from an Irish airport (terminal traffic) are included. From the table it is clear that the number of flights and flight hours rose during 2014.
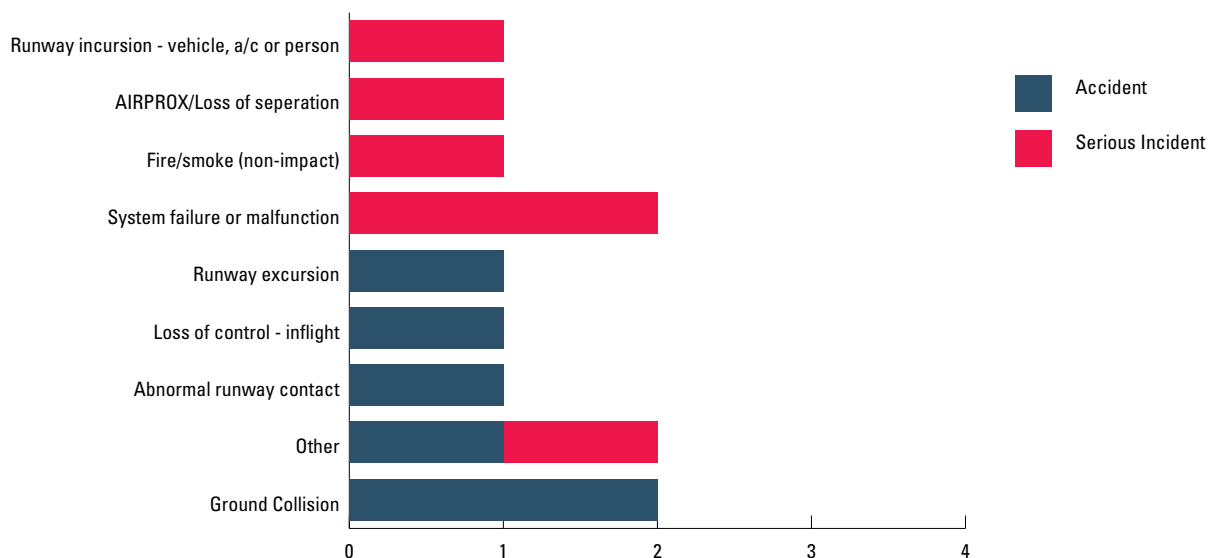
There were six accidents over the four year period considered and tragically one of these resulted in fatalities. The AAIU have published the findings of their investigation of this fatal accident in a formal report that is available on their website www.aaiu.ie (report reference no. 2014-001).

The two non-fatal accidents in 2014 were as a result of ground collisions which although thankfully did not result in injuries to persons on board, did result in substantial damage to the aircraft involved.

There were six serious incidents over the same period, none of which occurred during 2014.

Categorisation of accidents and serious incidents
The Irish AAIU assigns one of the CAST / ICAO common taxonomy categories to the accident or serious incident. The purpose of this is to assist in identifying safety issues. In some cases the category describes the end result in a chain of events rather than the cause. Figure 3.1 summarises the categories assigned to the six accidents and six serious incidents that took place between 2011 and 2014. It is clear from the graph there isn't a single common cause of occurrences classified as an accident or serious incident.

Figure 3.1: CAST / ICAO classification of Annex 13 occurrences which took place at the main Irish aerodromes licensed for public use (2011-2014)

The ESARR2 Severity Classification Scheme

Air Traffic Service (ATS) providers are subject to S.I. No. 285 of 2007 and must submit an MOR to IAA SRD if an occurrence which affects, or is likely to affect, the safety of the aircraft takes place. The European Union Regulation (EC) 376/2014 on occurrence reporting supersedes this S.I. from 15th November 2015. Once an MOR is submitted to IAA SRD an SRD Inspector classifies the type of occurrence and associated safety risk. The purpose of this is to identify

safety issues and target occurrences associated with an elevated safety risk for further investigation.

The safety risk associated with the occurrence is also assessed in accordance with the ESARR 2 Severity Classification Scheme described in Table 3.2. The IAA adheres to EUROCONTROL guidance material on how to implement the scheme.

