

RESEARCH PROJECT EASA.2022.HVP.04

IMPACT OF SECURITY MEASURES ON SAFETY – D-2.3

Impact of Security Measures on Safety

(Public Version)

Research conducted by:



An Agency of the European Union



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APSS Software & Services Ltd is part of the Centre for Adaptive Security Research and Applications (CASRA), which was founded in 2008. CASRA emerged from the Visual Cognition Research Group of the University of Zurich, which was founded by Adrian Schwaninger in 1999. Today, CASRA APSS has a workforce of around 35 people, comprising of psychologists, economists, computer scientists, imaging specialists, software developers, aviation security experts, and more, most of which have an academic degree. The main objective of CASRA is to increase security and facilitation at airports and other environments involving people and technology. Through their studies and research on human – machine interaction, it was identified that visual abilities and training determine largely screeners' performance. As such CASRA has been working with a number of aviation security authorities and airports on selection, training and competency assessment processes providing advisory and research as well as their solutions globally.

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Abbreviations

ACRONYM	DESCRIPTION
ACC3	Air Cargo or Mail Carrier operating into the Union from a Third Country Airport
AMC	Acceptable Mean of Compliance
ATC	Air Traffic Control
ATM	Air Traffic Management
ATS	Air Traffic Services
BEA	(French) Bureau d'Enquête et d'Analyse
CAA	Civil Aviation Authority
CAMO	Continuing Airworthiness Management Organisation
CRM	Crew Resource Management
EASA	European Union Aviation Safety Agency
EC	European Commission
EPAS	European Plan for Aviation Safety
EU	European Union Aviation Safety Agency
FAA	Federal Aviation Administration
FOD	Foreign Object Debris
GM	Guidance Material
GSE	Ground Service Equipment
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
ICAS	Intelligent Cockpit Access Systems
IED	Improvised explosive device
IMS	Integrated Management System
IOSA	IATA Operational Safety Audit
ISMS	Information Security Management System
MRO	Maintenance and Repair Organisation
NAA	National Aviation Authority
NPA	Notices of Proposed Amendment
PED	Personnel Electronic Device
SeMS	Security Management System
SI	Safety Issue
SIA	Safety Impact Assessment
SIB	Safety Information Bulletin
SME	Subject Matter Expert
SMS	Safety Management System
SOP	Standards Operating Procedures
SRA	Security Restricted Area
TEM	Threat and Error Management
UAS	Unmanned Aircraft System
UGV	Unmanned Ground Vehicle

1. Executive summary

In an aviation sector facing increasingly complex and evolving physical and information security threats, the implementation of robust security measures is essential to protect passengers, personnel, and assets against acts of unlawful interference. Nevertheless, given the inherent interdependencies between safety and security, the implementation of these measures can inadvertently impact aviation safety, both directly and indirectly.

The general objective of the project '*Impact of Security Measures on Safety*' is to examine the nature and extent of the interdependencies between safety and security. The aim of this research is to build a comprehensive knowledge base that thoroughly outlines these interrelationships.

Task 2 focuses on assessing the positive and negative impacts of security measures on safety, with the goal of providing a thorough description of these impacts in terms of both nature and magnitude. This report, D-2.3 '*Impact of Security Measures on Safety*', serves as the final deliverable of Task 3. It marks a crucial step in the research project by consolidating and leveraging the findings from all previous deliverables, and by laying the foundation for the next stages of the research.

The assessments conducted applying a dedicated Safety Impact Assessment (SIA) methodology and the participation of relevant aviation stakeholders have identified certain security measures with a direct negative impact on safety. These impacts are substantiated by historical events or clear potential consequences. For instance, the presence of a reinforced flight deck door has repeatedly been identified as a factor in accidents and incidents where a crew member intentionally locked themselves in the cockpit, preventing others from regaining access. Meanwhile, the implementation of requirements related to counter-UAS technologies could lead to unintended effects on navigation systems or civilian infrastructure. While the nature of these impacts differs, they share the common characteristic of directly affecting flight safety.

However, it has been demonstrated that the majority of security measures influence safety indirectly, with their effects often being less visible and more diffuse.

In an industry that is safer and more secure, where the majority of accidents are increasingly the result of a combination of contributing factors rather than a single root cause, these indirect safety impacts require careful attention. It is crucial to assess, account for, and mitigate these effects to sustain and improve aviation safety.

As identified and further detailed in this report, the primary negative impacts of security measures on safety are twofold:

- The adverse effect security measures can have on staff performance in terms of human factors, primarily through increased operational complexity, decreased operational efficiency, and the resulting rise in workload and pressure on personnel.
- The challenge of coordination and alignment, not only between aviation stakeholders but also within organisations, in balancing the management of both safety and security systems to ensure effective handling of potential conflicting priorities.

These challenges are further compounded by the rapid evolution of security threats, particularly in the realm of information security. The introduction of additional cybersecurity measures and the need for enhanced integration between management systems underscore the necessity for proactive and collaborative approaches to address these interdependencies.

This report provides actionable insights and recommendations for addressing these challenges, ensuring that security measures contribute to a safer and more efficient aviation environment.

Finally, the report underscores the need to balance the negative impacts of security measures on safety with their positive contributions to both security and safety.

2. Overall Methodology

Task 2 aims to assess the impact, whether positive or negative, of security measures on safety. As the final report for Task 2, this deliverable presents the safety impact assessments of these security measures, along with their findings, conclusions and recommendations to ensure better safety outcomes.

The core element of the methodology applied in this deliverable is the Safety Impact Assessment (SIA) framework developed in the project's initial task, documented in deliverable D-1.3. The D-1.3 report establishes a methodology that enables the evaluation of security measures to determine the scope and magnitude of their impact on safety, whether positive or negative. Although this safety impact assessment methodology was originally designed for use by aviation organisations and National Aviation Authorities to evaluate prospective security measures, it has been applied within this project to assess existing security measures. The five main steps of this methodology are as follows:

- Step 1 – Security measures to be assessed
- Step 2 – Identification of safety domain and selection of safety experts
- Step 3 – Assessment
- Step 4 – Impact rating
- Step 5 – The outcome

As further detailed in Chapter 4, this deliverable is closely linked to previous deliverables, builds upon them, and incorporates their findings as follows, to ensure the efficient implementation of the SIA methodology.

- **Task 1 – D-1.1** *'Report on safety areas affected by security'* identified the safety areas impacted by security and outlined the nature of safety – security interdependencies. These identified safety areas, along with their associated interdependencies, provided the foundation for applying the first step of the SIA methodology.
- **Task 1 – D-1.2** *'Report job roles involving both safety and security functions'* identified aviation job roles that encompass both safety and security functions or exhibit a safety–security interdependency. These identified roles served as the basis for the second step of the SIA methodology, facilitating the selection of relevant stakeholders to be consulted for the security measures assessment conducted in this report.
- **Task 1 – D-1.3** *'Report on the detailed methodology used during the project, including the development of the knowledge based and assessment framework'* outlines the methodology applied to assess the potential safety impact of security measures, supporting the primary objective of D-2.3.
- **Task 2 – D-2.2** *'Interim report listing the safety and security interdependencies to be assessed, the questionnaires and interviews proposed as well as the participant to the surveys'*, constitutes the application of the first two steps of the SIA methodology. It describes the security measures and identifies the relevant stakeholders for their assessment. This deliverable also facilitated the definition of the methods used for the assessment and enabled the selection of the final list of security measures that were evaluated.

As detailed further in this report, the analysis of data collected through the safety impact assessments was supplemented, where necessary, by surveys, literature reviews, and regulatory analyses. Finally, the findings from D-2.1, Identification of the Main Security Threats and Scenarios (Physical threats and information security Threats) Impacting Aircraft Safety, served as a foundational reference for the gap analysis conducted in D-2.3. This analysis enabled the identification and suggestion of appropriate mitigation measures to address the potential negative impacts of security measures on safety.

3. Context

The European Union Aviation Safety Agency (hereinafter “EASA”) is an agency of the European Union, which has been given specific regulatory and executive tasks in the field of aviation safety. The Agency constitutes a key part of the European Union’s strategy to establish and maintain a high uniform standard of safety and environmental protection in civil aviation at European level.

As part of the Horizon Europe Work Programme 2021-2022 on Cluster 5 Climate, Energy and Mobility, the European Commission has entrusted EASA with the management of one specific research action entitled “Impact of security measures on safety”.

As a result, EASA has awarded a public contract to a consortium of three companies:

- CAA International
- Apave Aeroservices
- CASRA

The contract details the four main tasks which are specified in order to achieve the expected outcome which is to understand the nature and extent of the interdependencies between safety and security in order to assess the impact of security measures on safety. In doing so, the research project should identify which processes and job roles are affected by safety–security interdependencies and which certification requirements and licensing activities are affected. In the medium term, safety risk management techniques that can be applied to security will produce harmonised risk assessment methods and support integrated policy and decision-making processes at national and EU level.

The project aims at developing a comprehensive knowledge base for the evaluation of the potential impact of security measures on the safety performances of aviation systems, personnel and operations, including the leading indicators for measuring such an impact (positive or negative) as well as the main factors playing a role in such safety - security dependencies.

The four main tasks are:

- Task 1: Identify the interdependencies between security and safety
- Task 2: Assessment of the impact of security measures on safety
- Task 3: Analysis of certification standards
- Task 4: Integrated risk management

4. Objective of the document

Scope of the document

This report constitutes deliverable 'D-2.3' of the 'Impact of Security Measures on Safety' EASA research project (EASA.2022.HVP.04). The content presented here serves as the final report of Task 2.

Required objectives of the document

The primary objective of deliverable D-2.3 is to assess the impact of the agreed-upon security measures on safety, utilising the safety impact assessment framework developed during the initial task of this project. The assessment of security measures can be delineated as follows:

- Data collection on the safety impact, and assessment of selected security measures.
- Conclusion regarding their negative, positive, and neutral impact on safety.
- Gap analysis to define which elements and measures are currently missing to ensure better safety outcome.
- Formulation of recommendations based on the findings of the gap analysis.

Place of the document in the overall project

The present report D-2.3 serves as the final report of Task 2 and concludes the two first tasks of this project. It is based on the outputs of overall task 1, and previous deliverables of task 2: D-2.1 "Identification of the main security threats and scenarios (physical threats and information security threats) having an impact on aircraft safety" and D-2.2 "Interim report listing the safety and security interdependencies to be assessed, the questionnaires and interviews proposed as well as the participants to the surveys". The figure below exposes the dependencies between previous deliverables of task 1 and 2, current report D-2.3.

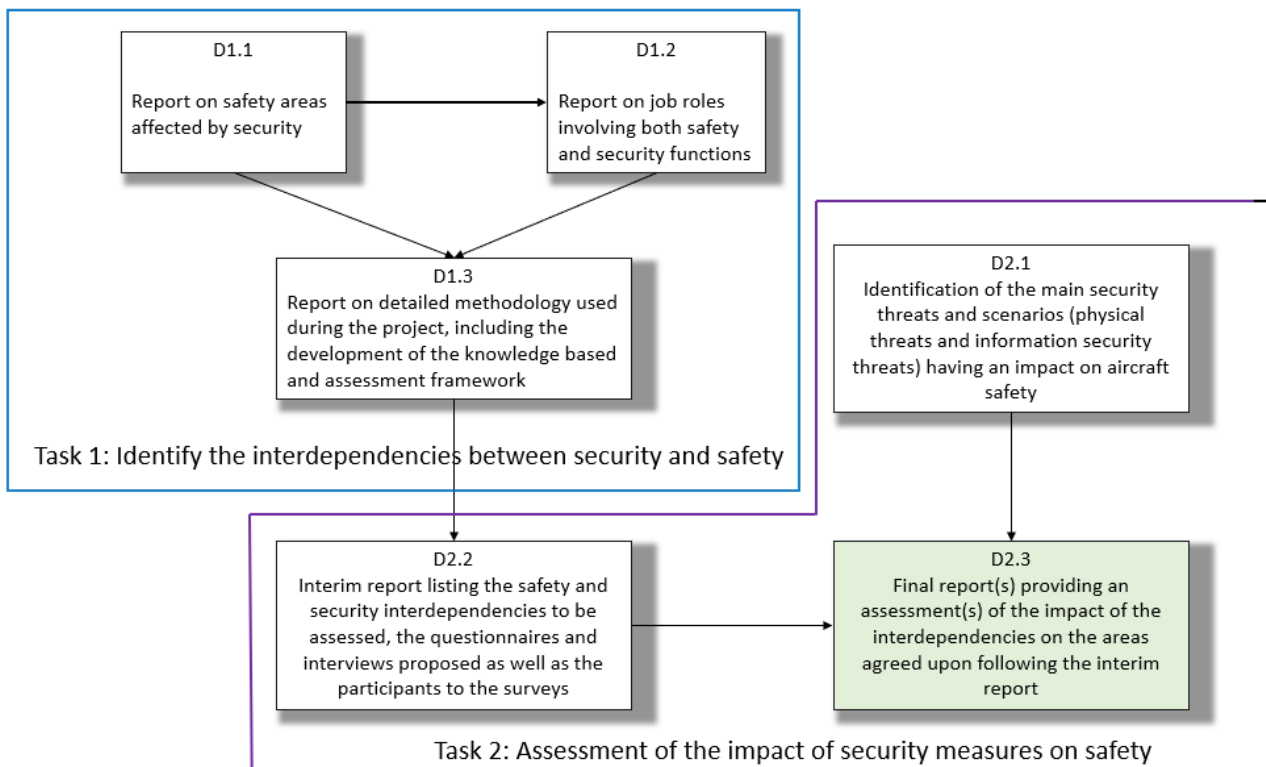


Figure 1 – D-2.2 – Dependencies between Task 1 and Task 2

5. Definitions

Accident¹

An occurrence linked with the operation of an aircraft which:

- Case of a manned aircraft: takes place between the time any person boards the aircraft with the intention of flight until the time as all such persons have disembarked;
- Case of an unmanned aircraft: takes place between the time the aircraft is ready to move with the purpose of flight until such time as it comes to park at the end of the flight and the primary propulsion system is shut down, and during which:
 - A person is fatally or seriously injured as a result of:
 - Being in the aircraft, or
 - Direct contact with any part of the aircraft, including parts which have become detached from the aircraft, or
 - Direct exposure to jet blast,except when the injuries are from natural causes, self-inflicted or inflicted by other persons, or when the injuries are to stowaways hiding outside the areas normally available to the passengers and crew; or
 - The aircraft sustains damage or structural failure which:
 - Adversely affects the structural strength, performance of flight characteristics of the aircraft, and
 - Would normally require major repair or replacement of the involved component,Except for engine failure or damage, when the damage is limited to a single engine (including its cowlings or accessories), to propellers, wing tips, antennas, probes, vanes, tires, brakes, wheels, fairings, panels, landing gear doors, windscreens, the aircraft skin (such as small dents or puncture holes), or for minor damages to main rotor blades, tail rotor blades, landing gear, and those resulting from hail or bird strike (including holes in the radome); or
 - The aircraft is missing or is completely unreachable.

Acts of Unlawful Interference (AUI)

Acts of unlawful interference are acts or attempts of jeopardising civil aviation safety and include but are not limited to²:

- Unlawful seizure of aircraft.
- Destruction of an aircraft in service.
- Hostage-taking on-board aircraft or in aerodromes.
- Forcible intrusion on-board an aircraft, in an airport or on the premises of an aeronautical facility.
- Introduction on-board an aircraft or at an airport of a weapon or hazardous device or material intended for criminal purposes.
- Use of an aircraft in service for the purpose of causing death, serious bodily injury, or serious damage to property or the environment.
- Communication of false information to jeopardise the safety of an aircraft in flight or on the ground, of passengers, crew, ground personnel or the public, at an airport or on the premises of a civil aviation facility.”

¹ Regulation (EU) No 996/2010 on the investigation and prevention of accidents and incidents in civil aviation, 2010

² ICAO Annex 17, Security, Safeguarding International Civil Aviation Against Acts of Unlawful Interference, July 2022

Aircraft Safety³

ICAO Annex 19 defines Safety as *“the state in which risks associated with aviation activities, related to, or in direct support of the operation of aircraft, are reduced and controlled to an acceptable level”*.

“Aircraft Safety” perimeter encompasses all contributors that might lead to a serious incident or an accident. Airworthiness of the aircraft is one component of the aircraft’s safety. Any threat leading to a failure condition classified as hazardous or catastrophic is considered in the study.

Airside⁴

The movement area of an airport, adjacent terrain and buildings or portions thereof, access to which is controlled.

As a matter of consequence, airside activities with a potential impact on safety have been defined as a list including:

- Refuelling
- De-Icing
- Passengers and baggage screening
- Baggage handling / loading / unloading.
- Aircraft cleaning
- Catering loading / unloading
- Line maintenance activities
- Passenger handling – embarking / disembarking

Area of impact

Within the scope of this project, the areas of impact are defined as operational areas, potentially impacted by security measures. Exhaustive list of areas, and sub-areas have been compiled in the previous deliverable D-1.3, as follows:

- Aircraft
 - Design
 - Maintenance
 - Staff recruitment and training (e.g., maintenance)
- Unmanned Aircraft Systems
 - UAS Design
 - Maintenance
 - UAS Operations
 - U-Space (UTM)
- Air Operations
 - Flight preparation (ground procedures)
 - In-flight operations
 - Emergency response and contingency planning
 - Staff recruitment and training
 - Staff performance
- Ground Operations/Handling
 - Ground supervision
 - Flight dispatch and load control
 - Passenger handling
 - Freight and mail handling

³ ICAO Annex 19, Safety Management, Second Edition, July 2016

⁴ ICAO Annex 17, Security, Safeguarding International Civil Aviation Against Acts of Unlawful Interference, July 2022

- Apron handling of aircraft
- Baggage handling
- Handling of dangerous goods
- Fuel and oil handling
- Aircraft services
- Loading of catering
- Staff recruitment and training
- Staff performance
- Emergency response and contingency planning
- Airport/Aerodrome
 - Passenger services and terminal operations
 - Airport security services
 - Aerodrome infrastructures and design
 - Aerodrome safety-related equipment
 - Staff recruitment and training
 - Staff performance
 - Emergency response and contingency planning
- Air Traffic Management / Air Traffic Services / Air Traffic Control
 - Operations
 - Ground equipment and infrastructure
 - Emergency response and contingency planning
 - Staff recruitment and training
 - Staff performance
- Others

Aviation Security⁵

Safeguarding civil aviation against acts of unlawful interference. This objective is achieved by a combination of measures and human and material resources.

Cybersecurity⁶

Cybersecurity means the activities necessary to protect network and information systems, the users of such systems, and other persons affected by cyber threats.

Cyberthreat⁷

Cyber threat means any potential circumstance, event or action that could damage, disrupt or otherwise adversely impact network and information systems, the users of such systems and other persons.

Dangerous goods⁷

Dangerous Goods means articles or substances which are capable of posing a risk to health, safety, property or the environment and which are shown in the list of dangerous goods in the technical instructions or which are classified according to those instructions.

Disruptive Passenger⁸

⁵ ICAO Annex 17, Security, Safeguarding International Civil Aviation Against Acts of Unlawful Interference

⁶ Regulation (EU) 2019/881 of the European Parliament and of the Council of 17 April 2019 on ENISA and on information and communications technology cybersecurity certification

⁷ Commission Regulation (EU) 965/2012 on technical requirements and administrative procedures related to air operations

⁸ ICAO Annex 17, Security, Safeguarding International Civil Aviation Against Acts of Unlawful Interference

A passenger who fails to respect the rules of conduct at an airport or on-board an aircraft or to follow the instructions of the airport staff or crew members and thereby disturbs the good order and discipline at an airport or on-board the aircraft.

(Cyber) Incident⁹

Incident means an event compromising the availability, authenticity, integrity or confidentiality of stored, transmitted or processed data or of the services offered by, or accessible via, network and information systems.

Insiders¹⁰

Insiders are full or part-time employees (including contractors, temporary and self-employed personnel) who are working in or for the aviation sector whose role provides them with privileged access to and/or knowledge of secured locations, items or sensitive security information. Insiders may conduct or facilitate an UAI through a lack of awareness, complacency or maliciousness. Lack of awareness of policies, procedures, and complacency (lax approach to policies and procedures) can cause insiders to unintentionally facilitate an AUI through their negligence, inaction or failure to follow security policies and procedures.

Landside

Landside represents the area of the airport to which the wider public has unrestricted access and is the first contact point with the airport system for passengers. Landside encompasses common features of every airport: access roads, transport infrastructure, parking lots, buildings and other facilities not located on the airport airside. Landside facilities provide access to the terminal as well as to the airside for passengers and staff. Landside position is conditioned by the airside position and the boundaries of the airport perimeter. The followings can be assimilated as landside activities:

- Fuel supply
- Airports surroundings such as the infrastructure / activity in the immediate vicinity
- Air Cargo and Catering supply
- Maintenance
- Continuing Airworthiness Management Organisations
- Airport remote infrastructure such as VOR, ILS, communications antenna, approach control room etc.

National Cybersecurity Strategy¹¹

National cybersecurity strategy means a coherent framework of a Member State providing strategic objectives and priorities in the area of cybersecurity and the governance to achieve them in that Member State.

Operational Complexity

In the context of this project, *Operational Complexity* refers to the structure and execution of operations. It includes, for example, the number of procedural steps to follow, the number of stakeholders involved, the level of coordination required, and the unpredictability of operations. Aviation security measures can positively, neutrally, or negatively influence operational complexity, depending on the nature of the measure and the context.

Operational Efficiency

⁹ Directive (EU) 2022/2555 [...] on measures for a high common level of cybersecurity across the Union

¹⁰ ICAO Pamphlet: managing insider risks, edition 01 November 2022

¹¹ Directive (EU) 2022/2555 [...] on measures for a high common level of cybersecurity across the Union

In the context of this project, *Operational Efficiency* refers to the ability of operations to achieve their objectives in a timely, reliable, and resource-effective manner. It includes, for example, the fluidity of workflows, the use of available resources, adherence to schedules, and the minimisation of delays or bottlenecks.

