EASA
European Aviation Safety Agency

ANNUAL SAFETY REVIEW 2018

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Foreword by the Executive Director

2017 has been an exceptional year for global airline safety, with fewer fatalities than at any time in the industry's history. Closer to home, we can see that in all aviation domains across the EASA Member States, the number of fatal accidents in 2017 has been lower than the average of the previous decade.

However, a regulator never rests on its laurels to ensure that this trend continues as the aviation system develops to face new challenges such as drones and cyber security risks. Indeed, by the end of January this year, the historically low figures for global airline safety for the whole of 2017 had already been exceeded. In the EASA Member States in 2017, there were fatalities in all non-commercial and specialised operation domains, as well as a fatal accident involving a medical flight that crashed in Italy with the loss of all 6 people on board.

Such accidents demonstrate the need to continuously drive safety improvements across the board, to share lessons learned. This is achieved through the safety actions that are identified in the European Plan for Aviation Safety (EPAS). In partnership with our Member States we are developing a better view of safety and defining a collective response. Additionally, EASA coordinates beyond Europe at a global level in order to help protect our citizens when they travel beyond our borders.

The Annual Safety Review will continue to evolve and with the launch of the Data4Safety, big-data programme, EASA is significantly enhancing the ability of the European Aviation System to be aware of potential safety risks. With this, we can react more quickly and help people to travel in the safest conditions.

Patrick Ky
Executive Director

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Introduction

EASA would like to welcome you to the 2018 version of the EASA Annual Safety Review. The review has been published since 2005 and is now in its 13th year. The analysis presented in this review together with the domain-specific safety risk portfolios provide the data-driven input that supports the decision-making in formulating the European Plan for Aviation Safety (EPAS).

This edition provides safety risk portfolios in 11 of the aviation domains analysed and builds on the work of previous years. As with the previous edition, the ongoing European Safety Risk Management Process, in particular the valuable input from the Network of Analysts (NoA) and Collaborative Analysis Groups (CAGs), means that the analysis in this year's review provides not just a statistical summary of aviation safety in the EASA Member States (MS) but also identifies the most important safety challenges faced in European aviation today. This analysis drives the development of safety actions for the EPAS and harnesses the experience of both the EASA Member States (EASA MS) and industry to connect the data with the current and future priorities of the Agency.

How the Safety Review is Produced

Information Sources

The EASA Annual Safety Review is produced by the Safety Intelligence and Performance Department (SM1) of EASA. The analysis in the review comes from two specific data sources:

- **EASA's Occurrence Database.** The main source of data is the Agency's own database, being accidents and serious incidents reported to the Agency by Safety Investigation Authorities (SIAs) world-wide, which is augmented by information collected by the Agency from other sources. In all domains, the data and its quality is also checked with the EASA MS through the NoA. EASA is grateful for the support of the safety analysis teams in each EASA MS in developing the Review.

- **European Central Repository.** The European Central Repository (ECR) is the central database of all occurrences reported to the competent authorities of the EASA MS, the reporting of which is governed by Reg. (EU) 376/2014 on the reporting, analysis and follow-up of occurrences in civil aviation. This is the primary source of information that is used to cross-check the accidents and serious incidents in EASA's own database.

Process for Safety Risk Portfolios

The safety risk portfolios are developed through an iterative process, starting with the data available in EASA's occurrence database and in the European Central Repository. This provides the portfolios with a starting list of the safety issues affecting aviation and an indication of the key risk areas that each safety issue relates to. In addition to understanding what the safety issues are, they are risk assessed using the European Risk Classification Scheme (ERCS), as it is soon to be required under Regulation (EU) 376/2014. EASA has begun applying the ERCS to historical occurrences assessed in this Review and are pleased to provide this additional element in the analysis results. Each occurrence receives an ERCS risk classification and the overall risk level of the safety issue is then calculated. This is then used to define the risk level of the key risk area.

European Risk Classification Scheme

Regulation (EU) 376/2014 on the reporting, analysis and follow-up of occurrences in civil aviation introduced the requirement for common occurrence risk classification at national level. The ERCS provides a clear understanding of the true risk of an occurrence leading to a fatal accident. The ERCS methodology measures the risk through a matrix covering 2 dimensions. The vertical axis considers what the severity would have been if the occurrence being scored had escalated into a fatal accident. This is done by considering both the size of the aircraft involved and how severe the accident outcome could have been.

Secondly, the horizontal axis measures how close the occurrence was to that fatal accident outcome based on a weighted barrier model. Therefore the ERCS gives a much better representation of risk that the normal classifiers of accident, serious incident and incident as it provides a proper estimation of the likely risk.

Using this data input, the draft portfolios are then discussed within the collaborative analysis groups. This ensures that the safety issues have been correctly defined and assessed and to add any safety issues that may not yet be present in the data, such as emerging issues.

Collaborative Analysis Groups (CAGs)

The CAGs are expert groups, responsible for analysing the safety of European aviation. Each CAG works on a domain and its membership is derived from key stakeholders in the domain. These stakeholders may come from industry or from EASA's regulatory partners. Each CAG meets up to three times per year to review available safety information, arrange in depth safety issue analyses and to identify emerging issues. They monitor the safety performance of their domain and provide feedback on the effectiveness of actions taken.

Chapter Overview

This document is split into a number of chapters, each of which covers the different operational domains in the European Aviation System. The different domains in each chapter cover the areas for which a specific safety risk portfolio has been developed. The scope of each domain chapter (and corresponding safety risk portfolio) is limited to the EASA MS, either as the state of operator or the state of registry. For the Aerodrome and ATM chapters, this scope is limited to the EASA MS as state of occurrence. The chapters of this review cover the following areas:

Chapter 1 Safety Overview

Review of Global Airline Safety: this provides a review of global safety for large commercial air transport aeroplanes.

Cross-domain Safety Overview for EASA MS: This provides an overview of the most important statistics across all the different domains. It helps to identify which domains are likely to need the greatest focus in the EPAS.

Chapter 2 Aeroplanes

Chapters 2.1-2.3 – Commercial Air Transport: This covers all commercial air transport airline (passenger and cargo operators) operations involving aeroplanes, as well as Non-commercially operated complex aircraft flown for business operations. The airline and business operations have the same safety risk portfolio due to the strong commonalities in their safety issues and key risk areas.

Chapter 2.4 – Specialised Operations: This covers all aerial work/ Part SPO operations involving aeroplanes and involves a wide range of different operational activities including aerial advertising, aerial patrol, agricultural, air shows, parachuting and towing (with glider operations).

Chapter 2.5 – Non-commercial Operations: The chapter covers all non-commercial operations involving aeroplanes and includes analysis of what would be understood within the traditional definition of general aviation. The chapter also includes flight training and other non-commercial activities.

Chapter 3 Rotorcraft

Chapter 3.1 – Offshore Commercial Air Transport: This covers operations in the offshore helicopter domain and includes some initial input on offshore renewable operations in addition to the oil and gas industry.

Chapter 3.2 – Other Commercial Air Transport: This covers all other commercial air transport operations involving helicopters such as passenger flights, air taxi and HEMS.

Chapter 3.3 – Specialised Operations: This covers all aerial work/ Part SPO operations involving helicopters and includes an even wider range of different operational activities than the equivalent aeroplanes chapter, adding Construction/ Sling Load operations and Logging to the categories already mentioned.

Chapter 3.4 – Non-commercial Operations: The chapter covers all non-commercial operations involving helicopters and includes analysis of what would be understood within the traditional definition of general aviation. The chapter also includes flight training and other non-commercial activities.

Chapter 4 Balloons: This chapter covers all operations involving hot air balloons.

Chapter 5 Gliders/ Sailplanes: This chapter covers all operations involving gliders and sailplanes.

Chapter 6 Aerodromes and Ground Handling: This chapter covers aerodrome operations that occur within the EASA MS. Therefore the scope for this chapter is EASA MS as state of occurrence. For the first time a safety risk portfolio is provided for this domain.

Chapter 7 ATM/ANS: This chapter is EASA MS as state of occurrence and covers ATM/ANS operations. An initial safety risk portfolio has also been provided for this domain for the first time.

Typical Structure for Each Chapter

Each of the domain chapters in this Annual Safety Review contains specific information which is useful in understanding the analysis of that domain. The structure of each chapter is as similar as possible, providing the ability to compare information in each domain. Such information includes:

Key Statistics: Every chapter starts with a set of key statistics. This provides information on the Tier 1 SPIs for that domain, which includes details of the number of fatal accidents, non-fatal accidents and serious incidents. It also outlines the number of fatalities and serious injuries in the domain. In all cases, the figures for 2017 are provided followed by comparison with the annual averages over the past 10 years. This helps to provide a reference on how this year's performance relates to historical trends. This information is also provided in a graphical format.

Domain Specific Analysis: As every domain has different facets to it, a further analysis of useful domain specific information is included. For example, within the areas of special operations it is useful to provide information on the type of operation involved in safety events, while some chapters include an analysis of the type of propulsion.

Safety Risk Analysis: The next part of the analysis, and the most important in each chapter, is the domain safety risk analysis. This section provides an overview of the relative risk level of each key risk areas, as well as outlining the high risk safety issues for the domain. The full safety risk portfolio is then provided. These safety risk portfolios show a snapshot in their development, taken at the point where occurrence data and CAG inputs have identified the safety issues, but without further consideration of the potential mitigating effects of forthcoming safety actions or the worsening effects of other circumstances.

The safety risk portfolio tables have 2 axes. Along the top, information is provided on the key risk areas, which are the most frequent accident outcomes or potential accident outcomes in that domain. In the context of the safety performance framework, the key risk areas are the Tier 2 safety performance indicators (SPIs) for the domain. The key risk areas are, in most cases, ordered on the basis of their risk levels, determined using the ERCS. On the left hand axis of the portfolio are the safety issues, which relate to the causal and contributory factors to the key risk areas (accident outcomes). In terms of safety performance, these are the Tier 2+ SPIs. These are prioritised on the basis of their high, medium or low risk using ERCS. The occurrences related to the individual safety issues and are identified by mapping event types in the ECCAIRS taxonomy to each safety issue.

The Connection with the European Plan for Aviation Safety

The European Plan for Aviation Safety

The European Plan for Aviation Safety (EPAS) is a coordinated safety action plan that is prepared by EASA each year with the support and technical inputs from EASA Member States and aviation stakeholders. It seeks to further improve aviation safety throughout Europe. The Plan looks at aviation safety in a systemic manner by analysing data on accidents and incidents. It considers not only the direct reasons, but also the underlying or hidden causes behind an accident or incident. Moreover, the Plan takes a longer term view into the future. Although the Plan is originated from EASA MS, it intends to be a valid reference for all States in ICAO EUR Region.

The EPAS is a key component of the Safety Management System at the European level, and it is constantly being reviewed and improved. As an integral part of EASA's work programme, the Plan is developed by EASA in consultation with the EASA Member States and industry. It is implemented by the EASA Member States on a voluntary basis through their State Programmes and Plans. The current EPAS edition covers the 5-year period from 2018 to 2022.

The Safety Risk Management Process

The EPAS is developed through the European safety risk management (SRM) process, which is defined in 5 clear and specific steps as shown below:

Identification of Safety Issues: The identification of safety issues is the first step in the SRM process and it is performed through analysis of occurrence data and supporting information from the Collaborative Analysis Groups. These candidate safety issues are formally captured by the Agency and are then subject to a preliminary safety assessment. This assessment then informs the decision on whether a candidate safety issue should be included formally within the relevant safety risk portfolio or be subject to other actions. Advice is taken from the Network of Analysts[1] and CAGs. The output of this step in the process are the domain safety risk portfolios. Within the portfolios, both the key risk areas and safety issues are prioritised.

Assessment of Safety Issues: Once a safety issue is identified and captured within the safety risk portfolio, it is subject to a formal safety assessment. These assessments are prioritised within the portfolio. The assessment process is led by EASA and is supported by the NoA and the CAGs. In addition, group members are encouraged to participate in the assessment itself; this external support is vital to achieving the best possible results. The result of the assessment is the production of scenario based bow tie models that help to identify weak controls for which potential actions can be identified. Together this forms the Safety Issue Assessment (SIA), which provides potential actions for the EPAS. This is followed by the Preliminary Impact Assessment (PIA), which assesses the wider implications and benefits of the proposed actions and makes recommendations on the actions to be implemented in the EPAS.

Definition and Programming of Safety Actions: Using the combined SIA/PIA, formal EPAS actions proposals are then made to the advisory bodies. Once discussed and agreed upon, the actions are then included in the next version of the EPAS. Prior to publication, the EPAS is approved by the EASA Management Board.

Implementation and Follow Up: The next step in the process involves the implementation and follow-up of the actions that have been included within the EPAS. There are a number of different types of action within the EPAS. These include focussed oversight, research, rulemaking and safety promotion.

Safety Performance Measurement: The final stage in the process is then the measurement of safety performance. This serves two purposes, firstly to monitor the changes that have resulted from the implementation of safety actions. Secondly, it also serves to monitor the aviation system so that new safety issues can be identified. To ensure that there is a systematic approach to the work in this step of the SRM process, a Safety Performance Framework has been developed that identifies different tiers of Safety Performance Indicators (SPIs). Tier 1

1 See Article 14(2) of REGULATION (EU) No 376/2014 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 3 April 2014 on the reporting, analysis and follow-up of occurrences in civil aviation

transversally monitors all the domains and the overview of the performance in each domain. Tier 2 then covers the key risk areas at domain level, whilst Tier 2+ monitors the safety issues. The Annual Safety Review is the annual review of the Safety Performance Framework. It identifies safety trends, highlights priority domains, key risk areas and safety issues. From this step the SRM process begins again.

More information on the EPAS can be found here:
https://www.easa.europa.eu/easa-and-you/safety-management/european-plan-aviation-safety

Safety Overview

1

1.1 Global Airline Fatal Accidents

This section covers large aeroplane passenger and cargo operations worldwide. The figures below show the EASA member states' operators contribution to the number of fatal accidents and fatalities. The relative contribution to the number of fatalities is mainly driven by the size of aircraft and nature of flight (passenger or cargo) involved. In 2017, there were 9 fatal accidents and 67 fatalities worldwide, the lowest number of fatal accidents and fatalities since the start of our records in 1970.

Figure 1. Number of Fatal Accidents and Fatalities Involving Large Aeroplane Passenger and Cargo Operations, EASA MS and Rest of the World, 2007-2017

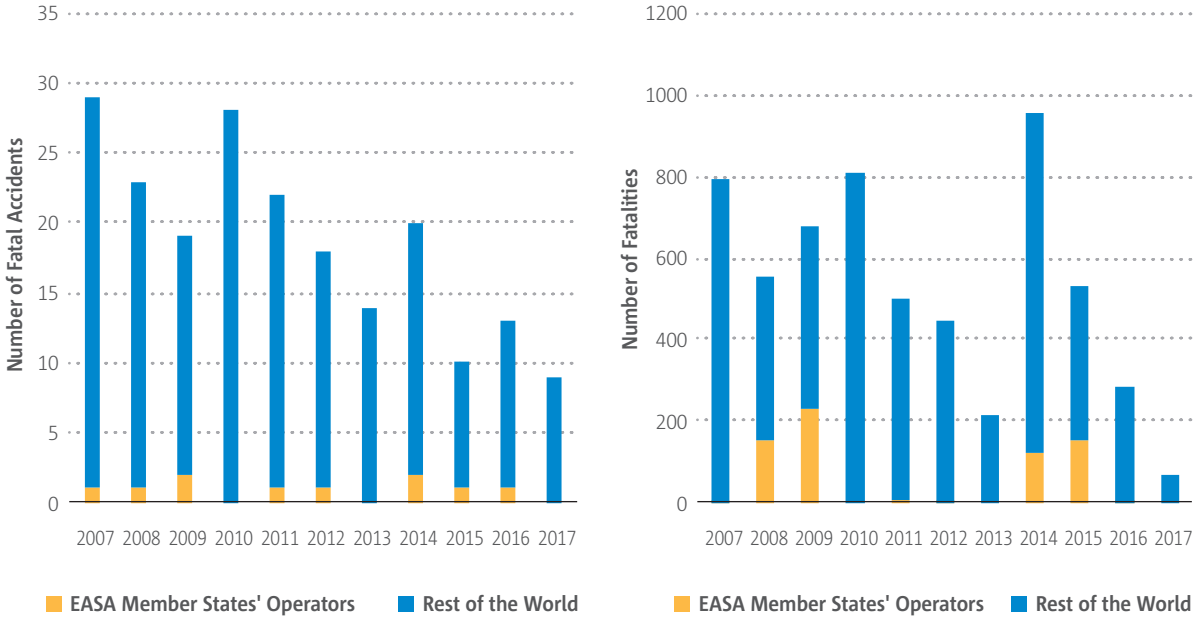
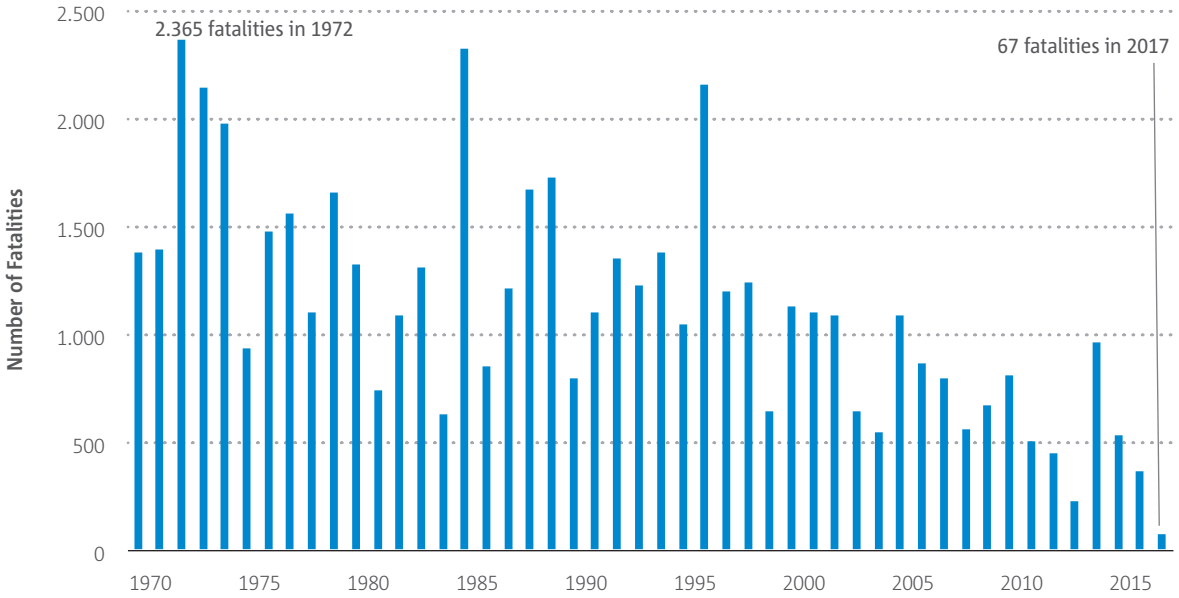


Figure 2. Number of Fatalities Involving Large Aeroplane Passenger and Cargo Operations Worldwide, 1970-2017



One of the reasons that 2017 had a particularly low number of fatalities in comparison with previous years is that the highest number of fatalities in a single accident was 39 and the median number of fatalities was 4 per accident. In comparison, over the previous ten years (2007-2016), the highest number of fatalities in a single accident was 298 and the median was 8.

1.2 EASA Member States Cross Domain Safety Overview

For each domain analysed in this Annual Safety Review, the number of fatal accidents and fatalities for 2017 has been compared with the preceding ten years, 2007-2016. The table reflects the chapter structure and definitions of the Annual Safety Review. For the aircraft chapters (aeroplanes, rotorcraft, balloons, gliders and RPAS), the definition relates to aircraft operated by an EASA member state AOC holder or registered in an EASA member state.

Both the mean average and the median number of fatalities are shown for the period 2007-2016. This is because for some aircraft domains the median provides a better representation of the number of accidents per year. This is typically related to the number of passengers on board aircraft involved in fatal accidents. Gliders usually only have one person on board and the number of fatal accidents and both the mean and median number of fatalities are very similar. By contrast, commercial air transport (CAT) airline accidents may involve one or several hundred fatalities, therefore the annual number of fatalities varies and the mean and median figures are quite different.

It can be seen in Table 1 that the highest number of fatal accidents and fatalities in 2017 occurred in the NCO aeroplane domain. This domain also has the highest mean number of fatal accidents and the highest mean and median number of fatalities over the preceding 10 years. By contrast, there were no fatal accidents in CAT-airlines, NCC-business, and Offshore CAT rotorcraft in 2017. Of these domains, over the preceding 10 years the lowest mean number of fatal accidents per year was in CAT-airlines. NCC-business had the lowest number of fatalities over the decade, followed by Offshore CAT helicopters.

Table 1. Cross Domain Comparison of EASA MS Aircraft Fatal Accidents and Fatalities, 2007-2017

Aircraft Domain	Fatal Accidents 2017	Fatal Accidents 2007-2016 Mean	Fatalities 2017	Fatalities Annual 2007-2016 Mean	Fatalities Annual 2007-2016 Median
Aeroplanes					
CAT - Airlines	0	0.9	0	66.4	4
NCC - Business	0	0.5	0	0.6	0
Specialised operations	3	7.3	4	18.1	16.5
Non-commercial operations	34	50.1	62	92.2	91
Rotorcraft					
Offshore CAT	0	0.4	0	1.3	0
Onshore CAT	1	1.7	6	5.4	4
Specialised operations	3	4	4	7.5	6
Non-commercial operations	3	5.6	7	13.2	12.5

Aircraft Domain	Fatal Accidents 2017	Fatal Accidents 2007-2016 Mean	Fatalities 2017	Fatalities Annual 2007-2016 Mean	Fatalities Annual 2007-2016 Median
Balloons	0	1.2	0	2.1	1
Sailplanes	25	25.4	27	29.5	29.5

A separate table has been used for aerodromes and ground handling and ATM/ANS, reflecting the fact that the definition here is different: it includes all fatal accidents and fatalities that happened at aerodromes or in airspace in an EASA member state. Therefore the infrastructure table not only counts fatal accidents and fatalities that are already in the table for the aircraft chapters, but also some that involve operators or aircraft registered outside of a member state.

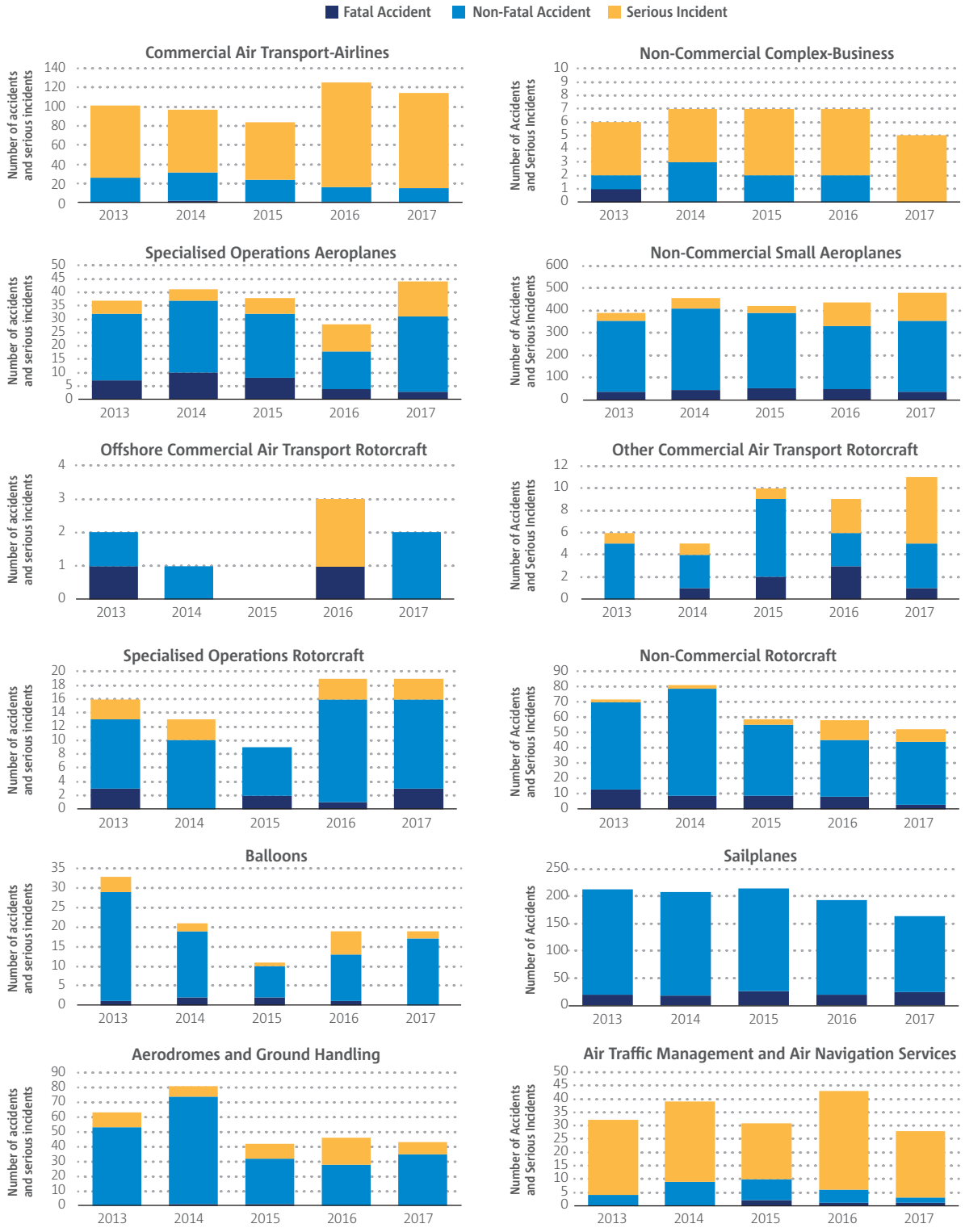
Table 2. Cross Domain Comparison of EASA MS Infrastructure Fatal Accidents and Fatalities, 2007-2017

Infrastructure	Fatal Accidents 2017	Fatal Accidents 2007-2016 Mean	Fatalities 2017	Fatalities Annual 2007-2016 Mean	Fatalities Annual 2007-2016 Median
ADM & GH	0	0.7	0	1.7	0.5
ATM/ANS*	1	0.5	6	1.6	0

*The ATM/ANS figures include both ATM/ANS related and contribution accidents. See chapter 7 for further details.

The graphs below show the number of fatal accidents, non-fatal accidents and serious incidents for each aircraft domain, providing a visual comparison.

Figure 3. Number of Fatal Accidents, Non-fatal Accidents and Serious Incidents by Domain, 2013-2017



Aeroplanes

2

This chapter covers all aeroplane operations. The chapter is divided in four main sections:

1. EASA MS Air Operators (EASA MS AOC Holders) of airline passenger/cargo with aeroplanes having a maximum take-off weight above 5700 kg

2. EASA MS registered complex aeroplanes operating non-commercial operations (NCC) not classified as special operations (SPO) and with a maximum take-off weight above 5700 kg

3. EASA MS registered aeroplanes or EASA MS AOC Holder performing special operations (SPO) such as air ambulance, advertisement, photography, etc.

4. EASA MS registered non-complex aeroplanes performing non-commercial operations, having a maximum take-off weight below 5700 kg and not covered in the sections above.

For each section, the key statistics are presented. For sections 1 and 2, a common safety risk portfolio has been developed since, despite of the different type of operations, they both have a large amount of commonalities in terms of risk areas and safety issues. Sections 3 and 4 contains an individual safety risk portfolio covering each domain.

2.1 Commercial Air Transport - Airlines

This section covers the main statistics for the EASA MS Air Operators (EASA MS AOC Holders) of airline passenger/cargo with aeroplanes having a maximum take-off weight above 5700 kg. Data is based on the accidents and serious incidents collected by the Agency as per Annex 13 investigations or by the active search of those events from other official sources.

2.1.1 Key Statistics

The key statistics for this domain are in the tables below and include comparison of the number of accidents (fatal and non-fatal) and serious incidents for the 10-year period 2007-2016 and the last year (2017). It also includes the comparison of the fatalities and serious injuries happened in those accidents between the same timeframe.

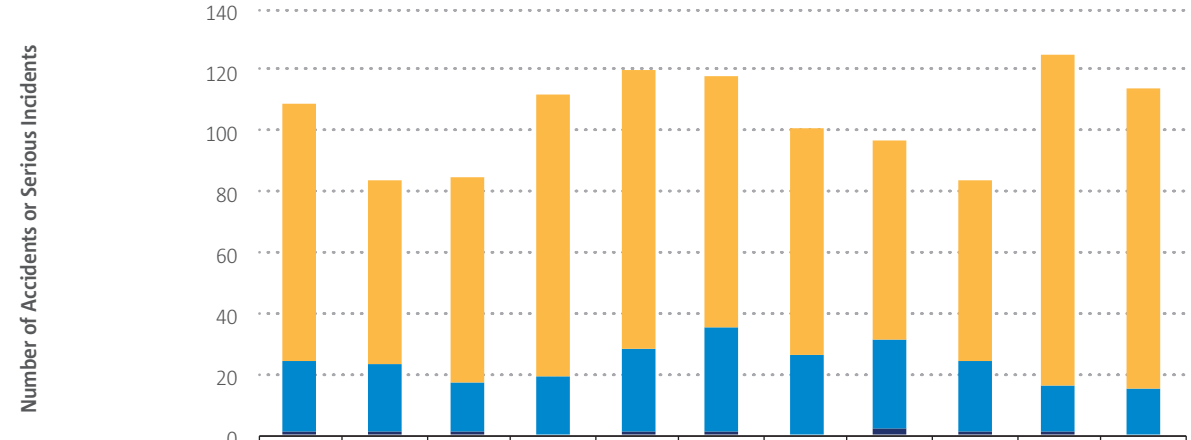
Table 3. Key Statistics for Commercial Air Transport Airlines, 2007-2017

	Fatal Accidents	Non-Fatal Accidents	Serious Incidents
2007-2016 total	9	235	792
2017	0	15	99

	Fatalities	Serious Injuries
2007-2016 total	664	111
2017	0	10

During 2017, there were no fatal accidents involving European CAT AOC Holders and the number of non-fatal accidents was lower than the average of the previous 10-year period. In 2017, there was an increase in serious incidents in comparison with the average of the previous 10-year period.

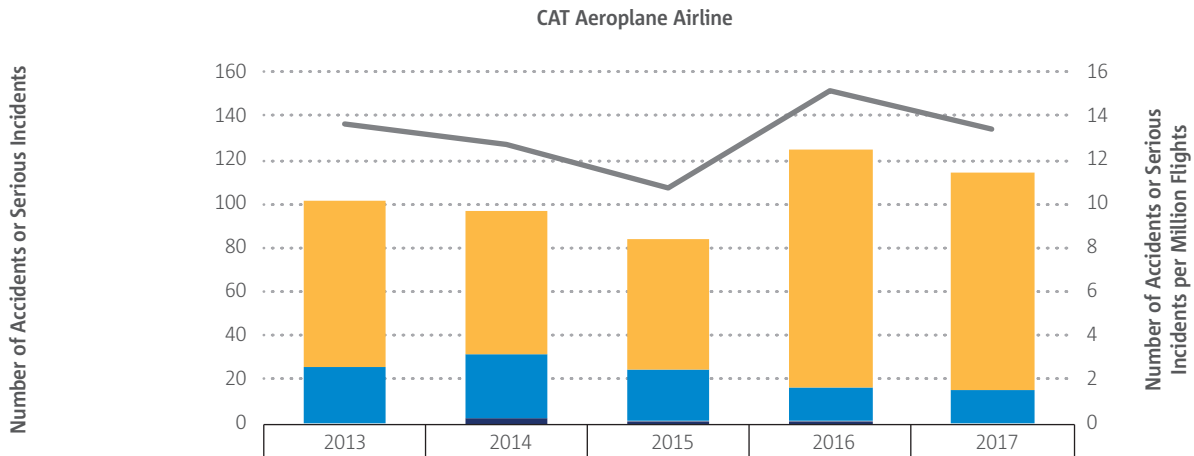
Figure 4. Number of fatal accidents, non-fatal accidents and serious incidents for commercial air transport airlines, 2007 - 2017



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Serious Incident	85	61	68	93	92	83	75	66	60	109	99
Non-Fatal Accident	23	22	16	19	27	34	26	29	23	15	15
Fatal Accident	1	1	1	0	1	1	0	2	1	1	0

The rate of accidents has continued to decrease since 2014, although the number of serious incidents remains higher than usual following a peak in 2016. This peak is the result of the more stringent classification of separation minima infringements by the Members States Aviation and Safety Investigation Authorities, after the entry into force of the Regulation (EU) 376/2014.

Figure 5. Number and rate of fatal accidents, non-fatal accidents and serious incidents for commercial air transport airlines, 2013 - 2017



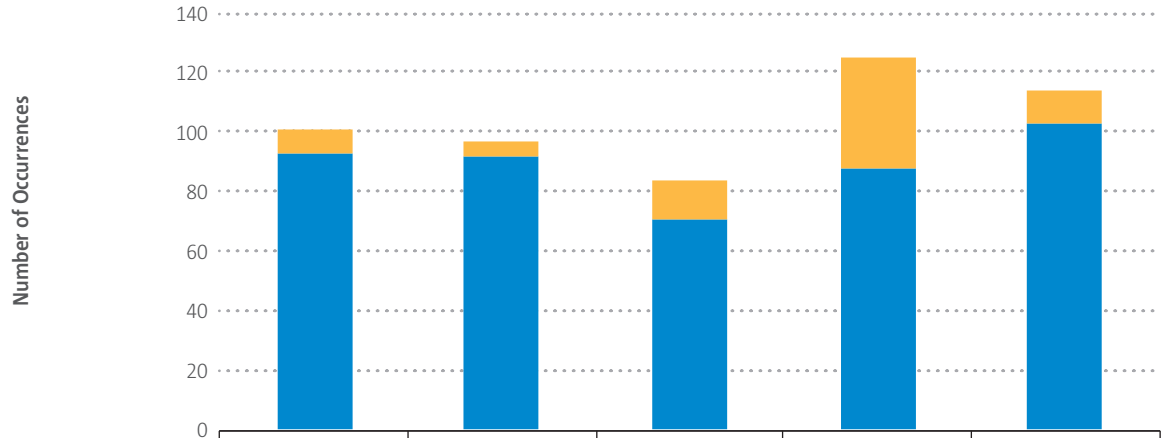
	2013	2014	2015	2016	2017
Serious Incident	75	66	60	109	99
Non-Fatal Accident	26	29	23	15	15
Fatal Accident	0	2	1	1	0
Rate per million flights	14	13	11	15	13

The use of the classification of accidents and serious incidents does not necessarily provide an accurate picture of the risk of those events. As example, a very close near-miss would be classified as a serious incident, while a collision between ground handling vehicle and an aircraft leading to substantial damages of the later would be classified as an accident. It is clear that in terms of risk, the serious incident in this example would be higher than the accident. This is the reason why the Regulation (EU) 376/2014 mandates the development and use of a common risk classification scheme (ERCS) to risk classify all occurrences reported to the European Authorities. The

main purpose of this risk score is to be able to discriminate between the occurrences with a high and lower associated risk. EASA, together with an expert group composed by relevant European Risk Experts, has developed the ERCS methodology that will be published by the European Commission in 2018.

Figure 6 shows the intended evolution of the key statistics from the accidents and serious incidents data supporting this section toward higher risk and lower risk occurrences. As it can be seen, the data shows a different pattern than the representation of accidents and serious incidents. This is because of the high risk of the occurrences classified as serious incidents that, in many cases equals or even exceeds the risk of certain accidents.

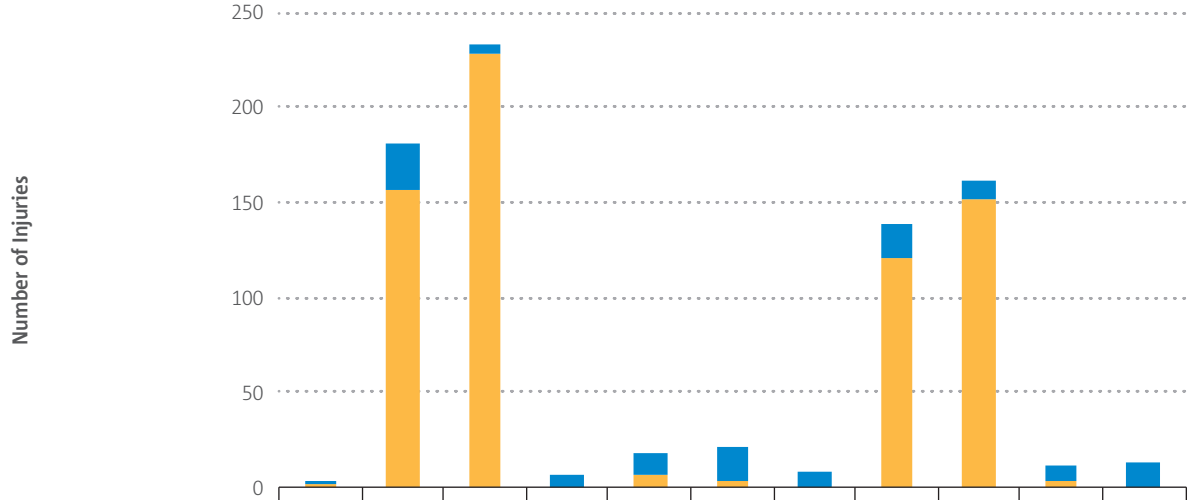
Figure 6. Number of accidents and serious incidents by higher and lower ERCS score for commercial air transport airline operations, 2013 - 2017



	2013	2014	2015	2016	2017
Lower Risk	8	5	13	37	11
Higher Risk	93	92	71	88	103

As can be seen in Figure 7, the number of fatalities per year changes substantially, being dependent on the size and occupancy of the aeroplane that involved in the accident.

Figure 7. Number of fatalities and serious injuries involving commercial air transport airlines, 2007 - 2017

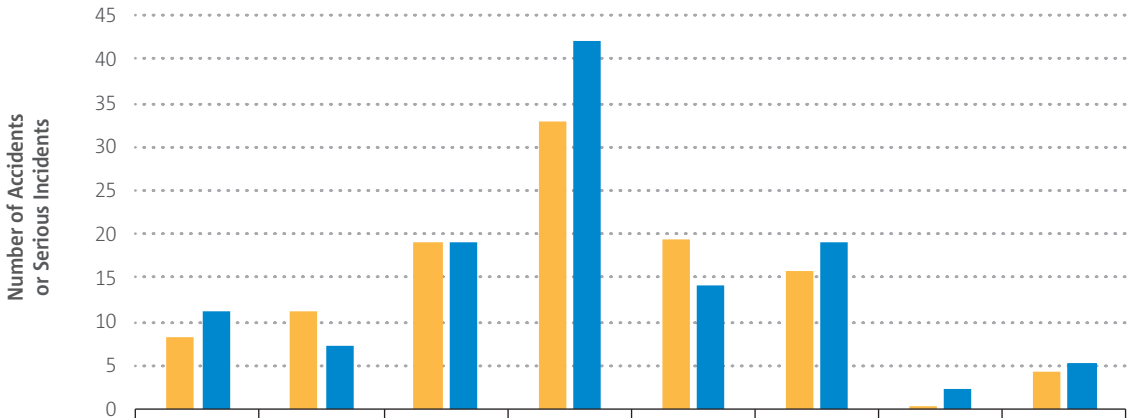


	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total Serious Injuries	2	25	4	6	11	18	8	18	10	9	12
Total Fatalities	1	155	228	0	6	2	0	120	150	2	0

2.1.1.1 Phase of flight

The numbers for 2017 show a decrease of accidents and serious incidents in taxi and approach when compared to the 10 year average. In same period however, accidents and serious incidents occurred during the other flight phases have increased. The “Unknown/blank” flight phase corresponds to those occurrences where no data was available and it normally relates to the second aircraft in some of the occurrences (e.g. a general aviation leisure flight leading to a loss of separation with an airliner, missing information on the specific flight phase for the general aviation flight).

Figure 8. Distribution of accidents and serious incidents by flight phase for commercial air transport airlines, 2007 - 2017

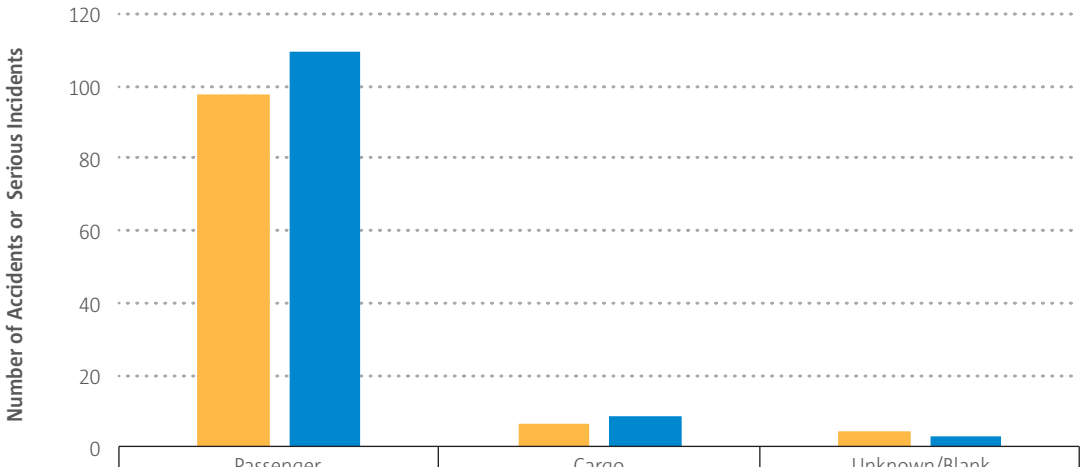


	Standing	Taxi	Take-off	En route	Approach	Landing	Tow	Unknown/ Blank
Average 2007-2016	7.9	11	18.8	32.8	19.1	15.6	0.1	4
2017	11	7	19	42	14	19	2	5

2.1.1.2 Operation type

The numbers for 2017 show a similar distribution between operation types (passenger or cargo) in comparison to the 10 year average, with a slight increase for the figures in 2017. “Unknown/blank” corresponds to those occurrences where no data on the operation type was available and it normally relates to the second aircraft in some of the occurrences (e.g. loss of separation between an airliner and another aircraft).

Figure 9. Distribution of accidents and serious incidents by operation type for commercial air transport airlines, 2007 - 2017

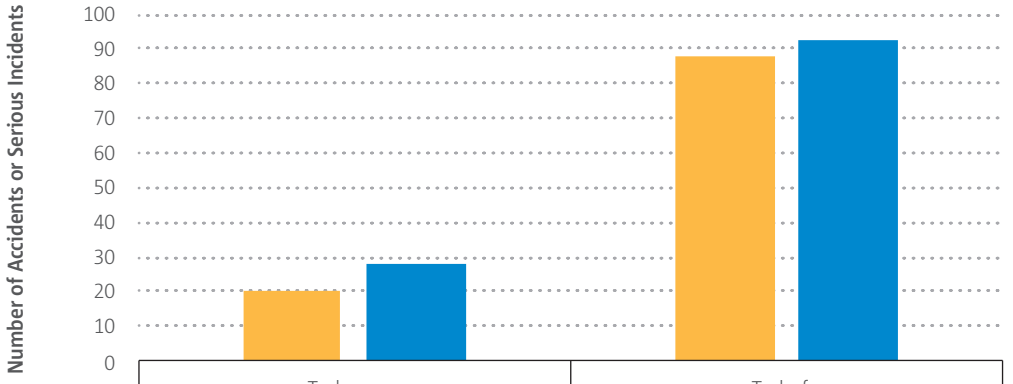


	Passenger	Cargo	Unknown/Blank
Average 2007-2016	97	6	4
2017	109	8	3

2.1.1.3 Propulsion type

The split by propulsion type shows an increase in 2017 of the turbofan and turboprop related occurrences with reference to the 10 year average. The comparison between turbofan and turboprop is in line with the split of aircraft fleet sizes and its different exposure figures.

Figure 10. Distribution of accidents and serious incidents by propulsion type of the aeroplane(s) involved for commercial air transport airlines, 2007 - 2017



	Turboprop	Turbofan
Average 2007-2016	20.2	87.7
2017	28	92

2.2 Non-Commercial Complex – Business

This section covers the safety performance of the EASA MS registered complex aeroplanes operating non-commercial operations (NCC) not classified as special operations (SPO) and with a maximum take-off weight above 5,700 kg. Data is based on the accidents and serious incidents collected by the Agency as per Annex 13 investigations or by the active search of those events from other official sources.

2.2.1 Key Statistics

The key statistics for this domain are in the tables below and include a comparison of the number of accidents (fatal and non-fatal) and serious incidents for the 10-year period 2007-2016 and the last year (2017). It also includes the comparison of the fatalities and serious injuries happened in those accidents between the same timeframe.

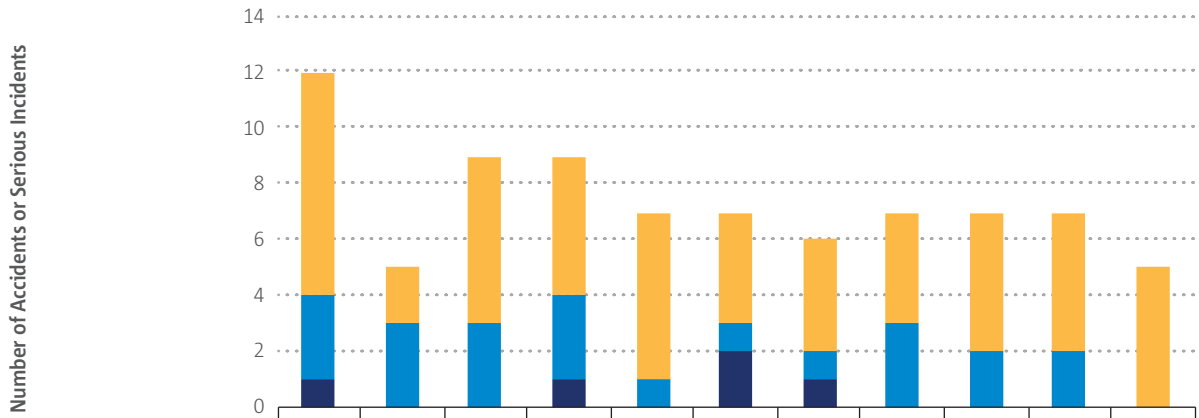
Table 4. Key Statistics for Non-commercial Complex Business Operations, 2007- 2017

	Fatal Accidents	Non-Fatal Accidents	Serious Incidents
2007-2016 total	5	22	49
2017	0	0	5

	Fatalities	Serious Injuries
2007-2016 total	6	3
2017	0	0

During 2017, there were no accidents involving European registered NCC operated aircraft, therefore there were also no fatalities or serious injuries in 2017. The number of serious incidents remained as the average of the previous 10-year period. The low numbers probably indicate an incomplete dataset, possibly as a result of the lack of reporting of occurrences not classified as accidents.

