EASA
European Union Aviation Safety Agency

EUROPEAN PLAN FOR AVIATION SAFETY (EPAS)

VOLUME III
Safety Risk Portfolios
2023 Edition

European Union Aviation Safety Agency

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1. Introduction: the basis of the EPAS safety mitigation

What is this volume about?

Volume III of the EPAS aims to present how aviation safety risks in Europe are analysed and the outcome of these analyses (i.e. where the risks are), with the purpose of providing readers with more insight on where the actions in the EPAS come from.

You can use the volume to:

- understand more about the accident outcomes and safety issues that are the focus of the EPAS;
- use the information on the safety issues to inform decision-making in your own organisation.

The European Safety Risk Management (SRM) process

The main safety risks and corresponding mitigating actions feeding the EPAS are developed through the European SRM process. This comprises a set of processes that aim to identify the safety issues[1] and their mitigations. It involves analysis of data from different sources and collaboration with safety partners from national aviation authorities and the industry (through the Collaborative Analysis Groups (CAGs) and the Network of aviation safety Analysts (NoAs)[2].

The SRM process follows five specific steps:

Figure 1-1: The European SRM process

1 Safety issues are safety deficiencies related to one or more hazards. They are the actual manifestation of a hazard or a combination of several hazards in a specific context. They can be assessed in terms of risk and practically managed (mitigated). The level of granularity of a safety issue should not be too detailed, in that it would then be controlled by selective and reactive operational mitigating controls, such as airworthiness directives (ADs) or safety directives (SDs). It should also not be too general, which would render its mitigation unfeasible in an acceptable timeframe.

2 For easy reference, the 'network of aviation safety analysts', as referred to in Regulation (EU) No 376/2014 of the European Parliament and of the Council, is abbreviated as 'NoAs'.

Identification of safety issues: The identification of safety issues is the first step in the SRM process, and it is performed through the analysis of occurrence data and other safety-related information and supporting information by the CAGs. 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 formally included within the relevant safety risk portfolio or be subject to other actions. Advice is taken from the NoAs and the 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 technical safety assessment. These assessments are prioritised within the portfolio. The assessment process is led by the Agency and is supported by the NoAs and the CAGs. In addition, group members are encouraged to participate in the assessment itself. This collaborative approach with the Agency's safety partners is critical to achieving the best possible results. Together, this forms the Safety Issue Assessment (SIA), which provides potential mitigating actions for the EPAS.

Definition and programming of safety actions: This includes an impact assessment through the best intervention strategy (BIS) document, defining possible mitigation actions, assessing the implications and benefits of each possible action, and making recommendations on the best mitigation action(s) to be implemented in the EPAS. Using the combined SIA/BIS, formal EPAS action proposals are then submitted to the Agency Advisory Bodies (ABs). 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 (MB). Actions that are of low cost or require more rapid intervention are often fast-tracked and appear in the next available update of the EPAS. In some cases, more immediate safety actions are needed that may be completed before the next EPAS would be published. Naturally, these are not included within the EPAS. Such actions could include the publication of a safety information bulletin (SIB) or take the form of immediate safety promotion activities.

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 different types of actions within the EPAS, e.g. research, rulemaking, Member State tasks, and safety promotion.

Safety performance measurement: The final stage in the process is then the measurement of safety performance. This serves to monitor:

(1) specific changes that have resulted from the implementation of safety actions; and

(2) the systemic changes that may have occurred in the aviation system and may require additional actions.

The measurement of the performance is done via a safety performance framework that monitors:

(1) transversally the various domains while looking at the key risk areas at domain level; and

(2) the specific safety issues.

The Annual Safety Review (ASR) 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.

Introducing the Safety Risk Portfolios

The EPAS Volume III provides the EASA Safety Risk Portfolios. In their most simplified versions, the Safety Risk Portfolios are a list of safety issues that need to be mitigated at European level.

Safety Risk Portfolios form an essential component of the European SRM process. In developing the portfolios, safety information is gathered and analysed from sources such as occurrence data, expert judgement, and safety studies. Our safety partners are essential to gathering this safety information.

Safety issues

Safety issues are identified through the Agency's analysis of aviation occurrence data and other safety-related information (such as hazards), or submitted as a candidate safety issue through the CAGs, NoAs, EASA's website or internal EASA stakeholders. Safety issues identified through aviation data collected by the Agency are published in the EASA ASR in the form of a data portfolio. The Safety Risk Portfolio is an advanced and processed form of the data portfolio that has been augmented with additional layers of qualitative analysis and subject-matter expertise from the CAGs and the NoAs.

Examples of safety issues are 'increased presence of wildlife at aerodromes' or 'ACAS RA not followed'. Beyond the name/label of the safety issues, a short description is provided so that the scope of a safety issue is widely understood.

The safety issues and Safety Risk Portfolios are grouped by domain as each domain has its particularities and requires specific expertise. The following domains[3] are part of the SRM process:

- Systemic and conjunctural (New)
- Human Factors / Human Performance
- Commercial Air Transport – Aeroplanes
- Rotorcraft
- Non-Commercial Operations – Small Aeroplanes
- Airworthiness (under development)
- Air Traffic Management / Air Navigation Services (ATM/ANS)
- Aerodromes and Groundhandling

Remark: For more information on the data portfolios mentioned above, please refer to the latest version of the EASA ASR, which can be accessed through this link. It is important to note that due to additional layers of qualitative assessment, the safety issues presented in the data portfolios may evolve in their scope. Thus, there might be slight differences in how the safety issues are presented in the data portfolio and Safety Risk Portfolio.

Although the analysis and portfolios are organised per domain, some safety issues are relevant to more than one domain. These safety issues have to be analysed from a multi-domain perspective. Within the Agency, we ensure that such issues are assessed in a cross-domain manner with one domain taking the lead. Thus, while the safety issue may appear in only one safety risk portfolio, all relevant domains participate in the assessment of the safety issue to ensure the development of a holistic solution. In addition to such efforts, EASA coordinates a multi-domain perspective for such safety issues through the Safety in Aviation Forum for Europe, which is also known as SAFE 360°.

Introducing the key risk areas

Key risk areas are the determination of the most likely type of accident that an occurrence could have escalated to. They are another core concept in the European SRM process along with safety issues. The key risk areas provide insights to the most common potential accident outcome and the immediate precursors that may lead to the accident outcome. The set of key risk areas (COMMISSION DELEGATED REGULATION (EU) 2020/2034) provides a common taxonomy for the possible accident outcomes, based on which the safety risk management is structured. Prioritisation applies to the safety issues being the safety deficiencies related to one or more hazards. They are the actual manifestation of a hazard or a combination of several hazards in a specific context. In prioritising safety issues, key risk areas are considered when determining the worst likely accident outcome the safety issue may have escalated to, as part of the residual risk classification (refer to the description of 'prioritisation').

3 A domain is a container that is used to consistently and coherently group safety issues to manage them. It can be led by operational, organisational, consensual or conjunctural considerations.

Each safety issue is therefore associated with one, or most of the time, several key risk areas. For example, the safety issue 'Entry of aircraft performance data' may have as an outcome (i.e. key risk area) 'excursion' or 'aircraft upset'.

The 10 key risk areas are listed below, using the definitions as per the Delegated Act for the European risk classification scheme[4]:

Airborne collision: a collision between aircraft while both aircraft are airborne; or between aircraft and other airborne objects (excluding birds and wildlife).

Aircraft upset: an undesired aircraft state characterised by unintentional divergences from parameters normally experienced during operations, which might ultimately lead to an uncontrolled impact with terrain.

Collision on runway: a collision between an aircraft and another object (other aircraft, vehicles, etc.) or person that occurs on a runway of an aerodrome or other predesignated landing area. This does not include collisions with birds or wildlife.

Excursion: an occurrence when an aircraft leaves the runway or movement area of an aerodrome or landing surface of any other predesignated landing area, without getting airborne. This includes high-impact vertical landings for rotorcraft/VTOL and balloons/airships.

Fire, smoke and pressurisation: an occurrence involving cases of fire, smoke, fumes or pressurisation situations that may become incompatible with human life. This includes occurrences involving fire, smoke or fumes affecting any part of an aircraft, in flight or on the ground, which is not the result of impact or malicious acts.

Ground damage: damage to aircraft induced by operation of aircraft on ground on any other ground area than a runway or predesignated landing area, as well as damage during maintenance.

Obstacle collision in flight: collision between an airborne aircraft and obstacles raising from the surface of the earth. Obstacles include such things as tall buildings, trees, power cables, telegraph wires and antennae as well as tethered objects.

Terrain collision: an occurrence where an airborne aircraft collides with terrain, without indication that the flight crew was unable to control the aircraft. This includes instances when the flight crew is affected by visual illusions or degraded visual environment.

Other injuries: an occurrence where fatal or non-fatal injuries have been inflicted, which cannot be attributed to any other key risk area.

Security: an act of unlawful interference against civil aviation. This includes all incidents and breaches related to surveillance and protection, access control, screening, implementation of security controls and any other acts intended to cause malicious or wanton destruction of aircraft and property, endangering or resulting in unlawful interference with civil aviation and its facilities. It includes both physical and cybersecurity events.

Links between safety issues and key risk areas they contribute to are depicted in Appendix A to this Volume.

4 Commission Delegated Regulation (EU) 2020/2034 of 6 October 2020 supplementing Regulation (EU) No 376/2014 of the European Parliament and of the Council as regards the common European risk classification scheme (OJ L 416, 11.12.2020, p. 1).

Safety issues affected by climate change

Managing the impact of climate change on aviation safety is a new strategic goal for the Agency (please, refer to Volume I of the EPAS). Climate change is likely to affect the frequency and the intensity of hazardous weather phenomena, but also where and at what time of the year such phenomena tend to occur.

Examples of weather hazards are severe airborne icing, severe turbulence, low-level windshear, hail encounters, lightning strikes, etc. Although the effects of climate change on hazardous weather phenomena are rather long-term, they should be considered to ensure that safety risk assessments and risk mitigation measures are sustainable.

The Agency is currently gaining more knowledge on the effects of climate change, with the intent to inform safety issue assessments. To that end, this topic has been part of the work programme of the Agency's Scientific Committee[5] since it was launched in 2022, and it is on the agenda of the European_Academia @EASA conference for 2023[6]. In addition, the Agency has been exchanging information, for example, with national initiatives, the World Meteorological Organization (WMO), etc., and has been looking for solutions to help establish a network with key stakeholders in Europe.

In the following section, provided a weather hazard contributes to a safety issue and there are indications that climate change is likely to influence trends related to a particular weather hazard, the affected safety issue is tagged '(CC effect)'.

Safety issue prioritisation: Safety Issue Priority Index (SIPI)

Safety issue prioritisation is a structured approach allowing safety issues to be risk-classified in a consistent manner, regardless of the operational domains they belong to, and regardless of the source of the safety intelligence (safety data, experts' inputs, etc.) through which they have been identified. Some safety issues are identified via occurrence data, others through accident and serious incident investigations, and still more through expert judgement and safety studies.

The approach creates an index that is built upon a residual risk evaluation of the safety issues. 'Residual risk evaluation' means that we consider the worst likely accident outcomes and the effectiveness of their implemented systemic barriers. In other words, a safety issue with the same potential outcome as another one but with additional effective mitigations in place will have a lower 'residual risk'.

Other elements that are factored in the prioritisation index are:

- whether the safety issue has already resulted in fatalities, or contributed to a high-energy accident outcome; or
- whether the safety issue is novel, i.e. associated conditions are not fully understood or known, thus the risk may potentially be elevated (e.g. associated with newly introduced technology, unusual operations, innovative design); or
- whether the operational exposure to the safety issue is important (e.g. safety issue is affecting all flights of the domain, or safety issue may only be of concern during training flights, reducing the operational exposure).

Any positive replies to the above questions will imply a higher-priority index.

The resulting index enables a prioritisation of the safety issues for further assessment (refer to SRM process step 2) and support the Agency and its safety partners in deciding what safety assessments are to be launched in

5 Refer to EASA's Scientific Committee (SciComm) | EASA (europa.eu)

6 Refer to European_Academia @EASA conference 2023 - Physical | EASA (europa.eu)

priority. The index is reviewed on a regular basis for all safety issues to reflect changes in the elements that were factored in. It is an iterative and continual approach towards prioritisation of safety issues.

As a practical way to support the prioritisation per domain, the safety issues are then split into two categories, an 'elevated' one and a 'normal-to-low' one. The eventual intention is to focus the collaborative resources first on safety issues within the elevated category. Indeed, based on the priority index construction, the 'elevated' category will include safety issues such as novel ones and/or safety issues for which undesired outcomes have already realised and where the effectiveness of the current systemic barriers is not satisfactory and for those where a significant part of the flights are affected.

Higher-risk safety issues in the EU aviation system

As the SIPI method is applied in a systemic and consistent manner for each of the safety issues from all domains, it also provides a cross-domain perspective of the higher-risk safety issues in the EU aviation system, irrespective of the SRM step they are currently in. Currently, there are 20 higher-risk cross-domain safety issues listed in alphabetical order:

ID	Domain	Title	Category/status
SI-2014	ATM/ANS	Airborne Collision with Unmanned Aircraft System (UAS)	ASSESS
SI-4010	NCO SA	Airborne Separation	MITIGATE/IMPLEMENT
SI-0007	CAT A	Approach path management	MITIGATE/DEFINE
SI-1010	ADRM&GH	Coordination and control of turnarounds	ASSESS
SI-0009	CAT A	Crew Resource Management (CRM)	MONITOR
SI-5017	SYS&CONJ	Cyber attacks	MONITOR
SI-3016	HF/HP	Decision-making in complex systems	ASSESS
SI-0015	CAT A	Entry of Aircraft Performance Data	MITIGATE/DEFINE
SI-0039	CAT A	Fatigue (FTL)	MONITOR
SI-3005	HP/HF	Fatigue and quality sleep	MITIGATE/DEFINE
SI-8028	RTR	Inadequate airborne separation under VFR operation	MITIGATE/IMPLEMENT
SI-8031	RTR	Inadequate obstacle clearance during low-altitude operation, take-off and landing	ASSESS
SI-0010	CAT A	Inappropriate Flight Control Inputs	ASSESS
SI-5515	SYS&CONJ	Increased risk of airspace infringements by military UAS, aircraft, or debris spilling over from conflict zones	MONITOR
SI-3012	HF/HP	Lack of industry-wide staff support programmes	ASSESS
SI-2032	ATM/ANS	Mass Diversion	ASSESS
SI-4007/ SI-8017	NCO SA/ RTR	Poor pre-flight planning and preparation	ASSESS
SI-5019	SYS&CONJ	Reduced Available Financial Resources	MONITOR
SI-3011	HF/HP	Training effectiveness and competence	MITIGATE/DEFINE
SI-2006	ATM/ANS	Undetected occupied runway	ASSESS

Table 1: 20 higher-risk cross-domain safety issues listed in alphabetical order

Process to handle safety issues in the SRM

Each safety issue is assigned an identification number (SI-DNNN) to facilitate tracking within the SRM process, as well as its relevance to different aviation domains. The safety issues are then categorised in the Safety Risk Portfolios as follows:

Assess - Elevated priority index

Facilitates Step 2: Assessment of safety issue

- Safety issues for which further assessment is or will be launched in higher priority to propose mitigation actions as needed.

Assess - Normal-to-low priority index

Facilitates Step 2: Assessment of safety issue

- Safety issues for which further assessment should be launched, when resources allow, to propose mitigation actions as needed.

Mitigate - define

Facilitates Step 3: Definition and programming of safety actions

- Safety issues with proposed mitigation actions under validation.

Mitigate - implement

Facilitates Step 4: Implementation and follow-up of safety actions

- Safety issues with validated mitigation actions ready for implementation, e.g. in the EPAS

Monitor

Facilitates Step 5: Safety performance measurement

- Monitoring the rate of occurrences linked to a safety issue or, more specifically, the effectiveness of the mitigations implemented for a given safety issue

Figure 1-2: Categories of safety issues

The mitigating action for some safety issues in the 'mitigate' or 'monitor' could be a safety promotion item; more information is available on the EASA Together4Safety Community Websites.

Main changes since the last edition

- 14 new safety issues added.
- An airworthiness chapter added as a placeholder.
- Cross-domain higher-risk safety issues listed.
- Safety issues affected by climate change tagged.
- COVID-19 safety risk portfolio transposed into new 'Systemic and conjunctural' safety risk portfolio.
- Links between safety issues and key risk areas they contribute to are now depicted.
- New SRPs and new safety issues marked '(New)'. Safety issues for which definitions were updated are marked '(Amended)'.

2. Systemic and conjunctural[7] (SYS&CONJ) (New)

Since 2020, the world has been exposed to the COVID-19 pandemic. It caused an extreme reduction in air operations, which began in March 2020. There was no real air traffic recovery over the summer of 2020.

With vaccines becoming available and countries lifting some of the travel restrictions, air traffic increased slightly over the summer of 2021 — however, still well below the 2019 air traffic levels. In 2022, air traffic recovered more rapidly — however, still not exceeding the 2019 air traffic levels. The COVID-19 pandemic had a negative impact on the aviation system safety landscape and introduced new risks.

In 2020, in collaboration with its safety partners, The Agency took the initiative to apply the SRM process to identify and manage safety risks associated with the COVID-19 pandemic.

On 24 February 2022, the Russian Federation invaded Ukraine. This posed new safety risks on top of the safety issues stemming from the COVID-19 pandemic and those existing before these two crises, meaning those captured in the standard domain portfolios. EASA, in close cooperation with its safety partners, initiated another exercise to identify the safety issues stemming from this war crisis.

The Agency published the following reviews:

in June 2020 (updated in April 2021): Review of Aviation Safety Issues Arising from the COVID-19 Pandemic, which, in addition to the safety issues, also listed the existing and available mitigation measures, where applicable.

In May 2022: Review of Aviation Safety Issues Arising from the war in Ukraine, including 20 safety issues.

To manage the crisis safety issues at a systemic level, the new 'Systemic and conjunctural safety risk portfolio' is created with this edition. It captures current safety issues stemming from both crises, introducing 13 new safety issues, as presented in this chapter.

It is important to note that some safety issues, such as 'Reduced available financial resources', cannot be addressed by the Agency or the EASA Member States but are important for organisations to include in their safety management systems during this period. In addition, not all safety issues may be applicable in the future due to the fluidity of the circumstances.

The safety issues in the portfolio are sorted into the 'Assess – Elevated priority index', 'Assess – Normal-to-low priority index', 'Mitigate – define', 'Mitigate – implement', and 'Monitor' categories, which provide a snapshot of their status within the European SRM process by the priority. The safety issue prioritisation method is described in the Introduction of this Volume. To understand each safety issue better, please click on the safety issue in the list to access their description.