Aviation security measures can positively, neutrally, or negatively influence operational efficiency, depending on the nature of the measure and the context.

Potentially Disruptive Passenger¹²

A potentially disruptive passenger is a passenger who is either a deportee, a person deemed to be inadmissible for immigration reasons or a person in lawful custody.

Prohibited article¹³

Prohibited articles means weapons, explosives or other dangerous devices, articles or substances that may be used to commit an act of unlawful interference that jeopardises the security of civil aviation.

(Cyber) Risk¹⁴

Risk means the potential for loss or disruption caused by an incident and is to be expressed as a combination of the magnitude of such loss or disruption and the likelihood of occurrence of the incident.

Screening¹⁵

The application of technical or other means which are intended to identify and/or detect weapons, explosives or other dangerous devices, articles or substances which may be used to commit an act of unlawful interference.

Security measures

Security measures considered are the ones included in the suite of EC Regulations falling under Regulation (EC) 300/2008 on common rules in the field of civil aviation security and implementing acts.

Training Complexity

In the context of this project, *Training Complexity* refers to the degree of intricacy involved in preparing personnel to perform their duties effectively. It includes, for example, the density of training content, the duration of the training, and its implementation. Training complexity can relate to both safety and security training.

Aviation security measures can positively, neutrally, or negatively influence training complexity, depending on the nature of the measure and the context.

(Cyber) Vulnerability¹⁶

Vulnerability means a weakness, susceptibility or flaw of ICT products or ICT services that can be exploited by a cyber threat.

¹² Regulation (EC) No 300/2008 on common rules in the field of civil aviation security

¹³ Regulation (EC) No 300/2008 on common rules in the field of civil aviation security

¹⁴ Directive (EU) 2022/2555 [...] on measures for a high common level of cybersecurity across the Union

¹⁵ ICAO Annex 17, Security, Safeguarding International Civil Aviation Against Acts of Unlawful Interference, July 2022

¹⁶ Directive (EU) 2022/2555 [...] on measures for a high common level of cybersecurity across the Union

6. Safety Impact Assessment of security measures

6.1 Security Measures Assessment Methodology

6.1.1 Selection of security measures to be assessed

In order to ensure the comprehensiveness of this research project and enhance the efficiency of the assessments, the security measures have been defined through a structured three-phase process:

- Phase 1 – Identification of security measures from regulatory references
- Phase 2 – Selection of security measures, and agreement on the ones to be assessed
- Phase 3 – Restructuring the organisation of security measures into coherent groups, when relevant, to facilitate their evaluation.

6.1.1.1 Phases 1 & 2 – Identification and selection of security measures

As this project, through its second task, aims to assess the positive and/or negative impact of security measures on safety, the starting point for the selection of security measures was the European security regulatory framework, specifically the suite of EC Regulations under Regulation (EC) No 300/2008 on common rules in the field of civil aviation security and its implementing acts.

Each security measure outlined in the European security regulatory framework has been analysed to determine its potential for establishing touchpoints with safety, when both regulatory frameworks overlap or complement each other. These touchpoints were identified in report D-1.1, and the final list of safety – security interdependencies, extracted from D-1.1. The regulatory frameworks provided by Regulation (EC) No 300/2008 and Regulation (EU) No 2015/1998 were employed for this analysis. The results are presented in Table 1, indicating:

- The specific European security regulatory requirement under consideration;
- The reference of any identified safety – security interdependencies, where applicable, based on those listed in report D-1.1;
- Its inclusion in the list of security measures to be assessed, following the decision process detailed in report D-2.2.

Table 1 - Security measures selected for Safety Impact Assessment (EU security regulatory framework)

Security Regulations (EC 300/2008 & EU 2015/2998)	Identified Interdependency	D-2.3 SIA
1. AIRPORT SECURITY		
1.0 GENERAL PROVISIONS	-	<input type="checkbox"/>
1.1 AIRPORT PLANNING REQUIREMENTS	#17, #18, #20	<input checked="" type="checkbox"/>
1.2 ACCESS CONTROL	#19	<input checked="" type="checkbox"/>
1.3 SCREENING OF PERSONS OTHER THAN PASSENGERS AND ITEMS CARRIED	#30, #35, #36	<input checked="" type="checkbox"/>
1.4 EXAMINATION OF VEHICLES	-	<input checked="" type="checkbox"/>
1.5 SURVEILLANCE, PATROLS AND OTHER PHYSICAL CONTROLS	#19	<input checked="" type="checkbox"/>
1.6 PROHIBITED ARTICLES	#29, #30	<input checked="" type="checkbox"/>

1.7 IDENTIFICATION AND PROTECTION OF CRITICAL INFORMATION, TECHNOLOGY, SYSTEMS AND DATA	#21, #47	<input checked="" type="checkbox"/>
2. DEMARCATED AREAS OF AIRPORTS	#22	<input checked="" type="checkbox"/>
3. AIRCRAFT SECURITY		
3.0 GENERAL PROVISIONS	-	<input type="checkbox"/>
3.1 AIRCRAFT SECURITY SEARCH	#40, #48	<input checked="" type="checkbox"/>
3.2 PROTECTION OF AIRCRAFT	#41, #40	<input checked="" type="checkbox"/>
4. PASSENGERS AND CABIN BAGGAGE		
4.0 GENERAL PROVISIONS	-	<input type="checkbox"/>
4.1 SCREENING OF PASSENGERS AND CABIN BAGGAGE	#31, #32, #33, #35	<input checked="" type="checkbox"/>
4.2 PROTECTION OF PASSENGERS AND CABIN BAGGAGE	-	<input checked="" type="checkbox"/>
4.3 POTENTIALLY DISRUPTIVE PASSENGERS	#42	<input checked="" type="checkbox"/>
4.4 PROHIBITED ARTICLES	#29, #30, #43	<input checked="" type="checkbox"/>
5. HOLD BAGGAGE		
5.0 GENERAL PROVISIONS	-	<input checked="" type="checkbox"/>
5.1 SCREENING OF HOLD BAGGAGE	#33	<input checked="" type="checkbox"/>
5.2 PROTECTION OF HOLD BAGGAGE	-	<input checked="" type="checkbox"/>
5.3 BAGGAGE RECONCILIATION	#44, #50	<input checked="" type="checkbox"/>
5.4 PROHIBITED ARTICLES	#43	<input checked="" type="checkbox"/>
6. CARGO AND MAIL		
6.0 GENERAL PROVISIONS	-	<input checked="" type="checkbox"/>
6.1 SECURITY CONTROLS — GENERAL PROVISIONS	-	<input checked="" type="checkbox"/>
6.2 SCREENING	#54, #55	<input checked="" type="checkbox"/>
6.3 REGULATED AGENTS	#56	<input checked="" type="checkbox"/>
6.4 KNOWN CONSIGNORS	#56	<input checked="" type="checkbox"/>
6.5 ACCOUNT CONSIGNORS	#56	<input checked="" type="checkbox"/>
6.6 PROTECTION OF CARGO AND MAIL	#57	<input checked="" type="checkbox"/>
6.7 HIGH RISK CARGO AND MAIL (HRCM)	-	<input checked="" type="checkbox"/>
6.8 SECURITY PROCEDURES FOR CARGO AND MAIL BEING CARRIED INTO THE UNION FROM THIRD COUNTRIES	-	<input checked="" type="checkbox"/>
7. AIR CARRIER MAIL AND AIR CARRIER MATERIALS		
7.0 GENERAL PROVISIONS	#51, #54, #55, #57	<input type="checkbox"/>
7.1 AIR CARRIER MAIL AND AIR CARRIER MATERIALS TO BE LOADED ONTO AN AIRCRAFT	#58, #59	<input checked="" type="checkbox"/>
7.2 AIR CARRIER MATERIALS USED FOR PASSENGER AND BAGGAGE PROCESSING	-	<input checked="" type="checkbox"/>
8. IN-FLIGHT SUPPLIES		
8.0 GENERAL PROVISIONS	-	<input type="checkbox"/>
8.1 SECURITY CONTROLS	#58	<input checked="" type="checkbox"/>
8.2 PROTECTION OF IN-FLIGHT SUPPLIES	#59	<input checked="" type="checkbox"/>
8.3 ADDITIONAL SECURITY PROVISIONS FOR IN-FLIGHT SUPPLIES OF LAGS AND STEBS	-	<input checked="" type="checkbox"/>
9. AIRPORT SUPPLIES		

9.0 GENERAL PROVISIONS	-	<input type="checkbox"/>
9.1 SECURITY CONTROLS	#58	<input checked="" type="checkbox"/>
9.2 PROTECTION OF AIRPORT SUPPLIES	#59	<input checked="" type="checkbox"/>
9.3 ADDITIONAL SECURITY PROVISIONS FOR SUPPLIES OF LAGS AND STEBS	-	<input checked="" type="checkbox"/>
10. IN-FLIGHT SECURITY MEASURES	#45	<input checked="" type="checkbox"/>
11. STAFF RECRUITMENT AND TRAINING		
11.0 GENERAL PROVISIONS	-	<input type="checkbox"/>
11.1 RECRUITMENT	#25, #56	<input checked="" type="checkbox"/>
11.2 TRAINING	#25, #27, #34, #46, #52, #60	<input checked="" type="checkbox"/>
11.3 CERTIFICATION OR APPROVAL	#56	<input checked="" type="checkbox"/>
11.4 RECURRENT TRAINING	Refer to 11.2	
11.5 QUALIFICATION OF INSTRUCTORS	-	<input type="checkbox"/>
11.6 EU AVIATION SECURITY VALIDATION	-	<input type="checkbox"/>
11.7 MUTUAL RECOGNITION OF TRAINING	#28	<input checked="" type="checkbox"/>
12. SECURITY EQUIPMENT	#38, #39	<input checked="" type="checkbox"/>

Aside from the security measures outlined in the European security regulatory framework, the decision has been made to also consider some specific measures, originating in “Safety” regulations (e.g. falling under the EASA Basic Regulations¹⁷ along with its Implementing Rules) or ICAO standards, that can either be considered as security measures, or that presents safety – security interdependencies as identified in D-1.1. The Table 2 below present these additional measures selected for the Safety Impact Assessment conducted.

Table 2 - Other measures selected for Safety Impact Assessment

Regulation	Identified Interdependency
Air Operations – Regulation (EU) 965/2012 amended, and Implementing Rules	
AMC1 ORO.GEN.110(a)	Operator responsibilities – Security training programme for crew members
AMC2 ORO.GEN.110(a)	Operator responsibilities – Security training programme for ground personnel
ORO.GEN.200A	Information security management system
ORO.SEC.100	Flight crew compartment security – Aeroplanes
ATM/ANS – Regulation (EU) 2017/373	
ATM/ANS.OR.D.010	Security management
ATM/ANS.OR.A.070	Contingency plans
ATS.OR.135	Contingency arrangements
Aerodromes – Regulation (EU) 139/2014 & ICAO Doc 8973	
ADR.AR.D.005	Management System
ADR.OR.D.005A	Information security management system
ADR.OR.D.007	Management of aeronautical data and aeronautical information
ADR.OPS.B.005	Aerodrome emergency planning
ICAO Doc 8973	Counter UAS Technologies
Aircraft Airworthiness – CS 25, Regulation (EU) 748/2012 and Regulation (EU) 1321/2014	

¹⁷ Regulation (EU) 2018/1139 on common rules in the field of civil aviation

21.A.139A	Information security management system
21.A.239A	Information security management system
CS 25.795	Security Consideration
CS 25.1319	Equipment, systems and network information security protection
145A.200A	Information security management system
CAMO.A.200A	Information security management system
UAS – Regulation (EU) 2019/947	
UAS.SPEC.050 ¹⁸	Preparedness and incident response
Part IS - (EU) 2023/203 and 2022/1645	

6.1.1.2 Phase 3 - Optimisation of the security measures organisation

With the aim of conducting interviews with stakeholders and Subject Matter Experts (SMEs) to assess the impact of specific security measures on safety, an analysis was conducted to optimise the presentation of security measures as defined in European regulations, where relevant. This work involved restructuring the organisation of security measures by grouping or separating them when appropriate, according to their operational domain of impact. The objective was to streamline the interview process, avoiding any redundancy between the security measures being assessed, while also considering the specific expertise of the stakeholders.

Concrete examples of “restructuring” of security measures

- **Regulation (EC) No 300/2008 (10.1.a) and Regulation (EU) No 965/2012 (ORO.SEC.100)** both address requirements pertaining to the security of the flight crew compartment during flight. While the former mandates that no unauthorised persons are permitted to enter the flight compartment during a flight, the latter establishes safety rules to ensure the integrity of the flight crew compartment by requiring the presence of a secure door and associated procedures. In this instance, both security measures have been consolidated into one, facilitating a comprehensive assessment of all aspects of flight crew compartment security and preventing any redundancy within the assessment.
- **Regulation (EU) 2015/1998 (11.2)** addresses security-related training requirements for aviation staff across various operational domains. Additionally, requirements pertaining to staff security training are delineated in multiple regulations under EASA Basic Regulations; for example, **Regulation (EU) 965/2012** includes **AMC1 ORO.GEN.110(a)** for crew members and **AMC2 ORO.GEN.110(b)** for ground personnel, among other provisions. Given that assessing the security training requirements as a whole could lead assessors to operate outside their area of expertise (e.g. a flight crew member could be required to evaluate the impact on safety of security training requirements for ground personnel) and complicate the impact assessment by evaluating the effects of security measures on safety across several operational domains, the security measures related to staff training have been categorised into specific subjects: security training for crew members, security training for airport staff, security training for personnel implementing security controls, and security training for Ground Handling Operations staff.

¹⁸ Other measures, considered as security measures within the scope of this study and stemming from Regulation (EU) 2019/947, have also been identified. Some of these measures are already addressed by other assessments (for example, Article 15 is covered by the 'Counter-UAS Technologies' impact assessment), while others were not selected for further assessment, in line with the methodology described in this chapter.

6.1.1.3 Final list of security measures to be assessed

As an outcome of this preliminary study, which involved identifying, selecting, and categorising the security measures to be assessed, a list of 36 security measures has been established, as presented in Table 3.

Table 3 - Final list of security measures under assessment and associated regulatory references

#	Operational Domain	Security Measures	Regulatory References
#01	Aerodromes/Airport Operations	Airport Planning Requirements	- (EU) 2015/1998 1.1.1, 1.1.2, 1.1.3 - (EU) 2015/1998 2.
#02	Aerodromes/Airport Operations	Access Control	- (EU) 2015/1998 1.2.1, 1.2.2, 1.2.3, 1.2.7
#03a	Aerodromes/Airport Operations	Screening Operations (Passengers, cabin, and hold baggage)	- (EU) 2015/1998 4.1.1, 4.1.2, 4.1.3, 5.1
#03b	Aerodromes/Airport Operations	Screening Operations (Non-passengers)	- (EU) 2015/1998 1.3.1
#04	Aerodromes/Airport Operations	Screening Operations & Security Controls (In-flight supplies, Airport supplies, Cargo & Mail)	- (EU) 2015/1998 6.1.2, 6.2.1, 6.3.2, 6.4.2, 6.7, 7.1, 7.2, 8.1.1, 8.1.2, 8.1.5, 8.3, 9.1.1, 9.1.2, 9.1.4, 9.3
#05	Aerodromes/Airport Operations	Screening Exemptions	- (EU) 2015/1998 1.3.2, 1.4.4, 6.1.1, 6.2.2
#06	Aerodromes/Airport Operations	Examination of vehicles	- (EU) 2015/1998 1.4.1, 1.4.2, 1.4.3
#07	Aerodromes/Airport Operations	Surveillance, patrols and other physical controls	- (EU) 2015/1998 1.5
#08	Aerodromes/Airport Operations	Prohibited articles	- (EU) 2015/1998 1.6.1, 4.4.1, 5.4.1
#09	Aerodromes/Airport Operations	Prohibited articles exemptions	- (EU) 2015/1998 1.4.4, 1.6.2, 1.6.3, 1.6.4, 1.6.5, 4.4.2, 4.4.3, 5.4.2, 5.4.3
#10	All Operational Domains	Information Security Measures	- (EU) 2015/1998 1.7 - (EU) 2023/203 - (EU) 2022/1645
#11	Air Operations	Aircraft Security Search	- (EU) 2015/1998 3.1
#12	Air Operations	Protection of aircraft	- (EU) 2015/1998 3.2
#13	Ground Handling/Operations	Protection of passengers and baggage	- (EU) 2015/1998 4.2 - (EU) 2015/1998 5.3
#14	Ground Handling/Operations	Protection of goods (In-flight supplies, Airport supplies, Cargo & Mail)	- (EU) 2015/1998 6.6.1, 6.6.2 - (EU) 2015/1998 8.2 - (EU) 2015/1998 9.2
#15	Air Operations	Hold baggage reconciliation	- (EU) 2015/1998 5.3.1, 5.3.2, 5.3.3
#16	Air Operations	Potentially disruptive passenger	- (EU) 2015/1998 4.3 - (EC) 300/2008 10.1.b
#17	Air Operations	In-flight Security measures	- (EC) 300/2008 10.1.a
#18	Ground Handling/Operations	Cargo, Mail & Supplies: Approval of regulated agents & suppliers, known consignors & suppliers, account consignors	- EU 2015/1998 6.3.1, 6.3.2 - EU 2015/1998 6.4 - EU 2015/1998 6.5 - EU 2015/1998 8.1.3, 8.1.4 - EU 2015/1998 9.1 - EU 2015/1998 11.6

#19	Aerodromes/Airport Operations	Training and certification for screeners and persons implementing security controls	<ul style="list-style-type: none"> - EU 2015/1998 11.2.1, 11.2.2, 11.2.3, 11.2.4 - EU 2015/1998 11.3 - EU 2015/1998 11.4 - EU 2015/1998 11.5 - EU 2015/1998 11.7
#20	Aircraft (Airworthiness)	Feature of aircraft design	- CS 25 – 25.795 (c)(3) & AMC
#21	Aircraft (Airworthiness)	Protection of flight crew compartment	- CS 25 AMC 25.795(a)(1) & AMC
#22	Aircraft (Airworthiness)	Other consideration related to aircraft design	- CS 25 AMC 25.795(b), (c)(2)
#23	Unmanned Aircraft System	Counter UAS Technology	- ICAO Guidance Doc 8973
#24	Unmanned Aircraft System	Preparedness and incident response	<ul style="list-style-type: none"> - (EU) 2019/947 - UAS.SPEC.030, AMC UAS.SPEC.030(3)(e)
#25	ATM / ATS	Protection of facilities	- (EU) 2017/373 - ATM/ANS.OR.D.010(a)(1) & (c)
#26	ATM / ATS	Contingency planning	- (EU) 2017/373 ATM/ANS.OR.A.070
#27	ATM / ATS	Security Management System	- (EU) 2017/373 - ATM/ANS.OR.D.10
#28	Aerodromes/Airport Operations	Security Equipment	- (EU) 2015/1998 – 12
#29	Ground Handling Operations	Cargo from third country	- (EU) 2015/1998 – 6.8.1, 6.8.2, 6.8.3, 6.8.4, 6.8.5
#30	Aerodromes/Airport Operations	Management System	- (EU) 139/2014 – ADR.OR.D.005
#31	Aerodromes/Airport Operations	Emergency Response Plan	- (EU) 139/2014 – ADR.OPS.B.005
#32	Aerodromes/Airport Operations ATM / ATS Ground Handling Operations	Recruitment	- (EU) 2015/1998 – 11.1
#33	Aerodromes/Airport Operations	Training (Airport staff other than person implementing security controls)	<ul style="list-style-type: none"> - (EU) 2015/1998 – 11.2.2, 11.2.5, 11.2.6, 11.2.7 - (EU) 2015/1998 11.4 - (EU) 2015/1998 11.5 - (EU) 139/2014 - ADR.OR.D.017
#34	Ground Handling Operations	Training (Ground Handling Operations Staff)	<ul style="list-style-type: none"> - (EU) 2015/1998 – 11.2.2, 11.2.5, 11.2.6, 11.2.7 - (EU) 2015/1998 – 11.4 - (EU) 2015/1998 – 11.5 - (EU) 965/2012 – AMC2 ORO.GEN.110 (a)
#35	Air Operations	Training (Crew Members)	<ul style="list-style-type: none"> - (EU) 2015/1998 – 11.2.3.11, 11.2.3.6, 11.2.3.7 - (EU) 2015/1998 – 11.4 - (EU) 2015/1998 – 11.5 - (EU) 965/2012 – AMC2 ORO.GEN.110 (a)

6.1.2 Selection of stakeholders

6.1.2.1 Methodology for stakeholders' selection

The selection of relevant stakeholders for conducting the safety impact assessment of security measures was carried out by applying the second step of the SIA methodology. This step first identifies the areas impacted by each security measure and then determines the “best-concerned” stakeholders for the assessment. Roles exhibiting safety – security interdependencies, along with the classifications established in report D-1.2, facilitate the identification of functions best suited to provide relevant insights for assessing the safety impact of each security measure. The findings of this preliminary analysis are detailed in deliverable D-2.2 and summarised in Table 6.

Reminder of D-1.2 findings

The primary objective of D-1.2 is to identify the job roles in aviation activities that involve both safety and security functions, or where there is a safety–security interdependency, describing the nature of the interdependencies. To achieve this, D-1.2 has followed a methodology aimed at comprehensively understanding security job roles and their primary functions, safety job roles and their primary functions, and finally, safety-security functions, identifying job roles within the realm of safety-security interdependency.