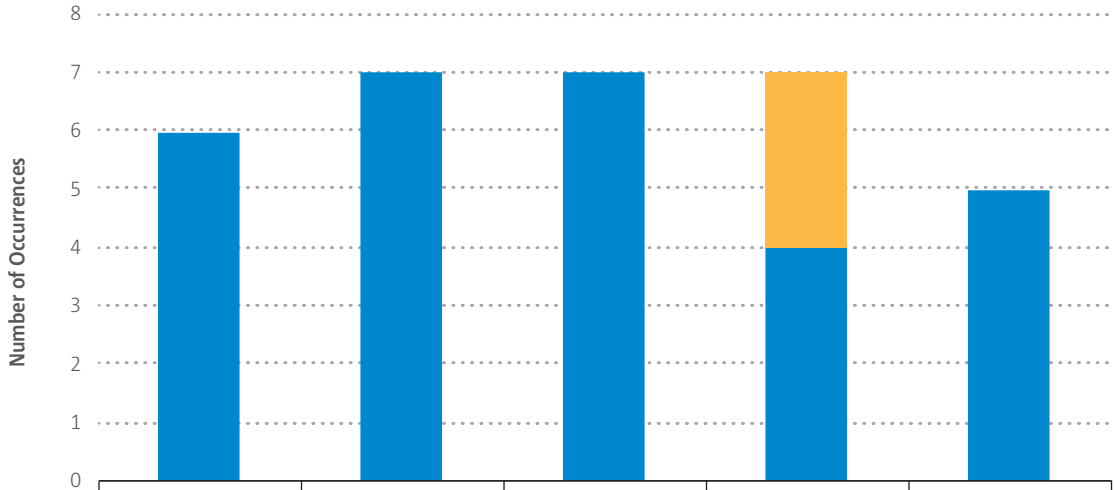
Figure 11. Number of fatal accidents, non-fatal accidents and serious incidents for non-commercial complex business, 2007 - 2017



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Serious Incident	8	2	6	5	6	4	4	4	5	5	5
Non-Fatal Accident	3	3	3	3	1	1	1	3	2	2	0
Fatal Accident	1	0	0	1	0	2	1	0	0	0	0

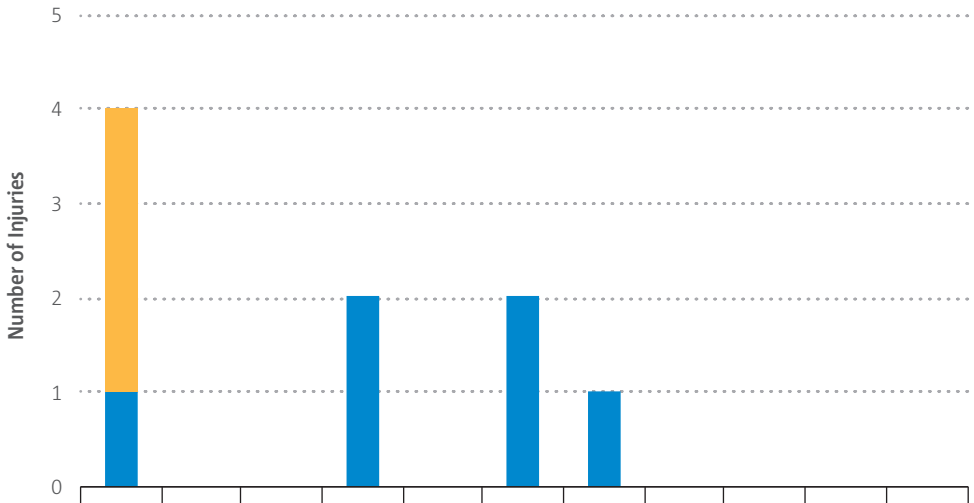
In the same way as in the previous section, Figure 12 shows the split of the accidents or serious incidents by the ERCS score grouped by higher risk and lower risk. This indicator provides an additional view with a proxy to the risk of those occurrences.

Figure 12. Number of accidents and serious incidents by higher and lower ERCS score for non-commercial complex business, 2013 - 2017



	2013	2014	2015	2016	2017
Lower Risk	0	0	0	3	0
High Risk	6	7	7	4	5

Figure 13. Number of fatalities and serious injuries involving non-commercial complex business, 2007 - 2017



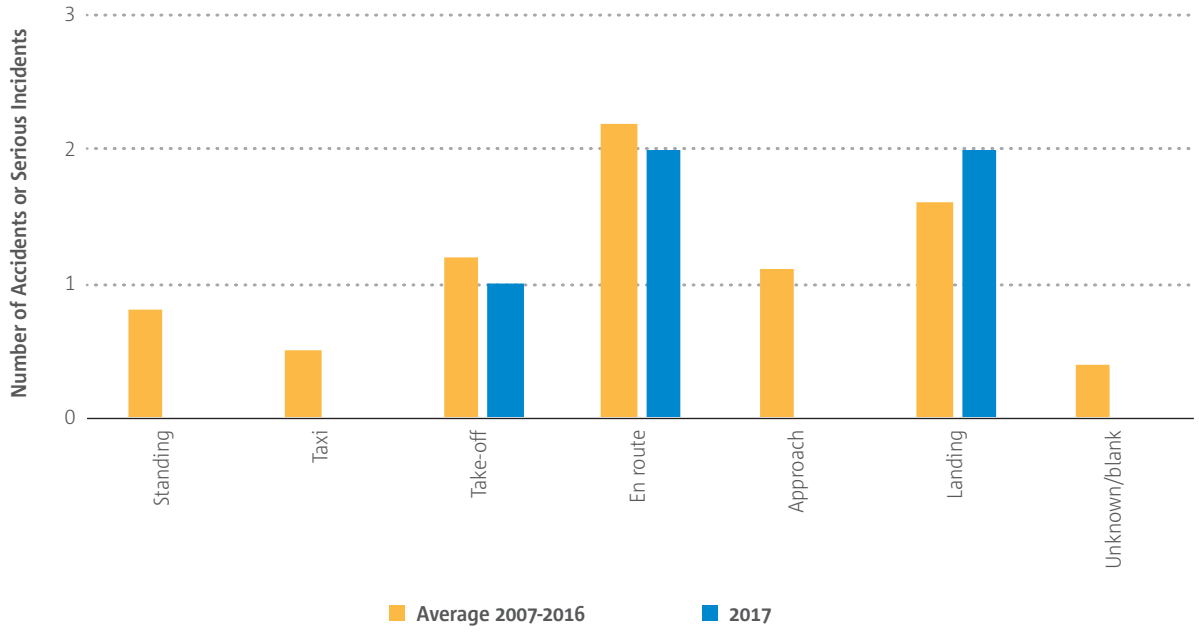
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total Serious Injuries	3	0	0	0	0	0	0	0	0	0	0
Total Fatalities	1	0	0	2	0	2	1	0	0	0	0

Due to the size of the aeroplanes used for the majority of this type of operation, the number of fatalities is significantly low.

2.2.1.1 Phase of flight

The low numbers in this section prevent any conclusions to be drawn in terms of the flight phase.

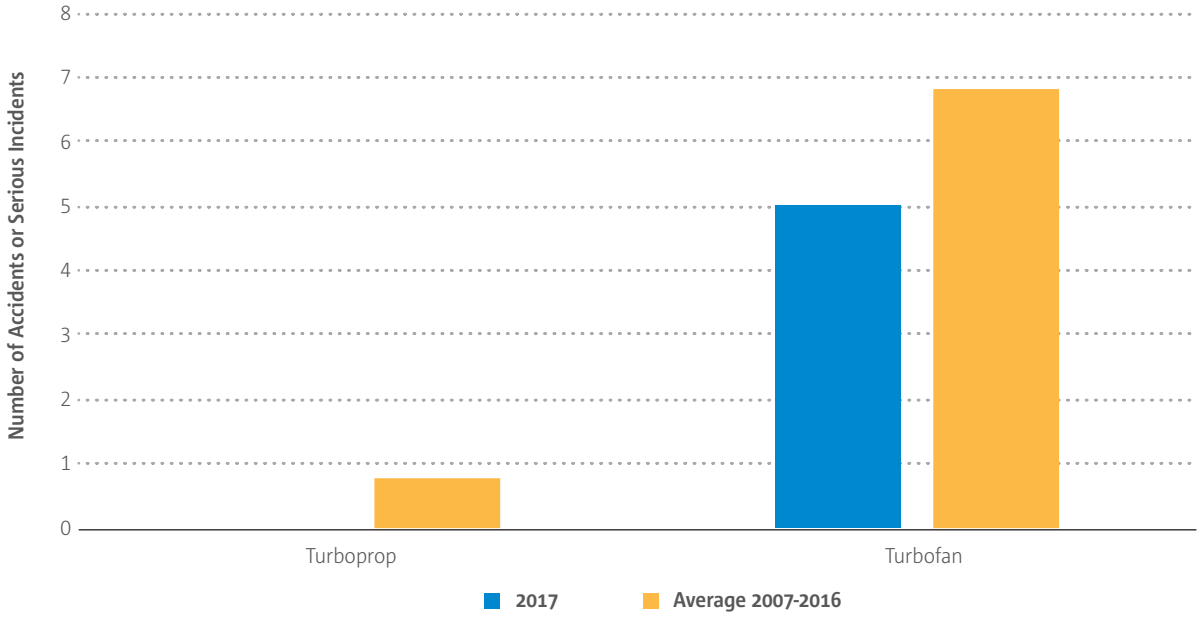
Figure 14. Distribution of accidents and serious incidents by flight phase for non-commercial complex business, 2007 - 2017



2.2.1.2 Propulsion type

The split by propulsion type shows that the only propulsion type involved in accidents or serious incidents in 2017 was the turbofan type.

Figure 15. Distribution of accidents and serious incidents by propulsion type for non-commercial complex business, 2007 - 2017



2.3 Safety Risk Portfolio for Large Aeroplane (CAT-Airlines and NCC-Business)

CAT Airlines and NCC Business operations are covered by a single Safety Risk Portfolio due to the similarity of the main risk areas and safety issues for both operation types, and to the small dataset available for NCC-Business. Those safety issues which might be only relevant for one of the operation types are highlighted as such when necessary.

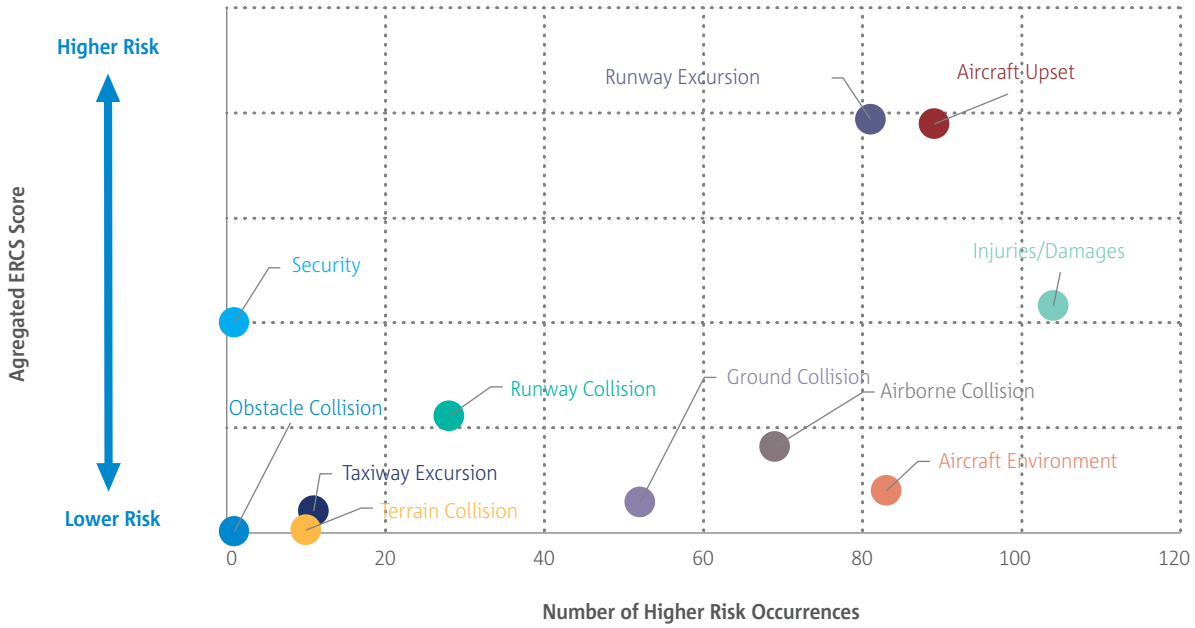
The safety risk portfolio for Airline and NCC-business operation provides a summary of the top risk areas and safety issues of this part of the aviation system. It covers the Tier 2 (Key Risk Areas) and Tier 2+ (Safety Issues) of the performance framework in each domain. The portfolio is used to prioritise the assessment of safety issues, to target analysis activities over key risk areas and to prioritise safety actions.

However, the portfolio presented in this section is not yet that safety risk portfolio referred above but the so-called “data portfolio”. This is the result of the yearly review of the relevant occurrence data to establish the link between each individual occurrence and the key risk areas and safety issues already listed in the last year’s portfolio. This is considered an intermediate step towards the final Safety Risk Portfolio.

While the information presented in the data portfolio is relevant and provides an indication of the potential areas of concern, it is not yet an indication of the main risk areas or safety issues. The data portfolio is used to identify a reduced number of key risk areas for which an in-depth analysis will be carried out to determine the completeness of safety issues that have contributed to those risk areas and to assess the level of control of over the most relevant safety issues. This assessment would consider the increase/decrease of exposure to the relevant hazard, the effectiveness of existing controls and the expected risk reduction by committed safety actions. This analysis integrates the expertise from the CAGs and the EASA operational departments so as to complement the view provided by occurrence data. The result of this review is the Safety Risk Portfolio that defines the safety priorities for each aviation domain.

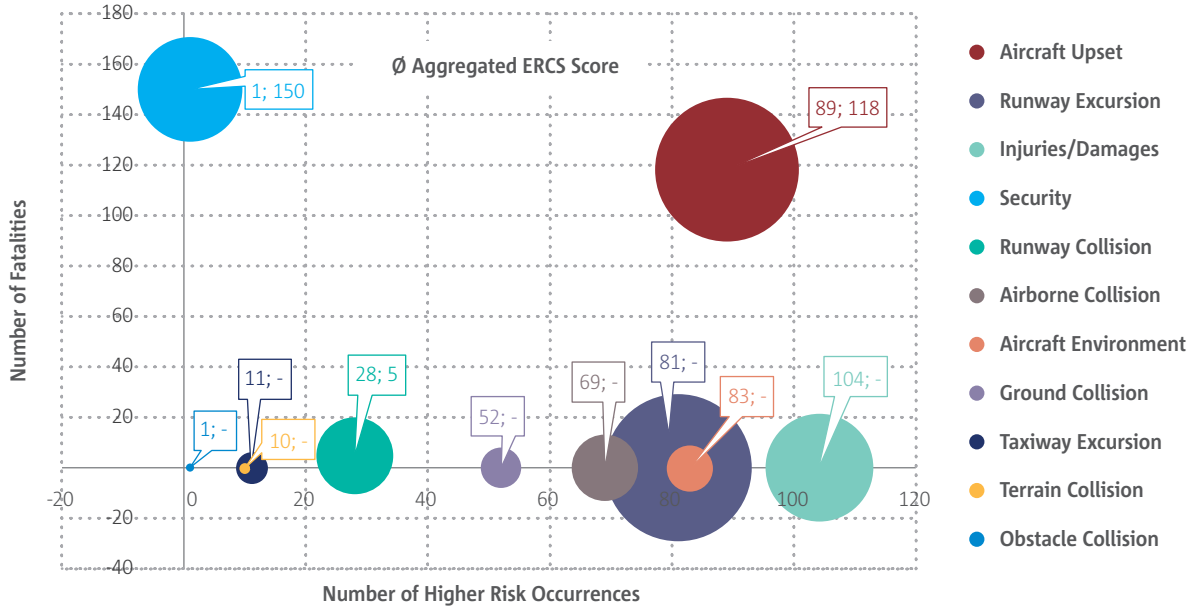
The data portfolio uses the aggregated ERCS score to provide and initial ranking of the key risk areas and safety issue. The figure below plots the high risk occurrences, based on its ERCS risk score, by their associated key risk areas. It draws in the x-axis the number of those high risk occurrences per key risk area and in the y-axis the aggregated ERCS risk score for each key risk area.

Figure 16. Distribution of key risk areas by frequency and aggregated ERCS risk score for commercial air transport airlines and non-commercial complex business, 2013-2017



The figure below provides a similar representation of the key risk areas but it introduces the dimension of fatalities associated to them (y-axis) and shows the aggregated ERCS risk score as the size of the bubbles.

Figure 17. Distribution of key risk areas by fatalities, number of higher risk occurrences and ERCS risk score for commercial air transport airlines and non-commercial complex business, 2013-2017



From these two representations, it can be concluded that the key risk areas accumulating higher risk score, based on the occurrence data used, are Runway Excursion and Aircraft Upset. They concern a high number of higher risk occurrences and aggregating the highest risk score. At a second stage, it lays the key risk areas of Injuries/Damages and Security. The first one occurs often leading to high severity outcomes though to a reduced number of persons (injuries to few crew or passengers). The second one, Security, very much depends on the will and capability to cause harm, considerations not appearing in pure safety risk assessments. Security shows that, while high risk occurrences associated to it are infrequent (only one confirmed in the last 5 years), it becomes of high risk due to the lack of efficient barriers to stop it. Runway Collision and Airborne Collision can be considered at a third stage of importance.

The data portfolio shown here below has been sorted following the risk order given by the aggregated ERCS risk score of the high risk occurrences related to key risk areas or to safety issues. It is acknowledged that this indicator is still a proxy to the risk, but it is evaluated as a better reference than the pure sorting by the number of accidents and serious incidents. This indicator will be complemented by the qualitative analysis to estimate the actual risk by considering the increase/reduction of exposure to the relevant hazards and the expected risk reduction of the ongoing safety actions, for both key risk areas and safety issues. This analysis will provide still a proxy to the risk but it will provide a more consistent ranking.

The safety risk portfolio shows in the upper part, the key risk areas (based on the ERCS score) for the past 5 years. A key risk area includes both the undesired outcome (accident) and the immediate precursors to those outcomes (less severe occurrences, normally). In rows, the safety risk portfolio shows a similar spread by safety issues based on the aggregated ERCS score of those occurrences where those safety issue were present. The dotted grid establishes the relation between safety issues and key risk areas – it identifies which safety issues contribute to which (potential) accident outcomes. Dots come from occurrence data.

Based on the data supporting the portfolio, the following relations between the priority 1 key risk areas and safety issues can be highlighted:

- Aircraft upset:
  - Monitoring of flight parameters and automation modes
  - Approach path management
  - Convective weather
  - In flight icing
  - Handling of technical failures

- Runway Excursion
  - Approach path management
  - Monitoring of flight parameters and automation modes
  - Handling of technical failures

The main Key Risk Areas highlighted above are defined by their accident outcome that needs to be prevented and by its immediate precursors.

- Aircraft upset: It includes uncontrolled collisions with terrain following an aircraft upset, but also occurrences where the aircraft deviated from the intended flight path or intended flight parameters, regardless of whether the flight crew realised the deviation and whether it was possible to recover or not. It also includes the triggering of stall warning and envelope protections.

- Runway excursion: It covers materialised runway excursions, both at high and low speed, and occurrences where the flight crew had difficulties maintaining the directional control of the aircraft or of the braking action during landing, where the landing occurred long, fast, off-centred or hard, or where the aircraft had technical problems with the landing gear (not locked, not extended or collapsed) during landing.

The safety issues identified as the main contributors and highlighted above are defined as follows:

- Monitoring of flight parameters and automation modes: It is the inadequate monitoring of the main flight parameters and automation modes, potentially leading to the upset of the aircraft, runway excursion or controlled collision with terrain. It covers the relevant SOPs and trainings of the flight crew. It also includes the considerations related to human factors, especially to the human-machine interface (HMI) of aircraft systems and indications.

- Approach path management: Ineffective or incorrect management of the approach path (i.e. not stable and/or compliant) that may lead to go-arounds, hard landings or runway excursion.

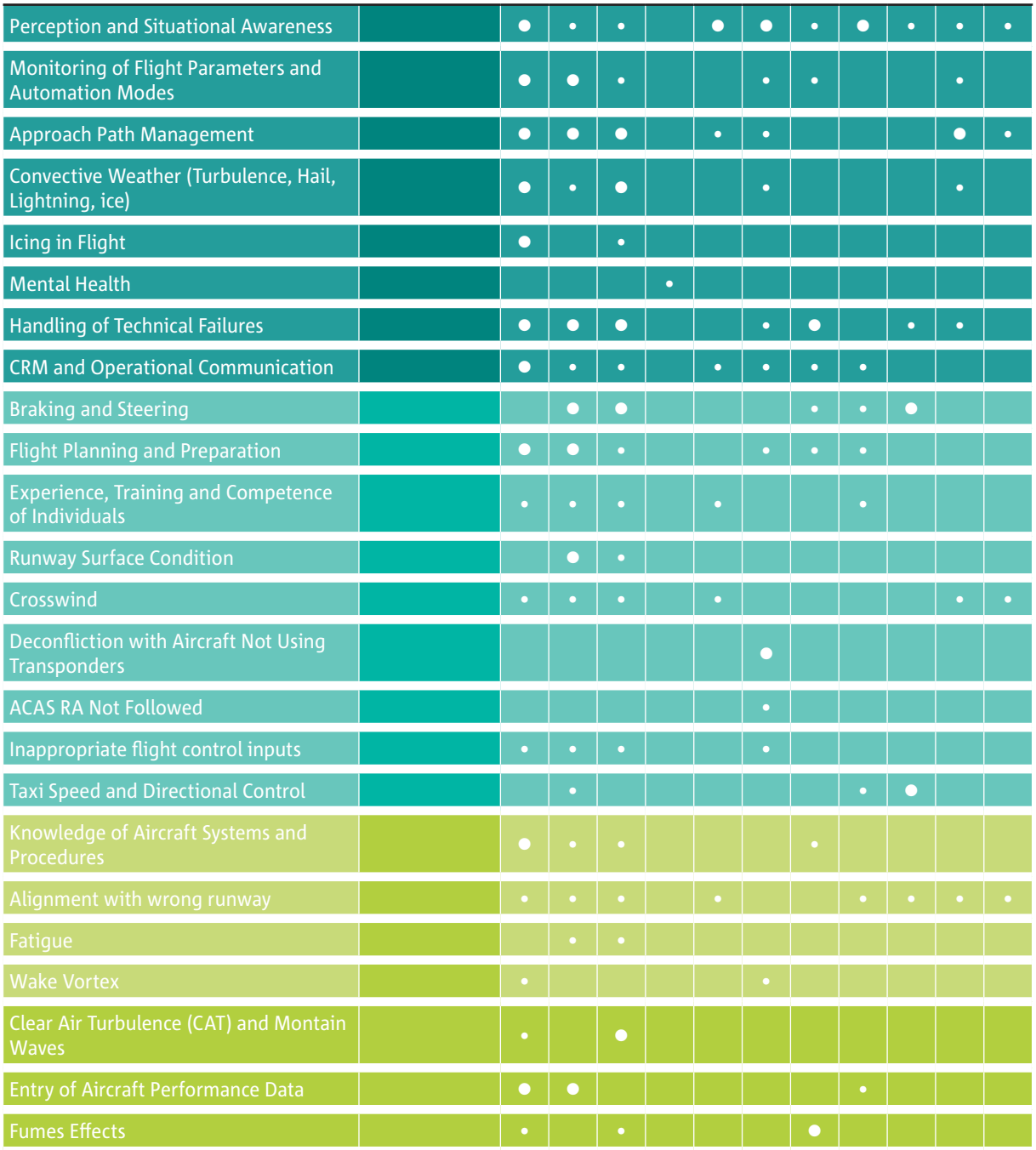
- Convective weather: it is the situation where the aeroplane flies within atmospheric convective phenomena, potentially leading to aircraft upset (uncontrolled collision with terrain) and injuries to passengers or crews. The safety issue covers the main convective phenomena affecting the safe flight, such as convective turbulence, up/down-drafts, wind shear, hail precipitation, lightning and icing. The main threat posed by this safety issue is the loss of control of the aircraft after being forced out of its flight envelope by a severe atmospheric phenomenon or after a system failure not adequately handled by the flight crew. This safety issue may also lead to injuries mainly due to the sudden encounter with turbulences. The safety issue covers the detection, avoidance and flying-in convective weather during the flight, and all the support to flight crews to deal with it before (e.g. flight planning, meteorological information) and during the flight (e.g. on-board detection systems, ATS vectoring). It especially covers the SOPs and training of the flight crew to maintain or recovering the safe flight. The safety issue also considers the robustness of the aeroplane to conduct a flight in convective atmospheric conditions, as per its initial certification and its in-service experience (i.e. continuous airworthiness process).

- Inflight icing: it is the situation where the aeroplane flies within icing conditions, potentially leading to aircraft upset (uncontrolled collision with terrain) due to ice accretion on the aeroplane. The main threat posed by this safety issue is the contamination of aircraft surfaces or systems that may severely impact the performance or controllability of the aircraft. It covers the detection, avoidance and flying-in icing conditions during the flight, and all the support to flight crews to deal with it before (e.g. flight planning, meteorological information) and during the flight (e.g. on-board detection systems, de/anti-icing

systems). It especially covers the SOPs and training of the flight crew to maintain or recovering the safe flight. The safety issue also considers the robustness of the aeroplane to conduct a flight in icing conditions, as per its initial certification and its in-service experience (i.e. continuous airworthiness process). This safety issue partially overlaps with the Convective Weather.

- Handling of technical failures: It is the ineffective handling of a non-catastrophic technical failure by the flight crew. Technical failures are those not rendering the aircraft uncontrollable and for which the flight crew are trained to manage them. It includes the human factors playing a role in the realisation and processing of the failure information and the later reaction of the crew to handle the issue. It covers the related SOPs and trainings of the flight crew.

Figure 18. Safety Risk Portfolio for CAT Airline and NCC Business aeroplane operations showing how the 5-year occurrence data 2013-2017 relates to safety issues and their outcomes relative to risk in descending order.



Large Aeroplane - Airlines / NCC Business

Bands of Aggregated ERCS Risk Score (2013-2017)		Priority 1		Priority 2		Priority 3		Priority 4				
Number of High Risk ERCS Occurrences		89	81	104	1	28	69	83	52	11	10	1
Safety Issues	Bands of Aggregated ERCS Score 2013-2017	Key Risk Areas (Outcomes and precursors)										
		Aircraft Upset	Runway Excursion	Injuries/Damages	Security	Runway Collision	Airborne Collision	Aircraft Environment	Ground Collision	Taxiway Excursion	Terrain Collision	Obstacle Collision
Aircraft maintenance		●	•	•				●			•	
Decision Making and Planning		•	•	•					•		•	
Icing on Ground		•	•	•				•	•			
Slow Rotation at Take-off		•	•									
Airborne Separation RPAS							•					
Windshear		•	•				•					
Baggage and Cargo loading		•										
False or Disrupted ILS Signal Capture		•	•			•					•	•
Gastrointestinal Illness				•								
Transport of Lithium Batteries				•				•				
Handling and Execution of Go-Arounds		•					•	•			•	
Bird/ Wildlife Strikes		•										
Personal Pressure and Arousal		•	•									
Supporting Information to the Flight Crews												
Tyre pressure condition												
Disruptive Passengers												
Effectiveness of Safety Management												
Fuel Contamination		under evaluation										
Laser Illumination Effects		under evaluation										
Fuel Management		under evaluation										
Non-Precision Approaches		under evaluation										
Safety Culture		under evaluation										
Damage Tolerance to UAS Collisions		under evaluation										

● A significant number of occurrences • A small number of occurrences

2.4 Specialised Operations

This chapter covers Aerial Work and Special Operations (SPO) involving aeroplanes of all mass groups with an EASA MS State of Registry or State of Operator.

2.4.1 Key Statistics

The key statistics for this domain are in the tables below and include a comparison of the number of accidents (fatal and non-fatal) and serious incidents for the 10-year period 2007-2016 and the last year (2017). It also includes the comparison of the fatalities and serious injuries happened in those accidents between the same timeframe.

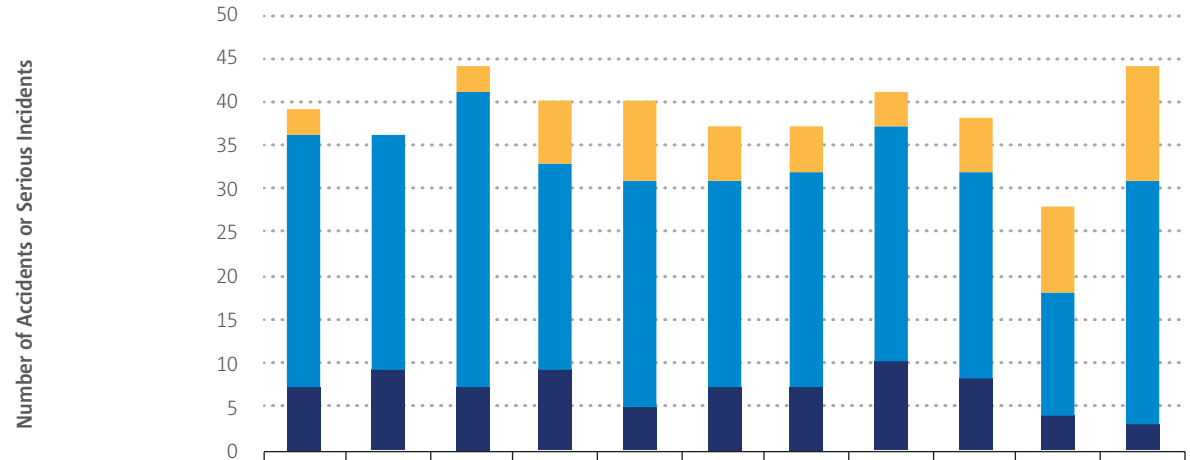
Table 5. Key Statistics for Aeroplane Specialised Operations, 2007-2017

	Fatal Accidents	Non-Fatal Accidents	Serious Incidents
2007-2016 total	73	254	53
2017	3	29	13

	Fatalities	Serious Injuries
2007-2016 total	181	86
2017	4	11

There were 3 fatal accidents in 2017, lower than the average of the preceding decade. However, at 29 the number of non-fatal accidents was slightly higher than the average of 2007-2016 and the number of serious incidents was considerably higher than the average of the preceding 10-year period. The number of fatalities in 2017 was considerably lower than the preceding decade average, whereas the number of serious injuries was slightly higher than the 2007-2016 average.

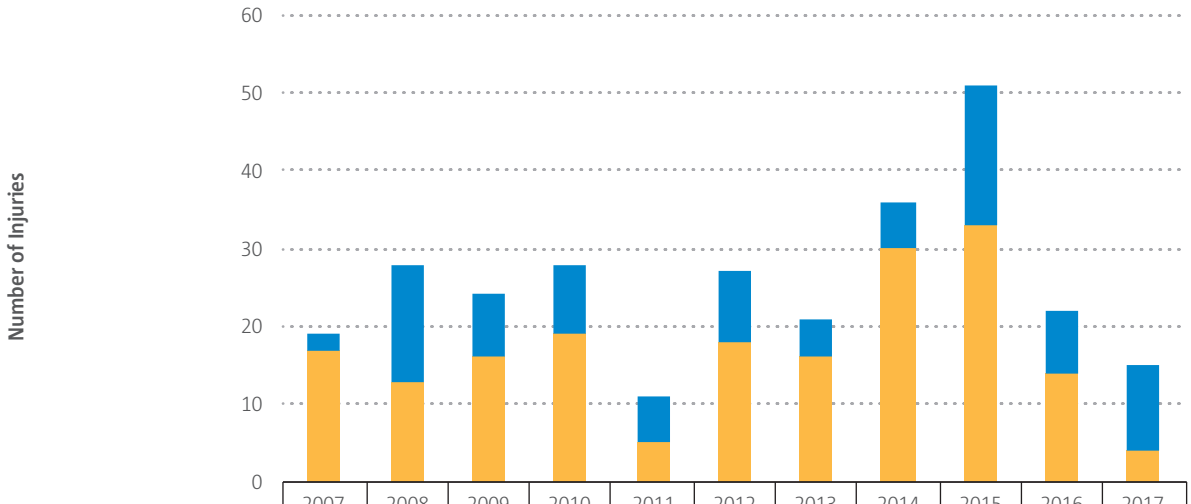
Figure 19. Number of fatal accidents, non-fatal accidents and serious incidents for aeroplane specialised operations, 2007 - 2017



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Serious Incidents	3	0	3	7	9	6	5	4	6	10	13
Non-Fatal Accidents	29	27	34	24	26	24	25	27	24	14	28
Fatal Accidents	7	9	7	9	5	7	7	10	8	4	3

The number of fatal accidents in 2017 was lower than that of any year in the preceding decade. Contrastingly, the number of non-fatal accidents was higher than all but two of the years (2007 and 2009) in the preceding 10-year period.

Figure 20. Aeroplane Specialised Operations Fatalities and Serious Injuries, 2007-2017



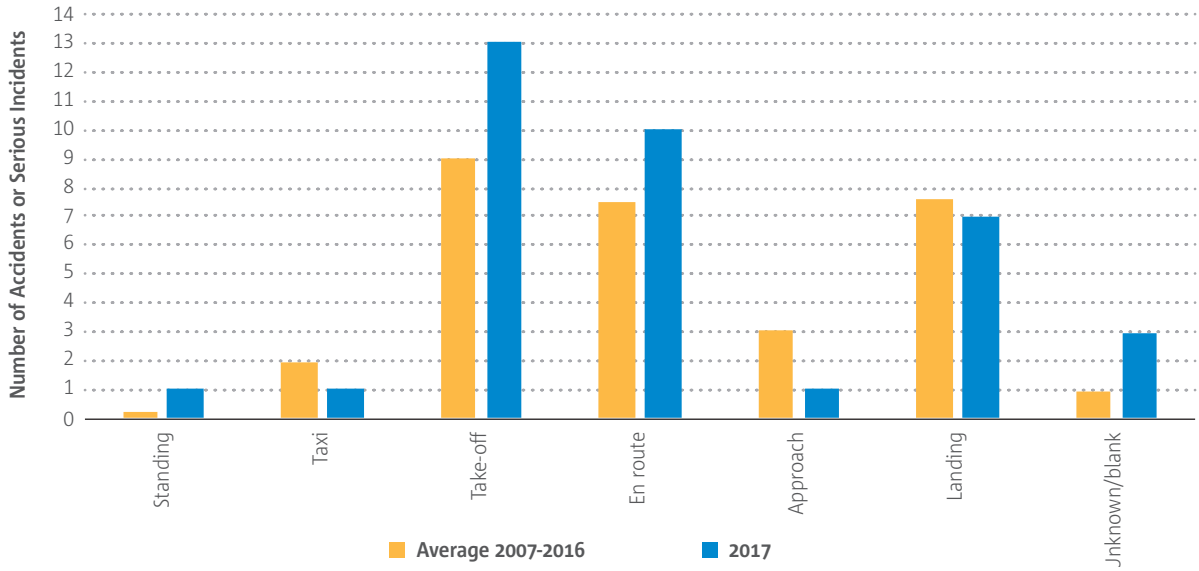
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total Serious Injuries	2	15	8	9	6	9	5	6	18	8	11
Total Fatalities	17	13	16	19	5	18	16	30	33	14	4

In line with the number of fatal accidents, the number of fatalities in 2017 was also lower than any year in the preceding decade. The number of serious injuries in 2017 was higher than all but two years (2008 and 2015) in the preceding 10-year period.

2.4.1.1 Phase of flight

The number of accidents and serious incidents in the standing, take-off and en-route phases were higher in 2017 than the average of the preceding decade. In 2017 there was only one accident/serious incident in the taxi and approach phases respectively, which was below the average of the preceding decade.

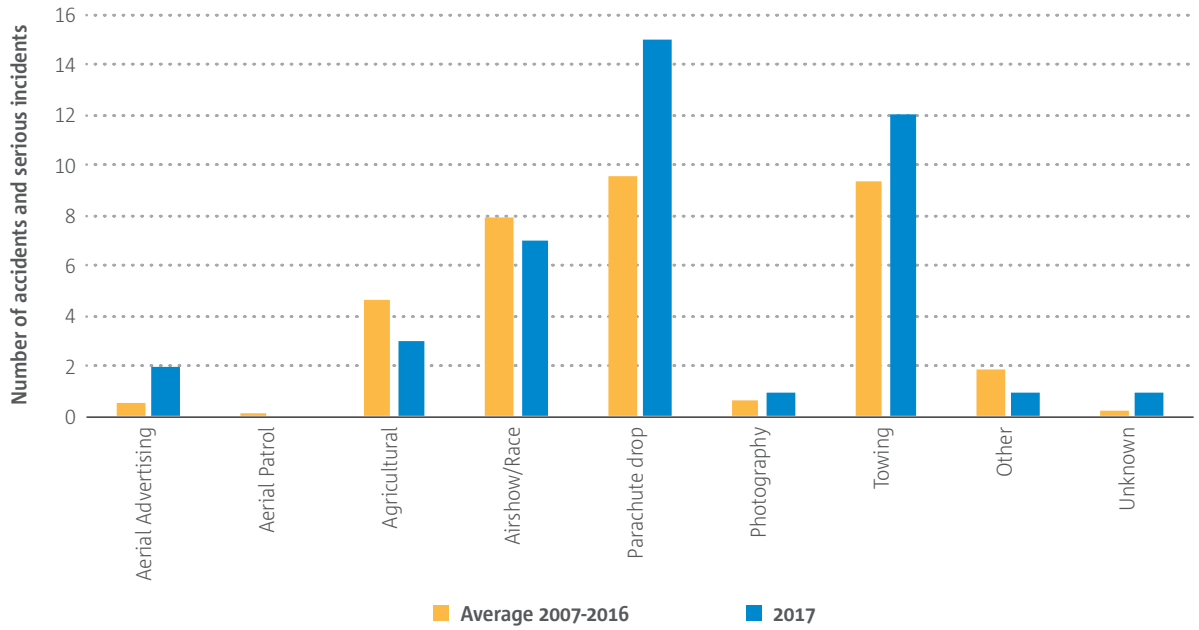
Figure 21. Aeroplane Specialised Operations Accidents and Serious Incidents by Phase of Flight, 2007-2017



2.4.1.2 Operation Type

The number of accidents and serious incidents in aerial advertising, parachute drop, photography and towing was higher in 2017 than the average of the preceding decade. In agricultural and airshow/race the 2017 number was lower than the preceding 10-year period. There were no aerial patrol accidents or serious incidents in 2017.

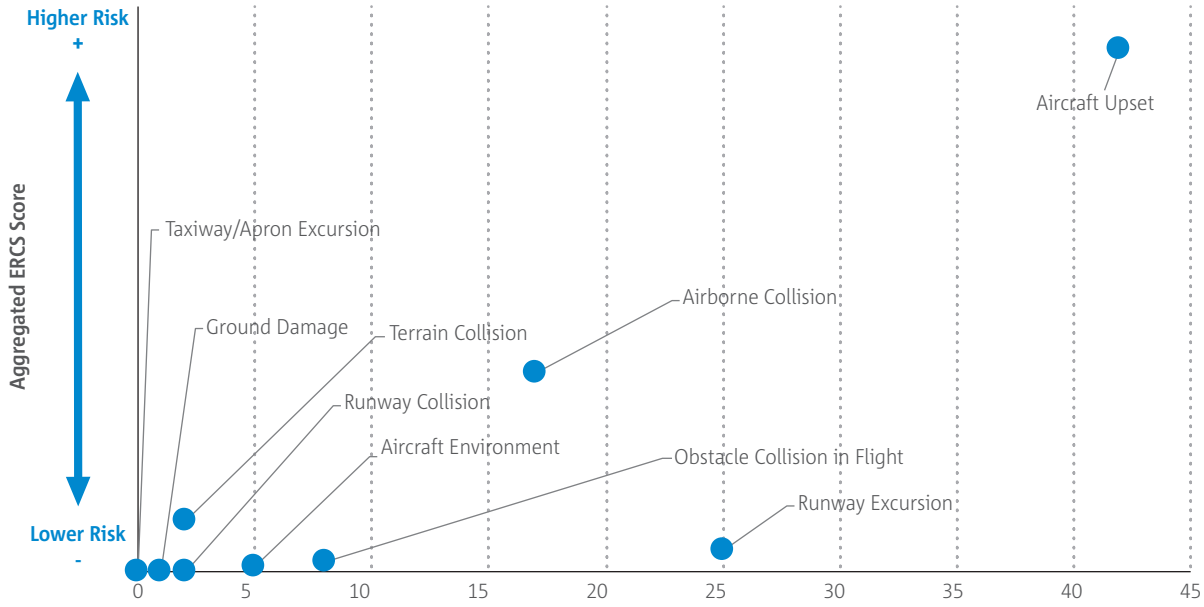
Figure 22. Aeroplane Specialised Operations Accidents and Serious Incidents by Type of Operation, 2007-2017



2.4.2 Safety Risk Portfolio

The key risk areas for Specialised Operations involving aeroplanes are shown in Figure 23. It can be seen that aircraft upset is the highest risk and most common type of accident or serious incident involving this domain.

Figure 23. Distribution of key risk areas by frequency and aggregated ERCS risk score for aeroplane specialised operations, 2015-2017



The Safety Risk Portfolio for Specialised Operations Aeroplanes is based solely on occurrence data, since an SPO Aeroplanes CAG has not yet been established. The Safety Issues and Key Risk Areas are prioritised based on the cumulative ERCS risk score for accidents and serious incidents in the EASA occurrence repository for the 2015-2017 period.

Strikingly, the highest risk safety issues in this domain all relate to human factors. The absence of an SPO aeroplane CAG means that these issues are not yet fully defined, but some examples of the human factors issues are provided here. “Perception and Situational Awareness“, “Human Performance” and “Experience, Training and Competence of Individuals”, all Human Factors-related issues, are among the top priority issues. One example of such an occurrence was a parachute jumper who, upon leaving the aircraft, did not notice that his leg had become entangled with a static line that had been used by one of the previous jumpers. As he jumped out, he was retained by the static line and was hanging approximately four meters below the aircraft, unable to free himself from the static line. The pilot was also not able to cut the line. The airfield fire services laid out a large area of foam on the airfield and the aircraft landed in the foamed area with the jumper hanging from it. The jumper received minor injuries. Another example is relates to the pre-flight/flight planning phase. A glider towing aircraft ran out of fuel shortly after releasing the glider, and the pilot carried out a successful forced landing in a field. It was determined that the fuel starvation was due to the pilot misjudging the amount of fuel needed for carrying out the planned flight.

Figure 24. Safety Risk Portfolio for SPO Aeroplane operations showing how the 3 year occurrence data 2015-2017 relates to safety issues and their outcomes relative to risk in descending order

2.5 Non-Commercial Operations

This chapter covers General Aviation Non-Commercial Operations involving aeroplanes of mass groups below 5700 kg with an EASA MS State of Registry. Key statistics and an occurrence data based Safety Risk Portfolio (SRP) are presented. The SRP is enhanced with expertise from operators, manufacturers and National Aviation Authorities with the establishment of a GA Aeroplane Collaboration and Analysis Group.

2.5.1 Key Statistics

The key statistics for this domain are in the tables below and include a comparison of the number of accidents (fatal and non-fatal) and serious incidents for the 10-year period 2007-2016 and the last year (2017). It also includes the comparison of the fatalities and serious injuries happened in those accidents between the same timeframe.

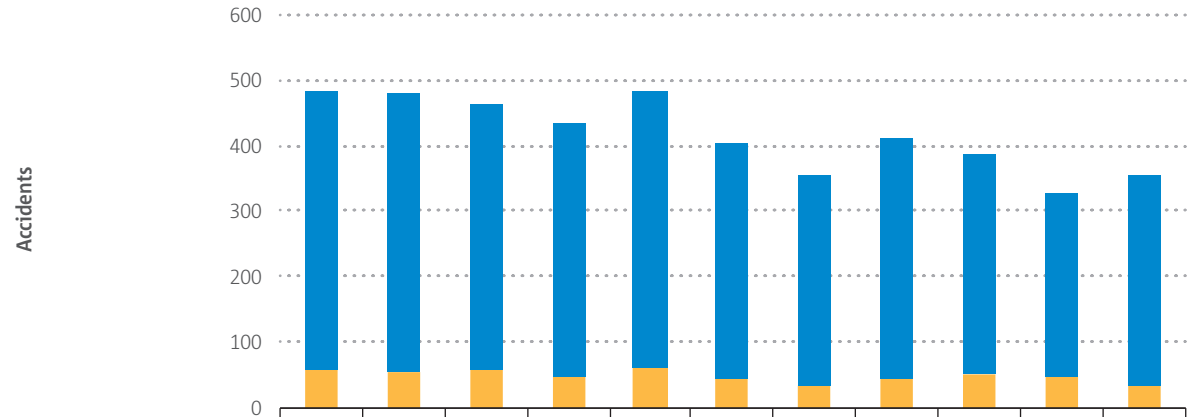
Table 6. Key statistics for non-commercially operated aeroplanes 2007-2017

	Fatal Accidents	Non-Fatal Accidents	Serious Incidents
2007-2016 total	501	3730	375
2017	34	321	125

	Fatalities	Serious Injuries
2007-2016 total	922	496
2017	62	45

In non-commercial operations with aeroplanes, there were 34 fatal accidents, which continues the downward trend and is lower than the 10-year average. However, looking at non-fatal accidents it can be seen that from 2016 to 2017 there is close to 12% increase in those accidents. Combined with fatal accidents the increase between 2016 and 2017 is 7.3%. When looking at the historical data in Figure 25 for fatal and non-fatal accidents since 2007 it can be observed that the downward trend for the period is 27%.