7 A critical set of circumstances; a crisis.

List 2-1: Systemic and conjunctural safety issues per category & priority

Assess - Elevated priority index

Facilitates Step 2: Assessment of safety issue

- NIL

Assess - Normal-to-low priority index

Facilitates Step 2: Assessment of safety issue

- NIL

Mitigate - define

Facilitates Step 3: Definition and programming of safety actions

- NIL

Mitigate - implement

Facilitates Step 4: Implementation and follow-up of safety actions

- Reduced adherence to procedures (SI-5014) (Amended)
- Impact of the pandemic on the ground handling industry – human factors (SI-5022)

Monitor

Facilitates Step 5: Safety performance measurement

- Increased risk of airspace infringements by military drones, aircraft, or debris spilling over from conflict zones (SI-5515) (New)
- Cyber attacks (SI-5017) (Amended)
- Reduced Available Financial Resources (SI-5019)
- Shortage of operational and technical staff (SI-5018) (Amended)
- Increased Presence of Wildlife on Aerodromes (SI-5010)
- Non-standard and unplanned military activities outside the conflict zones (SI-5508) (New)
- Decreased Wellbeing of Aviation Professionals during Shutdown (SI-5006/5007)
- Separation with unidentified aircraft (SI-5514) (New)
- Aviation personnel fatigue (SI-5002)
- Skills and knowledge degradation due to lack of recent practice (SI-5003) (Amended)
- Flight route congestion (hotspots) (SI-5506) (New)
- Continuing airworthiness related issues due to sanctions (SI-5502) (New)
- Leased aircraft captured by the Russian Federation (SI-5503) (New)
- Airline systems vulnerability leading to disruptions due to cyber attacks (SI-5017A) (New)
- A long-lasting crisis may lead to further financial strain on organizations after the COVID-19 pandemic situation (SI-5524) (New)
- Reduced focus on, or prioritisation of safety (SI-5009)
- Shut-down, restart and gradual recovery of a Complex System is unpredictable (SI-5005)
- Reduced oversight by competent authorities (SI-5001)
- Prevention and treatment of unruly passengers in the context of COVID-19 (SI-5021) (Amended)
- Spare parts shortages (other than aircraft) (SI-5504) (New)
- Aircraft vulnerability leading to flight safety degradation due to cyber attacks (SI-5017B) (New)
- Management of Air Traffic Evolution during Recovery Phase (SI-5030) (New)
- Reduction in training effectiveness due to remote training (SI-5023) (New)
- Missing suppliers and difficulty liaising with suppliers (SI-5020)

- Crew fatigue due to unavailability of rest facilities at destination or extended duty period (SI-5013)
- GPS signal manipulation leading to navigation or surveillance degradation (SI-5501A) (New)
- The scale of aircraft storage and subsequent destorage may lead to technical failures (SI-5011)

Aircraft vulnerability leading to flight safety degradation due to cyberattacks (SI-5017B) (New)

Aircraft systems may be vulnerable to hacking, or ground support systems leading to faulty maintenance, airline systems causing major disruptions to the air traffic system.

Airline systems' vulnerability leading to disruptions due to cyber attacks (SI-5017A) (New)

Airline systems may be vulnerable to hacking, causing major disruptions to the air traffic system.

A long-lasting crisis may lead to a further financial strain on organisations after the COVID-19 pandemic situation (SI-5524) (New)

In the scenario where the crisis lasts for a long time, this could create a further and stronger financial pressure on organisations due to reduced air traffic demand, distorted air traffic flows or new, necessary investments on security measures.

Aviation personnel fatigue (SI-5002)

With redundancy and furlough reducing the available number of personnel, those left working have often worked additional hours or had a more complex working day due to a greater variety of tasks being performed. Preparing for an increase in or return to more normal operations will require significant additional effort in comparison with actual normal operations. Organisations should pay close attention to fatigue reporting and actively support reporting of fatigue and other occurrences via a strong just culture.

Guidance on how to address this issue is available at: https://www.easa.europa.eu/community/topics/fatigue-management

Continued airworthiness related issues due to sanctions (SI-5502) (New)

Due to sanctions, aircraft manufacturers are unable to technically support their fleets in Russia, which will have an impact on the safety standards of the affected aircraft. This includes maintenance support, customer service, technical assistance, and parts. Type-certificate holders will not receive information from Russian air operators regarding failures, malfunctions, defects, or other occurrences which cause or might cause adverse effects on the continued airworthiness of aircraft type designs.

Crew fatigue due to unavailability of rest facilities at destination or extended duty period (SI-5013)

At certain destinations, crews are required to stay on board the aircraft and neither hotels nor restaurants are available. Where crews can leave the airport, extended duty periods may occur due to health checks and the need for physical separation making leaving/re-entering the airport a longer process. Operators that have remained active throughout the pandemic (such as cargo or HEMS) should pay particular attention to long-term fatigue issues.

Guidance on temporary FTL exemptions is available at:
https://www.easa.europa.eu/document-library/general-publications/flight-time-limitation-temporary-exemptions-under-article-711

Cyber attacks (SI-5017) (Amended)

Increase in cyberattacks, associated with the war in Ukraine.

Proposed actions to mitigate this safety issue:

- Perform security risk assessments
- Identify severe threats
- Raise staff and user awareness of cybercrimes
- Constantly train IT and security staff
- Protect sensitive data
- Use multi-factor authentication
- Ensure strong security policy
- Conduct regular unannounced audits
- Advise crew to avoid carrying substantial amounts of company data (laptops or removable storage devices)

Decreased well-being of aviation professionals during shutdown (SI-5006/5007)

The pandemic is a significant source of anxiety, stress, and uncertainty for almost everyone. During the shutdown, with people working from home or furloughed and therefore isolated from normal support, the personal well-being of professionals will suffer. For those working, this may lead to task distraction/interruption, workload/task saturation, instructions or requirements not followed. Regardless of whether personnel are working or not, are employed, furloughed or unemployed, we have a duty of care to provide support to aviation professionals' well-being.

As traffic levels increase, personnel will be returning to duty with a higher-than-normal psychological stress. Organisations and regulators need to understand the sources of aviation professionals' fear, increased stress, and distraction, which can potentially reduce staff performance and increase safety risks.

The Agency created a well-being resource hub to support aviation professionals throughout the pandemic and beyond.
https://www.easa.europa.eu/community/content/wellbeing

You can find specific information about personal well-being in the section 'Well-being for you'
https://www.easa.europa.eu/community/topics/wellbeing-you

Flight route congestion (hotspots) (SI-5506) (New)

The reduction of available airspace (due to military activity and airspace closure) creates a corresponding increase in traffic in the remaining available airspace. This may lead to flight route congestion or high traffic on certain routes, with consequences such as: increased ATCO / flight crew workload, more frequent turbulence and wake turbulence, phraseology issues, risk of injury to passengers and aircrew during avoidance manoeuvres, and increased risk of mid-air collision.

GPS signal manipulation leading to navigation or surveillance degradation (SI-5501A) (New)

Due to military electronic warfare system usage, GPS signals may be disturbed in countries adjacent to conflict zones, affecting the operation of aircraft en route and/or operating at aerodromes. GPS signal interference may be only temporary, and pilots should not only be aware of the risk but also ensure that procedures in case of GNSS signal loss are included in the flight planning. This safety issue is linked with SI-0034 Over-reliance on satellite navigation.

Guidance on how to address this issue is available at:
EASA SIB 2022-02: Global Navigation Satellite System Outage Leading to Navigation / Surveillance Degradation

Impact of the pandemic on the groundhandling industry — human factors (SI-5022)

Groundhandling organisations have lost staff and those left have managed a very varied workload with fewer daily aircraft movements. If traffic increases steeply, there will be a combination of staff who are no longer used to a busy airport environment and newly recruited staff. The poor employment conditions experienced by many in this aviation domain may have exacerbated the impact of the pandemic both personally and professionally.

Increased risk of airspace infringements by military UAS, aircraft, or debris spilling over from conflict zones (SI-5515) (New)

Airspace infringement by military unmanned aircraft systems (UAS), or aircraft spilling over from conflict zones into the controlled airspace without coordination/permission, debris of shot missiles, could lead to loss of separation. Presence of military UAS unexpectedly within civilian air traffic areas may disrupt normal operations. There is the potential for misuse of civilian UAS as obstacles, to attack critical sites or to disrupt normal air traffic flows.

Increased presence of wildlife on aerodromes (SI-5010)

The reduced traffic at aerodromes has increased the presence of wildlife habitation at aerodromes. This carries the risk not only of birds and insects nesting in stored aircraft and equipment, but also bird strikes to aircraft once airborne.

Guidance on how to address this issue is available at:
https://www.easa.europa.eu/community/topics/wildlife-hazard-management

EASA_SIB_2020-07R2 on Progressive Restart of Aerodrome Operations after Complete or Partial Closure addresses wildlife hazard management.

Leased aircraft captured by the Russian Federation (SI-5503) (New)

The breach by the Russian Federation of the Chicago Convention by capturing leased aircraft in Russia and allowing to operate them further. Due to sanctions, aircraft operators have no access to spare parts and to aircraft maintenance. In the short to longer term, the following issues may arise: cannibalisation of parts, non-compliance with the applicable airworthiness directives, and non-traceable aircraft maintenance records. This may lead to the operation of unairworthy aircraft.

Management of Air Traffic Evolution during Recovery Phase (SI-5030) (New)

The scale of the increase in air traffic levels has made and may make the evolution of air traffic difficult to predict, creating a mismatch in terms of ATM/ANS capacity. Member States' differing pace of recovery in terms of available capacity and air traffic demand may exacerbate the problem.

Missing suppliers and difficulty liaising with suppliers (SI-5020)

The lockdowns resulted in difficulties for organisations liaising with their suppliers. Further economic constraints may increase problems resulting in difficulties to maintain the supply chain, leading to a lack of spare parts, products, calibrated tooling, etc. A lack of any of these resources can interfere with the ability to complete a task.

Non-standard and unplanned military activities outside the conflict zones (SI-5508) (New)

This safety issue relates to non-standard military activities, such as increased activity of unmanned aircraft patrolling, or surveillance conducted outside conflict zones. The response to the Ukraine war may result in Member States experiencing an increase in unplanned military exercises, as well as movement of military aircraft

from certain airbases to others. Unexpected 'due regard' flights could also pose an increased risk for commercial air operations in certain areas. Traffic types that are unusual in certain areas (e.g. formation flights, in-flight refuelling of aircraft, etc.) may increase. Overall, this can lead to an increase in ATCO workload created by the need for increased coordination/communication. It will affect the airspace capacity and increase the risk of airborne collision of civil traffic with military manned and unmanned aircraft.

Prevention and treatment of unruly passenger incidents in the context of COVID-19 (SI-5021) (Amended)

A further increase in unruly or disruptive passenger cases should be expected, either prior to departure or in flight. Procedures to manage this, as well as related training, need to be developed.

Reduced adherence to procedures (SI-5014) (Amended)

During previous, low-activity periods, low workload levels may have created a sense of a less risky operating environment, causing staff to become complacent, not completely following procedures, and/or being less alert. In the context of increasing levels of operations, organisations should consider these aspects.

Reduced available financial resources (SI-5019)

A reduction in available financial resources may cause the loss of key personnel and corporate knowledge, increased pressure on personnel, and affect decision-making. Long-term investment plans may slip or be changed, with consequences long after traffic levels have begun to recover.

Reduced focus on, or prioritisation of safety (SI-5009)

There are multiple factors that mean that organisations may not be providing safety and safety management with the same level of attention and resources as normal. These include distractions and stress at a personal level, and economic pressures, loss of staff and the practical pressures of returning to service at an organisational level.

Guidance on how to address this problem is available at:
https://www.easa.europa.eu/community/topics/maintaining-safety-focus-during-covid-19-pandemic

Reduced oversight by competent authorities (SI-5001)

Competent authority staff are less available and on-site visits have thus far been difficult or impossible. This means that oversight is not in-depth and in many cases the time periods between checks have increased. In addition, occurrence data collection has reduced in proportion with traffic, making it harder to perform remote monitoring. Guidance has been provided to the Member State competent authorities on how to effectively mitigate against this risk.

Reduction in training effectiveness due to remote training (SI-5023) (New)

The necessary adaptations to the delivery of training to prevent the spread of COVID-19 may reduce the effectiveness of certain types of training. Examples include CRM training if it cannot be delivered on-site, or cabin crew training using safety equipment and performing cardiopulmonary resuscitation (CPR).

Separation with unidentified aircraft (SI-5514) (New)

This safety issue addresses the increased presence of unresponsive and/or unidentified traffic. As an example, between the Finnish and the Estonian territorial waters, there is a narrow corridor of neutral waters providing Russia with access to the Baltic Sea and Kaliningrad. Russian flights may or may not have a transponder on / flight

plan, they may or may not be in radio contact, and they use any level that suits their purpose. Such traffic conflicts with the Helsinki inbound–outbound civil traffic or is a completely new category of en-route traffic operating under normal ATS rules and regulations but within the limitations set for Russian operators concerning the Finnish and the Estonian airspace. The number of flights over neutral waters has drastically increased, increasing in turn the ATC workload and imposing an effect on the flight profiles of civil aircraft.

Shortage of operational and technical staff (SI-5018) (Amended)

The organisations' limited financial resources have caused a reduction in the number of staff they employ, and movement restrictions due to the pandemic have further hampered personnel in remaining in the workplace. Staff shortage at aerodromes, caused by difficulties in recruiting and retaining ground-handling staff and significantly exacerbated by the unexpectedly strong recovery of European airline operations may lead to an increase in occurrences where human error is a factor due to lower staff competence, high staff workload / time pressure causing unofficial adaptations to streamline tasks, increased time in security checks (for passengers and aircrew) causing delays and constraining pre-flight activities, and delays causing changes to planned operations. This safety issue also includes shortage of dispatchers, and staffing problems in air traffic services.

Guidance on how to address this safety issue is available at:
EASA SIB 2022-06 : Risks Emerging During Ramp-up of Aviation Activities

Shutdown, restart and gradual recovery of a complex system is unpredictable (SI-5005)

The aviation system is highly interconnected, sophisticated and merges people and technology. This means that the consequences of shutdown, restart and gradual recovery are not completely predictable. Thus, the aviation system resilience needs to be improved. Organisations will need to prepare good communications and decision-making strategies, using personnel expertise, data/ information, and good internal and external coordination.

Guidance on how to address this issue is available at:
https://www.easa.europa.eu/community/topics/resilience

Skills and knowledge degradation due to lack of recent practice (SI-5003) (Amended)

This safety issue concerns the degradation of skills and knowledge of aviation professionals across the different aviation domains due to the lack of recent practice largely attributed to the sharp decrease in traffic due to the COVID-19 pandemic and exacerbated by the war in Ukraine. Some aviation organisations may again resort to furloughing their staff due to less competitive flights (increased fuel prices in combination with longer routes). While this situation impacts on all aviation professionals, including those for whom aviation is a leisure activity (e.g. general aviation pilots), this safety issue primarily focuses on aviation professionals such as air traffic controllers (ATCOs), commercial flight crew, aerodrome operations staff, ground-handling staff, and maintenance engineers.

Guidance on how to address this issue is available at:
https://www.easa.europa.eu/community/topics/skills-and-knowledge-degradation

Spare parts shortages (other than aircraft) (SI-5504) (New)

The current crisis may lead to an increase in the prices of spare parts (other than aircraft, ATM/ANS equipment, aerodromes, ground handling, etc.) and shortages in the availability of electronic equipment, especially if components are manufactured in countries which are directly affected by the crisis or are geopolitically aligned with Russia, and this may have a negative effect on aviation safety.

The scale of aircraft storage and subsequent destorage may lead to technical failures (SI-5011)

An unprecedented number of aircraft have been parked/stored since the beginning of 2020. The maintenance practices and requirements due to prolonged parking are defined by the type certificate (TC) holder usually within the aircraft maintenance manual (AMM). The operators and/or Continuing Airworthiness Management Organisations (CAMOs), in close relation with the approved maintenance organisations (AMOs), are required to plan these maintenance tasks at intervals defined in the AMM. These requirements are essential to keep the aircraft and its engines/systems/components in a functional state and prevent any degradation so that when the aircraft is returned to service, no excessive failure rate is experienced. However, reduced manpower may mean that operators/AMOs may not have the capacity to carry out the required maintenance tasks.

Gradually, as travel restrictions are lifted and as operators prepare to resume passenger flights, operators will need the aircraft that have been parked/stored to be returned to service. Due to the high number of aircraft involved and the limited supporting resources available to perform the work, organisations and personnel are expected to experience difficulties and increased risks. Organisations' management systems play an essential role in identifying the hazards, developing control measures to mitigate the associated risks and thus in ensuring a safe return to service of all aircraft.

Guidance on how to address this issue is available at:
https://www.easa.europa.eu/community/topics/destorage-aircraft

And related SIBs:

EASA SIB 2020-14R1 Contamination of Air Data Systems During Aircraft Parking and / or Storage due to the COVID-19 Pandemic

EASA SIB 2020-18 Nickel-Cadmium Batteries - Risk of Capacity Reduction during Aircraft Parking and Storage

EASA SIB 2020-06 Use of DuPont Kathon FP 1.5 Biocide

EASA SIB 2020-05 on Aircraft Maintenance Programme under Part-ML

3. Human Factors / Human Performance – HF/HP

The Human Factors (HF) / Human Performance (HP) Safety Risk Portfolio developed in 2017 by the Agency, in conjunction with the HF Collaborative Analysis Group, has since been reviewed annually. Due to the broad nature of HF/HP safety issues, they contribute to most, if not all key risk areas.

The safety issues in the portfolio are sorted into the 'Assess – Elevated priority index', 'Assess - Normal-to-low priority index', 'Mitigate – define', 'Mitigate – implement', and 'Monitor' categories, which provide a snapshot of their status within the European SRM process by the priority. The safety issue prioritisation method is described in the Introduction of this Volume. To understand each safety issue better, please click on the safety issue in the list to access their description.

List 3-1: Human Factors / Human Performance safety issues per category & priority

Assess - Elevated priority index

Facilitates Step 2: Assessment of safety issue

- Decision-making in complex systems (SI-3016)
- Lack of industry-wide staff support programmes (SI-3012) (Amended)

Assess - Normal-to-low priority index

Facilitates Step 2: Assessment of safety issue

- Senior management competence and commitment to HF/HP principles (SI-3001) (Amended)
- Heavy workload and misaligned tasks (SI-3006) (Amended)
- Error-mitigation by design (maintenance and production) (SI-3017)
- Reduced attention and vigilance (SI-3015) (Amended)
- Impact of culture on human performance (SI-3002)
- Knowledge development and sharing (SI-3008)
- Degradation of resilient performance of an organisation and/or individual (SI-3009) (Amended)
- Inadequate HF activities/HF specialist involvement and the effect on safety, efficiency, effectiveness and project timeline (SI-3014) (Amended)
- Integration of HF/ HP principles into the organisations management (SI-3004)
- Limitations to root cause analysis (SI-3018) (Amended)
- Startle and surprise (SI-3010)

Mitigate - define

Facilitates Step 3: Definition and programming of safety actions

- Training effectiveness and competence (SI-3011)
- Fatigue and quality sleep (SI-3005)

Mitigate - implement

Facilitates Step 4: Implementation and follow-up of safety actions

- Human factors competence for regulatory staff (SI-3003)
- Design and use of procedures (SI-3007)

Monitor

Facilitates Step 5: Safety performance measurement

- Human factors of multiple remote towers (SI-3022)
- Alignment between OSD and equivalent processes at other authorities (SI-3023)

Alignment of OSD and equivalent processes at other certification authorities (SI-3023)

Both the EASA operational suitability data (OSD) and the FAA Flight Standardisation Board (FSB) processes aim to ensure that flight crew training appropriately takes aircraft designs into consideration. Misalignment of the two would potentially create training discrepancies. This safety issue has been categorised as 'monitor' because it is believed that it has been resolved through coordination between EASA and the FAA.