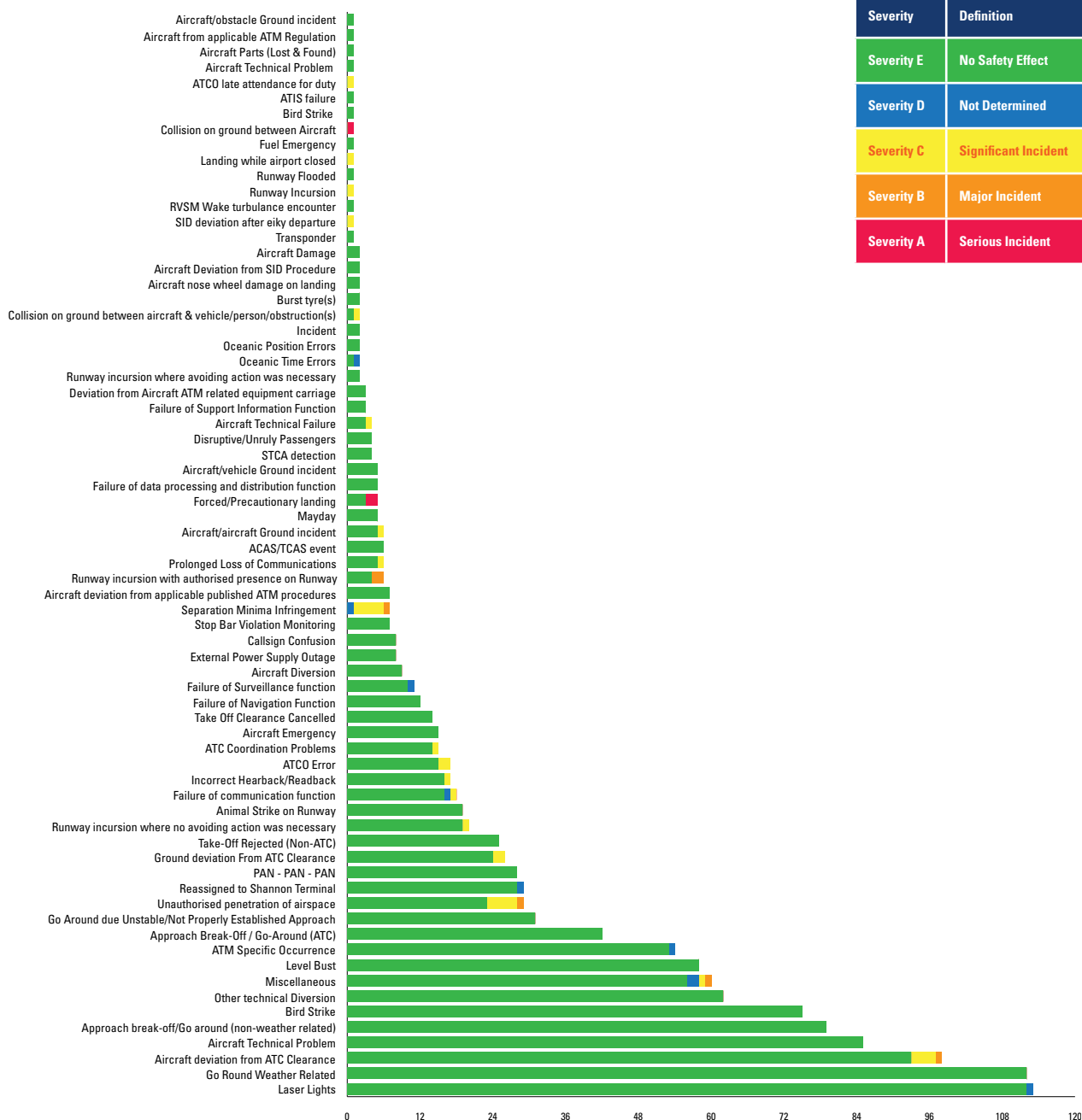| Severity	Definition
Severity E	No Safety Effect
Severity D	Not Determined
Severity C	Significant Incident
Severity B	Major Incident
Severity A	Serious Incident

Figure 3.2: Summary of occurrences submitted by Irish ATS providers during 2014.

Mandatory Occurrence Reporting in Air Traffic Services (ATS)

During 2014 the ATS providers at the principal aerodromes submitted 1,162 MORs to IAA SRD. Figure 3.2 summarises the occurrence categorisation and classification (ESARR 2 severity core) assigned to the MORs.

The three issues most regularly reported were 'Laser shone at aircraft', 'Weather related go around' and 'Aircraft deviation from ATC clearance'.

The most common occurrence submitted by ATS was 'Laser shone at aircraft'. Pilots usually notify ATS of a laser attack on the aircraft which can cause dangerous distraction to the flight crew or even serious eye injury to persons on board. It is a criminal offence under Irish law for any person to intentionally shine a laser beam at an aircraft.

The second most common occurrence reported by ATS was 'Weather related go-around'. Many of these reports indicate there was a sudden change in wind velocity that would make continuing the approach unsafe and so a go-around was performed.

The third most common occurrence reported by ATS is 'Aircraft deviation from ATC Clearances'. This is one of the Key Safety Indicators discussed below in more detail.

Key Safety Indicators (KSIs)

ICAO defines safety indicators as "the parameters that characterise and / or typify the level of safety of a system". EUROCONTROL has identified the following occurrences as having the potential to cause or contribute to an accident or serious incident within European Airspace; separation minima infringements, level busts, deviation from ATC clearance, runway incursions and airspace infringements. As part of the State Safety Programme (SSP) the IAA has adopted these occurrences as KSIs for air traffic services at Irish Aerodromes.