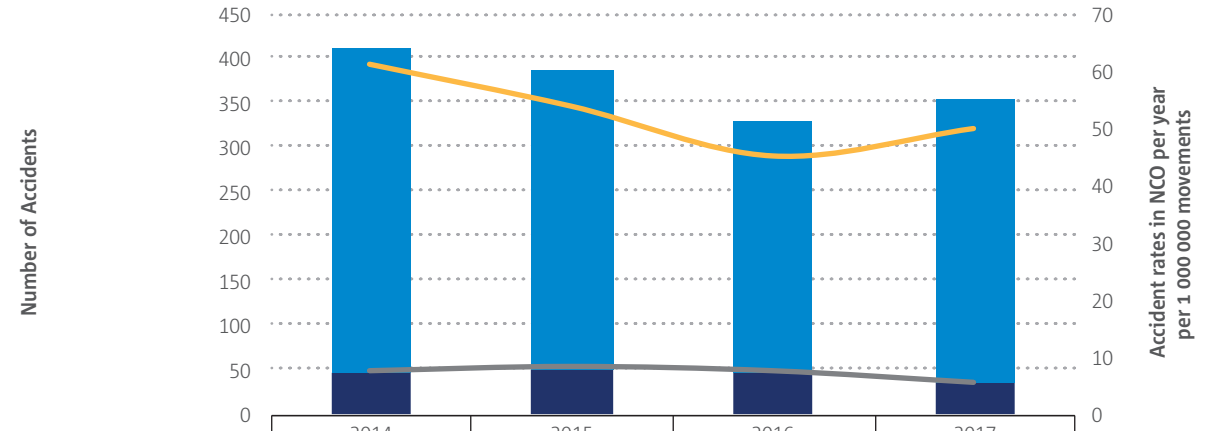
Figure 25. Number of fatal accidents, non-fatal accidents and serious incidents for aeroplane non-commercial operations, 2007 - 2017



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Non-Fatal Accidents	424	428	405	386	423	360	319	365	337	283	321
Fatal Accidents	59	53	59	49	61	45	35	44	50	46	34

Last year EASA published for the first time accidents rates for GA Fixed wing aircraft. These rates were based on responses from 12 NAAs and estimations made for the rest of the EASA MS. EASA has not received the necessary data for exact calculation of the accident rates but instead based the estimation for 2017 on the average EU GDP of 2.6%. This is reflected in Figure 26. The number of movements are estimated to have increased in direct proportion of the GDP as a better economy should affect the whole community and also the pilot's budget for flying. This figure will be updated when reliable data is available.

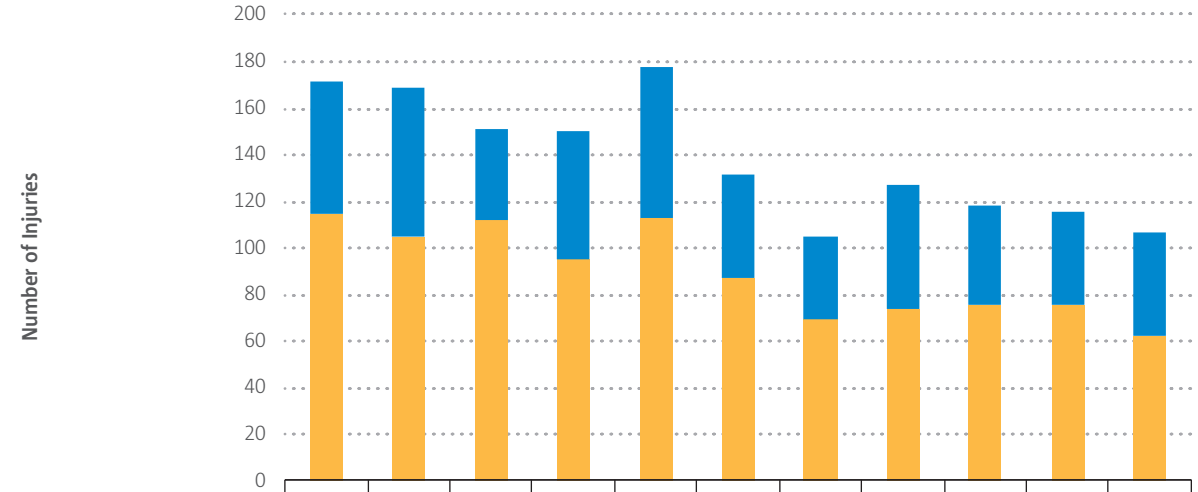
Figure 26. Accident rates per year in NCO per 1 000 000 movements



	2014	2015	2016	2017
Non-Fatal Accidents	365	337	283	321
Fatal Accidents	44	50	46	34
Fatal Accident Rate	7.2	7.9	7.2	5.3
Non-fatal Accident Rate	60.8	53.7	45.2	49.9

Number of fatalities have also been significantly reduced compared to the 10-year average but the number of serious injuries shows a slight increase when compared to 2016. When looking at the period 2007-2017, it may be seen that the combined number of fatalities and serious injuries has reduced by 38%.

Figure 27. Number of fatalities and serious injuries for aeroplane non-commercial operations, 2007-2017

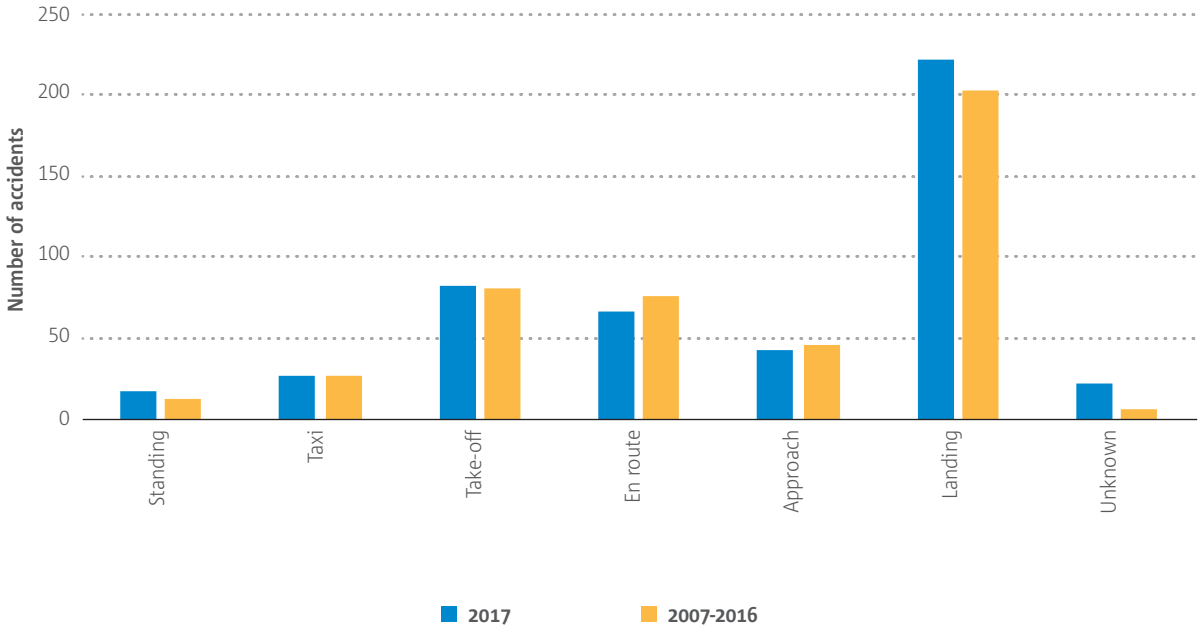


	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total Serious Injuries	57	64	39	55	65	45	36	53	42	40	45
Total Fatalities	115	105	112	95	113	87	69	74	76	76	62

2.5.1.1 Phase of flight

In terms of flight phase in GA FW NCO aeroplanes accidents it can be seen that the most accidents take place during the landing phase of the flight mostly resulting in runway excursions. The take-off and en route phases show that there were fewer accidents last year compared to the 10 year average but the landing phase accidents increased slightly compared to the 10 year average.

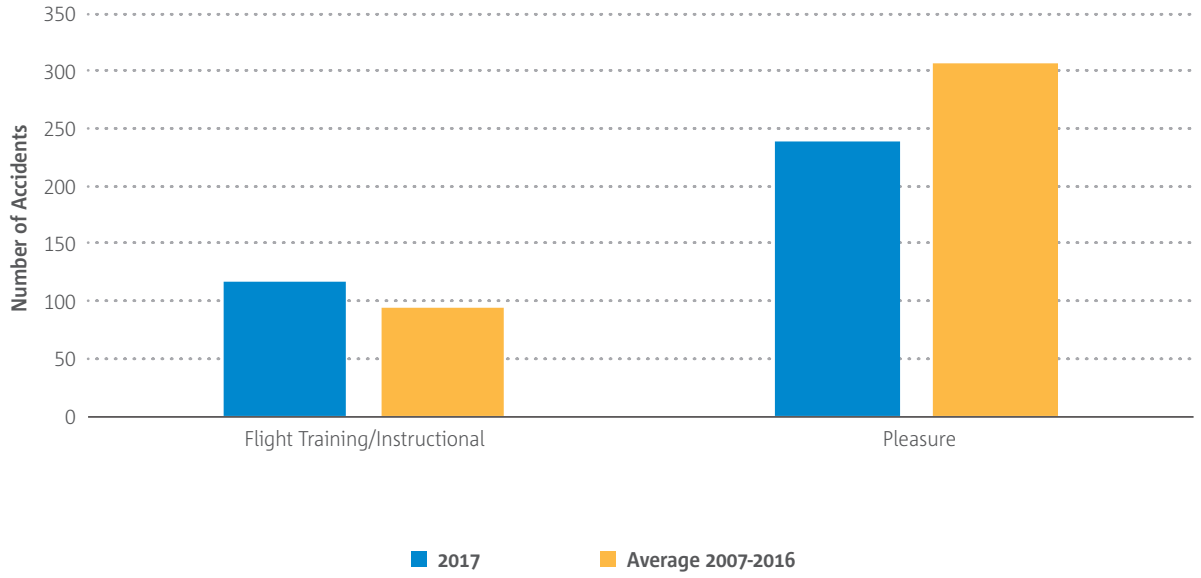
Figure 28. NCO accidents per phase of flight 2007-2017



2.5.1.2 Operation Type

Most of the accidents occurred during pleasure flights, followed by Flight training/Instructional flights. This can be considered to be normal as those operation types are the most common within the domain. Apart from that it should be noted that there is close to 7% increase in flight training accidents compared to the 10 year average.

Figure 29. Main operation types in GA Aeroplane NCO.

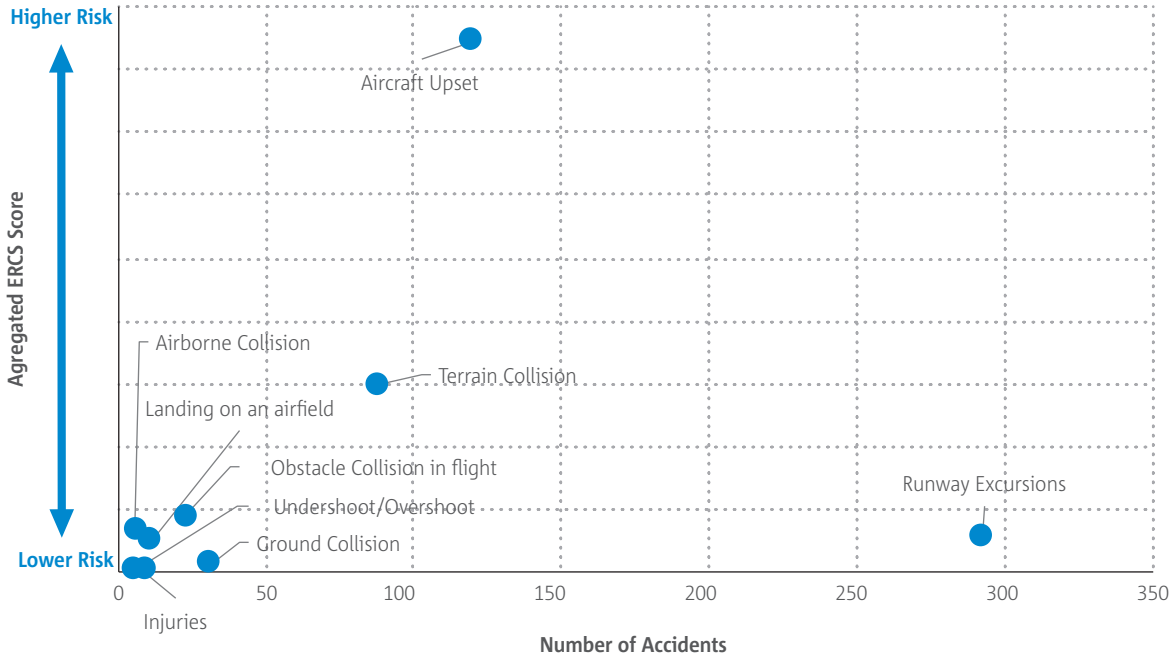


2.5.2 Safety Risk Portfolio

2.5.2.1 Categories and ERCS scores 2016-2017

EASA has now risk assessed the GA FW NCO dataset - both fatal and non-fatal accidents using the European Risk Classification Scheme (ERCS). Figure 30 shows the Key Risk Areas (KRAs) in relation to the number of accidents vs. the aggregated ERCS score. The figure shows clearly that the KRA showing the highest risk is Aircraft upset. Runway Excursions are common but have a lower risk of fatalities or serious injuries. Figure 30 therefore indicates where the efforts should lie in terms of action areas in the EPAS.

Figure 30. Distribution of key risk areas by frequency and aggregated ERCS risk score for aeroplane non-commercial operations, 2015-2017

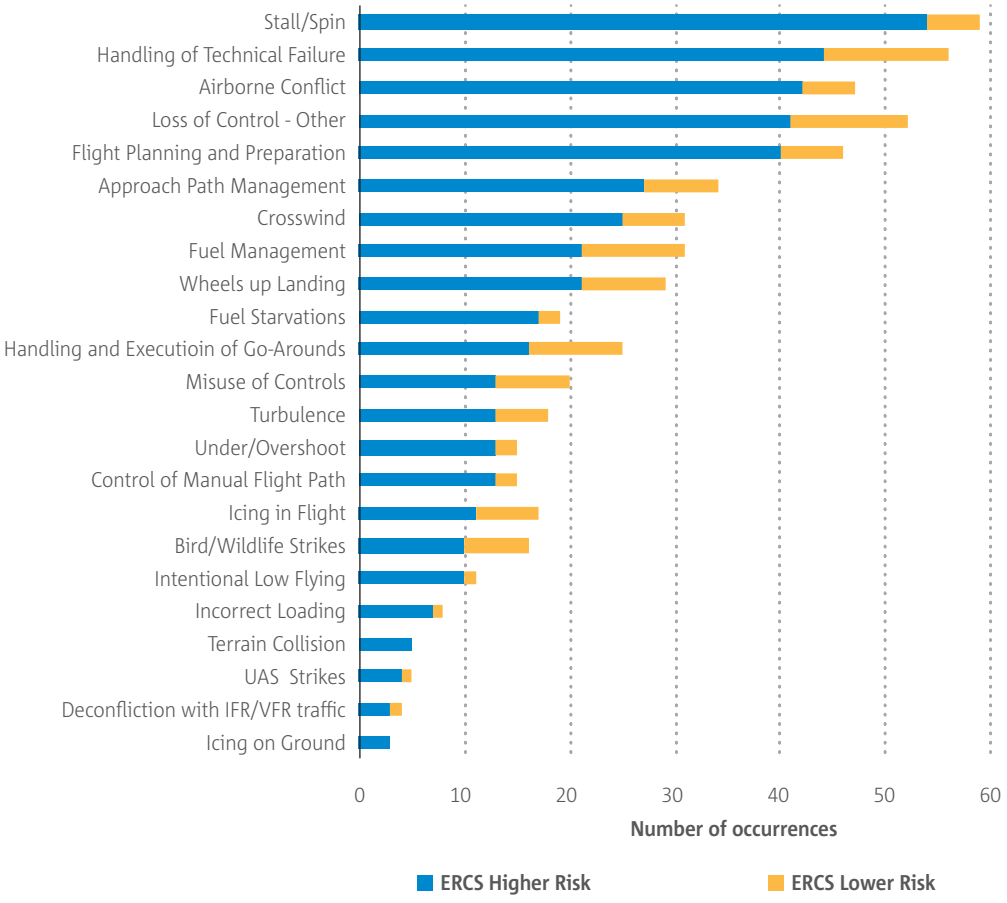


2.5.2.2 Identified Safety Issues and ERCS scores

The identified safety issues for the GA FW Safety Risk Portfolio are shown in Figure 31. It was decided this year to change the presentation of the portfolio and connect the safety issues to the ERCS score.

Figure 31 shows that the safety issue 'Stall/Spin' is the most common one. This supports Figure 30 where we see Aircraft Upset bearing the highest risk. Strongly associated with that safety issue is the 'Handling of Technical Failures' which highlights pilot's actions that are either precursors or resulting actions to salvage the situation. The third issue is 'Airborne Conflict' this issue shows both actual collisions as well as near-misses. Due to the nature of the issue it often bares high risk and is therefore high on the list. The fourth safety issue is 'Loss of control – Other'. This issue relates to other types of control loss and excludes stalls and spins. Directional control, heading, pitch and roll are all part of this safety issue. The fifth safety issue touches the operational side where human factors are often strongly associated with. This is the 'Flight Planning and Preparation' issue. This issue includes events like Flight planning, minimum equipment violation, performance calculation, pre-flight planning, route planning and loading of the aircraft, weight/balance calculations and weather planning.

Figure 31. GA FW NCO Accidents. Safety issues in relation to high and low risk occurrences.



2.5.2.3 The Portfolio

Based on the data above the NCO portfolio can be seen in Figure 31. It should be noted that the portfolio is entirely built upon queries. It should therefore be kept in mind that the data behind the portfolio not fully verified in terms of validity. It is worth noting that two safety issues have been added. Those are Stall/Spin and Loss of control (other). Both of these issues focus on take-off, manoeuvring, approach and landing phases of the flight. It was decided to add these safety issues in, even though the Key Risk Area Aircraft Upset is present as stalls and spins are the most common types of loss of control and have the highest risk score and therefore should be addressed as the top priority. It should be noted that in the Stall/spin row a mark can be seen under the KRA Airborne Collision. This is unavoidable due to the coding of the occurrences as mid-air collisions tend to result in loss of control after impact. When looking at the safety issues it can also be seen that 'Perception and Situational Awareness', 'Decision Making and Planning' and 'Flight Planning and Preparation' affect all four KRAs under Priority 1. Aircraft Upset, Terrain Collision Obstacle Collision and Runway Excursions can all be considered to be scoring high in the risk assessment. System Reliability contains data on both engine failures and other system failures on board the aircraft.

Figure 32. Safety Risk Portfolio for General Aviation fixed-wing aeroplane non-commercial operations showing how the 3 year occurrence data 2015-2017 relates to safety issues and their outcomes relative to risk in descending order

2.5.4 Safety Issue Assessments

One safety issue assessment is currently being performed. The safety issue 'Deconfliction with IFR/VFR traffic' has been considered to be producing significant risk in the vicinity of smaller aerodromes. These aerodromes are holding substantial amount of mixed traffic and are surrounded with airspace class D/E and G. The risk is found to be too high for omitting it – hence, EASA has launched a safety issue assessment to address the risk. A collision between a commercial airliner and a GA aircraft would most likely end in a catastrophic event causing serious implications for both the GA community as well as the commercial domain. The group will provide a report with proposed actions aimed at mitigating the risk in as efficient way as possible. There are several existing analysis available and the group has been looking at the issue from all angles. The group has used the European Central Repository (ECR) dataset for reference as we fortunately do not have any accidents stored in EASA's accident database between a GA aircraft and a Commercial Airliner. The ECR contains to a large extent incident data from the national authorities. The data for the Deconfliction with IFR/VFR in Figure 31 does therefore not reflect the risk correctly as that figure is based on accidents from the EASA dataset.

Other safety issue assessments have not been launched. However, the information shown above provides a direction on where to focus the Community's efforts.

This chapter covers all rotorcraft operations and it is divided into four sections. The first section covers offshore operations and the second section covers all other commercial air transport helicopter operations. The scope in these two sections being helicopter operations involving an EASA Member State Air Operator Certificate (AOC) Holder. The third and fourth sections cover Specialised Operations (Part SPO)/aerial work operations and Non-Commercial Operations, respectively, involving "certified" helicopters of all mass groups with an EASA MS as State of registry or as State of operator.

Each section provides details on key statistics, an overview of key risk areas and safety risk portfolio and discusses possible safety priorities in support of the European Plan for Aviation Safety.

3

3.1 Offshore Commercial Air Transport Rotorcraft

The key statistics in Offshore rotorcraft operations involving an EASA MS AOC Holder are provided below.

3.1.1 Key Statistics

The key statistics for this domain are in the tables below and include comparison of the number of accidents (fatal and non-fatal) and serious incidents for the 10-year period 2007-2016 and the last year (2017). It also includes the comparison of fatalities and serious injuries happened in those accidents between the same timeframe.

Table 7. Key Statistics for Offshore Commercial Air Transport Helicopters, 2007-2017

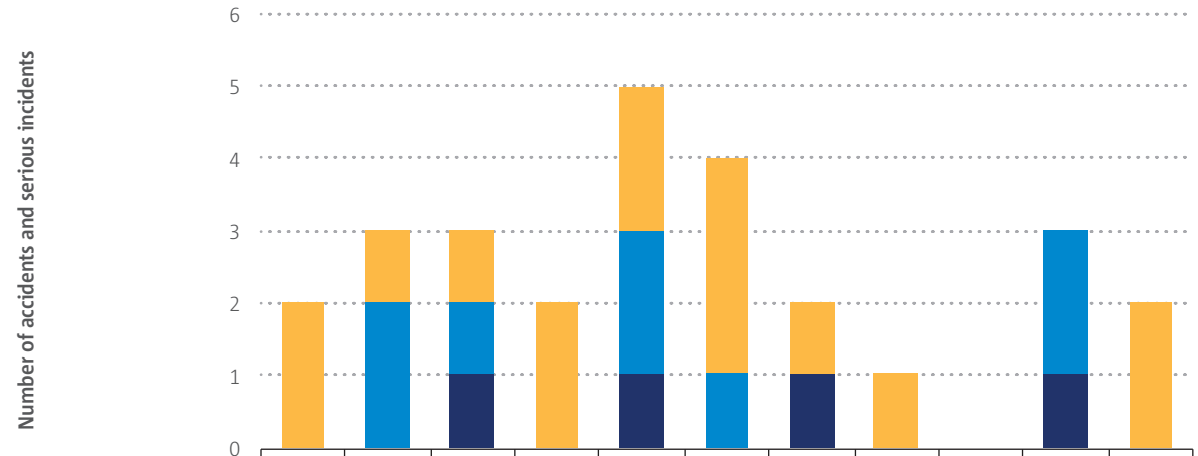
	Fatal Accidents	Non-Fatal Accidents	Serious Incidents
2007-2016 total	4	8	13
2017	0	0	2

	Fatalities	Serious Injuries
2007-2016 total	13	6
2017	0	0

There have been 2 serious incidents and no fatal or non-fatal accidents in offshore helicopter operations in 2017. The number of serious incidents in 2017 is higher than the average for the 10 year period previous to 2017. Prior to 2017, there have been one fatal accident which involved the loss of an Airbus Helicopters EC225 Super Puma in Norway on 29 April 2016 and another fatal accident in 2013 involving the loss of EUROCOPTER AS332 Super Puma.

The number of fatal accidents, non-fatal accidents and serious incidents is shown below, covering the period 2007-2017. It can be seen that the number of these occurrences has remained relatively stable over the period analysed.

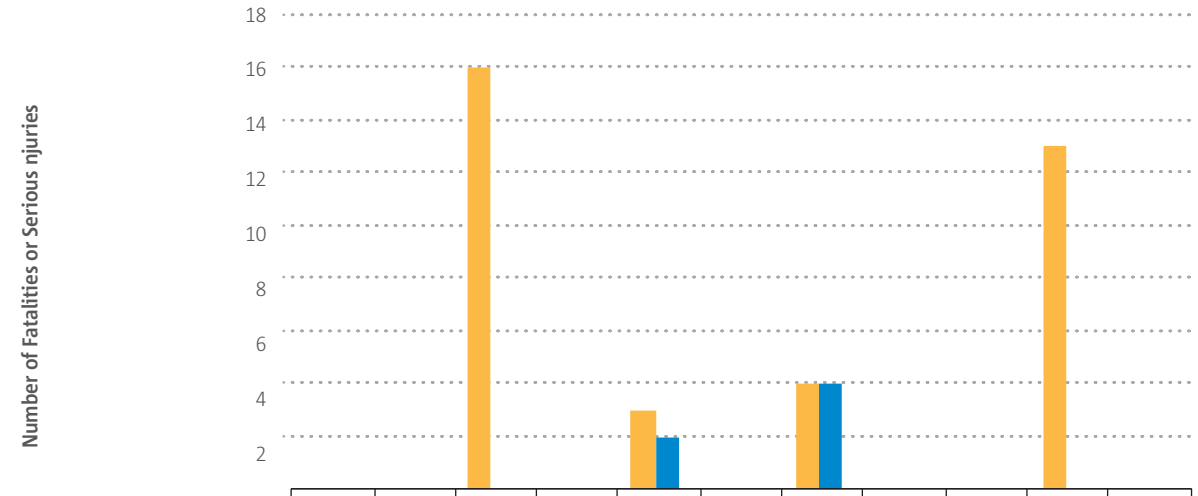
Figure 33. Offshore Commercial Air Transport Helicopters Fatal Accidents, Non-fatal Accidents and Serious Incidents, 2007-2017



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Serious incidents	2	1	1	2	2	3	1	1	0	0	2
Non-fatal accidents	0	2	1	0	2	1	0	0	0	2	0
Fatal accidents	0	0	1	0	1	0	1	0	0	1	0

There were no fatalities or serious injuries in offshore helicopter operations in 2017.

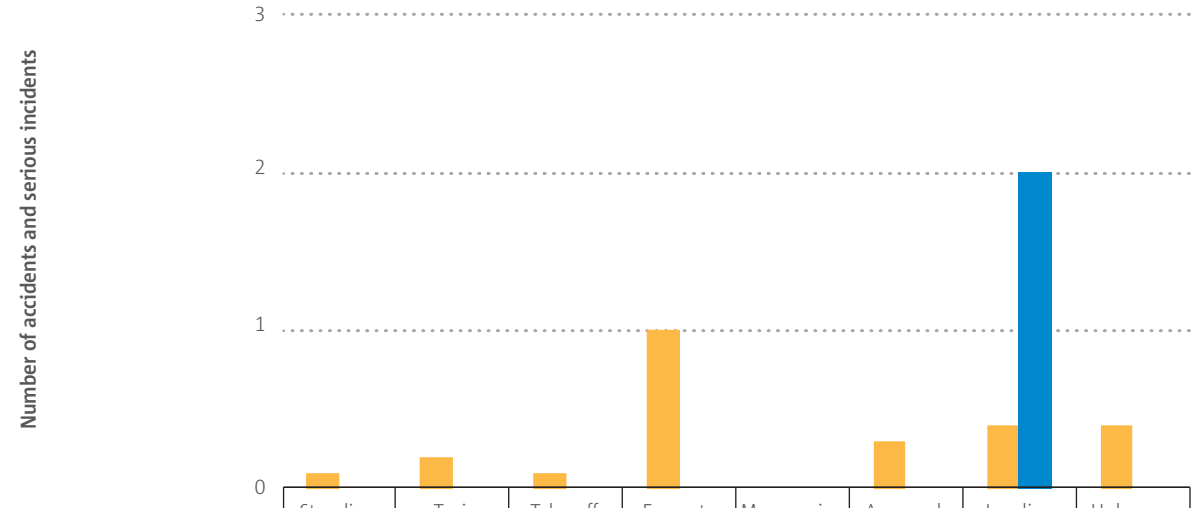
Figure 34. Number of fatalities and serious injuries in offshore commercial air transport, 2007-2017



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total Fatalities	0	0	16	0	3	0	4	0	0	13	0
Total Serious Injuries	0	0	0	0	2	0	4	0	0	0	0

The low number of accidents and serious incidents in this domain prevents any conclusions from being drawn regarding the phase of flight. However, the figures are presented below for information.

Figure 35. Offshore Commercial Air Transport Rotorcraft Accidents and Serious Incidents by phase of flight, 2007-2017

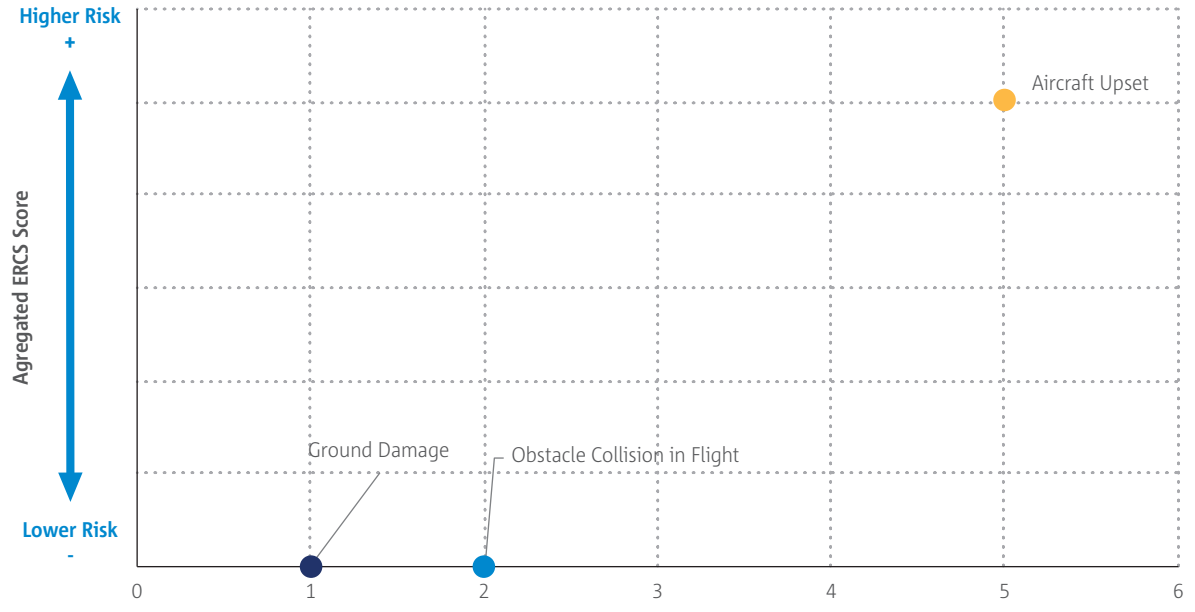


	Standing	Taxi	Take-off	En route	Manoevring	Approach	Landing	Unknown
2007-2016 Avg	0.1	0.2	0.1	1	0	0.3	0.4	0.4
2017	0	0	0	0	0	0	2	0

3.1.2 Safety Risk Portfolio

The safety risk portfolio for offshore helicopter has been developed with the support of the Offshore Helicopter Collaborative Analysis Group (CAG). The safety risk portfolio provides a summary of key risk areas and associated safety issues identified in accidents and serious incidents that happened from 2013 and 2017 in offshore operations.

Figure 36. Offshore commercial air transport rotorcraft Key Risk Areas plotted in relation to the European Risk Classification Score (ERCS) methodology



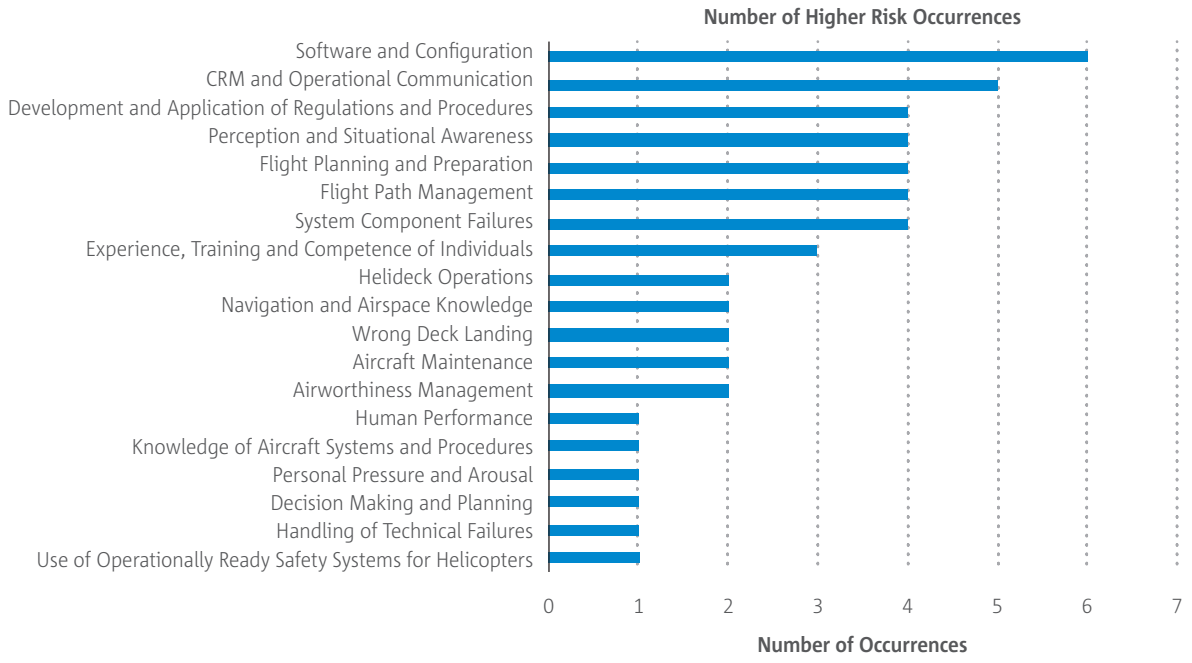
The main key risk areas in offshore helicopter operations are Aircraft Upset, Obstacle Collision in Flight and Ground Damage. Aircraft Upset (Loss of Control) is the largest key risk area for offshore operations and includes two fatal accidents and 17 fatalities, 1 non-fatal accident and 2 serious incidents. Obstacle Collision in Flight is the second largest key risk areas for offshore and has been identified in 2 serious incidents reported in 2017 associated with landing on a wrong deck. Ground Damage key risk area includes a non-fatal accident during taxi where the helicopter main rotor blades hit the side of a parked truck.

The safety risk portfolio lists the safety issues that contribute to the key risk areas, based on the number of high risk occurrences and their aggregated risk score. The key risk areas are listed at the top of the safety risk portfolio and prioritised based on the number of high risk occurrences.

For each safety issue listed in the safety risk portfolio information is provided on the number of high risk occurrences and their aggregated risk score, which is further distributed by the key risk areas to which the safety issue had contributed in terms of both number of high risk occurrences and aggregated risk score.

In this way, it can be easily assessed to which key risk area a safety issues is more relevant for, as well as to prioritize safety issues within a key risk area.

Figure 37. Offshore commercial air transport rotorcraft safety issues.



Based on the data supporting the portfolio, the following relations between the priority 1 key risk areas and safety issues can be highlighted:

- Aircraft Upset
  - Software and Configuration
  - Systems Failures
  - Flight Path Management
  - Perception and Situational Awareness
  - Experience, Training and Competence of Individuals

- Obstacle Collision
  - CRM and Operational Communication
  - Software and Configuration
  - Flight Planning and Preparations
  - Wrong Deck Landings
  - Helideck Operations

The safety issues listed in the safety risk portfolio that were not identified in high risk occurrences are included for safety performance monitoring purposes as they were identified during the meetings of the Offshore CAG.

Figure 38. Safety Risk Portfolio for Off-shore Helicopter operations showing how the 5 year occurrence data 2013-2017 relates to safety issues and their outcomes relative to risk in descending order

Software and Configuration	6		●	•							
CRM and Operational Communication	5			●			•				
System Component Failures	4		●								
Flight Path Management	4		●								
Flight Planning and Preparation	4		•	●							
Perception and Situational Awareness	4		●				•				
Development and Application of Regulations and Procedures	4		●	•			•				
Experience, Training and Competence of Individuals	3		●								
Airworthiness Management	2		●								
Aircraft Maintenance	2		●								
Wrong Deck Landing	2			●							
Navigation and Airspace Knowledge	2			●							
Helideck Operations	2			●							
Use of Operationally Ready Safety Systems for Helicopters	1		●								
Handling of Technical Failures	1		●								
Decision Making and Planning	1		●								
Personal Pressure and Arousal	1		●								
Knowledge of Aircraft Systems and Procedures	1		●								
Human Performance	1		●								
Emergency/Crash Locator Devices	0										
Damage Tolerance to UAS Collisions	0										
Intentional Low Flying	0										
Airborne Separation	0										
Downwash	0										
Icing in flight?	0										
Helicopter Obstacle See and Avoid	0										
Degraded Visual Environment	0										
Bird/Wildlife Strikes	0										
Safety Culture	0										
Effectiveness of Safety Management	0										
Ground handling	0										

3.2 Other Commercial Air Transport Helicopters

The key statistics are provided below for operations involving commercial air transport rotorcraft other than off-shore operations and with an EASA MS AOC.

3.2.1 Key Statistics

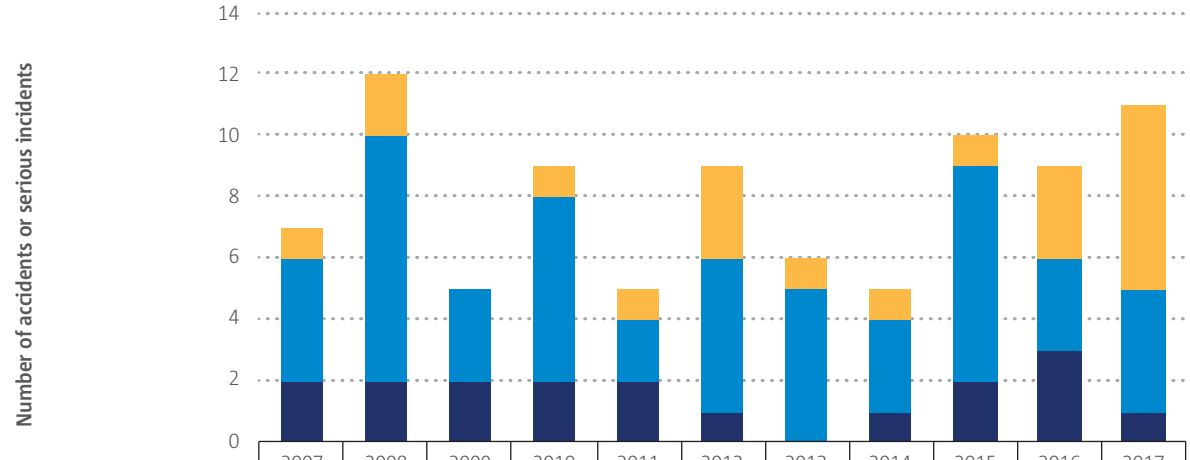
The key statistics for this domain are in the tables below and include comparison of the number of accidents (fatal and non-fatal) and serious incidents for the 10-year period 2007-2016 and the last year (2017). It also includes the comparison of fatalities and serious injuries happened in those accidents between the same timeframe.

Table 8. Key Statistics for Other Commercial Air Transport Helicopters, 2007-2017

	Fatal Accidents	Non-Fatal Accidents	Serious Incidents
2007-2016 total	17	46	14
2017	1	4	6

	Fatalities	Serious Injuries
2007-2016 total	54	39
2017	6	3

Figure 39. Other Commercial Air Transport Helicopters Fatal Accidents, Non-fatal Accidents and Serious Incidents, 2007-2017

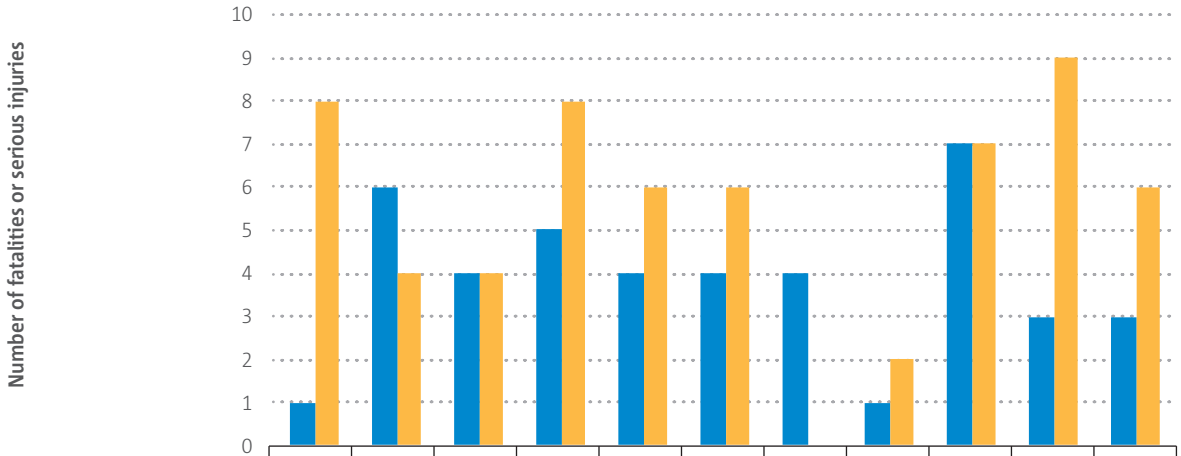


	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Serious incidents	1	2	0	1	1	3	1	1	1	3	6
Non-fatal accidents	4	8	3	6	2	5	5	3	7	3	4
Fatal accidents	2	2	2	2	2	1	0	1	2	3	1

There was one fatal accident in 2017, the AW139 accident in Campo Felice, Italy during HEMS operations. Overall, the number of fatal accidents in 2017 had decreased compared to 2016 and 10 year average. The number of non-fatal accidents have increased slightly in 2017 compared to 2016 but it is below the 10-year average. For serious incidents, the numbers doubled in 2017 compared to 2016 but they are well below the 10-year average.

The number of fatalities in other CAT helicopter operations are slightly above the median for 2007-2016 whereas the number of serious injuries have decreased. Overall, the number of fatalities and serious injuries have not changed substantially between 2007 and 2017.

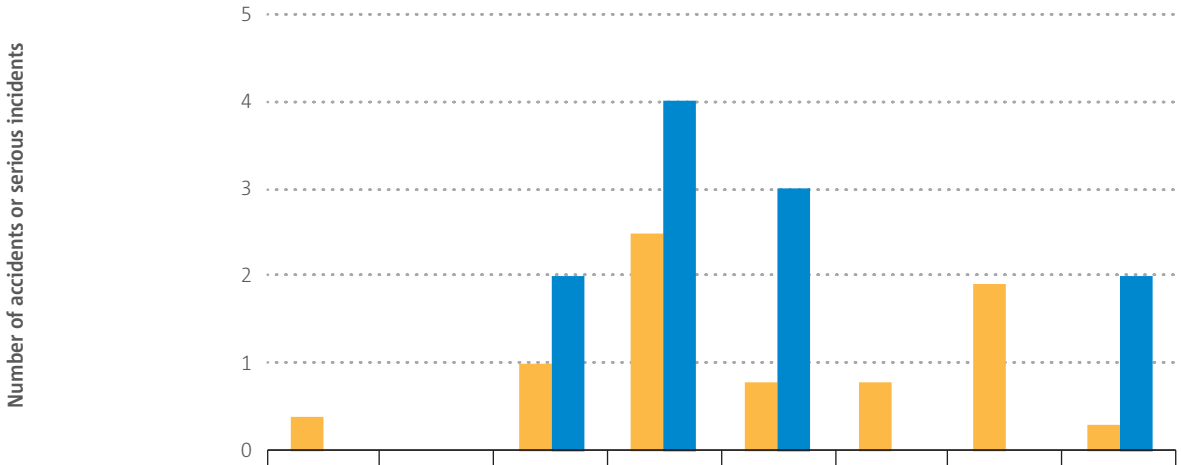
Figure 40. Number of fatalities and serious injuries for rotorcraft other commercial air transport, 2007-2017



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Serious injuries	1	6	4	5	4	4	4	1	7	3	3
Fatalities	8	4	4	8	6	6	0	2	7	9	6

3.2.1.1 Phase of flight

Figure 41. Other Commercial Air Transport Helicopters Accidents and Serious Incidents by phase of flight, 2017 and 2007-2016

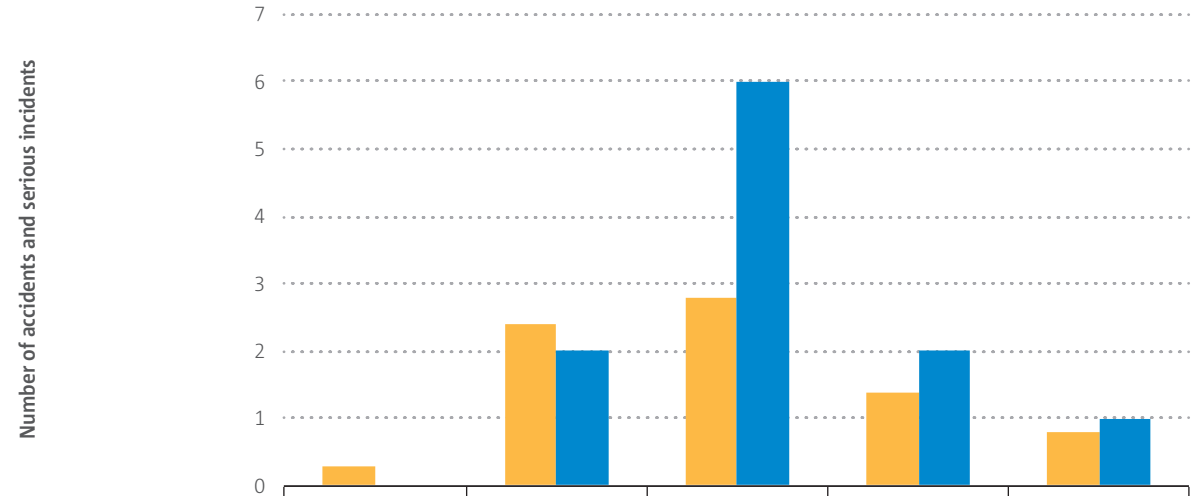


	Standing	Taxi	Take-off	En route	Manoevring	Approach	Landing	Unknown
2007-2016 average	0.4	0	1	2.5	0.8	0.8	1.9	0.3
2017	0	0	2	4	3	0	0	2

Most of the accidents and serious incidents in 2017 happened during the en route and manoeuvring phases of flight, and in comparison with 10 year average the numbers are well higher.