Decision-making in complex systems (SI-3016)

Decision-making in aviation-related activities can be complex, pressing and involve a high risk. This by definition means that assessing trade-offs and interdependencies or making the right decisions can be difficult. Structures and processes to support decision-making can be helpful; however, the complexity of the system means that it is difficult to create such structures and processes with the necessary level of detail.

Degradation of resilient performance of an organisation and/or individual (SI-3009) (Amended)

Organisational resilience is a key factor in successfully and safely managing operations, but there is scant regulatory guidance on how to apply the concept. Resilience comprises both a system's ability to withstand disturbance, challenges and change, and to recover and sustain operations following disturbance, challenges and change. The positive contribution to safety of every single staff member is the key component of an organisation's resilience.

Design and use of procedures (SI-3007)

Procedures are used throughout the aviation industry to describe the correct actions and sequence of actions to perform a task. Due to necessity, procedures are designed using assumptions about the circumstances in which they will be applied. While this frequently produces well-designed procedures, the complex nature of the aviation working environment means that not every circumstance can reasonably be accounted for. Regardless of whether the procedure has been designed well or badly, rapid changes in the aviation system can mean that a procedure becomes more difficult to use over time.

Error-mitigation by design (maintenance and production) (SI-3017)

Incorrect assembly in production or maintenance may lead to an unsafe condition for the aircraft. It is inappropriate to rely solely on warnings in maintenance instructions, markings and independent inspections to detect misassembly, when the hazard can be eliminated by careful design in most cases.

Fatigue and quality sleep (SI-3005)

Fatigue is repeatedly identified as one of the most serious challenges within the aviation industry. The signs of fatigue are subtle and will lower human performance in all the known areas of human limitations. Preventing fatigue is dependent on obtaining both a sufficient quantity and quality of sleep. SI 3005 strives to ensure that adequate prevention against effects of fatigue is provided in all aviation domains.

Heavy workload and misaligned tasks (SI-3006) (Amended)

Year 2022 propelled workload issue to the top of aviation discussions. It can be considered as consisting of two major components: physical workload and cognitive workload. High physical and mental workload situations often coincide, causing a significant degradation to cognitive capacity and consequently to one's ability to execute a task correctly. In addition, task elements not aligned to staff competence will create additional error-prone conditions.

HF of Multiple Remote Towers (SI-3022)

Remote tower operations are increasingly being used as a means of effectively and efficiently providing ATS at an aerodrome. Multiple remote tower operations are also now being introduced, and the human factors associated with this type of work needs thorough consideration.

Human factors competence for regulatory staff (SI-3003)

Competence is a set of observable and measurable behaviours that an individual is expected to demonstrate in relation to required task performance. It is important for regulatory staff to have specific human factors competence to be able to perform their duties. This also provides an added benefit of improving the conversation on safety and human factors between regulatory staff and people at different levels in industry.

Impact of culture on human performance (SI-3002)

Organisational culture is an important element in supporting human performance in the workplace. Culture depends on the historical context and the socio-technical environment and economic context in which we live. For example, with the 'economic survival' effect — or when the 'commercial benefit' dictates the running of the organisation too much, leading to: a lack of resources; stressful environment; no training policy; too much operational pressure and time pressure; too many subcontracting activities; insufficient maintenance or aerodrome or ATC equipment; and so on.

Inadequate HF activities/HF specialist involvement and the effect on safety, efficiency, effectiveness and project timeline (SI-3014) (Amended)

When a human factors (HFs) intervention is proposed, there are implicit questions including 'Will that make a safety enhancement difference?' and 'Can that be measured/qualified with respect to safety effectiveness and operational efficiency?'. Succinctly, what is the cost and safety impact of investments in HFs and HFs-related organisational interventions? Being able to evaluate the effect of HFs activities and knowing at which point in a process to involve HFs professionals is an important element of a successful project.

Integration of HF/ HP principles into the organisations management (SI-3004)

An organisation is made up of humans, procedures and processes, which work together, often in a hierarchical manner and interacting to achieve a common goal. As such, the organisation's management system cannot be fully effective unless it has integrated human factors considerations and human performance principles in a practical manner.

Knowledge development and sharing (SI-3008)

Knowledge sharing, particularly of tacit knowledge, is difficult to do well. This makes knowledge retention in situations of increased staff turnover very difficult. Knowledge development and sharing is about developing the right knowledge and making this knowledge available to the right people at the right time.

Lack of industry-wide staff support programmes (SI-3012) (Amended)

The EASA-led Task Force on Germanwings Flight 9525 identified a number of safety risks, including the need for pilot support programmes. However, humans throughout the aviation system need such support programmes. This has been highlighted in particular throughout and post-COVID-19 pandemic, where aviation professionals have worked under high pressure and often in isolating circumstances.

Limitations to root cause analysis (SI-3018) (Amended)

Investigations into incidents and hazard observations often result in poor or ineffective interventions because investigations pursue straightforward root causes of the issue. Shallow investigations often address symptoms of the event rather than the error-prone conditions, and consequently rarely prevent reoccurrence.

Reduced attention and vigilance (SI-3015) (Amended)

Maintaining appropriate levels of attention and vigilance supports situational awareness. It is important to ensure that the working environment, equipment and processes support the operator in performing the task, and do not introduce additional and unnecessary challenges to attention and vigilance required for safe operations.

Senior management competence and commitment to HF/HP principles (SI-3001) (Amended)

Operators, maintenance organisations, manufacturers, national aviation authorities, and other entities that contribute to continuing safety and efficiency strive to promote the process of positive organisational cultural change. Positive cultural evolution requires cooperation and shared values across all levels of management and workers. Corporate safety culture is particularly affected by the values and actions of senior management. Senior leaders need to understand and communicate the critical significance of human factors and human performance to all members of staff.

Startle and surprise (SI-3010)

Surprise and its consequent reaction, startle, is a significant impediment to managing safety-critical situations but not enough is known about how to mitigate it. Research shows that cognitive impairment, particularly in the working memory, can be significant. Narrowed attention, decreased search behaviour, longer reaction time to peripheral cues, decreased vigilance, degraded problem-solving, performance rigidity, degraded working memory function and critical effects on psychomotor skills are just some of the impairments noted under the effects of startle and surprise.

Training effectiveness and competence (SI-3011)

Despite the obvious technological advances that have made the aviation industry safer and more efficient in the last few decades, the way that those working in the industry are trained has not changed significantly. ICAO has sought to address this through the development of competency frameworks; however, organisations and States need to assure themselves that they fully appreciate how to utilise competency frameworks to their best advantage, whilst striving for a shared understanding of terms and concepts.

4. Commercial air transport — aeroplanes - CAT A

The CAT Aeroplanes Safety Risk Portfolio was first developed in 2016 by the Agency, in conjunction with the CAT A Collaborative Analysis Group, and has since been reviewed annually. Each safety issue contributes to one or more key risk areas as defined in the Introduction of this Volume.

Regarding the main key risk areas for this domain, refer to the EASA ASR 2022 Section 2.3 Safety risks for large aeroplanes (CAT airlines, air taxi and NCC business) Figure 21 'Key Risk Areas by aggregated ERCS score and number of risk-scored occurrences, involving commercial air transport – airlines and air-taxi'. These key risk areas are defined by their potential accident outcome and by the immediate precursors of that accident outcome. This figure is obtained by aggregating the ERCS score for the risk-scored occurrences relevant to this domain and plotting it against the number of risk-scored occurrences. The risk picture of this domain identifies the key risk areas of greater concern that are airborne collision, runway excursion, and aircraft upset.

The safety issues in the portfolio are sorted into the 'Assess – Elevated priority index', 'Assess – Normal-to-low priority index', 'Mitigate – define', 'Mitigate – implement', and 'Monitor' categories, which provide a snapshot of their status within the European SRM process by the priority. The safety issue prioritisation method is described in the Introduction of this Volume. To understand each safety issue better, please click on the safety issue in the list to access their description.

List 4-1: Commercial Air Transport – Aeroplanes (CAT A) safety issues per category & priority

Assess - Elevated priority index

Facilitates Step 2: Assessment of safety issue

- Inappropriate Flight Control Inputs (SI-0010)

Assess - Normal-to-low priority index

Facilitates Step 2: Assessment of safety issue

- False or Disrupted ILS Signal Capture (SI-0035)
- Non-Precision Approaches (SI-0037)
- Adverse Convective Weather (Turbulence, Hail, Lightning, ice) (SI-0003) (CC effect) 
- Gap between certified take-off performance and take-off performance achieved in operations (SI-0017) (CC effect) 
- Over-reliance on satellite navigation (SI-0034) (Amended)
- Encoding of Required navigation performance approaches (RNP APP) in Flight Management Systems (FMS) (SI-0051)
- Management of Repetitive Defects on Safety Critical Systems (SI-0050)
- Safety education of air passengers (SI-0052)

Mitigate - define

Facilitates Step 3: Definition and programming of safety actions

- Approach path management (SI-0007)
- Entry of Aircraft Performance Data (SI-0015) (CC effect)
- Alignment with wrong runway (SI-0014)
- Poor language proficiency causing communication break-down (SI-0054)
- Volume and quality of the information in NOTAMs (SI-0044)
- Emergency evacuation (SI-0042)

Mitigate - implement

Facilitates Step 4: Implementation and follow-up of safety actions

- Icing in Flight (SI-0001) (CC effect)
- Deconfliction of IFR and VFR traffic (SI-0043/SI-4010)
- Effectiveness of Safety Management (SI-0041)
- Clear Air Turbulence (CAT) and Mountain Waves (SI-0018) (CC effect)

Monitor

Facilitates Step 5: Safety performance measurement

- Fatigue (FTL) (SI-0039)
- Crew Resource Management (CRM) (SI-0009)
- State of Wellbeing and Fit for Duties (SI-0005)
- Explosive Door Openings on Parked Aeroplanes (SI-0048)
- Wake Vortex Encounter (SI-0012)
- Fuel Management (SI-0025)
- Fuel Contamination and quality (SI-0011)
- Congestion/interference of the Electromagnetic Spectrum (5G) (SI-0053)
- Hail (SI-0003A) (New) (CC effect)
- Handling and Execution of Go-Around (SI-0019)
- Bird/Wildlife Strikes (SI-0045)
- Wind shear (SI-0024) (CC effect)
- Icing on Ground (SI-0002) (CC effect)
- Carriage and Transport of Lithium Batteries (SI-0027)
- Runway Surface Condition (SI-0006) (CC effect)
- Flight Crew Incapacitation (SI-0049) (Amended)
- Disruptive Passenger (SI-0047)
- Laser Illumination (SI-0046)
- Excessive Speed in Manoeuvring Area (SI-0028)

Adverse convective weather (turbulence, hail, lightning, and ice) (SI-0003) (CC effect)

This safety issue addresses the ability and capability of the flight crew to manage the entire flight, including dispatch, and the possibility to detect, avoid and/or mitigate the effects of adverse convective weather on the flight. If not managed well, a flight crew may experience aircraft upset after being forced out of its flight envelope by a severe atmospheric phenomenon, or a significant degradation in performance or the handling qualities of the aircraft, or injuries due to abrupt movements. It also reviews the requirements for the aircraft to fly in certain atmospheric conditions. The main threats of convective phenomena affecting the flight, such as convective turbulence, up/down-drafts, wind shear, hail precipitation, lightning, and icing are reviewed in this safety issue.

Alignment with the wrong runway (SI-0014)

Unintended landing, approach, or take-off of an aircraft on/to/from a wrong landing/take-off surface can lead to excursions or collisions. It includes cases of landing on/take-off from a taxiway or other surface mistakenly identified by the flight crew as the assigned runway. The mistake could be due to visual acquisition, wrong data entered in the flight management system (FMS) or miscommunication between ATC and the flight crew. Other contributing factors include complex aerodrome design, multiple runway thresholds located near one another and other aerodrome-design-related complexities. The safety issue includes the relevant standard operating procedures (SOPs) and the flight crew training, the ATS procedures and the lighting and marking of the aerodrome surfaces.

Approach path management (SI-0007)

This safety issue addresses the inappropriate execution of an approach at any point from FL100 until reaching safe taxiing speed. This can lead to runway excursions, aircraft upset, terrain collision, or airborne collision. It covers all types of instrumental and visual approaches. The following areas are reviewed in this safety issue:

- Management of the energy of the aircraft and the influence of external factors affecting the approach, such as tail or crosswind, windshear, down/up drafts and other weather-related factors;
- Decision-making process of the flight crew to go around or continue with the approach; and
- SOPs and the relevance of those procedures for the approach flown, flight crew training and the existing regulatory framework.

In addition to addressing this safety issue from a flight crew perspective, this safety issue also explores ATM-related factors that may lead to non-stabilised approaches. These include ATCO instructions (e.g. vectoring, intermediate level-off) that result in a high descent profile for the flight crew or bring the aircraft too close to the runway. This safety issue is linked to the 'ATM influence on non-stabilised approaches (SI-2010)' in the ATM/ANS Safety Risk Portfolio.

Bird/wildlife strikes (SI-0045)

Insufficient control of birds and wildlife may lead to either damage to the aircraft or loss of control during take-off or landing. This safety issue addresses the inadequate uncontrolled/excessive presence of birds/wildlife in the aerodrome vicinity, and reviews the controls in place by the different stakeholders e.g. aerodrome operators, aircraft operators, aircraft/engine manufacturers, certification authorities, environment protection agencies, etc.

Carriage and transport of lithium batteries (SI-0027)

Lithium batteries carried or contained in electronic devices on board carry a risk of fire in the aircraft. These batteries may potentially ignite due to a thermal runaway, self-ignition or other heat sources. Lithium batteries may be carried on board an aircraft as part of a cargo shipment, check-in luggage of the passengers in the cargo holds or in the cabin in personal electronic devices carried by the passengers or crew.

Clear air turbulence and mountain waves (SI-0018) (CC effect)

Clear air turbulence and turbulence generated by high mountains (mountain waves) are weather phenomena that may result in aircraft upset or injuries/damages. To cope with the effects of such turbulence and mountain waves, it is important to train flight crew to identify and avoid such phenomena and ensure that the relevant SOPs are implemented. These efforts should be complemented by the provision of information from external sources, such as ATC or pilot reports (PIREP), during the flight. The issue also covers the preparation of the flight and the availability of information to enable the flight crew to foresee a possible encounter with such phenomena during the flight.

Congestion/interference of the electromagnetic spectrum (5G) (SI-0053)

The electromagnetic spectrum is crucial to the management of aviation activity as frequencies are required for ATM and ground movements control, navigation aids, weather and ATC radars, radio-altimetry, air-air communications, terrain and ground collision avoidance systems. The spectrum is becoming increasingly congested as traffic levels grow and the increasing demand for bandwidth from other users such as telecoms, radio and television services have led to some portions of the spectrum previously allocated to aviation being diverted for this purpose. This in turn leads to equipage changes (e.g. radar frequencies) and radiotelephony (RTF) frequency congestion. The proximity of competing users can have interference effects that cannot be managed or controlled by either user.

The roll-out of 5G across the world will have an impact on navigational equipment. The issue is that the equipment may not be robust enough against certain 5G frequency bandwidths. In some countries the two (aircraft navigational equipment and 5G networks) may not be able to co-exist.

It also includes the potential for interference from 5G transmissions from the passenger cabin.

Crew resource management (CRM) (SI-0009)

The issue encompasses all aspects of the communication that may impact the situational awareness of the crew members and/or the conduct of the flight, including lack of a common action plan, inadequate division of duties, poor coordination between crew members, use of non-standard phraseology, sensory overload (loss of communications, multiple aural messages, etc.), etc. Good CRM can be achieved by implementing relevant training for flight crew and an effective regulatory framework for CRM requirements. The goal of CRM is to maximise the available resources, through effective communication and efficient workload management.

Deconfliction of IFR and VFR traffic (SI-0043/SI-4010)

Ineffective deconfliction of flights adhering to instrument flight rules (IFR) and visual flight rules (VFR) in an airspace class where at least one of the flights is not under air traffic control (ATC) separation has been identified as a strong contributor to airborne collision risk. Such airspace classes include class E, controlled airspace where VFR flights are not subject to ATC clearance and no IFR-VFR separation is provided by ATC, and class G, where neither IFR flights nor VFR flights are subject to ATC clearance and ATC does not provide any separation service. The safety issue arises due to the fragmented knowledge of the traffic situation as some traffic is subject to ATC clearance (i.e. IFR) and some other traffic is not (i.e. VFR). ATC may not be aware of VFR flights or their intentions and potentially may not pass traffic information to the IFR traffic. In addition, some of the VFR traffic may not be equipped with airborne collision avoidance system (ACAS) or even a transponder (C or mode-S), reducing the conspicuity of VFR traffic. As a result, both IFR and VFR traffic have to rely solely on the visual acquisition by the flight crew to maintain separation. This safety issue addresses how the conspicuity of VFR traffic can be improved as well as best practices to underscore the importance of existing procedures in maintaining airborne separation. This safety issue is captured in the Non-Commercial Operations – Small Aeroplanes Safety Risk Portfolio and is also relevant to the ATM/ANS domain.

Disruptive passengers (SI-0047)

Disruptive passengers are defined as passengers who do not follow safety procedures or instructions from the cabin crew. Such behaviour is normally associated with the consumption of alcohol, drugs and certain types of medication. However, it may be also the result of stress or emotional distress. It is important to subdue these passengers as they may pose a safety threat to other passengers or the cabin crew. To achieve this, airlines have to design effective procedures and train cabin crew to handle such situations in a safe manner.

Effectiveness of safety management (SI-0041)

Aviation organisations are required to implement safety management systems as part of their safety programmes. This issue reviews an ineffective implementation of safety management system by the aviation organisations. The complex nature of aviation safety and the significance of addressing HF aspects show the need for an effective management of safety by the aviation organisations. This issue covers the regulatory requirements and promotion of SMS principles, for both aviation authorities and organisations, and the capability to detect, anticipate and act upon new emerging threats and associated challenges. It also includes the settling of the adequate safety culture in organisations and authorities. This issue had deteriorated in the context of COVID-19 pandemic; refer to Reduced focus on, or prioritisation of safety (SI-5009).

Emergency evacuation (SI-0042)

The safety issue refers to the unsuccessful evacuation of an aircraft after an emergency. The areas of risk identified are:

- hand luggage amount blocking the aisle preventing or slowing down the evacuation;
- passengers taking hand luggage preventing or slowing down the evacuation; and
- emergency evacuation with the aircraft engine still running.

This safety issue considers the passenger behaviour and compliance with safety instructions, the decision-making for the flight crew to command the evacuation, the cabin crew to adequately execute it, and the certification requirements to ensure the adequacy of equipment and aircraft systems. As such, relevant SOPs, training for both flight and cabin crew, and the relevant regulatory requirements have to be reviewed to ensure the safe and efficient egress of all passengers during an emergency.

Encoding of the required navigation performance approaches (RNP APP) in flight management systems (FMS) (SI-0051)

The naming of the performance-based navigation (PBN) approach procedure is not standardised throughout the world. It is also inconsistent with the PBN navigation specifications. Examples of different naming: RNAV (GPS) RWY XX, RNAV (GNSS) RWY XX, RNAV (RNP) RWY XX. Chart identification and FMS encoding differences may lead to confusions and misunderstanding amongst crew. Procedure requirements are not always clearly understood e.g. specifications versus requirements (RF, RNP, missed approach RNP). The situation is the same as regards understanding of the minima (LNAV, LNAV/VNAV and LPV).