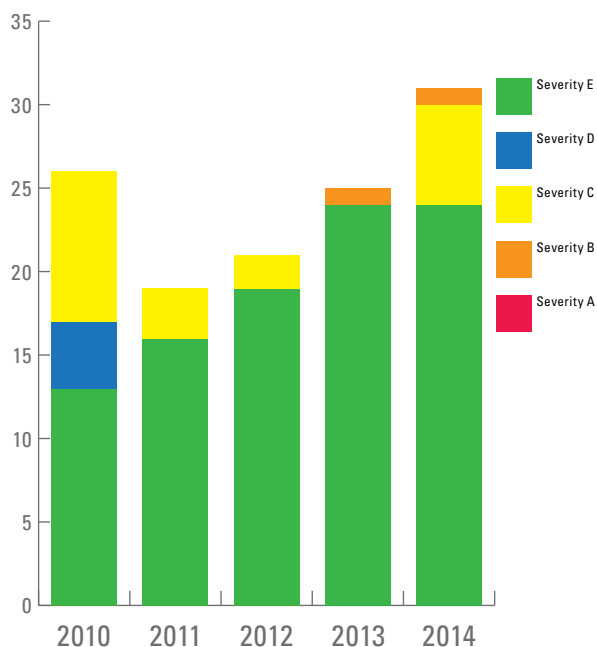There are a small number of occurrence reports which describe two KSIs, for example a deviation from ATC clearance may lead to a level bust. In these circumstances both classifications were applied to the occurrence and consequently some occurrences are counted twice in the following summaries. The safety risk attached to the KSIs is assessed in accordance with the ESARR 2 Severity Classification Scheme.

Airspace Infringements

An airspace infringement occurs when an aircraft enters airspace without requesting and obtaining clearance from the authority controlling the airspace in advance of doing so.

The number of airspace infringements rose steadily over the last four years. The vast majority of airspace infringements were not associated with a safety risk and were classified as Severity E, the lowest rating on the ESARR 2 Severity Classification Scheme. The majority of incidents recorded involve General Aviation (GA) aircraft, reflecting that whereas most GA VFR flights are conducted outside control areas and zones, some infringements into the outer margins of controlled airspace by GA aircraft do occur.
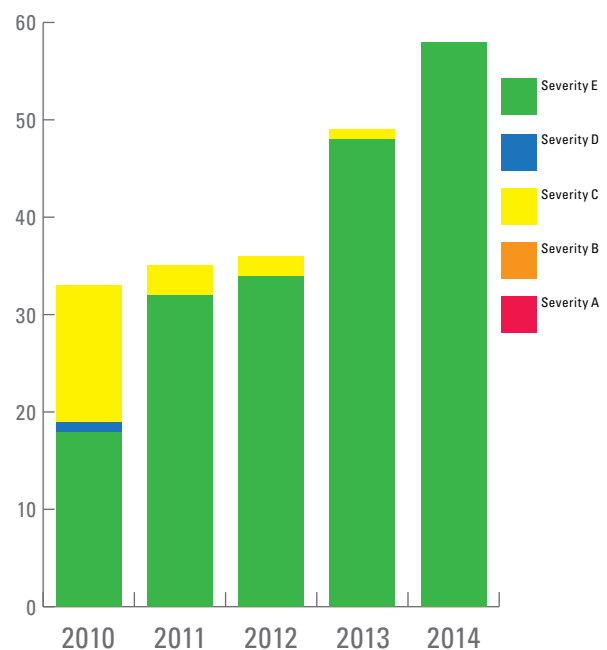
The European Commercial Aviation Safety Team (ECAST) European Action Plan for Airspace Infringement Risk Reduction was developed to help reduce their frequency. The IAA has implemented the 13 recommendations for regulators in this Plan and focus on the implementation of recommendations for service providers as part of oversight activities. In addition the IAA State Safety Plan includes specific initiatives to address airspace infringements by GA aircraft.