3.2.1.2 Operation type

Figure 42. Other Commercial Air Transport Helicopters Accidents and Serious Incidents by type of operation, 2017 and 2007-2016



	Airline	Air Taxi	HEMS	Sightseeing	Other/ Unknown
2007-2016 Average	0.3	2.4	2.8	1.4	0.8
2017	0	2	6	2	1

The highest number of accidents and serious incidents in 2017 have been in HEMS followed by Air Taxi and Sightseeing types of operation.

Figure 43. Other Commercial Air Transport Helicopters type of operation and aggregated ERCS risk score, 2007-2017

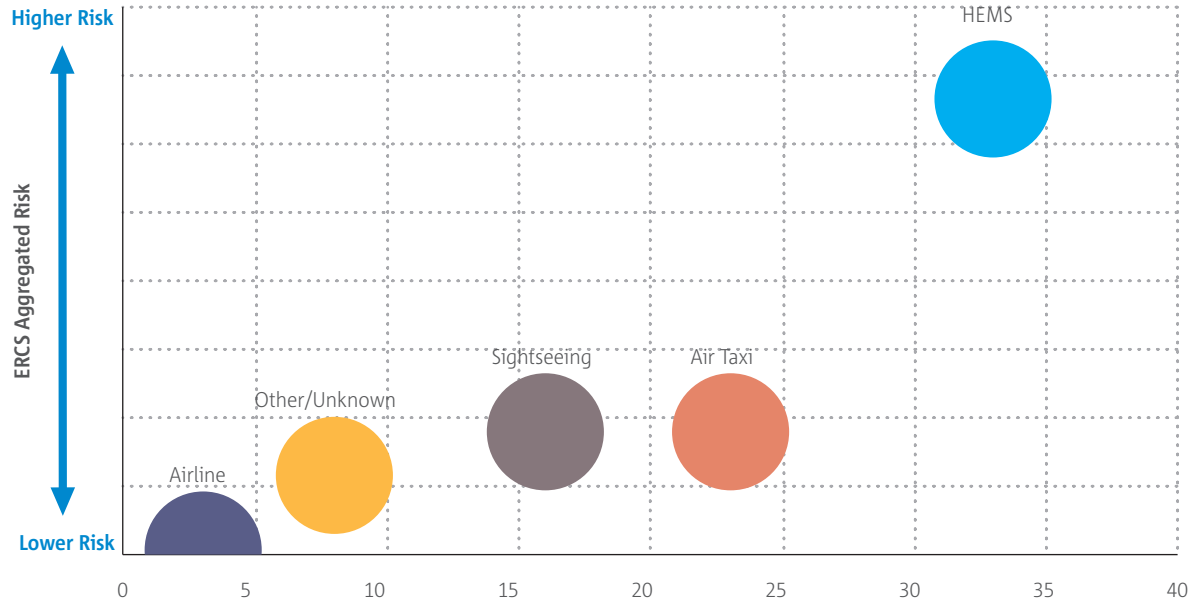


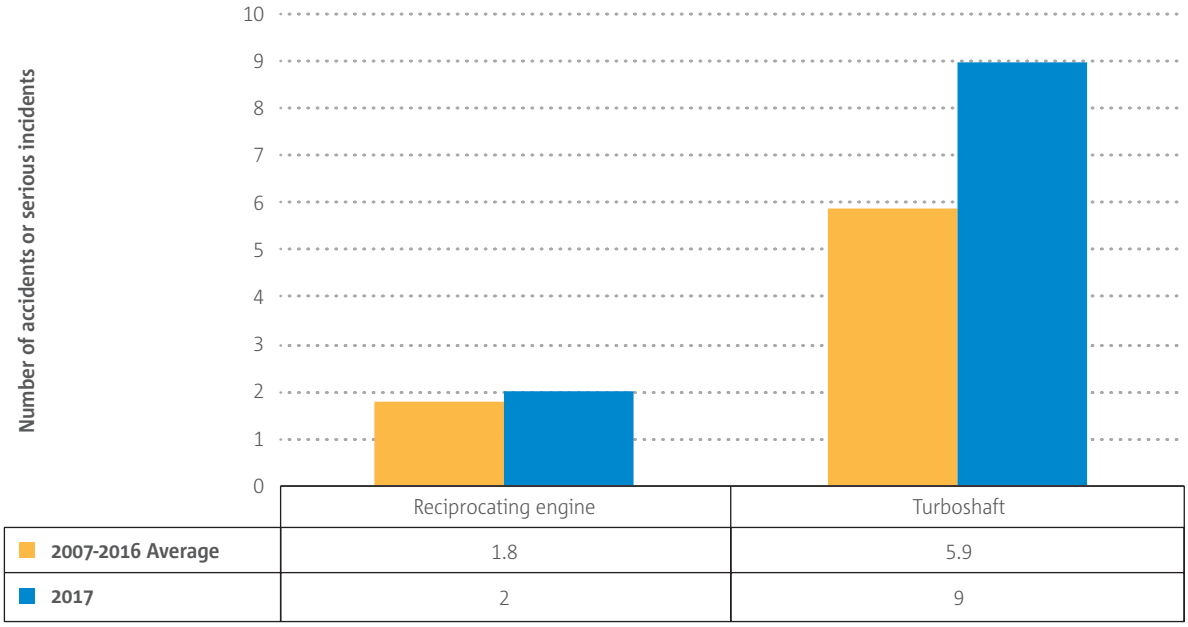
Figure 43 provides information regarding the aggregated risk score of high risk occurrences of the different operation types falling in the scope of this section that happened from 2007 – 2017. As it can be observed HEMS

operations have the highest aggregated risk score and highest number of high risk occurrences too, followed by Air Taxi and Sightseeing operation types.

EASA has already started an analysis activity into HEMS operation in collaboration with industry and Network of Analysts to support decision-making in the context of the SRM process.

3.2.1.3 Rotorcraft Type/ Propulsion Type

Figure 44. Other Commercial Air Transport Helicopters Accidents and Serious Incidents by Propulsion type, 2017 and 2007-2016



	Reciprocating engine	Turboshaft
2007-2016 Average	1.8	5.9
2017	2	9

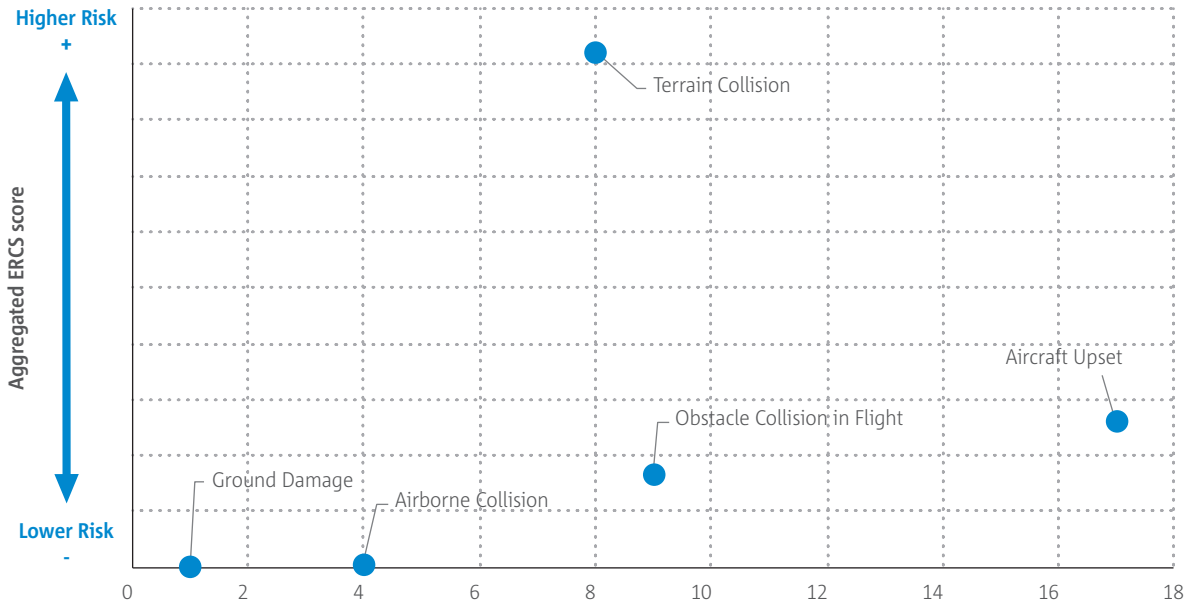
There have been a higher number of accidents and serious incidents involving turboshaft equipped helicopters then those with a reciprocating engine. For both propulsion types the number of accidents and serious incidents are above the 10 year average.

3.2.2 Safety Risk Portfolio

The safety risk portfolio for other CAT helicopter has been developed based on the analysis of accidents and serious incidents that happened from 2013 to 2017. Similar to the offshore helicopter safety risk portfolio it provides details of key risk safety areas and associated safety issues prioritised based on the number of high risk occurrences assessed using the ERCS methodology.

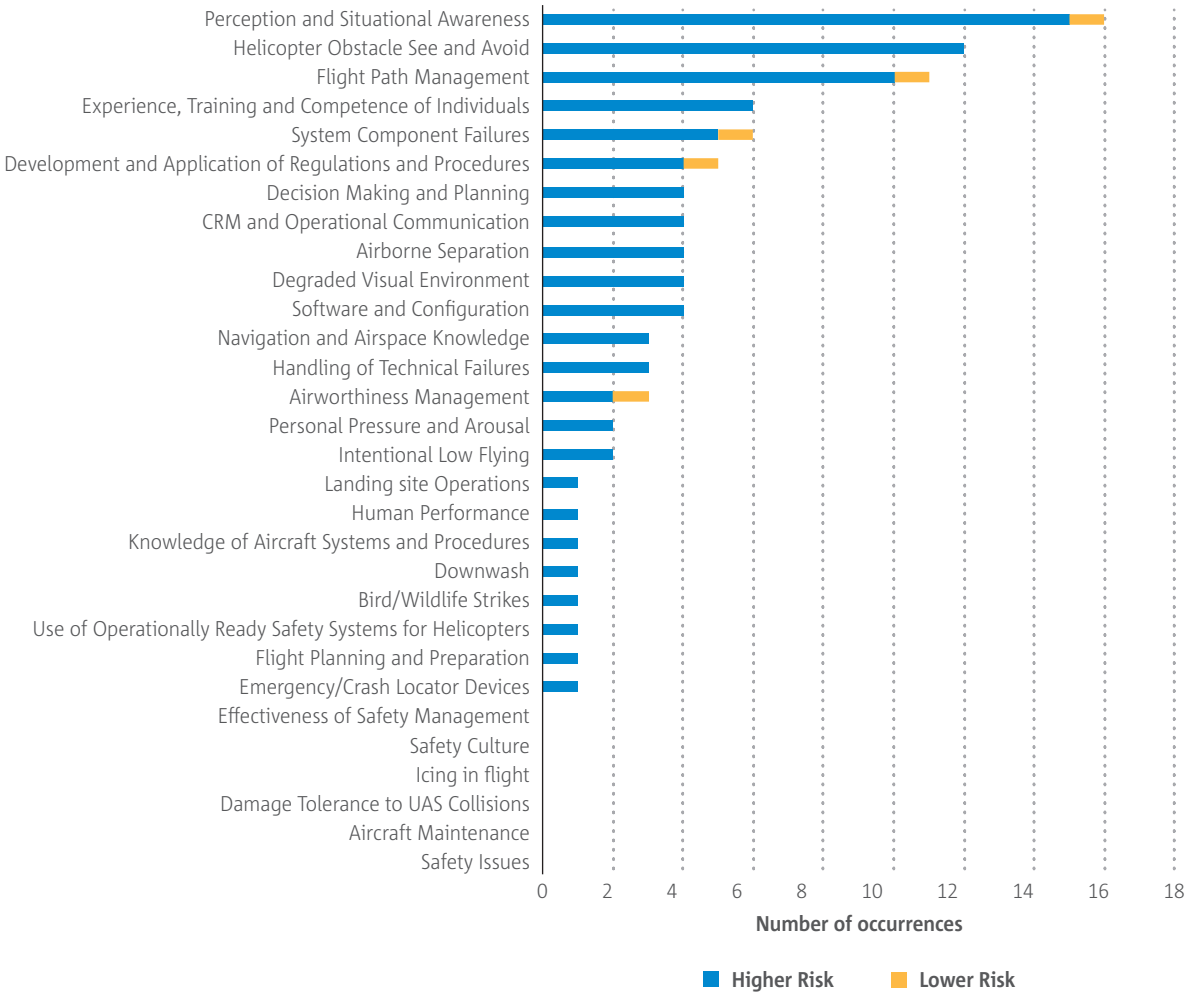
Aircraft Upset, Obstacle Collision inflight and Terrain Collision are the main key risk areas for other CAT helicopters based on the aggregated risk score and number of high risk occurrences that covers 2013 – 2017 period.

Figure 45. Other Commercial Air Transport Helicopters Key Risk Areas



The main key risk areas in terms of aggregated risk score and number of high risk occurrences covering 2013 – 2017 are Aircraft Upset, Terrain Collision and Obstacle Collision inflight.

Figure 46. Other Commercial Air Transport Rotorcraft safety issues, by higher and lower ERCS risk score, 2013-2017.


Perception and Situational Awareness
Helicopter Obstacle See and Avoid
Flight Path Management
Experience, Training and Competence of Individuals
System Component Failures
Development and Application of Regulations and Procedures
Decision Making and Planning
CRM and Operational Communication
Airborne Separation
Degraded Visual Environment
Software and Configuration
Navigation and Airspace Knowledge
Handling of Technical Failures
Airworthiness Management
Personal Pressure and Arousal
Intentional Low Flying
Landing site Operations
Human Performance
Knowledge of Aircraft Systems and Procedures
Downwash
Bird/Wildlife Strikes
Use of Operationally Ready Safety Systems for Helicopters
Flight Planning and Preparation
Emergency/Crash Locator Devices
Effectiveness of Safety Management
Safety Culture
Icing in flight
Damage Tolerance to UAS Collisions
Aircraft Maintenance
Safety Issues
0
2
4
6
8
10
12
14
16
18
Number of occurrences
Higher Risk
Lower Risk

Based on the data supporting the portfolio, the following relations between the priority 1 key risk areas and safety issues can be highlighted:

- Aircraft Upset
  - Flight Path Management
  - Systems Failures
  - Perception and Situational Awareness
  - Experience, Training and Competence of Individuals
  - Handling of Technical Failures

- Obstacle Collision
  - Helicopter Obstacle See and Avoid
  - Perception and Situational Awareness
  - Intentional Low Flying
  - Software and Configuration

- Terrain Collision
  - Perception and Situational Awareness
  - Helicopter Obstacle See and Avoid
  - Decision Making and Planning
  - Experience, Training and Competence of Individuals
  - Degraded Visual Environment

Figure 47. Safety Risk Portfolio for Other CAT Helicopter operations showing how the 5 year occurrence data 2013-2017 relates to safety issues and their outcomes relative to risk in descending order

Perception and Situational Awareness	15		•	●	•						
Helicopter Obstacle See and Avoid	12			●	•						
Flight Path Management	10		●	•							
Experience, Training and Competence of Individuals	6		●		•						
Systems Failures	6		●	•							
Decision Making and Planning	**4**			•	●						
Degraded Visual Environment	**4**		•		●						
CRM and Operational Communication	4		•		●						
Software and Configuration	4		•	•	●						
Development and Application of Regulations and Procedures	4		●		•						
Airborne Separation	4					●					
Navigation and Airspace Knowledge	3		•		●						
Handling of Technical Failures	3		●								
Personal Pressure and Arousal	2				●						
Intentional Low Flying	2			●							
Airworthiness Management	**2**		●								
Flight Planning and Preparation	1				●						
Landing site Operations	1			●							
Emergency/Crash Locator Devices	1		●								

Other CAT Helicopters

Bands of Aggregated ERCS Risk Score (2013-2017)			Priority 1			Priority 2		Priority 3		Priority 4	
Higher Risk ERCS Occurrences (2013-2017)			17	9	7	4	1	0	0	0	0
Safety Issues			Key Risk Areas (Outcomes and precursors)								
Safety Issues	#HRO ERCS	Bands of Aggregated ERCS Risk Score (2013-2018)	Aircraft Upset	Obstacle Collision	Terrain Collision	Airborne Collision	Ground Damage	Runway Collision	Unsurvivable Aircraft Environment	Excursions	Injuries
Use of Operationally Ready Safety Systems for Helicopters	1		●								
Bird/Wildlife Strikes	1		●								
Knowledge of Aircraft Systems and Procedures	1		●								
Human Performance	1		●								
Downwash	1						●				
Aircraft Maintenance	0										
Damage Tolerance to UAS Collisions	0										
Icing in flight	0										
Safety Culture	0										
Effectiveness of Safety Management	0										

● A significant number of occurrences • A small number of occurrences

3.3 Specialised Operations

This chapter covers Special Operations (Part SPO) involving helicopters of all mass groups with an EASA MS State of Registry or State of Operator.

3.3.1 Key Statistics

The key statistics for this domain are in the tables below and include comparison of the number of accidents (fatal and non-fatal) and serious incidents for the 10-year period 2007-2016 and the last year (2017). It also includes the comparison of fatalities and serious injuries happened in those accidents between the same timeframe.

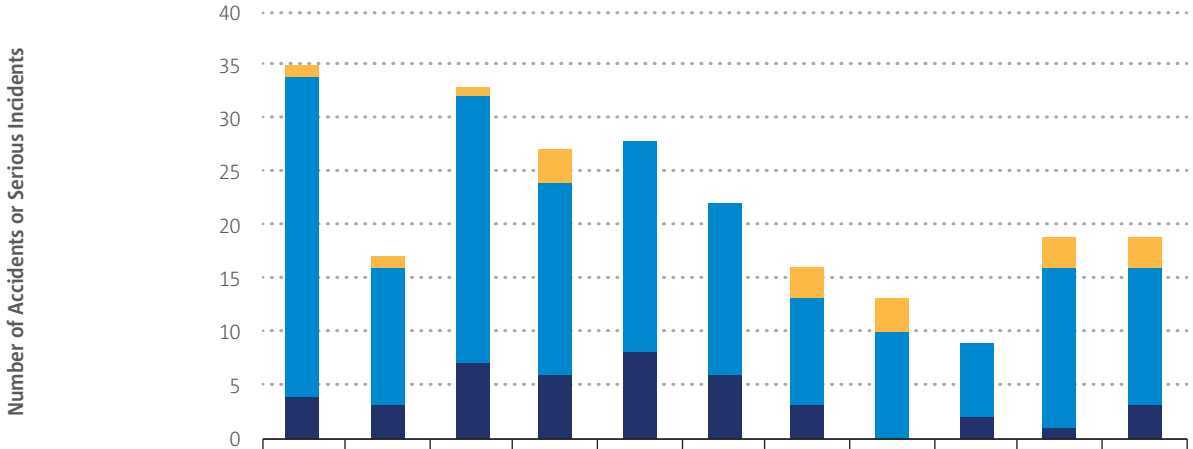
Table 9. Key Statistics for Specialised Operations Rotorcraft, 2007-2017

	Fatal Accidents	Non-Fatal Accidents	Serious Incidents
2007-2016 total	40	164	15
2017	3	12	5

	Fatalities	Serious Injuries
2007-2016 total	75	71
2017	4	5

The number of fatal accidents in 2017 was slightly lower than the average of the preceding decade, the number of non-fatal accidents was lower than the average of 2007-2016, while the number of serious incidents was considerably higher than the average of the preceding 10-year period. The number of fatalities in 2017 was lower than the preceding decade average, whereas the number of serious injuries was slightly lower than the 2007-2016 average.

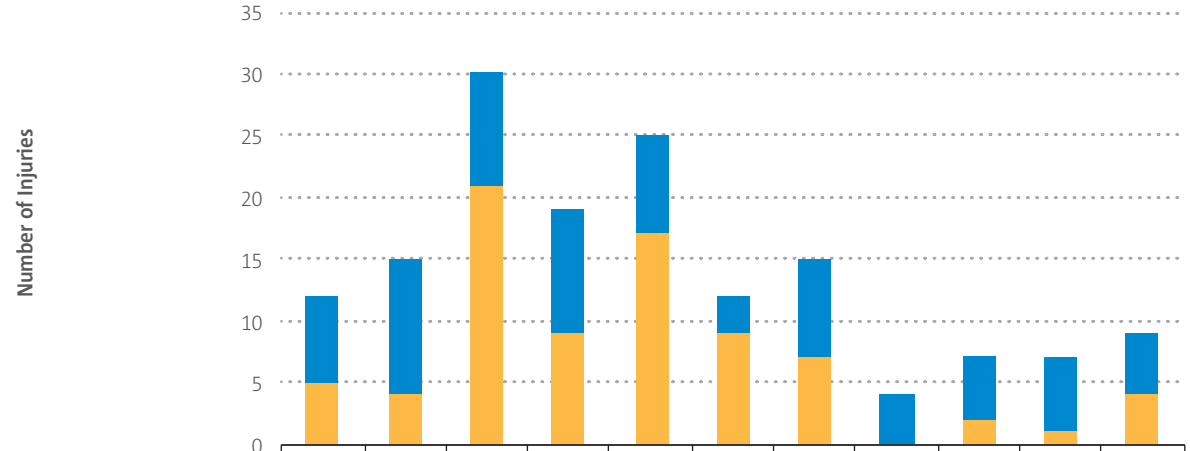
Figure 48. Number of fatal accidents, non-fatal accidents and serious incidents for rotorcraft specialised operations, 2007-2017



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Serious Incidents	1	1	1	3	0	0	3	3	0	3	3
Non-Fatal Accidents	30	13	25	18	20	16	10	10	7	15	13
Fatal Accidents	4	3	7	6	8	6	3	0	2	1	3

The four fatalities in 2017 was the highest total number of fatalities since 2013, although from 2007 up to and including 2013 the number of fatalities have been 4 or higher per year. Overall, the number of fatal or serious injuries has decreased across the period analysed.

Figure 49. Number of fatalities and serious injuries for rotorcraft specialised operations, 2007-2017

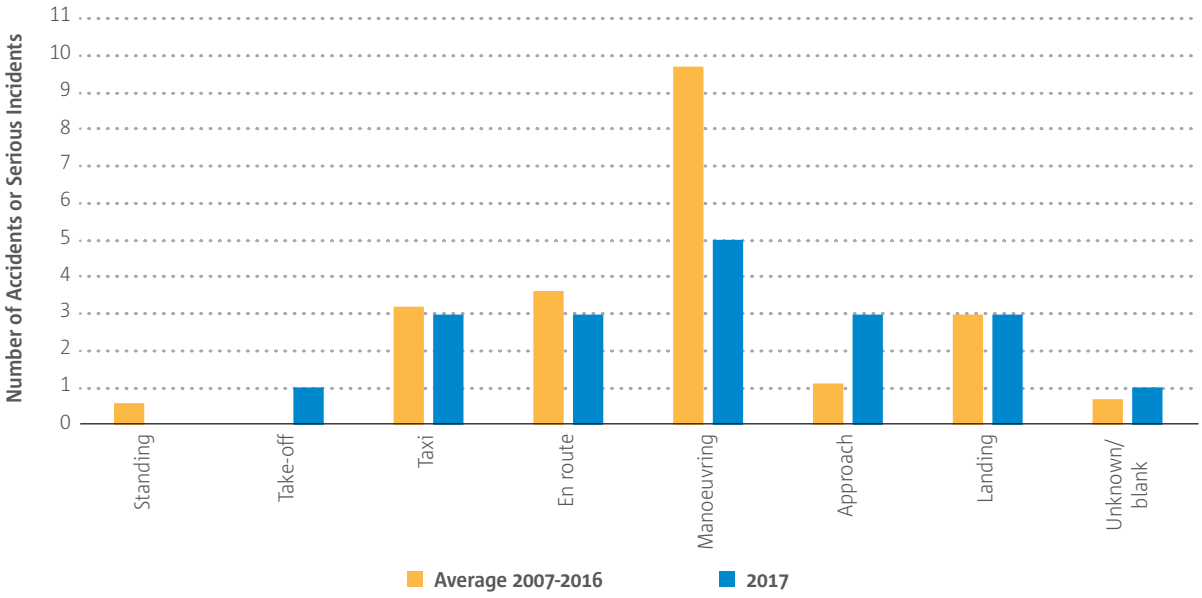


	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total Serious Injuries	7	11	9	10	8	3	8	4	5	6	5
Total Fatalities	5	4	21	9	17	9	7	0	2	1	4

3.3.1.1 Phase of flight

The number of accidents and serious incidents in the en-route and approach phases was higher in 2017 than the average of the preceding decade. The number of accidents and serious incidents in the take-off and manoeuvring phases were lower in 2017 compared with the average of 2007-2016. In 2017 there was one accident/serious incident in the taxi (air taxi) phase, in the preceding decade no such accidents/serious incidents occurred. In the standing phase, no accidents or serious incidents occurred in 2017.

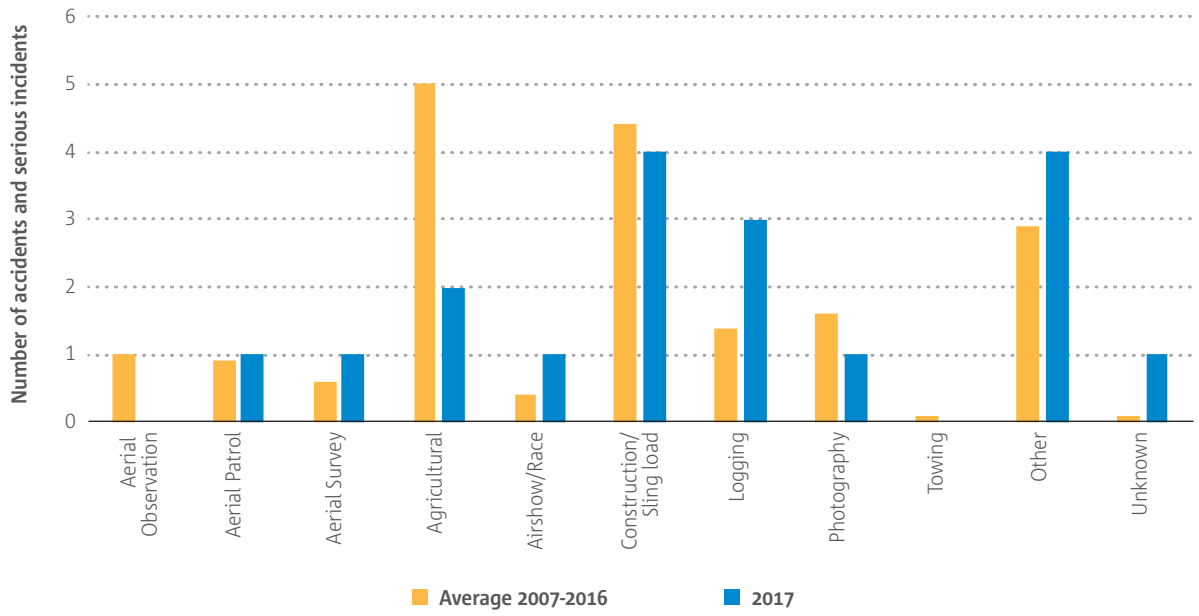
Figure 50. Rotorcraft Specialised Operations Accidents and Serious Incidents by Phase of Flight, 2007-2017



3.3.1.2 Operation Type

The number of accidents and serious incidents in aerial patrol, aerial survey, airshow/race, construction/sling load, logging and other was higher in 2017 than the average of the preceding decade. In photography the 2017 number was lower than the preceding 10-year period. There were no aerial observation accidents or serious incidents in 2017.

Figure 51. Rotorcraft Specialised Operations Accidents and Serious Incidents by Type of Operation, 2007-2017

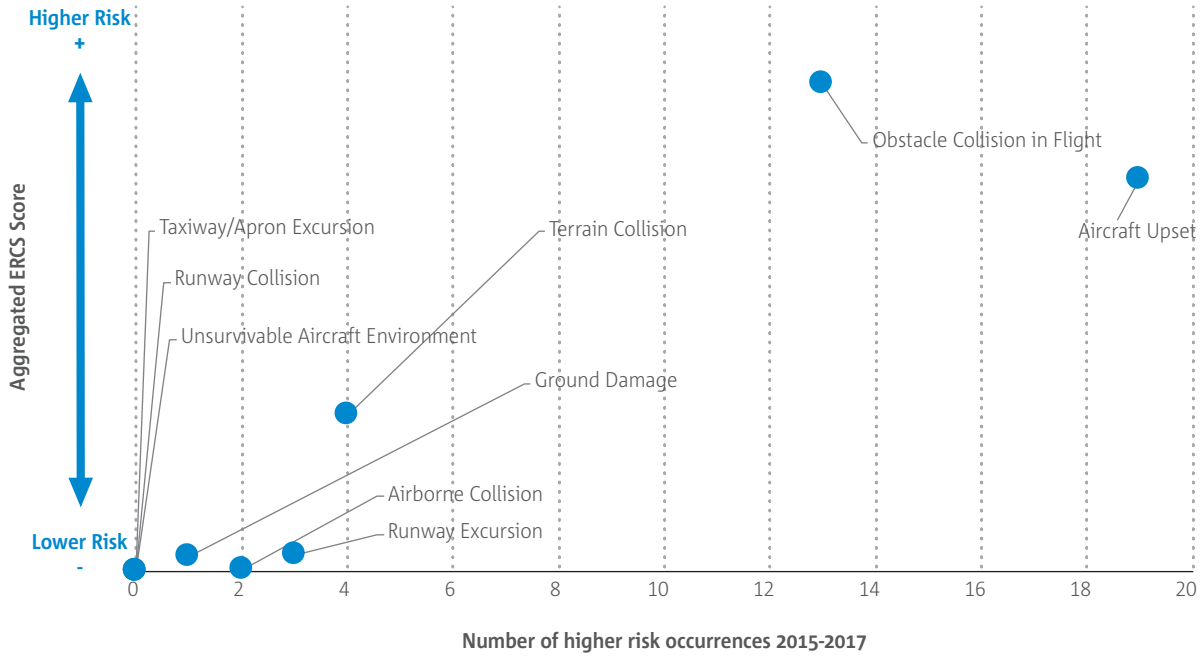


3.3.2 Safety Risk Portfolio

The Safety Risk Portfolio for Specialised Operations rotorcraft is based only on occurrence data, since an SPO Helicopters CAG has not been established. The Safety Issues and Key Risk Areas are prioritised based on the cumulative ERCS risk score for accidents and serious incidents in the EASA occurrence repository for the 2015-2017 period.

The key risk areas with the highest risk and highest number of occurrences involving specialised operations rotorcraft were Obstacle Collision In-flight and Aircraft Upset.

Figure 52. Distribution of key risk areas by frequency and aggregated ERCS risk score for rotorcraft specialised operations, 2015-2017



Based on the data supporting the portfolio, the following relations between the priority 1 key risk areas and safety issues can be highlighted:

- Obstacle Collision In-flight:
  - › Intentional low-flying,
  - › Helicopter obstacle see and avoid.

- Aircraft Upset:
  - › System reliability.

Figure 53. Safety Risk Portfolio for SPO Helicopter operations showing how the 3 year occurrence data 2015-2017 relates to safety issues and their outcomes relative to risk in descending order

Intentional Low Flying		●	•	•						
Helicopter Obstacle See and Avoid		●	•	•						
Perception and Situational Awareness		•	•	•			•			
Control of the Helicopter Flight Path and Use of Automation		•	•							
System Reliability			●		•					
Flight Planning and Preparation			•							
Human Performance		•	•							
Handling of Technincal Failures			•							
Decision Making and Planning		•								
Airborne Separation							•			
CRM and Operational Communications		•								
Aircraft Maintenance		No data								
Approach Path Management		No data								
Bird and Wildlife Strikes		No data								
Damage Tolerance to UAS Collisions		No data								
Degraded Visual Environment		No data								
Development and Application of Regulations and Procedures		No data								
Experience, Training and Competence of Individuals		No data								
Knowledge of Aircraft Systems and Procedures		No data								
Personal Pressure and Arousal		No data								

3.4 Non-Commercial Operations

The key domain statistics for non-commercial operations involving certified helicopters registered in an EASA MS or for which an EASA MS is the State of Operator are provided below.

3.4.1 Key Statistics

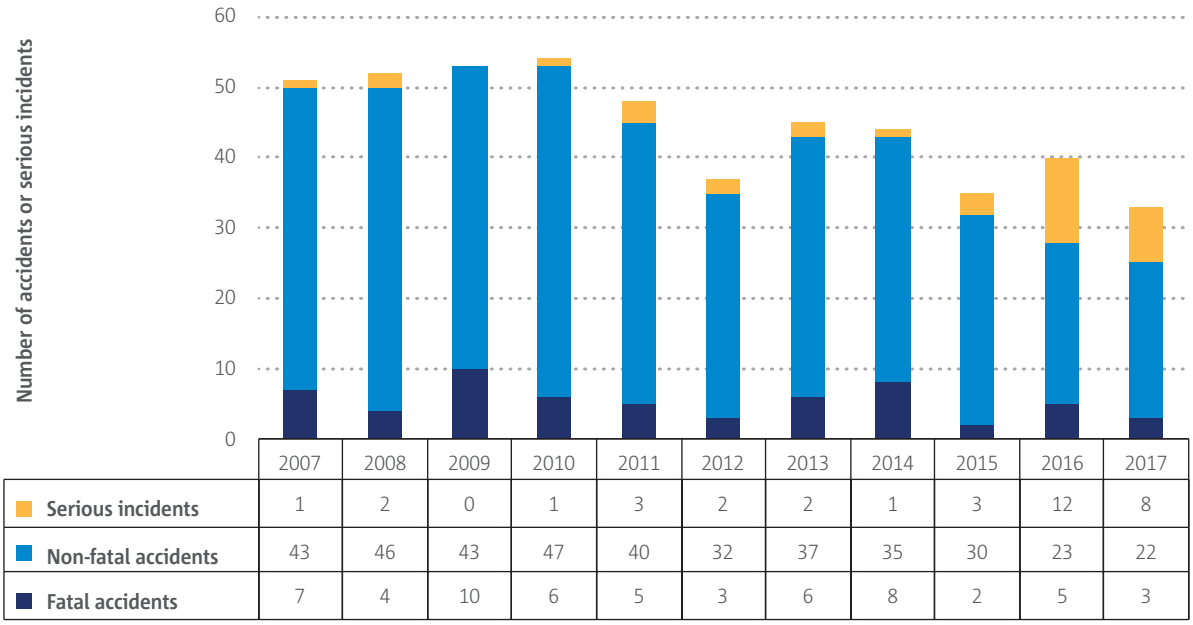
The key statistics for this domain are in the tables below and include comparison of the number of accidents (fatal and non-fatal) and serious incidents for the 10-year period 2007-2016 and the last year (2017). It also includes the comparison of fatalities and serious injuries happened in those accidents between the same timeframe.

Table 10. Key Statistics for Non-commercial Rotorcraft, 2007-2017

	Fatal Accidents	Non-Fatal Accidents	Serious Incidents
2007-2016 total	56	376	27
2017	3	22	8

	Fatalities	Serious Injuries
2007-2016 total	132	58
2017	7	11

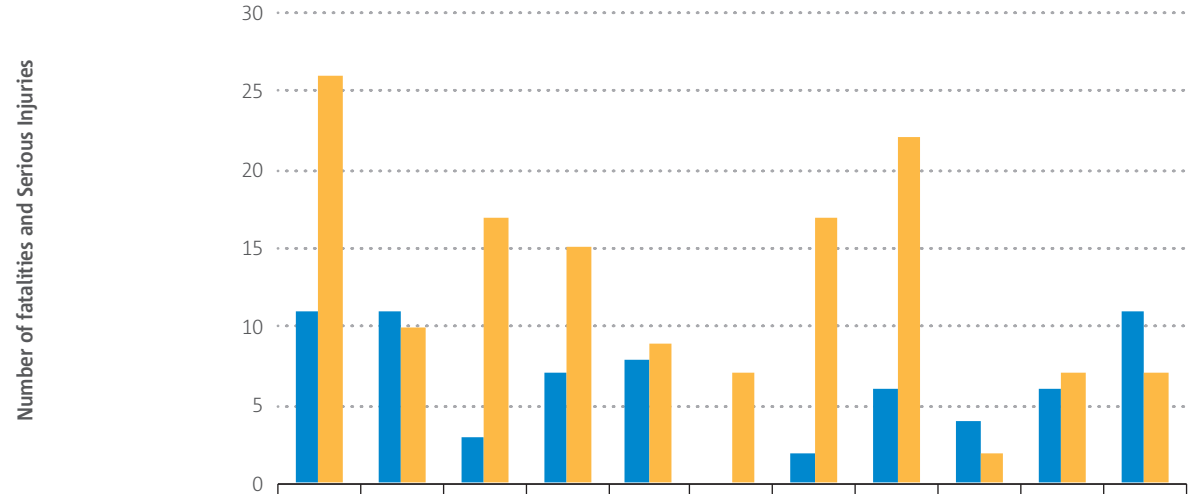
Figure 54. Non-commercially operated rotorcraft Accidents and Serious Incidents, 2007 - 2017



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Serious incidents	1	2	0	1	3	2	2	1	3	12	8
Non-fatal accidents	43	46	43	47	40	32	37	35	30	23	22
Fatal accidents	7	4	10	6	5	3	6	8	2	5	3

There has been a decrease in the number of fatal accidents in 2017 compared to 2016 and the 10 year average. There were also fewer non-fatal accidents and serious incidents in 2017 compared with 2016 and 10-year average.

Figure 55. Number of fatalities and serious injuries in non-commercially operated rotorcraft, 2007 - 2017

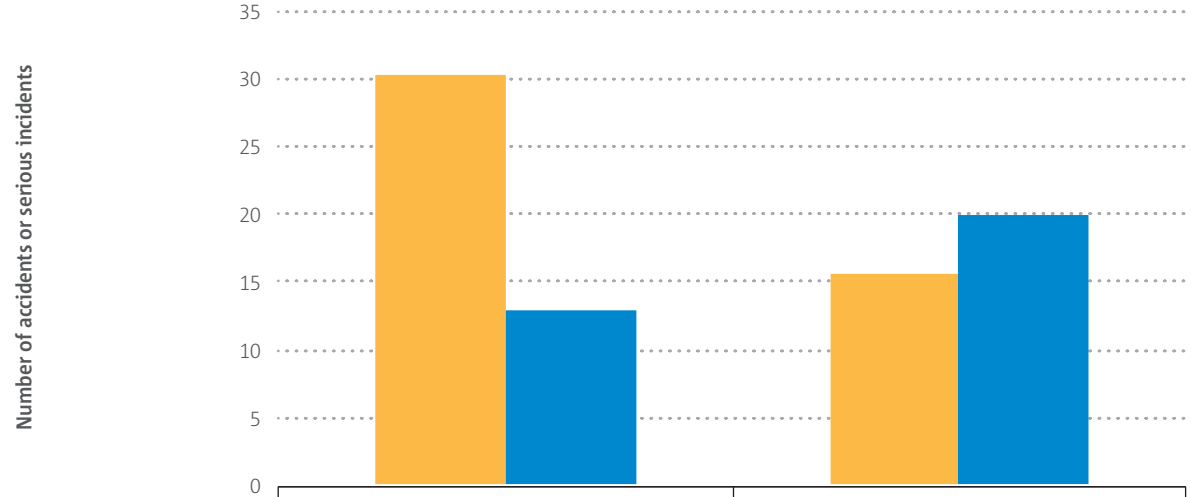


	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Serious injuries	11	11	3	7	8	0	2	6	4	6	11
Fatalities	26	10	17	15	9	7	17	22	2	7	7

The number of fatalities was also lower in 2017 compared to the 10 year average, and there is a higher number of serious injuries in 2017 compared to 2016 and previous 10 year-average. The number of fatal and serious injuries for non-commercially operated rotorcraft changes each year. Although the number of fatal injuries in the last three years has been lower in general than the ten year period, no overall trend could be identified.

3.4.1.1 Rotorcraft Type/ Propulsion Type

Figure 56. Distribution of accidents and serious incidents by rotorcraft propulsion type, 2007-2016 and 2017.

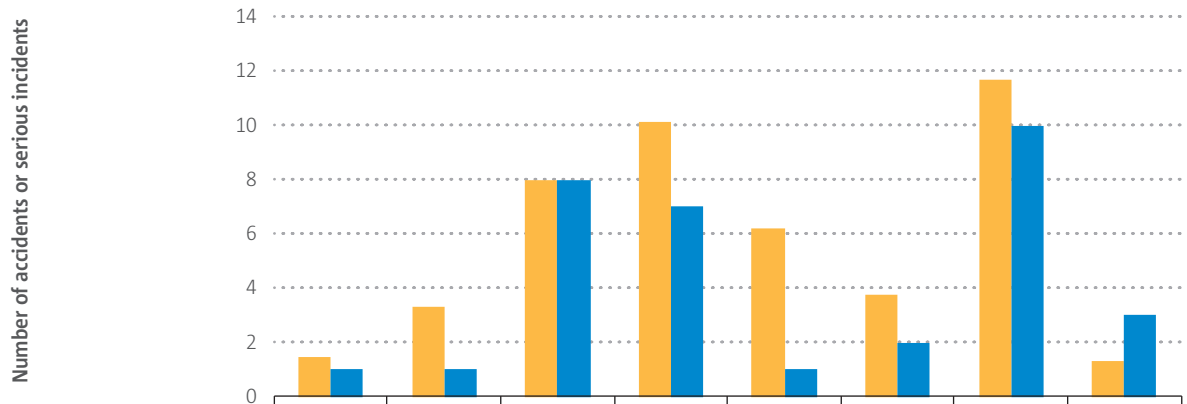


	Reciprocating	Turboshaft
2007-2016 Average	30.2	15.6
2017	13	20

In 2017 there were fewer accidents and serious incidents involving rotorcraft with reciprocating engines than turboshaft engines. However, based on the 2007-2016 average, the number of accidents and serious incidents involving reciprocating engine helicopters was higher than the average for turboshaft.

3.4.1.2 Phase of flight

Figure 57. Distribution of accidents and serious incidents by phase of flight for non-commercially operated rotorcraft, 2007-2016 and 2017

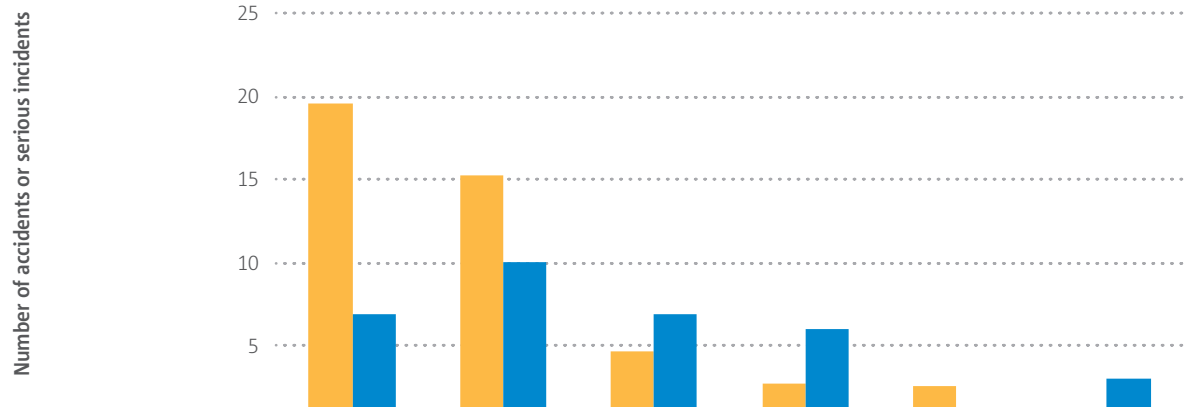


	Standing	Taxi	Take-off	En route	Manoeuvring	Approach	Landing	Unknown
2007-2016 Average	1.5	3.3	8	10.1	6.2	3.8	11.7	1.3
2017	1	1	8	7	1	2	10	3

The highest number of accidents and serious incidents occurred during the take-off, en-route and landing phases of flight. There is a significant decrease in 2017 in the number of accidents and serious incidents during enroute and manoeuvring compared to the 10-year average.

3.4.1.3 Type of Operation

Figure 58. Distribution of accidents and serious incidents by operation type for non-commercially operated rotorcraft, 2007-2016 and 2017



	Pleasure	Flight Training/ Instructional	Other/Unknown	Business	Relocation	Test Flight
2007-2016 Average	19.6	15.3	4.7	2.8	2.6	0.9
2017	7	10	7	6	0	3

Most accidents and serious incidents occurred in 2017 have happened during Flight Training/Instructional and Pleasure types of operations, and they are below the 10-year average.

Figure 59. Non-commercially operated rotorcraft aggregated ERCS risk score by type of operation, 2013-2017.