Another issue will be the data storage capacity and encoding capability of the on-board equipment against the number of approaches and different encoding requirements (e.g. letter designator for circling approaches, Z–Y, etc., when more than one approach exists).

Entry of aircraft performance data (SI-0015) (CC effect)

The incorrect entry of data into the FMS that is used to set the take-off or landing performance parameters of the aircraft can have catastrophic consequences. This can potentially occur due to miscommunication errors, errors in electronic flight bags (EFBs), entry of data into FMS, last-minute changes by ATC and load masters, and the incorrect calculation of the performance parameters. To mitigate this safety issue, technical solutions are being considered for the long term; in the short to medium term, the focus will be on improvements to SOPs.

Excessive speed in the manoeuvring area (SI-0028)

Excessive ground speed of the aircraft during taxiing at the aerodrome before take-off or after landing may lead to collision on ground, injuries or damages. This safety issue includes also taxiing phases on the runway, e.g. back tracking. Such occurrences may occur due to lapses in SOPs and the associated trainings for the flight crews as well as due to poorly designed aerodrome procedures.

Explosive door opening (SI-0048)

When an aeroplane is parked, cooling or heating of the aeroplane cabin can be provided through the air-conditioning system powered up by the auxiliary power unit (APU) or by an external source of air (e.g. ground air-conditioning cart) ducted to the aeroplane cabin. Closing all aeroplane doors helps to reach and maintain the desired temperature. However, it may also result in an undesired build-up of excessive differential pressure between the cabin and the outside environment if the outflow valve is closed. As a result, this may cause an explosive door opening that can lead to injuries or damages. This may happen during normal operation of the aeroplane, during maintenance activities, or when conducting practical training of personnel on the aeroplane on ground.

False or disrupted instrument landing system (ILS) signal capture (SI-0035)

Aircraft on approach may potentially capture a false or disrupted ILS or localiser signal due to several factors:

- technical issues with the ILS; or
- interference of the ILS signal by obstacles, aircraft, and vehicles in the sensitive ILS areas; or
- inadequate approach procedures leading to the capture of upper/lower/side lobes.

A false or disrupted capture may lead to terrain collision or runway excursion. Due to its multi-faceted nature, this safety issue also includes the review of existing safety barriers implemented by different stakeholders, such as the CNS providers, aerodrome operators, ATS, aircraft operators, manufacturers as well as regulators.

Fatigue (FTL) (SI-0039)

Fatigue can negatively affect aircrew performance in the aircraft and pose a hazard to flight safety. In commercial air transport, aircrew rosters are traditionally developed on the basis of prescriptive duty time limits, flight time limits, minimum rest requirements and other constraints such as minimum notification times and prohibition to combine certain duties, to name a few. These limits and requirements, referred to as flight time limitations (FTL), are presumed to be adequate for maintaining aircrew fatigue at levels that will not put at risk the safety of flight operations. Note that general fatigue issues that are not limited to flight crew fatigue, such as quality sleep, are managed under Fatigue and quality sleep (SI-3005) in the Human Factors Safety Risk Portfolio.

Flight crew incapacitation (SI-0049) (Amended)

This safety issue relates to pilot incapacitation, not being able to perform his/her duties and associated risks.

Fuel contamination and quality (SI-0011)

This safety issue relates to the upload of contaminated fuel in the aircraft or to fuel being contaminated once stored in the aircraft fuel system. This safety issue covers all types of contamination from water, algae, polymers, etc.; anything that is sufficient to cause an in-flight shutdown of the engines or to affect adversely the delivery of power from the engines. It also includes the supply chain of fuel that may be the cause of the contamination, the oversight capabilities of the aircraft operators and the regulatory framework of both the fuel supply and the operators' oversight.

Additionally, it includes the non-compliance with the technical specification for specific fuel type, resulting in wrong flash point, wrong concentration of any required chemical component, etc.

Fuel management (SI-0025)

Inadequate management of the fuel to perform the flight that may lead to aircraft upset or collision with terrain. This involves fuel planning, calculation, and the management once the flight has commenced i.e. defined as the point when the first engine has started. It includes the communication and coordination of the flight crew with ATC and the operations department of their organisation, the relevant SOPs, fuel policy and training of the flight crew.

Hail (SI-0003A) (New) (CC effect)

This safety sub-issue of the adverse convective weather safety issues group (SI-0003) focuses on the 'hail' phenomenon/precipitation. It is relevant for the take-off/climb and approach/landing phases of flight.

Gap between certified take-off performance and take-off performance achieved in operations (SI-0017) (CC effect)

One type of incorrect rotation is slow rotation rate performed by the flight crew at take-off, with the aim of avoiding tail strikes. This is especially critical in short- and high-altitude runways as too slow rotations there can lead to runway excursions, aircraft upset, or terrain collision. The most critical scenario is a heavy aircraft, typically a long-haul flight by a large four-engine aircraft with high payload, in short high-altitude runways. Relevant SOPs and training for flight crew have to be reviewed and implemented to ensure that flight crew rotate the aircraft at the correct rate during take-off.

Handling and execution of go-arounds (SI-0019)

Inadequate execution of the go-around manoeuvre may lead to aircraft upset, runway excursion, injuries or damages, or collision with terrain. It is the deviation from the SOPs and published go-around procedures. It covers the HF relevant during this manoeuvre (e.g. somatogravic illusion, breakdown of CRM). It includes the procedures and training of the flight crew, and the adequacy of those, regarding go-around with all engines operating (workload).

Icing in flight (SI-0001) (CC effect)

Icing in flight may occur due to various reasons, however, this safety issue is focused on the manifestation of icing during flight caused by an atmospheric icing phenomenon. The typical manifestation is the accretion of ice on aerodynamic surfaces, probes, engine parts or flight control system, leading to degradation of handling

quality or performance issues, system failures or malfunctions, or damages on aeroplane's structure. When such icing occurs, it is important to ensure that the flight crew is able to recognise the situation and manage the flight in adverse icing conditions. Other sources of icing, such as frozen water leaks from the waste water aircraft system, are excluded from this safety issue. This safety issue is also relevant to the Non-Commercial Operations – Small Aeroplanes domain.

Icing on ground (SI-0002) (CC effect)

Icing on the ground may occur due to an atmospheric icing phenomenon and the adverse effect of the de-icing / anti-icing fluids. If managed poorly, the flight crew may experience aircraft upset or collision with terrain after take-off, runway excursion, injuries or damages. It is crucial to ensure relevant SOPs and training are implemented to ensure that flight crew are able to recognise and manage the effects of adverse icing conditions experienced during the ground phases of flight. This safety issue is also relevant to the Non-Commercial Operations – Small Aeroplanes domain.

Inappropriate flight control inputs (SI-0010)

Flight crew may inadvertently introduce flight control inputs which may result in a deviation from actual or intended immediate flight path. Depending on the circumstance and magnitude of input, inappropriate flight control inputs may result in an undesirable safety consequence, such as aircraft upset, runway excursion, injuries or damage. It also addresses the HF affecting the flight crew performance, for instance, by reducing their cognitive capacity to recognise the situation and react appropriately.

Laser illumination (SI-0046)

Even though it is illegal to shine a laser device at an aircraft in most countries, such errant behaviour still occurs and puts flight crews at risk of temporary or permanent blindness. It may result in pilot distraction, temporary vision impairments and, in serious cases, ocular injury. These effects may pose significant flight safety hazards in critical phases of flight during approach and landing near airports.

Management of repetitive defects on safety-critical systems (SI-0050)

The safety issue refers to the complex and repetitive defects on safety-critical systems. Although this safety issue may be seen as part of the safety issue 'Handling of Technical Failures', this particular safety issue focuses on the critical interface between flight crew and engineering/maintenance staff. While there are clear requirements about the process of recording and rectifying defects (including deferred defects), management of repetitive defects (identification, recording and communication with the flight crew) is a challenge many operators face on a daily basis. For example, while the flight crews have the visibility of deferred defects in the Tech Log system, in many cases / organisations, they have no visibility of repetitive defects. Therefore, they do not have the opportunity to conduct their own risk assessments, make go/no-go decisions and/or be prepared to deal with the consequences of a repetitive defect recurring particularly at a critical phase of the flight e.g. radio altimeter failure during approach / landing.

Non-precision approaches (SI-0037)

The safety issue refers to the erosion of pilot skills to conduct non-precision approaches as most airline pilots are not required to conduct such approaches frequently. The high standards and wide spread of precision approaches, including the increasing number of performance-based navigation (PBN), are reducing the exposure, and limiting non-precision approaches to isolated cases (e.g. en-route diversion). The safety issue covers the training and SOPs for the flight crews on non-precision approaches. This safety issue is linked with Approach path management (SI-0007).

Poor language proficiency causing communication breakdown (SI-0054)

The use (or misuse) of language can contribute directly or indirectly to an accident. Therefore, a minimum standard level of knowledge of the language used for communication mainly between pilots and Air Traffic Controllers (ATCOs) is critical to flight safety.

ICAO standardised phraseology should be used whenever possible. Also, when phraseology is not applicable, pilots and ATCOs should demonstrate a minimum level of proficiency in plain language.

The effective use of plain language is vital in routine operational situations in which phraseology provides no 'ready-made' form of communication and is especially critical in unusual or emergency situations.

Inevitable language errors should always be considered and judged in the wider context of miscommunication or failure to communicate successfully. The recognition of these errors contributed to the construction of ICAO Operational Level 4 which is considered to be the minimum level acceptable to ensure safe operations.

Over-reliance on satellite navigation (SI-0034) (Amended)

This safety issue refers to the increasing reliance on satellite-based navigation and the potential impact of the associated vulnerabilities on the safety of the flight. Such vulnerabilities include jamming, spoofing and over-reliance of flight crew on satellite-based navigation. Over-reliance on satellite-based navigation may lead to complacency resulting in inadequate pre-flight preparation and potential loss of orientation when the GNSS unit fails. It covers the equipment on board, the SOPs, training, and navigation procedures published. The procedure of key interest is the procedure to revert to other means of navigation in critical flight phases should the GNSS unit malfunction in flight. Wrong position information has severe repercussions as it can lead to airspace infringement, mid-air collision, or trigger false TAWS events which might result in increased controlled flight into terrain (CFIT) risk. Related with SI-5501A GPS signal manipulation leading to navigation or surveillance degradation.

Runway surface condition (SI-0006) (CC effect)

The mismatch between the actual status of the runway surface condition and the one used to calculate the aircraft landing performance may lead to runway excursions. This includes the measurement systems, the methodology to assess the runway surface condition and the reporting methods used to communicate said condition to the flight crews in approach. This safety issue also addresses the calculation methods used by the flight crew provided by the operator in the AFM/FCOM and the performance data provided by the aircraft manufacturer.

Safety education of air passengers (SI-0052)

Poor air passenger understanding of residual risks inherent in commercial air transport operations is likely to result in failure to comply with safety instructions and advice, with a consequent increase in the risks borne by crew and other passengers.

The understanding by the passengers of the cabin crews' safety role in the cabin (that is not only limited to assistance and selling). Instructions need to be obeyed, the safety purpose understood, attention to briefings paid, especially when relevant to coping with potential distress situations/evacuation.

State of well-being and fit for duties (SI-0005)

Flight crew have to be fit and well both physically and mentally to conduct a flight safely. This is achieved by ensuring the well-being of flight crew through the introduction of procedures for airlines to assess the conditions

of flight crew and well-being initiatives in the airline. These efforts should be undergirded by an effective regulatory framework. Refer also to Decreased well-being of aviation professionals during shutdown (SI-5007).

Volume and quality of the information in NOTAMs (SI-0044)

With the steady growth in the number of notices to airmen (NOTAMs), flight crew are increasingly challenged in processing the volume of information during their pre-flight preparation. It is hard to identify the most important and relevant information, which may result in the flight crew overlooking safety-critical information. This is also exacerbated by the inconsistent quality of the information provided in NOTAMs. The content of a NOTAM does not always adhere to ICAO standards and the use of non-standard acronyms may create confusion or a delay in understanding the content. The safety issue explores the different mitigations which can be adopted in the short to medium term while the long-term solution of digital NOTAMs is implemented incrementally across Europe.

Wake vortex (SI-0012)

The safety issue refers to the encounter with the wake turbulence of a preceding aircraft, which may lead to the upset of the trailing aircraft. It includes the possible ATS role in providing separation of the traffic, the SOPs for flight crews to stay away from the wakes of other aircraft and their associated training. Due to the differences in ATS procedures, encounter geometries and mitigation strategies, the safety issue can be divided in two scenarios: 'encounters during arrival and departure' and 'en-route encounters'.

Windshear (SI-0024) (CC effect)

The encounter with windshear on final approach, landing, take-off, and initial climb may lead to aircraft upset or runway excursions. Effective SOPs and the training for the flight crew should be implemented by airlines to ensure that flight crew are well-equipped to avoid or deal with those conditions. Such efforts should also be supplemented by detection of potential windshear by third parties, such as ATC, and the effective relay of this information to the flight crew.

5. Rotorcraft - RTR

The Rotorcraft Safety Risk Portfolio was first developed in 2021 by the Agency, in conjunction with the European Safety Analysis Group for Rotorcraft (ESAG-R) and has since been reviewed. Each safety issue contributes to one or more key risk areas as defined in the Introduction of this Volume.

Regarding the main key risk areas for this domain, refer to the EASA ASR 2022 Sections: 3.2 Safety risks for commercial air transport helicopters Figure 67 'Key risk areas by aggregated ERCS score and number of risk-scored occurrences, involving commercial air transport helicopters'; 3.3 Safety risks for specialised operations helicopters Figure 76 'Key risk areas by aggregated ERCS score and number of risk-scored occurrences, involving specialised operations helicopters'; and 3.4 Safety risks for non-commercial operations helicopters Figure 85 'Key risk areas by aggregated ERCS score and number of risk-scored occurrences involving non-commercial operations helicopters'. These key risk areas are defined by their potential accident outcome and by the immediate precursors of that accident outcome. This figure is obtained by aggregating the ERCS score for the risk-scored occurrences relevant to this domain and plotting it against the number of risk-scored occurrences. The risk picture of this domain identifies the key risk areas of greater concern that are aircraft upset for commercial air transport helicopters, specialised operations with helicopters, and non-commercially operated helicopters.

The safety issues in the portfolio are sorted into the 'Assess – Elevated priority index', 'Assess - Normal-to-low priority index', 'Mitigate – define', 'Mitigate – implement', and 'Monitor' categories, which provide a snapshot of their status within the European SRM process by the priority. The safety issue prioritisation method is described in the Introduction of this Volume. To understand each safety issue better, please click on the safety issue in the list to access their description.

List 5-1: Rotorcraft safety issues per category & priority

Assess - Elevated priority index

Facilitates Step 2: Assessment of safety issue

- Inadequate obstacle clearance during low-altitude operation, take-off and landing (SI-8031)
- Poor pre-flight planning and preparation (SI-8017)
- Helicopter-maintenance-related issues (SI-8005)

Assess - Normal-to-low priority index

Facilitates Step 2: Assessment of safety issue

- Unanticipated yaw / Loss of tail rotor effectiveness (SI-8024)
- Lack of knowledge of aircraft systems and application of procedures (SI-8011)
- Inadequate flight path management during manual control (SI-8023)
- Inadequate flight path management with the use of automation (SI-8022)
- Systems-related issues with manned VTOL-capable aircraft
- Insufficient safety culture of organisation (SI-8045)
- Poor management of take-off and landing sites (SI-8034)

Mitigate - define

Facilitates Step 3: Definition and programming of safety actions

- NIL

Mitigate - implement

Facilitates Step 4: Implementation and follow-up of safety actions

- Inadequate airborne separation under VFR operation (SI-8028)
- External-sling-load-operations-related issues (SI-8038)
- Degraded visibility conditions (SI-8019)
- Inadequate handling of simulated technical failures and abnormal procedures during a training flight (SI-8027)
- Pilot fatigue (SI-8016)
- Ineffective safety management systems (SI-8044)
- Hazardous conditions following ditching (SI-8039)
- Helicopter rotor and transmission system failures (SI-8001)
- Inadequate training and competence transfer — initial and recurrent training (SI-8015)
- Bird and other wildlife hazard (SI-8030)
- Vortex ring state (SI-8025)
- Deficiencies and inconsistencies in operating manuals (SI-8046)
- Hoist-operations-related issues (SI-8037)

Monitor

Facilitates Step 5: Safety performance measurement

- Engine loss of power in flight (SI-8026) (Amended)
- Incorrect in-flight decision-making (SI-8014)
- Adverse weather encounter — effects other than on visibility (SI-8021) (CC effect)
- Ineffective application of crew resource management and multi-crew cooperation (SI-8013)
- Dynamic rollover (SI-8040)
- Improper management of helicopter continuing airworthiness (SI-8004)
- On-board carriage of PEDs with lithium batteries (SI-8048)
- Incorrect application of operational rules and procedures (SI-8012)
- Interference by lasers (SI-8049)
- ADELTs, ELTs and PLBs malfunctions (SI-8043)
- Helicopter system failures — other than rotor and transmissions (SI-8002)
- Navigation-related issues (SI-8036)
- Downwash adverse effects (SI-8041)
- Unruly passengers (SI-8042)

ADELTs, ELTs and PLBs malfunctions (SI-8043)

This issue refers to failures and malfunctions of automatically deployable emergency locator transmitters (ADELTs), emergency locator transmitters (ELTs) and personal locator beacons (PLBs). It includes, in particular, the cases when these systems do not perform as required after impact, or when there is an unintentional deployment or activation of these systems. The failure of activation of these systems can increase the risk of post-impact fatalities.

Adverse weather encounter — effects other than on visibility (SI-8021) (CC effect)

This issue refers to environmental conditions encountered during the flight and contributing to aircraft upset situations. It includes icing conditions, lightning strikes, high winds, convective weather phenomena such as windshear, up and down drafts or microburst, and obstacle induced turbulence. The safety issue addresses the identification, avoidance and recovery of such conditions.

Bird and other wildlife hazard (SI-8030)

This issue refers to proximity or actual collision with bird and other wildlife during flight operations, contributing to a possible unsafe outcome. It also includes the lack of control or inadequate warning of bird and wildlife hazard at an aerodrome or any take-off and landing sites.

Deficiencies and inconsistencies in operating manuals (SI-8046)

This issue refers to operating manuals not appropriate, not accurate or out of date. It encompasses the pilot's operating handbook (POH), the rotorcraft flight manual (RFM), the flight crew operating manual (FCOM), the Standard Operating Procedures (SOPs), the quick reference handbook (QRH) and the company operating manual Part B.

Degraded visibility conditions (SI-8019)

This safety issue relates to all operational situations where the visibility of the flight crew is degraded, causing a loss of visual cues and situational awareness, leading potentially to obstacle collision, terrain collision or aircraft upset. It includes the inadvertent entry into clouds during VFR flights, night conditions, but also degraded visibility conditions caused by dust or sand (brownout), snow (whiteout), smoke, salt spray or any element that degrades the use of visual cues.

Downwash adverse effects (SI-8041)

This safety issue relates to helicopter downwash effects such as the blowing of FOD which can lead to injuries or damage to third parties on ground, or the recirculation of the snow/dust causing possible damages to the helicopter own engines. This safety issue does not include the effect of degraded visibility (addressed in SI-8019).

Dynamic rollover (SI-8040)

This issue refers to inability to prevent helicopter rollover during take-off, landing or air taxiing / hovering phases. It includes, in particular, the inadequate knowledge of the operating environment (soft landing surface, obstacles), and the inadequate skills to recover after the skid or landing gear enters in contact with possible obstacles and the aircraft started to roll.