Level Busts

A level bust can only occur within controlled airspace and is defined as when an aircraft ascends or descends more than 300 feet from an ATS flight clearance. ECAST identified level busts as one of five main risk factors which can lead to a loss of separation event. (The other four principal factors were ineffective air traffic control, airspace infringements, lateral navigation errors and ineffective collision avoidance). The number of level busts remained steady during 2011 and 2012. There has been a noticeable increasing trend in the numbers reported in 2013 and 2014, however the majority were of Severity E, indicating there was no safety effect.
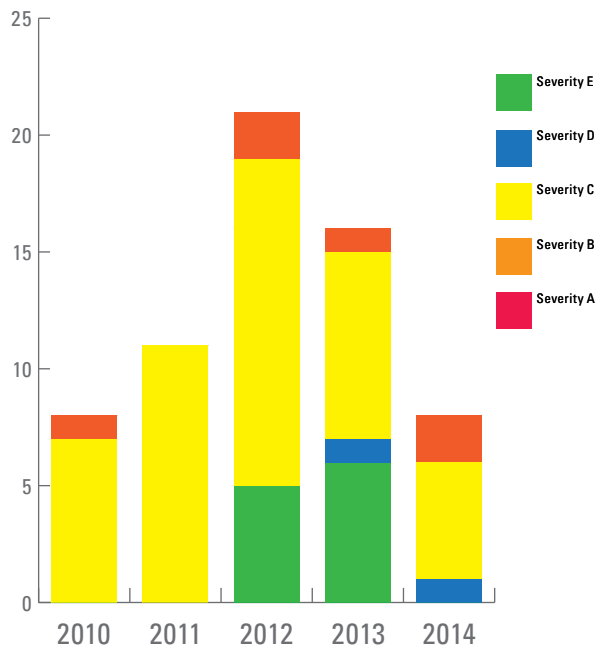

Figure 3.4: No. of level busts between 2010 and 2014

Figure 3.3: No. of airspace infringements between 2010 and 2014

Separation Minima Infringements

Separation describes the concept of keeping two or more airborne aircraft a minimum distance apart on both the horizontal and vertical planes to reduce the risk of the aircraft colliding and prevent occurrences due to wake turbulence. Minimum separation distances are specified by regulatory authorities and are based on ICAO standards. A separation minima infringement occurs when these minimum distances are breached on the horizontal plane, the vertical plane, or both planes while the aircraft are airborne.

There has been a steady decline in the number of reported separation minima infringements since 2012. The 2012 peak was successfully addressed through a targeted programme which concentrated on the application of accurate speed control to maintain spacing.

Deviation from ATC clearance

Deviations from ATC clearance occur when a pilot does not follow the instructions issued by ATC while the aircraft is on the ground or airborne and as a result the aircraft deviates from its' assigned path. Factors known to contribute to a deviation from ATC clearance include ATC issuing several instructions in one transmission or issuing conditional clearances.

Deviations from ATC clearance are the most commonly reported KSI every year, this is because they may contribute to many other types of occurrences, such as level busts or runway incursions. The number of deviations from ATC clearance has increased steadily since 2013, however the majority of these occurrences were classified as Severity E (no safety effect).

Figure 3.5: No. of separation minima infringements between 2010 and 2014

Figure 3.6: No. of deviations from ATC clearance between 2010 and 2014

Runway Incursions

Runway incursions are recognised as a key risk in aviation safety due to the number which occur world-wide and their potential consequences. ICAO defines a runway incursion as any occurrence at an aero-drome 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. The IAA uses this definition to identify runway incursions that occur at Irelands aerodromes. Figure 3.7 shows the number of runway incursions at Irish aerodromes since 2010.

There was a slight increase in the number of runway incursions reported in 2014 however the majority of these reports were Severity Level E (no safety effect). The IAA has implemented the recommendations for regulators in the 2011 edition of the European Action Plan for the Prevention of Runway Incursions (EAP-PRI) and will review the level of implementation by service providers as part of the State Safety Plan.

Figure 3.7: **Number of runway incursions between 2010 and 2014**

Ryanair Boeing 737-800 at Cork Airport

Photo by Paul Daly

Various aircraft types used by general aviation enthusiasts in Ireland

Photos by Frank Grealish

4 General Aviation and Aerial Work

General Aviation (GA) includes all civil aviation other than commercial air transport or aerial work. Aerial Works (AW) include commercial operations involving specialised services such as agriculture, construction, photography, surveying, observation, patrol or aerial advertisement. This section discusses accidents and serious incidents involving aircraft engaged in GA and Aerial Work under different aircraft categories.

Previous reports included two accidents in 2011, one involving a light aeroplane and one involving a microlight aircraft, that were reclassified as serious incidents. The associated tables below are updated accordingly.

General Aviation and Aerial Works – Aeroplanes

Table 4.1 (overleaf) provides fatal accident, non-fatal accident and serious incident statistics for fixed-wing aeroplanes involved in General Aviation and Aerial Works (GA/AW) activities.

The EASA Annual Safety Review provides these statistics according to whether the aeroplanes maximum take-off mass (MTOM) was above or below 2,250kg. For consistency the statistics presented herein are broken down according to the same MTOM categories. The number of Irish registered aircraft in each category is also provided however accidents that occurred in Irish airspace involving both Irish and non–Irish registered aircraft are included in the statistics.

Aeroplanes over 2,250kg

There are currently 8 aeroplanes with an MTOM greater than 2,250kg on the Irish aircraft register that are used in general aviation or for aerial work.