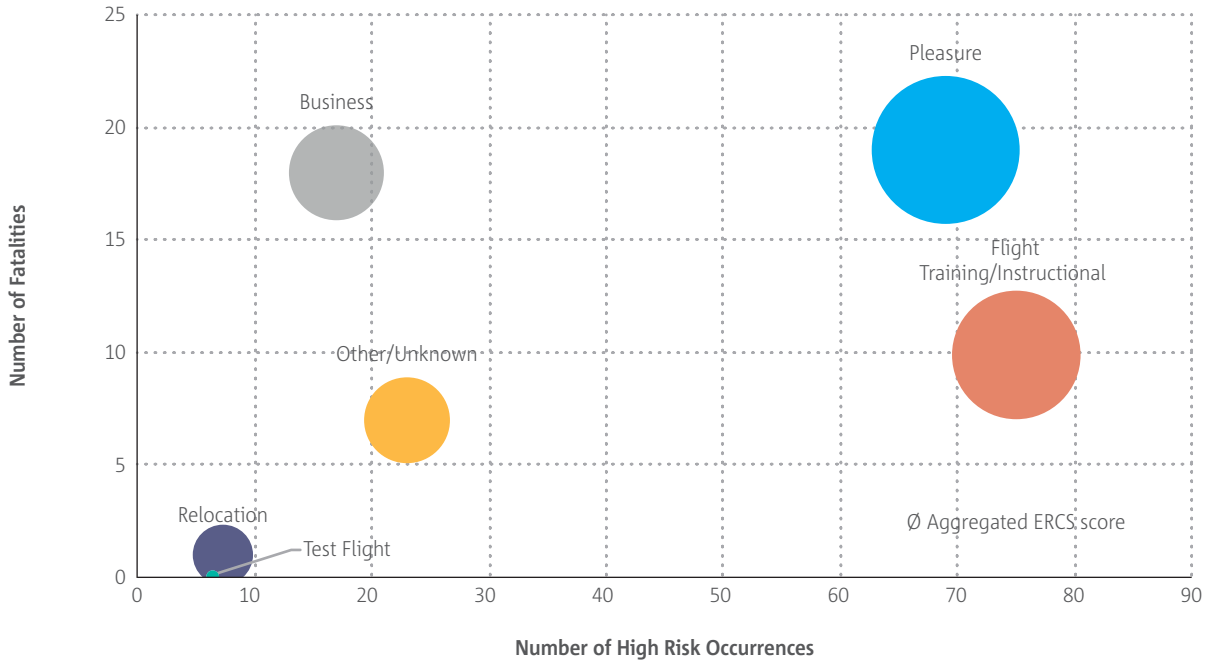


Figure 59 provides information regarding the aggregated risk score of high risk occurrences of the different operation types falling in the scope of this section that happened from 2013 – 2017. It can be seen that there are more high risk occurrences in Flight Training/Instructional operation type then in Pleasure but Flight Training/Instructional has a lower aggregated risk score than Pleasure operation type.

3.4.2 Safety Risk Portfolio

The safety risk portfolio for non-commercial helicopter operations has been developed based on the analysis of accidents and serious incidents that happened from 2013 to 2017. It provides details of key risk safety areas and associated safety issues prioritised based on the number of high risk occurrences assessed using the ERCS methodology.

Aircraft Upset, Obstacle Collision inflight and Terrain Collision are the main key risk areas non-commercial helicopter operations based on the aggregated risk score and number of high risk occurrences that covers 2013 – 2017 period.

Figure 60. Non-commercially operated rotorcraft Key Risk Areas plotted in relation to the European Risk Classification Score (ERCS) methodology, 2013-2017

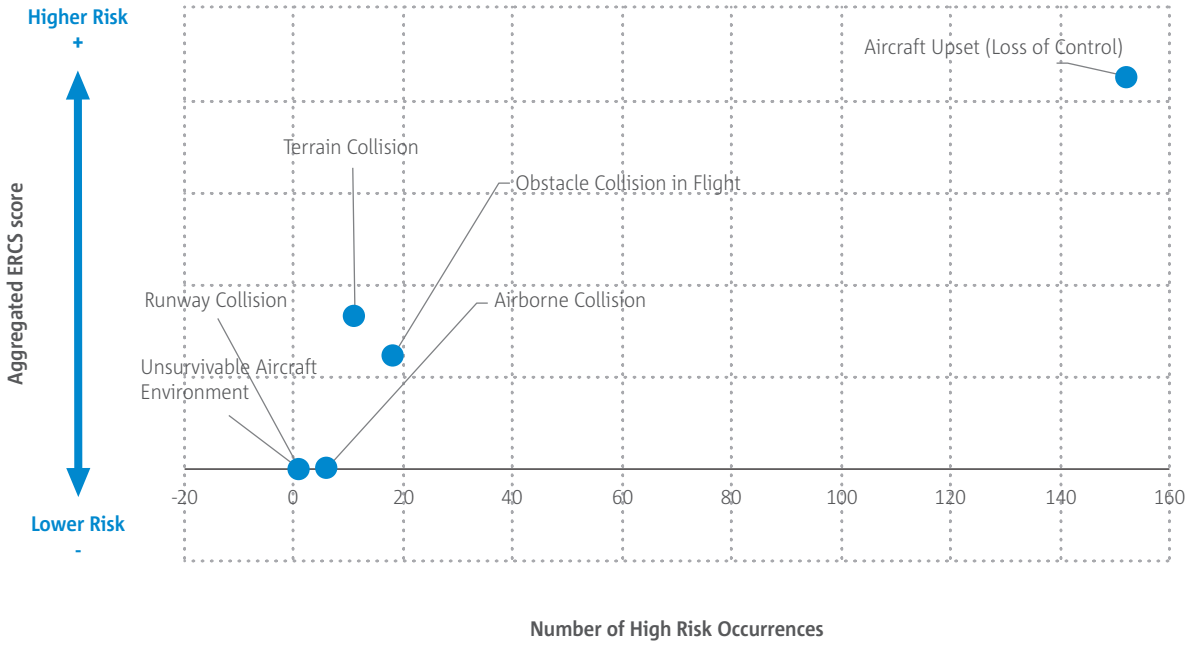
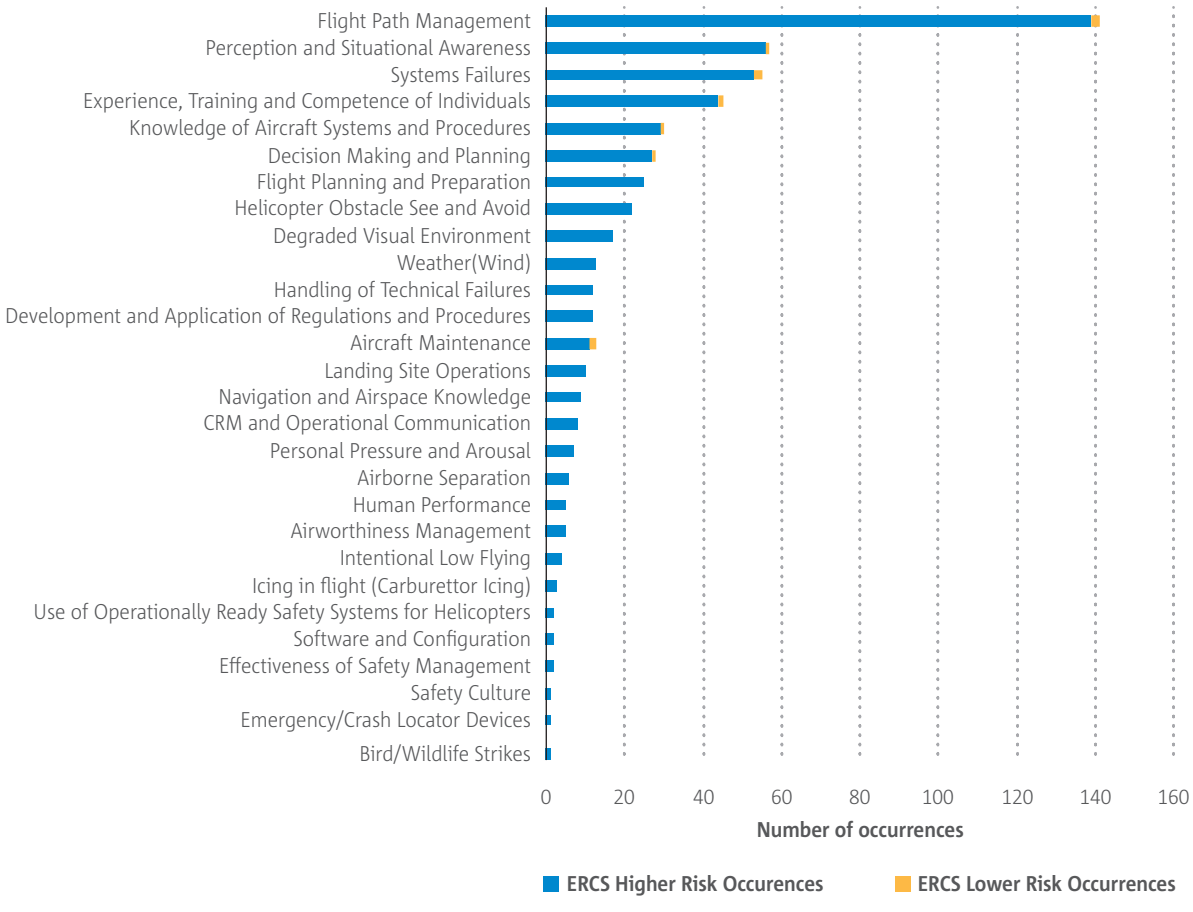


Figure 61. Non-commercially operated rotorcraft safety issues by high and low risk scores, 2013-2017



Based on the data supporting the portfolio, the following relations between the priority 1 key risk areas and safety issues can be highlighted:

- Aircraft Upset
  - Flight Path Management
  - Perception and Situational Awareness
  - Systems Failures
  - Experience, Training and Competence of Individuals
  - Knowledge of Aircraft Systems and Procedures

- Obstacle Collision
  - Helicopter Obstacle See and Avoid
  - Degraded Visual Environment
  - Navigation and Airspace Knowledge
  - Landing Site Operations

- Terrain Collision
  - Helicopter Obstacle See and Avoid
  - Navigation and Airspace Knowledge
  - Decision Making and Planning

Figure 62. Safety Risk Portfolio for NCO Helicopter operations showing how the 5 year occurrence data 2013-2017 relates to safety issues and their outcomes relative to risk in descending order

Flight Path Management	139		●	•	•						
Perception and Situational Awareness	56		●	•	•			•			
Systems Failures	53		●		•				•		
Experience, Training and Competence of Individuals	44		●	•							
Knowledge of Aircraft Systems and Procedures	29		●		•						
Decision Making and Planning	27		●	•	•						
Flight Planning and Preparation	25		●	•	•						
Helicopter Obstacle See and Avoid	22			●	•						
Degraded Visual Environment	17		●	•	•						
Weather(Wind)	13		●		•						
Handling of Technical Failures	12		●								
Development and Application of Regulations and Procedures	12		●		•						
Aircraft Maintenance	11		●								
Landing Site Operations	10		●	•	•		•				
Navigation and Airspace Knowledge	9		●	•	•			•			
CRM and Operational Communication	8		●		•			•			
Personal Pressure and Arousal	7		●		•						
Airborne Separation	6					●					
Airworthiness Management	5		●								

NCO Helicopters

Bands of Aggregated ERCS Risk Score (2013-2017)			Priority 1			Priority 2		Priority 3		Priority 4	
Higher Risk ERCS Occurrences (2013-2017)			152	18	11	6	1	1	1	0	0
Safety Issues	#HRO ERCS	Bands of Aggregated ERCS Risk Score (2013-2017)	Key Risk Areas (Outcomes and precursors)								
			Aircraft Upset	Obstacle Collision	Terrain Collision	Airborne Collision	Ground Damage	Runway Collision	Unsurvivable Aircraft Environment	Excursions	Injuries
Human Performance	5		●	•	•						
Intentional Low Flying	4		•	●	•						
Icing in flight (Carburettor Icing)	3		●								
Software and Configuration	2		●								
Use of Operationally Ready Safety Systems for Helicopters	2		●								
Effectiveness of Safety Management	2		●								
Emergency/Crash Locator Devices	1		●								
Bird/Wildlife Strikes	1		●								
Safety Culture	1		●								

● A significant number of occurrences • A small number of occurrences

Balloons

4

This chapter covers balloon operations where the state of registry was an EASA MS. The Balloon Collaborative Analysis Group was the first CAG to be established and met for the fourth time in 2018. It has already proven the concept of CAGs. The group has reviewed all the fatal accidents and to some extent the non-fatal accidents last five years. The group is combination of industry, manufacturer and NAAs providing an excellent source of inside knowledge and expertise for the deeper analysis of the accidents. The identified safety issues in relation to the available data are seen to give an accurate picture of the safety within the hot air ballooning industry today. The future work of the CAG will be to risk assess the balloon accidents and further support the EASAs SRM process.

4.1.1 Key Statistics

The key statistics for this domain are in the tables below and include comparison of the number of accidents (fatal and non-fatal) and serious incidents for the 10-year period 2007-2016 and the last year (2017). It also includes the comparison of the fatalities and serious injuries happened in those accidents between the same timeframe.

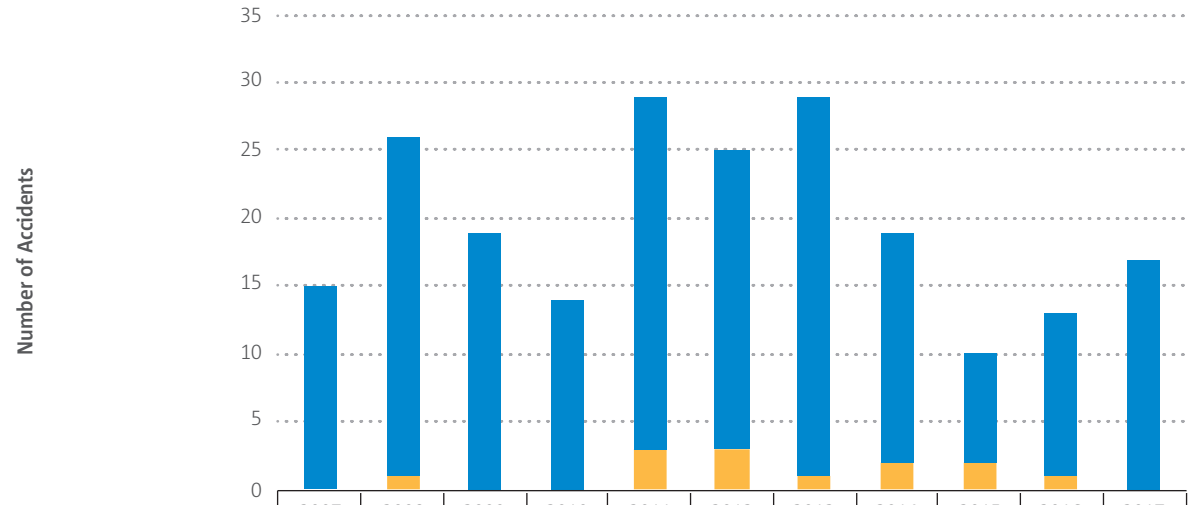
Table 11. Key statistics for balloons, 2007-2017

	Fatal Accidents	Non-Fatal Accidents	Serious Incidents
2007-2016 total	13	186	16
2017	0	17	2

	Fatalities	Serious Injuries
2007-2016 total	21	192
2017	0	15

2017 was a good year for balloon operations. No fatal accident occurred and number of non-fatal accidents have reduced. There were two serious incidents in 2017, which is in line with historical data.

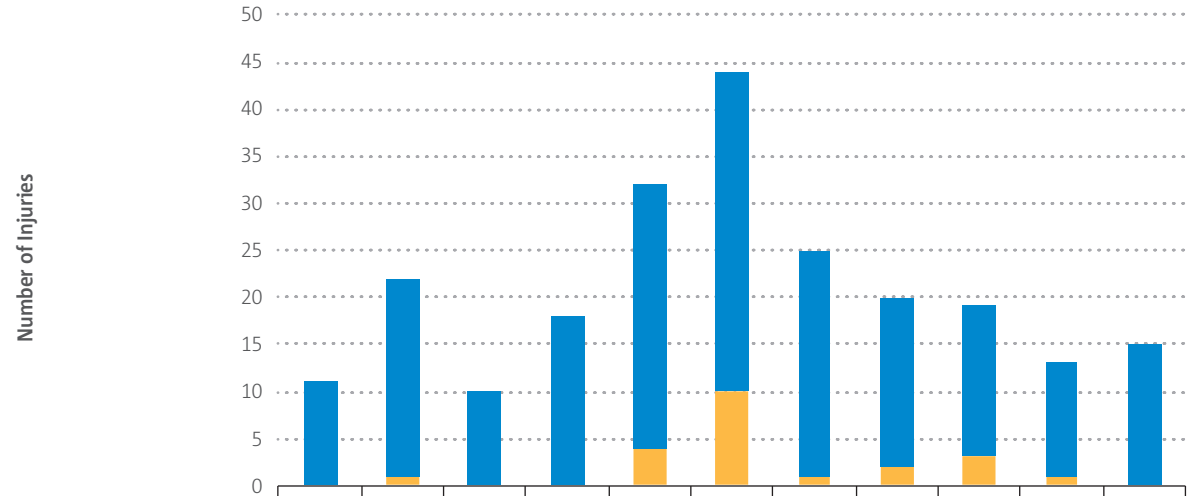
Figure 63. Balloon fatal and Non-fatal accidents from 2007-2017



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Non-Fatal Accidents	15	25	19	14	26	22	28	17	8	12	17
Fatal Accidents	0	1	0	0	3	3	1	2	2	1	0

There were no fatal injuries in 2017. Number of serious injuries also decreased, or from 19.2 on average for the time period 2007-2016 to 15 in 2017.

Figure 64. Fatalities and serious injuries 2007-2017

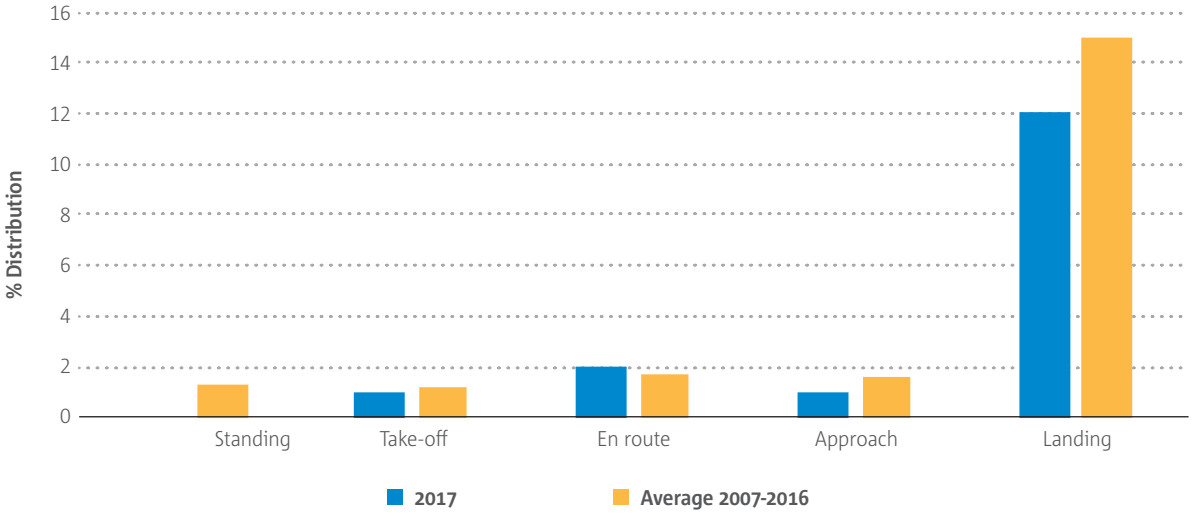


	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total Serious Injuries	11	21	10	18	28	34	24	18	16	12	15
Total Fatalities	0	1	0	0	4	10	1	2	3	1	0

4.1.1.1 Phase of flight

Using the same dataset it can be seen that most balloon accidents occur during the landing phase of the flight. The average from 2007-2016 shows that 72% of the accidents happen during landing but last year that percentage dropped to 63%.

Figure 65. Distribution of balloon accidents between flight phases

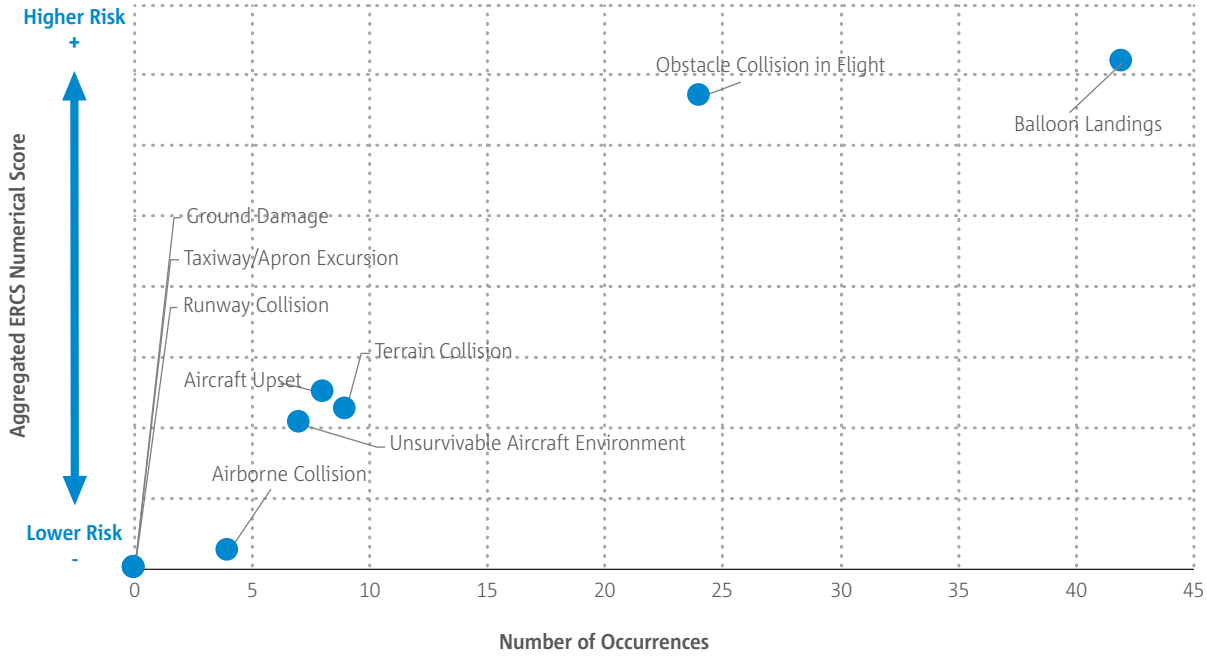


4.1.2 Safety Risk Portfolio

4.1.2.1 Categories and ERCS scores 2015-2017

By using the European Risk Classification Scheme (ERCS) EASA has now risk assessed five years of balloon accidents and serious incidents. Figure 66 shows that the Key Risk Areas bearing the highest risk are Balloon Landings and Obstacle Collision in Flight. When reviewing the data it can be seen that collisions with power lines and hard landings are the events that tend to cause injuries in ballooning operations. The causes of power line collision are mainly lack of information, position of the sun causing difficulty to spot the lines, fog or wind gusts. Main causes for hard balloon landings causing injuries are mainly wind gusts or downdrafts, passengers not ready for the impact or they have a weak bone that gives in during touch down.

Figure 66. Balloon accidents and serious incident key risk areas by aggregated ERCS score.



4.1.2.2 Safety Risk Portfolio table

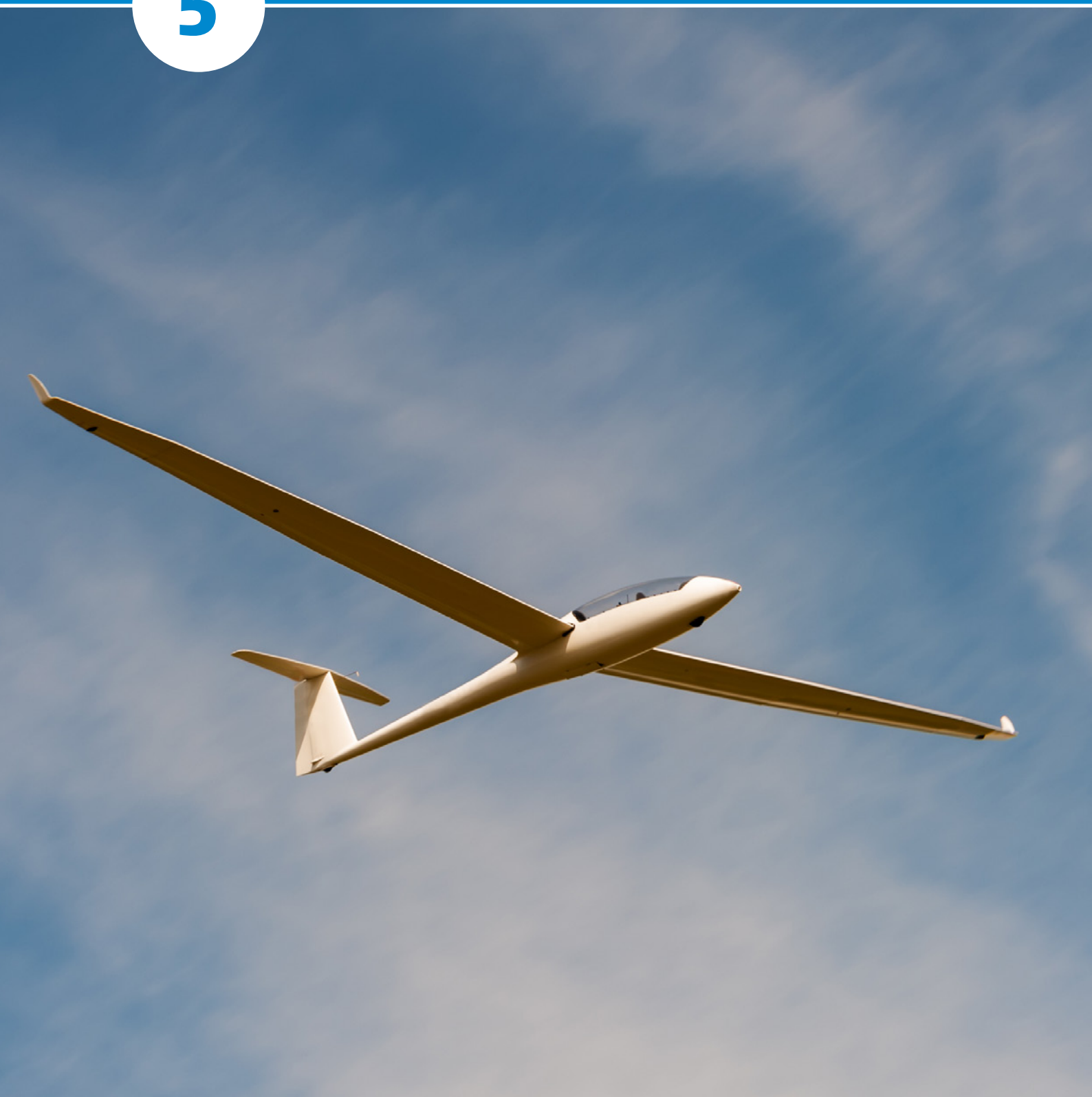
Figure 67 provides us with the Safety Risk Portfolio (SRP) for balloon operations. The portfolio is fully data driven. The safety issues have been ordered by aggregated ERCS scores and they are then marked accordingly with the appropriate priority. The same goes with the Key Risk Areas.

Based on the coding of the occurrences, the priority one safety issues are Decision Making and Planning and Presence and Use of Pilot Restraints.

Figure 67. Safety Risk Portfolio for Balloon operations showing how the 5 year occurrence data 2013-2017 relates to safety issues and their outcomes relative to risk in descending order

Sailplanes

5



Sailplanes in the GA domain differ somewhat from other General Aviation applications. This has to do with how gliding is performed. In other domains you jump on board your aircraft and you start flying but that is not so simple with sailplanes – unless you are flying a motor glider of course. Sailplane operations depend on teamwork. You will not go anywhere unless you have a team around you that makes sure that you are safely towed into the air. This added operational complexity has provided the gliding community with a collaborative team spirit and a cohesive atmosphere for safety. The gliding community with the leadership of the European Gliding Union (EGU) has been active in EASA's work on the new Sailplane OPS and FCL rules and has provided EASA with valuable input and insight into sailplane operations. The analysis that EGU with the diligent support from the British Gliding Association (BGA) has provided insight on where the risks are and what they should be called so as to be of the best use for the gliding community.

This chapter covers Sailplane operations where the state of registry is an EASA MS using EASA's accident dataset.

5.1.1 Key Statistics

The key statistics for this domain are in the tables below and include comparison of the number of accidents (fatal and non-fatal) and serious incidents for the 10-year period 2007-2016 and the last year (2017). It also includes the comparison of the fatalities and serious injuries happened in those accidents between the same timeframe.

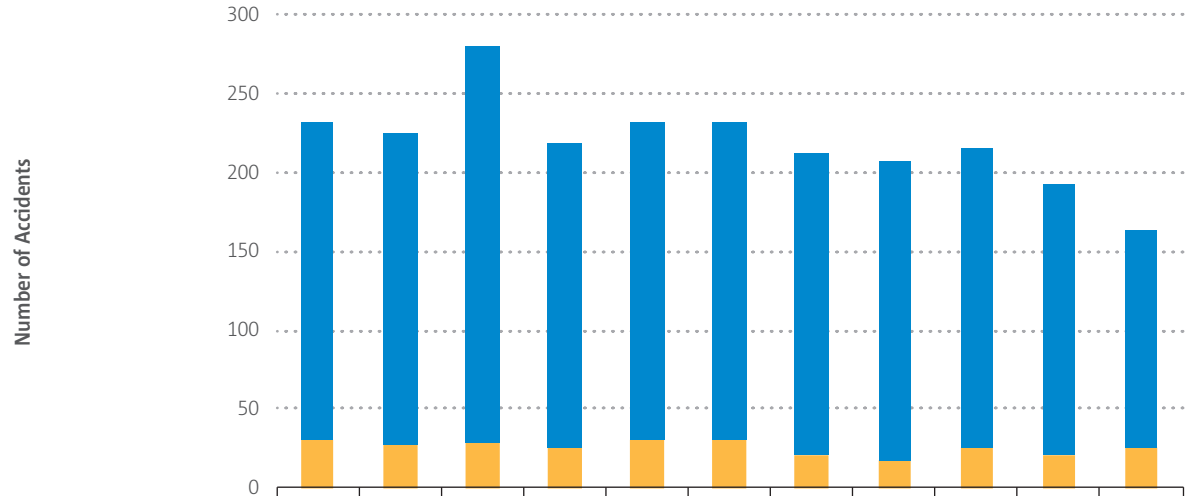
Table 12. Key statistics for sailplanes, 2007-2017.

	Fatal Accidents	Non-Fatal Accidents	Serious Incidents
2007-2016 total	254	1992	55
2017	25	138	18

	Fatalities	Serious Injuries
2007-2016 total	295	336
2017	27	20

For Sailplanes, there was an increase of fatal accidents in 2017 with 25 fatal accidents causing 27 fatalities. The number of nonfatal accidents was substantially lower than the 10-year average with 138. There was a significant decrease in the number of serious injuries. A detailed picture showing the historical fatal and non-fatal accident development can be seen in Figure 55 and fatal and serious injuries in Figure 70 below. It can be seen that number of fatal accidents have been very stable through the last decade. However, the overall trend in terms of number of accidents is decreasing.

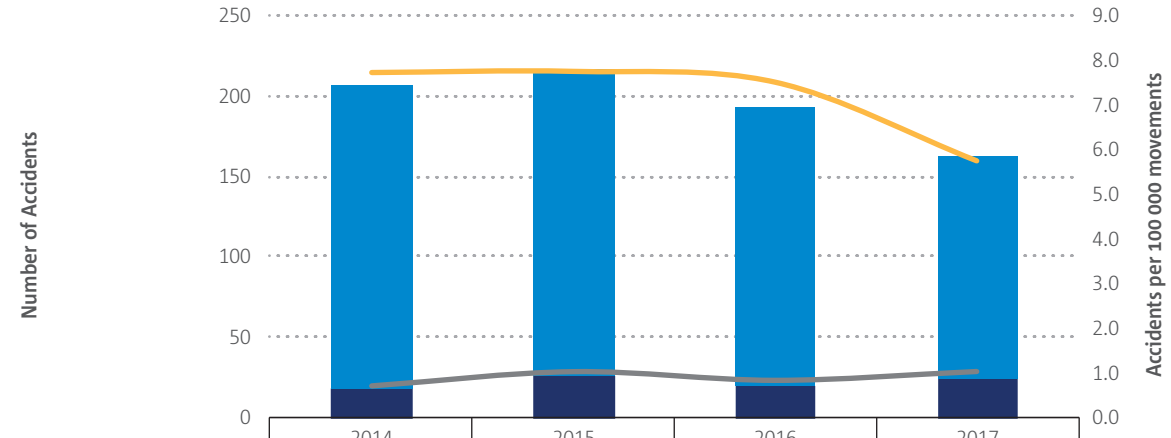
Figure 68. Sailplane fatal and non-fatal accidents 2007-2017



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Non-Fatal Accidents	201	198	253	194	202	201	192	189	189	173	138
Fatal Accidents	30	27	28	25	30	30	20	18	26	20	25

There are no accurate figures available on number of movements. However, by using the available data reported by NAAs in 2016 and a joint survey performed by AOPA and EASA in relation to fleet size and estimation of movements and use that data to estimate for the rest of the EASA MS it is possible to estimate number of flights from 2014-2016. It was decided to use the average EU GDP increase of 2.6% from 2016 to 2017 to estimate the movements for 2017.

Figure 69. Estimated accident rates for Sailplane operations 2014-2017



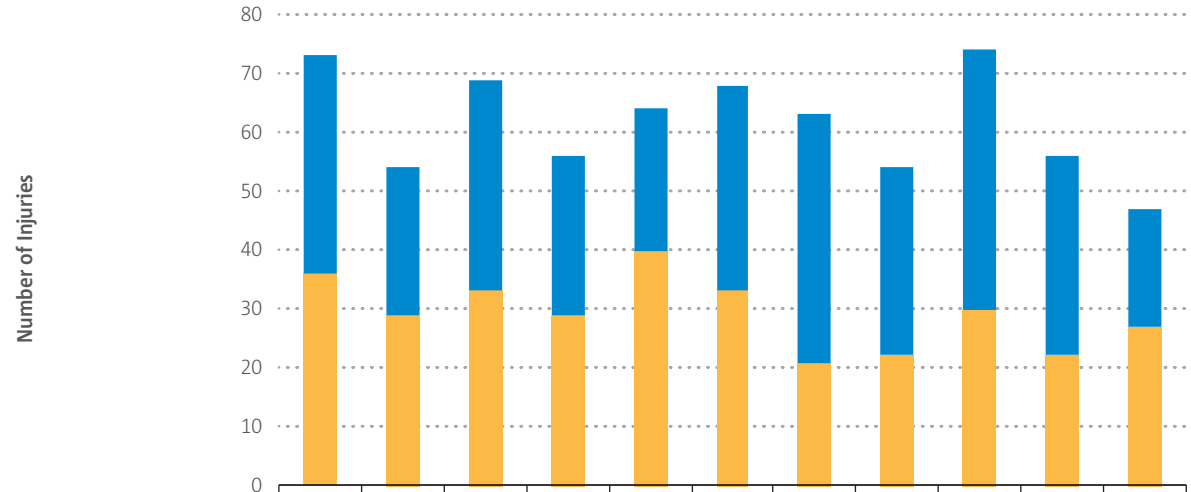
	2014	2015	2016	2017
Non-Fatal Accidents	189	189	173	138
Fatal Accidents	18	26	20	25
Fatal Accident Rate	0.7	1.0	0.9	1.0
Non-fatal Accident Rate	7.7	7.7	7.5	5.7

It should be noted that the rates displayed in the Figure 69 are estimated for all EASA MS. It should also be noted that accidents rates are different between individual EASA MS. This is in particular evident when comparing geographically where the accidents occurred. Number of fatal accidents are higher in the Alpine area than in areas with lower or more even landscape. The duration of the flights are also longer in the mountainous areas than in the lower parts of Europe where the number of movements is higher but the duration of each flight is much shorter.

The fatal accident rate is relatively stable over the four year period but then non-fatal accident rate is dropping in 2017. As the exposure data is very fragmented it is impossible at this time to provide an accident rate map of Europe. NAAs, flight clubs and associations are encouraged to both collect and share aggregated exposure data with EASA to enable better overview of the current situation.

There were 27 fatalities in sailplanes in 2017, which is in line with the figures over the preceding decade. The number of serious injuries in 2017 was the lowest in the time period analysed. As can be seen in Figure 56 a downward trend from 2007 to 2017 is evident.

Figure 70. Sailplane fatalities and serious injuries 2007-2017

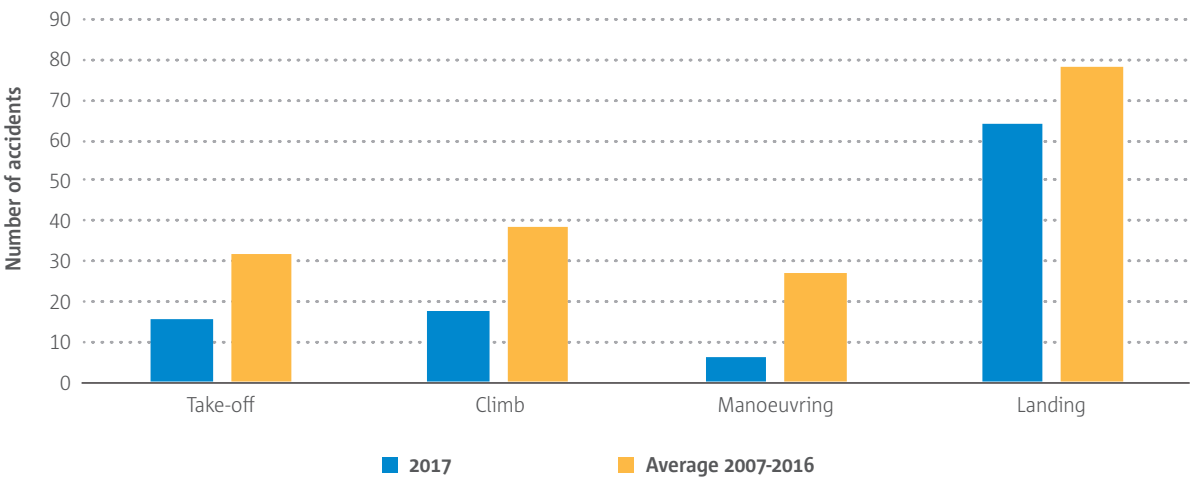


	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total Serious Injuries	37	25	36	27	24	35	42	32	44	34	20
Total Fatalities	36	29	33	29	40	33	21	22	30	22	27

5.1.1.1 Phase of flight

In terms of flight phase the majority of the glider/sailplane accidents occur during the landing phase of the flight. Either it is a landing on an airfield or an off-field landing due to loss of lift. It is mostly perception of the situation which causes hard landings and/or ground loops. It should be noted that Figure 71 contains all landings both on airfield and off-field landings. During takeoff it is often a wing touching ground during a winch launch, during climb it is loss of control during the winch launch.

Figure 71. Number of Sailplane accidents per flight phase



When looking at the landing phase specifically it can be seen that over 70% of the landing accidents are during Level-off/touch down or during landing roll at the airfield. Last year 30% were attributed to off-field landings where the aircraft landed outside the airfield perimeter. As the event type 'Off-field landing' is relatively new it does not give a perfect picture. It can be assumed that some of the 'Level-off/touchdown' event types have occurred during an off-field landing.

5.1.1.2 Sailplane operation type

Figure 72 shows that the main operation types on Sailplanes are pleasure flying and instructional flights.

Figure 72. Distribution of Sailplane accidents per operation type.

5.1.2 Safety Risk Portfolio

The main Key Risk Areas (KRAs) used in other domains within this report have been omitted and Safety Issues (SIs)/Accident Categories have been used instead in this joint analysis done by EGU/BGA and EASA. It is well worth noting that these safety issues or accident categories are formed by the apparent immediate cause of the accident. It should also be noted that the 'In Motor Gliders/Tugs' safety issue, contains accidents that can only occur on a powered aircraft.

Figure 73. Percentage of Sailplane Fatal Accidents per Safety Issue - EASA dataset 2013-2017

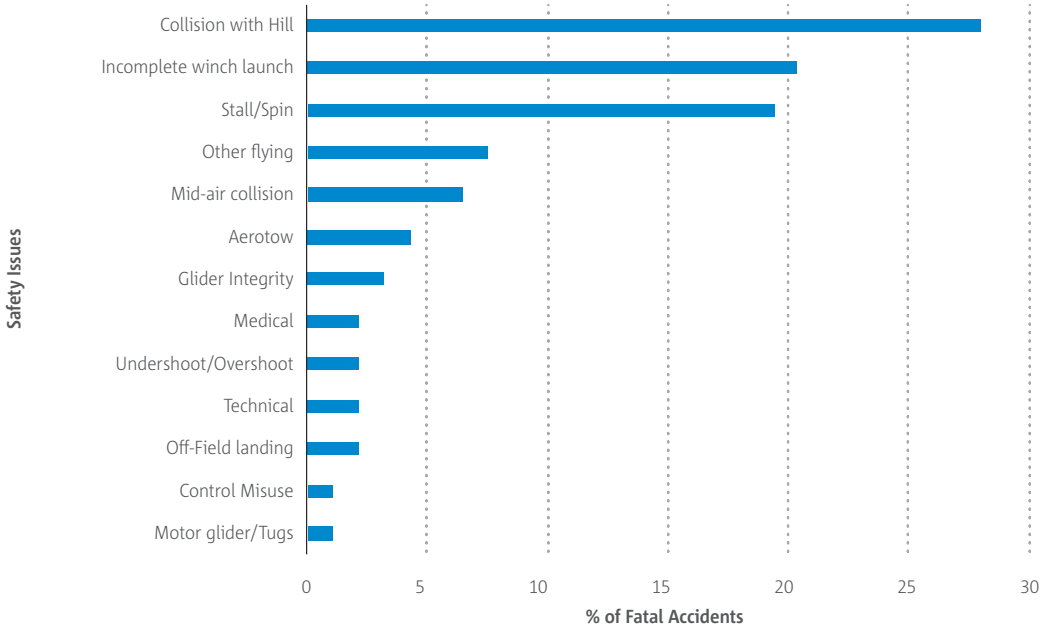
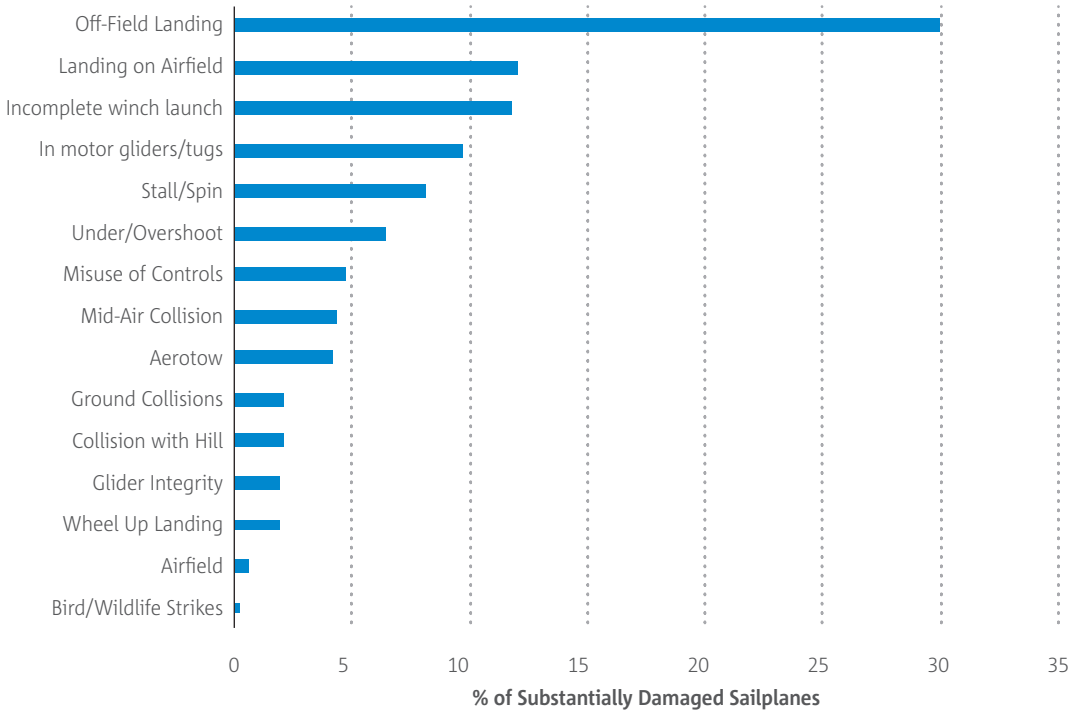


Figure 74 shows us the fatal accidents being mapped onto the safety issues. It should be noted that of 108 fatal accidents from 2013-2017 there were 15 occurrences where there was no information available to determine the immediate cause of the accident. The largest killers are:

- **Collision with hill:** Alpine flying is popular but very unforgiving. The strong winds that form around the mountains can be deadly.
- **Winch launches:** During the take-off run the aircraft swerves due to wing tip hitting the ground, angle of attach is to high causing structural overload or stall, or pilot loses control due to incomplete winch launch.
- **Stall/spin:** Loss of control is a big part of the picture when it comes to winch launches but also during the approach and landing phases of the flight.
- **Mid-Air collisions:** Searching for thermal lift with other sailplanes at the same time and approaching an airfield where communication is minimal or non-existent increases the risk of mid-air collisions.