Engine loss of power in flight (SI-8026) (Amended)

This safety issue relates to the inability to safely continue the flight once a power loss occurs. It includes, for example, inefficient CRM, inadequate training, or abnormal procedures not followed, leading to hard landings or total loss of control in flight.

External-sling-load-operations-related issues (SI-8038)

This safety issue gathers all operational scenarios specific to helicopters flying with external sling load, for both human and non-human cargo, which can contribute to an unsafe outcome. It includes, in particular, sling load falling or contacting terrain or obstacles, sling load contacting the tail rotor, main rotor or fuselage. Unnoticed exceed of the maximum all up mass (MAUM) is also addressed.

Hazardous conditions following ditching (SI-8039)

This safety issue includes all hazards endangering the survivability of the helicopter occupants after a ditching has been performed. In addition to the helicopter emergency floatation system (EFS) malfunctions, it includes the hazards related to an evacuation after a helicopter capsizing such as issues with the emergency exit suitability, signage, the internal and external emergency lighting, the life raft deployment from the cabin or externally, defective or unsuitable survival suits, the inadequate crew and passenger training for underwater escape and the use emergency and safety equipment such as life jackets and emergency breathing systems.

Helicopter-maintenance-related issues (SI-8005)

This safety issue relates to incorrect, incomplete or deficient maintenance actions contributing to an unsafe operational outcome. It also includes the human factors aspects when performing maintenance tasks.

Helicopter rotor and transmission system failures (SI-8001)

This safety issue relates to technical failures, malfunctions and defects of the helicopter main rotor (ATA 62), main rotor drive system (ATA 63), tail rotor (ATA 64) and tail rotor drive system (ATA 65), contributing to an unsafe operational outcome.

Helicopter system failures — other than rotor and transmissions (SI-8002)

This safety issue relates to technical failures, malfunctions and defects of any helicopter systems other than the rotor and transmissions systems (addressed in SI-8001) and contributing to an unsafe operational outcome. It includes, for example, the helicopter power plant system, flight controls system, electrical system and avionics system. It does not include the helicopter hoist systems (addressed in SI-8037) and the external sling load systems (addressed in SI-8038).

Hoist-operations-related issues (SI-8037)

This safety issue encompasses both technical and operational issues specific to hoist operations. It includes hoist malfunctions such as loss of reel in/out functions, hoist cable break due to design issues or due to damages from operational events or inadequate maintenance, but also cable contacts with obstacle or fuselage.

Improper management of helicopter continuing airworthiness (SI-8004)

This safety issue relates to management of the helicopter which negatively affects its airworthiness, contributing to an unsafe operational outcome. It includes the improper management of the helicopter configuration, and in particular its mass and balance configuration.

Inadequate airborne separation under VFR operation (SI-8028)

This safety issue relates to the inability, during a VFR flight, to detect, avoid or maintain sufficient airborne separation with other manned or unmanned aircraft, increasing the risk of airborne collision. The safety issue addresses both design and operational aspects involved.

Inadequate flight path management during manual control (SI-8023)

This safety issue relates to the inability to follow the intended helicopter flight path when flying with manual control, contributing to an unsafe outcome. The safety issue encompasses both technical and operational aspects leading to this situation.

Inadequate flight path management with the use of automation (SI-8022)

This safety issue relates to the inability to follow the intended helicopter flight path with the automatic flight control system (AFCS) being active, contributing to an unsafe outcome. The safety encompasses both technical

and operational aspects leading to this situation. It includes, in particular, the ineffective use or monitoring of flight parameters and automation modes, and the inadequate management of the transition manual-automated flight.

Inadequate handling of simulated technical failures and abnormal procedures during a training flight (SI-8027)

This safety issue relates to the inability, during a training flight, to handle simulated technical failures such as power loss or hydraulic system failures, contributing to unsafe outcomes. It includes, in particular, the diagnosis of system failures in flight, and the handling of autorotation and forced landing, leading to hard landings or total loss of control in flight.

Inadequate obstacle clearance during low-altitude operation, take-off and landing (SI-8031)

This safety issue relates to the inability to identify and safely avoid obstacles during the helicopter take-off and landing phase, as well as during low-level operations such as agricultural work or power lines check, both in urban and natural environments.

Inadequate training and competence transfer — initial and recurrent training (SI-8015)

This safety issue relates to the incomplete or inadequate training content as well as ineffective delivery of training for any personnel involved in helicopter operations, including both initial and recurrent training, causing a degradation of competence transfers within an organisation, impacting the necessary knowledge and skills required to operate safely in normal and emergency operational situations.

Incorrect application of operational rules and procedures (SI-8012)

This safety issue relates to the flight crew not complying with SOPs or operational manuals, contributing to an unsafe operation outcome. It includes, for example, operating below weather minima, altitude minima, or beyond the helicopter flight envelope.

Incorrect in-flight decision-making (SI-8014)

This safety issue relates to the cases where flight crew decisions during the flight negatively affect the operational safety. It includes, in particular, the decisions on diversions, or on contingency plans.

Ineffective application of crew resource management and multi-crew cooperation (SI-8013)

This safety issue relates to deficiencies in flight crew coordination, integration, communications and workload management, affecting the decision-making and problem-solving capacity, necessary to operate safely the aircraft.

Ineffective safety management systems (SI-8044)

This safety issue relates to ineffective or incomplete application of safety management systems within organisations, in particular change management, SRM, and safety reporting tools and processes.

Insufficient safety culture of organisation (SI-8045)

This safety issue relates to lack of safety policy, leadership and management, resulting in poor staff engagement for safety in the organisation, as well as poor knowledge of safety reporting and ‘just culture’ principles.

Interference by lasers (SI-8049)

This safety issue relates to events that involve the unintentional or malicious shining of a laser at an aircraft in flight leading to flight crew disorientation or distraction.

Lack of knowledge of aircraft systems and application of procedures (SI-8011)

This safety issue relates to the flight crew lacking the knowledge of the helicopter systems and related procedures necessary to operate safely these systems in normal and abnormal situations, in particular when frequently changing of aircraft types, variants, or configuration/equipment flown.

Navigation-related issues (SI-8036)

This safety issue relates to inadequate or incorrect navigation of the helicopter, both in VFR and IFR operations. It includes, for example, deviations from nominal track, interferences or losses of the radio navigation source as well as issues related to helicopter PBN operations.

On-board carriage of PEDs with lithium batteries (SI-8048)

This safety issue relates to carrying on board of personal electronic devices (PEDs) powered by lithium batteries which contain a risk of overheat and fire ignition in the cargo compartment or in the cockpit.

Pilot fatigue (SI-8016)

This safety issue relates to flight crew fatigued by the duration of the flight or length of the duty period, affecting its performance and contributing to an unsafe outcome. It also includes non-compliance with the approved FTL scheme, or an FTL scheme not fit for purpose.

Poor management of take-off and landing sites (SI-8034)

This safety issue relates to poor or inadequate management of take-off and landing sites, including aerodromes, heliports, helidecks, and any other urban or natural sites. It includes the management of vehicles, persons, obstacles, the training of ground operations personnel as well as the selection of a suitable landing site.

Poor pre-flight planning and preparation (SI-8017)

This safety issue relates to the inability to carry-out appropriate pre-flight planning due to pilot insufficient knowledge and/or lack of planning resources and information. It includes, in particular, the planning of the weather conditions, navigation, fuel, weight and balance, aircraft performance, and risk assessment for the planned flight.

Systems-related issues with manned VTOL-capable aircraft (SI-8008)

This issue includes any potential issues specific to the emerging electric vertical take-off and landing (VTOL) capable aircraft technologies, both from a design and an operational point of view, which can have an impact on operational safety.

Unanticipated yaw / loss of tail rotor effectiveness (SI-8024)

This safety issue relates to the inability to detect, control and recover from an unanticipated yaw or a loss of tail rotor effectiveness (LTE) during low-speed phases of flight, leading to the helicopter loss of control.

Unruly passengers (SI-8042)

This safety issue relates to passengers who, during commercial or private flights, do not respect or follow safety procedures, or cause disturbance to the flight crew. It also includes passengers overriding or pressuring professionals. The lack of adequate passenger pre-flight briefing is also addressed within this safety issue.

Vortex ring state (SI-8025)

This safety issue relates to the inability to detect, control and recover from an inadvertent vortex ring state (VRS) condition in flight, leading to the helicopter loss of control.

6. Non-commercial operations — small aeroplanes – NCO SA

The Non-Commercial Operations – Small Aeroplane (NCO SA) Safety Risk Portfolio was first developed in 2016 by the Agency, in conjunction with the General Aviation Collaborative Analysis Group, and has since been reviewed annually. Each safety issue contributes to one or more key risk areas as defined in the Introduction of this Volume.

Regarding the main key risk areas for this domain, refer to the EASA ASR 2022 Section 2.5 Non-commercially operated small aeroplanes Figure 43 'Key Risk Areas by aggregated ERCS score and number of risk-scored occurrences, involving non-commercially operated small aeroplanes'. These key risk areas are defined by their potential accident outcome and by the immediate precursors of that accident outcome. This figure is obtained by aggregating the ERCS score for the risk-scored occurrences relevant to this domain and plotting it against the number of risk-scored occurrences. The risk picture of this domain identifies the key risk area of greater concern that is aircraft upset.

The safety issues in the portfolio are sorted into the 'Assess – Elevated priority index', 'Assess - Normal-to-low priority index', 'Mitigate – define', 'Mitigate – implement', and 'Monitor' categories, which provide a snapshot of their status within the European SRM process by the priority. The safety issue prioritisation method is described in the Introduction of this Volume. To understand each safety issue better, please click on the safety issue in the list to access their description.

➨ List 6-1: Non/Commercial Operations – Small Aeroplanes safety issues per category & priority

Assess - Elevated priority index

Facilitates Step 2: Assessment of safety issue

- Poor pre-flight planning and preparation (SI-4007) (Amended)

Assess - Normal-to-low priority index

Facilitates Step 2: Assessment of safety issue

- Inadvertent flight into IMC/scud running (SI-4008)
- Experience, training, and competence of individual (SI-4004) (Amended)
- Approach path management on GA aeroplanes (SI-4005)
- Inflight decision making (SI-4003)
- Inappropriate control input (SI-4029)

Mitigate - define

Facilitates Step 3: Definition and programming of safety actions

- Handling of technical failures (SI-4001)
- Risks associated with parachuting operations (SI-4023) (Amended)

Mitigate - implement

Facilitates Step 4: Implementation and follow-up of safety actions

- Airborne separation (SI-4010)

Monitor *Facilitates Step 5: Safety performance measurement*

- Icing in flight (SI-0001) (CC effect) 
- Knowledge of aircraft systems and procedures (SI-4017)
- Fuel management in flight (SI-4011)
- Mass and balance (SI-4014)
- Other aircraft system reliability (SI-4028)
- Engine system reliability (SI-4012)
- Crosswind (SI-4015) (CC effect) 
- Operational communication (SI-4021)
- Maintenance of GA aeroplanes (SI-4018)
- Damage tolerance to UAS collisions (SI-4019)
- Bird and wildlife strikes at smaller aerodromes/airfields (SI-4013)

Airborne separation (SI-4010)

In this version, the 'Deconfliction with IFR/VFR traffic (SI-4009)' definition has now been merged with the airborne separation issue and SI-4009 has been removed from the list.

Maintaining airborne separation is one of the key contributory factors in reducing mid-air collision risk. This relies on the pilot's ability to detect and avoid loss of separation and maintain safe distance between the aircraft and the surrounding traffic. This involves the adherence to separation minima and visual separation.

Approach path management on GA aeroplanes (SI-4005)

This safety issue addresses the inappropriate execution of an approach at any point from the IAF until reaching safe taxiing speed after landing. This can lead to runway excursions, aircraft upset, terrain collision, or airborne collision. It covers all types of instrumental and visual approaches. The following areas are reviewed in this safety issue:

- Management of the energy of the aircraft and the influence of external factors affecting the approach, such as tail or crosswind, windshear, down/up drafts and other weather-related factors;
- Decision-making process of the flight crew to go around or continue with the approach; and
- SOPs and the relevance of those procedures for the approach flown, pilot training and the existing regulatory framework.

The main objectives are to train pilots to achieve stabilised approaches on correct speeds, enhance pilots' go-around decisions when the approach is unstable and the deployment of PBN approaches.

Bird and wildlife strikes at smaller aerodromes/airfields (SI-4013)

This safety issue considers the following contributory factors:

- Pilot's ability/inability to detect, recognise and avoid bird strike or wildlife strike;
- ATC's ability/inability to report the likelihood of bird strikes or wildlife strikes; and
- Aerodrome operator's ability/inability to control the population of birds and other wildlife in the vicinity of the airport.

For pilots experiencing a bird strike or a wildlife strike, the main goal is to enable them to manage the startle effect and control the aircraft correctly to achieve a safe landing.

Crosswind (SI-4015) (CC effect) (Amended)

Crosswind conditions increase the complexity of a landing or take-off procedure as the pilot has to consider the crosswind conditions to avoid an aircraft upset or runway excursion. It includes the preparation of the approach and landing and the take-off, and the information received on crosswind, either from external sources or from the aircraft systems. It also includes the certified capabilities of the aircraft type to perform the landing in crosswind conditions (limitations), the Standard Operating Procedures (SOPs) and training of the pilot. It also includes the accuracy of the measurement of the wind conditions and the relay of that information to the pilot prior to landing or take-off.

The 'Turbulence' safety issue (SI-4016) is transposed into the 'Crosswind' safety issue as many of the turbulence incidents occurred during the take-off or approach/landing phases of the flight.

Damage tolerance to UAS collisions (SI-4019)

Unmanned aircraft systems (UAS) are a growing airborne collision threat to manned aircraft due to their growing popularity among the public who may not be aware of UAS regulations. It is important to consider the structural tolerance of a general aviation aircraft to withstand impact with UAS and its ability to maintain controllability to enable a safe landing after a collision with a UAS. The damage tolerance has a direct relationship with the weight and size of the UAS.

Engine system reliability (SI-4012)

The reliability and handling of any hardware/software system on board the aeroplane is crucial for a safe flight. This issue is focused on the engine and its operation. Failure of any of these hardware/software systems can result in loss of power, leading to loss of control while the pilot is trying to solve the problem.

Fuel management in flight (SI-4011)

This safety issue includes the fuel planning, calculation, and the management once the flight has started. Examples are pre-flight visual fuel quantity inspections including test for water in the fuel, correct mixture leaning during the flight, correct use of fuel valves, pumps, and switches. Fuel management is important to ensure that there is sufficient fuel for the flight or different legs of the flight. Poor fuel management may result in high workload and stress for the flight crew as they have to look for alternate aerodromes/airfields to land at a short notice.

Handling of technical failures (SI-4001)

Pilots may suffer from non-catastrophic technical failure(s) in the aircraft systems from time to time. It is important for the pilot to have the ability and capability to manage such failures to avoid an aircraft upset. This includes, for example, handling of engine failures, flight control problems as well as failures in navigation systems. Occurrence data shows that the pilot's focus is often fixed on resolving the technical issue instead of flying the aircraft towards the safest landing site. This often results in loss of control and, potentially, fatal accidents.

Icing in flight (SI-0001) (CC effect)

Icing in flight may occur due to various reasons; however, this safety issue is focused on the manifestation of icing during flight caused by an atmospheric icing phenomenon. The typical manifestation is the accretion of ice on aerodynamic surfaces, probes, engine parts or flight control system, leading to degradation of handling quality or performance issues, system failures or malfunctions, or damages on the aeroplane's structure. When such icing occurs, it is important to ensure that the pilot is able to recognise and manage the flight in adverse icing

conditions. Aircraft specifically with carburettors are most prone to engine icing in flight. Proposed mitigations include the promotion of knowledge on icing conditions and how to handle the aircraft when icing occurs. This safety issue is captured in the Commercial Air Transport – Aeroplanes Safety Risk Portfolio.

Inadvertent flight into IMC/scud running (SI-4008)

A poorly executed planned low-altitude flight may result in the aircraft's collision with objects or surface. This includes also what is called 'scud running' where the pilot flies under low clouds close to the ground to reach their planned destination. This also captures 'press-on-it' mentality during a VFR flight where pilots put themselves into unnecessary danger trying to reach their destination.

Inappropriate control input (SI-4029)

Included in this safety issue are occurrences where inappropriate control input by the pilot was evident in the occurrence.

Inflight decision making (SI-4003)

To effectively respond to dynamic situations or changes during the flight, the pilot needs to possess the ability to correctly gather information and re-plan in flight. This includes decisions involving navigational matters, problem-solving and avoiding or recovering from low- or no-visibility conditions. This is exacerbated by social and commercial pressures (e.g. pressure from the passenger) to reach the planned destination, pushing the pilot to take unnecessary risks, instead of turning around and try another time. A wrong decision based on incorrect evaluation of the circumstances has caused fatal accidents. Proposed actions are to provide/promote education in the use of available information to enhance the decision-making process. This includes increasing the availability of information and simplifying the presentation of this information to the pilot to facilitate understanding.

Knowledge of aircraft systems and procedures (SI-4017)

This issue refers to the pilot's ability/inability to apply formerly acquired knowledge and training to the current event. This is evident when pilots fly aircraft that they do not have much experience on – i.e. transitional training has not been or inadequately performed resulting in incorrect actions causing even cascade of other problems and inadequate decision-making. It is important for pilots to understand the characteristics of the different systems on board the aircraft. Pilots who are proficient in their knowledge of systems should instinctively use the correct systems; otherwise, they may lose precious time in searching for the correct systems or use the wrong system.

Maintenance of GA aeroplanes (SI-4018)

This issue refers to aircraft maintenance performed incorrectly, or the lack thereof, leading to a technical occurrence or failure. This issue involves both certified technicians as well as GA pilots performing part of the aircraft maintenance in accordance with their training.

Mass and balance (SI-4014)

The mass and balance of the aircraft may be adversely affected by inadequate or incorrect loading of the aircraft by the pilot. GA pilots usually load their aircraft by themselves and do not use ground handling services. The objective is to improve the calculation of load and balance sheets and ensure that the baggage and cargo are securely fastened to prevent them from shifting and changing the aircraft's centre of gravity.

Operational communication (SI-4021)

Ineffective communication, including language proficiency (all languages), use of standard terminology, hand signals, visual communication, distraction from outer sources (e.g. mobile phones) are all factors that may lead to unsafe situations in the airside operational environment. In a well-functioning operational environment, individuals have the necessary skills to communicate effectively.

Other aircraft system reliability (SI-4028)

This issue refers to the reliability of all aircraft systems, other than the engine and propeller.

Risks associated with parachuting operations (SI-4023) (Amended)

Parachuting operations are flights which are specifically chartered/operated to transport parachutists (called 'skydivers' in sport parachuting) to a designated altitude for jumping out from the aircraft. These operations, usually entailing short flights, are exposed to a range of operational hazards that may relate to changes in weight and balance, possible interference of the parachute deployment devices with structural elements of the aircraft upon exit, insufficient communication between the pilot and the parachutists, non-adherence to SOPs leading to convergent aircraft descent- and free-falling parachutist trajectories (a risk in particular in the case of wing suit or large formation skydiving), etc. This type of operation may also be exposed to organisational hazards such as commercial pressure, lack of or inadequate safety briefings, inadequate monitoring of continuing airworthiness.