There was one non-fatal accident and no serious incidents involving this aircraft type over the last four years. The non-fatal accident, involving a foreign registered aircraft, was categorised as a runway excursion and it occurred in 2014.

Aeroplanes below 2,250kg

The number of aeroplanes registered in Ireland with an MTOM below 2,250kg has fallen steadily from 259 in 2011 to 211 in 2014.

Over the last four years a total of 16 accidents have occurred, six of which took place in 2014. Three of these accidents involved Irish registered aircraft and three involved non-Irish registered aircraft. Of the 16 accidents one tragically resulted in fatalities. This accident occurred during 2012. During the same period six serious incidents occurred. In their Annual Report for 2013, EASA reported 378 accidents in Europe involving aeroplanes with MTOM less than 2,250 kgs, 42 of which resulted in fatalities.

A breakdown of the categories of general aviation aeroplanes with MTOM less than 2,250kg is provided in Figure 4.1. The most common categories assigned to the accidents involving these aircraft are Runway Excursion, Engine Failure or Malfunction and System Failure or Malfunction (typically landing gear related)

Figure 4.1: AAIU Classification of Annex 13 occurrences involving General Aviation aeroplanes MTOM less than 2,250Kgs (2011-2014)

General Aviation and Aerial Works – Helicopters

The EASA Annual Safety Review defines large helicopters as those with an MTOM of greater than 2,250kg and small helicopters as those with an MTOM less than 2,250kg. For consistency this safety review uses the same definition. Table 4.2 summarises the safety statistics according to these MTOM categories. The number of Irish registered GA helicopters in each category is also provided.

GA Helicopters over 2,250kg

There are currently 4 helicopters on the Irish aircraft register within this mass category. There were no accidents or serious incidents involving Irish registered large helicopters or of non-Irish registered helicopters in Irish Airspace over the period considered.

Helicopters below 2,250kg

Similar to other types of aircraft used for general aviation and aerial work the number of light helicopters on the Irish register has fallen steadily in recent years and that trend continued in 2014.

There was one Loss of Control-Inflight accident in Ireland involving an Irish registered helicopter in 2011, and one serious incident following engine failure in 2014. There was also a collision on take-off accident in 2014 involving a non-Irish registered helicopter flying in Irish Airspace. None of these events resulted in fatalities or serious injuries.

General Aviation – Microlights

There are many different types of microlight aircraft. Those on the Irish aircraft register are aircraft with an MTOM of less than 450kg for a two-seater land plane/ helicopter or an MTOM of less than 472.5kg for a two-seater land plane equipped with an airframe mounted total recovery parachute system.

Table 4.3 shows that the number of microlights on the Irish aircraft register has remained fairly steady since January 2011. In December 2014 there were a total of 148 microlights on the Irish register, 71 of which held a valid Flight Permit. The other 64 aircraft do not have permission to be flown.

There was one loss of control-inflight accident in Ireland involving a foreign registered microlight in 2014. There were no serious incidents involving these aircraft types in Ireland in 2014. There were 9 non-fatal accidents involving microlights over the years 2011 through 2014, six of which were registered abroad. In their 2013 Annual Safety Review EASA reported 219 accidents in Europe involving microlight aircraft in 2013, 40 of which resulted in fatalities.

Year	Total Registered in Ireland	Accidents			Serious Incidents
		Non-fatal	Fatal	Total	
Aeroplanes over 2,250kg					
2011	23	0	0	0	0
2012	11	0	0	0	0
2013	11	0	0	0	0
2014	8	1	0	1	0
Total	-	1	0	1	0
Aeroplanes below 2,250kg					
2011	259	4	0	4	4
2012	216	2	1	3	1
2013	214	3	0	3	1
2014	211	6	0	6	0
Total	-	15	1	16	6

Table 4.1: Total no. of accidents, fatal accidents and serious incidents involving GA/AW aeroplanes

Year	Total Registered in Ireland	Accidents			Serious Incidents
		Non-fatal	Fatal	Total	
Helicopters over 2,250kg					
2011	8	0	0	0	0
2012	12	0	0	0	0
2013	5	0	0	0	0
2014	4	0	0	0	0
Total	-	0	0	0	0
Helicopters below 2,250kg					
2011	39	1	0	1	0
2012	27	0	0	0	0
2013	26	0	0	0	0
2014	22	1	0	1	1
Total	-	2	0	2	1

Table 4.2: Total no. of accidents, fatal accidents and serious incidents involving GA/AW helicopters

Year	Total Registered in Ireland	Accidents			Serious Incidents
		Non-fatal	Fatal	Total	
2011	147	3	0	3	2
2012	133	4	0	4	0
2013	135	1	0	1	0
2014	148	1	0	1	0
Total	-	9	0	9	2

Table 4.3: Total no. of accidents, fatal accidents and serious incidents involving microlight aircraft

General Aviation - Other Types of Aircraft

Table 4.4 (overleaf) summarizes the number of non-fatal accidents, fatal accidents and serious incidents involving sailplanes, powered sailplanes, gyroplanes, balloons, paragliders, powered paragliders and powered parachutes.