Each of the security and safety job roles have been classified into four categories:

- *Management job roles with primary function of operations safety or security management;*
- *Compliance monitoring job roles with primary function of compliance and quality control of safety or security;*
- *Training job roles primarily involve delivering safety- or security-related training;*
- *Operational staff with primary roles for operational safety and security.*

Detailed example of job position identification

To illustrate the identification of relevant job positions for the security measures assessment, an example is presented below related to ‘Hold Baggage Reconciliation’ measures (EC 300/2008 5.3 and EU 2015/1998 5.3).

The first step of the SIA methodology defines the scope by establishing a clear description, listing regulatory reference(s) and mitigated threat(s), and detailing the rationale behind the introduction of this security measure. While knowledge of aviation operations could suffice to determine relevant job positions for the impact assessment, applying the first step of the methodology provides a structured approach that ensures the scope of the security measure is clearly defined. These elements are essential for exhaustively identifying the relevant stakeholders. The Table 4 below presents the findings from the application of the first step of the SIA methodology, on ‘Baggage Reconciliation’ security measures.

Table 4 - SIA Step 1 (Security Measures to be assessed) – Hold baggage reconciliation

Hold baggage reconciliation	
STEP 1 – Security Measure to be assessed	
Description of the security measure	The security measures under consideration pertain to the identification of hold baggage, verification that the owners of the hold baggage are on-board the aircraft, and include specific requirements for the transportation of unaccompanied hold baggage. These measures impact air carriers' procedures and entail responsibilities for all functions involved in baggage handling and surveillance, and job roles operating in close proximity to hold baggage.
Requirements originate from	- (EC) 300/2008 5.3 - (EU) 2015/1998 5.3
Rationale for introduction	These security measures have been introduced in the security regulatory framework to ensure that all transported hold baggage is identified and that the owners are also on-board the aircraft, after the Lockerbie accident. Additionally, the

transportation of unaccompanied hold baggage might be necessary in certain cases (for example, in the event of mistakenly directed or lost baggage), but it needs to be adequately regulated by appropriate security measures.

Mitigated threats

- IED in hold baggage

After clearly defining the security measures under assessment and their scope, the process of identifying relevant job roles begins by pinpointing the safety areas impacted by this security measure. Given that these measures are required to be applied by air carriers, Air Operations is clearly identified as a primary area of impact. Additionally, as most air carriers subcontract baggage handling to ground handling organisations, these organisations hold responsibilities and play a role in baggage reconciliation. Ground Handling Operations is therefore also selected as an area of impact.

Once the impacted areas for each baggage reconciliation requirement are identified, a list of relevant job positions is developed, focusing on individuals who are likely to implement or support the implementation of these measures. However, these individuals are not necessarily the ones who will be interviewed; rather, heads or managers may represent their departments. Report D-1.2, which establishes lists of job positions, helps to identify those roles combining safety and security-critical functions or having security-critical roles with safety responsibilities within these areas.

Returning to the example of baggage reconciliation requirements: for the primary area of impact, Air Operations, crew members are chosen because they are on the front line in applying these measures, as well as ground handling staff responsible for baggage handling within the Ground Handling Operations area. Furthermore, compliance functions in both areas are tasked with ensuring adherence to these measures and monitoring their implementation. Finally, safety functions are best positioned to collect data on the impact of these measures on safety through safety reporting and risk management processes. The Table 5 below presents the results from applying the second step of the SIA methodology.

Table 5 - SIA Step 2 (Security Measures to be assessed) - Baggage reconciliation

Baggage reconciliation	
STEP 2 – Identification of safety domain and selection of safety experts	
Areas of Impact	<input type="checkbox"/> Aircraft <input type="checkbox"/> ATM / ATS / ATC <input checked="" type="checkbox"/> Air Operations <ul style="list-style-type: none"> • Flight preparation (ground procedures) <input checked="" type="checkbox"/> Ground Operations/Handling <ul style="list-style-type: none"> • Baggage handling <input type="checkbox"/> UAS <input type="checkbox"/> Airport/Aerodrome <input type="checkbox"/> Other:
Stakeholders to be consulted	Air Operations <ul style="list-style-type: none"> • Compliance Monitoring Manager • Safety Manager • Crew Members Ground Operations/Handling <ul style="list-style-type: none"> • Ground Handling Operations Manager • Compliance Monitoring Manager • Safety Manager

6.1.2.1 Outcomes of the stakeholders' selection

Outputs from the application of the SIA methodology – Step 2

The Table 6 below presents the list of identified job roles to be interviewed, derived from the application of the second step of the SIA methodology. As outlined in the selection and identification process, these job roles not only encompass those responsible for implementing security measures that could potentially impact safety but also include functions overseeing departments affected by these measures. This approach explains why the number of identified stakeholders may be limited for certain areas of impact.

Table 6 - List of job roles identified to conduct the security measures assessments

Area of Impact	Stakeholders & Subject Matter Experts
Aircraft	<ul style="list-style-type: none"> • Design Organisation Manager • MRO/CAMO Manager • MRO/CAMO Safety Manager
ATM / ATS / ATC	<ul style="list-style-type: none"> • Security Manager • Safety Manager • Emergency Response Manager
Air Operations	<ul style="list-style-type: none"> • Compliance Monitoring Manager • Safety Manager • Crew Members • Security Manager • Ground Handling Operations Manager
Ground Operations/Handling	<ul style="list-style-type: none"> • Ground Handling Operations Manager • Safety Manager • Cargo Manager
Unmanned Aircraft Systems	<ul style="list-style-type: none"> • Safety Manager • Operations Manager
Airport/Aerodrome	<ul style="list-style-type: none"> • Security Personnel • Security • Safety Manager • Operations Manager • Maintenance Manager • Emergency Response Manager

Stakeholders identification

Based on the identified job roles, and having conducted numerous interviews, workshops, and questionnaires as part of the previous deliverables of this project, the Consortium has compiled a comprehensive list of aviation stakeholders relevant to the interviews. Individuals who had previously participated in the project were also approached to ensure continuity and familiarity with its progress.

The selected stakeholders are drawn from organisations within the European aviation sector, with a focus on:

- Creating a representative panel in terms of geographic location and company size.
- Focusing on safety personnel, as the aim is to determine the impact on safety;
- Focusing on the safety areas the most impacted by security measures, as Air Operations, Ground Handling Operations, and Aerodrome Operations;
- Ensuring that all stakeholders possess knowledge of security regulatory requirements, to facilitate their understanding of the measures to assess;
- Incorporating security and cybersecurity personnel when relevant.

The demographics of the stakeholders interviewed are presented in Chapter 6.2. To facilitate the organisation and conduct of the interviews, it has been decided to characterise the stakeholders solely by their job roles, without publicly disclosing their names or the names of the organisations to which they belong.

6.1.3 Reminders on the Safety Impact Assessment methodology

Applying the first two steps of the Safety Impact Assessment methodology allowed for the selection and definition of the scope of the security measures to be assessed as well as the identification of the relevant stakeholders and subject matter experts to be consulted. This chapter outlines the assessment process, which is conducted in the next step of the methodology.

Safety Impact Assessment - Step 1 (Security measure to be assessed)

A clear definition of the security measure is essential to understand its applicability and potential impact on safety domains. The objective of the first step in the Safety Impact Assessment methodology is to clearly identify and describe the security measure under assessment. This definition is supported by its rationale for introduction and the mitigated security threats, offering a better understanding of the intended security objective.

Safety Impact Assessment – Step 2 (Identification of safety domain and selection of safety experts)

Once having clearly described and defined the security measure under assessment, the next step of the Safety Impact Assessment methodology consists in identifying the most suited job position to conduct the assessment. For that purpose, the first element is to identify the safety areas of impact of the security measures. Further detailed in report D-1.3, the safety areas potentially impacted by security measures are as follows:

- Aircraft (airworthiness)
- Unmanned Aircraft System
- Air Operations
- Ground Operations / Handling
- Airport / Aerodrome
- Air Traffic Management / Air Traffic Services / Air Traffic Control

After identifying the area(s) impacted by each security measure, a list of stakeholders is developed, focusing on individuals likely to implement these measures. The aim is to target the most relevant job roles, combining safety and security-critical functions or carrying security-critical roles with safety responsibilities within the identified area. This list of job roles per interdependency serves as the basis for selecting stakeholders and subject matter experts to be interviewed.

Safety Impact Assessment - Step 3 (Assessment)

The objective of the third step is to select safety indicators applicable to the security measure under assessment and to provide the rationale for their selection. A pre-defined list of safety indicators, categorised according to their potential negative, positive, or neutral impact on safety, was provided to the selected stakeholders for each security measure.

The methodology dictates that negative indicators are reviewed and selected first, when applicable, followed by positive indicators. In cases where neither negative nor positive indicators are selected, stakeholders are invited to choose neutral indicators.

Once the selection of indicators is completed, stakeholders are asked to justify their choices by describing the rationale behind the indicator selection. This rationale aims to gather qualitative data on the security measure under assessment and provides a comprehensive overview of the reasoning behind the selection of relevant indicators. Stakeholders are guided to answer the generic question, "*Why was this indicator selected?*" with further detailed questions based on the identified negative or positive impacts.

Finally, to ensure the consistency and relevance of the assessment outcomes, the selected indicators are cross-checked across related assessments and reviewed by Subject Matter Experts from the Consortium members. The list of indicators, along with the questions supporting the description of the rationale for their selection are provided in Annex 1 – SIA Step 3 – Safety Impact Assessment Template, extracted from the SIA methodology proposed in report D-1.3.

Safety Impact Assessment - Step 4 (Impact Rating)

The objective of this fourth step is to assess the negative impact of the security measures on safety by compiling and analysing the information collected. While this step also allows for a general description of the positive and neutral impacts, it primarily focuses on the negative impacts, enabling a quantitative rating based on a three-point scale (High Negative Impact, Medium Negative Impact, Low Negative Impact), supported by pre-established criteria. The different criteria allowing to rate the impact are provided in Annex 2 – SIA Step 4 – Impact Rating.

In addition to this classification, the assessment of certain security measures revealed that they may have effects that do not constitute a direct and immediate impact on safety but rather act as contributing factors. These include influences on human factors, operational complexity, operational efficiency, and the complexity of required training for staff, which, while not always directly measurable, could indirectly affect safety outcomes. To track these effects and distinguish them from the direct negative impacts identified, they are described under the category “Potential Indirect Impact.”

Safety Impact Assessment - Step 5 (The outcome)

The objective of the fifth step is to determine the overall outcome of the safety impact assessment (Step 5a) and to identify appropriate risk management options (Step 5b) in cases where adverse safety impacts have been identified. The overall outcome of each of the security measures assessed may be:

- Positive
- Neutral
- Negative (Low, Medium or High)

Additionally, when the assessments identified an indirect impact through contributing factors without conclusive evidence of the impact, it was designated as an “Indirect Potential Impact”.

These outcomes can be combined and are not necessarily limited to a single, exclusive choice.

6.1.4 Tools and approaches

Interviews

Interviews have been conducted one-on-one between a representative of the Consortium responsible and stakeholders or experts in the relevant field. The primary goal of these interviews was to meet the requirements of D-2.3, by applying the Safety Impact Assessment methodology aimed at assessing the impact of security measures on safety. To achieve this, the interview frameworks were adapted according to the operational domain or expertise of the stakeholder or subject matter expert, and the flow of the interview and responses provided. The interview outcomes were then cross-checked across related interviews and reviewed by Subject Matter Experts to ensure their consistency and relevance.

Surveys

A survey conducted as part of this project aimed to validate the trends identified during the assessment of security measures, which was carried out through stakeholder interviews. It sought to explore further assumptions that arose from the assessments. The results from the survey are utilised throughout the report, and the complete survey is provided in the restricted version.

Literature review

To deepen the analysis of the data collected through stakeholder interviews and the survey, a literature review was conducted on specific matters and operational domains. The bibliography at the end of this report lists the consulted literature.

Regulatory studies

Regulatory requirements applicable to all identified operational domains, from both safety and security perspectives, have been analysed to:

- Define the scope of the security measures to be assessed,
- Conduct a gap analysis by identifying whether safety measures exist to counter any potential negative impacts, and
- Support the findings of the gap analysis and recommendations.

The bibliography at the end of this report lists the consulted literature.

6.2 Participation, demography from Survey and Interviews

Interviews

Interviews were used in the scope of this project, to assess the impact of the selected security measures on safety, through the application of the safety impact assessment methodology developed in the previous deliverable D-1.3. After having defined and selected the security measure to be assessed, the application of the second step of this methodology allowed identification of the relevant job positions required to assess each of the security measures. Firstly, this second step allowed identification of the areas of impact of each of the security measures, which, linked to the list of job roles presenting safety and security interdependencies, allowed identification of the relevant positions to be consulted. The stakeholder's selection process is further detailed in Chapter 6.1.2.

A total of 34 stakeholders were interviewed to assess the impact of selected security measures on safety through the application of the SIA methodology. Figure 2 below illustrates their distribution across various operational domains. As previously highlighted, particular attention was devoted to those domains most significantly affected by security measures in terms of safety.

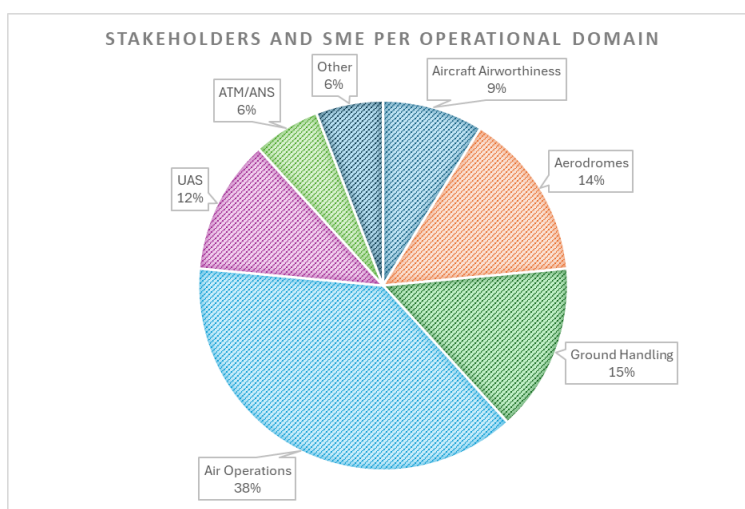


Figure 2 - Distribution of interviewed stakeholders per operational domain

Additionally, as the primary objective of this study is to evaluate the impact of security measures on safety rather than their efficiency on mitigating security threats, specific attention was given to individuals whose

primary responsibilities are directly related to safety. Figure 3 below illustrates the distribution of stakeholders according to their primary domain of expertise, categorised into Safety, Security, and Cybersecurity.

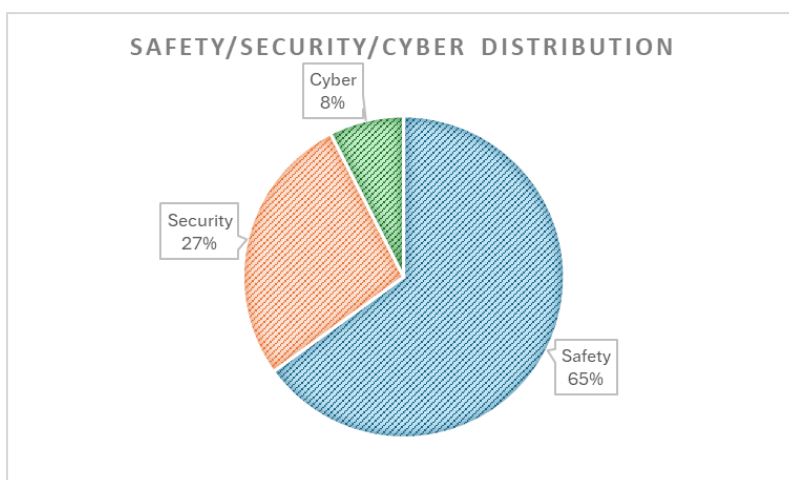


Figure 3 - Safety/Security/Cyber distribution of interviewed stakeholders

Survey

The survey conducted as part of this project aimed to validate the trends identified during the assessment of security measures, which was carried out through stakeholder interviews. Additionally, it sought to explore further assumptions that arose from the assessments.

To ensure the reliability and relevance of the results, participants for the survey were specifically selected rather than allowing open participation. This targeted selection was supplemented with demographic questions to filter responses based on participants' experience in aviation, their roles as crew members, and whether they had previously held a position in a Safety Management System.

A total of 27 responses were collected, comprising 17 flight crew members and 10 cabin crew members. The demographic data of participants were as follows:

- All respondents had more than five years of experience in the aviation industry, with 77% having over ten years of experience.
- All respondents had more than five years of experience as crew members, and 70% had over ten years of experience in this role.
- 66% of participants had previously held a position within a Safety department.

6.3 Security Measures Impact Assessment

The following chapter presents the outcomes of the assessment of the impact on safety of security measures, according to the SIA methodology summarised in Chapter 6.1.3. These outcomes are the results of the stakeholders' interviews conducted, complemented by studies, survey, and other means as applicable. For each security measures selected as detailed in Chapter 6.1.1, the following elements are presented:

- **The security measure under assessment:** Description of the security measure and regulatory references;
- **The impact rating:** Description of the impacts (Positive, and/or neutral, and/or negative), including the identification of potential indirect impacts through contributing factors such as human factors, operational complexity, and the complexity of required training. A quantitative rating of the negative impact is provided, where applicable (Low, Medium or High), according to the pre-defined criteria presented in Annex 2 – SIA Step 4 – Impact Rating.
- **Suggested risk management options:** Where applicable, recommendations for mitigating or managing the identified risks.

It should be noted that the assessments and suggested risk management options represent the position of the Consortium, based on factual research and feedback gathered from aviation stakeholders, but do not reflect the official opinion or position of EASA.

Full details of the Safety Impact Assessment for each security measure are presented in the restricted version of the report. A dynamic link on each security measure title below provides direct access to the corresponding assessment.

The details of the third step of the SIA methodology are not for public disclosure and are presented in a restricted annex to this report, for European Commission and EASA purpose only.

6.3.1 Air Operations

Aircraft Security Search (#11)

Description of the Security Measure
The measures considered are the ones laid down in the European security regulatory framework, defining in which situations an aircraft security search is required and how it must be carried out. An aircraft security search is defined by Regulation (EC) No 300/2008 as an inspection of the interior and accessible exterior of the aircraft to detect prohibited articles and unlawful interferences that jeopardise the security of the aircraft. The Implementing Rules associated with Regulation (EC) 300/2008 also provide requirements for training pertaining to staff in charge of security searches.
Requirements originate from <ul style="list-style-type: none"> • (EU) 2015/1998, 3.1 • (EC) 272/2009 Part D

Impact Rating	
POTENTIAL INDIRECT IMPACT	
According to the data collected through the assessments, security measures related to aircraft security searches present a potential indirect impact to flight safety.	

First, as aircraft security searches require additional checks to ensure that no prohibited articles are concealed onboard, they increase operational complexity, as air carriers, responsible for security searches, even when subcontracted, must implement appropriate processes to ensure compliance with these requirements. These processes include determining when searches must be conducted, how they should be performed, the qualifications required for personnel conducting searches, and the necessary actions in case of prohibited item detection. When security searches are subcontracted, complexity increases further, as air carriers must also monitor their subcontractors to ensure adherence to applicable regulations and procedures.

One direct consequence of this increased complexity is the resulting decrease in operational efficiency. Implementing procedures to meet security search requirements demands time and resources, while these searches take place before flights, a critical period when crew members, ground handling staff, and airport personnel are also assigned other tasks essential to flight safety. These include safety checks inside and outside the aircraft, flight preparation by pilots, baggage loading, fuel and passenger management.

One key issue is the pressure on personnel to perform both security and safety checks within a limited turnaround time, which reduces overall operational efficiency. This dual responsibility increases the risk of rushing critical pre-flight checks, potentially leading to oversight in either domain. For example, cabin crew may face the task of checking life jackets, seatbelts, and emergency exits while simultaneously or consecutively, conducting security searches, which complicates their workflow and diminishes overall efficiency. Furthermore, the complexity grows with multiple aircraft types operated (for crew members and/or ground personnel), requiring separate procedures and training for each.

Increased operational complexity also means that crews may struggle to retain critical safety and security knowledge, particularly when working under stressful conditions. Training programs, often designed separately for safety and security, may not adequately prepare staff for the reality of performing both tasks simultaneously. Survey responses and expert consultations suggest that cognitive overload and fatigue are growing concerns, although no incident data directly links them to security search procedures.

Another finding from the assessment is the potential conflicting safety and security priorities faced by crew members conducting security searches. As security searches, performed under “security” regulation (EU) 2015/1998, 3.1.1, often coincide with the pre-flight inspection of the cabin. This pre-flight inspection, required under “safety” regulation 965/2012 (“Air Operations”) AMC1 ORO.GEN.110(f)(h)(b), ensures the readiness of the cabin and its safety and emergency equipment for the intended flight(s).

When both checks are required before a flight, this creates conflicting safety and security priorities. Both processes are time-consuming and occur under commercial pressure. The assessment indicates that these checks are frequently conducted simultaneously, introducing a bias where the focus may lean towards either safety or security, depending on the specific context and the personnel performing the tasks. This bias may be influenced by:

- Contextual factors: For example, if there is reasonable suspicion of unauthorised access to the aircraft, personnel may prioritise security over safety.
- Concurrent audits/inspections: When conducted alongside audits or inspection, attention might naturally shift towards safety or security aspects depending on the inspection type.
- Recent training: Individuals may place greater emphasis on safety or security depending on the focus of their most recent training.