Poor pre-flight planning and preparation (SI-4007) (Amended)

Effective pre-flight planning and preparation is achieved by ensuring that the correct processes, tools, and information are used by the flight crew/operator to plan the flight. It includes the adequacy, accuracy and timeliness of the information used, how this is processed and digested by the flight crew, and their training and procedures. It includes the flight preparation steps before the flight is initiated.

Training, experience, and competence of individuals (SI-4004) (Amended)

This safety issue relates to the pilot's training, experience, and competence to handle the required tasks in flying the aircraft from engine start-up till engine shutdown, as well as their ability to address occurrences they may face during the flight. This issue also addresses training aspects and planning within training organisations.

7. Airworthiness – AIW (New)

While existing product-related safety risk portfolios, such as commercial air transport aeroplanes or rotorcraft, may have collected safety issues adversely affecting initial and continued airworthiness of the type design (including operational suitability data (OSD)), continuing airworthiness, and/or associated organisations/ competent authorities (i.e. design, production, continuing airworthiness management, maintenance), they were essentially flight operations centric.

An airworthiness safety risk portfolio is, therefore, being developed by the Agency to focus on safety issues related to airworthiness and environmental certification, and continuing airworthiness[8]. Integrating the lessons learnt from the B737 MAX accidents in the European safety risk management process and centralising airworthiness-related safety issues in one place, were instrumental in the decision to establish that portfolio.

Safety issues of interest for the airworthiness portfolio are expected to be defined where:

- they adversely affect more than one product type or part, more than one organisation, and/or more than one competent authority;
- they would not be controlled by selective and reactive mitigating controls, such as airworthiness directives (ADs), safety directives (SDs), or inspection findings;
- they are framed to scenarios mainly controlled by design, production, maintenance, continuing airworthiness management organisations, and their competent authorities.

The airworthiness safety risk portfolio is planned to contain:

- airworthiness-related safety issues already listed in existing safety risk portfolios, e.g. management of repetitive defects in safety critical systems (SI-0050), error mitigation by design (maintenance and production) (SI-3017), etc. These safety issues will be transposed into the airworthiness safety risk portfolio.
- safety issues built upon the lessons learnt from the B737 MAX accidents, e.g. insufficient consideration of flight crew human factors in functional hazard assessments (FHAs).
- candidate safety issues, e.g. environmental condition assumptions adversely affected by the climate change, errors resulting in common cause failures and cascading failures in critical aircraft functions, inadequate reporting amongst organisations.

The first edition of the airworthiness safety risk portfolio will be published as part of the next revision of EPAS Volume III.

8 In the context of Regulation (EU) No 748/2012 and Regulation (EU) No 1321/2014.

8. Air Traffic Management/ Air Navigation Services - ATM/ANS

The ATM/ANS Safety Risk Portfolio was first developed in 2017 by the Agency, in conjunction with the ATM/ANS Collaborative Analysis Group and has since been reviewed annually. Each safety issue contributes to one or more key risk areas as defined in the Introduction of this Volume.

Regarding the main key risk areas for this domain, refer to the EASA ASR 2021 Chapter 7 ATM /ANS Figure 132 'Key risk areas by aggregated ERCS score and number of risk-scored ATM/ANS occurrences'. These key risk areas are defined by their potential accident outcome and by the immediate precursors of that accident outcome. This figure is obtained by aggregating the ERCS score for the risk-scored occurrences relevant to this domain and plotting it against the number of risk-scored occurrences. The risk picture of this domain identifies the key risk areas of greater concern that are airborne collision, runway excursion, and aircraft upset.

The safety issues in the portfolio are sorted into the 'Assess – Elevated priority index', 'Assess – Normal-to-low priority index', 'Mitigate – define', 'Mitigate – implement', and 'Monitor' categories, which provide a snapshot of their status within the European SRM process by the priority. The safety issue prioritisation method is described in the Introduction of this Volume. To understand each safety issue better, please click on the safety issue in the list to access their description.

List 8-1: ATM/ANS safety issues per category & priority

Assess - Elevated priority index

Facilitates Step 2: Assessment of safety issue

- Undetected occupied runway (SI-2006)
- Mass diversions (SI-2032) (Amended) (CC effect)
- Airspace infringement (SI-2025)
- Airborne collision with an unmanned aircraft system (UAS) (SI-2014)

Assess - Normal-to-low priority index

Facilitates Step 2: Assessment of safety issue

- Level bust (SI-2004)
- High energy runway conflict (SI-2005)
- Deconfliction with aircraft operating with a malfunctioning or non-operative transponder (SI-2002)
- Inefficient conflict detection with the closest aircraft (SI-2003) (Amended)
- Landing/take-off/crossing without clearance (SI-2007)
- Safety issues raising from new technologies and automation (e.g. remote tower, SWIM) (SI-2015)
- Cybersecurity (SI-2013)
- Use of more than one language on frequency (SI-2029) (NEW)
- Failure of air-ground communication service (SI-2018) (Amended) (CC effect)
- Inaccurate provision of weather information (wind at low height) (SI-2009) (Amended)
- Inaccurate provision of weather information (turbulence/windshear/convective weather) (SI-2008) (Amended)

- Failure of surveillance service (SI-2017) (Amended) (CC effect)
- Failure of navigation service (SI-2016) (Amended) (CC effect)
- Airborne sector overload (SI-2019) (Amended) (CC effect)
- Lack of understanding and monitoring system performance interdependencies (SI-2022) (Amended)

Mitigate - define

Facilitates Step 3: Definition and programming of safety actions

- ACAS RA not followed (SI-2001)

Mitigate - implement

Facilitates Step 4: Implementation and follow-up of safety actions

- Airborne separation (SI-4010)
- Lack of effectiveness of safety management system (SI-2026) (Amended)

Monitor

Facilitates Step 5: Safety performance measurement

- ATCO-pilot operational communication (SI-2027)
- Inadequate procedure design and obstacle publication (SI-2028) (Amended)

ACAS RA not followed (SI-2001)

The anti-collision avoidance system (ACAS) is considered one of the last lines of defence in preventing an airborne collision. This safety issue pertains to the situations where the flight crew of one or both aircraft ignore the ACAS RA, react excessively late, do not follow the instruction regarding vertical rate precisely or respond in opposite direction. Flight crew are required to comply immediately with all resolution advisories (RAs), unless doing so would endanger the aircraft. Similarly, air traffic controllers (ATCOs) are required not to provide further air traffic control (ATC) instructions once the flight crew reports the RA. The appropriate responses which flight crew and ATCOs are expected to demonstrate in the event of an ACAS RA are outlined in ICAO and EU regulatory documentation.

Airborne collision with an unmanned aircraft system (UAS) (SI-2014)

The increasing popularity of drones, especially drones of less than 25 kg operating in the 'open' category, has inadvertently led to an increase of airborne collision risk between drones and manned aircraft. This is largely due to unauthorised activity of drones in both take-off and approach paths of commercial airlines up to 5 000 ft. While less common, unauthorised activity of drones may also pose a collision hazard when an aircraft is flying en-route. Authorised UAS operations in the 'specific' category may include UAS flights at altitudes at which other (manned) aircraft will fly, and therefore these could possibly pose risks as well. For example, failure of the UAS guidance and control system or degradation of technical systems supporting e-identification, geo-fencing, detect and avoid, (self)-separation or collision avoidance, could increase the risk of airborne collision with a UAS. Also, human factors (HF) issues and unintended remote pilot/operator errors could result in airspace violations, procedural deviations, and altitude deviations (thereby increasing the risk of airborne collision).

This safety issue is exacerbated by the fact that UAS are often not detected by ground equipment and/or on-board conspicuity devices of other aircraft.

As a result of a drone sighting, aerodrome traffic may be stopped or diverted, leading to secondary risks, such as fuel shortages, airspace capacity saturation and an increased workload of air traffic controllers and pilots.

Airborne sector overload (SI-2019) (Amended) (CC effect)

Sector overload refers to a complex situation where the ATCO on operational duty can no longer manage the existing levels of air traffic in a safe manner. As ATCOs are personnel responsible for the safe, orderly and expeditious flow of air traffic, it is important to address any situation which impairs the controller's ability to achieve the desired levels of safety. A complex situation may arise due to a confluence of external or internal factors. External factors include aircraft deviation from the planned trajectory, unexpected bad weather conditions, reduction of available airspace, amongst others. Internal factors include degradation of ATM system performance, parallel system maintenances, blocked runway, amongst others. When assessed individually, some of these contributory factors may have a minor impact on safety. However, when compounded, these factors may manifest in unsafe management of the traffic demand.

Airspace infringement (SI-2025)

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. Such infringements pose a safety risk to traffic within the controlled airspace and increase the air traffic controllers' workload. The safety issue addresses infringements by aircraft flying using VFR in controlled airspace (Class A to D), aircraft accessing airspace without ATC clearance, and infringements of restricted airspaces such as danger areas, restricted areas, prohibited areas and temporary segregated/reserved areas by all types of traffic.

Inadequate ATCO-pilot operational communication (SI-2027) (Amended)

Good communication between air traffic controllers (ATCOs) and flight crew is essential in ensuring clear understanding of instructions and maintaining situational awareness. ATCO-pilot communication deficiencies may lead to all types of serious incidents and accidents. Common issues include three or more instructions in a single clearance, incorrect use of standard phraseology, misuse of the aircraft emergency frequency (121.5 MHz), and the uncoordinated introduction of phraseology.

Inefficient conflict detection with the closest aircraft (SI-2003) (Amended)

Air traffic controllers (ATCOs) may not detect a conflict between one aircraft and another aircraft close to it due to attention failure. Attention is a limited resource and numerous processes compete for it. In blind spot events the needed elements of attention — vigilance (maintaining awareness) and focus (concentration on the task) — are adversely affected by:

(1) competition for the attention resources from other tasks, attempts to remember, increased mental workload; and

(2) erosion of the attention resources by filtering mechanisms and physiological factors like distraction and fatigue.

ATCOs usually experience this loss of separation 'blind spot' after an incorrect descent or climb clearance in the context of a rapidly developing situation. There is normally very little or no time to react and most of the conflicting clearances result in an incident. The scope of this safety issue is limited to controlled airspace. While airspace infringements may potentially result in a controller blind spot, these events are excluded from this safety issue as they are addressed in the 'Airspace Infringement (SI-2025)' safety issue.

Cybersecurity (SI-2013)

ATM systems have become increasingly digitalised to reap efficiency gains. However, a move towards the digital sphere exposes ATM systems to more vulnerabilities and threats to confidentiality, integrity and availability of

the systems. Given the strong interdependence of the different domains in the aviation industry, a cyberattack on ATM systems may compromise safety and integrity of the aviation system as a whole. In addition to terrorist-related attacks, the safety issue is concerned with how ATM systems can remain resilient in the face of attacks perpetrated by hackers to gain access to systems or cause disruption for non-terrorist purposes and attacks carried out for commercial espionage. Link with SI-5017 'Cyber attacks'.

Airborne separation (SI-4010)

Ineffective deconfliction of flights adhering to instrument flight rules (IFR) and visual flight rules (VFR) in an airspace class where at least one of the flights is not under air traffic control (ATC) separation has been identified as a strong contributor to airborne collision risk. Such airspace classes include class E, controlled airspace where VFR flights are not subject to ATC clearance and no IFR-VFR separation is provided by ATC, and class G, where neither IFR flights nor VFR flights are subject to ATC clearance and ATC does not provide any separation service. The safety issue arises due to the fragmented knowledge of the traffic situation as some traffic is subject to ATC clearance (i.e. IFR) and some traffic is not (i.e. VFR). ATC may not be aware of VFR flights or their intentions and potentially may not pass traffic information to the IFR traffic. In addition, some of the VFR traffic may not be equipped with airborne collision avoidance system (ACAS) or even a transponder (C or mode-S), reducing the conspicuity of VFR traffic. As a result, both IFR and VFR traffic have to rely solely on the visual acquisition by the flight crew to maintain separation. This safety issue addresses how the conspicuity of VFR traffic can be improved as well as best practices to underscore the importance of existing procedures in maintaining airborne separation. This safety issue is captured in the Non-Commercial Operations – Small Aeroplanes Safety Risk Portfolio and is also relevant to the Commercial Air Transport – Aeroplanes domain. Link with SI-4010 of the NCO SA portfolio and SI-0043/SI-4010 in the CAT A portfolio.

Deconfliction with aircraft operating with a malfunctioning/non-operative transponder (SI-2002)

When an aircraft with a non-operative transponder or malfunctioning transponder operates in an airspace where aircraft must be equipped with a secondary surveillance radar (SSR) transponder, the incorrect information transmitted by the transponder increases the risk of airborne collision or terrain collision. Without a functioning transponder, ATC may be misled by the incorrect data on the aircraft's position, and this may result in ATC issuing a clearance which poses a safety risk to another aircraft or to the aircraft itself if the clearance directs it into a terrain e.g. a mountain. As the operation of ACAS is contingent on a functioning transponder, other nearby aircraft will not be able to receive traffic advisories or RAs to maintain separation with the aircraft without a functioning transponder should the need arise. This safety issue explores the frequency of such occurrences and whether the existing procedures suffice in mitigating the risk posed by aircraft operating without a functioning transponder.

Failure of air-ground communication service (SI-2018) (Amended) (CC effect)

Failure of the air–ground communication system may degrade the performance of the communications service and increase safety risk to an unacceptable level. Air–ground communication refers to aeronautical fixed and mobile services to enable air-to-ground voice or data communication for air traffic control (ATC) purposes. Common failures in voice communications include radio equipment malfunction (in the air and on the ground), loss of communication, blocked frequency, radio interference, and sleeping VHF receiver problem. Another key mode of the air–ground communication service is controller–pilot data link communications (CPDLC), which allows air traffic controllers to transmit non-time-critical messages to an aircraft as an alternative to voice communications. Common failures in CPDLC include technical failure of the data link equipment (air and ground) and disconnections known as 'provider aborts'. This safety issue explores how such failures can be prevented using pre-emptive measures and the best practices to manage such failures on a tactical basis when they occur. The impact of the failure of air–ground communication service includes the entire provision of air traffic service (ATS).

Failure of navigation service (SI-2016) (Amended) (CC effect)

Failure of the navigation service can lead to the loss of the facilities and services (VOR, DME, ILS, GNSS, NDB) that support aircraft with positioning and time, and thus increase safety risk to an unacceptable level.

This could potentially lead to the situation that the crew does not know the correct position of the aircraft, or the indicated position is not correct. This could lead to the overload of the air traffic controllers when they are required to provide the missing information verbally or via the system. For example, a corrupted/interrupted ILS signal can lead to an unstabilised approach, go-around, and even CFIT.

This safety issue covers appropriate maintenance, procedures to identify failures and their impact on ATS, procedures to operate in degraded modes of operation, and training of staff to deal with abnormal situations.

Failure of surveillance service (SI-2017) (Amended) (CC effect)

Failure of the surveillance service may degrade the performance of ATS and increase safety risk to an unacceptable level. Surveillance systems are used by air traffic control to determine the respective positions of aircraft to allow safe separation. Such systems include PSR, SSR, GNSS and Automatic Dependent Surveillance – Broadcast (ADS-B), Wide Area Multilateration (WAM) and systems for processing and displaying surveillance data.

Effective management of these systems is essential in minimising the impact on ATS. This safety issue covers appropriate maintenance, procedures to identify failures and their impact on ATS, procedures to operate in degraded modes of operation, and training of staff to deal with abnormal situations.

High-energy runway conflict (SI-2005)

A high-energy runway conflict occurs when there is little or no time for the air traffic controllers to react to a potential conflict between a high-energy landing (indicated airspeed (IAS) of 100 knots or more) or take-off (IAS of 80 knots or more) and an aircraft which has infringed an active runway, which is also known as a runway incursion. Runway incursion is defined as any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for the landing and take-off of aircraft. Thus, this safety issue addresses a specific subset of runway incursions.

Inaccurate provision of weather information (turbulence/windshear/convective weather) (SI-2008) (Amended)

Inaccurate or missing weather information on weather phenomena such as turbulence, windshear, and convective weather on board the aircraft (flight crew) and on ground (ATCOs) may lead to aircraft flying through weather phenomena without warning. Depending on the severity of the weather phenomena, passengers or cabin crew may sustain injuries on board. This safety issue is focused on IFR flights in the en-route/approach environment, where improvement in the provision of meteorological information will enable controllers to better manage traffic flows and pass weather information to pilots.

Inaccurate provision of weather information (wind at low height) (SI-2009) (Amended)

The landing phase is considered one of the highest-risk phases of flight due to the high cockpit workload and execution of difficult tasks such as the landing flare. Weather information near the surface of the runway such as tail wind on ground and cross wind is crucial to assist flight crew during the landing phase. Inaccurate weather information may contribute to non-stabilised approaches and increase the risk of runway excursions. As this topic spans across several aviation domains, the scope of this safety issue is focused on the ANSPs' and ATC's role in ensuring that accurate and timely weather information is provided to flight crew during the landing phase.

Inadequate procedure design and obstacle publication (SI-2028) (Amended)

With the advent of new navigation systems, the design of instrument flight procedures (IFPs) and its publications have become key enablers of the ATM system globally. They must therefore be managed to ensure that quality-assured procedures are provided in support of ATM operations. Poorly designed IFPs can increase the risk of loss of separation, level bust and CFIT. In addition to well-designed IFPs, it is also essential to ensure that information relating to the IFP is accurate and updated in a timely manner. This reduces potential discrepancies during the take-off/approach of the flight.

Lack of effectiveness of safety management system (SI-2026)

Ineffective implementation of safety management systems may lead to deficient management of ATM/ANS risks within the service provider organisations. The complex nature of aviation safety and the significance of addressing HF aspects justify the need for an effective management of safety by the aviation organisations. Shared understanding between regulatory/competent authorities and air navigation service providers is imperative for an effective SMS functioning in an already ultra-safe industry, like aviation. However, the lack of competent and experienced inspectors and regulatory authorities lead to the risk of bureaucratising SMS seeing it only as a compliance system. This safety issue covers the regulatory requirements and promotion of SMS principles, on both aviation authorities and organisations, and the capability to detect and anticipate new emerging threats and associated challenges. This safety issue is mitigated through the SES Performance and Charging Scheme'.

Lack of understanding and monitoring system performance interdependencies (SI-2022) (Amended)

The safety performance of the ANSPs can be affected by a multitude of internal and external factors. While most ANSPs are adept at managing the safety hazards related to their provision of services, it is also important to consider the impact of external factors such as commercial pressure and demands related to increasing capacity and environmental protection on the safety performance of ANSPs. It is important to strike a balance between the competing priorities of safety, efficiency, capacity and environment protection, especially in view of limited resources in most ANSPs. To understand such trade-offs better, regulators and ANSPs should analyse safety performance using a dynamic safety model, such as Rasmussen's Migration Model, and develop guidelines to prevent ANSPs from drifting towards unsafe operations under the influence of competing priorities. Metrics related to factors that have not been traditionally linked to safety performance can be developed to monitor this practical drift and serve to provide 'weak signals' in ATM safety performance.

Landing/take-off/crossing without clearance (SI-2007)

Aircraft landing, taking-off and crossing runways without clearance from the air traffic controller (ATCO) poses a significant runway collision risk. Such events typically happen during critical and high-workload stages of the flight and can result in similar hazardous outcomes, such as runway incursion and runway collision. The safety issue covers contributory factors from both the flight crew and ATCOs ranging from call sign confusion, runway confusion, incorrect phraseology and expectation bias to cockpit overload.