The **'Other flying'** safety issue contains 3 structural overload during flight, 1 aerobatics accident, 1 dive into the ground, 1 unexplained loss of control and 1 suicide. The Glider Integrity issue relates to the 'Pre-flight planning and preparation' used in the last version of the portfolio including assembly of the Sailplane before flight.

Figure 74. Substantially damaged or destroyed Sailplanes - EASA dataset. Average percentage per safety issue.



Considering Figure 74 it shows accidents where sailplanes suffered substantial damage or were considered to be damaged beyond repair. The main Safety Issues are:

- **Off-field landings:** Landings in an unfamiliar territory – crop fields and other agricultural areas where it can be difficult to determine the quality of the designated landing field from above.
- **Landing on airfield:** The second Safety Issue involves landings at airfields. This includes the hard and bounced landings, causing a swerve or a runway excursion.
- **Incomplete winch launches:** This type of take-offs requires a good coordination between the pilot and the ground crew. Too high angle of attack or incorrect adjustments for the winch can cause unexpected and unintended results for the people involved.
- **In motor gliders/Tugs:** These are occurrences that can only occur to motorised sailplanes e.g. involving engine failures.
- **Stall/spin:** Loss of control is the cause of many of the fatalities. Actions are needed to address these accidents.
- **Under/overshoot:** This Safety Issue involves unstable approaches, speed and approach control in general.

5.1.2.1 Identified Safety Issues and safety issue analysis

The EASA dataset for 2015-2017 has been risk scored according to the European Risk Classification Scheme (ERCS. This allows a comparison of the key risk area and the aggregated ERCS risk score, identifying the highest risk and most commonly occurring key risk area accidents.

Figure 75. Sailplanes ERCS Scores plotted per Safety Issue.

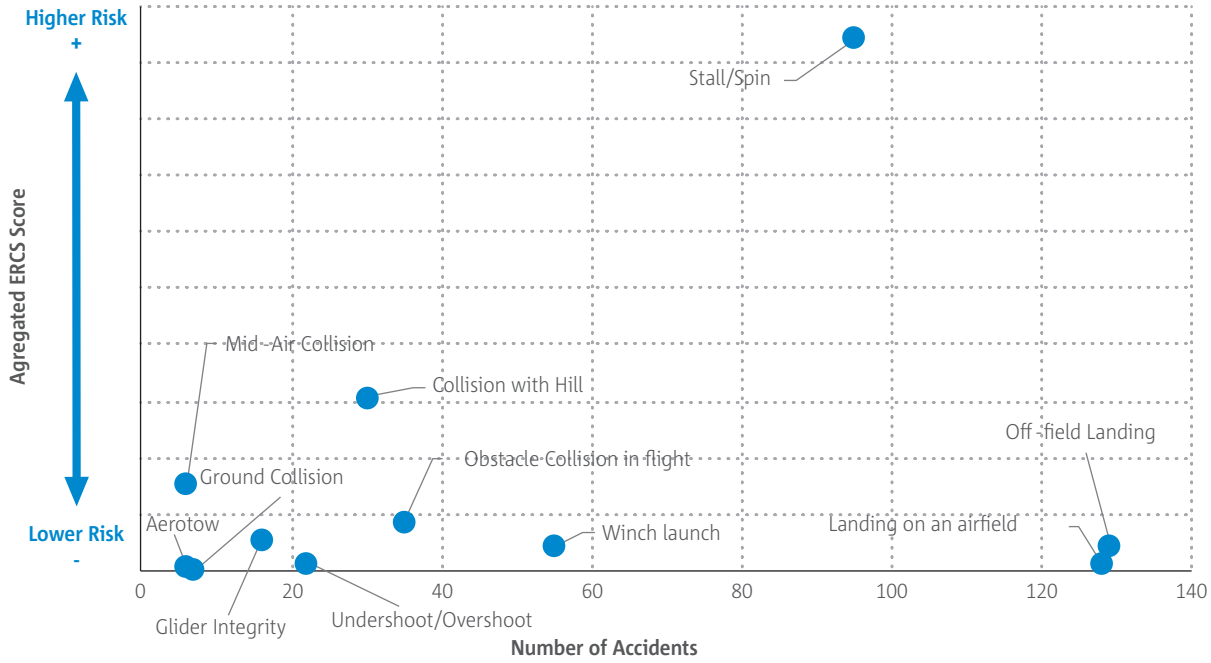


Figure 75 displays the aggregated risk vs. the number of accidents in Sailplane operation. Note that the scale of the risk is not visible as the actual risk score is not relevant. The figure shows quite clearly that the attributed risk in occurrences involving a stall or a spin resulting in a fatality or serious injury is quite high. On the other hand the figure shows also that in spite of high number of accidents the risk of a fatality or serious injury is very low. Both the Off-field landing and Landing on an airfield issues are very low in risk. Collision with Hill is showing a clear distinction in terms of risk but other safety issues show low risk but also with fewer accidents behind them.

Figure 76. Sailplane Safety Issues split between Higher and Lower Risk base on the ERCS score.

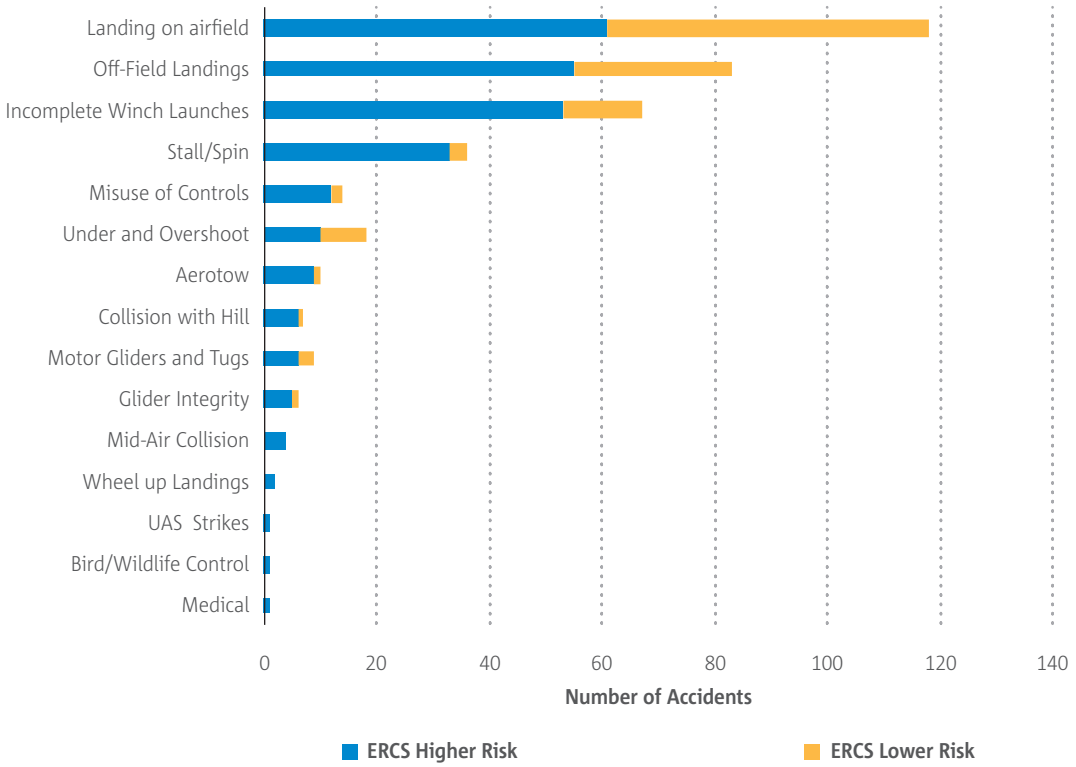


Figure 76 gives us a different perspective. The higher risk occurrences are the yellow and red areas in the risk matrix where the lower risk areas are green. The safety issues 'Landing on airfield' and 'Off-field landings' contain many occurrences resulting in both higher and lower risk occurrences. The higher risk occurrences are not high enough to push them up the scale in Figure 75 as fatalities and serious injuries are few. The main outcome of the high risk accidents are substantial damage of the sailplane involved. It can also be observed that 'Incomplete Winch Launches' has much fewer lower risk occurrences. This implies that both damage and injuries are more severe in that type of accidents. The safety issue 'Stall/Spin' has fewer still lower risk accidents but the number of fatalities are much higher. This explains why Stall/spin is so high in Figure 75.

Aerodromes and Ground Handling

6

This chapter covers aerodrome operations, with the scope being the EASA Member States as State of Occurrence. Data is fetched from the EASA database (accidents and serious incidents) as well as the European Central Repository. It is worth noting that the accidents and serious incidents in this Chapter are those related to Aerodrome operations in a general context, which means that the aerodrome itself may or may not have had a contribution to the given occurrence, but it may have a role in preventing similar occurrences in the future.

The data in this chapter differs from previous years' Annual Safety Review; this is because the scope of the data extraction from the database has changed. The data is now only extracted based on aerodrome related event types and non-airborne flight phases in the ECCAIRS taxonomy.

A Safety Risk Portfolio for Aerodrome and Ground Handling operations is also provided. This has been developed with the support of the Aerodrome and Ground Handing Collaborative Analysis Group (CAG). The CAG is lead by the Agency and has members from airports, airlines, national authorities, international organisations and unions.

6.1 Key Statistics

The key statistics for this domain are in the tables below and include comparison of the number of accidents (fatal and non-fatal) and serious incidents for the 10-year period 2007-2016 and the last year (2017). It also includes the comparison of the fatalities and serious injuries happened in those accidents between the same timeframe.

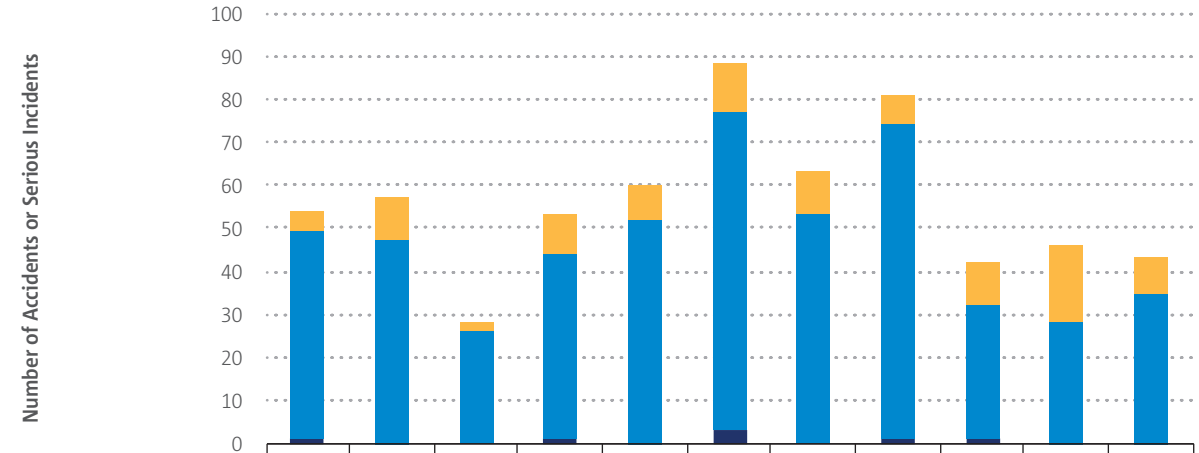
Table 13. Key statistics for aerodromes and ground handling, 2007-2017

	Fatal Accidents	Non-Fatal Accidents	Serious Incidents
2007-2016 total	7	475	90
2017	0	35	8

	Fatalities	Serious Injuries
2007-2016 total	17	36
2017	0	4

There were no fatal accidents related to aerodrome and ground handling operations in 2017. The number of non-fatal accidents were 35, which is less than the average of the preceding decade, which was 47.5.

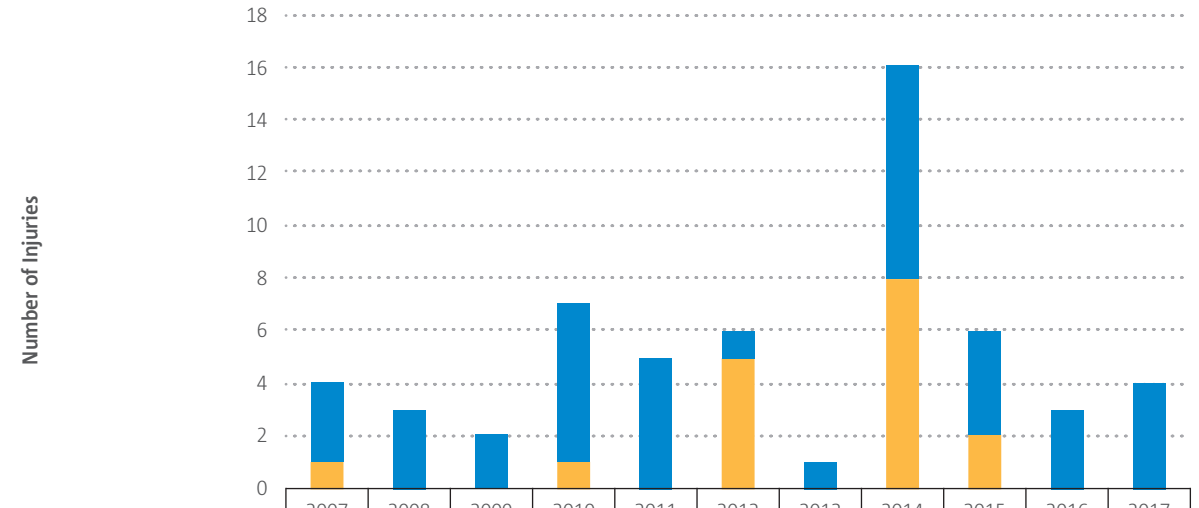
Figure 77. Aerodrome related fatal accidents, non-fatal accidents and serious incidents, 2007-2017



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Serious Incidents	5	10	2	9	8	11	10	7	10	18	8
Non-Fatal Accidents	48	47	26	43	52	74	53	73	31	28	35
Fatal Accidents	1	0	0	1	0	3	0	1	1	0	0

The figures for the past three years (2015-2017) represent a return to more normal accident and serious incident levels after a peak between 2012 and 2014.

Figure 78. Number of fatalities and serious injuries in aerodrome-related accidents 2007-2017



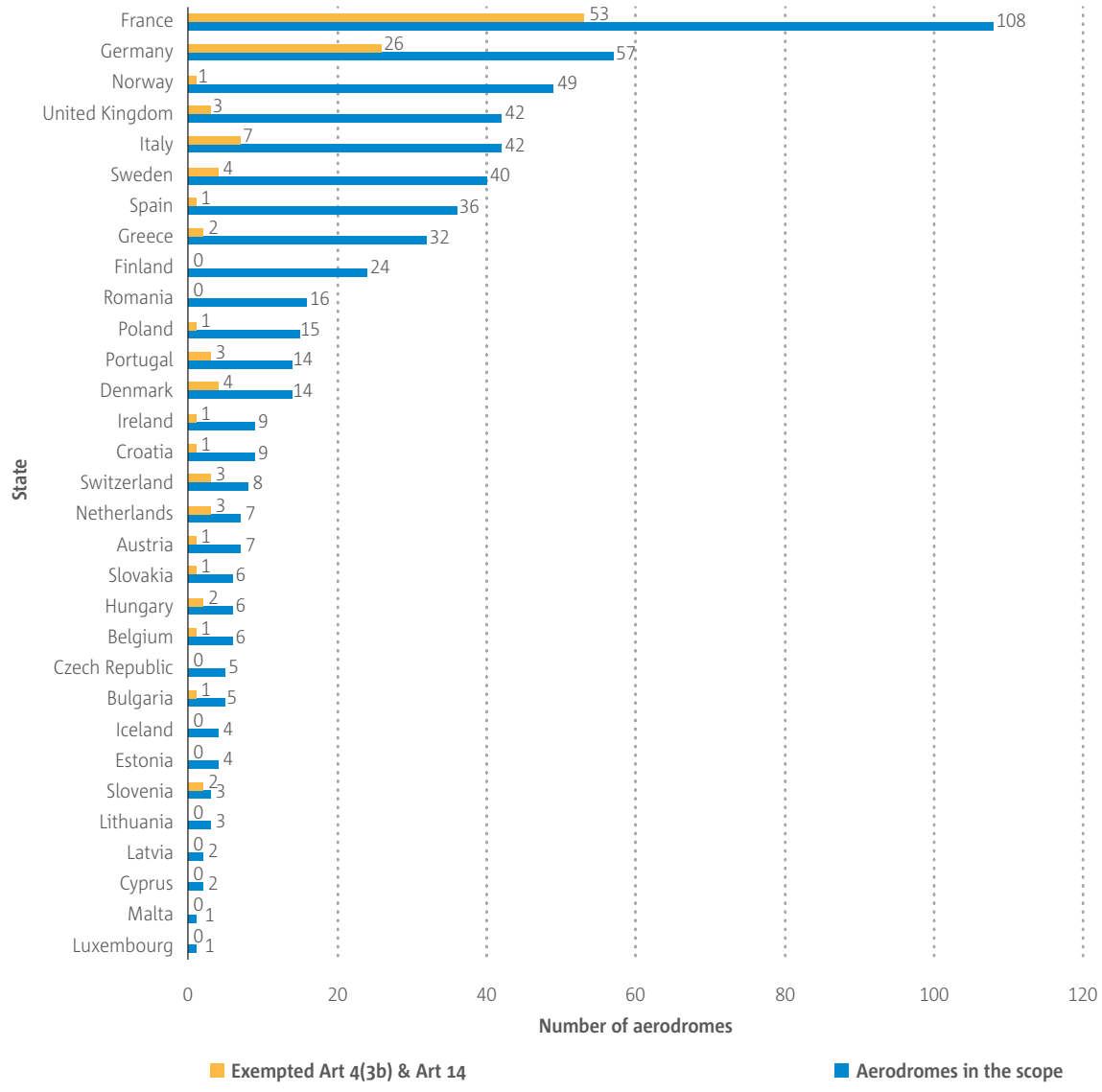
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total Serious Injuries	3	3	2	6	5	1	1	8	4	3	4
Total Fatalities	1	0	0	1	0	5	0	8	2	0	0

With the exception of 2014, the number of fatalities and serious injuries in aerodromes and ground handling have not exceeded 7 in any year in the past decade. However, in 2014 8 people were killed and a further two were seriously injured in a single accident in Finland when the aircraft's right wing broke shortly after take-off.

6.1.1 Number of EASA MS Certified Aerodromes

Regulation (EU) 139/2014 lays down the requirements for the certification of aerodromes in the EASA Member States. At time of publication, there are 577 aerodromes in the scope of the regulation. 438 of these have been certified and 118 have been granted an exemption in accordance with Article 5 of the regulation.

Figure 79. Number of Aerodromes in scope of Regulation (EU) 139/2014, by EASA Member State.



Of the 577 aerodromes in the scope of Regulation (EU) 139/2014, the Agency has, at time of publication, received traffic data (number of passengers and number of cargo movements) for 490 aerodromes for 2016. The Agency has also received traffic data for 2017 from 326 of those aerodromes. Those 326 aerodromes had a total of just over 800 million passengers and 286 000 cargo movements in 2017, an increase in passenger numbers by 6.6% and an increase in cargo movements by 3.6% compared to 2016. The highest increase in passenger numbers for an individual aerodrome was just under 4.9 million passengers, which for that aerodrome was an increase of 7.7%. The highest decrease in passenger numbers for an individual aerodrome was just over 793 000 passengers, which for that aerodrome was a decrease by 3.7%. The highest increase in cargo movements for an individual aerodrome was 2327 movements, which for that aerodrome was an increase of 8.2%. The highest decrease of cargo movements for an individual aerodrome was 681 movements, which for that aerodrome was a decrease by 15.1%.

6.2 Safety Risk Portfolio

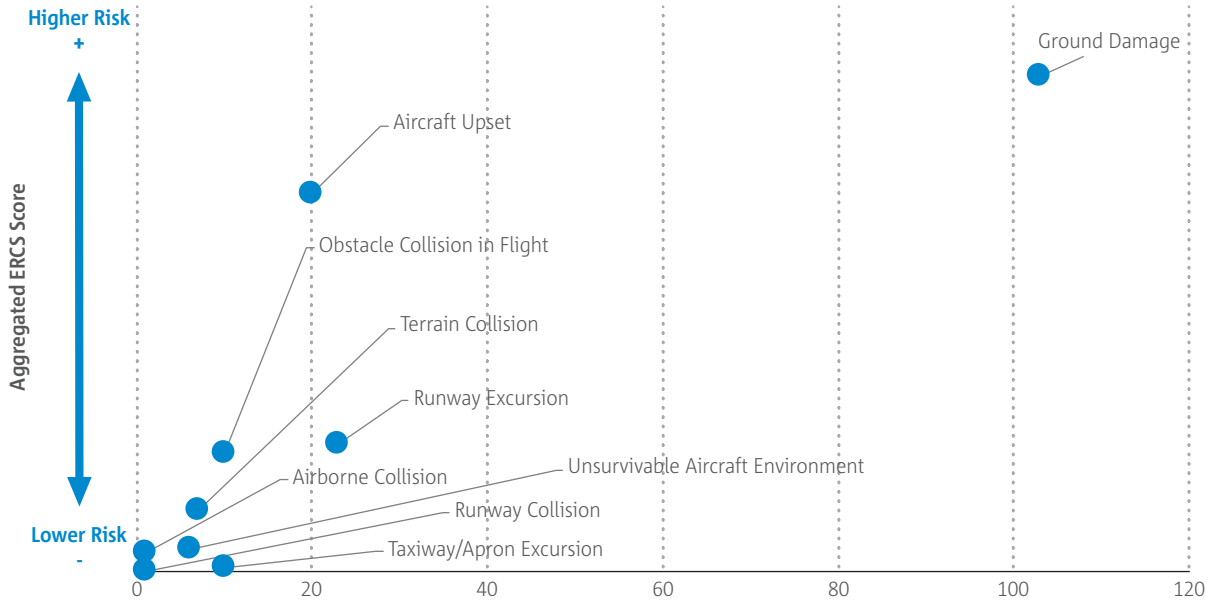
The Aerodromes and Ground Handling Safety Risk Portfolio has been developed by EASA and the Aerodromes and Ground Handling Collaborative Analysis Group (CAG). The CAG was launched in March 2017.

In the Aerodromes and Ground Handling scope, EASA has reviewed the accidents and serious incidents for 2015, 2016 and 2017 with regards to risk. All accidents and serious incidents within the scope have been risk assessed using the European Risk Classification Scheme methodology, and have been given an ERCS score.

6.2.1 Key Risk Areas

The ERCS review of the Key Risk Areas is presented below.

Figure 80. Distribution of key risk areas by frequency and aggregated ERCS risk score for aerodromes and ground handling related accidents and serious incidents, 2015-2017



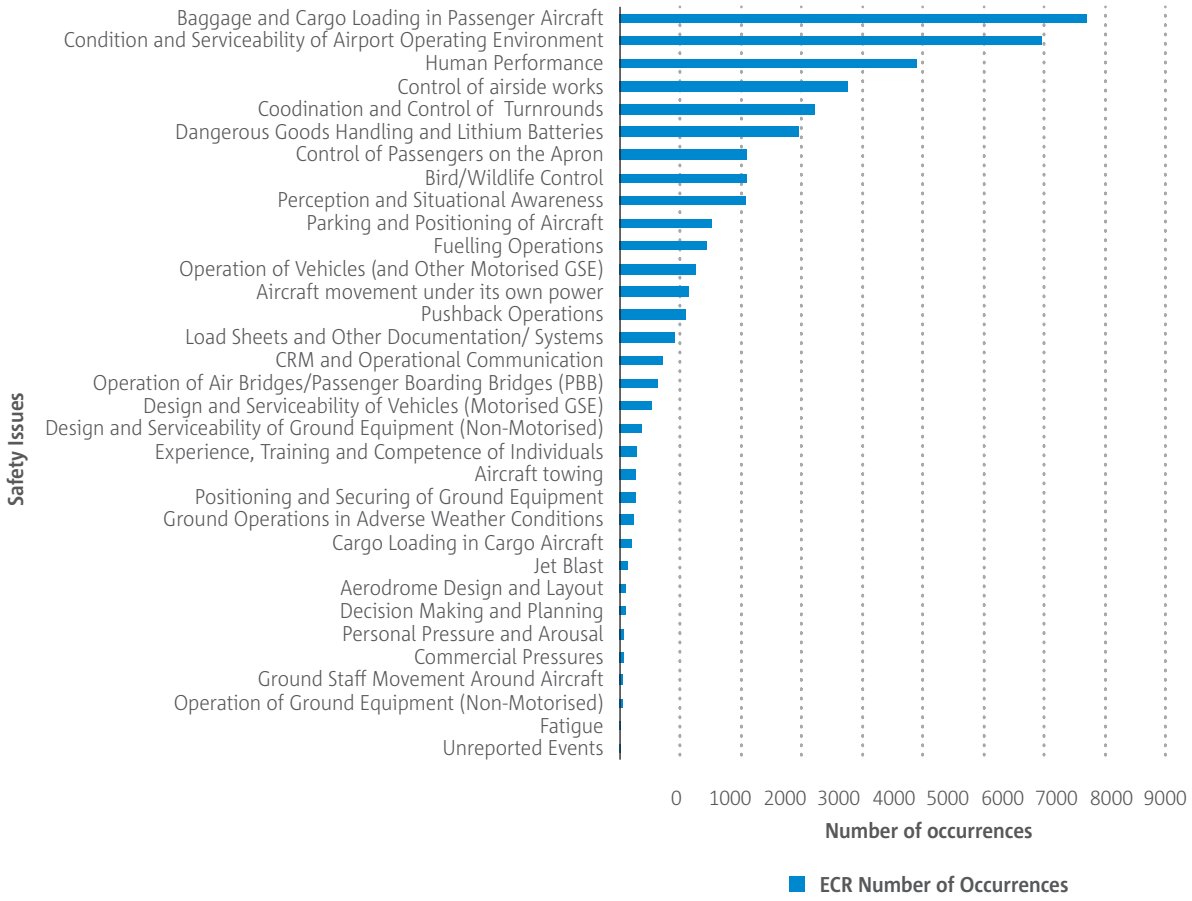
The most common Key Risk Area for Aerodrome and Ground Handling related accidents and serious incidents is Ground Damage, followed by Aircraft Upset and Runway Excursions.

6.2.2 Safety Issues

The safety issues in the Aerodrome and Ground Handling domain have been identified by the Aerodrome and Ground Handling CAG. They are derived from occurrence data from the EASA occurrence repository and the European Central Repository (ECR), as well as the operational expertise provided by the members of the CAG. The wording of the safety issues have been reviewed by the CAG as well as coordinated across other domains. Where possible, ECCAIRS queries have been constructed for each safety issue in order to identify the occurrences associated with each safety issue.

The table below shows the number of occurrences in the ECR for each safety issue (where an ECCAIRS query was possible). One occurrence can be included in more than one safety issue.

Figure 81. Number of ECR occurrences per Aerodromes and Ground Handling Safety Issue – 2015-2017

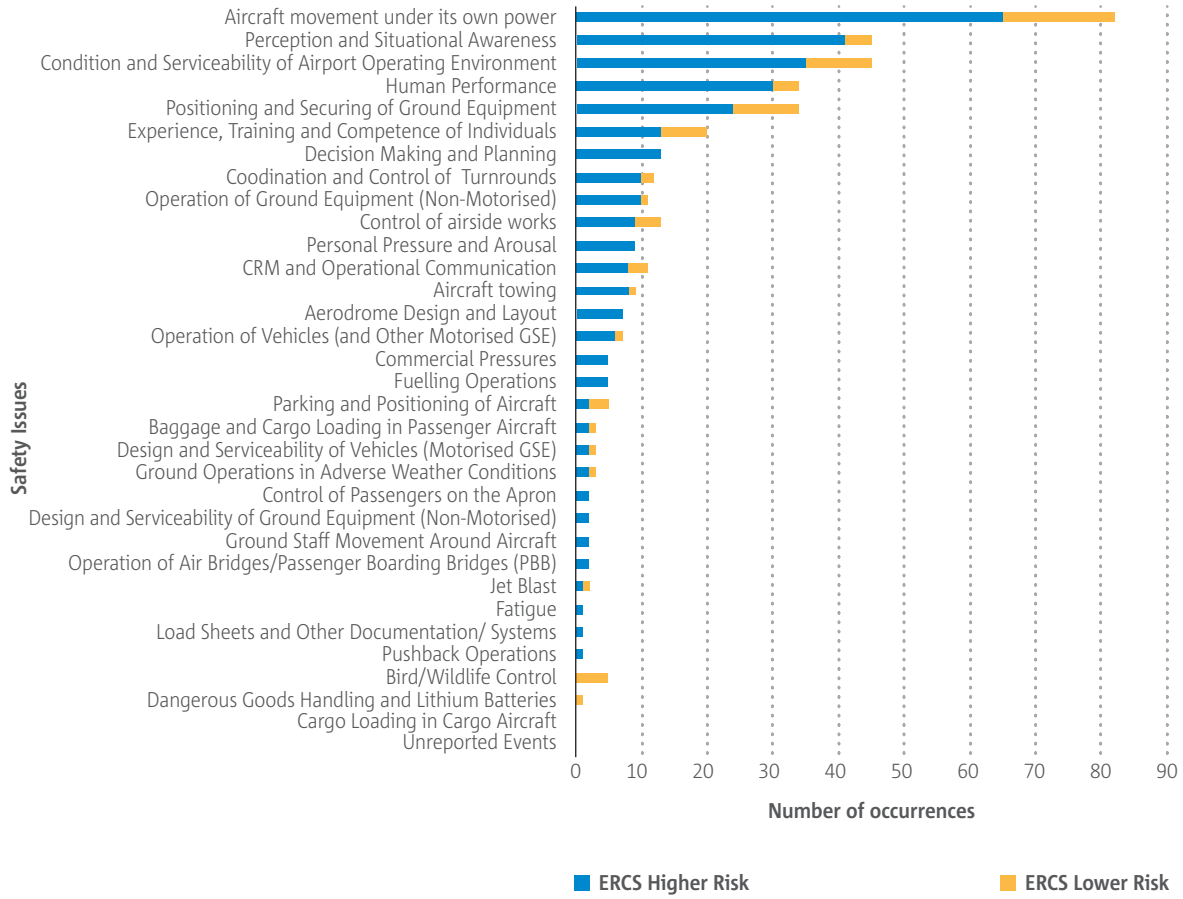


Baggage and Cargo Loading in Passenger Aircraft is the top safety issue based on number of occurrences in the ECR. It was also identified as the top safety issue of concern by the members of the Aerodromes and Ground Handling CAG. Therefore it has been selected as the first issue for assessment in the Safety Risk Management (SRM) Process and this assessment was started in 2017.

The second issue to be assessed in the SRM process will be Ground Staff Movement Around Aircraft. The number of ECR occurrences for this safety issue is low, this is however a function of the ECCAIRS taxonomy not having event types to clearly capture such risks, in combination with under-reporting from ground handling organisations.

The ERCS review of the accidents and serious incidents for each Safety Issue is presented below.

Figure 82. Number of occurrences per safety issue and ERCS severity – accidents and serious incidents 2015-2017

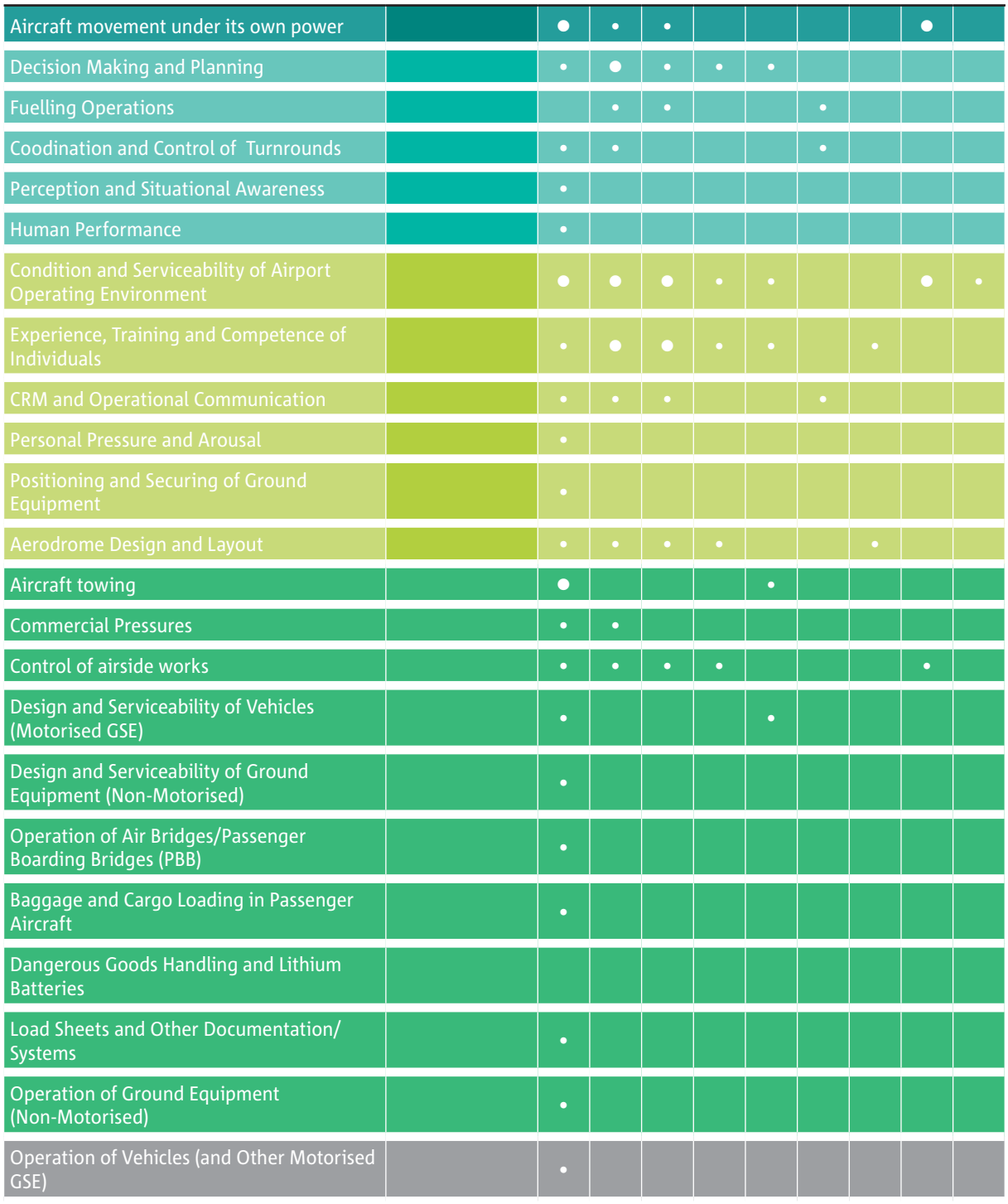


Higher Risk means occurrences that were given a red or amber score, Lower risk refers to occurrences that were given a green score.

6.2.3 Safety Risk Portfolio

The Safety Risk Portfolio presented below is purely based on occurrence data, mainly accidents and serious incidents, in the EASA occurrence database for 2015-2017. When the European Risk Classification Scheme (ERCS) is fully implemented, it will be possible to make such an analysis on incident data in the European Central Repository, which will be more useful.

Figure 83. Safety Risk Portfolio for Aerodromes and Ground Handling operations showing how the 5 year occurrence data 2013-2017 relates to safety issues and their outcomes relative to risk in descending order



Aerodromes and Ground Handling

Bands of Aggregated ERCS Risk Score (2015-2017)		Priority 1		Priority 2		Priority 3		Priority 4		
ERCS scored Occurrences (2015-2017)		103	20	23	10	3	5	1	10	1
Safety Issues	Priority	Key Risk Areas								
		Ground Damage	Aircraft Upset	Runway Excursion	Obstacle Collision in Flight	Terrain Collision	Unsurvivable Aircraft Environment	Airborne Collision	Taxiway/Apron Excursion	Runway Collision
Parking and Positioning of Aircraft		•								
Control of Passengers on the Apron										
Ground Staff Movement Around Aircraft		•								
Pushback Operations		•								
Ground Operations in Adverse Weather Conditions		•							•	
Jet Blast		•								
Fatigue		•							•	
Bird/Wildlife Control				•						
Cargo Loading in Cargo Aircraft		No data								
Unreported Events		No data								

● **A significant number of occurrences** • **A small number of occurrences**

The Aerodromes and Ground Handling CAG has given each Safety Issue a problem statement, to further specify what needs to be addressed. These are presented in the tables below, in alphabetical order.

6.2.3.1 Operational Safety Issues

Table 14 Operational aerodromes and ground handling safety issues and problem statements

Aircraft movement under its own power	The management, handling or coordination of aircraft movement under its own power may lead to damage and/or injuries.
Aircraft towing	The management, handling or coordination of towing operations may lead to damage and/or injuries.
Apron/Stand Design and Layout	Apron/Stand design and layout problems that may induce the potential for collisions, aircraft damage, and injuries. Continuous monitoring of occurrences related to Aerodrome Design and Layout.
Baggage and Cargo Loading in Passenger Aircraft	Inadequate management or handling of the baggage and cargo loading process that may lead to ground damage or other safety effects.
Bird/Wildlife Control	The control of birds and wildlife that may lead to either damage or loss of control.
Cargo Loading in Cargo Aircraft	The management or handling of the cargo loading process that may lead to ground damage or other safety effects.
Condition and Serviceability of Airport Operating Environment	The management of the condition and serviceability of the airport operating environment including maintenance of ATM/CNS Equipment, Aerodrome Surfaces, Visual Aids, Markings/Signage, Lights, Snow/Ice Removal, FOD control and Other Infrastructure.
Control of airside works	The supervision, coordination and control of airside works may lead to damage and/or injuries.
Control of Passengers on the Apron	Control of passengers on the apron or any other operational area of the aerodrome or airport.
Coodination and Control of Turnrounds	The management, handling or coordination of the turnaround process.
Dangerous Goods Handling and Lithium Batteries	Fires involving lithium batteries and/or other dangerous goods, both in the aircraft cabin or hold areas, followed by the potential inability to extinguish any subsequent fire to prevent injuries or an Unsustainable Aircraft Environment.
Design of Air Bridges/Passenger Boarding Bridges (PBB)	Design of air bridges that may lead to ground collisions or injuries.
Design of Ground Equipment (Non-Motorised)	Design of non-motorised airport ground support equipment including steps, baggage trollies/dollys may lead to damage and/or injuries.
Design of Vehicles (Motorised GSE)	Design of motorised airport ground support equipment including belt loaders, baggage trucks, catering trucks, fuel bowsers and pushback equipment etc. may lead to damage and/or injuries.
Emergency/abnormal operations	The supervision, coordination and control of emergency/abnormal operations may lead to damage, injuries, and/or impaired responses to emergencies.
Emerging technologies	
Fuelling Operations	The management and handling of the refuelling process and its coordination/oversight.
Ground Operations in Adverse Weather Conditions	Negative effects of adverse weather on ground operations including low visibility, high winds, thunderstorms, and extremes of temperature etc.
Ground Staff Movement Around Aircraft	Unsafe movement of personnel takes place around an aircraft while engines are running or an aircraft is about to move (anti-collision beacon on) or within extended danger zones during cross-bleed engine starts.
Handling of Passengers with Reduced Mobility	Handling of passengers with reduced mobility may lead to injuries.

Safety Issue Title	Safety Issue Problem Statement
Jet Blast	The management of ground running or taxi patterns lead to injuries or damage due to jet blast.
Load Sheets and Other Documentation/ Systems	Errors and omissions in load systems and documentation or systems for recording loading of aircraft.
Operation of Air Bridges/Passenger Boarding Bridges (PBB)	The operation of air bridges that may lead to ground collisions or injuries.
Operation of Ground Equipment (Non-Motorised)	Operation of non-motorised ground equipment that may lead to ground collisions or injuries.
Operation of Vehicles (and Other Motorised GSE)	The operation of vehicles/motorised ground equipment that may lead to ground collisions or injuries.
Parking and Positioning of Aircraft	The marshalling, parking or positioning of aircraft that may to lead to damage or injuries. This includes problems with visual parking aids. This also includes stand allocation.
Positioning and Securing of Ground Equipment	The positioning or inadequate securing of ground equipment such as baggage trolleys/dollys, ULDs etc. or steps that may be blown around the apron in bad weather.
Pushback Operations	The management, handling or coordination of the pushback may lead to damage and/or injuries.
Runway/Taxiway Design and Layout	Runway/Taxiway design and layout problems that may induce runway incursions or the potential for collisions and aircraft damage. Continuous monitoring of occurrences related to Aerodrome Design and Layout.
Servicability of Air Bridges/Passenger Boarding Bridges (PBB)	Servicability and maintenance of air bridges that may lead to ground collisions or injuries.
Servicability of Apron/Stand	Servicability and maintenance of aprons/stands that may lead to collissions, damage, and/or injuries.
Servicability of Runways/Taxiways	Servicability and maintenance of runways/taxiways that may lead to collissions, damage, and/or injuries.
Serviceability of Ground Equipment (Non-Motorised)	Servicability of non-motorised airport ground support equipment including steps, baggage trollies/dollys may lead to damage and/or injuries.
Serviceability of Vehicles (Motorised GSE)	Servicability of motorised airport ground support equipment including belt loaders, baggage trucks, catering trucks, fuel bowsers and pushback equipment etc. may cause damage and/or injuries.
Terminal Design and Layout	Terminal design and layout problems that may induce the potential for collisions, aircraft damage, and injuries. Continuous monitoring of occurrences related to Aerodrome Design and Layout.
Transition of service contracts	The transition of the ground handling operations between service providers might induce damage and/or injuries.
Unreported Events	Events go unreported due to fear of repercussions/lack of training etc. For damage to composite structures there might be more significant damage not visible.
Worker Fatigue leading to Human Error	Inability to recruit and retain ground handling staff is leading to staff shortages, long working hours and an ageing workforce. In the long term, if left unchecked, commercial growth & expectations will exceed human resources, resulting in unsustainable operations with possible safety critical impact on flight safety due to human error.

6.2.3.2 HF Safety Issues

Table 15 Human performance-related aerodromes and ground handling safety issues and problem statements

CRM and Operational Communication	Ineffective CRM and communication, including Language Proficiency, Use of Standard Terminology, Hand Signals, Visual Communication, Distraction from outer sources (ex. Mobile Phones).
Decision Making and Planning	Incorrect planning and decision making by individuals.
Experience, Training and Competence of Individuals	Individuals (all types of actors) have insufficient experience, training or competence to perform the duties that they have been assigned.
Fatigue	Inability of individuals to perform to their best due to fatigue.
Perception and Situational Awareness	Incorrect perception and inadequate situational awareness of individuals.
Personal Pressure and Arousal	Inability of individuals to perform to their best due to pressure or lack of/excessive arousal. Problems typically arise during periods of intense workload such as the turnround.
Weather Effects	Inability of individuals to perform to their best due to the effect of weather.
Human Performance	Combining all of the above HF safety issues to address the ability of individuals to meet the human performance needs for a specific task or duty for reasons such as arousal, fatigue, repetitive processes and weather.

6.2.3.3 Organisational Safety Issues

Table 16 Organisational aerodromes and ground handling safety issues and problem statements

Commercial Pressures	Commercial pressures (e.g. Seasonal Workforce/Contracts/On-Time Performance/Non-Aviation Regulations) have an effect on Safety.
Effectiveness of Safety Management	Lack of or Ineffective implementation of Safety Management Systems.
Safety Culture	Inadequate Safety Culture in all levels of the organisation (Including Senior Leadership Role in Safety)

ATM/ANS

7

This Chapter covers accidents and serious incidents related to the provision of ATM/ANS services in the EASA Member States and the analysis thereof. The analysis includes accidents and serious incidents extracted from the EASA's Occurrence Database which occurred within an EASA MS as State of Occurrence, involving at least one CAT, either fixed wing airplane with MTOW of 2,250 kg or above, or small (CS-27) or large (CS-29) helicopter. It should be noted that, contrary to previous years, CAT helicopter operations have been included in the statistics of this Chapter. As a result, figures of accidents and serious incidents included in previous editions of the Annual Safety Report may not be coherent to the figures in this edition.

It is worth noting that the accidents and serious incidents mentioned in this Chapter are those related to the provision of ATM/ANS services, which means that the ATM system may or may not have had a contribution to the given occurrence, but it may play a role in preventing or ameliorating similar occurrences in the future. These are named as "ATM/ANS related". Among them, there are occurrences where the ATM/ANS provision of services was a factor contributing to the occurrence, or at least the ATM/ANS services played a role in aggravating the occurrence encountered by the aircraft. These events are usually known as events with "ATM/ANS contribution". In the chapter, these two types of events are distinguished when necessary.

The ATM/ANS Collaborative Analysis Group (CAG) launched in 2017 has developed an initial ATM/ANS Safety Risk Portfolio identifying Key Risk Areas and main Safety Issues in relation to the ATM/ANS provision of services. The group is working to analyse the safety issues identified and updating the portfolio on regular basis. The chapter introduces the initial ATM/ANS safety risk portfolio and the major candidate safety issues identified by the group and the prioritisation based on the analysis of accidents and serious incidents collected in the EASA database. The Safety Issues will be later completed by the ATM/ANS group with expert advice and additional occurrence data analysis from other sources (e.g., European Central Repository) as to prioritise the safety issue assessments and derive actions that will be included in the European Plan for Aviation Safety (EPAS).

7.1 Key Statistics

The key statistics for this domain are in the tables below and include comparison of the number of accidents (fatal and non-fatal) and serious incidents for the 10-year period 2007-2016 and the last year (2017). It also includes the comparison of the fatalities and serious injuries happened in those accidents between the same timeframe. The figures are split into ATM/ANS related and ATM/ANS contribution.