This overlap in responsibilities and the resulting prioritisation challenges underscore the need for clearer guidance, improved resource allocation, and enhanced training to ensure both safety and security checks are conducted effectively and without compromise. Notably, 77% of surveyed crew members disagreed with the statement: *“The current training program (for safety or security) effectively addresses the conflicting interactions between safety and security.”*

The implementation of aircraft security search procedures may increase the complexity of training programs for the personnel involved (security searches may be performed by cabin crew, flight crew, or ground staff, when subcontracted, depending on the air carrier's policy). This potential complexity may be heightened when personnel are trained to perform security searches on multiple aircraft types (flight crew members are allowed to operate up to two aircraft types (AMC1 ORO.FC.240), and cabin crew up to three aircraft types (ORO.CC.240), with no aircraft type limitation for subcontracted third parties). This may pose an additional challenge for air carriers to ensure that the necessary security search training is effectively delivered, without overloading staff or creating overlaps and inconsistencies, which could negatively impact their competencies and overall safety and security performance.

While these potential negative impacts have been acknowledged, no evidence or incident data has been found to substantiate such concerns, and their consequences on safety appear to be minor and indirect.

POSITIVE IMPACT

The data collected through the stakeholders’ interviews shows that security searches can bring several positive impacts to flight safety. These searches, designed to detect prohibited items, offer opportunities for uncovering potential safety hazards not directly related to security. For instance, the detection of dangerous goods, missing or malfunctioning safety equipment, such as life jackets, or seatbelts, might be identified during these checks, enhancing compliance with safety regulations. Additionally, such thorough inspections often reveal wear and tear on cabin fixtures, seats, and panels, preventing future safety hazards caused by deteriorating equipment.

Security searches also heighten crew and ground staff awareness, fostering a safety-conscious mindset that integrates security concerns into overall aviation safety practices. The act of performing detailed checks reinforces the importance of vigilance, thereby enhancing staff alertness to both safety and security risks. This increased awareness can indirectly lead to an overall improvement in flight safety by promoting a proactive approach to identifying and addressing potential safety issues.

This awareness can reduce the likelihood of overlooked hazards, ensuring that safety measures are reinforced alongside security protocols. In summary, security searches provide additional layers of safety vigilance, ultimately contributing to the overall security and safety of flight operations.

Overall Outcome

POTENTIAL INDIRECT IMPACT

Potential indirect negative impacts on safety have been identified, relating to the increased operational complexity, which can lead to decreased operational efficiency, and the potential for conflicting safety and security priorities these measures may introduce. Details of the indirect impact are provided at the impact rating stage.

POSITIVE IMPACT

A positive impact on safety has been identified, relating to the additional safety benefits these measures may provide, such as detecting threats beyond their primary security purpose. Details of the impact are provided at the impact rating stage.

Suggested Risk Management Options

Considering the findings of the assessment the following risk management options are recommended:

- **Align or integrate safety training related to the pre-flight cabin check with security training for aircraft security searches, or vice versa.** This alignment should ensure that both training programs address the necessary information and provide awareness of the potential conflicting priorities between safety and security.

Additionally, the indirect impact of security measures, manifesting as increased operational complexity is further detailed in Chapter 6.4.4, and the potential negative impact of heightened training requirements, is explored in Chapter 6.4.2.

Protection of Aircraft (#12)

Description of the Security Measure

These security measures pertain to the protection of an aircraft against unauthorised access, regardless of its location at an airport, whether it is parked with air operators’ staff on-board or left unattended. Specifically, (EU) 2015/1998 addresses requirements to ensure that persons attempting to gain unauthorised access are promptly challenged, along with specific requirements (sealing, removal of access aids, access locking and monitoring) for aircraft parked outside critical areas.

Requirements originate from

- (EC) 300/2008 3.2
- (EU) 2015/1998, 3.2

Impact Rating

POTENTIAL INDIRECT IMPACT

The data collected through the assessment highlights that compliance with aircraft protection requirements creates a potential negative indirect impact on safety, as it leads to increased vehicle movement near or in contact with the aircraft, particularly when removing or repositioning access aids. This can increase the risk of collisions between aircraft and passenger boarding bridges or ground support equipment. If undetected, such incidents could lead to aircraft operations with a non-airworthy aircraft.

These measures also add to operational complexity by introducing new protocols and procedures for leaving, accessing or overseeing parked aircraft.

While the impact remains indirect, it nonetheless adds to the workload of these staff, which may increase the risk of errors or lead them to prioritise either safety or security responsibilities, potentially affecting overall safety performance.

POSITIVE IMPACT	
While primarily designed to prevent the intrusion of malicious individuals into aircraft, aircraft protection measures also serve to prevent any unauthorised access, regardless of whether the intent is deliberate or unintentional. By restricting access to authorised personnel only, these measures contribute directly to maintaining the aircraft’s integrity, as well as that of its systems and equipment, and, consequently, its airworthiness.	

Overall Outcome	
POTENTIAL INDIRECT IMPACT	
Potential indirect impacts have been identified, particularly regarding increased operational complexity, and safety risks generated by the additional movements around the aircraft. Details of the indirect impacts are provided at the impact rating stage.	
POSITIVE IMPACT	
Positive impact has been identified, relating to maintaining the aircraft integrity and airworthy condition. Details of the impact are provided at the impact rating stage.	

Suggested Risk Management Options	
Considering the upcoming regulation (EASA Opinion No 01/2024 ¹⁹) on ground handling requirements, which aims to mitigate safety risks associated with the operation and positioning of vehicles around aircraft and boarding bridges, no further risk mitigation actions are recommended.	
The indirect impact of security measures, manifesting as increased operational complexity, is explored in greater details in Chapter 6.4.4.	
Considering the above, no further risk management options are recommended.	

Transportation of Potentially Disruptive Passenger (#16)

Description of the Security Measure	
The security measures under consideration pertain to those to be applied when transporting potentially disruptive passengers onboard an aircraft. These measures include the information to be provided to the air carrier, the timeframe for such notifications, and the requirements for escorting potentially disruptive passengers.	
As a reminder, potentially disruptive passengers are defined as <i>“a passenger who is either a deportee, a person deemed to be inadmissible for immigration reasons or a person in lawful custody”</i> .	
Requirements originate from	
<ul style="list-style-type: none"> • (EC) 300/2008 4.3; 10 • (EU) 2015/1998 4.3; 10 	

Impact Rating	
POTENTIAL INDIRECT IMPACT	

¹⁹ EASA Opinion No 01/2024 - Ground Handling Requirements (RMT.0728)

Data collected from the assessments indicates that implementing security measures for managing potentially disruptive passengers may indirectly impact safety. It is important to emphasise that the assessment focuses on the measures employed during the handling of such passengers, rather than the act of transporting them, which can pose additional safety issues beyond the scope of this study.

One of the challenges lies in the increasing complexity of required training for involved personnel, such as crew members, who must be able to effectively apply the necessary procedures when transporting such passengers. The increased complexity is corroborated by the stakeholder survey, which revealed that 77% of crew members agreed that security measures related to the transportation of potentially disruptive passengers add to operational complexity and reduce operational efficiency. Additionally, the survey indicated that 77% of crew members believe these security measures may create conflicting priorities with their safety responsibilities.

Additionally, the assessment has identified some inconsistencies and overlaps between safety and security regulatory frameworks concerning the definitions of "potentially disruptive passenger," "disruptive passenger," and "unruly passenger," which presents an opportunity for improvement.

- EC 300/2008 defines a "potentially disruptive passenger" as "a passenger who is either a deportee, a person deemed to be inadmissible for immigration reasons or a person in lawful custody".
- (EU) 2015/1998 outline the specific security measures to transport such passengers, and mandates that specific training is provided to crew members when transporting such passengers.
- (EU) 1178/2011 ("Aircrew") provides Guidance Material which include the appropriate management of disruptive passengers, including restraint technique as considered required.
- (EU) 965/2012 ("AirOps") use both terms "disruptive" and "unruly" passenger:
 - GM1 ORO.GEN.110(f) (c)(9) - Communication to the flight crew by the cabin crew in case of "disruptive passenger".
 - ORO.CC.255 (c)(2) – Training for single cabin crew members on the management of disruptive and unruly passengers.
 - AMC2 CAT.GEN.MPA.140 (c)(7) – Hazard identification and risks assessment about disruptive passengers when developing procedure related to the transportation of PED (Portable Electronic Devices) onboard.
 - CAT.OP.MPA.155 (a)(3) defines "deportees, inadmissible passengers or prisoners in custody" as a special category of passenger without naming it as "potentially disruptive passenger".

From a linguistic perspective, disruptive behaviour can be understood as actions that interfere with the normal operations of a flight or the comfort of other passengers, typically without deliberate malice. Examples include excessive noise, failure to comply with basic requests, or behaviours that cause delays. While generally less severe, disruptive behaviours can escalate if not managed appropriately. In contrast, unruly behaviour involves deliberate non-compliance with crew instructions or aviation regulations, often posing a direct threat to safety. Examples include refusing to remain seated during critical phases of flight, physical aggression, or consuming prohibited substances. Unruly behaviour is usually more severe and may result in legal or regulatory consequences.

POSITIVE IMPACT

The data collected shows that security measures to be applied when transporting potentially disruptive passengers positively impact safety. Early notification allows crews to prepare effectively, ensuring compliance with SOPs and safety rules, such as correct seating and briefings, ultimately enhancing their ability to anticipate and manage challenges arising from the transportation of such passengers, both during normal operations and in emergency situations. Timely information improves crew situational awareness and supports the application of TEM (Threat Error Management) principles, particularly the identification and management of threats, enhancing their ability to handle potential safety risks. Additionally, as these security measures are designed to prevent and mitigate flight disruptions that could negatively impact safety, they help reduce potential conflicts between safety and security priorities. The alignment between safety and security objectives, further facilitates safer flight operations.

Overall Outcome

POTENTIAL INDIRECT IMPACT

Potential indirect impacts have been identified, related to the increased complexity of required training requirements for crew members and ground handling personnel, further compounded by the difference in terminology between safety and security regulatory frameworks. Details of the indirect impacts are provided at the impact rating stage.

POSITIVE IMPACT

A positive impact on safety has been identified, relating to the additional safety benefits these measures provide by ensuring that crew members are aware of and prepared for the specific requirements associated with the transportation of such passengers. Details of the impact are provided at the impact rating stage.

Suggested Risk Management Options

The indirect impact of security measures, manifesting as increased complexity of required training in Chapter 6.4.2. Considering the above, no further risk management options are recommended.

Hold Baggage Reconciliation (#15)

Description of the Security Measure

The security measures under consideration pertain to the identification of hold baggage, verification that the owners of the hold baggage are on-board the aircraft and include specific requirements for the transportation of unaccompanied hold baggage.

Requirements originate from

- (EC) 300/2008 5.3
- (EU) 2015/1998 5.3

Impact Rating

POTENTIAL INDIRECT IMPACT

The data highlights several potential indirect negative impacts of baggage reconciliation requirements, particularly the additional workload imposed on involved staff, which may in turn reduce both operational efficiency and staff performance.

The additional workload placed on crew members and ground staff during baggage reconciliation, particularly when baggage is improperly tagged, introduces stress and operational complexity. This process frequently results in flight delays, escalating tensions among passengers and sometimes leading to unruly behaviour. Crew members must then manage both the reconciliation process and potential conflicts, increasing strain on human performance. The interaction between safety and security in such situations is often overlooked in training, with insufficient focus on human factors.

Beyond the human factors impact, baggage reconciliation procedures inherently increase operational complexity. The process involves specific protocols, often requiring the use of specialised software, and can vary significantly between different air carriers and ground handling companies.

Furthermore, baggage reconciliation is a time-intensive process that involves offloading luggage and, in some cases, searching for passengers, both of which reduce operational efficiency. The commercial pressure to maintain flight schedules further exacerbates stress, increasing the risk of mistakes. While the negative impact has been identified through the assessment, it remains diffuse and indirect as no direct evidence of consequences have been found.

POSITIVE IMPACT

The data collected shows that baggage reconciliation requirements can have indirect positive safety benefits, particularly through enhanced data collection regarding transported baggage: In response to these regulatory requirements, aviation stakeholders often implement baggage tracking systems. These systems not only ensure baggage traceability but also improve the monitoring and tracking of baggage throughout the transport process. By providing accurate data on the location, weight, and potential specific contents of baggage, these systems support proper aircraft load management, ensuring balanced weight distribution. They also facilitate the rapid identification and removal of suspicious or non-compliant baggage, limiting delays and interruption in operational procedures. This increased efficiency reduces pressure on ground handling staff and crew members, enabling them to focus on the safe execution of their tasks without unnecessary distraction that could have a negative impact on safety.

It should be noted that the positive impact is primarily due to the measures implemented by aviation stakeholders to comply with these regulatory requirements, rather than the requirements themselves.

Overall Outcome

POTENTIAL INDIRECT IMPACT

Negative indirect impacts on safety have been identified, relating to the increased operational complexity, and the potential negative impact these measures can generate on staff in term of human factors. Details of the indirect impact are provided at the impact rating stage.

POSITIVE IMPACT

Positive impacts on safety have been identified, relating to the increased operational efficiency and the associated benefits provided by the systems implemented to comply with these requirements. Details of the impact are provided at the impact rating stage.

Suggested Risk Management Options

The indirect impact of security measures, manifesting as increased operational complexity, reduced operational efficiency, is explored in greater details in Chapter 6.4.4.

Considering the above, no further risk management options are recommended.

In-flight security measure - Flight deck door (#17 & #21)

Description of the Security Measure

Both the European safety and security regulatory frameworks address requirements for the protection of the flight crew compartment. While security requirements are solely covered in Regulation 300/2008, which includes a generic requirement to ensure that "*unauthorised persons shall be prevented from entering the flight crew compartment during a flight*" safety requirements are more detailed. Even though it is located within the safety regulatory framework, ORO.SEC.100²⁰ can easily be assimilated to security requirements. This regulatory point details the necessity of a cockpit door based on the characteristics of the aircraft, the expected locking and monitoring mechanisms, and mandates the flight phases during which the door must be locked.

Requirements originate from

- (EC) 300/2008, 10.
- (EU) 965/2012 amended, ORO.SEC.100
- (EU) CS 25 AMC 25.795(a)(1) & AMC

Impact Rating

HIGH NEGATIVE IMPACT

Severe consequences – may lead to an aircraft accident or serious incident within the meaning of Regulation (EU) 996/2010	<input type="checkbox"/>
Direct impact on the aircraft / aircraft operation (flight crew, ATM, aerodrome), aircraft critical systems and equipment	<input checked="" type="checkbox"/>
There is a documented history of accidents resulting from this security measure	<input checked="" type="checkbox"/>
Robust evidence of negative impact (for existing security measures) in form of occurrence reports and root cause analysis	<input type="checkbox"/>
High number of mitigating measures is required in form of procedures, training and (if applicable) equipment to counter negative impact on safety	<input checked="" type="checkbox"/>

Considering the negative impact identified through the analysis of the collected data from stakeholder interviews, as well as historical events where the presence of the flight deck door has been recognised as a contributory factor in high-energy accidents, the negative impact of such a flight deck door on safety is categorised as “high negative.”

However, this high negative safety impact must be carefully balanced against the significant positive impact the flight deck door has on security. Its design and implementation effectively prevent unauthorised cockpit intrusions, mitigating an historic security threat to flight safety.

The “high-negative” categorisation is mainly due to the data collected for the safety indicator “Develops latent conditions whereby safety can be compromised.” The other output from the data collection outlines other potential impacts on safety, with less visible and direct impact.

²⁰ Regulation (EU) 965/2012 on technical requirements and administrative procedures related to air operations amended by Commission Implementing Rules 2019/1387

A summary of areas of high negative impact is presented below:

- **Develops latent conditions whereby safety can be compromised**

Initially introduced as a countermeasure against aircraft hijackings in response to several unlawful acts of interference, some of which resulted in fatal accidents, this measure was implemented during a period when other security practices, such as passenger screening, ground-based controls, and security searches, were significantly less developed.

Given the historical accidents where the presence of the reinforced cockpit door was identified as a contributing factor, it is worth considering whether the procedure associated with the use of the reinforced cockpit door, remain fully adapted to today's threat landscape. This is particularly pertinent considering insider threats posed by authorised personnel in the cockpit, as evidenced by incidents such as the hijacking of Ethiopian Airlines Flight 702 in 2014, the LAM Mozambique Airlines Flight 470 crash in 2013, and the Germanwings Flight 9525 crash in 2015.

Although these events remain highly isolated cases with an extremely low probability, especially when compared to the vast volume of air traffic, their dramatic consequences, significant media attention, and profound psychological impact on the aviation sector and its users underscore the importance of addressing insider threats related to aircraft hijacking. These threats, when facilitated by the reinforced cockpit door, demand careful consideration and appropriate mitigation strategies to ensure the continued balance between safety and security.

The Germanwings 9525 accident, and the subsequent investigation by the French BEA, led to a regulatory update through the publication of Regulation (EU) 2018/1042, amending Air Operations (EU 965/2012) and Aircrew (EU 1178/2011). The key measures introduced in response to the Germanwings 9525 accident are as follows:

- The implementation of support programs for crew members
- Psychological assessments for flight crew members
- Systematic and random testing for psychoactive substances to ensure the medical fitness of crew members

These measures, while deemed necessary based on the accident analysis and the root causes identified, only address the issue partially. They focus primarily on the mental health of flight crew members and exclude the critical issue of fully securing the cockpit door from the inside, without any means of external access. Even in the case of a pilot or other authorised personnel who does not show mental impairments that would indicate a potential threat to safety, the risk of the aircraft being taken over still exists.

Therefore, these regulatory updates address the mental health aspect of crew members, but they do not fully account for potential issues related to the cockpit door security itself.

Additionally, the design and security protocols surrounding the reinforced cockpit door can inadvertently introduce new latent risks to flight safety. The inability to access the cockpit externally in certain scenarios, as evidenced by the Air India Flight AI-403 incident in 2013, highlights the risk of the door failing in a locked position, preventing flight crew from regaining access to the cockpit. Beyond the risk of denied cockpit access, the reinforced door may also obstruct crew members from exiting the cockpit in emergencies, such as after an impact or an on-board fire, where swift evacuation is critical.

- **Introduces additional challenges in the management of emergency situations**

The data collected through the assessment indicates that the presence of a cockpit door introduces additional challenges in managing emergency situations. Two primary challenges have been identified: effective communication between flight and cabin crew during emergencies, and the movement of crew members between the cockpit and cabin, whether for evacuation or to access safety equipment.

Among surveyed crew members, 93% acknowledged that the cockpit door presents an additional challenge to emergency management. When asked, "*To what extent do you believe cockpit doors affect the crew's ability to respond promptly to emergencies (e.g., PED fire, flight crew incapacitation, evacuation, etc.)?*", only 7% responded "Not at all," while 22% chose "Slightly," 48% "Moderately," and 23% "Significantly."

To address these challenges, Air Operations Regulation (EU) 965/2012 requires crew members to acquire the necessary skills and practice to effectively respond to emergencies. This is achieved through mandated initial and recurrent training programs, which include situational drills and exercises tailored to each aircraft type. These programs ensure that crew members are adequately trained in effective communication and rapid cockpit access. Consequently, no additional risk management options are deemed necessary regarding crew training on this issue.

- **Decreases safety awareness**

The final negative impact on safety identified through the assessment is the reduced situational awareness between the cockpit and the cabin caused by the flight deck door. It is evident that the physical barrier created by the door diminishes mutual awareness between flight and cabin crew. This was confirmed by the survey, where 88% of crew members agreed that the locked cockpit door reduces safety awareness, though the impact was generally rated as low, with 33% of respondents selecting "Slightly", and 37% "Moderately" when asked, "*In your opinion, to what extent does the locked cockpit door reduce the crew's situational awareness?*".

However, considering that maintaining a sterile environment for flight crew has also been identified as a positive safety impact in this study, no additional risk management options are recommended. The balance between safety benefits and limitations appears to be appropriately managed under current protocols.

POTENTIAL INDIRECT IMPACT

In addition to the negative impacts described above, the assessments identified indirect impacts that, while acting as potential contributing factors, do not constitute a direct and immediate impact on safety:

- **Increases maintenance requirements**

The presence of a flight deck door and its associated systems naturally requires additional maintenance procedures to ensure their proper functioning. While this is an obvious necessity, it has only a relatively minor negative impact on safety, primarily due to the additional workload it creates for maintenance and continuing airworthiness organisations. However, these maintenance tasks are very well-established in industry practices. Also, according to Regulation (EU) 1321/2014, it is the responsibility of the maintenance organisation to assess, measure, and allocate the necessary resources in accordance with the workload generated by maintenance tasks.

- **Increases complexity of required training**

A negative impact on safety has been identified due to the increased complexity of the required training that the presence of a cockpit door entails. This training is necessary for both cabin and flight crew members to ensure the proper use of the flight deck door and secure access to the cockpit. Given that well-established procedures and training programs already exist for this purpose, no additional risk management options are recommended.

- **Introduces additional challenges in safety management**

As part of its risk management process, safety management should address the potential risks associated with the presence of a cockpit door. However, since this requirement is no longer in its early implementation stage and given the diffuse negative impact that addressing these risks has on safety management systems, no further risk management options are recommended for this aspect of the identified negative impact.

POSITIVE IMPACT

The flight deck door contributes positively to safety by facilitating the maintenance of a sterile cockpit environment during normal flight operations, where disruptions or interruptions to the flight crew's procedural tasks can lead to distractions and task discontinuity. Moreover, during in-flight cabin emergencies, the flight deck door enables the flight crew to remain protected and isolated from the immediate consequences of the emergency, allowing them to focus on the safe management of the flight.

A summary of areas of positive impact is presented below:

- **Sterile flight crew compartment**

The assessments highlighted the positive role of the flight deck door in maintaining a sterile flight deck environment, a critical factor in ensuring aviation safety. As stipulated in Regulation (EU) 965/2012 ORO.GEN.110(f) and its associated AMC1, a sterile flight deck is defined as "*any period of time when the flight crew members are not disturbed or distracted, except for matters critical to the safe operation of the aircraft or the safety of the occupants.*"

Distractions in the cockpit can contribute as probable factors to safety incidents or accidents, influencing the chain of events that may lead to adverse outcomes. Such distractions can erode situational awareness, disrupt task management and prioritisation, or result in cognitive overload during flight operations. By providing a physical barrier between the cabin and the flight deck, the flight deck door significantly reduces the potential for distractions, allowing the crew to maintain their focus on managing the flight effectively.