Level bust (SI-2004) (Amended)

Level bust is defined as any unauthorised vertical deviation of more than 300 ft from an ATC flight clearance. Within reduced vertical separation minima (RVSM) airspace, this limit is reduced to 200 ft. Level bust contributes towards the airborne collision and CFIT key risk areas when the aircraft fails to fly at the level to which it has been cleared. Such events may occur due to communication error, flight crew error in entering the clearance in the flight control unit and insufficient time for the flight crew to react to a late re-clearance.

Mass diversions (SI-2032) (Amended) (CC effect)

Mass diversions due to airspace and/or airport closure have pervasive repercussions on various aviation domains, ranging from ATC to flight operations, due to their extensive nature. The large amount of displaced traffic results in an overload for ATC and increase workload for the flight crew. This carries the potential for loss of separation as well as other risks related to high-workload tasks and situational awareness. This safety issue covers policies regarding fuel emergencies, air traffic flow management, ensuring that alternate aerodromes have sufficient capacity, and diversions from many airports to one.

Safety issues raising from new technologies and automation (SI-2015) (Amended)

This safety issue refers to the potential increase in safety risks due to the complexities arising from the introduction of new technology and concepts in ATM such as remote tower operations and system wide information management (SWIM). With more complex automation, it is important to address the relationship between humans and automation within the framework of a contemporary safety management system.

Undetected occupied runway (SI-2006)

This safety issue pertains to runway incursions by an aircraft landing on or taking-off from an already occupied runway. This could be due to oversight by air traffic controllers, aerodrome design or other organisational factors. Especially during periods of high workload, the controller may accidentally clear an aircraft or a vehicle to enter a runway even though they had already cleared another aircraft to land on or take-off from the same runway. Aerodrome design is also another key contributor to this safety issue as flight crew or manoeuvring area vehicle drivers may navigate onto the wrong surface if the design of the aerodrome may lead to disorientation.

Use of more than one language on frequency (SI-2029) (New)

This safety issue refers to the risk that occurs when using different languages at the same time on the ATC frequency. Despite that the default language of international aviation worldwide is English, local languages are used concurrently for air–ground communication. Under certain circumstances, pilots might prefer to use their native language to address controllers and controllers might address ground personnel in their native language. Having several aircraft on one frequency, the result might be that certain aircrews do not understand clearances given to an aircraft in the same airspace and the responses of the aircrew. Therefore, the aircrew might not be aware of what the other aircrew is about to do. This can lead to the loss of situational awareness of the involved parties with regard to the respective other traffic in the same airspace.

9. Aerodromes and groundhandling – ADRM/GH

The Aerodromes and Groundhandling Safety Risk Portfolio was first developed in 2017 by the Agency, in conjunction with the Aerodromes and Groundhandling Collaborative Analysis Group. Due to the temporary discontinuation of this Collaborative Analysis Group in 2022, this safety risk portfolio could only be updated partially this year. Each safety issue contributes to one or more key risk areas as defined in the Introduction of this Volume.

Regarding the main key risk areas for this domain, refer to the EASA ASR 2022 Chapter 6 Aerodromes and ground-handling Figure 114 'Key risk areas by aggregated ERCS score and number of risk-scored occurrences involving aerodromes and groundhandling'. These key risk areas are defined by their potential accident outcome and by the immediate precursors of that accident outcome. This figure is obtained by aggregating the ERCS score for the risk-scored occurrences relevant to this domain and plotting it against the number of risk-scored occurrences. The risk picture of this domain identifies the key risk areas of greater concern that are aircraft upset and ground damage.

The safety issues in the portfolio are sorted into the 'Assess – Elevated priority index', 'Assess – Normal-to-low priority index', 'Mitigate – define', 'Mitigate – implement', and 'Monitor' categories, which provide a snapshot of their status within the European SRM process by the priority. The safety issue prioritisation method is described in the Introduction of this Volume. To understand each safety issue better, please click on the safety issue in the list to access their description.

➨ List 9-1: Aerodromes and Groundhandling safety issues per category & priority

Assess - Elevated priority index

Facilitates Step 2: Assessment of safety issue

- Coordination and control of turnarounds (SI-1010)

Assess - Normal-to-low priority index

Facilitates Step 2: Assessment of safety issue

- Ground staff movement around aircraft (SI-1019)
- Parking and positioning of aircraft (SI-1026)
- Serviceability of runways/taxiways (SI-1032)
- Operation of vehicles (and other motorised GSE) (SI-1025)
- Worker fatigue leading to human error (SI-1039)
- Runway/taxiway design and layout (SI-1029)
- Aircraft movement under its own power (SI-1001)
- Design of ground equipment (non-motorised) (SI-1013)
- Unreported events (SI-1038)
- Load sheets and other documentation/systems (SI-1022)
- Bird/wildlife control (SI-1005)

- Serviceability of ground support equipment (non-motorised) (SI-1033)
- Design of vehicles (motorised GSE) (SI-1014)
- Apron/stand design and layout (SI-1003)
- Serviceability of vehicles (motorised GSE) (SI-1034)
- Control of passengers on the apron (SI-1009)
- Ground operations in extreme temperatures (SI-1044) (CC effect)
- Operation of ground support equipment (non-motorised) (SI-1024)
- Positioning and securing of ground support equipment (SI-1027)
- Control of airside works (SI-1008)
- Pushback operations (SI-1028)

Mitigate - define

Facilitates Step 3: Definition and programming of safety actions

- Baggage and cargo loading in passenger aircraft (SI-1004)

Mitigate - implement

Facilitates Step 4: Implementation and follow-up of safety actions

- Operation of air bridges/passenger boarding bridges (PBBs) (SI-1023)

Monitor

Facilitates Step 5: Safety performance measurement

- Cargo loading in cargo aircraft (SI-1006)
- Dangerous goods handling and lithium batteries (SI-1011)
- Fuelling operations (SI-1017)
- Aircraft towing (SI-1002)
- Jet blast (SI-1021)
- Ground operations in high winds, rain, thunderstorms (SI-1042) (CC effect)
- Serviceability of apron/stand (SI-1031)
- Ground operations in low-visibility conditions (SI-1018)
- Ground operations in snow/ice conditions (SI-1043) (CC effect)
- Emergency/abnormal operations (SI-1015)
- Terminal design and layout (SI-1035)

Aircraft movement under its own power (SI-1001)

The management, handling or coordination of aircraft movement under its own power may lead to damage and/or injuries. Aircraft movements under its own power should be correctly managed and coordinated to ensure safe operations. This safety issue covers all potential events that may occur when the aircraft is moving under its own power, such as collisions with ground vehicles, ground equipment and ground infrastructure, injuries and damage due to jet blast and potential foreign object debris (FOD) ingestion in aircraft engines.

Aircraft towing (SI-1002)

The forward movement of an aircraft, usually with engines off, using the power of a specialised ground vehicle attached to or supporting the nose landing gear. It includes both towing performed with nose gear elevation (towbarless, no person in cockpit), as well as towing with towbar (person in cockpit). This safety issue covers all potential events that may occur when the aircraft is being towed, such as collisions with ground vehicles, ground equipment and ground infrastructure, damage to the towing vehicle and/or towing equipment and injuries to towing personnel. In this safety issue, towing operation out of a parking position (pushback) is not included – this is addressed in Pushback operations (SI-1028).

Apron/stand design and layout (SI-1003)

Effective apron/stand design and layout is crucial in ensuring safe operations during aircraft taxiing, aircraft parking and loading/unloading of baggage. Poor design and layout may induce the potential for collisions, aircraft damage, and injuries. Important factors to consider are placement and marking of designated areas for parking of ground equipment, proximity to adjacent stands/buildings/structures, evaluation of needed space against the minimum required space, etc.

Baggage and cargo loading in passenger aircraft (SI-1004)

Inadequate management or handling of the baggage and cargo loading process may lead to ground damage or other safety repercussions. Baggage and cargo loading is correctly managed and handled to ensure that. The issue relates to the inadequate management or handling of the baggage and cargo loading process which may result in a significant change in the centre of gravity of the aircraft or the actual weight of the aircraft without the flight crew becoming aware. This safety issue includes the procedures, training and equipment provided to the groundhandling personnel to perform their duties. It also includes the coordination with other actors (dispatch, flight crews, etc.).

Bird/wildlife control (SI-1005)

Insufficient control of birds and wildlife may lead to either damage to the aircraft or loss of control during take-off or landing. By understanding bird and wildlife habitats in detail, airport operators can develop and implement bird and wildlife hazard management plans to manage such activity in and around the aerodrome, thereby minimising the risk for bird strikes and bird ingestions in engines, which may lead to critical situations during take-off/climb and approach/landing.

Cargo loading in cargo aircraft (SI-1006)

The management or handling of the cargo loading process that may lead to ground damage or other safety repercussions. Cargo loading is correctly managed and handled to ensure that all activities are carried out effectively in accordance with relevant regulations, procedures and processes. The issue relates to the inadequate management or handling of the cargo loading process, which may result in a significant change in the centre of gravity of the aircraft or the actual weight of the aircraft without the flight crew becoming aware. This safety issue includes the procedures, training and equipment provided to the groundhandling personnel to perform their duties. It also includes the coordination with other actors (dispatch, flight crews, etc.).

Control of airside works (SI-1008)

Improper supervision, coordination and control of airside works may lead to aircraft damage and/or injuries. Airside works are properly supervised, coordinated, and controlled to ensure safe operations. This safety issue covers all potential events that may occur where airside works are involved, such as ingestion of FOD produced by construction equipment/material, aircraft collisions with vehicles/equipment, etc.

Control of passengers on the apron (SI-1009)

Insufficient control of passengers on the apron or any other operational area of the aerodrome or airport. If passengers move outside of designated areas on the apron, the risk of sustaining injuries increases. In a well-functioning operation, passengers are correctly controlled between leaving the terminal and entering the aircraft and vice versa.

Coordination and control of turnarounds (SI-1010)

Inadequate management or coordination of the turnaround process, covering the period from leaving the centre line of the taxiway until the aircraft leaves under its own power. This includes the non-application or incorrect application of procedures due to mismanagement, in particular those relating to loading and off-loading of passengers and cargo, fuelling operations or those involving coordination with other entities (such as the aerodrome operator or other handling companies).

Dangerous goods handling and lithium batteries (SI-1011)

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 may lead to an aircraft environment incompatible with human life. In a well-functioning system, dangerous goods and lithium battery handling is correctly identified and managed to ensure that all activities are carried out effectively in accordance with relevant regulations, procedures and processes.

Design of ground equipment (non-motorised) (SI-1013)

This safety issue covers the design of non-motorised airport ground support equipment (GSE) including steps, baggage trollies/dollies. If the design of the equipment is not fit for purpose, it may lead to damage and/or injuries. Effective design of non-motorised airport GSE will prohibit occurrences where damage and/or injuries are sustained due to improper design of the ground equipment.

Design of vehicles (motorised GSE) (SI-1014)

This safety issue covers the design of motorised airport GSE including belt loaders, baggage trucks, catering trucks, fuel bowsers and pushback equipment, etc. If the design of the equipment is not fit for purpose, it may lead to damage and/or injuries. Effective design of motorised airport GSE will prohibit occurrences where damage and/or injuries are sustained due to improper design of the ground equipment.

Emergency/abnormal operations (SI-1015)

The supervision, coordination and control of emergency/abnormal operations may lead to damage, injuries, and/or impaired responses to emergencies. In a well-functioning operational environment, emergency/abnormal operations are properly supervised, coordinated, and controlled to ensure safe operations.

Fuelling operations (SI-1017)

This safety issue covers the management and handling of the aircraft refuelling process and its coordination/oversight. In a well-functioning operational environment, fuelling operations are correctly managed to ensure that all activities are carried out effectively in accordance with relevant regulations, procedures and processes. Adherence to the procedures and communication with crew (flight/cabin) during fuelling with pax on board or during embarking/disembarking are important factors to avoid fire, spillage, contamination, misfuelling and incorrect fuel load and fuel quality, etc.

Ground operations in extreme temperatures (SI-1044) (CC effect)

Negative effects of extreme temperatures (high or low) on ground operations may lead to unsafe situations in the airside operational environment. In a well-functioning operational environment, the effective handling and management of ground operations in extreme temperatures will mitigate the risks of unsafe situations.

Ground operations in high winds, rain, thunderstorms (SI-1042) (CC effect)

Negative effects of high winds, intense rain, thunderstorms on ground operations may lead to unsafe situations in the airside operational environment, such as equipment malfunctions (e.g. non-functioning windscreen wipers on vehicles) or equipment caught by winds, as well as danger of staff and/or passengers being struck by lightning. In a well-functioning operational environment, the effective handling and management of ground operations in high winds, intense rain, thunderstorms, etc. will mitigate the risks of unsafe situations.

Ground operations in low-visibility conditions (SI-1018)

Negative effects of low visibility in ground operations may lead to unsafe situations in the airside operational environment. In a well-functioning operational environment, the effective handling and management of ground operations in low-visibility conditions will mitigate the risks of unsafe situations.

Ground operations in snow/ice conditions (SI-1043) (CC effect)

Negative effects of winter conditions on ground operations may lead to unsafe situations in the airside operational environment. In a well-functioning operational environment, the effective handling and management of ground operations in winter conditions will mitigate the risks of unsafe situations.

Ground staff movement around aircraft (SI-1019)

This safety issue covers the movement of personnel that takes place around an aircraft during the turnaround process, especially 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. In a well-functioning operational environment, ground staff are able to move safely around the aircraft without the risk of injuries whilst being aware of the risks involved.

Jet blast (SI-1021)

This safety issue covers the management of ground running or taxi patterns, which may lead to injuries or damage due to jet blast. In a well-functioning operational environment, ground running and taxi patterns are properly managed to mitigate the consequences of jet blast.

Load sheets and other documentation/systems (SI-1022)

This safety issue covers errors and omissions in load systems and documentation or systems for recording loading of aircraft. Errors in the load sheets and other documentation can lead to incorrect pre-flight calculations of flight parameters, which may put the aircraft in an unsafe state. In a well-functioning operational environment, the completion and reconciliation of load sheets and other documentation or systems for recording loading of aircraft are carried out properly.

Operation of air bridges/passenger boarding bridges (PBBs) (SI-1023)

This safety issue covers the operation of air bridges or passenger boarding bridges (PBBs), which, if done incorrectly, may lead to collisions between aircraft and PBBs or injuries to personnel or passengers. In a well-functioning operational environment, the operation of air bridges follows effective user training and the correct use of effective procedures and processes.

Operation of ground support equipment (non-motorised) (SI-1024)

This safety issue covers the operation of non-motorised ground support equipment (GSE) on the aerodrome movement area, which, if done incorrectly, may lead to collisions between aircraft and non-motorised GSE or injuries to personnel or passengers. In a well-functioning operational environment, the operation of non-motorised GSE follows effective user training and the procedures and processes are applied correctly and effectively.

Operation of vehicles (and other motorised GSE) (SI-1025)

This safety issue covers the operation of vehicles/motorised ground support equipment (GSE) on the aerodrome movement area, which, if done incorrectly, may lead to collisions between aircraft and vehicles/motorised GSE or injuries to personnel or passengers. In a well-functioning operational environment, the operation of vehicles/motorised GSE follows effective user training and the procedures and processes are applied correctly and effectively.

Parking and positioning of aircraft (SI-1026)

This safety issue covers the procedures and processes of marshalling, parking or positioning of aircraft which, if done incorrectly, may to lead to damage or injuries. It includes issues related to visual parking aids, manual marshalling and stand allocation. In a well-functioning operational environment, aircraft are marshalled, parked and positioned on an aerodrome such that sufficient clearance from other aircraft and objects is ensured.

Positioning and securing of ground support equipment (SI-1027)

This safety issue covers the positioning or inadequate securing of ground support equipment (GSE) such as baggage trolleys/dollies, unit load devices (ULDs), steps, etc. when they are not in use. If done incorrectly, GSE may be blown around the apron due to bad weather, jet blast or other external influence and consequently, cause damage to aircraft or injuries to passengers or personnel. In a well-functioning operational environment, GSE is parked in designated areas and properly secured in order to prevent it from being blown around the apron.

Pushback operations (SI-1028)

This safety issue covers the management, handling and coordination of the pushback, which, if done incorrectly, may lead to collisions with other aircraft or ground vehicles/equipment and/or injuries to ground personnel. In a well-functioning operational environment, pushbacks are correctly managed and coordinated to ensure safe operations.

Runway/taxiway design and layout (SI-1029)

Complex runway/taxiway design and layouts may induce a higher probability of runway incursions or the potential for collisions and aircraft damage. In a well-functioning environment, the design of runways/taxiways minimises the likelihood of incursions and/or collisions.

Serviceability of apron/stand (SI-1031)

This safety issue covers the serviceability and maintenance of aprons/stands which, if not performed correctly, may lead to collisions, damage, and/or injuries. In a well-functioning operational environment, the serviceability and maintenance of aprons/stands are performed effectively and thus facilitate safe operations at aprons/stands.

Serviceability of ground support equipment (non-motorised) (SI-1033)

This safety issue covers the serviceability and maintenance of non-motorised airport ground support equipment (GSE) including steps, baggage trollies/dollies, ULDs, which, if not performed correctly, may lead to damage and/or injuries. In a well-functioning operational environment, the serviceability and maintenance of non-motorised airport GSE are performed effectively and thus facilitate safe operations of non-motorised airport GSE.

Serviceability of runways/taxiways (SI-1032)

This safety issue covers the serviceability and maintenance of runways/taxiways which, if not performed correctly, may lead to collisions, damage, and/or injuries. In a well-functioning operational environment, the serviceability and maintenance of runways/taxiways are performed effectively and thus facilitate safe operations on runways and taxiways.

Serviceability of vehicles (motorised GSE) (SI-1034)

This safety issue covers the serviceability of vehicles/motorised airport ground support equipment (GSE) including belt loaders, baggage trucks, catering trucks, fuel bowsers and pushback equipment, etc. which, if not done correctly, may cause damage and/or injuries. In a well-functioning operational environment, the serviceability and maintenance of vehicles/motorised airport GSE are performed effectively and thus facilitate safe operations of vehicles/motorised GSE.

Terminal design and layout (SI-1035)

When planning and (re-)designing the airport, terminal design and layout problems may induce the potential for collisions, aircraft damage, and injuries. In a well-functioning risk-based design process, the design and placement of terminals are done effectively, thereby minimising the likelihood of taxiway incursions, injuries, and/or collisions.

Unreported events (SI-1038)

In a non-functioning or badly functioning operational environment, events go unreported due to fear of repercussions, lack of awareness of and training on occurrence reporting and just/learning culture, etc. In particular, damages to composite structures tend to be under-reported as such damage, which sometimes can be significant and may not be visible on the surface. In a well-functioning operational environment, the just culture within the organisation facilitates the accurate reporting of events by ground staff to ensure that an assessment is carried out.

Worker fatigue leading to human error (SI-1039)

The inability to recruit and retain groundhandling staff is leading to staff shortages, long working hours and an ageing workforce. In the long term, if left unchecked, commercial growth and expectations will exceed human resources, resulting in unsustainable operations with possible safety-critical impact on flight safety due to human error.