Table 17 Key statistics for ATM/ANS, 2007-2017

	Fatal Accidents		Non-Fatal Accidents		Serious Incidents	
	ATM/ANS related	ATM/ANS contribution	ATM/ANS related	ATM/ANS contribu-tion	ATM/ANS related	ATM/ANS contribution
2007-2016 total	5	0	61	13	347	143
2017	1	0	2	0	25	5

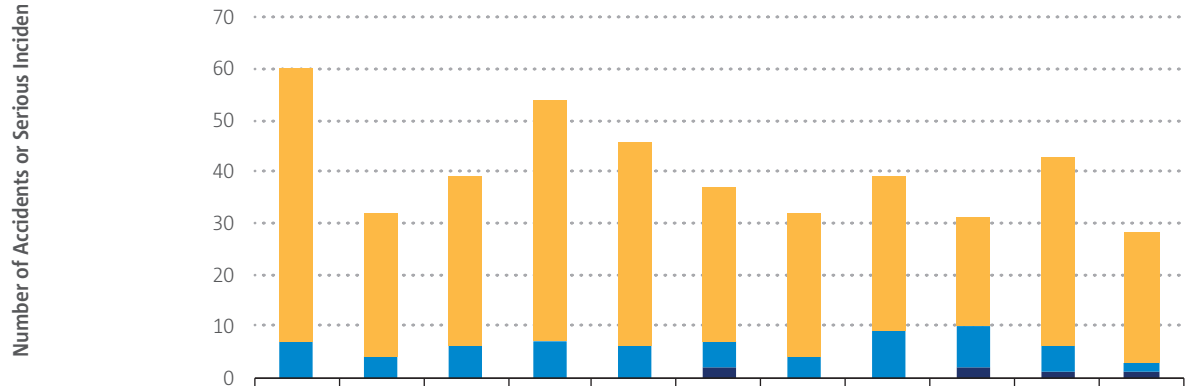
	Fatalities		Serious Injuries	
	ATM/ANS related	ATM/ANS contribution	ATM/ANS related	ATM/ANS contribution
2007-2016 total	16	0	48	2
2017	6	0	2	0

Table 17 shows that there were no accidents with contribution from ATM/ANS services provided in EASA MS in 2017. Fatal accidents with ATM/ANS contribution remains cero for the last ten-year period, and the non-fatal accidents (cero) and serious incidents (five) were lower than the average in previous ten-year period. One

fatal accident and three non-fatal accidents ATM/ANS related occurred in 2017. The total number of non-fatal accidents and the number of serious incidents ATM/ANS related in 2017 remains lower than the average of the preceding ten-year average period.

Figure 84 illustrates the evolution of accidents and serious incidents throughout the last decade. During the last three years, fatal accidents with some relation to ATM/ANS have happened. These accidents involved helicopters (see Appendix 1.5) as the last accident with ATM relation that involved a CAT fix-wing aeroplane occurred in 2012.

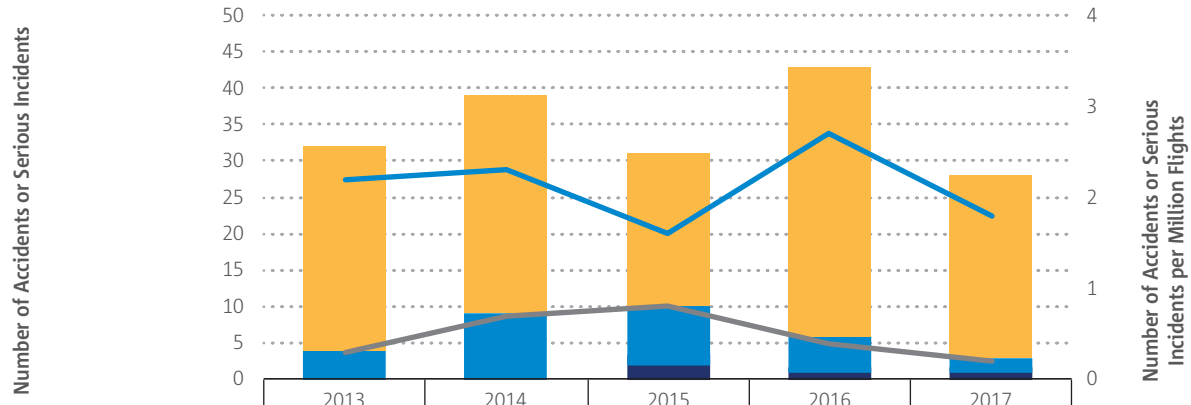
Figure 84. ATM/ANS related fatal and non-fatal accidents and serious incidents per year, 2007-2017, in EASA MS



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Serious Incidents	53	28	33	47	40	30	28	30	21	37	25
Non-Fatal Accidents	7	4	6	7	6	5	4	9	8	5	2
Fatal Accidents	0	0	0	0	0	2	0	0	2	1	1

Figure 85 depicts that the rate of ATM/ANS related accidents (fatal and non-fatal) per millions of IFR controlled flight hours continues decreasing since the plateau reached in 2014. The rate of serious incidents, despite the steady increase of flight hours, does not show a constant trend.

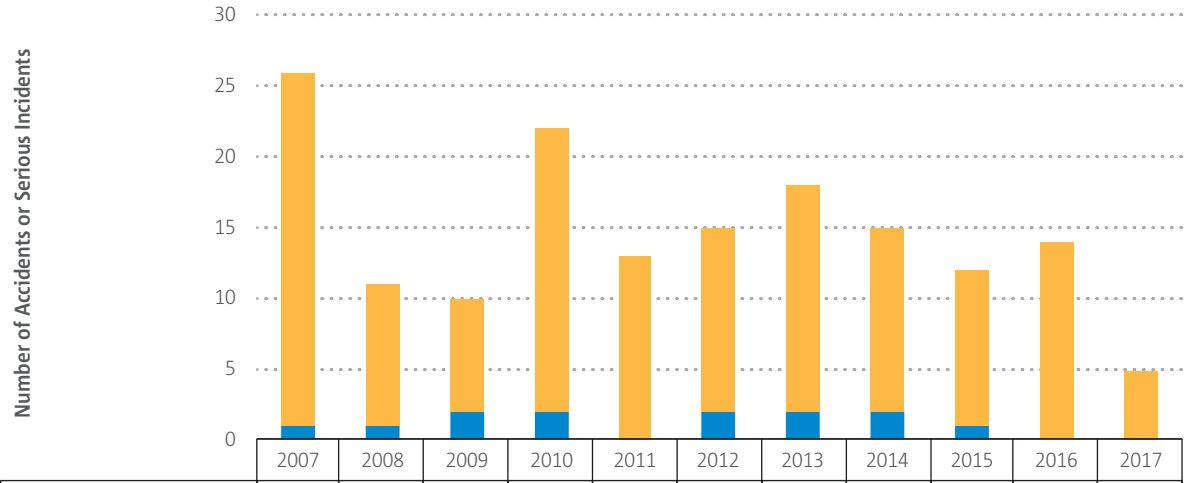
Figure 85. Rates of ATM/ANS related accidents and serious incidents per year, 2013-2017, in EASA MS



	2013	2014	2015	2016	2017
Serious Incidents	28	30	21	37	25
Non-Fatal Accidents	4	9	8	5	2
Fatal Accidents	0	0	2	1	1
Serious incident rate per million flights	2.2	2.3	1.6	2.7	1.8
Accident rate per million flights	0.3	0.7	0.8	0.4	0.2

Figure 86 illustrates that, when restricting on those occurrences with some level of contribution of the ATM/ANS services, no accidents, either fatal or non-fatal, have occurred in the last two years, with no fatal accident in the last decade.

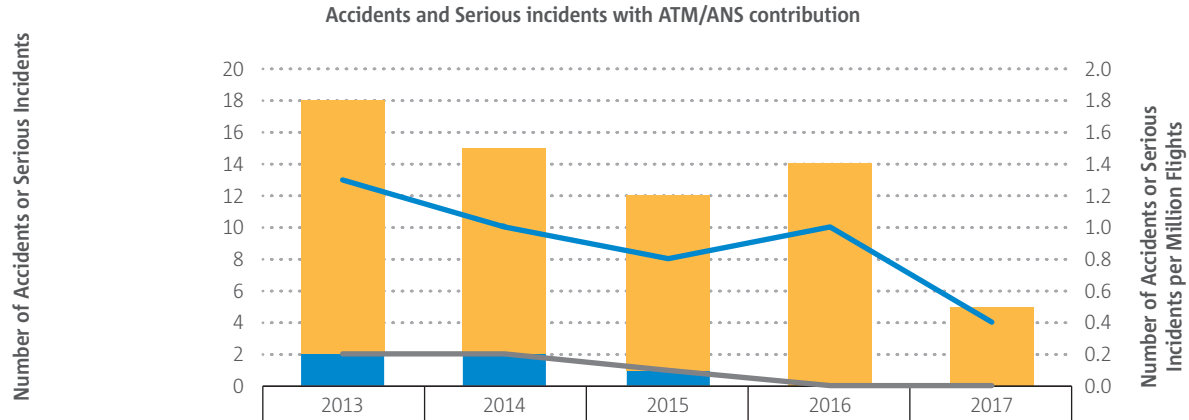
Figure 86. Fatal and non-fatal accidents and serious incidents with ATM/ANS contribution per year, 2007-2017, in EASA MS



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Serious Incidents	25	10	8	20	13	13	16	13	11	14	5
Non-Fatal Accidents	1	1	2	2	0	2	2	2	1	0	0
Fatal Accidents	0	0	0	0	0	0	0	0	0	0	0

The decreasing trend in the last 5 years is also observed in the rate of both the accidents and serious incidents with ATM/ANS contribution, as Figure 87 illustrates.

Figure 87. Rates of fatal and non-fatal accidents and serious incidents with ATM/SN contribution per year, 2013-2017, in EASA MS

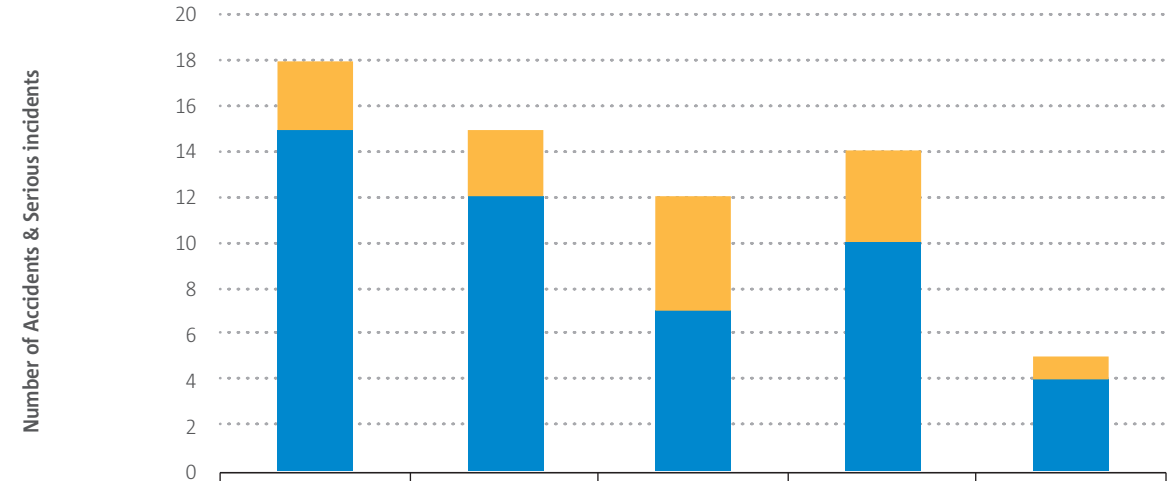


	2013	2014	2015	2016	2017
Serious Incidents	16	13	11	14	5
Non-Fatal Accidents	2	2	1	0	0
Fatal Accidents	0	0	0	0	0
Accident rate per million flights	0.2	0.2	0.1	0.0	0.0
Serious incident rate per million flights	1.3	1.0	0.8	1.0	0.4

The statistics of accidents and serious incidents does not necessarily represent an accurate picture of the risk of past events, as each occurrence of the same kind may bear a different risk, and even some accidents may be

considered to bear lower risk than some serious incidents. For example, a near-miss involving an aircraft with the TCAS unserviceable would be classified as a serious incident, while a collision between a ground handling vehicle and an aircraft would be classified as an accident. However, based on the potential credible worse consequences of both events, the serious incident notionally would bear higher risk that the accident described. This led the Regulation (EU) 376/2014 to consider the development a common risk classification scheme (ERCS) to risk classify all occurrences reported to the European Aviation Authorities, which will be finalised and published in 2018. The main purpose of this method is to associate a risk score to each occurrence store in the EASA's database. Even though the ERCS material is not finalised and published, EASA has applied the classification to the occurrences as from 2013. Figure 88 shows the distribution of aggregated higher and lower risk events with ATM/ANS contribution in the last 5 years. The decreasing trend of risk of events is observed as indicated by Figure 87 based on the absence of accidents in 2016 and 2017, but the indication that the serious incidents that occurred in 2016 and 2017 had a greater proportion of higher risk suggests that performance of the system can be further improved and that effort should still be dedicated towards this objective.

Figure 88. Higher and lower risk scored accidents and serious incidents with ATM/ANS contribution per year, 2013-2017, in EASA MS

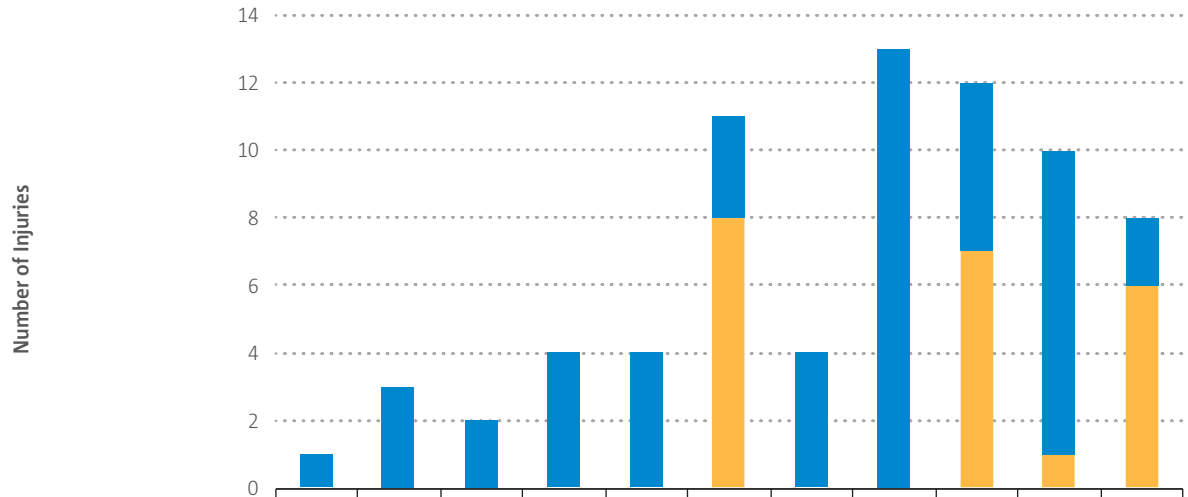


	2013	2014	2015	2016	2017
Lower Risk	3	3	5	4	1
Higher Risk	15	12	7	10	4

With regards to fatalities and injuries, Figure 86 shows that the number of fatalities and serious injuries in events where there was ATM/ANS contribution was zero in 2017, while Figure 89 shows that within the ATM/ANS- related occurrences, the number of fatalities and serious injuries in 2017 were 6 and 2, respectively.

As it can be seen in Figure 89 below, the number of fatalities per year in ATM/ANS related accidents does not follow a clear pattern, depending on the size of aircraft involved in the reduced number of accidents that occurred only in some years of the period under analysis, which corresponds to only CAT helicopters involved in ATM/ANS related accidents in the last three years.

Figure 89. Fatalities and serious injuries in ATM/ANS related accidents per year, 2007-2017, in EASA MS

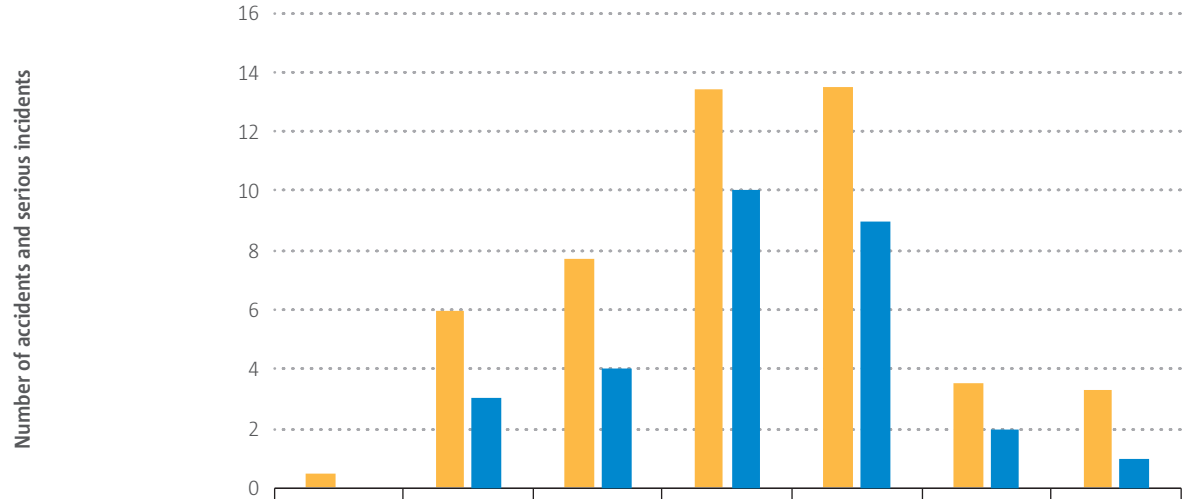


	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total Serious Injuries	1	3	2	4	4	3	4	13	5	9	2
Total Fatalities	0	0	0	0	0	8	0	0	7	1	6

7.1.1.1 Phase of flight

With regard the flight phase, the majority of ATM/ANS-related accidents and serious incidents took place during the En-Route and Approach phases, followed by Take-off, Taxi and Landing phases. By comparing the percentages of flight phase distribution in 2017 data with the 2007-2016 average, differences are not remarkable and follow the same distribution, with small increase in the proportions of events in En-route and Approach phases. "Unknown/blank" corresponds to those occurrences where no data is available for one or both aircraft involved in the event. This proposition has decreased, which indicates a better and more complete coding of event in the database.

Figure 90. Phase of flight in ATM/ANS related accidents and serious incidents per year, 2007-2017, in EASA MS

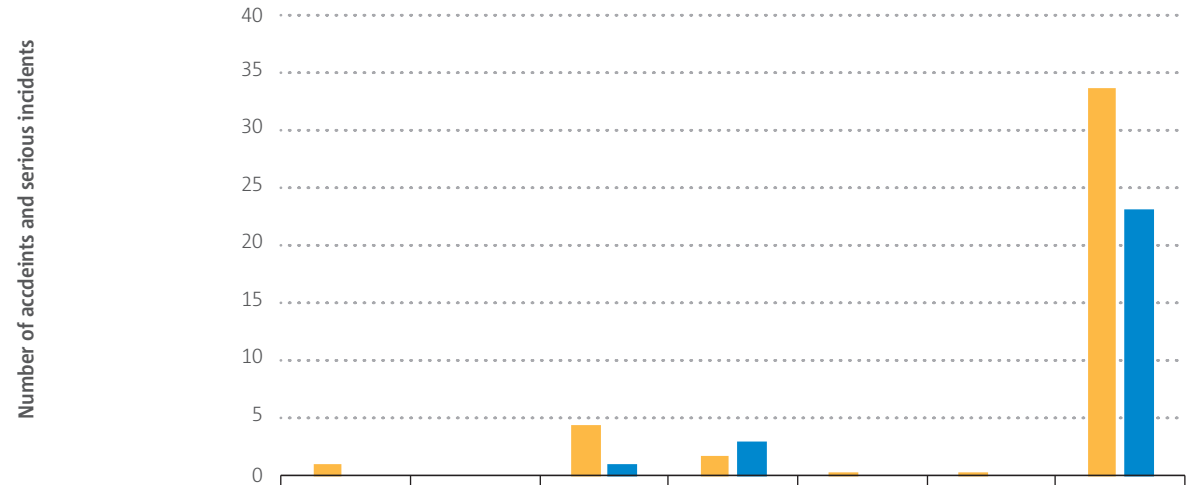


	Standing	Taxi	Take-off	En route	Approach	Landing	Unknown/ Blank
Average 2007-2016	0.5	6	7.7	13.4	13.5	3.5	3.3
2017	0	3	4	10	9	2	1

7.1.1.2 Class of airspace

The airspace class where the ATM/ANS related accidents and serious incidents occurred is shown in Figure 91. It is worth noting that the majority of events do not contain information about the type of airspace class where the service was provided. This information is very relevant to the service provided (e.g. separation provision, information service, etc). Even though the proportion of events in class D seems to have increased, and those in class C to have decreased, the number of events coding the airspace class is too small,three and one respectively, to reach any conclusion in the trend.

Figure 91. Airspace class where ATM/ANS related accidents and serious incidents occurred, 2007-2017, in EASA MS



	A	B	C	D	E	G	Blank
2007-2016 Average	1	0	4.3	1.7	0.3	0.2	33.5
2017	0	0	1	3	0	0	23

7.2 Safety Risk Portfolio of the ATM/ANS domain

This section describes the top risk areas and the major safety issues of concern in the ATM/ANS domain that can be derived from the occurrence data available in the EASA database, i.e. using analysis of accidents and serious incidents. These top risk areas and safety issues are collected in the form of a safety risk portfolio for the ATM/ANS services. In a nut shell, the analysis of these occurrences has been used to populate a list of indicators (Key Risk Areas and Safety Issues) of the performance framework in the ATM/ANS domain. The portfolio is later used to prioritise the assessment of safety issues, to target analysis activities over key risk areas and to prioritise safety actions, involving various ATM/ANS partners in the recently set-up ATM Collaborative Analysis Group, which includes ANSPs, Aviation Authorities, Eurocontrol, organisations of aviation professionals, and the like.

It is worth noting that the ATM safety portfolio that is described below is a snapshot of the risks beard by past events derived by the limited data analysed, i.e. accidents and serious incidents. This is considered an intermediate step towards the final ATM/ANS Safety Risk Portfolio. The incorporation of additional occurrence data not analysed by the Aviation Safety and Investigation Authorities, e.g., occurrences reported to the European Central Repository or occurrences analysed by the SMS of organisations providing ATM/ANS services, may change the risk picture shown here, helping identify additional precursors of accidents and making the analysis more proactive. In addition, the safety risk portfolio may add other criteria, based on qualitative expert judgement of the ATM CAG members and the EASA Operational Departments that consider, for example, the effectiveness of existing controls and barriers and the expected risk reduction by already agreed safety actions. This will help close the gap of risks that are not observable in the data sample. By adding this additional information, the safety risk portfolio may change both in terms of additional safety issues and a different prioritisation for analysis of safety issues.

7.2.1.1 Key Risk Areas

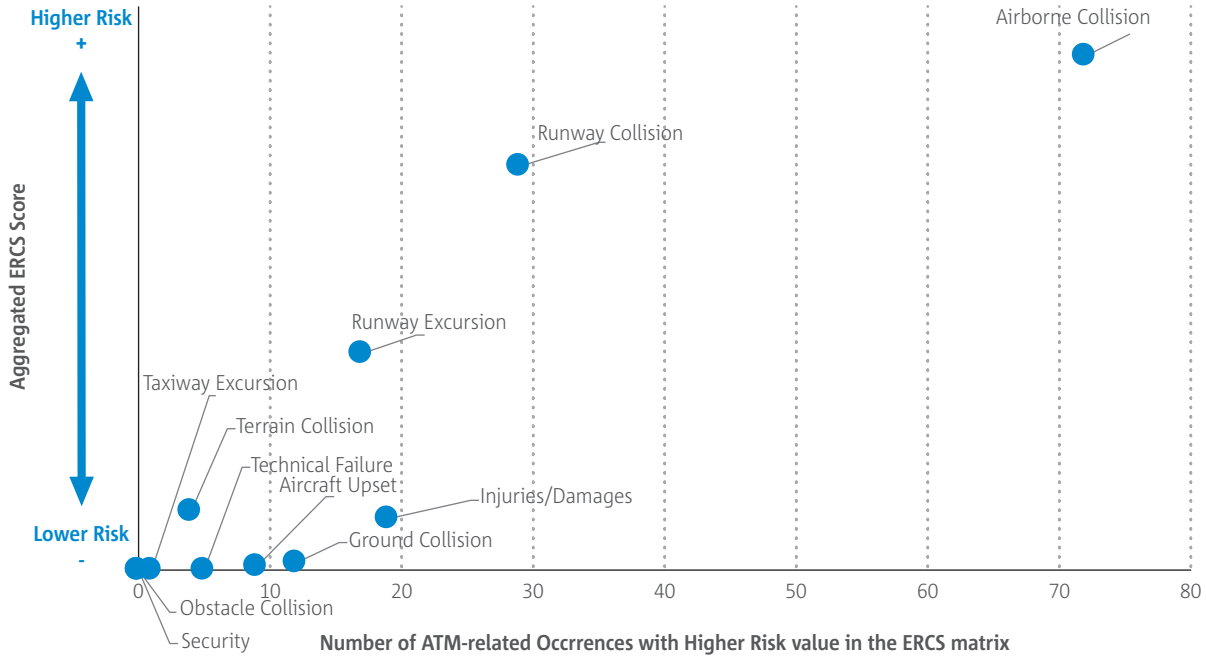
To identify the top Key Risk Areas in the ATM/ANS domain, the ATM/ANS related accidents and serious incidents of the last 5 years were assesses, risk classified using the draft common risk classification scheme (ERCS), and the ERCS risk scores aggregated. The results are illustrated in Figure 92. The figure depicts the number of higher risk occurrences per key risk area in the x-axis and the aggregated ERCS risk score of those higher risk occurrences for each key risk area, which is used as a proxy of the safety risk associated to that area. It shows that the top Key Rey Risk Areas in the ATM/ANS domain are, not surprisingly, Airborne Collision and Runway Collision, which are ranked higher in the aggregated ERCS score and frequency of occurrences. In a second layer of priority, the Key Risk Areas of Runway Excursion, Terrain Collision and Injuries are placed. Finally, a third layer of priority includes the rest of risk areas (i.e., Ground Collisions, Aircraft Upset, Technical Failures, Obstacle Collisions and Security).

The top Key Risk Areas highlighted above are defined by their accident outcome to be prevented and by the immendiate precursors of that accident outcome:

- **Airborne Collision**: it includes occurrences involving actual or potential airborne collisions between aircraft while both aircraft are airborne and between aircraft and other controllable airborne objects (which excludes birds and wildlife). This includes all separation-related occurrences regardless the cause, AIRPROX reports and genuine TCAS/ACAS alerts. It does not include false TCAS/ACAS alerts caused by equipment malfunctions or loss of separation with at least one aircraft on the ground, which may be coded as Runway or Movement Area Collision if the occurrence meets the criteria.

- **Runway Collision**: it includes all occurrences involving actual or potential runway collisions between an aircraft and other aircraft, vehicle or person that occurs on the runway of an aerodrome or other predesignated landing area. This includes occurrences 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. It does not include occurrences involving wildlife on the runway.

Figure 92. Prioritisation of Key Risk Areas of the ATM/ANS services, 2013-2017, in EASA MS



7.2.1.2 Safety Risk Portfolio

The safety risk portfolio derived from the sample of ATM/ANS related accidents and serious incidents in the last five years is shown in Figure 93. It shows the ranking of safety issues given by the aggregated ERCS risk score of the higher risk occurrences related to the safety issues. This indicator is used as proxy of the risk posed by the safety issue, but it is evaluated as a better reference than the pure sorting by the number of accidents and serious incidents. The risk priority is depicted notionally with coloured bands from red (higher priority) to blue (lower priority). The number of occurrences higher risk ERCS scores are indicated in the table too. The ranking is being further modified by inputs from the ATM CAG group and EASA Operational Departments.

The top row of the table include the key risk areas ranked by the aggregated ERCS score, as indicated previously. The risk priority is depicted notionally with coloured bands from red (higher priority) to blue (lower priority). The number of occurrences with higher risk ERCS scores are indicated in the table above each Key Risk Area too. The "•" symbol indicates that an observed occurrence contained a certain safety issues and was associated to a key risk area areas, i.e. it identifies which safety issues contribute to which (potential) accident outcomes. When the symbol "●" is used means that the majority of occurrences of the safety issue contributes primarily with that key risk areas, in other words with that (potential) accident outcome. Where no symbol is indicated means that no occurrence was found linked to the safety issue and the concerning risk area.

The safety issues with higher risk scores identified in Figure 93, based on the used data sample, are defined as follows:

- **Deconfliction IFR vs VFR flights**. It involves ineffective deconfliction of IFR vs VFR flights in an airspace class where IFR-VFR are not provided (i.e., class D, E, and G), which may lead to airproxes and ultimately to airborne collision.

- **Airspace Infringement.** Airspace infringement occurs when an aircraft enters notified airspace without previously requesting and obtaining clearance from the controlling authority of that airspace, or enters the airspace under conditions that were not contained in the clearance.

- **Undetected Occupied runway**. It involves runway incursions with aircraft landing/taking-off and the ATC missing that the runway is occupied by a vehicle or aircraft that had received a clearance to be on the runway.

- **ACAS RA not followed by the pilot**. It involves encounters where the TCAS system installed on board of aircraft triggered a Resolution Advisory message and one of the aircraft's flight crew (or both) did not follow the instruction given by the TCAS to resolve the conflict and avoid the mid-air collision.

- **Provision of weather information (wind at low height).** In involves inaccurate or missing wind-related information provided to the crew by ground (e.g., tail wind on ground, gusts) during the approach phase, which may lead to increase of non-stabilised approaches and thus increasing the risks of runway excursions.

It is worth noting that this ranking and the list of safety issues in the safety risk portfolio may vary when additional occurrence data, i.e. other than accidents and serious incidents, are added and/or when complemented with qualitative criteria evaluated by the ATM CAG and EASA operational departments. One example of special interest of additional criteria considered may be to prioritise safety issues that involve not only ATM/ANS related occurrences, but those that have contribution from the ATM/ANS services, and therefore, where the ATM/ANS has greater managerial control to mitigate the risks.

Figure 93. Safety Risk Portfolio for ATM/ANS services operations showing how the 5 year occurrence data 2013-2017 relates to safety issues and their outcomes relative to risk in descending order

Deconfliction IFR/VFR	10		●										
Airspace infringement	6		●										
Undetected occupied runway	13		•	●									
ACAS RA not followed	5		●	•									
Wind information (wind at low height)	9		•		●								
Deconfliction with aircraft operating without transponder	4		●							•			
High energy runway conflict	7			●	•	•							
Provision of weather information (turbulence/windshear/convective weather)	20		•		•		●		•				
Conflict detection with closest aircraft	12		●										
Integration of RPAS/Drones	4		●										
Landing/take-off without clearance	3		•	●									
ATM influence on the non-stabilised approaches	4				●	•							
Failure of Navigation service	1					•				•			
Level Bust	4		●			•			•				
Failure of Surveillance service	2		•							•			
Coordination/handling of pushback	1							●					
Failure of Air/Ground communications	1		•							•			
Ground Operations in Adverse Weather Conditions	0												
Cybersecurity	0												

ATM/ANS SERVICES

Bands of Aggregated ERCS Risk Score (2013-2017)			Priority 1		Priority 2			Priority 3				Priority 4	
Higher Risk ERCS Occurrences (2013-2017)			72	29	17	4	19	12	9	5	1	0	0
Safety Issues	#HRO ERCS	Bands of Aggregated ERCS Risk Score (2013-2018)	Key Risk Areas (Outcomes and precursors)										
			Airborn Collision	Runway Collision	Runway Excursion	Terrain Collision	Injuries/Damages	Ground Collision	Aircraft Upset	Technical Failure	Taxiway Excursion	Security	Obstacle Collision
New technologies and automation (e.g. rTWR, SWIM)	0												
Safety Culture	0												
Effectiveness of Safety Management	0												
Understanding and monitoring system performance interdependencies	0												

● A significant number of occurrences • A small number of occurrences

Appendix 1 -
List of Fatal Accidents

1.1 Aeroplanes

1.1.1 Commercial Air Transport Airline

Local date	State/area of occurrence	Location	Aeroplane	Headline
25/01/2007	France	AD Pau (64)	FOKKER - F27 - 100	Loss of control during take-off due to ice contamination, collision with a vehicle at the crash.
20/08/2008	Spain	Madrid	MCDONNELL DOUGLAS	Loss of control on take-off from Madrid Barajas, due to incorrect take-off configuration and disabled warning. Post-crash fire.
01/06/2009	South Atlantic Ocean	Près du point TASIL	AIRBUS - A330 - 200	Loss of control during cruise due to incorrect handling of technical failure. Aircraft crashed into the sea.
10/02/2011	Ireland	Cork Apt EICK	SWEARINGEN - SA227 - BC	Loss of control during landing below weather minima. Impacted runway inverted
11/11/2012	Italy	Roma Fiumicino Airport	AIRBUS - A320	Loading crew caught between loader and baggage door during aircraft ground handling operation.
24/07/2014	Mali	80 km south-east of Gossi	DOUGLAS - DC9 - 80 - 83	Loss of control due to incorrect engine power. Anti-icing system not activate leading to the blockage of the engine pressure sensor by ice crystals. Aircraft stalled and crashed.
20/10/2014	Russian Federation	UUWW (VKO): Moskva/ Vnukovo	DASSAULT - FALCON 50 - EX	Aircraft collided with a snowplough vehicle during take-off run. Aircraft was destroyed by fire.
24/03/2015	France	Prads-Haute-Bléone	AIRBUS - A320 - 200 - 211	First officer alone in the cockpit, initiated a rapid descent - Aircraft impacted mountainous terrain
08/01/2016	Sweden	Oajevágge	BOMBARDIER - CL600 2B19	IRU malfunction - Crew spatial disorientation - Loss of control - Aircraft crashed on a mountainous terrain

1.1.2 Non-commercial Complex Business

Local date	State/area of occurrence	Location	Aeroplane	Headline
26/12/2007	Kazakhstan	Almaty Airport (ALA)	CANADAIR - CL600 2B16 - 600 - 604	Loss of control after take-off due to ice contamination on the wings. Wing-anti-ice not ON
14/02/2010	Germany	Reinhardts-dorf-Schöna	CESSNA - 550 - NO SERIES EXISTS	During climb the crew performed an aerobatic manoeuvre and lost control of the aircraft. Aircraft disappeared from radar screen at FL250.
24/09/2012	United States	San Francisco CA	GULFSTREAM - GV	Truck collision with stationary aircraft
10/12/2012	Cyprus	Larnaca	CESSNA - 750 - NO SERIES EXISTS	A service vehicle struck the right wingtip, vehicle driver trapped
29/04/2013	Congo, Democratic Republic of the	FZAA (FIH): Kinshasa/ N'djili	DASSAULT - FALCON 900EX	Runway incursion by a person during take-off. Aircraft hit the person

1.1.3 Specialised Operations

Local date	State/area of occurrence	Location	Aircraft make/model	Headline
2007-03-11	United Kingdom	HEADCORN AIRFIELD, KENT	DE HAVILLAND - DHC2 - III	Aircraft failed to get airborne during take-off run
2007-03-17	Italy	Campo dei Fiori (Varese)	MAULE - MXT7 – 180, PZL BIELSKO - SZD55	Loss of control and subsequent crash after glider release
2007-08-07	Spain	SANTA AMALIA (BADAJOZ)	PIPER - PA36, PIPER - PA36 - 285	Mid-air collision between two aircraft
2007-08-13	Czech Republic	LKHC	OTHER	Loss of control and subsequent crash, post-impact fire
2007-09-01	Poland	MATZ EPRA	ZLIN - Z526 - AFS, ZLIN - Z526 - F	Airshow midair collision.
2007-09-25	Romania	near Vaideeni	DIAMOND - DA42	Propeller control failure - uncommanded IFSD, spin and crash; Overweight.
2007-12-06	France	Enroute	NORTH AMERICAN - T6 - G	North American T6 - Flew Into the Ground During Aerobatics - 2 POB - 2 Killed
2008-01-11	Slovenia	Trbovlje	ANTONOV - AN2	Aircraft crashed into mountain during low visibility conditions
2008-04-26	Germany	Eisenach-Kindel	ZLIN - Z37	Runway excursion after aborted take-off at airshow, aircraft impacted spectators

Local date	State/area of occurrence	Location	Aircraft make/model	Headline
2008-05-10	Romania	Ulmeni	PZL OKECIE	Aircraft crashed during crop spreading operation, post-impact fire
2008-05-14	Bulgaria	Topoli village, near LBWN	LET	Collision with power lines during manoevering at low height
2008-05-30	Spain	near Lillo y Villatobas	PILATUS - PC6	In flight structural failure in turbulence
2008-06-14	France	Connantre (51)	PIPER - PA38	Loss of control in flight, collision with the ground during an air race
2008-06-14	France	Castres (81)	OTHER	Loss of control during practice for airshow
2008-06-28	Spain	Sa Pobla (Illes Balears)	OTHER	COLLISION WITH TERRAIN
2008-08-12	Italy	località Val Vibrata, Corropoli, Teramo	PIPER - PA18 - 150	Piper PA18-150 - Loss of control in flight and ground impact- 1POB - 1OB Fatal - A/C Destroyed
2009-06-20	Czech Republic	200 m left RWY 24, LKCR	LET	Loss of control uring parachute operations
2009-07-08	United Kingdom	Bishop Norton (Lincolnshire)	PERCIVAL	Mechanichal engine failure and in-flight fire
2009-07-18	Hungary	LHDK	ZLIN - Z42	Crash when performing low-level aerobatics
2009-08-14	Portugal	Evora - Bairro de Almeirim	BEECH - 99	Loss of control during single-engine go-around
2009-08-23	Germany	Erpfental near Ellwangen	CESSNA - F182, ROBINSON - R44	Mid-air collision between aeroplane and helicopter near airshow
2009-09-06	Italy	LIPO Airport	MUDRY - CAP10	Aircraft impacted on ground during aerobatic manouver.
2009-10-09	Italy	Canevare (Modena)	PARTENAVIA - P68	Loss of control inflight
2010-05-28	Czech Republic	LKTO	OTHER	Aircraft crashed shortly after takeoff
2010-05-29	Spain	Aldeanueva de Barbarroya (To)	PIPER - PA25	STALL DURING FLIGHT
2010-06-19	United Kingdom	Methley Bridge (West Yorkshire	EXTRA - EA300	Aircraft crashed while performing an aerobatic display
2010-08-17	Spain	Aerodr. Casarrubios del Monte	OTHER	COLLISION WITH TERRAIN DURING ACROBATIC MANOEUVRE
2010-09-04	United Kingdom	Near Ryde, Isle of Wight	MOONEY - M20, VANS - RV4 - UNDESIGNATED SERIES	Mid air collision during Merlin Trophy Air Race

Appendix 1 - List of Fatal Accidents

Local date	State/area of occurrence	Location	Aircraft make/model	Headline
2010-09-05	Germany	Lauf-Lillinghof	OTHER	Collision with airshow spectators during take off roll
2010-09-19	Germany	Warngau (Miesbach)	EXTRA - EA300, OTHER	Mid-air collision during airshow
2010-10-02	France	Les Moëres	CESSNA - F172 - M, Aveko VL3B	Cessna F172 & Aveko VL3B - Midair Collision - 4POB - 2OB Fatalities - 2OB Minor - F172 Substantial damage - Aveko Destroyed
2010-10-12	Spain	Navarra	ROBIN - DR400	COLLISION WITH TERRAIN DURING CRUISE
2011-01-11	Italy	Airport LIRG	ROBIN - DR400 - 180R	Robin 400 180R while towing a glider in the take off phase crashed. The pilot of the airplane is killed.
2011-06-02	Netherlands	EHTE	CESSNA - F172	The aircraft crashed after pick up of a banner
2011-06-18	Poland	Plock - Wisla River	CHRISTEN - EAGLE II	Crash during aerobatics over river
2011-07-04	France	AD Dijon-Darois (21)	SOCATA	Stalling of towing aircraft after glider release
2011-08-30	Poland	Nowy Targ	PZL OKECIE	Loss of control during approach and subsequent crash with post-impact fire
2012-04-28	Germany	Alkersleben	ZLIN - Z226	A/C touched the ground after a formation flight
2012-05-05	France	AD Buno Bonnevaux (91)	PIPER - PA25 - 235, SLINGSBY - T31	Mid-air collision between a glider and an aeroplane above runway
2012-06-17	Romania	Banesti, Prahova	OTHER	Collision with power cables on approach and subsequent crash and post-impact fire
2012-07-22	France	AD Couhé Vérac (86)	OTHER	Loss of control and subsequent crash during airshow
2012-09-07	Italy	Di Fioranello street 163, Rome	CESSNA - 402	Aircraft impacted terrain during aerial work operations - aerial photography
2012-09-09	Germany	Backnang-Heiningen	ROBIN - DR400 - 180R	Avions Robin DR400 - Loss of control during take off as A/C fell into the vortex generated by the preceding a/C flying - 4POB - 3OB Fatalities - 1OB Serious
2012-10-22	Netherlands	EHAA	DIAMOND - DA40, GENERAL AVIA - F22	Mid air collision during photo flight - POB 2 on each aircraft - 2 fatalities - 2 serious injuries - both aircraft destroyed
2013-03-09	Czech Republic	600m N Srbce (Chrudim)	ZLIN - Z37 - A	Aircraft collided with trees in IMC

Local date	State/area of occurrence	Location	Aircraft make/model	Headline
2013-05-05	Spain	Madrid-Cuatro Vientos Airport (LECU)	HISPANO AVIACION - HA200 - D	Aircraft crashed during airshow
2013-05-08	Netherlands	Egmond aan Zee, Noord-Holland	OTHER - Not mapped	Ditched in north sea near Egmond
2013-06-01	Sweden	Söderhamn Airport	SAAB - 91	Engine failure during airshow due to loose spark plugs
2013-06-29	Germany	Eberswalde-Finow	ZLIN - Z526 - AFS	Aircraft crashed during aerobatics
2013-06-30	Sweden	Near Veberöd, Sweden	GRUMMAN - GA7	Crash in a field after reported engine problems
2013-10-19	Belgium	Gelbressee	PILATUS - PC6	Abrupt maneuver - left wing structural failure due to a significant overload - A/C out of control crashed into a ploughed field
2014-04-20	Finland	2 km from Jämijärvi airfield EFJM, Satakunta	OTHER	During climb, right wing broke due to a fatigue failure - aircraft entered a spin, crashed and caught fire - 11POB - 8OB Fatalities
2014-05-08	Latvia	EVLA - Liepaja	PITTS - S2 - B	Pitts S-2B Special - Aircraft crashed during aerobatic routine - 1POB - 1OB Fatal - A/C Destroyed
2014-05-10	Italy	Ceriano Laghetto (Monza province)	OTHER	Aircraft crash during a demonstrative flight, two persons died.
2014-06-06	Czech Republic	near Krizanov airfield, LKKA	TECNAM - P92	Crashed shortly after take off whilst glider towing. Glider disconnected and landed safely - 1POB - 1OB Fatal - A/C Destroyed
2014-06-23	Germany	Near Olsberg-Elpe	LEARJET - 35 - A, OTHER - Military	Collision of two A/C in flight, one military - 3POB - 2OB Fatally Injured
2014-07-05	Poland	Topolów district My-kanów, Czesto-chowskas-treet No 36; near Czestochowa	PIPER - PA31P	Piper PA-31 Navajo - Engine problems during climb-out, loss of height and collision with ground. A/C Destroyed by post-impact fire - 12POB - 11OB Fatal -1OB Serious - A/C Destroyed
2014-07-19	Czech Republic	1 NM S LKKM	ZLIN - Z526 - F	The aircraft entered an inverted spin and impacted the ground
2014-09-13	France	At FL110 AD Tarbes Laloubère	CESSNA - U206 - F	Parachute opened upon parachutist leaving the aircraft, parachute struck the tail of the aircraft and damaged part of the stabilizer, loss of control of aircraft and subsequent crash

Local date	State/area of occurrence	Location	Aircraft make/model	Headline
2014-09-21	Italy	near Venezia Lido Airport	OTHER - Not mapped	XtremeAir Xtreme 3000 - Aircraft crashed during aerobatics performance - 1POB - 1OB Fatal - A/C Destroyed
2014-09-28	Italy	Colle di Val d'Elsa, Siena	PITTS	Pitts 12 - Aircraft fell during aerobatic maneuvers - 2POB - 2OB Fatalities - A/C Destroyed
2015-05-30	France	Blois	STAMPE - SV4 - C	During aerobatics session the aircraft entered into spin after a half loop maneuver - Aircraft crashed
2015-05-31	Adriatic Sea	Tortoreto, Alba Adriatica (TE)	VANS - RV8 - A, VANS - RV7	Collision of two aircraft in flight during an air show
2015-08-01	United Kingdom	near Oulton Park	OTHER - Military	Flight into terrain during airshow
2015-08-01	Romania	Stancuta, Braila county	PZL MIELEC - AN2 - R	Aircraft crashed shortly after take-off.
2015-08-20	Slovakia	Cervený Kamen	LET - L410 - UVP, LET - L410	Mid-air collision during en-route. Both aircraft were performing parachute dropping operations.
2015-08-22	United Kingdom	near EGKA - Shoreham Airport	HAWKER - HUNTER - T7 - T7	Aircraft crashed on a road during an air show.
2015-08-23	Switzerland	Dittingen LSPD	2x COMCO IKARUS - IKARUS C42 - B	Mid-air collision during airshow
2015-08-30	Austria	Airfield Friesach Hirt, Carinthia	PITTS - S2 - B	Loss of control during Aerobatic show with A/C crashed
2016-05-20	Germany	Rodigast	PZL OKECIE - PZL101	Loss of control and subsequent crash into forest
2016-06-11	Italy	Cecina	PILATUS - PC6	Parachutists reserve parachute opened prematurely. Parachutist hit the RH stabilizer - structural damage in flight and crash.
2016-06-19	Portugal	Canhestros	PILATUS - PC6	In-flight fuselage breakup due to material fatigue
2016-09-18	Hungary	Gödöllo Arboretum	PIPER - PA28 - 140, CESSNA - 182 - D	Two aircraft collided with each other in the vicinity of LHGD. 4 POB, 4 fatalities
2017-08-15	Spain	Near the 55 kilometer point of N-340 road	PIPER - PA36 - 375	Bird strike followed by crash during fumigation work in a rice field (low altitude operation)
2017-09-03	Italy	Pontinia	CESSNA - 182 - P	Loss of control inflight - crash and fire.
2017-09-16	Slovakia	LZPE	ZLIN - Z37 - C	Loss of control and crash

1.1.4 Non-commercial Other Than Complex

The list below provides information on all fatal accidents occurring within NCO for the past 3 years.