The flight deck door thus plays a vital role in supporting a sterile cockpit environment. By mitigating potential distractions, it reinforces a foundational principle of aviation safety: maintaining the flight crew's focus on operational tasks, ensuring

situational awareness, effective communication, and sound decision-making, all of which are essential for the safe conduct of the flight.

- **Physical barrier protecting the flight deck**

In addition to ensuring a sterile flight deck environment, the flight deck door plays a vital role as a physical barrier against various safety threats. EASA Certification Specification for large aeroplanes (CS 25) mandates, under CS 25.795(a), that flight deck doors on certain aircraft categories must be designed to resist forcible intrusion, as well as penetration by small arms fire and fragmentation devices. While the primary aim of these requirements is to address security threats, such as unauthorised access, gunfire, or other malicious actions, the same specifications also provide an additional benefit in safeguarding the flight crew against unintended safety hazards, such as the protection against flying objects or debris.

- **Other Positive Impact of the Flight Deck Door Protecting the Flight Deck**

Under the security considerations of CS 25.795 (b)(1), and based on FAA AC 25-795-3²¹, the flight deck door is also required to limit the entry of smoke, fumes, and noxious gases into the cockpit. This requirement serves as an additional layer of protection, not only against unlawful acts of interference, but also against unintended safety hazards. The door's ability to prevent the infiltration of harmful substances into the flight deck is crucial in situations such as the release of engine fumes into the cabin or the spread of smoke from a fire in the passenger area.

This design feature ensures that the flight crew remains isolated from potentially hazardous fumes, thereby safeguarding their ability to focus on their critical operational duties during emergencies. Whether the threat is a malicious act or a non-intentional safety issue, the flight deck door plays a dual role in mitigating both security risks and safety hazards.

Finally, during a rapid decompression of the cabin, the structural integrity of the aircraft becomes crucial. The cockpit door's ability to maintain its seal is key in preventing the loss of pressurisation from impacting the flight crew. As the cockpit is pressurised separately from the passenger cabin, a properly sealed cockpit door ensures that the flight crew can continue to operate the aircraft safely, protected from the effects of decompression. The reinforced door acts as a physical barrier, preserving the cockpit's pressurisation, which allows the crew to make vital emergency decisions without being affected by the decompression in the cabin.

Overall Outcome	
HIGH NEGATIVE IMPACT	Negative impacts on safety have been identified, primarily relating to the latent conditions it may generate, such as the possibility of voluntarily locking oneself inside the cockpit. Details of the impacts are provided at the impact rating stage.
POTENTIAL INDIRECT IMPACT	Potential indirect impacts have been identified, related to the increased training and maintenance requirements and the additional challenges faced by the safety management system in adequately managing the risks associated with the reinforced cockpit door. Details of the indirect impacts are provided at the impact rating stage.
POSITIVE IMPACT	A positive impact on safety has been identified, particularly in maintaining a sterile environment and ensuring the protection of the flight deck and its occupants against the consequences of safety incidents within the cabin. Details of the impact are provided at the impact rating stage.

Suggested Risk Management Options
<p>Considering the role the reinforced cockpit door plays in preventing security threats, along with its positive impact on flight safety by preventing disruptions to the flight crew during both normal and emergency situations, the presence of the cockpit door itself is not being questioned. However, certain risk management options are or could be undertaken to address its potential negative impact on safety, particularly in scenarios where latent conditions may develop that compromise safety (e.g., the intentional act of a crew member locking themselves in the cockpit):</p> <ul style="list-style-type: none"> • Systematic presence of two crew members in the cockpit. While some air carriers have implemented measures ensuring the systematic presence of two crew members in the cockpit, so that there is never just one crew member alone in the cockpit when the other exits for physiological needs or other reasons, there are currently no regulatory requirements mandating this practice. By ensuring that at least two individuals are present at all

²¹ Federal Aviation Administration Advisory Circular (AC) 25.795-3, Flight deck Protection (smoke and fumes)

times, it reduces the opportunity for a lone crew member to seize control of the aircraft and block access to the cockpit from the outside.

However, this measure should be carefully assessed to ensure it does not introduce additional threats or challenges. The presence of a second crew member would need to be evaluated for its effectiveness in preventing suicidal behaviour, ensuring that the second crew member would be able to detect and respond appropriately to such a threat. Additionally, careful consideration should be given to the potential security risks associated with this approach. Often, the second crew member would be a cabin crew member, who typically undergo less rigorous medical evaluations as flight crew, and no psychological assessment. This significant difference could raise concerns about whether this measure might inadvertently introduce new threats, particularly if the second crew member themselves were to exhibit suicidal tendencies, which could be undetectable for cabin crew members. Finally, such measures could also reduce the cabin surveillance, and interrupting cabin crew in their normal duties. These measures were initially recommended by EASA following the Germanwings Flight 9525 accident through SIB 2015-04²², which was subsequently withdrawn and replaced by SIB 2016-09²³, following stakeholder feedback²⁴ regarding the challenges of implementation and doubts about its effectiveness. SIB 2016-09 leaves the decision to air operators, based on an assessment of the safety and security risks associated with this measure.

- **Enhanced cockpit door security – Intelligent Cockpit Access Systems.** With technological advancements, Intelligent Cockpit Access Systems (ICAS) could be developed to monitor both crew behaviour and aircraft performance. These systems would track potential threats, whether they arise from abnormal actions by the flight crew or unusual flight data (such as altitude changes or flight path deviations). In such cases, the system could initiate a direct action on the cockpit door, allowing remote unlocking or overriding of the door's security to ensure that authorised personnel can access the cockpit swiftly. This combined approach of monitoring crew and aircraft would provide a proactive solution for responding to abnormal events and potential security breaches. These measures should be carefully assessed to ensure they do not introduce additional risks, particularly in terms of cybersecurity. The increasing number of connected systems could lead to new vulnerabilities, potentially exposing the system to breaches.

The data collected also revealed other negative impacts associated with the presence of the cockpit door. While these impacts are more diffuse and indirect, they nonetheless persist, particularly in relation to increased demands on training programs and the management of emergency situations:

- **Ensure that all necessary emergency equipment is located within the areas it is intended to be used,** to further reduce the need for cockpit access during emergencies. While regulations already require the strategic placement of safety and emergency equipment within the cabin, certain items, such as the crash axe, crowbar, and some firefighting tools (e.g., fire-protective gloves and hoods), are not specifically required to be positioned in easily accessible location from the cabin. Only (EU) 965/2012 CAT.IDE.A.100 requires that *"All required emergency equipment shall be easily accessible for immediate use"*, which leaves space for interpretation. The data collected through stakeholder interviews highlights that certain emergency equipment, such as fire-fighting kits, including fireproof gloves and hoods, is often located in the cockpit. This creates a potential obstacle for cabin crew during emergencies, as access to this equipment may be delayed due to the presence of the flight deck door. Addressing this gap by ensuring these items are placed in easily accessible areas within the cabin, or that supplemental equipment is strategically placed in accessible locations, would enhance safety and help mitigate the negative impact of the cockpit door on emergency response procedures.
- **Managing the impact of increased complexity of security training on safety.** The indirect negative impact on safety stemming from the complexity of the training program is discussed in detail in Chapter 6.4.2.

Security training for crew members (#35)

Description of the Security Measure

²² EASA SIB 2015-04 - Authorised persons in the flight crew compartment

²³ EASA SIB 2016-09 - Minimum Cockpit Occupancy

²⁴ EASA - Summary of results on "Assessment of effectiveness of 2-persons-in-the-cockpit recommendation included in EASA SIB 2015-04"

The measures under consideration pertain to the security training of crew members, regardless of their roles or hierarchical level. These include training requirements based on crew members' duties, as well as recurrent training requirements and those related to the qualification of instructors.

Requirements originate from

- (EU) 2015/1998 – 11.2
 - 11.2.3.11
 - 11.2.3.6
 - 11.2.3.7
- (EU) 2015/1998 – 11.4
- (EU) 965/2012 – AMC2 ORO.GEN.110 (a)

Impact Rating

INDIRECT POTENTIAL IMPACT

The implementation of security training for crew members, while essential for ensuring compliance and safeguarding operations against security threats, can inadvertently lead to several negative impacts on safety. These impacts stem from the inherent complexities and challenges associated with integrating and aligning safety and security training programs. The integration of security training without adequate alignment with existing safety training can introduce challenges in safety management: In the absence of cohesive training strategies, air carriers risk creating inconsistencies between the two training frameworks, which can result in confusion and miscommunication among crew members. This misalignment can hinder the effectiveness of both security and safety measures, creating an environment ripe for safety risks and leading to a decrease in safety awareness among crew members.

When the focus shifts predominantly towards fulfilling security training requirements, there is a risk that crucial safety concerns may be overlooked. This is particularly evident in situations where security and safety topics intersect.

By developing training programmes that harmonise security and safety training, air carriers can foster a culture of safety that effectively balances the demands of both areas, ensuring that safety remains a top priority in all operational aspects. However, it is essential to acknowledge that the positive or negative impact of security training on safety is contingent upon how this training is constructed and delivered. There are currently no regulatory requirements mandating the coordination of security and safety training or the implementation of a Security Management System in conjunction with the Safety Management System.

POSITIVE IMPACT

The implementation of security training for crew members, when effectively designed and integrated with existing safety training, can facilitate compliance with safety regulations and enhance overall safety within the aviation environment. By recognising the inherent link between safety and security functions, security training can serve as a valuable tool for improving safety outcomes.

One of the key benefits of security training is its potential to increase safety awareness among crew members. Well-structured security training can equip crew members with the knowledge and skills to identify safety hazards that may not be immediately obvious. This dual focus not only fulfils security protocols but also enhances safety oversight, ultimately leading to improved operational safety. Training that prepares crew members to handle security threats effectively also equips them with skills to de-escalate situations, thereby preventing security incidents from escalating into safety threats. In conclusion, when security training is efficiently implemented and well-coordinated with safety training, it can significantly enhance flight safety. By increasing safety awareness, facilitating compliance with safety regulations, and improving staff performance in terms of human factors, security training serves as a critical component in the broader safety framework of the aviation industry. Cultivating an organisational culture that values both safety and security is paramount to ensuring that safety remains a top priority in all operational aspects.

Overall Outcome

INDIRECT POTENTIAL IMPACT

An indirect negative impact on safety has been identified, primarily related to the increased complexity of required training for crew members, who are already subject to numerous training programs. Additionally, it presents further challenges for safety management in ensuring that security training is efficiently coordinated with other training programs, to prevent any overlaps or inconsistencies. Details of this indirect impact are provided at the impact rating stage.

POSITIVE IMPACT

A positive impact on safety has been identified, relating to the additional safety benefits that a properly implemented and coordinated security training program can provide. Details of this impact are provided at the impact rating stage.

Suggested Risk Management Options

As highlighted by the data collected, this indirect potential impact primarily stems from how air carriers choose to implement these training requirements, particularly in coordinating and aligning them with safety training programs. Beyond the potential negative effects related to training overload, the impact of security training requirements on overall safety depends largely on the implementation approach, which remains at the discretion of individual air carriers. These challenges, along with the associated recommendations, are explored in greater detail in Chapter 6.4.2.

6.3.2 Aerodromes/Airport Operations

Airport Planning Requirements (#01)

Description of the Security Measure

European security regulations break down airport planning requirements into two aspects. The first describes security requirements regarding the boundaries between different security areas, while the second defines the SRA and CPSRA and associated requirements. It is these measures aimed at distinguishing between different security areas within an airport that are considered.

In regard to boundaries, European security regulatory framework mandates that *“Boundaries between landside, airside, security restricted areas, critical parts and, where applicable, demarcated areas shall be clearly identifiable at each airport in order to enable the appropriate security measures to be taken in each of those areas.”* Additionally, it stipulates that the boundary between landside and airside must be a physical obstruction that is clearly visible to the public and prevents unauthorised access, which also constitutes fencing.

The assessment also considers requirements related to demarcated areas of airport, which mandates the designation of zones for flights which have been derogated from basic standards and apply alternative security measures. The demarcation of these zones ensures that the “standard” security measures applicable to other aircraft, passengers and baggage, are not compromised.

Requirements originate from

- (EU) 300/2008 1.1, 2
- (EU) 2015/1998 1.1

Impact Rating

NEUTRAL IMPACT

The potential negative impact of airport planning requirements identified through the assessment pertains more to the security controls induced by these requirements to penetrate the different airport areas, rather than the requirement pertaining to airport planning requirements themselves. The assessments of measures pertaining to access control, surveillance and patrols, are further detailed in dedicated assessments.

The only negative indicators retained for these requirements is the increased maintenance requirements imposed by the presence of physical barriers to delimitate the different airport areas, from landside to airside, and between the different security zones. While these maintenance demands have indeed increased, there is no apparent negative impact on safety.

POSITIVE IMPACT

The data collected through stakeholder interviews suggests that the positive impact of security measures related to airport planning requirements and boundaries lies primarily in the control of flows that these regulatory delimitations enforce. Indeed, by defining airport zones and controlling access, these security measures allow the control of non-passengers, vehicles, and passenger flows.

This control not only helps prevent the intrusion of threat perpetrators into the security restricted areas of the aerodrome (in terms of security), but also limits the intrusion of wildlife, contributing to safety. By ensuring “clear” zones, these measures can have a positive effect on airport professionals from a human factors’ perspective, allowing them to focus more effectively on their tasks.

Overall Outcome	
NEUTRAL IMPACT	
A neutral impact on safety has been identified, relating to the increased airport maintenance requirements. Details of the impact is provided at the impact rating stage.	
POSITIVE IMPACT	
A positive impact on safety has been identified, relating to the regulation of access and prevention of unauthorised entry. Details of the impact are provided at the impact rating stage.	

Suggested Risk Management Options
Considering the above, no risk management options are recommended.

Access Control (#02)

Description of the Security Measure
The security measures under consideration involve access to restricted airport areas, including escorted access requirements and protocols for crew and airport identification cards.
Requirements originate from
<ul style="list-style-type: none"> EU 2015/1998 1.2

Impact Rating	
POTENTIAL INDIRECT IMPACT	
The data collected identified a potential negative indirect impact related to the increased operational complexity and decreased efficiency these measures may cause. By requiring additional checks and adding complexity to access security-restricted areas, these measures may result in delays, impatience, distraction and frustration, which could negatively affect human factors. This, in turn, may impact staff with responsibilities critical to operational safety. While this impact has been identified, no evidence has been identified, and the consequence on safety remains diffuse and indirect.	
NEUTRAL IMPACT	
While some negative indicators have been identified and are relevant to access control requirements, their impact on safety is neutral. Indeed, although these requirements necessitate the implementation and maintenance of various access control checkpoints, security equipment, implementation of specific procedures, and training programmes for security staff, they do not directly impact aircraft safety. Similarly, while access control checkpoints may lead to passenger congestion, creating potential targets for malicious acts or challenges in managing emergencies by complicating the effective implementation of evacuation procedures, there is no impact on aircraft safety as defined within the scope of this study.	
POSITIVE IMPACT	
The data collected underscores the positive impact of safety and security measures related to access control, as these measures encourages staff to adhere to safety and security regulations while within these areas, as they are aware of the consequences of inappropriate behaviour, such as the potential revocation of their access badge and the risk of losing their employment. This heightened awareness promotes a culture of compliance and responsibility, ultimately contributing to a safer operational environment within the airport.	

Overall Outcome	
POTENTIAL INDIRECT IMPACT	
Negative indirect impacts on safety have been identified, related to the increased complexity and reduced efficiency of operations, which could potentially affect staff in terms of human factors. Details of the indirect impacts are provided at the impact rating stage.	
NEUTRAL IMPACT	

Neutral impacts on safety have been identified, related to airport-specific aspects of implementing access control checkpoints (including infrastructure, resources, and procedures) and the potential challenge posed by passenger accumulation within these checkpoints. Full details of the impact are provided at the impact rating stage.

POSITIVE IMPACT

A positive impact on safety has been identified, related to access control measures that encourage compliance with safety regulations. Full details of the impact are provided at the impact rating stage.

Suggested Risk Management Options

Risk management options related to increased operational complexity, reduced operational efficiency, is explored in greater details in Chapter 6.4.4.

Considering the above, no further risk management options are recommended.

Screening Operations of Non-Passengers (#03b)

Description of the Security Measure

The security measures under consideration are the ones related to the screening operations to be conducted on non-passengers (Staff requiring access to security restricted areas).

Requirements originate from

- (EU) 2015/1998 1.3

Impact Rating

POTENTIAL INDIRECT IMPACT

The indirect negative impact of screening requirements for non-passengers arises from the increased operational complexity and reduced efficiency they generate. By adding additional layers of control, the process complicates the flow of access to security-restricted areas for staff assigned to safety-critical tasks, such as crew members, ground handling personnel, or airport staff.

A direct consequence of this complexity is the reduction in operational efficiency, particularly for personnel who need frequent access to these areas. The increased complexity and decreased efficiency can generate potential stress or fatigue caused by these screening processes and their repeated application over time, which can divert the attention of staff from their safety-related tasks.

While the negative impact relates to its effect on human factors, no direct evidence of safety consequences has been identified. It is acknowledged, however, that these impacts could serve as contributing factors to safety incidents rather than constituting a direct safety risk.

NEUTRAL IMPACT

While the increased complexity of training requirements for security staff has been identified, potentially leading to information overload (especially when staff are assigned various functions or tasks within the screening process), and also an added workload in organising, managing, delivering, and updating training programs, these factors do not have an impact on aircraft safety.

POSITIVE IMPACT

Screening operations of non-passengers can support the identification of dangerous goods or suspicious behaviours, which aids in compliance with safety rules and regulations.

Moreover, the implementation of robust screening processes increases safety awareness among both aviation personnel. Training programmes focused on security screening educate personnel about potential threats and the importance of adhering to safety protocols, ultimately fostering a safer operational environment. This heightened awareness equips staff to better recognise and respond to unusual situations.

Overall Outcome

POTENTIAL INDIRECT IMPACT

An indirect negative impact on safety has been identified, relating to the consequence screening operations of non-passengers may have on staff human factors. Details of the indirect impact are provided at the impact rating stage.

NEUTRAL IMPACT	
A neutral impact on safety has been identified, relating to the increased complexity of required training for airport security staff. Details of the impact are provided at the impact rating stage.	
POSITIVE IMPACT	
A positive impact on safety has been identified, linked to the detection of safety hazards beyond the primary purpose of screening requirements in preventing the introduction of prohibited items on board aircraft. Details of the impact are provided at the impact rating stage.	

Suggested Risks Management Options	
The indirect impact of security measures, manifesting a potential negative impact on staff performance due to the increased operational complexity and reduced operational efficiency is explored in greater detail in Chapter 6.4.4. Considering the above, no further risk management options are provided.	

Examination of vehicles (#06)

Description of the Security Measure	
The security measures under consideration are the ones related to the examination of vehicles entering airport areas. It includes the requirements for examination, and the methods of examinations.	
Requirements originate from	
<ul style="list-style-type: none"> • (EU) 2015/1998 1.4.1, 1.4.2, 1.4.3 	

Impact Rating	
POTENTIAL INDIRECT IMPACT	
<p>The indirect negative impact of vehicle examination requirement arises from the increased operational complexity and reduced efficiency they generate. By adding additional layers of control, the process complicates the flow of access to security-restricted areas by staff reaching the security restricted areas with their vehicle. Some of them are assigned with safety-critical tasks, such as maintenance technicians, continuing airworthiness agents when working airside, ground handling agents, air traffic personnel, etc.</p> <p>A direct consequence of this complexity is the reduction in operational efficiency. The increased complexity and decreased efficiency can generate potential stress or fatigue caused by these examinations and their repeated application over time, which can divert the attention of staff from their safety-related tasks.</p> <p>While the primary negative impact relates to its effect on human factors, no direct evidence of safety consequences has been identified. It is acknowledged, however, that these impacts could serve as contributing factors to safety incidents rather than constituting a direct safety risk.</p>	
NEUTRAL IMPACT	
While the increased complexity of training requirements for security staff has been identified, potentially leading to information overload and an added workload in organising, managing, delivering, and updating training programs, these factors do not have an impact on aircraft safety, as they are not related to, or in direct support of aircraft operations.	
POSITIVE IMPACT	
The data collected outlines that vehicle examinations can positively impact safety, primarily because these inspections, although designed with a security focus, also provide opportunities to identify additional safety hazards. These may include vehicle faults, the presence of dangerous goods, and defective equipment. By facilitating the detection of such issues, vehicle examinations contribute to a safer operational environment.	

Overall Outcome	
POTENTIAL INDIRECT IMPACT	
An indirect negative impact on safety has been identified, related to the consequence vehicle examinations may have on human factors. Details of the indirect impact are provided at the impact rating stage.	
NEUTRAL IMPACT	

A neutral impact on safety has been identified, related to the increased complexity of required training for airport security staff. Details of the impact are provided at the impact rating stage.

POSITIVE IMPACT

A positive impact on safety has been identified, relating to the detection of safety hazards beyond the primary purpose of vehicle examination requirements in preventing the introduction of prohibited items within the security restricted area via a vehicle. Details of the impact are provided at the impact rating stage.

Suggested Risk Management Options

The indirect impact of security measures, manifesting a potential negative impact on staff performance due to the increased operational complexity and reduced operational efficiency is explored in greater detail in Chapter 6.4.4. Considering the above, no risk management options are provided.