Sailplanes and Powered Sailplanes

A sailplane is a type of glider aircraft with rigid wings and an undercarriage. Powered sailplanes have motors and engines that can be used for take-off or to allow the pilot to fly for an extended period. Some gliders may be launched by a tug aircraft. All sailplanes with a maximum empty mass of more than 80kg when a single-seater or 100kg when a two-seater, including those which are foot launched, are subject to the requirements of EASA European Regulations. There have been zero accidents and one runway excursion serious incident (in 2012) involving this category of aircraft in the four year period considered. There were no accidents or serious incidents in 2014.

Gyroplane

A gyroplane is a type of rotorcraft which uses an unpowered rotor in autorotation to develop lift, and an engine-powered propeller, similar to that of a fixed-wing aircraft, to provide thrust. Single and two-seater gyroplanes with a maximum take-off mass not exceeding 560kg are regulated by national legislation. Larger gyroplanes are regulated by EASA. There was one non-fatal Loss of Control-Inflight accident in 2014 and one system component failure serious incident in 2012 involving gyroplanes. In their 2013 Annual Safety Review EASA reported there were a total of 17 accidents in 2013, six of which resulted in fatalities.

Balloon aircraft

A hot air balloon consists of an envelope, which is capable of containing heated air, suspended above a gondola or wicker basket, which carries passengers and a source of heat such as an open flame. The heated air inside the envelope makes it buoyant and allows the aircraft to become airborne. There were no reports of any accidents involving balloons between 2011 and 2014 in Ireland. EASA reported a total of 16 accidents in Europe in 2013, one of which resulted in fatalities.

Paraglider, Powered Paraglider and Powered Parachutes

A paraglider is a wide canopy resembling a parachute that is attached to a person's body by a harness in order to allow them to glide through the air after jumping from or being hauled to a height. Powered paragliding, also known as paramotoring, is a form of ultralight aviation where the pilot wears a motor on his back which provides enough thrust to take off using an adapted paraglider wing. Powered parachuting utilises a self-powered flying parachute equipped with a motor and wheels. These types of aircraft are not registered. There was one low altitude operations serious incident and five accidents (three Loss of Control In-flight and two Mid-Air Collision) involving paragliders, powered paragliders and powered parachutes between 2011 and 2014 in Ireland. None of the accidents resulted in fatalities.

Year	Irish Airport Flights (Arrivals & Departures)	Accidents			Serious Incidents
		Non-fatal	Fatal	Total	
Sailplanes and Powered Sailplanes					
2011	27	0	0	0	0
2012	27	0	0	0	1
2013	26	0	0	0	0
2014	26	0	0	0	0
Total	-	0	0	0	1
Gyroplanes					
2011	12	0	0	0	0
2012	13	0	0	0	1
2013	15	0	0	0	0
2014	17	1	0	1	0
Total	-	1	0	1	1
Balloons					
2011	10	0	0	0	0
2012	10	0	0	0	0
2013	10	0	0	0	0
2014	10	0	0	0	0
Total	-	0	0	0	0
Paraglider, Powered Paraglider and Powered Parachutes					
2011		1	0	1	0
2012	-	3	0	3	1
2013	-	0	0	0	0
2014		1	0	1	0
Total	-	5	0	5	1

Table 4.4: Total no. of accidents, fatal accidents and serious incidents involving sailplanes, powered sailplanes, gyroplanes, balloons, paragliders, powered paragliders and powered parachutes

General Aviation – Parachute Jumps

Parachuting is distinguished from the other para-gliding/motoring activities discussed in Table 4.4 on previous page due to the fact that parachutists exit an airborne aircraft from great heights and return to earth with the aid of gravity. The rate of descent is slowed during the last part of the jump using a parachute or other means (such as a wing suit) and parachute jumps must be conducted within a designated parachute dropping centre, to help ensure the safety of the parachutists themselves and other aircraft flying in the vicinity of the jump. Permission to operate a dropping centre is obtained from the IAA.

Table 4.5 summarises the number of parachute jumps the licensed clubs have carried out and the number of injuries sustained which required medical attention. The table includes occurrences where the injuries were minor and consequently were not classified by the AAIU as an Annex 13 accident or serious incident. None of the injuries sustained in 2014 warranted an Annex 13 investigation.

There is a noticeable decreasing trend in the rate of parachuting injuries over the past three years. Over the four year period considered a total of 60,146 jumps took place during which 27 parachutists were injured. This corresponds to 0.45 injuries per 1,000 jumps or 1 injury per 2,228 jumps. Most of the injuries sustained were sprained or broken ankles.