03/01/2015	United Kingdom	Blackwood Forest, near the EGHP	ALPI AVIATION - PIONEER400	Engine failure at approach, aircraft crashed in woodland.
18/01/2015	Germany	Rech-berghausen	PIPER - PA24 - 260	Aircraft crashed into a garage
26/01/2015	Germany	Dannenfels	PIPER - PA30	Aircraft crashed killing the pilot
18/02/2015	France	Colombier	ROBIN - DR400 - 160	Aircraft impacted the top of a tree and crashed in adverse weather conditions
23/02/2015	Switzerland	Proche AD Yverdon	ROBIN - DR400 - 140B	Aircraft crashed near the airfield shortly after the take-off
11/03/2015	France	Vrigny	ROBIN - DR400 - 120	Loss of Control on Approach - Aircraft crashed to the ground
03/04/2015	Germany	Witzenhausen	PIPER - PA28	Aircraft crashed into a Forrest
04/04/2015	United Kingdom	Near Loch Etive, Oban, Argyll and Bute	PIPER - PA28 - 140	Aircraft crashed into mountainous terrain
12/04/2015	Germany	Oldenburg - Hatten	CESSNA - F172 - N	A/C hit trees and crashed into the ground
15/04/2015	Germany	Moosburg	BOLKOW - BO207	Controlled flight into terrain
22/04/2015	United Kingdom	EGSV:OLD BUCKENHAM	OTHER	Aircraft crashed while practising aerobatics. One POB, fatally injured.
03/05/2015	United Kingdom	West of Abernyte, near Dundee	BEECH - 55 - 95B55	Flew into terrain on approach
21/05/2015	France	Saint-Laurent-Blangy	ROBIN - DR400 - 140B	Engine power loss and loss of control during initial climb, Aircraft crashed and caught fire
21/05/2015	Bulgaria	LBLS	OTHER	Accident with airplane RALLY 105, reg. marks LZ-GVG, while taking-off from Lesnovo airfield.
26/05/2015	Sweden	Skå-Edeby	OTHER	Destroyed aircraft, Steen Skybolt - one fatality
26/05/2015	Portugal	Next to the football field of Água Longa, SANTO TIRSO.	OTHER	Loss of control during base approach - Spiral dive - aircraft crashed
26/05/2015	France	Remoray-Boujeons	CEA - DR380	Collision with high terrain in adverse weather conditions with fog

Appendix 1 - List of Fatal Accidents

Date	State of Occurrence	Location of Occurrence	Make/Model	Summary
06/06/2015	Italy	AVIOSU-PERFICIE "ALVARO LEONARDI" - TERNI	UNKNOWN	The engine failed and the aircraft hit the ground about 270 meters from the runway threshold
07/06/2015	Croatia	Zvekovac	VANS - RV7 - A	Accident report - Airplane below 2250 kg
23/06/2015	Germany	Holzminden	JABIRU - J430	Aircraft hit tree tops and then impacted the ground
25/06/2015	Croatia	Split	LAKE - LA4 - 200	Accident report - Airplane below 2250 kg
26/06/2015	Lithuania	Alytus	YAKOVLEV - YAK55	Akrobatinio skrydzio metu nukrito lektuvas
28/06/2015		Aviosuper-ficie "Alvaro Leonardi" - Terni	RUTAN	Incidente aereo aeromobile marche D-EESY
30/06/2015	Germany	Egelsbach	DIAMOND - DA20 - A1	Take-off collision with power lines
01/07/2015	France	Treilles	PIPER - PA28 - 181	Collision with high terrain during cruise affected by adverse weather conditions. Post-crash fire
18/07/2015	Sweden	ESGF	VANS - RV6 - A	Loss of control in flight
30/07/2015	Germany	Villingen-Schwennin-gen	EXTRA	Loss of control in climb phase
02/08/2015	France	AD Marennes	BRANDLI - BX2	Aborted landing, Aircraft collided first with the vegetation then struck the ground.
05/08/2015	Switzerland	Hundwil/AR	SKYSTAR - KITFOX	Aircraft crashed into a forest
09/08/2015	Iceland		DE HAVILLAND - DHC2	Aircraft collided with a mountain during flight. Fatal accident; 1 fatality
12/08/2015	Spain	Robledillo de Mohernando Airfield (Término municipal de Malaguilla)	ZENAIR - CH640	Aircraft fell to the ground during the base leg.
17/08/2015	United Kingdom	Newquay Airport	PIPER - PA34 - 220T	Aircraft crashed during go-around.
04/09/2015	United Kingdom	Hinton in the Hedges Airfield	CESSNA - 150 - F	Loss of control during go-around after bounced landing
05/09/2015	France	AD Haguenau	BRUGGER - MB2	Aircraft crashed shortly after take-off.
05/09/2015	Sweden	Brattsfor-sheden	YAKOVLEV - YAK42	Accident YAK52two fatally injured
08/09/2015	Belgium	Celles	OTHER	Aircraft impacted the ground at a low horizontal / high vertical speed.

Date	State of Occurrence	Location of Occurrence	Make/Model	Summary
08/09/2015	Spain	Toses	PIPER - PA28 - 181	Aircraft crashed into a mountain.
10/09/2015	Germany	Können	BEECH - 24	Aircraft crashed into a field due to unknown circumstances. 1 POB, 1 fatality
16/09/2015	Germany	Mechernich-Bergheim	PIPER - PA28 - 161	Crew abandoned the aircraft during enroute. Aircraft crashed and caught fire.
20/09/2015	Switzerland	Muhen/AG	NEW GLASAIR - GLASAIR SUPER II - RG	Collison with a car during emergency landing in Muhen/AG
26/09/2015	Germany	Sandstedt	CESSNA - F172	Collision in Flight causing one aircraft to lose control and crash. 4 POB, 3 fatalities.
03/10/2015	United Kingdom	Near Chigwell	BEECH - 200 - B200	Aircraft crashed shortly after take-off
08/11/2015	Austria	Ma. Rojach	BREEZER	Aircraft crashed during low flying. 2 POB, 2 fatalities
08/11/2015	Slovenia	near Slovenske Konjice Airport	TL ULTRALIGHT - TL2000 STING	Ultralight aircraft crashed shortly after take-off. Ballistic Recovery System activated but parachute didn't fully open.
12/11/2015	Iceland	Kapelluhraun	TECNAM - P2002 - JF	A/C crashed - during familiarization training flight
03/12/2015	United Kingdom	EGNH (BLK): Blackpool	ROCKWELL - 112 - B	Aircraft reported missing over sea. One POB, missing.
03/12/2015	Austria	Mengeš	PIPER - PA28R - 201	Aircraft crashed. Pilot reported having problem during the approach.
04/12/2015	France	La Bresse	ROBIN - DR400 - 140	Aircraft collided with mountainous terrain in adverse conditions not favourable to VFR flight
06/12/2015	France	Peypin d'Aigues	PIPER - PA28 - 161	Loss of visual references - aircraft crash on a mountainous terrain
24/12/2015	Spain	Ronda	SOCATA - TB9	Aircraft crashed and consumed by post-crash fire.
04/01/2016	Netherlands	North See, 4.5 NM west from Schoorl	CIRRUS - SR20	Unintended flight in IMC, loss of control and crash to the sea. 1 POB, 1 fatality
16/01/2016	Spain	Serranía de Cuenca Natural Park	SOCATA - TB20	Bird strike - left wing partial detachment - aircraft crashed and caught fire. 4 POB, 4 fatalities
09/02/2016	Spain	near Beas de Segura	CESSNA - 172 - P	Aircraft asked a flight path deviation due to bad weather before crash. 1 POB, 1 fatality
21/02/2016	France	near AD Vinon	JODEL	Loss of control during initial climb, aircraft crashed. 1 POB, 1 fatality
25/02/2016	France	Saint-Héand	EXTRA - EA300 - 200	Collision with high level terrain due to adverse weather conditions. 1 POB, 1 fatality

Date	State of Occurrence	Location of Occurrence	Make/Model	Summary
28/02/2016	Hungary	5km SW from Agostyán, Tata	CESSNA - FA152	Aircraft crashed in bad weather conditions. 1 POB, 1 fatal, 1 serious injury
20/03/2016	Ireland	EIAB - Abbeyshrule	OTHER	Aircraft crashed while executing rolls. 1 POB, 1 fatality
25/03/2016	Hungary	Dány térsége	TECNAM - P2002 - JF	Aircraft crashed due to unknown reasons. 2 POB, 2 fatalities
30/03/2016	Spain	Perales de Tajuña	CESSNA - 172 - R	A bird strike, wing separation in flight and a crash. 3 POB, 3 fatalities
01/04/2016	Poland	Chmielewo	TECNAM - P2002	Aircraft lost control and collided with terrain on a steep angle. 2 POB, 2 fatalities
01/04/2016	France	Sondernach	ROBIN - HR100 - 210D	Aircraft crashed and caught fire. The aircraft impacted the ground with a significant pitch down attitude. 1 POB, 1 fatality
20/04/2016	Czech Republic	near LKST - Strakonice	CESSNA - 150	Aircraft lost control and crashed into a meadow. 1 POB, 1 fatality
30/04/2016	United Kingdom	Whitwell-on-the-Hill	SLINGSBY - T67 - MII	Loss of control in flight - Aircraft crashed into a field. 2 POB, 2 fatalities
05/05/2016	Germany	Grafenau-Lichteneck	MORANE SAULNIER - MS893 - E	Aircraft collision with the ground due to unknown reasons. 1 POB, 1 fatality
06/05/2016	Austria	near LOAN - Wr.Neustadt / Ost	RANS - S12	Aircraft spin and crash during flight around the aerodrome. 2 POB, 2 fatalities
19/05/2016	Spain	Arbizu	ROBIN - DR400 - 180	Aircraft crashed due to bird strike. 3 POB, 3 fatalities
01/06/2016	France	Coëx	VANS - RV4	Engine shut-down in flight and crash. 2 POB, 1 fatal, 1 serious injury
09/06/2016	United Kingdom	Near Cushendun,	COMCO IKARUS - IKARUS C42 - FB80	Aircraft crashed into the sea for unknown reasons. 2 POB, 2 fatalities
03/07/2016	Germany	Mosbach	OTHER	Loss of Control during take-off. 1 POB, 1 fatality
05/07/2016	Spain	LECU - Madrid / Cuatro Vientos	CIRRUS - SR22	Aircraft crash at the aerodrome during touch and go landing. 2 POB, 2 fatalities
08/07/2016	United Kingdom	1 nm north of Dinton, Wiltshire	YAKOVLEV - YAK52	After loss of engine power and unsuccessful forced landing due to late decision A/C crashed in field. 2 POB, 1 fatal, 1 serious injury
10/07/2016	Austria	LOWZ:Zell am see	PIPER - PA28 - 161	Aircraft not able to maintain climb due to low speed during take-off and stalls followed by crash. 4 POB, 1 fatal, 3 serious injuries

Date	State of Occurrence	Location of Occurrence	Make/Model	Summary
03/08/2016	France	LFCV - Villefranche de Rouergue	JODEL	Crash after unsuccessful landing. 1 POB, 1 fatality
06/08/2016	United Kingdom	English Channel, 1 mile from Winchelsea	PIPER - PA28 - 161	Engine problem reported - most likely carburettor icing, aircraft ditched and sank. 1 POB, 1 fatality
15/08/2016	France	LFNE - Salon / Eyguieres	EXTRA - EA300 - 200	Unconsciousness during a training flight in aerobatics and crash. 1 POB, 1 fatality
25/08/2016	France	Saint-Rémy de Maurienne	JODEL - D11	Loss of control during the initial climb - Aircraft crashed and caught fire. 2 POB, 2 fatalities
01/09/2016	Slovenia	near Cezsoca	PIPER - PA28 - 161	Aircraft crashed due to unknown circumstances. 3 POB, 3 fatalities
01/09/2016	Germany	Herlazhofen	ROBIN - DR400 - 140B	Aircraft crashed after engine failure. 3 POB, 3 fatalities
03/09/2016	Germany	Dierdorf	OTHER	Aircraft crashed due to unknown circumstances. 1 POB, 1 fatality
04/09/2016	Germany	Stettiner Haff	SOCATA - TB20	Aircraft crashed into the ocean. 3 POB, 3 fatalities
04/09/2016	Poland	Wrocanka	VANS - RV6	Loss of control shortly after take-off. 2 POB, 2 fatalities
05/09/2016	Bulgaria	LBDB:DOLNA BANYA (AIRFIELD)	TECNAM - P92	Aircraft collided with high voltage wires and crashed. 2 POB, 2 fatalities
06/09/2016	Spain	Close to Villanueva del Condado village (León - Spain)	ROBIN - DR400 - 180	On a long visual flight the AC came down at a meadow close to the village buildings. 2 POB, 2 fatalities
14/09/2016	Austria	near Sankt Anton, Steiß-bachtal (Vallugabahn)	AQUILA - AT01	Collision with cableway. 1 POB, 1 fatality
18/09/2016	Hungary	Gödöllo Arboretum	PIPER - PA28 - 140	Two aircraft collided with each other in the vicinity of LHGD. 4 POB, 4 fatalities
27/09/2016	France	Saint Ambroix	VANS - RV8	Loss of control at low altitude. A/C crashed and caught fire. 2 POB, 2 fatalities
02/10/2016	United Kingdom	near Topcroft Farm Airstrip	NORTH AMERICAN - P51 - D	Aircraft crashed into a tree during aborted landing. 2 POB, 1 fatal, 1 seriously injured
04/10/2016	Slovakia	near Jakubovany	LANCAIR - 360	Probable hypoxia of the pilot and icing of the airframe. 1 POB, 1 fatality
15/10/2016	Romania	Luncani, Cluj County	CESSNA - 182	Skydiver's parachute was deployed while he was inside the aircraft and fell to the ground unconscious. 1 fatality

Date	State of Occurrence	Location of Occurrence	Make/Model	Summary
16/10/2016	Greece	east of Kalabryta	CESSNA - 172 - P	Aircraft crashed into mountain. 2 POB, 2 fatalities
17/10/2016	United Kingdom	near EGSN - Bourn	CESSNA - F150 - M	Aircraft crashed after take-off. 2 POB, 1 fatal, 1 seriously injured
24/11/2016	Poland	EPZP - Zielona Góra	PIPER - PA31 - 350	Premature LG retraction and crash during take-off. 1 POB, 1 fatality
25/11/2016	France	Jarsy	SOCATA - TB20	Aircraft collision with mountain due to unintended flight into IMC. 2 POB, 2 fatalities
04/12/2016	United Kingdom	over Lubenham	CESSNA - 150 - L	Mid-air collision powered ACFT and glider; Glider crashed killing the pilot.
07/12/2016	France	AD Bale-Mulhouse	PIPER - PA34 - 200T	Collision with the ground during landing - fire. 1 POB, 1 fatality
19/12/2016	Germany	Garz	TECNAM	Aircraft crashed into the forest for unknown reasons. 1 POB, 1 fatality
15/01/2017	United Kingdom	Near Aston Rowant Nature Reserve	PIPER - PA30	Aircraft flying at low altitude in IMC condition, crashed into woodland. 1 POB, 1 fatality
15/01/2017	Spain	near LEMT - Casarrubios Del Monte	TECNAM - P2002	Aircraft crashed into a field in a high nose down attitude. 2 POB 2 fatalities.
02/02/2017	Germany	Melle	DIAMOND - DA20 - A1	Aircraft collided with a wind turbine. 1 POB, 1 fatality.
20/02/2017	Guadeloupe	Petit Bourg	PIPER - PA28 - 161	Airplane crashed into a building. 1 POB, 1 fatality
27/03/2017	Ireland	Clon-coskoran, near Dun-garvan Co. Waterford	RUTAN - LONGEZ	Aircraft crashed in a field due to engine failure. 1 POB, 1 fatality
09/04/2017	France	AD Chelles Le Pin	EVEKTOR AEROTECHNIK	Bounced landing, the student pilot lost the aircraft's control after initiating a go/around. The aircraft crashed in a field. 1 POB, 1 fatality
14/04/2017	Italy	Dovera (CR)	TECNAM - P92	A/C crashed on the ground during VFR flight. 2 POB, 2 fatalities
17/04/2017	Portugal	Cascais	PIPER - PA31T	Aircraft stalled during take-off and crashed to the buildings. 4 POB, 4 fatalities
29/04/2017	Spain	Canillas de Aceituno	SOCATA - TB20	Direct impact against the terrain. 3 POB, 3 fatalities
25/05/2017	United Kingdom	2 miles north of Skipness, Kintyre	PIPER - PA28R - 201	Aircraft lost from radar, wreckage found in water. 2 POB, 2 fatalities
28/05/2017	United Kingdom	Apperknowle	EUROPA	A/C partial loss of power as a result of fuel vapour disrupting fuel supply to engine during take-off followed by crash in adjacent field. 1 POB, 1 fatality

Date	State of Occurrence	Location of Occurrence	Make/Model	Summary
18/06/2017	United Kingdom	Spanhoe Airfield, Northamp-tonshire	AUSTER	Aircraft descended into a field of crops near the airfield. 2 POB, 1 injury 1 fatality.
26/06/2017	Czech Republic	LKHD: Hodkovice	PIPER - L4 - J	Aircraft crashed shortly after take-off. 2 POB, 1 fatality, 1 serious injury.
05/07/2017	Switzerland	near LSGN - Neuchatel	CZECH SPORT - PS28	Pilot lost control after take-off during initial climb. 2 POB, 2 fatalities
19/07/2017	Finland	near Haalatvantie	PIPER - J3C - 65 - 65	The aircraft crashed into a forest during final approach in bad weather condition. 1 POB, 1 fatality
21/07/2017	Poland	EPML	OTHER	Loss of control shortly after take-off - 2 POB - 2 fatal injuries
28/07/2017	Poland	EPLL	CESSNA - 152	Aircraft collided with trees during approach. 1 POB, 1 fatality
01/08/2017	Norway	Oppland county	AQUILA - AT01	Aircraft crashed into mountain. 1 POB, 1 fatality
02/08/2017	Portugal	Praia de São João da Caparica	CESSNA - 152	Forced landing on the beach due to engine failure. Aircraft collided with pedestrians. 2 POB 2 fatal injuries on ground
04/08/2017	Switzerland	Diavolezza/ GR	PIPER - PA28 - 181	Collision with high terrain. 3 POB, 3 fatally injured
08/08/2017	Germany	Bodensee / Mainau	PIPER - PA46	The aircraft crashed into the Lake Bodensee north of Konstanz. 2 POB 2 fatalities
19/08/2017	Romania	Valcica village, Iasi county	OTHER	Aircraft crashed due to unknown reasons. 2 POB, 1 fatally injured, 1 seriously injured
20/08/2017	Switzerland	Alp Tsanfleuron, Savièse VS	PIPER - PA28 - 161	Aircraft collided with terrain. 3 POB and 3 fatalities
22/08/2017	Norway	near Holmestrand	PITTS - S2 - B	Pilot lost the aircraft control while performing aerobatics manoeuver and crashed. 2 POB, 2 fatalities
26/08/2017	United Kingdom	EGHA: Compton abbas	DE HAVILLAND - DH82 - A	Crashed shortly after take-off. Aircraft destroyed. 2 POB fatally injured.
27/08/2017	Germany	Moormeer-land	MORANE SAULNIER - MS883	Collision with the ground due to unknown circumstances. 1 POB 1 fatality
09/09/2017	Italy	Salussola (BI)	PIPER - PA34	Aircraft crashed on the ground during VFR approach in poor weather conditions. 1 POB 1 fatality
11/09/2017	United Kingdom	Wolferton, Norfolk	PIPER - PA28RT - 201	Rough running engine and electrical fire followed by Mayday call by pilot. 2 POB, 2 fatalities
12/09/2017	France	Ghisonaccia	DIAMOND - DA42	Aircraft crashed due to unknown reasons. 4 POB 4 fatalities.

Date	State of Occurrence	Location of Occurrence	Make/Model	Summary
12/09/2017	Switzerland	Braunwald/ GL	MOONEY - M20K	Aircraft crashes in high terrain - 2 POB - 2 fatally injured - Aircraft destroyed.
19/09/2017	Norway	near ENHA - Hamar / Stafsberg	VANS - RV4	Loss of control on approach, spin and crash. 2 POB, 2 fatalities
28/09/2017	United Kingdom	Wolvey, Warwickshire	EUROPA - EUROPA	On landing, runway excursion through hedge. Damage: Substantial. 2 POB, 2 fatal injuries.
05/10/2017	Portugal	Olhão: Quelfes	KOLB - TWINSTAR - III	Aircraft stalled shortly after take-off. 1 POB, 1 fatality
17/11/2017	United Kingdom	near Waddesdon	CESSNA - 152	Aircraft Mid-air collision between a Cessna and a Guimbal helicopter fatal injuries. 2 POB, 2 fatalities

1.2 Rotorcraft

1.2.1 Offshore Commercial Air Transport

Local date	State/area of occurrence	Location	Helicopter	Headline
01/04/2009	United Kingdom	Near Peterhead, Scotland	AEROSPATIALE – AS332 - L2	Loss of control inflight due to main rotor gearbox failure
11/07/2011	Myanmar	Yetagon Oil Rig, Andaman Sea	SIKORSKY – S76 - C	Power loss during take-off. Helicopter capsized during ditching
23/08/2013	United Kingdom	Samburgh Airport	AEROSPATIALE – AS332 - L2	Loss of control during approach to land at Sumburgh Airport. Crashed into the sea
29/04/2016	Norway	near Turøy	EUROCOPTER – EC225 - LP	Loss of control inflight due to main rotor gearbox failure

1.2.2 Other Commercial Air Transport

Local date	State/area of occurrence	Location	Helicopter	Headline
02/06/2007	Italy	Villa Vomano (Teramo)	ROBINSON - R44	Collision with power lines during sightseeing flight
03/08/2007	United Kingdom	Kendal (Cumbria)	ROBINSON - R44	Loss of control inflight in poor weather conditions
02/03/2008	Antarctica	nr Neumayer II	EUROCOPTER - BO105 - CBS4	Helicopter crash during research mission
31/07/2008	Hungary	Near Bankháza-Kiskun-lacháza	EUROCOPTER - EC135	Loss of control following power loss during HEMS operations
17/02/2009	Poland	Jerostow	PZL SWIDNIK - MI2	Loss of control during HEMS flight
14/08/2009	France	Dangé Saint Romain (86)	ROBINSON - R44	Loss of control during sightseeing flight
27/01/2010	Norway	Horten	ROBINSON - R44	Loss of control in poor visibility conditions
28/10/2010	Antarctica	A 53 NM de Dumont d'Urville	AEROSPATIALE - AS350 - B3	Loss of control due to loss of visual references in whiteout conditions
04/07/2011	Norway	Dalamot	AEROSPATIALE - AS350 - B3	Loss of control following abrupt manoeuvring

Local date	State/area of occurrence	Location	Helicopter	Headline
09/11/2011	Italy	Italy	AEROSPATIALE - AS365 - N3	Collision with wind turbine during HEMS operations
08/04/2012	Niger	Niger	AEROSPATIALE - AS350 - BA	Helicopter crashed in for as yet unknown reason
14/01/2014	Norway	Near Solihogda, Norway	EUROCOPTER - EC135 - P2	Collision with power lines during HEMS operations
31/07/2015	Italy	Pizzo Zocca di val Masino (Sondrio)	AEROSPATIALE - AS350 - B3	Terrain collision during flight in adverse cloud condition
17/07/2015	Slovakia	Hornád canyon - Slovenský Raj	AGUSTA - A109 - K2	Collision with power cables during en-route HEMS operations
02/06/2016	Moldova	Haragis	EUROCOPTER - EC135 - T2	Helicopter crashed in a wood for as yet unknown reason
07/09/2016	Slovakia	Strelníky	BELL - 429	Terrain collision during HEMS operations in mountainous area.
08/09/2016	Austria	Carinthia, ca. 2346 m	ROBINSON - R66	Terrain Collision in mountainous area
24/01/2017	Italy	Campo Felice	AGUSTA - AW139	Collision with mountain slope during HEMS operations.

1.2.3 Specialised Operations

Local date	State/area of occurrence	Location	Aircraft make/model	Headline
2007-07-12	Ireland	Ballynacally, County Clare	AEROSPATIALE - AS350	Engine failure and subsequent crash
2007-07-20	Austria	Gusswerk/ Steiermark	AEROSPATIALE - AS332	Ground staff fatally injured by sling load
2007-08-09	Italy	Marina di Camerota	ROBINSON - R22	Helicopter loss of control and subsequent crash in water
2007-10-11	Germany	Tegernsee	BELL - 206	Filming flight over lake, rotor downwash capsized a canoe, one canoe occupant drowned
2008-01-07	Germany	Zuzenhausen	BELL - 206	Helicopter crashed in a forest during bad weather conditions
2008-07-03	Slovakia	near Brusno	MIL - MI8	Engine failure and subsequent crash
2008-09-27	Denmark	Kirke Såby	ROBINSON - R22	Fatal helicopter accident - vortex ring
2009-02-04	Norway	Rostadalen	AEROSPATIALE - AS350 - B3	Helicopter accident during low flying in degraded visibility
2009-02-10	Hungary	Csepeli szennyvíz tisztító	ROBINSON - R44	Helicopter ditched in river

Local date	State/area of occurrence	Location	Aircraft make/model	Headline
2009-06-20	France	Bregnier-cordon (01)	AEROSPATIALE - AS350 - B2	Helicopter loss of control and subsequent crash
2009-08-23	Germany	Erpfental near Ellwangen	ROBINSON - R44, CESSNA - F182	Mid-air collision between aeroplane and helicopter near airshow
2009-09-02	Switzerland	Fully/VS	AEROSPATIALE - AS350 - B3	Flight assistant on ground killed by falling wall during hovering of the helicopter
2009-09-07	Italy	Val d'Aosta	AEROSPATIALE - SA315	Rotor strikes rocks on ground
2009-10-09	France	Domjulien (88)	AEROSPATIALE - AS350 - B3	Collision with trees and ground due to adverse weather conditions
2010-06-27	Netherlands	Maasvlakte, Rotterdam	EUROCOPTER - EC130	Loss of control during hover
2010-07-23	Austria	Gahbuhel	BELL - 204 - B	Tail rotor collision with tree during sling load operation
2010-07-31	France	Bormes-les-Mimosas (83)	AEROSPATIALE - AS350	Vibrations during landing, hard landing
2010-08-04	French Guyana	2 Nm S-E Croisée d'Apatou	AEROSPATIALE - AS350	Collision with vegetation during sling load mission
2010-08-08	Belarus	Minsk-Barawaja	HUGHES - 369 - H - HS	Accident during low level aerobatic flight manoeuvres
2010-08-17	Algeria	Benbakhta, wilaya de Boumerdes	AEROSPATIALE - AS350 - B3	Loss of control and subsequent crash
2011-03-08	United Kingdom	Honister Slate Mine, Seatoller	AEROSPATIALE - SA341 - G	Aircraft missing - later found crashed in valley
2011-04-26	Italy	1.3 NM S-SE of Sulmona (AQ)	ROBINSON - R22	Helicopter R22 Accident - CFIT during aerial work
2011-06-07	Spain	Quincoces de Yuso	BELL - 407	Helicopter crash in mountainous area and post-impact fire
2011-06-15	Andorra	Pleta de Juclar (Canillo)	AEROSPATIALE - AS350 - B3	Helicopter crash durirng sling load operation
2011-06-25	Italy	Cison di Valmarino (TV)	SCHWEIZER	Helicopter impacts cables during aerial work
2011-08-05	Italy	Cogolo di Pejo (Trento)	AEROSPATIALE - AS350 - B3	collision with obstacles during aerial work
2011-09-14	France	Vallorcine (74)	AEROSPATIALE - AS350 - B3	Collision with cable car cable, post-impact fire
2011-10-18	Belgium	10km from Liege	EUROCOPTER - EC120	Crashed during aerial work
2012-01-11	Norway	Mosjøen SE of	ROBINSON - R44	Helicopter crashed into ground during reindeer herding.
2012-03-12	Martinique	Le Lorrain	BELL - 47	Collision with power lines and subequent post-impact fire

Local date	State/area of occurrence	Location	Aircraft make/model	Headline
2012-03-14	Gabon	near Iguela	BELL - 212	Collision with obstacles during sling load operation
2012-04-06	Belgium	Huy	ROBINSON - R22	Collision with cable in hover
2012-06-29	Germany	Lieser, nahe	HUGHES - 369 - D	Collision with powerline
2012-09-09	Germany	Roßfelder Glider Airfield	EUROCOPTER - EC120 - B	Loss of control during an airshow - 1 Ground fatality, 3 Ground injuries, 2 OB injuries
2013-06-29	Switzerland	Switzerland	AEROSPATIALE - AS350 - B2	Crash due to loss of control caused by a previous rotor strike
2013-11-12	France	Saint-Chaffrey	AEROSPATIALE - AS350 - B3	Helicopter crash after hitting a cable of a chairlift
2013-12-18	Portugal	near Monchique	EUROCOPTER - EC120 - B	Helicopter collision with power lines and crash.
2015-07-14	Switzerland	Guggig-letscher, Lauterbrun-nen	AEROSPATIALE - AS350 - B3	Aircraft crashed in a mountainous snow-covered area during aerial work mission
2015-12-31	Réunion	Rempart du Maïdo	AEROSPATIALE - AS350 - B3	Aircraft turned back due to bad weather conditions and crashed shortly afterwards.
2016-05-19	Bulgaria	Gylovtsa village, Nesebar	KAMOV - KA26	Fatal accident - collision with power lines
2017-05-13	Switzerland	Petersgrat	AEROSPATIALE - AS350 - B2	While landing in a mountainous area, the helicopter overturned onto its side and rolled over.
2017-06-23	Greece	Scinias of Marathonas area wetland	MD HELICOPTER - 369 - E - E	Helicopter crashed at marathonas area during low flying due to collision with electrical power lines
2017-09-26	Sweden	Högheden	MD HELICOPTER - 369	Fatal helicopter accident during positioning flight

1.3 Balloons

29/08/2008	Germany	Bobenheim	SCHROEDER - FIRE BALLOONS G	Uncommanded balloon lift off after landing. Two passenger fell from the basket one fatal injury.
01/01/2011	United Kingdom	Midsomer Norton	CAMERON - O120	Balloon deflated during flight and fell to the ground
22/04/2011	Belgium	Oudenburg	KUBICEK - BB37 - N	Flight initiated in spite of poor weather forecast. High speed landing caused the basket to flip 180 degrees
25/06/2011	Switzerland	Fisibach/AG	WORNER	Loss of control of a balloon and hard landing
13/05/2012	France	Charly-sur-Marne (02)	SCHROEDER	Collision with a power line during a first flight
19/08/2012	France	Feings(41)	CAMERON	Cameron Balloons Z-750 - Hard landing, One passenger was ejected and hit by the basket - 34 POB - 1 OB Fatal - No damage
23/08/2012	Slovenia	Ljubljana marshes	LINDSTRAND - LBL600C	Lindstrand LBL600C - Hot air balloon crash in storm - 32POB - 6OB Fatalities - 12OB Serious - 14OB Minor - A/C Destroyed
06/08/2013	Switzerland	Haut-Intyamon/ FR	CAMERON - Z105	Collision of balloon with power line
05/10/2014	France	Cazes Mondenard (82)	SCHROEDER - FIRE BALLOONS G	Precautionary bounced landing - basket flipped on its side - fire - evacuation - 10POB - 1OB Fatal - 2OB Serious - 7OB Minor - A/C Destroyed
05/10/2014	France	Lauzerte	SCHROEDER - FIRE BALLOONS G	Balloon basked tipped over and fire broke out
12/07/2015	Spain	Vilanova del Cami	ULTRAMAGIC - S160	Balloon basket impacted against the top of a metal fence on final approach, basket overturned, expulsion of some occupants included pilot - pilot died
08/10/2015	Italy	Montescaglioso (MT)	SCHROEDER - FIRE BALLOONS G	Balloon forced landing after hitting power line
05/01/2016	France	Aurel	ULTRAMAGIC - M120	Fall of a person gripped on the outside of the basket during take-off.

1.3.1 Sailplanes

Local date	State/area of occurrence	Location	Aeroplane	Headline
06/04/2015	Sweden	10 km SSE Nikkaluokta	GROB - G103C - TWIN III SL - TWIN III SL	Loss of control during wave flight (in cloud), glider destruction in flight. Pilot bailed out, the student was killed.
12/04/2015	Germany	Oschatz	SCHEIBE - LSPATZ 55	Wing hit the Ground during Take Off - the glider swerved and overturned.
29/04/2015	France	La Piarre	GLASER DIRKS - DG800	Breakage of airbrakes control during a mountain flight, autorotation, collision with terrain.
02/05/2015	Germany	Bad Münder, Bakede	SCHEMPP HIRTH - NIMBUS 3	Glider stalled and crashed into a forested area.
18/05/2015	Austria	Near Airfield Hohenems, Vorarlberg	GLASER DIRKS - DG300	Mid-air collision. One of the two aircraft crashed into the mountain rocks and caught fire. The other aircraft returned to the airfield and landed safely.
28/05/2015	Germany	Bartholomä	SCHEMPP HIRTH - JANUS	Glider crashed into the Ground during a winch launch.
05/06/2015	Italy	Monte Terlago (TN)	SCHEMPP HIRTH - VENTUS 2CM	Glider crashed on a mountain slope.
07/06/2015	Hungary	LHEM	OTHER	Two Sailplanes collided during approach. One Sailplane broke and crashed. 2 POB - 2 fatalities. The other glider managed to land.
14/06/2015	United Kingdom	Aston Down Airfield	SCHLEICHER - K8 - B	A Glider Crashed into roof of building – Suicide.
01/07/2015	Switzerland	Klosters-Serneus/ GR	ROLLADEN SCHNEIDER - LS8 - 18	Glider accident in Klosters-Serneus/ GR.
03/07/2015	Austria	Seiten-stetten, NÖ	PILATUS - B4 - PC11	The sailplane hit the ground after an aerobatic manoeuvre (ARF 2015-008).
13/07/2015	France	Eygliers	PIPISTREL	Loss of control in flight, the Sailplane collided with the ground.
02/08/2015	France	Saint-André	SCHEMPP HIRTH - VENTUS C	Collision with the mountain side. The glider wreckage has been found at 2700m of altitude.
03/08/2015	Croatia	Donji Lapac., area Kruge		Glider found crashed - POB 1, 1 fatal injury.
06/08/2015	Germany	Füssen	ROLLADEN SCHNEIDER - LS8	The Glider lost control and crashed in a forested area
06/08/2015	Romania	MUCHIA CHEII, Masivul Postavarul	OTHER	Aircraft crashed in a mountain area. Wreckage found several months after the accident flight.

Local date	State/area of occurrence	Location	Aeroplane	Headline
11/08/2015	Poland	ATZ EPPL	PZL BIELSKO - SZD50 - 2	Glider collided with a winch cable and crashed.
11/08/2015	France	Embrun	ROLLADEN SCHNEIDER - LS1	Glider collided with trees and crashed to the mountain.
12/08/2015	Italy	Col FERRET	SCHEMPP HIRTH	Motor glider crashed against a mountain slope.
20/08/2015	Germany	Purkshof	GLASER DIRKS - DG100	Glider disconnected the rope during towing and crashed on the runway.
23/08/2015	Spain	1NM to Sevilla airport (LEZL)	PIPISTREL	Pilot incapacitation in flight - Passenger took the controls - Aircraft crashed and caught fire.
24/09/2015	Norway	Hatten mountain, Lesja municipality	SCHLEICHER - ASW24	Aircraft crashed. The pilot bailed out the aircraft before the crash at low altitude and was killed when hit the ground.
26/09/2015	Denmark	5 km øst for EKRS: Ringsted	SCHLEICHER - ASW24	From level flight the aircraft suddenly pitched nose down and hit the ground in a steep nose down attitude. The pilot died and the glider was destroyed.
03/10/2015	Poland	Miedzy-brodzie Zywieckie	PZL BIELSKO - SZD48 - 3	Glider entered spin after a long flight and crashed.
13/12/2015	Germany	Koblenz-Winningen	OTHER	TMG collided with a communication tower during a flight in fog.
24/12/2015	Namibia	Stryfontein Farm	SCHEMPP HIRTH - VENTUS CM	Powered Glider crashed, no details available.
03/01/2016	Germany	Near Kamp Lintfort Airfield (EDLC)	DIAMOND - HK36 - R	Aircraft crashed during a go-around - 1 POB 1 fatality.
26/03/2016	France	Seillans	OTHER - Generic	Pilot incapacitated due to a medical condition - Loss of Control, Collision with Trees and Terrain.
03/04/2016	Austria	3,3 kmNorth from LOGL - Lanzen-Turnau	SPORTINE AVIACIJA - LAK19	Glider entered spin and crashed into terrain. 1 POB - 1 fatality.
03/04/2016	Austria	Kötschach Mauthen	GLASER DIRKS - DG400	Glider crashed into a mountain - 1 POB, 1 fatality.
16/04/2016	Poland	EPST	PZL BIELSKO - SZD9	Glider crashed into the ground after winch cable was released. 1 POB 1 fatality.
20/04/2016	Slovakia	Lysá Polana	SCHLEICHER - ASW27 - 18E	Competition flight - loss of height below safe altitude - abrupt manoeuvre - The aircraft stalled and crashed with a nose down attitude. 1 POB 1 fatality.
03/05/2016	Germany	Bautzen	PIK - PIK20E - NO SERIES EXISTS	Crash on Approach during glider competition.

Local date	State/area of occurrence	Location	Aeroplane	Headline
04/05/2016	Slovenia	Near Airport LJSG	GLASER DIRKS - DG800	Glider accident. Suspected pilot incapacitation. 1 POB 1 fatality.
21/05/2016	Switzerland	Montricher LSTR	GLASER DIRKS - DG400	Glider collides with trees and crashes. 1 POB 1 fatality.
29/05/2016	Germany	Rhede/ Emsland	LET - L23	Glider crashed into a field under unknown circumstances. 2 POB 1 fatality.
19/06/2016	Germany	Bramsche	SCHEMPP HIRTH	Loss of control during approach causing the aircraft to enter spin. 1 POB 1 fatality.
22/06/2016	France	Authon	SCHEMPP HIRTH	Loss of control followed by collision with terrain - during training flight en route.
06/07/2016	Switzerland	Lenk/BE	GLASER DIRKS - DG800	Glider collides with elevated terrain. 1 POB 1 fatality.
21/07/2016	United Kingdom	Bradley	SCHLEICHER - ASW27	Loss of control in-flight, leading to ground impact. 1 POB 1 fatality.
09/08/2016	Germany	Lüsse	SCHLEICHER - ASW27	Glider fell to the ground during winch launch take-off. 1 POB 1 fatality.
27/08/2016	France	Sauto	SPORTINE AVIACIJA - LAK17 - A	Collision with a cable/wire followed by crash. 1 POB 1 fatality.
10/09/2016	Germany	Großrück-erswalde	SCHLEICHER - ASK21	Two aircraft -glider and an ultralight collided close to the threshold. Pilot of the ultralight died.
14/09/2016	Switzerland	L'Isle/VD	BINDER	Glider lost control entered a vertical dive and crashed. 2 POB 2 fatalities
04/12/2016	United Kingdom	over Lubenham	CESSNA - 150 - L	Mid-air collision powered ACFT and glider; Glider crashed killing the pilot.
04/12/2016	United Kingdom	Brentor	SCHLEICHER - ASW24	Glider winch launch failed. Pilot was not able to land safely due to downdraft. 1 POB 1 fatality.
19/03/2017	France	Le Vernet	GLASER DIRKS - DG1000 - M	Collision with trees and ground. 2 POB 1 fatality 1 serious injury.
29/03/2017	France	LFLE - Chambéry / Challes-les-Eaux	SPORTINE AVIACIJA - LAK17 - A	Glider crash during winch launch take-off. 1 POB 1 fatality.
08/04/2017	United Kingdom	Currock Hill airfield	PZL BIELSKO - SZD55 - 1	Glider elevator not connected - glider crashed on aero tow. 1 POB 1 fatality.
08/04/2017	Germany	Eschbach	SCHLEICHER - ASW24 - E	Glider Crashed into Industrial Area. 1 POB 1 fatality.
12/04/2017	France	Valdeblore	SCHLEICHER - ASW22	Glider lost control - rolled onto its side and crashed into the ground. 1 POB 1fatality.
03/05/2017	Poland	EPJL	PZL BIELSKO - SZD30	Glider made a steep climb then rolled and crashed during a winch launch. 1 POB 1 fatality.

Local date	State/area of occurrence	Location	Aeroplane	Headline
06/05/2017	Germany	Mannheim	SPORTINE AVIACIJA - LAK17	Glider spin shortly after release from winch-launch followed by crash.
14/05/2017	France	Near to AD Auch	SCHEMPP HIRTH - CIRRUS	The glider collides with the ground shortly after release.
20/05/2017	Hungary	Nyíregyháza	PZL BIELSKO - SZD30	Glider crash for unknown reasons.
10/06/2017	Italy	Riva Valdobbia (VC)	GLASFLUGEL - MOSQUITO	Glider collided the terrain below mountain tip.
11/06/2017	Italy	Novi Ligure	OTHER	Glider lost wing during aero tow and crashed in city centre
15/06/2017	Austria	near Karlhöhe	GLASER DIRKS - DG600	Glider lost control and crashed in a mountainous area.
16/06/2017	Hungary	LHTL	SCHEIBE - SF25 - C	Motorized sailplane lost control and crashed during training exercise. 2 POB 2 fatalities.
18/06/2017	Germany	Purkshof	GROB - G102 - ASTIR CS	Wing tip of the Glider hit ground during winch launch causing it to overturn. 1 POB 1 fatality.
24/06/2017	Germany	Bartholomä-Amalienhof	GROB - G103 - TWIN ASTIR	Glider lost control while searching for lift and fell to the ground. 1 POB 1 fatality.
13/07/2017	United Kingdom	Near Brimslade Farm	DIAMOND - HK36 - TC	Aircraft crashed into a field due to unknown circumstances. 2 POB 2 fatalities.
13/07/2017	Hungary	Pirtó	SCHLEICHER - ASW27 - 18E	Glider crashed due to loss of control. 1 POB. 1 fatal injury.
14/07/2017	France	Val des Prés	SCHEMPP HIRTH - VENTUS C	Glider collided with elevated terrain due to unknown circumstances. 1 POB 1 fatality.
17/07/2017	France	LFOV (LVA): Laval Entrammes	CENTRAIR - 101 - A	Glider impacted the ground during winch launch take-off
04/08/2017	Germany	Rädicke	SCHLEICHER - ASW24 - E	Glider was found crashed on a field. Loss of control suspected. 1 POB 1 fatality.
13/08/2017	Switzerland	Villavolar	GLASER DIRKS - DG800B	The glider crashed onto a steep pasture and was destroyed upon impact.
27/08/2017	Croatia	Sinj - Kamešnica	GROB - G103 - TWIN ASTIR	Sailplane crashed below a mountain ridge. 2 POB. 1 Fatality and 1 Seriously injured.
30/08/2017	Poland	EPBC Warszawa Babice / ATZ EPBC	PZL BIELSKO - SZD50 - 3	Glider accident (crash) – spin after the safety latch of the winch cable broke while winch launching.
10/09/2017	Germany	Hockenheim	ROLLADEN SCHNEIDER - LS8	Glider stalled during winch launching. 1 POB 1 fatality.
14/10/2017	Switzerland	Davos/GR	ROLLADEN SCHNEIDER - LS8 - 18	Glider crashed in ca 2500 meter altitude in mountainous area. Circumstances unknown. 1 POB 1 fatality.

1.4 Aerodromes and Ground Handling

2007-01-25	France	AD Pau (64)	FOKKER - F27 - 100	Loss of control during take-off, collision with a vehicle.
2010-07-25	Spain	Aeródromo Casarrubios del Mont	OTHER	Gyroplane collided with person during taxi
2012-05-05	France	AD Buno Bonnevaux (91)	PIPER - PA25 - 235, SLINGSBY - T31	Mid-air collision between a glider and an aeroplane above runway
2012-11-11	Italy	Roma Fiumicino Airport	AIRBUS - A320	Loading crew caught between loader and baggage door
2012-12-10	Cyprus	Larnaca	CESSNA - 750 - NO SERIES EXISTS	A service vehicle struck the right wingtip, vehicle driver trapped
2014-04-20	Finland	2 km from Jämijärvi airfield EFJM, Satakunta	OTHER	During climb, right wing broke due to a fatigue failure - aircraft entered a spin, crashed and caught fire - 11POB - 8OB Fatalities
2015-12-24	Spain	Ronda	SOCATA - TB9	Aircraft crashed and consumed by post crash fire, incorrect fuel used

1.5 ATM/ ANS

02/08/2012	Spain	Santiago Airport (LEST)	CESSNA - 500	Unstabilized approach: Aircraft crashed on approach in heavy fog condition.
30/09/2012	Austria	Ellbögen, Tirol	CESSNA - 414	Aircraft crashed in wooded terrain in IMC weather conditions. Aircraft not airworthy and overloaded -
17/07/2015	Slovakia	Hornád canyon - Slovenský Raj	AGUSTA - A109 - K2	Helicopter crashed on a river bank after strike with power cables during en-route EMS mission
31/07/2015	Italy	Pizzo Zocca di val Masino	AEROSPATIALE - AS350 - B3	Helicopter ontrolled flight into mountain peak obscured by clouds
08/09/2016	Austria	Carinthia	ROBINSON - R66	Helicopter crash in a mountainous area
24/01/2017	Italy	Campo Felice (AQ)	AGUSTA - AW139	Helicopter crashed into a mountain slope during a medical emergency flight.

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