Surveillance, Patrol and other Physical Control (#07)

Description of the Security Measure

The security measures under consideration relate to surveillance, patrols, and other physical controls to be conducted within and around airport premises. This includes the requirements for the areas where these operations are to be conducted, the elements to be verified, the requirements on the frequency of these activities, and those related to their unpredictability.

Requirements originate from

- (EU) 2015/1998 1.5

Impact Rating

POTENTIAL INDIRECT IMPACT

The data collected indicates that the implementation of surveillance, patrols, and associated controls at aerodromes, while essential for security, may have indirect negative repercussions on safety by affecting human performance. Indeed, additional and unpredictable checks often interrupt tasks conducted on the ground by safety-critical functions such as crew members, airport staff, ground handlers, maintenance personnel, etc., increasing operational complexity, and disrupting their workflow. These distractions can increase the likelihood of human error during safety-critical tasks, thus having an impact on staff performance in terms of human factors, and creating potential safety hazards.

POSITIVE IMPACT

The data collected shows that the implementation of surveillance and patrols at aerodromes positively impacts safety. Firstly, the presence of security personnel ensures the rigorous application of safety rules, raising awareness among staff regarding the consequences of non-compliance, such as loss of access badges and penalties. This awareness not only contributes to the effective implementation of safety regulations but also encourages compliance with safety protocols among staff, thereby reducing the likelihood of unsafe practices, such as speeding or operating defective vehicles. Additionally, while the primary focus of surveillance and patrols may be security, these operations allow for the detection and mitigation of safety threats, including breaches or defects in aerodrome fencing, barriers, improperly packaged dangerous goods, vehicle issues, FOD detections, as well as suspicious behaviours without malicious intent. The proper reporting of these safety risks plays a crucial role in their proactive identification, contributing significantly to safety data collection and overall operational safety.

Overall Outcome

POTENTIAL INDIRECT IMPACT

An indirect negative impact on safety have been identified, relating to the potential adverse effects on staff performance due to the task disruptions it may cause. Details of the indirect impacts are outlined at the impact rating stage.

POSITIVE IMPACT

A positive impact on safety has been identified, relating to the opportunity these measures provide in detecting safety hazards beyond their primary security functions. Details of the impact are provided at the impact rating stage.

Suggested Risk Management Options

The indirect impact of security measures, manifesting a potential negative impact on staff performance due to the increased operational complexity is explored in greater detail in Chapter 6.4.4. Considering the above, no further risk management options are recommended.

Screening Operations: Passengers, cabin and hold baggage (#03a)

Description of the Security Measure

The security measures under consideration are the ones related to the screening operations to be conducted on non-passengers, passengers, cabin and hold baggage.

Requirements originate from

- (EU) 2015/1998 4.1
- (EU) 2015/1998 5.1

Impact Rating

POTENTIAL INDIRECT IMPACT

The increased operational complexity in accessing security restricted areas, induced by screening requirement, often lead to extended waiting times and may result in denied boarding or restrictions on carrying certain items into the restricted areas. These situations can cause stress and frustration, potentially leading to disruptive or unruly behaviour once on board. However, the impact is indirect, diffuse, and without clear evidence of significant direct consequences on safety.

NEUTRAL IMPACT

While the increased complexity of training requirements for security staff has been identified, potentially leading to information overload (especially when staff are assigned various functions or tasks within the screening process), and also an added workload in organising, managing, delivering, and updating training programs, these factors do not have an impact on aircraft safety.

POSITIVE IMPACT

The data collected indicates that airport screening procedures, beyond their primary function of detecting prohibited items, also play a role in identifying dangerous goods and suspicious passenger behaviour, thereby reducing safety risks. First, since some dangerous goods are also classified as prohibited articles, screening operations contribute to compliance with safety regulations by preventing their transportation. Additionally, as passengers and their baggage undergo screening, this process may help detect hazardous goods, even if not explicitly listed as prohibited items, as well as suspicious behaviours that do not necessarily pose security threats (e.g., passengers under the influence of drugs or alcohol).

Overall Outcome

POTENTIAL INDIRECT IMPACT

A negative indirect impact on safety has been identified, related to the consequence screening operations of passengers may have on passengers' behaviours. Details of the indirect impact are provided at the impact rating stage.

NEUTRAL IMPACT

A neutral impact on safety has been identified, related to the increased complexity of required training for airport security staff. Full details of the impact are provided at the impact rating stage.

POSITIVE IMPACT

A positive impact on safety has been identified, relating to the detection of safety hazards beyond the primary purpose of screening requirements in preventing the introduction of prohibited items on board aircraft. Full details of the impact are provided at the impact rating stage.

Suggested Risks Management Options

The indirect potential impact identified, stemming from the potential for inappropriate passenger behaviour, is considered diffuse, with minimal consequences on safety, and no clear mitigation leverage. Considering the above, no further risk management options are recommended.

Prohibited articles (#08)

Description of the Security Measure
The security measures under consideration are the ones related to prohibited articles requirements: List of prohibited articles.
Requirements originate from <ul style="list-style-type: none"> (EU) 2015/1998 1.6 (EU) 2015/1998 4.4 (EU) 2015/1998 5.4

Impact Rating
<div style="background-color: #92d050; padding: 2px;">POSITIVE IMPACT</div>
As certain prohibited articles are also classified as dangerous goods under safety regulations, preventing the introduction of these items into security-restricted areas and onboard an aircraft facilitates compliance with safety rules, albeit in a non-comprehensive manner.

Overall Outcome
<div style="background-color: #92d050; padding: 2px;">POSITIVE IMPACT</div>
A positive impact on safety has been identified, relating to the detection of dangerous goods during the security check, when they are referenced as prohibited articles. Details of the impact are provided at the impact rating stage.

Suggested Risk Management Options
Considering the positive impact identified, no further risk management options are recommended. In addition to this assessment, the effectiveness of screening operations in detecting dangerous goods, whether these are classified as prohibited articles or not, is examined in greater detail in Chapter 6.4.1, along with the outputs of assessments pertaining to screening operations, and security equipment.

Prohibited articles exemptions (#09)

Description of the Security Measure
<p>The security measures under consideration are the ones related to exemptions of prohibited articles requirements:</p> <ul style="list-style-type: none"> - Exemptions and associated requirements for persons other than passengers to carry prohibited article into security restricted area to undertake essential tasks for the operations of airport facilities or aircraft, or performing in-flight duties - Exemptions and associated requirement for passengers to carry prohibited articles into security restricted areas or on board an aircraft - Exemptions and associated requirement for passengers to carry prohibited articles in their hold baggage into security restricted areas or on board an aircraft.
Requirements originate from <ul style="list-style-type: none"> (EU) 2015/1998 1.6 (EU) 2015/1998 4.4 (EU) 2015/1998 5.4

Impact Rating	
NEUTRAL IMPACT	
While the increased complexity of training requirements for security staff has been identified, this factor does not impact aircraft safety, as they are not directly related to or in support of aircraft operations. Similarly, the development of potential latent conditions, where safety could be compromised by habituating security personnel to authorise entry into security-restricted areas for prohibited articles, could lead to personnel becoming overly accustomed to these exemptions. However, there is no direct safety impact. Thus, the impact on safety of these two aspects is considered neutral.	
POSITIVE IMPACT	
The assessments highlight a positive impact of these security measures, primarily through increased operational efficiency. These measures enable the swift intervention of specific vehicles or specialised personnel authorised to carry prohibited articles, ensuring the proper execution of their assigned tasks. In standard operations, this facilitates smoother workflows and task fulfilment. In emergency situations, it allows for rapid response and intervention, thereby preventing potential escalation of consequences and mitigating risks effectively.	

Overall Outcome	
NEUTRAL IMPACT	
A neutral impact on safety has been identified, relating to the increased complexity of required training for airport security staff, and the potential latent conditions it can develop. Details of the impact are provided at the impact rating stage.	
POSITIVE IMPACT	
A positive impact on safety has been identified, relating to the increase in operational efficiency, particularly during emergency situations. Details of the impact are provided at the impact rating stage.	

Suggested Risk Management Options
Considering the neutral and positive impacts identified, no further risk management options are recommended.

Screening Operations & Security Controls: In-flight supplies, Airport supplies, Cargo & Mail (#04)

Description of the Security Measure
The security measures under consideration are the ones related to the screening operations and security controls to be conducted on cargo, mail, airport and supplies.
<p>Requirements originate from</p> <ul style="list-style-type: none"> • (EU) 2015/1998 6.1 • (EU) 2015/1998 6.2 • (EU) 2015/1998 6.3.2 • (EU) 2015/1998 6.4.2 • (EU) 2015/1998 6.7 • (EU) 2015/1998 7.1 • (EU) 2015/1998 7.2 • (EU) 2015/1998 8.1 • (EU) 2015/1998 8.3 • (EU) 2015/1998 9.1 • (EU) 2015/1998 9.3

Impact Rating	
NEUTRAL IMPACT	

While several negative indicators have been relevant for selection in the case of screening requirements for goods entering within the security restricted areas other than passengers' baggage, they have no impact on safety as per the definition used within this study.

The data collected during the assessment revealed an increase in operational complexity due to the addition of security control layers in the supply chain for goods. These controls require specific infrastructure, resources, equipment, procedures, and qualified personnel. A direct consequence of this increased complexity is reduced operational efficiency, as the process of moving goods into security-restricted areas becomes longer and more demanding.

However, this increased operational complexity and the resulting decrease in efficiency occur too far upstream in the supply chain to have a direct impact on aircraft safety. Similarly, the added complexity of training requirements for security staff does not affect aircraft operations or compromise safety.

POSITIVE IMPACT

The implementation of screening processes can enhance safety awareness among staff by fostering a heightened sense of vigilance on security threats, but also on safety risks. Staff implementing security controls can become more adept at identifying irregularities, such as dangerous goods, or improperly packaged or damaged items, which can pose potential safety risks. These screening measures contribute to preventing unsafe goods from entering critical areas, reducing the risk of accidents like fires, leaks, or spills that could compromise airport safety.

Overall Outcome

NEUTRAL IMPACT

A neutral impact on safety has been identified, stemming from the increased complexity of training requirements for security staff and the added complexity and reduced efficiency in the process of moving goods into airport security-restricted areas. Details of the impact are provided at the impact rating stage.

POSITIVE IMPACT

A positive impact on safety has been identified regarding the potential of these screening operations and security controls to detect non-compliant goods. Details of the impact are provided in the impact rating section.

Suggested Risk Management Options

Considering the above, no further risk management options are recommended.

Screening exemptions (#05)

Description of the Security Measure

The security measures under consideration are the ones related to the screening exemptions, applicable to all persons and goods and vehicles.

Requirements originate from

- (EU) 2015/1998 1.3.2
- (EU) 2015/1998 1.4.4
- (EU) 2015/1998 6.1.1
- (EU) 2015/1998 6.2.2

Impact Rating

NEUTRAL IMPACT

While a negative indicator related to the increased complexity of security staff training has been identified, it does not impact aircraft safety, as it is not related to or in direct support of the operation of aircraft. Similarly, the positive indicator regarding the increased efficiency of the cargo supply chain does not influence aircraft safety, as it pertains to upstream processes that are not directly connected to or supportive of aircraft operations.

POSITIVE IMPACT

The collected data underscores the primary positive impact of these security measures: a significant increase in operational efficiency. For personnel screening exemptions, the positive impact is evident in facilitating quicker responses during emergencies and enabling staff to gain timely access to security-restricted areas to carry out their duties more efficiently without being distracted or delayed by security checks.

Overall Outcome	
NEUTRAL IMPACT	
Neutral impacts on safety have been identified, relating to the increased complexity of required training for security staff, and increased efficiency in the supply chain of goods to be introduced into the security restricted areas. Details of the impacts are provided at the impact rating stage.	
POSITIVE IMPACT	
A positive impact on safety has been identified, relating to the timely access of authorised staff to the security restricted areas, especially during emergency situations. Details of the impact are provided at the impact rating stage.	

Suggested Risk Management Options
Considering the above, no further risk mitigation options are recommended.

Recruitment (#32)

Description of the Security Measure
The measures under consideration pertain to the recruitment of personnel working within the airport premises. They include the completion of a back-ground or pre-employment check, along with their associated requirements, and the verification of their physical and mental abilities and aptitudes.
Requirements originate from
<ul style="list-style-type: none"> (EU) 2015/1998 – 11. Recruitment

Impact Rating
POSITIVE IMPACT
The data collected highlights the positive impact on safety of vetting requirements, by providing additional safety benefits: Beyond the verification of background in terms of security, vetting requirements also mandate the assessment of candidates’ physical and mental abilities. These evaluations play a crucial role in ensuring that individuals are fit for the demanding and high-pressure environment of airport and aviation operations. Properly conducted physical assessments can identify any health conditions or physical limitations that may affect an individual’s ability to perform safety-critical tasks, such as operating machinery, responding to emergencies, or maintaining focus during long hours. Similarly, mental health evaluations help identify any psychological conditions that could impair judgment, decision-making, or the ability to handle stress, particularly in emergency situations. When these vetting processes are thorough, they significantly reduce the risk of incidents caused by individuals who are physically or mentally unfit for their roles, thus enhancing overall aerodromes’ safety.

Overall Outcome
POSITIVE IMPACT
A positive impact on safety has been identified, relating to ensuring that recruited staff possess the necessary physical and mental abilities to perform assigned tasks within security-restricted areas. Details of the impact are provided at the impact rating stage.

Suggested Risk Management Options
Considering the above, no further risk mitigation options are recommended.

Training and certification requirements for screeners and persons implementing security controls (#19)

Description of the Security Measure

The security measures under consideration pertain to the training, approval, and certification of screeners and persons implementing or supervising security controls. This includes the mutual recognition of training across Member States, as well as the qualification requirements for instructors.

Requirements originate from Ground Handling Staff

- (EU) 2015/1998 11.2
 - 11.2.1
 - 11.2.2
 - 11.2.3
 - 11.2.4
- (EU) 2015/1998 11.3
- (EU) 2015/1998 11.4
- (EU) 2015/1998 11.5
- (EU) 2015/1998 11.7

Impact Rating

NEUTRAL IMPACT	
While the increased complexity of required training for security staff has been identified, potentially leading to information overload (especially when staff are assigned various functions or tasks within the screening processes), ineffective learning and also an added workload in organising, managing, delivering, and updating training programs, these factors do not have an impact on aircraft safety, as they are not related to, or in direct support to aircraft operations.	

POSITIVE IMPACT	
With security training incorporating elements also shared by safety training, such as organisational and human factors, safety awareness, and crisis management, it has been identified through the assessment that these requirements can provide additional safety benefits. By equipping personnel with enhanced safety awareness, necessary for those working in a safety-sensitive environment like an airport, they become more conscious of their surroundings, better understand safety constraints, and are more likely to adhere to safety protocols. This heightened awareness not only improves individual performance but also contributes to a safer working environment, ultimately enhancing the overall safety of airport operations.	

Overall Outcome

NEUTRAL IMPACT	
Neutral impacts on safety have been identified, relating to the increased complexity of required training for security personnel, and the increased operational complexity it generates. Details of the impacts are provided at the impact rating stage.	

POSITIVE IMPACT	
A positive impact on safety has been identified, relating to the interdependencies and shared elements between safety training and security training for screeners and personnel implementing security controls. Details of the impact are provided at the impact rating stage.	

Suggested Risk Management Options

Considering the neutral and positive impacts identified, no further risk management options are recommended.
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Security training for aerodrome personnel (Other than security personnel implementing security controls) (#33)

Refer to security measure #34 in “Ground Handling Operations” Chapter 6.3.3.

Security Equipment (#28)

Description of the Security Measure
The measures under consideration are the ones pertaining to security equipment laid down in EU 2015/1998 – chapter 12. They include detection requirements and screening equipment, image projection, detection dogs, security scanners, and auto clear software.
Requirements originate from <ul style="list-style-type: none"> • (EU) 2015/1998 – 12

Impact Rating	
NEUTRAL IMPACT	
While several negative indicators are relevant for consideration in the assessment of security equipment requirements, they have no direct impact on safety. The handling of security equipment increases the complexity of training required for security staff and adds to operational complexity by necessitating additional resources and protocols. However, these factors are neither related to nor directly supportive of aircraft operations and, therefore, do not affect safety.	
POSITIVE IMPACT	
<p>The collected data highlights additional safety benefits associated with security equipment-related measures. While their primary purpose is to detect prohibited articles intended for malicious use, these systems are also capable of identifying prohibited items inadvertently introduced into the SRA and certain dangerous goods, provided these are also listed as prohibited articles.</p> <p>Moreover, an additional safety benefit lies in the deterrent effect these measures have on passengers. As passengers are likely unaware that not all dangerous goods cannot be detected by security equipment, they tend to be more cautious, ensuring they do not inadvertently carry dangerous goods. This heightened awareness contributes to improved overall safety.</p>	

Overall Outcome	
NEUTRAL IMPACT	
A neutral impact has been identified, relating to the increased complexity of required training and the increased operational complexity. Details of the impact are provided at the impact rating stage.	
POSITIVE IMPACT	
A positive impact has been identified, relating to the deterrent effect security equipment can have, and their capability to detect dangerous goods, when also prohibited articles. Details of the impact are provided at the impact rating stage.	

Suggested Risk Management Options
Considering the neutral and positive impacts on safety identified, no further risk mitigation options are recommended. The detection of dangerous goods through the screening process is further detailed in Chapter 6.4.1, along with the outputs from assessments of security measures related to screening operations, prohibited article lists.

Emergency Response Plan (#31)

Description of the Security Measure

Regulation (EU) 139/2014 ADR.OPS.B.005 stipulates that aerodromes must implement an emergency response plan to ensure a coordinated and effective approach to managing emergencies, including those arising from acts of unlawful interference.

Requirements originate from

- (EU) 139/2014 – ADR.OPS.B.005

Impact Rating

POSITIVE IMPACT

The data collected through the assessment indicates several positive impacts on safety of contingency planning measures.

The first and most evident impact is the enhancement emergency management and the efficiency of operations during such situations. A well-structured emergency response plan ensures a coordinated and structured response, minimising response times, reducing confusion, and enabling the continuity of services even under challenging circumstances. The evidence highlights that clear roles and responsibilities, efficient communication, and the availability of necessary resources contribute to improved outcomes. Additionally, training and preparedness activities enhance the effectiveness of emergency procedures, ensuring that staff are better equipped to manage emergencies. The airport emergency response plan not only supports the smooth functioning of airport operations but also benefits the emergency response activities of other aviation stakeholders, such as air traffic and aircraft operations, by facilitating seamless coordination among all parties involved.

Additionally, contingency planning fosters a broader improvement in safety awareness and preparedness. The process raises awareness of safety procedures and risks, encouraging better decision-making during emergencies. Regular training and exercises provide opportunities to identify areas for improvement, leading to the enhancement of safety protocols and practices. This is particularly effective when different aviation stakeholders collaborate during planning or simulations, allowing for the exchange of expertise and experience. Moreover, these activities improve staff performance by reducing the impact of stress and pressure during emergencies. Staff who are well-trained and familiar with contingency procedures are better equipped to handle high-pressure situations, ultimately reducing the likelihood of errors and improving safety outcomes.

Overall Outcome

POSITIVE IMPACT

Positive impacts on safety have been identified, particularly regarding the enhancement of emergency response, the efficiency of aerodrome operations, and staff performance in terms of human factors. Details of the impacts are provided at the impact rating stage.

Suggested Risk Management Options

Considering the above, no further risk management options are recommended.

Security Management System (#30)

Refer to “Security Management System” in ATM/ATS Chapter 6.3.6.

6.3.3 Ground Handling Operations

Protection of baggage and passengers (#13)

Description of the Security Measure

The security measures under consideration are the ones related to the protection of passengers, cabin and hold baggage. They include requirement and restrictions for passengers and passengers rescreening, and requirements for passengers to access their hold baggage.

Requirements originate from

- (EU) 2015/1998 4.2
- (EU) 2015/1998 5.2

Impact Rating

POTENTIAL INDIRECT IMPACT

The data collected suggests that implementing passenger and baggage protection measures impacts operational efficiency and complexity for Aerodrome and Ground Handling Operations. The required design and ongoing surveillance of passenger pathways to ensure compliance, coupled with the monitoring of passenger flows and screened baggage, as well as the detection, reporting, and correction of any non-compliance, contribute to an operational environment characterised by increased complexity.

While this potential negative impact has been acknowledged, no evidence of its occurrence has been found.

Overall Outcome

POTENTIAL INDIRECT IMPACT

Negative impacts have been identified, relating to the increased operational complexity and decreased operational efficiency these requirements can generate. Details of the impacts are provided at the impact rating stage.

Suggested Risk Management Options

The indirect impact of security measures, manifesting as increased operational complexity, reduced operational efficiency is further detailed in Chapter 6.4.4. Considering the above, no risk management options are recommended.

Protection of cargo, mail, and supplies (#14)

Description of the Security Measure

The security measures under consideration pertain to the protection of cargo, mail, in-flight supplies, and airport supplies against unlawful acts of interference throughout their transportation, handling, storage, and, where applicable, loading onto aircraft.

Requirements originate from

- (EU) 2015/1998 6.6
- (EU) 2015/1998 8.2
- (EU) 2015/1998 9.2

Impact Rating

NEUTRAL IMPACT

These security measures increase operational complexity by introducing additional requirements for goods protection, including secure transportation, surveillance, handling, and loading where applicable. For instance, air carriers and logistics providers must reinforce chain-of-custody procedures, and ensure compliance with security protocols at every stage of the supply chain. This results in increased administrative workload, potential delays, and the need for additional resources to manage security compliance effectively.

Furthermore, to guarantee that personnel responsible for goods protection fully understand these requirements, such as when goods are considered secure or when re-securing is necessary, additional training is required. This increases the complexity of staff training programs, as employees must not only be familiar with evolving security regulations but also integrate these procedures into daily operations.