Year	No. Jumps	No. Injuries	Rates per 1,000 jumps
2011	13,595	6	0.44
2012	18,214	10	0.55
2013	15,040	7	0.47
2014	13,297	4	0.30
Total	60,146	27	0.45

Table 4.5: **Total no. of parachute jumps and injuries**

The General Aviation Safety Council of Ireland (GASCI)

The General Aviation Safety Council of Ireland is a volunteer body made up of representatives from General Aviation in Ireland set up in 2012. GASCI meets on a regular basis with the aim to promote General Aviation Safety in Ireland. A large part of the GASCI function is to promote safety awareness among all those involved in the Irish GA community.

This is accomplished by:

• Organising GA Safety Seminars

• Developing printed material, such as Safety Leaflets, posters etc and distributing these to GASCI organisation members and flying clubs

• Providing safety information on GASCI website http://gasci.weebly.com/ as well as on the GASCI Facebook page https://www.facebook.com/ gasci. ireland

GASCI identifies safety issues from all available sources of information. For General Aviation much of the available information unfortunately derives from Accident Investigation reports. GASCI would like to encourage anyone involved in General Aviation to report safety related occurrences that they experience, especially if the sharing of this information might provide a valuable lesson to others who might find themselves in similar circumstances and not be so fortunate to as to avoid a serious incident or accident. Such reports can be made voluntarily to the Irish Aviation Authority (see https://www.iaa.ie/ voluntary-safety-reporting) with the assurance that the confidentiality of the report is guaranteed by law. A less formal mechanism for information sharing is available on the GASCI website http://gasci.weebly. com/report-an-incident- contact-us.html.

The current membership of GASCI includes
• National Microlight Association of Ireland

• Irish Microlight Association

• Irish Paramotor Association

• The Irish Gliding and Soaring Association

• Irish Aviation Authority

• Aircraft Owners and Pilots Association Ireland

• Air Accident Investigation Unit

• Irish Sport Rotorcraft Club

• Model Aeronautics Council of Ireland

• Irish Hang Gliding and Paragliding Association

• Irish Ballooning Association

• The Parachute Association of Ireland Ltd

• Irish Light Aviation Society

• Irish Instructors and Examiners Panel

GASCI held four Council Meetings in 2014 and works to a specific plan of action which is regularly updated. The GASCI accomplishments in 2014 include:

• Organising three Safety Evenings and distribution of Safety Data Packs with latest safety information from EASA, IAA and GASCI.

    • April 2014 – Two safety evenings were conducted in conjunction with UK GASCo. These safety presentations addressed significant safety risks to GA pilots through all flight phases from check-in to shut down.

    • Nov 2014 – Presentations highlighting safety issues including Angle of Attack awareness, hazards associated with Cessna 150 aircraft and airspace infringements.

• Work on Safety Recommendations issued by the Air Accident Investigation Unit of Ireland. Three safety recommendations were closed in 2014. One safety recommendation remains a work in progress.

Upcoming GASCI events planned for early 2015 include:

• Two safety evenings in Dublin and Cork in conjunction with UK sister organisation GASCo on 23/24th April - see GASCI website for details.

Voluntary Reporting

Voluntary Reporting involves the collection of any safety data on actual or potential safety deficiencies that may not be captured by the mandatory reporting requirements. The reports may relate to a specific event during a flight or can relate to a safety hazard or concerns encountered by aviation professionals or the general public.

The IAA has implemented the Voluntary Reporting System using the IAA website on http://www.iaa.ie/ voluntary-safety-reporting which contains all the information required to submit a report. Confidentiality of the data is assured. Three separate templates for submitting voluntary reports are provided:

General Public: This template is best suited for use by a member of the general public who wishes to report a safety event experienced on a commercial airline (Irish and from any other country) or on a business jet.
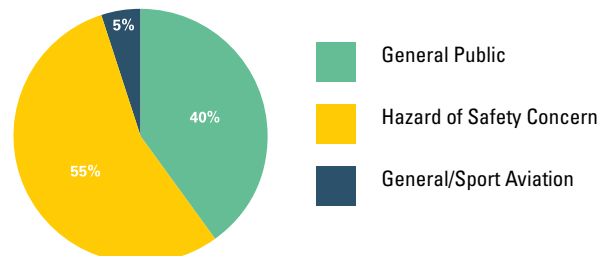
General / Sport Aviation: This template is best suited for use by a private pilot or a passenger of a private aircraft who wishes to report a safety event experienced while flying.

Hazard or Safety Concern: This template is best suited for reporting a hazard or safety concern that is not directly linked to a specific event. This may be used by any person, either in commercial or non-commercial aviation.