Appendix A — link between safety issues and key risk areas they are contributing to

Portfolio	SI ID	Safety Issue Title	All	Airborne Collision	Aircraft Upset	Collision on Runway	Ground Damage	Obstacle Collision in Flight	Excursion	Terrain Collision	Security	Fire, smoke and pressurisation	Other Injuries
ADRM&GH	SI-1001	Aircraft movement under its own power					✔						
ADRM&GH	SI-1002	Aircraft towing					✔						
ADRM&GH	SI-1003	Apron/stand design and layout					✔						
ADRM&GH	SI-1004	Baggage and cargo loading in passenger aircraft					✔						
ADRM&GH	SI-1005	Bird/Wildlife control			✔								
ADRM&GH	SI-1006	Cargo loading in cargo aircraft			✔								
ADRM&GH	SI-1008	Control of airside works					✔						
ADRM&GH	SI-1009	Control of passengers on the apron											✔
ADRM&GH	SI-1010	Coordination and control of turnarounds			✔								
ADRM&GH	SI-1011	Dangerous goods handling and lithium batteries										✔	
ADRM&GH	SI-1013	Design of ground equipment (non-motorised)			✔								
ADRM&GH	SI-1014	Design of vehicles (motorised GSE)					✔						
ADRM&GH	SI-1015	Emergency/abnormal operations					✔						

Portfolio	SI ID	Safety Issue Title	All	Airborne Collision	Aircraft Upset	Collision on Runway	Ground Damage	Obstacle Collision in Flight	Excursion	Terrain Collision	Security	Fire, smoke and pressurisation	Other Injuries
ADRM&GH	SI-1017	Fuelling operations										✔	
ADRM&GH	SI-1044	Ground operations in extreme temperatures					✔						
ADRM&GH	SI-1042	Ground operations in high winds, rain, thunderstorms					✔						
ADRM&GH	SI-1018	Ground operations in low visibility conditions										✔	
ADRM&GH	SI-1043	Ground operations in snow/ ice conditions							✔				
ADRM&GH	SI-1019	Ground staff movement around aircraft											✔
ADRM&GH	SI-1021	Jet blast					✔						
ADRM&GH	SI-1022	Load sheets and other documentation/systems			✔								
ADRM&GH	SI-1023	Operation of Air Bridges/ Passenger Boarding Bridges (PBB)					✔						
ADRM&GH	SI-1024	Operation of ground support equipment (non-motorised)					✔						
ADRM&GH	SI-1025	Operation of vehicles (and other motorised GSE)					✔						
ADRM&GH	SI-1026	Parking and positioning of aircraft					✔						
ADRM&GH	SI-1027	Positioning and securing of ground support equipment					✔						
ADRM&GH	SI-1028	Pushback operations					✔						
ADRM&GH	SI-1029	Runway/taxiway design and layout					✔						

Portfolio	SI ID	Safety Issue Title	All	Airborne Collision	Aircraft Upset	Collision on Runway	Ground Damage	Obstacle Collision in Flight	Excursion	Terrain Collision	Security	Fire, smoke and pressurisation	Other Injuries
ADRM&GH	SI-1031	Serviceability of apron/stand					✔						
ADRM&GH	SI-1033	Serviceability of ground support equipment (non-motorised)					✔						
ADRM&GH	SI-1032	Serviceability of runways/ taxiways							✔				
ADRM&GH	SI-1034	Serviceability of vehicles (motorised GSE)					✔						
ADRM&GH	SI-1035	Terminal design and layout					✔						
ADRM&GH	SI-1038	Unreported events			✔								
ADRM&GH	SI-1039	Worker fatigue leading to human errors			✔								
ATM/ANS	SI-2001	ACAS RA not followed		✔									
ATM/ANS	SI-2014	Airborne Collision with Unmanned Aircraft System (UAS)		✔									
ATM/ANS	SI-2019	Airborne sector Overload (CC)		✔									
ATM/ANS	SI-2025	Airspace Infringement		✔									
ATM/ANS	SI-2013	Cyber Security		✔									
ATM/ANS	SI-2002	Deconfliction with aircraft operating with malfunctioning or non-operative transponder		✔									
ATM/ANS	SI-2018	Failure of Air-Gound Communication Service (CC)	✔										

Portfolio	SI ID	Safety Issue Title	All	Airborne Collision	Aircraft Upset	Collision on Runway	Ground Damage	Obstacle Collision in Flight	Excursion	Terrain Collision	Security	Fire, smoke and pressurisation	Other Injuries
ATM/ANS	SI-2016	Failure of Navigation Services (CC)		✔									
ATM/ANS	SI-2017	Failure of Surveillance Services (CC)		✔									
ATM/ANS	SI-2005	High Energy Runway Conflict				✔							
ATM/ANS	SI-2008	Inaccurate provision of weather information (turbulence/windshear/ convective weather)				✔							
ATM/ANS	SI-2009	Inaccurate provision of weather information (wind at low height)				✔							
ATM/ANS	SI-2027	Inadequate ATCO-pilot operational communication		✔									
ATM/ANS	SI-2028	Inadequate procedure design and obstacle publication								✔			
ATM/ANS	SI-2003	Inefficient conflict detection with closest aircraft		✔									
ATM/ANS	SI-2026	Lack of effectiveness of Safety Management System	✔										
ATM/ANS	SI-2022	Lack of understanding and Monitoring system performance interdependencies		✔									
ATM/ANS	SI-2007	Landing/take off/crossing without a clearance				✔							
ATM/ANS	SI-2004	Level Bust		✔									
ATM/ANS	SI-2032	Mass Diversion			✔								
ATM/ANS	SI-2029	More than one language on frequency											

Portfolio	SI ID	Safety Issue Title	All	Airborne Collision	Aircraft Upset	Collision on Runway	Ground Damage	Obstacle Collision in Flight	Excursion	Terrain Collision	Security	Fire, smoke and pressurisation	Other Injuries
ATM/ANS	SI-2015	Safety issues raising from new technologies and automation (e.g. remote tower, SWIM, etc)	✔										
ATM/ANS	SI-2006	Undetected occupied runway				✔							
CAT A	SI-0003A	Adverse Convective Weather - Hail			✔								
CAT A	SI-0003	Adverse Convective Weather (Turbulence, Hail, Lightning, ice)			✔								
CAT A	SI-0014	Alignment with wrong runway							✔				
CAT A	SI-0007	Approach path management							✔				
CAT A	SI-0045	Bird/Wildlife Strikes			✔								
CAT A	SI-0027	Carriage and Transport of Lithium Batteries											✔
CAT A	SI-0018	Clear Air Turbulence (CAT) and Mountain Waves			✔								
CAT A	SI-0053	Congestion/interference of the Electromagnetic Spectrum (5G)	✔										
CAT A	SI-0009	Crew Resource Management (CRM)	✔										
CAT A	SI-0043/ SI-4010	Deconfliction of IFR and VFR traffic		✔									
CAT A	SI-0047	Disruptive Passenger											✔
CAT A	SI-0041	Effectiveness of Safety Management	✔										

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Portfolio	SI ID	Safety Issue Title	All	Airborne Collision	Aircraft Upset	Collision on Runway	Ground Damage	Obstacle Collision in Flight	Excursion	Terrain Collision	Security	Fire, smoke and pressurisation	Other Injuries
CAT A	SI-0042	Emergency evacuation											✔
CAT A	SI-0051	Encoding of Required navigation performance approaches (RNP APP) in Flight Management Systems (FMS)	✔										
CAT A	SI-0015	Entry of Aircraft Performance Data			✔								
CAT A	SI-0028	Excessive Speed in Manoeuvring Area											✔
CAT A	SI-0048	Explosive Door Openings on Parked Aeroplanes											✔
CAT A	SI-0035	False or Disrupted ILS Signal Capture								✔			
CAT A	SI-0039	Fatigue (FTL)	✔										
CAT A	SI-0049	Flight Crew Incapacitation [considering Single Pilot Operations (SPO) or Reduced Crew Operations (RCO)]	✔										
CAT A	SI-0011	Fuel Contamination and quality			✔								
CAT A	SI-0025	Fuel Management			✔								
CAT A	SI-0017	Gap between certified take-off performance and take-off performance achieved in operations							✔				
CAT A	SI-0019	Handling and Execution of Go-Around			✔								

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Portfolio	SI ID	Safety Issue Title	All	Airborne Collision	Aircraft Upset	Collision on Runway	Ground Damage	Obstacle Collision in Flight	Excursion	Terrain Collision	Security	Fire, smoke and pressurisation	Other Injuries
CAT A	SI-0001	Icing in Flight			✔								
CAT A	SI-0002	Icing on Ground			✔								
CAT A	SI-0010	Inappropriate Flight Control Inputs			✔								
CAT A	SI-0046	Laser Illumination			✔								
CAT A	SI-0050	Management of Repetitive Defects on Safety Critical Systems			✔								
CAT A	SI-0037	Non-Precision Approaches							✔				
CAT A	SI-0054	Poor language proficiency causing communication break-down	✔										
CAT A	SI-0034	Over-reliance on satellite navigation		✔									
CAT A	SI-0006	Runway Surface Condition							✔				
CAT A	SI-0052	Safety education of air passengers										✔	
CAT A	SI-0005	State of Wellbeing and Fit for Duties							✔				
CAT A	SI-0044	Volume and quality of the information in NOTAMs							✔				
CAT A	SI-0012	Wake Vortex Encounter			✔								
CAT A	SI-0024	Wind shear			✔								
HF/HP	SI-3023	Alignment of OSD and equivalent processes at other certificating authorities			✔								

Portfolio	SI ID	Safety Issue Title	All	Airborne Collision	Aircraft Upset	Collision on Runway	Ground Damage	Obstacle Collision in Flight	Excursion	Terrain Collision	Security	Fire, smoke and pressurisation	Other Injuries
HF/HP	SI-3016	Decision-making in complex systems	✔										
HF/HP	SI-3009	Degradation of resilient performance of an organisation and/or individual	✔										
HF/HP	SI-3007	Design and use of procedures	✔										
HF/HP	SI-3017	Error-mitigation by design (maintenance and production)	✔										
HF/HP	SI-3005	Fatigue and quality sleep	✔										
HF/HP	SI-3006	Heavy workload and misaligned tasks	✔										
HF/HP	SI-3022	HF of Multiple Remote Towers		✔									
HF/HP	SI-3003	Human factors competence for regulatory staff	✔										
HF/HP	SI-3002	Impact of culture on human performance	✔										
HF/HP	SI-3014	Inadequate HF activities/ HF specialist involvement and the effect on safety, efficiency, effectiveness and project timeline	✔										
HF/HP	SI-3004	Integration of practical HF/ HP into the organisations management system	✔										
HF/HP	SI-3008	Knowledge development and sharing	✔										

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Portfolio	SI ID	Safety Issue Title	All	Airborne Collision	Aircraft Upset	Collision on Runway	Ground Damage	Obstacle Collision in Flight	Excursion	Terrain Collision	Security	Fire, smoke and pressurisation	Other Injuries
HF/HP	SI-3012	Lack of industry-wide staff support programmes	✔										
HF/HP	SI-3018	Limitations to root cause analysis	✔										
HF/HP	SI-3015	Reduced attention and vigilance	✔										
HF/HP	SI-3001	Senior management competence and commitment to HF/HP principles	✔										
HF/HP	SI-3010	Startle and surprise	✔										
HF/HP	SI-3011	Training effectiveness and competence	✔										
NCO SA	SI-4010	Airborne Separation		✔									
NCO SA	SI-4005	Approach Path Management on GA Aeroplanes			✔								
NCO SA	SI-4013	Bird and Wildlife Strikes at smaller Aerodromes			✔								
NCO SA	SI-4015	Crosswind							✔				
NCO SA	SI-4019	Damage Tolerance to UAS Collisions		✔									
NCO SA	SI-4012	Engine System Reliability			✔								
NCO SA	SI-4004	Experience, Training and Competence of Individuals			✔								
NCO SA	SI-4011	Fuel Management in Flight			✔								
NCO SA	SI-4001	Handling of Technical Failure			✔								

Portfolio	SI ID	Safety Issue Title	All	Airborne Collision	Aircraft Upset	Collision on Runway	Ground Damage	Obstacle Collision in Flight	Excursion	Terrain Collision	Security	Fire, smoke and pressurisation	Other Injuries
NCO SA	SI-4022 (SI-0001)	Icing in Flight			✔								
NCO SA	SI-4008	Inadvertent flight into IMC/ Scud flying			✔								
NCO SA	SI-4029	Inappropriate control input			✔								
NCO SA	SI-4003	Inflight decision making			✔								
NCO SA	SI-4017	Knowledge of Aircraft Systems and Procedures	✔										
NCO SA	SI-4018	Maintenance of GA aeroplanes	✔										
NCO SA	SI-4014	Mass and Balance			✔								
NCO SA	SI-4021	Operational Communication		✔									
NCO SA	SI-4028	Other Aircraft System Reliability	✔										
NCO SA	SI-4007	Poor pre-flight planning and preparation			✔								
NCO SA	SI-4023	Risks associated with parachute operations			✔								
RTR	SI-8043	ADELTs, ELTs and PLBs malfunctions											✔
RTR	SI-8021	Adverse weather encounter - effects other than on visibility			✔								
RTR	SI-8030	Bird and other wildlife hazard			✔								
RTR	SI-8046	Deficiencies and inconsistencies in operating manuals			✔								

Portfolio	SI ID	Safety Issue Title	All	Airborne Collision	Aircraft Upset	Collision on Runway	Ground Damage	Obstacle Collision in Flight	Excursion	Terrain Collision	Security	Fire, smoke and pressurisation	Other Injuries
RTR	SI-8019	Degraded visibility conditions								✔			
RTR	SI-8041	Downwash adverse effects											✔
RTR	SI-8040	Dynamic rollover							✔				
RTR	SI-8026	Engine loss of power in flight			✔								
RTR	SI-8008	E-VTOL-systems-related issues			✔								
RTR	SI-8038	External-sling-load-operations-related issues			✔								
RTR	SI-8039	Hazardous conditions following ditching											✔
RTR	SI-8001	Helicopter rotor and transmission system failures			✔								
RTR	SI-8002	Helicopter system failures - other than rotor and transmissions			✔								
RTR	SI-8005	Helicopter-maintenance-related issues			✔								
RTR	SI-8037	Hoist-operations-related issues											✔
RTR	SI-8004	Improper management of helicopter continuing airworthiness			✔								
RTR	SI-8028	Inadequate airborne separation under VFR operation		✔									
RTR	SI-8023	Inadequate flight path management during manual control			✔								

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RTR	SI-8022	Inadequate flight path management with the use of automation			✔								
RTR	SI-8027	Inadequate handling of simulated technical failures and abnormal procedures during a training flight			✔								
RTR	SI-8031	Inadequate obstacle clearance during low-altitude operation, take-off and landing								✔			
RTR	SI-8015	Inadequate training and competence transfer - initial and recurrent training			✔								
RTR	SI-8012	Incorrect application of operational rules and procedures			✔								
RTR	SI-8014	Incorrect in-flight decision making			✔								
RTR	SI-8013	Ineffective application of crew resource management and multicrew cooperation			✔								
RTR	SI-8044	Ineffective safety management systems			✔								
RTR	SI-8045	Insufficient safety culture of organisation			✔								
RTR	SI-8049	Interference by lasers			✔								
RTR	SI-8011	Lack of knowledge of aircraft systems and application of procedures			✔								

APPENDIX A

Portfolio	SI ID	Safety Issue Title	All	Airborne Collision	Aircraft Upset	Collision on Runway	Ground Damage	Obstacle Collision in Flight	Excursion	Terrain Collision	Security	Fire, smoke and pressurisation	Other Injuries
RTR	SI-8036	Navigation-related issues								✔			
RTR	SI-8048	On board carriage of PEDs with lithium batteries	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
RTR	SI-8016	Pilot fatigue			✔								
RTR	SI-8034	Poor management of take-off and landing sites											✔
RTR	SI-8017	Poor pre-flight planning and preparation			✔								
RTR	SI-8024	Unanticipated yaw / Loss of tail rotor effectiveness			✔								
RTR	SI-8042	Unruly passengers			✔								
RTR	SI-8025	Vortex ring state			✔								
SYS&CONJ	SI-5524	A long-lasting crisis may lead to further financial strain on organizations after the COVID-19 pandemic situation	✔										
SYS&CONJ	SI-5017B	Aircraft vulnerability leading to flight safety degradation due to cyber attacks									✔		
SYS&CONJ	SI-5017A	Airline systems vulnerability leading to disruptions due to cyber attacks									✔		
SYS&CONJ	SI-5002	Aviation personnel fatigue	✔										
SYS&CONJ	SI-5502	Continuing airworthiness related issues due to sanctions	✔										

Portfolio	SI ID	Safety Issue Title	All	Airborne Collision	Aircraft Upset	Collision on Runway	Ground Damage	Obstacle Collision in Flight	Excursion	Terrain Collision	Security	Fire, smoke and pressurisation	Other Injuries
SYS&CONJ	SI-5013/C-3	Crew fatigue due to unavailability of rest facilities at destination or extended duty period	✔										
SYS&CONJ	SI-5017	Cyber attacks	✔										
SYS&CONJ	SI-5006/5007	Decreased Wellbeing of Aviation Professionals during Shutdown	✔										
SYS&CONJ	SI-5506	Flight route congestion (hotspots)		✔									
SYS&CONJ	SI-5501A	GPS signal manipulation leading to navigation or surveillance degradation								✔			
SYS&CONJ	SI-5022	Impact of the pandemic on the ground handling industry – human factors	✔										
SYS&CONJ	SI-5010	Increased Presence of Wildlife on Aerodromes			✔								
SYS&CONJ	SI-5515	Increased risk of airspace infringements by military drones, aircraft, or debris spilling over from conflict zones									✔		
SYS&CONJ	SI-5503	Leased aircraft captured by the Russian Federation	✔										
SYS&CONJ	SI-5030	Management of Air Traffic Evolution during Recovery Phase		✔									
SYS&CONJ	SI-5020	Missing suppliers and difficulty liaising with suppliers	✔										

Portfolio	SI ID	Safety Issue Title	All	Airborne Collision	Aircraft Upset	Collision on Runway	Ground Damage	Obstacle Collision in Flight	Excursion	Terrain Collision	Security	Fire, smoke and pressurisation	Other Injuries
SYS&CONJ	SI-5508	Non-standard and unplanned military activities outside the conflict zones		✔									
SYS&CONJ	SI-5021	Prevention and treatment of unruly passengers in the context of COVID-19									✔		
SYS&CONJ	SI-5014	Reduced adherence to procedures	✔										
SYS&CONJ	SI-5019	Reduced Available Financial Resources	✔										
SYS&CONJ	SI-5009	Reduced focus on, or prioritisation of safety	✔										
SYS&CONJ	SI-5001	Reduced oversight by competent authorities	✔										
SYS&CONJ	SI-5023	Reduction in training effectiveness due to remote training	✔										
SYS&CONJ	SI-5514	Separation with unidentified aircraft									✔		
SYS&CONJ	SI-5018	Shortage of operational and technical staff	✔										
SYS&CONJ	SI-5005	Shut-down, restart and gradual recovery of a Complex System is unpredictable	✔										
SYS&CONJ	SI-5003	Skills and knowledge degradation due to lack of recent practice	✔										
SYS&CONJ	SI-5504	Spare parts shortages (other than aircraft)	✔										
SYS&CONJ	SI-5011	The scale of aircraft storage and subsequent destorage may lead to technical failures	✔										

EASA
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