The additional procedures and training primarily affect logistical operations rather than aircraft operations or in-flight safety. While they contribute to overall supply chain security, they do not directly support or interact with aircraft operations, meaning their impact on aircraft safety, as defined in this research, is considered neutral.

Overall Outcome

NEUTRAL IMPACT

A neutral impact on safety has been identified, as these measures increase operational complexity and training requirements for staff involved in goods protection but do not directly affect aircraft safety, as they remain outside core aircraft operations. Details of the impact are provided at the impact rating stage.

Suggested Risk Management Options

Considering the neutral impact identified, no further risk management options are recommended.

Cargo, Mail & Supplies: Approval of regulated agents & suppliers, known consignors & suppliers, account consignors (#18)

Description of the Security Measure

The security measures under consideration pertain to the approval and designation of specific entities handling cargo, mail, and supplies. These measures include the approval requirements for regulated agents, known consignors, account consignors, regulated suppliers, and known consignors, as well as the requirements for EU Aviation Security validators.

Requirements originate from

- (EU) 2015/1998 6.3
 - 6.3.1
 - 6.3.2
- (EU) 2015/1998 6.4
- (EU) 2015/1998 6.5
- (EU) 2015/1998 8.1
 - 8.1.3
 - 8.1.4
- (EU) 2015/1998 9.1
- (EU) 2015/1998 11.6

Impact Rating

NEUTRAL IMPACT

While the increased operational complexity for such organisations, along with the increased complexity required training for their staff have been identified these factors do not have an impact on aircraft safety, as they are not related to, or in direct support to aircraft operations.

POSITIVE IMPACT

The data collected through the assessment highlights the positive impact of these security measures. First, although these stakeholders are part of the supply chain, and even if this is not under their authority, they can still detect potential safety threats. This could include identifying issues like leaking packages or undeclared dangerous goods, contributing to safety enhancements. Additionally, the tasks carried out by these third parties help reduce the workload of airport staff, allowing them to focus on other critical operations. Ultimately, this delegation improves overall operational efficiency and streamlines the handling process, benefiting both security and the efficiency of airport operations.

Overall Outcome

NEUTRAL IMPACT

Neutral impacts on safety have been identified, relating to the increased operational complexity and increased complexity of required training. Details of the impacts are provided at the impact rating stage.

POSITIVE IMPACT

Positive impacts on safety have been identified, relating to the ability of stakeholders to detect potential safety threats, while also reducing the workload of airport staff and improving overall operational efficiency. Details of the impacts are provided at the impact rating stage.

Suggested Risk Management Options

Considering the neutral and positive impacts identified, no further risk management options are recommended.

Cargo from third countries (#29)

Description of the Security Measure

The measures under consideration pertain to the acceptance of cargo from third countries. They include the requirements related to the designation of air carriers, the validation and discontinuation of ACC3 air carriers, the security controls to be applied to such cargo and mail, and the validation requirements for regulated agents and known consignors.

Requirements originate from

- (EU) 2015/1998
 - 6.8.1
 - 6.8.2
 - 6.8.3
 - 6.8.4
 - 6.8.5

Impact Rating

NEUTRAL IMPACT

While the increased complexity of required training for third-party cargo providers has been identified, along with an increase in operational complexity leading to a potential decrease in operational efficiency due to the additional layers of control required to import cargo from third countries, these factors do not impact aircraft safety, as they are not directly related to or in direct support of aircraft operations.

Overall Outcome

NEUTRAL IMPACT

Neutral impacts have been identified, relating to the increased complexity of required training, increased operational complexity and decreased operational efficiency. Details of the impacts are provided at the impact rating stage.

Suggested Risk Management Options

Considering the neutral impact identified, no further risk management options are recommended.

Security training for Ground Handling Personnel (#34)

Description of the Security Measure

The measures under consideration pertain to the training of ground handling and aerodrome personnel (other than security staff implementing security controls), at all hierarchical levels. These include the training requirements according to the staff profile, as well as the recurrent training requirements and those related to the qualification of instructors.

Requirements originate from

- (EU) 2015/1998 – 11.2
 - 11.2.2
 - 11.2.5
 - 11.2.6
 - 11.2.7
- (EU) 2015/1998 – 11.4
- (EU) 2015/1998 – 11.5
- (EU) 965/2012 – AMC2 ORO.GEN.110 (a)
- (EU) 139/2014 – ADR.OR.D.017

Impact Rating

POTENTIAL INDIRECT IMPACT

The assessment highlights an indirect negative impact on safety from these security measures, primarily due to the inherent complexities involved in aligning security training with other training programs to ensure and maintain their effectiveness.

Moreover, ensuring the proper coordination and alignment of security training with other training programs increases operational complexity. It requires dedicated resources and time to effectively plan, deliver, monitor, and continuously update training programs to maintain their relevance and compliance with evolving requirements.

While the negative impact was identified during the assessment, it was acknowledged that this impact remains indirect and diffuse, without direct consequences on safety and no concrete evidence supporting its occurrence.

POSITIVE IMPACT

The data collected through the assessment highlights the potential benefits from security training when effectively implemented. When appropriately coordinated and aligned with other training requirements, such as safety or emergency response training, security training can provide ground handling personnel with the necessary knowledge to handle situations involving simultaneous safety and security issues. As their role is at the core of safety-security interdependencies, and they are exposed to both safety and security constraints, adequate training equips them with the tools to manage potentially conflicting priorities effectively, and increases their awareness of potential risks they may face. This heightened awareness helps them to be more cautious and proactive in their security and safety duties, improving both their ability to manage security challenges and contribute to a safer operational environment.

Overall Outcome

POTENTIAL INDIRECT IMPACT

Indirect negative impacts on safety have been identified, relating to the increased complexity of required training. Details of the indirect impacts are provided at the impact rating stage.

POSITIVE IMPACT

A positive impact on safety has been identified, relating to the potential safety improvements these measures can offer when appropriately coordinated with safety training. Details of the impact are provided at the impact rating stage.

Suggested Risk Management Options

In addition to the evident challenges of increased complexity of required training, the analysis of the collected data highlights the critical issue of implementing security training effectively and in a coordinated manner. When security training is well-implemented, it delivers significant benefits to personnel, enhancing both their awareness and their ability to respond effectively to threats. Conversely, poorly executed training can introduce new challenges or risks, such as disengagement, insufficient learning outcomes, or conflicting priorities with other training programs. These challenges, along with detailed recommendations for addressing them, are further explored in Chapter 6.4.2.

Recruitment (#32)

Refer to “Recruitment” in Aerodrome Operations Chapter 6.3.2.

6.3.4 Unmanned Aircraft Systems

Counter UAS Technologies (#23)

Description of the Security Measure	
<p>The counter UAS technology under consideration involves identifying and mitigating risks associated with the malicious use of UAS. These measures include techniques such as disabling or destroying the UAS through various means, such as weaponry, capture, or electromagnetic interference (active systems).</p>	
<p>Requirements originate from</p> <ul style="list-style-type: none"> ICAO Guidance Doc 8973 	

Impact Rating	
HIGH NEGATIVE IMPACT	
Severe consequences – may lead to an aircraft accident or serious incident within the meaning of (EU) No 996/2010	<input checked="" type="checkbox"/>
Direct impact on the aircraft / aircraft operation (flight crew, ATM, aerodrome), aircraft critical systems and equipment	<input checked="" type="checkbox"/>
There is a documented history of accidents resulting from this security measure	<input type="checkbox"/>
Robust evidence of negative impact (for existing security measures) in form of occurrence reports and root cause analysis	<input type="checkbox"/>
High number of mitigating measures is required in form of procedures, training and (if applicable) equipment to counter negative impact on safety	<input checked="" type="checkbox"/>
<p>The implementation of C-UAS technologies presents several safety challenges. Firstly, depending on the type of technology used, these systems are designed to detect, disable, or destroy unmanned aircraft, which contradicts safety regulations prohibiting actions that endanger an aircraft. Disabling or destroying a drone aligns with the definition of an “accident” under Regulation (EU) 996/2010, underscoring the significant safety risks when such operations are conducted near infrastructures, ground or aircraft operations. Additionally, these technologies can degrade system performance and compromise safety, particularly when employing electromagnetic energy (e.g., jamming or spoofing), which may interfere with airport and aircraft systems. Such interference can disrupt critical surveillance and navigation systems, reducing the accuracy of surveillance data and hindering air traffic controllers’ ability to track aircraft effectively. The potential for unintended interference extends to ATS, aerodromes, and aircraft, increasing safety hazards, particularly through collateral damage from falling debris in densely populated areas. Given these risks, aviation stakeholders, including air operators, ATS/ATM, and aerodrome management, must assess, evaluate, and mitigate the associated safety threats within their respective Safety Management Systems.</p>	
POSITIVE IMPACT	
<p>While no direct positive impact has been identified, the assessment has highlighted the following potential ones. C-UAS technologies, particularly those designed to detect and identify UAS, are unlikely to directly increase operational efficiency but can help to limit its decline. By enabling the early detection of potential threats, these systems allow for the implementation of appropriate procedures that ensure the continuity of operations while maintaining safety. Although aviation stakeholders are trained and qualified to manage operational disruptions, such situations remain complex, increasing safety risks and potentially leading to heightened stress and operational pressure among involved staff. Furthermore, the use of C-UAS technologies may serve as a deterrent to UAS operators, as the risks associated with operating in areas covered by such systems would be greater. Additionally, these technologies could encourage UAS manufacturers to incorporate restricted zone capabilities into their navigation systems, thereby preventing incursions into prohibited airspace.</p>	

Overall Outcome	
HIGH NEGATIVE IMPACT	

Negative impacts on safety have been identified pertaining to impact it may have on navigation and surveillance systems, but also by the safety hazards posed by these technologies and the potential collateral damage they may cause. Details of the impacts are provided at the impact rating stage.

POSITIVE IMPACT

Positive impacts on safety have been identified, pertaining to the role of C-UAS technologies in maintaining operational efficiency and deterring UAS operators from unauthorised areas. Details of the impact are provided at the impact rating stage.

Suggested Risk Management Options

Given that C-UAS technologies are still in their infancy, there are currently no specific requirements governing their use. However, if or when such technologies become more widespread, **they must be accompanied by strict regulatory requirements to establish clear procedures and delineate responsibilities regarding their deployment.** These regulations should specifically address:

- **The types of C-UAS technologies to be utilised:** Regulatory guidance should identify the appropriate technologies to use, taking into account their effectiveness against specific threats and the nature of those threats.
- **Authorised personnel:** The regulations should clearly define who is authorised to operate these technologies, their responsibilities, and the necessary training they must undergo and qualifications they must detain to ensure safe and effective use.
- **Operational procedures:** Procedures should be established based on the level and type of threat posed by UAS. These should also include protocols for coordination with other aviation stakeholders potentially impacted by the use of C-UAS technologies.
- **Operational authorisations:** Clear criteria for the authorisation of C-UAS operations should be determined, specifying conditions based on operational zones, type of C-UAS technologies and threat levels.

In addition to requirements for users, manufacturers of C-UAS technologies should adhere to rigorous certification protocols to enhance the reliability and safety of their systems. This would ensure that both current and future technologies are fit for widespread adoption and capable of addressing evolving UAS threats effectively.

Alongside the development of a robust regulatory framework for C-UAS users and manufacturers, aviation stakeholders potentially impacted by these technologies should be sensitised to their associated risks. These risks should be integrated into the stakeholders’ Management Systems (SMS, SeMS and ISMS) to ensure that all threats to safety are systematically identified and mitigated. To achieve this, stakeholders may need – among other – to:

- Evaluate the necessary level of staff awareness regarding the risks posed by C-UAS deployment.
- Establish appropriate coordination mechanisms to manage interactions with other aviation actors.
- Incorporate C-UAS-related risks into emergency response and contingency planning, ensuring adequate preparedness.
- Develop surveillance and response procedures tailored to the specific threats induced by C-UAS technologies.

Preparedness and incident response (#24)

Description of the Security Measure

The measures under consideration are the ones pertaining to the implementation and maintenance of an Emergency Response Plan (ERP) that ensures orderly and safe transition from normal operation to emergency, and return to normal operation. This encompasses the processes and procedures that must be integrated into UAS operators’ documentation to guarantee their preparedness in managing emergencies involving their UAS, as well as ensuring that their personnel are adequately trained for addressing such scenarios.

Requirements originate from

- (EU) 2019/947 – UAS.SPEC.030, AMC UAS.SPEC.030(3)(e)

Impact Rating

POSITIVE IMPACT

The data collected through the assessment indicates positive impacts on safety from emergency response measures. These measures enhance emergency management by ensuring a coordinated response, reducing confusion, and minimising response times. Clear roles, efficient communication, and proper resources improve outcomes, while training increases staff preparedness. Additionally, emergency response processes encourage better decision-making, and enhance safety protocols through regular training and exercises. It improves staff performance by reducing stress during emergencies, leading to fewer errors and better safety outcomes.

Overall Outcome	
POSITIVE IMPACT	
Positive impacts on safety have been identified, particularly regarding the enhancement of emergency response, the increased operational efficiency when managing emergencies, and staff performance in terms of human factors. Details of the impacts are provided at the impact rating stage.	

Suggested Risk Management Options
Considering the above, no further risk management options are recommended.

6.3.5 Aircraft Airworthiness (Initial and Continuing)

Feature of aircraft design to facilitate security searches (#20)

Description of the Security Measure
The measure considered is the one included into EASA Basic Regulation under Certification Specification CS25, related to aircraft interior design, focusing on the requirement aiming at minimising potential hiding places within an aircraft’s cabin (to facilitate security searches).
Requirements originate from
<ul style="list-style-type: none"> CS 25.795 – AMC 25.795(c)(3)

Impact Rating
POSITIVE IMPACT
The assessment highlighted a positive impact on safety in operational areas for air carriers. This security measure reduces operational complexity, enhances performance, and improves efficiency. By facilitating quicker and less complex security searches, it minimizes conflicts with other safety-related duties, such as safety equipment checks and flight preparation. Cabin crew can better focus on their responsibilities when fewer panels and hatches are accessible to passengers. Additionally, when external entities conduct security searches, the simplified process requires less time, further streamlining ground operations.

Overall Outcome
POSITIVE IMPACT
A positive impact on safety has been identified relating to the reduced operational complexity, and improved efficiency for air carriers when conducting security searches. Details of the impact are provided at the impact rating stage.

Suggested Risk Management Options
Considering the above, no further risk management options are recommended.

Protection of flight crew compartment (#21)

Refer to security measure #17, in Chapter 6.3.1 (Air Operations)

Other considerations related to aircraft design (#22)

Description of the Security Measure
<p>The security measures under consideration pertain to security considerations related to aircraft design as outlined in CS 25. They include the following elements, to be assessed from a design and airworthiness perspective:</p> <ul style="list-style-type: none"> - Flight deck smoke protection - Passenger cabin smoke protection - Cargo compartment fire suppression - Survivability of the systems - Security of the chemical oxygen generators
<p>Requirements originate from</p> <ul style="list-style-type: none"> • CS 25 AMC 25.795(b), (c), (d)

Impact Rating	
NEUTRAL IMPACT	
<p>While the assessment highlighted that these requirements increase maintenance complexity, it was acknowledged that they do not negatively impact safety. Indeed, additional maintenance requirements related to aircraft interior design features are considered established practices, fully integrated into current maintenance procedures, and do not have a direct impact on safety.</p>	
POSITIVE IMPACT	
<p>While included under the “Security Considerations” chapter of CS-25, these requirements also serve to mitigate potential safety risks. For instance, if the cabin or cockpit is protected against smoke resulting from an act of unlawful interference, it is equally protected from smoke arising from a safety incident. Likewise, fire suppression systems in cargo areas, designed to enable fire suppression in response to a security threat, also enhance safety by addressing safety-related incidents in the hold such as a lithium battery fires or system failure causing fire outbreaks.</p>	

Overall Outcome	
NEUTRAL IMPACT	
<p>A neutral impact on safety has been identified, relating to the increased maintenance requirements caused by features of aircraft interior design measures. Details of the impact are provided at the impact rating stage.</p>	
POSITIVE IMPACT	
<p>A positive impact on safety has been identified, relating to the prevention or mitigation of safety events that would have similar consequences to security incidents. Details of the impact are provided at the impact rating stage.</p>	

Suggested Risk Management Options
<p>Considering the neutral and positive impact identified, no further risk management options are recommended.</p>

6.3.6 Air Traffic Services / Management

Protection of facilities (#25)

Description of the Security Measure
<p>Regulation (EU) 2017/373 ATM/ANS.OR.B.005 stipulates that ATM Security Management Systems must ensure “the security of their facilities and personnel so as to prevent unlawful interference with the provision of services”.</p>

Requirements originate from

- (EU) 2017/373 – ATM/ANS.OR.B.005

Impact Rating

NEUTRAL IMPACT

While the assessment highlighted that these requirements increase operational complexity by adding layers to access ATM/ATS facilities, it was acknowledged that they do not negatively impact safety. In fact, this added complexity is considered part of established practices, with a diffuse and indirect impact, not directly related to or supporting aircraft operations.

POSITIVE IMPACT

The assessments highlighted the positive impact of the security measures related to the ATC facilities protection. These measures primarily ensure that only authorised personnel are present in the facility, which directly and positively influences safety. By limiting access to only those who are necessary for operations, the measures prevent unnecessary interruptions of tasks, and can foster a sense of security among personnel, which will have a positive impact on staff performance.

They also ensure that, in case of an emergency, only essential personnel are present, thereby facilitating efficient crisis management. Additionally, by preventing unauthorised access, these measures reduce the risk of operational disruptions and maintain the operational efficiency.

Overall Outcome

NEUTRAL IMPACT

A neutral impact on safety has been identified pertaining to the increased operational complexity to access ATM/ATS facilities. Details of the impact are provided at the impact rating stage.

POSITIVE IMPACT

A positive impact on safety has been identified, relating to the ability of these measures to maintain a sterile environment for ATM/ATS staff. Details of the impact are provided at the impact rating stage.

Suggested Risk Management Options

Considering the positive and neutral impacts identified, no further risk management options are recommended.

Contingency Planning (#26)

Description of the Security Measure

ATM/ANS.OR.A.070 mandates that a service provider shall have in place contingency plans for all the services it provides in the case of events which result in significant degradation or interruption of its operations. These safety requirements encompass a much wider scope than the emergency response procedures associated with security incidents.

Requirements originate from

- (EU) 2017/383 ATM/ANS.OR.A.070

Impact Rating

POSITIVE IMPACT

The data collected through the assessment indicates several positive impacts on safety of contingency planning measures.

The first and most evident impact is the enhancement emergency management and the efficiency of operations during such situations. A well-structured emergency response plan ensures a coordinated and structured response, minimising response times, reducing confusion, and enabling the continuity of services even under challenging circumstances. The evidence highlights that clear roles and responsibilities, efficient communication, and the availability of necessary resources contribute to improved outcomes. Additionally, training and preparedness activities enhance the effectiveness

of emergency procedures, ensuring that staff are better equipped to manage emergencies. ATM/ATS contingency planning not only supports the smooth functioning of air traffic operations but also benefits the emergency response activities of other aviation stakeholders, such as airport and aircraft operations, by facilitating seamless coordination among all parties involved.

Additionally, contingency planning fosters a broader improvement in safety awareness and preparedness. The process raises awareness of safety procedures and risks, encouraging better decision-making during emergencies. Regular training and exercises provide opportunities to identify areas for improvement, leading to the enhancement of safety protocols and practices. This is particularly effective when different aviation stakeholders collaborate during planning or simulations, allowing for the exchange of expertise and experience. Moreover, these activities improve staff performance by reducing the impact of stress and pressure during emergencies. Staff who are well-trained and familiar with contingency procedures are better equipped to handle high-pressure situations, ultimately reducing the likelihood of errors and improving safety outcomes.

Overall Outcome

POSITIVE IMPACT

Positive impacts on safety have been identified, particularly regarding the enhancement of emergency response, the efficiency of air traffic operations, and staff performance in terms of human factors. Details of the impacts are provided at the impact rating stage.

Suggested Risk Management Options

Considering the above, no further risk management options are recommended.

Recruitment (#32)

Refer to “Recruitment” in Aerodrome Operations Chapter 6.3.2.

Security Management System (#27 & #30)

Description of the Security Measure

The measures under consideration pertain to implementation, maintenance, and continuous improvement of a management system for aerodrome operators and air traffic services. These measures do not include requirements related to information security management system, which are assessed independently.

Requirements originate from

- (EU) 2017/373 – ATM/ANS.OR.D.10
- (EU) 139/2014 – ADR.OR.D.005

Impact Rating

POSITIVE IMPACT

The implementation of a comprehensive Management System, including a Security Management System, adds an extra layer to risk identification and mitigation by incorporating security aspects into the overall framework. This integrated approach strengthens the implementation of safety rules, ensuring that security concerns are aligned with safety objectives. By systematically addressing security risks, the SeMS enhances the operational environment for flight safety, making the management of safety rules more robust and complete. This synergy between safety and security enhances the overall compliance culture, ensuring that both domains are supported, mutually reinforcing, and provides a more resilient framework capable of proactively identifying and managing overlapping safety and security challenges.