The IAA reviews all voluntary reports to identify any safety hazards or concerns that may be emerging or were previously unidentified. All reports received are investigated fully in conjunction with the operator or persons involved, and any necessary actions to avoid future occurrences of the incident are taken.

The IAA appreciates the efforts of those reporters who voluntarily submit reports that may help improve aviation safety and is especially thankful to those reporters who have kindly provided their permission for IAA to contact them. Reporters should not however be alarmed if the IAA does not contact them. Reasons why the IAA may not contact a reporter include; the report provided is comprehensive, the report concerns an issue which is already well known to IAA, IAA has received multiple reports of the same occurrence.

By the end of 2014 a total of 206 voluntary reports have been received since the system has been made available in mid-2011. A breakdown of the templates used shows that the majority of the reports are received using the templates for General Public and Hazard or Safety Concern with a smaller, but growing percentage of reports received using the General/ Sports Aviation templates.

- General Public — 40%
- Hazard of Safety Concern — 55%
- General/Sport Aviation — 5%

A detailed analysis of the subject matter of the reports is shown in the graph below. 10% of the reports concern General/Sports Aviation (GA), however this percentage has been growing slowly but steadily since 2012. One of the prime aims of the voluntary reporting system is to allow individuals involved in this area to report safety information in order to share the lessons learned with fellow enthusiasts and to help prevent accidents. It is noted that under EU Regulation 376/2014 (applicable November 2015) a large portion of this GA sector will be included in the mandatory occurrence reporting scheme for the first time. The IAA, in conjunction with the General Aviation Safety Council of Ireland, will continue to promote the voluntary reporting in this area.

The vast majority of the reports (80%) concern Commercial Aviation. These reports address passenger experience, including cabin related issues and passenger perceptions of hazardous aircraft operations (heavy landings, proximate traffic etc) as well as a growing number of voluntary reports from aviation professionals (pilots, cabin crew).

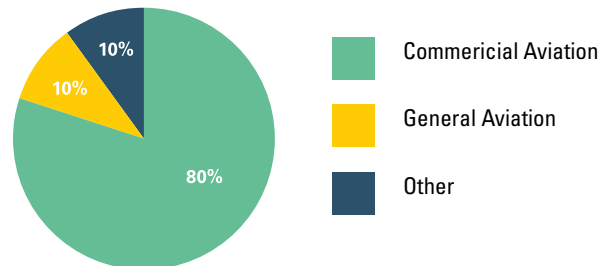10% of the reports concern "other" issues and typically concern maintenance or aerial work related reports.

- **Commericial Aviation** — 80%
- **General Aviation** — 10%
- **Other** — 10%

Photo by Frank Grealish

Ryanair Boeing 737-800 at sunset in Dublin

Photo by Frank Grealish

5 Glossary of Terms

A

AAIU Air Accident Investigation Unit

ANSD Air Navigation Services Department

AOC Air Operators Certificate

ARMS Aviation Risk Management Solutions

ATC Air Traffic Control IAA Irish Aviation Authority

ATS Air Traffic Service

C

CAST Commercial Aviation Safety Team

CFIT Controlled Flight Into Terrain

E

EASA European Aviation Safety Agency

EASA MS EASA Member States
(28 EU Member States plus Iceland, Liechtenstein, Norway and Switzerland)

EASP European Aviation Safety Plan

EC European Commission

ECR European Central Repository

EGAST European General Aviation Safety Team

ERC Event Risk Classification

EU European Union

G

GA General Aviation

GASCI General Aviation Safety Council

I

IAA Irish Aviation Authority

ICAO International Civil Aviation Organisation

K

KSI Key Safety Indicators

L

LOC-I Loss of control in flight

M

MAC Mid air collision

MOR Mandatory Occurrence Report

MTOM Maximum Take-Off Mass

N

NoA Network of Analysts

S

SAR Search and rescue

SMS Safety Management System

SOTS Safety Occurrence Tracking System

SRD Safety Regulation Division

U

UN United Nations

Photo Credits

Special thanks to Mr Michael Kelly, Mr Frank Grealish, Mr Paul Daly and Mr Joe Heeney for kind permission to use their photos in this report. Visit www.IrishAirPics.com to see further examples of their work. The IAA would like to continue using photographs showing different aspects of Irish aviation and its support systems within future Annual Safety Performance Reviews. If you took a photograph you are willing to let us use please send it to us at AviationPhotos@IAA.ie with relevant information for the photo caption.

Disclaimer

The data and images presented in this document are for information purposes only. It is obtained as snap-shot data from a number of different sources, and some of this data may be part of ongoing investigations and subject to change. Future versions of this report will provide updated data, where relevant, and will correct any errors or omissions that may arise.

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ATR 72-600 operated by Stobart Air

Photo by Joe Heeney

Aerial View of Dublin Airport

Photo by Michael Kelly

IAA