Overall Outcome

POSITIVE IMPACT	
<p>A positive impact on safety has been identified, relating to the enhanced risk identification and mitigation through the integrated approach of SeMS and SMS, leading to a more resilient and proactive safety and security management framework. Details of the impact are provided at the impact rating stage.</p>	

Suggested Risk Management Options	
<p>Considering the above, no risk mitigation options are recommended. However, the data collected throughout the assessment highlighted challenges related to the implementation of a SeMS, particularly in its interaction with other existing Management Systems. The challenges of implementing SeMS in coordination with other Management Systems, along with associated recommendations, are further explored and detailed in Chapter 6.4.3.</p>	

6.3.7 Impact assessment of the information security measures on safety

Information Security and Cybersecurity measures (#10)

Description of the Security Measure	
<p>The security measures under consideration are the ones related to information security, and the implementation of Information Security Management Systems.</p>	
<p>Requirements originate from</p> <ul style="list-style-type: none"> • (EU) 2023/203 • (EU) 2022/1645 • (EU) 2015/1998 1.7 	

Impact Rating	
POTENTIAL INDIRECT IMPACT	
<p>It is acknowledged that the implementation of information security measures is essential to mitigate information security threats, thereby safeguard aviation safety. However, the data collected through the assessment highlight indirect potential impacts of measures related to the implementation of an Information Security Management System and associated cybersecurity measures, primarily due to the novelty of these requirements. These measures bring additional challenges to safety management, primarily because it necessitates the alignment and coordination of ISMS with existing SMS to ensure efficiency of both. This involves incorporating threats identified by the ISMS into traditional safety risks management, which can increase complexity and demand enhanced coordination between SMS and ISMS. While integration of both Systems is an option under Part IS, it remains a decision of the organisation. Another challenge lies in addressing potential conflicting priorities. Measures implemented to mitigate cybersecurity risks may occasionally hinder safety protocols. For example, heightened protections for critical systems could restrict access during emergencies, potentially delaying safety-critical interventions. These kinds of risks, along with the indirect negative impact of the decreased operational efficiency should be addressed by safety management. Finally, considering the novelty of cybersecurity in aviation (at least from a regulatory perspective for some aviation stakeholders), it may be perceived as a constraint rather than a necessity, potentially creating resistance to the adoption of new protocols. Similar to the earlier introduction of Safety Management Systems, a shift in mindset is required, to ensure that staff fully understand the importance of information security measures and are committed to implementing it effectively.</p>	
POSITIVE IMPACT	

In addition to its primary objective of safeguarding aviation against increasing information security threats, the assessments also highlighted several other positive impacts Information Security Management System and cybersecurity measures can have on safety.

- **Improves safety management**

The integration of information security into the overall Management System framework supports a holistic approach to risks management, enhancing its efficiency in addressing risks with different types of impact. By combining safety and information security measures, organisations can ensure that all aspects of operational safety are considered and managed effectively. This comprehensive Management System enhances the organisation's ability to meet regulatory requirements and improve overall safety performance, ensuring that both domains are supporting, mutually reinforcing, and provides a more resilient framework capable of proactively identifying and managing any type of threats.

- **Increase safety awareness**

The information security measures put in place under Part IS and Regulation (EU) 2015/1998 inherently promote safety awareness by educating staff about potential information security threats and their implications for operational safety. Increased safety awareness leads to a more vigilant workforce that is better equipped to identify and respond to safety issues. This is true for operational staff who are already accustomed to SMS processes and training, but it also applies to non-operational staff, such as IT personnel. Indeed, IT staff, who must be involved in the implementation of information security measures, have the opportunity to gain a better understanding of the constraints and issues related to operational safety.

- **Provides additional safety benefits**

The implementation of a robust and efficient Information Security Management System will foster a climate of trust regarding the protection and integrity of system and data among staff. Also, as staff may feel more engaged and responsible for data and systems integrity, there will ultimately be a positive impact on overall safety within the organisation.

- **Enables increased data collection**

By gathering more comprehensive and reliable data, aviation stakeholders can make more informed decisions based on the insights derived from this data. This increased data flow not only supports operational efficiency but also helps in identifying emerging threats and safety risks, allowing for more proactive responses. Moreover, the ISMS ensures that data is properly secured and protected, maintaining the integrity of the information that is critical for both safety and security operations. The ability to collect and analyse a broader set of data ultimately leads to improved safety outcomes, as it supports monitoring, risk assessment, and mitigation efforts. This foster continuous improvement and the development of more mature processes for addressing information security risks with a potential impact on safety.

Overall Outcome

POTENTIAL INDIRECT IMPACT

Negative indirect impacts on safety relate to the risks arising from a lack of coordination with existing Management Systems. Details of the indirect impacts are provided at the impact rating stage.

POSITIVE IMPACT

Positive impacts on safety have been identified, pertaining to the benefits the implementation of ISMS can offer to existing Management Systems. Details of the impacts are provided at the impact rating stage.

Suggested Risk Management Options

It is important to acknowledge that these measures are still in their early stages of implementation. Consequently, the identified positive and negative impacts are likely to evolve in tandem with the development of cyber threats. This dynamic underscores the necessity for ongoing evaluation and adaptation to ensure that the measures remain effective and continue to provide net benefits in terms of safety and operational resilience.

The challenges associated with safety management, particularly in ensuring seamless coordination among various management systems, including the ISMS, are further explored in Chapter 6.4.3.

The assessment also identified the need for information security training and awareness to ensure a comprehensive understanding of information security challenges and adherence to associated measures. However, these requirements are already covered by the existing information security regulatory framework.

Considering the above, no further risk mitigation options are recommended.

6.4 Analysis of Specific Interdependencies

6.4.1 Impact of the existing security measures implemented for cargo and mail, hold baggage and cabin baggage on ensuring compliance with the safety requirements for the transport of dangerous goods.

This specific study aims at assessing the impact of security measures on ensuring compliance with safety requirements for the transport of dangerous goods. In other words, are the security measures efficient at identifying dangerous goods, and preventing their transportation onboard aircraft. The following chapter is based on the outputs from the assessments conducted on security measures related to:

- Prohibited Articles Lists
- Screening operations (Personnel, passenger, cabin and hold baggage)
- Screening operations (In-flight & airport supplies, cargo & mail)
- Examination of vehicles
- Training for persons implementing security controls
- Security Equipment

Scope

According to Annex 18²⁵ of Chicago Convention, dangerous goods can be classified according to three categories:

- Dangerous Goods permitted for transport by air
- Dangerous Goods forbidden for transport by air unless exempted
- Dangerous Goods forbidden for transport by air under any circumstances

This study will focus on assessing how security measures can prevent the transportation of dangerous goods forbidden for transport by air unless exempted, and the one forbidden for transport by air under any circumstances.

For the scope of this study, security measures considered are the ones included in the suite of EC Regulations falling under Regulation (EC) 300/2008 on common rules in the field of civil aviation security and implementing acts. It is important to note that, for the purposes of this report, only security mitigation measures outlined in European security regulations are considered.

Air carriers responsibilities

Regulation (EU) 965/2012 CAT.GEN.MPA.200 c) state that air carriers shall establish procedures to ensure that all reasonable measures are taken to prevent dangerous good from being carried on board an aircraft inadvertently, and that the transport of such dangerous goods by air shall be conducted in accordance with Annex 18 to the Chicago Convention, and its further amendments.

Regarding the transportation of dangerous goods by passengers (either on their person or in their cabin or hold baggage), air carriers are required, under Regulation (EU) 965/2012 CAT.GEN.MPA.200(f), to provide passengers with information about dangerous goods. This requirement aligns with the provisions of the ICAO Technical Instructions, which mandate the implementation of the following measures:

²⁵ ICAO Annex 18 - The Safe Transport of Dangerous Goods by Air

- Air carriers must provide information to passengers on the types of dangerous goods forbidden to transport aboard an aircraft.
- Air carriers must ensure that notice warning passengers of the types of dangerous goods forbidden to transport aboard an aircraft are prominently displayed.
- Air carriers should have information on those dangerous goods which may be carried by passengers made available on their website or other source of information.
- In case of passenger remote check-in, air carriers must ensure that information on the types of dangerous goods which a passenger is forbidden to transport aboard an aircraft is presented to passengers.
- In case passenger self-check-in at the airport, air carriers must ensure that information on the types of dangerous goods which a passenger is forbidden to transport aboard an aircraft is presented to passengers.

While comprehensive to cover the different check-in process types, these measures are only declarative, providing information to passengers, without active mitigation action such as search of their baggage.

Regarding the transportation of dangerous goods in cargo and mail, two situations must be taken into account, according to whether the air carrier is allowed to transport dangerous goods or not.

Regulation (EU) 965/2012 ORO.GEN.110(j) mandates that air carriers obtain an approval delivered by their NAA before the transportation of dangerous goods. The delivery of this approval is only made possible after ensuring that:

- A training program has been developed and approved for personnel involved
- Operational procedures are developed and approved for the carriage of dangerous goods, including:
 - Air operator policy to transport dangerous goods
 - The requirements for acceptance, handling, loading, stowage and segregation of dangerous goods
 - Actions to take in the event of an aircraft accident or incident when dangerous goods are being carried
 - The response to emergency situations involving dangerous goods
 - The removal of any possible contamination
 - The duties of all personnel involved, especially with relevance to ground handling and aircraft handling
 - Inspection for damage, leakage or contamination
 - Dangerous goods accident and incident reporting

Finally, in the case that air operators are not allowed to transport dangerous goods but still transport cargo, they should ensure that notices giving information about the transport of dangerous goods are provided at acceptance points for cargo.

Based on the above, the three main areas where the efficiency of security measures plays a role in preventing the inadvertent introduction of dangerous goods onboard are as follows:

- Transport of dangerous goods by passengers
- Transport of undeclared or forbidden dangerous goods by air operators authorised to transport dangerous goods
- Transport of undeclared dangerous goods by air operators not authorised to transport dangerous goods

Security requirements potentially preventing the transport of dangerous goods onboard aircraft

To evaluate the effectiveness of security measures in ensuring compliance with safety requirements for the transport of dangerous goods, a regulatory analysis was conducted. This study aimed to identify the security

measures that could potentially detect and prevent the inadvertent transportation of dangerous goods onboard an aircraft. Each of the regulatory requirements identified have been classified according to its purpose:

- Procedures to be applied for personnel implementing security controls
- Training of personnel implementing security controls
- Handling of passengers, baggage, cargo and mail
- Requirements for security equipment

The Table 7 below presents the outcomes of this review.

Table 7 - Identification and classification of security measures potentially preventing or dangerous goods transportation

Regulatory References	Security Controls	Training	Equipment
4.1 Screening of passengers and cabin baggage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.1 Screening of hold baggage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.1 Security controls for cargo and mail	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Staff recruitment and training	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
12. Security equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4.1 Screening of passengers and cabin baggage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.1.2 Screening of cabin baggage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.1.3 Screening of liquids, aerosols and gels (LAGs)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.4 Prohibited articles	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Attachment 4-C	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.1 Screening of hold baggage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.4 Prohibited articles	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Attachment 5-B	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.1 Security controls – General provisions	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.2 Screening	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.8 Security procedures for cargo and mail being carried into the Union from third countries	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.8.3 Security controls for cargo and mail arriving from a third country	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11.2 Training	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
11.2.1 General training obligations	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
11.2.2 Basic training	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
11.2.3 Job specific training for persons implementing security controls	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
11.2.4 Specific training for persons directly supervising persons implementing security controls (supervisors)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
11.3 Certification or approval	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
11.4 Recurrent training	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
11.5 Qualifications of instructors	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
12.4 Explosive detection systems (EDS) equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
12.5 Threat image projection	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
12.6 Explosive trace detection equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
12.7 Equipment for screening liquids, aerosols and gels (LAGs)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
12.8 Methods of screening using new technologies	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
12.9 Explosive detection dogs	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
12.10 Metal detection equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
12.13 Auto clear software	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

In addition to the requirements listed above, it should be noted that the Safety Impact Assessment conducted as part of this study revealed that some security measures may facilitate the detection of dangerous goods, beyond their primary security purpose. These measures, which involve the monitoring, management, and handling of passengers and goods, provide an opportunity for security personnel responsible for their implementation to identify dangerous goods, even though this is not exhaustive and falls outside their primary scope of responsibility. These measures include:

- Protection of passengers and baggage
- Protection of hold baggage
- Baggage reconciliation
- Protection of cargo and mail
- Air carrier mails and materials

Outcomes of the security measures assessments

The data collected through the assessment of these security measures highlights the following regarding their ability to detect dangerous goods and prevent their introduction onboard an aircraft, thus complying with safety requirements for their transport:

- Security measures related to equipment do not mandate the detection of dangerous goods that are not also classified as prohibited articles. Consequently, even with advancements in security technology, these measures are not designed in detecting dangerous goods that fall outside the scope of prohibited articles.
- Training requirements for personnel implementing security controls do not include provisions for detecting dangerous goods that are not considered prohibited articles. These training programs do not aim to equip security personnel with the capability to detect all kind of dangerous goods and prevent their introduction onboard.
- Security requirements for handling and controlling cargo and mail focus primarily on acceptance, surveillance and protection. While they do not offer a comprehensive way to prevent the introduction of dangerous goods onboard, these requirements may provide additional safety benefits by contributing to the detection of damaged or leaking dangerous goods.
- Security requirements for protecting passengers and baggage are not designed to detect dangerous goods beyond prohibited articles and are, therefore, not effective in identifying them.

In conclusion, screening operations are primarily security functions aimed at detecting prohibited articles that pose a direct threat to the integrity of an aircraft or its passengers. Conversely, the detection of dangerous goods inadvertently carried onboard is fundamentally a safety responsibility under the purview of air operators, who are required to ensure compliance with safety regulations.

The screening process, as the sole active inspection of passengers, their baggage, and cargo, presents the most practical opportunity to mitigate safety threats posed by dangerous goods.

Recommendations

Considering the above, it is recommended to assess the feasibility of extending screening responsibilities to include the detection of dangerous goods not classified as prohibited articles. Particular attention should be given to ensure that this extension does not compromise the effectiveness and efficiency of security operations, nor introduce unintended consequences that could negatively impact both safety and security.

The deliverable D-3.1.2 *“Assessment Report on the Relevance of the Existing Detection Requirements for Screening Equipment to Mitigate Threats to Aircraft Structure”* delves further into assessing the impact of security measures on ensuring compliance with safety requirements for the transport of dangerous goods. It provides additional conclusions and actionable recommendations for improvement.

6.4.2 Cross-domains challenges posed by security training requirements

As the landscape of aviation safety and security evolves, so does the complexity of training required across all the operational domains. One of the critical findings of the assessments conducted is that the increasing integration of security measures within these domains often leads to a significant increase in the complexity of training programs. While security measures, including training protocols, are essential for safeguarding both passengers and staff, the complexity and volume of these training programs can have unintended consequences on staff performance and training effectiveness, thus potentially impacting the efficiency and effectiveness of operations, in terms of safety.

For example, it has been identified through the assessments that an overload of training requirements for staff can lead to negative aspects such as cognitive overload, or reduction in deployed training resources and means to minimise associated costs. Additionally, training programs that are poorly designed or not synchronised with other training programs can result in the emergence of overlaps or inconsistencies between different training programs. Although these issues are not unique to the security-related training requirements, the increasing demand for security training can contribute to the occurrence or exacerbation of these factors, ultimately decreasing the effectiveness of the training and, consequently, the performance of staff in terms of safety and security. These aspects are detailed further in the following section of this chapter.

It should be specified that EASA has identified “*Training effectiveness and competence*” as a Safety Issue listed in its Safety Risk Portfolio published in the European Plan for Aviation Safety²⁶. This chapter aims to explore the broader impact of security-related training demands, which, despite their importance, can detract from the operational readiness and efficiency of individuals across multiple areas.

Cognitive Overload

Security training is required for all aviation personnel working within airport premises or having security responsibilities, and the complexity of these requirements varies significantly depending on the tasks and security responsibilities of these different stakeholders. While some personnel are primarily assigned security tasks on which they need to be trained, others are assigned both security and safety-related tasks, requiring them to undergo both security and safety training, with each having its own set of regulatory requirements.

For those also assigned with safety functions, the increasing volume of security training places a significant cognitive load on personnel, ensuring they are capable of applying both security and safety competencies effectively. While security procedures are vital to ensure the prevention and mitigation of security threats, they often involve complex protocols that must be retained and applied alongside safety training requirements. This creates an overwhelming amount of information for personnel to process, particularly in high-pressure situations.

For example, crew members, who operate at the intersection of safety and security responsibilities, must effectively and simultaneously apply their security tasks during flight preparation (such as conducting security searches, managing the transportation of potentially disruptive passengers, verifying and controlling boarding access, potentially dealing with baggage reconciliation), while also adhering to their safety duties (such as managing fuel and passengers loading, performing cabin safety checks, and preparing the flight).

Cognitive load theory posits that when individuals are overloaded with information, their ability to retain and recall critical details is diminished, potentially impairing their ability to respond quickly and efficiently in security or safety-critical situations. The added complexity of security training may thus diminish the overall awareness and preparedness of personnel, making them more susceptible to errors or delayed reactions during critical or emergency situations.

²⁶ European Plan for Aviation Safety (EPAS) Volume III - Safety Risk Portfolio

Tunnel Vision: Security vs. Safety Priorities

One of the more subtle but significant consequences of excessive security training is the risk of “tunnel vision.” When personnel undergo extensive security training, they may develop a tendency to focus disproportionately on security-related issues, even in situations where broader safety concerns should be considered.

This shift toward security may occur immediately after security training, when staff are highly focused on implementing their security tasks, or when they have been briefed about a major incident involving an act of unlawful interference. For example, a crew member may become overly focused on the aircraft security search, potentially overlooking some safety tasks related to the aircraft’s preparation, particularly after being briefed during a training about an investigation into an incident involving prohibited articles concealed onboard the cabin.

This bias towards security priorities can detract from the overall safety response, especially in operational contexts where both safety and security issues must be managed simultaneously. For instance, personnel might overlook potential safety hazards or fail to manage multiple concurrent tasks effectively, concentrating too much on security procedures. This tunnel vision can be especially hazardous in the complex aviation environments, where quick decisions and multitasking are essential to ensure both safety and security.

Resource allocation and risk of compliance over quality

The growing complexity of security training also places a significant pressure on organisational resources. The need for comprehensive training programs requires significant time, means, resources and financial investment. For aviation stakeholders, also working under financial constraints, this means diverting resources from other operational priorities. In response, organisations often seek cost-effective training solutions, such as e-learning, to mitigate these challenges. While these alternatives offer financial benefits and demand fewer resources, they often fail to match the effectiveness of more interactive, hands-on training methods in developing technical skills.

However, these methods often lack the interactivity and real-world applicability necessary to ensure deep understanding of safety and security procedures. Furthermore, e-learning can lead to disengagement of staff, especially if the content is perceived as superficial or compliance-driven, ultimately hindering retention of critical information and the development of necessary practical competencies. When security procedures are taught without sufficient practical application, it impacts not only security performance but also broader safety outcomes, as personnel may struggle to manage real-time, high-pressure situations effectively.

This shift toward efficiency can directly affect the safety and security performance. As organisations focus on reducing costs and streamlining training, there is a risk that personnel are underprepared for the complex, interrelated tasks they must perform.

Overlap of safety and security training programs

Safety and security training requirements stem from different regulations, each addressing its own safety or security objectives. Through the assessments conducted, overlaps between safety and security training requirements have been identified, resulting in potential inconsistencies.

It has been identified that certain security-related training aspects are incorporated into safety regulations, particularly for Air Operations. For example, Regulation (EU) 965/2012 AMC1 ORO.GEN.110(a) outlines a detailed training syllabus for crew members, as does Regulation (EU) 2022/1174 11.2.3.11.

Although there are clear touchpoints between both syllabi, some elements are covered exclusively under security regulations, while others fall solely within safety regulations. For instance, topics such as *“Use of non-lethal protective devices assigned to crew members whose use is authorised by the Member State,”* and *“Appropriate self-defence response”* are included in safety requirements but not addressed within security regulations.

Additionally, some training elements are covered in both regulations, such as the management of disruptive passengers, but with distinct specifications. Safety regulations address “*unruly passengers*” as individuals who deliberately fail to comply with crew instructions or regulations, whereas security regulations define “*potentially disruptive passengers*” as deportees, inadmissible passengers, or prisoners in custody. Even though not all potentially disruptive passengers are unruly passengers, there is an evident safety-security touchpoint in this area, which would warrant better coordination between security and safety training programs.

However, nothing in the safety or security regulatory framework mandates that aviation stakeholders coordinate and align their safety and security training programs, nor does it require them to address the safety – security conflicting priorities their staff may face. As long as the requirements for each training program are met separately and distinctly, both systems can be fully compliant. Therefore, it is left to the discretion of aviation stakeholders to coordinate the training programs to mitigate these potential challenges.

Regarding these challenges, 77% of staff surveyed disagreed with the statement, “*The current training program (for safety or security) effectively addresses the conflicting interactions between safety and security*”, and agreed with the statement, “*Safety and security training should be better aligned and integrated?*”.

Coordinating safety and security trainings, which could address the inconsistencies and overlap between safety and security requirements, demands a comprehensive approach that goes beyond mere regulatory compliance. This requires additional resources and processes to effectively align both areas. However, the feasibility of implementing such coordination depends on the organisational maturity and available resources of aviation stakeholders. As detailed above, the existing safety and security requirements already impose significant operational constraints. Consequently, integrating both areas could introduce an additional layer of complexity into the development of training programs.

Finally, the Safety Impact Assessment of security measures related to training for staff involved in safety functions, particularly crew members and ground handling staff, highlighted that the benefits of this training primarily depend on how it is implemented. When both training programs are not coordinated and aligned, for stakeholders that merely comply with regulatory requirements without necessarily going further in a proactive training approach, it may negatively impact by decreasing their safety awareness, ultimately affecting their performance in terms of human factors. The possible duplication of training opens the door to inconsistencies between the two trainings, thus creating new safety risks.

On the other hand, an efficient implementation of security training, well-coordinated and synergised with safety training, will have a positive effect on flight safety.

Recommendations to Aviation Authorities

- **Guide aviation stakeholders in identifying conflicting safety and security (physical and information) priorities:** Provide a structured methodology to help organisations systematically recognise and document situations where safety and security priorities might conflict. This guidance should include case studies, operational scenarios, and best practices drawn from real-world assessments. This research project, particularly through Task 1 and its associated deliverables, provides an initial foundation for the identification of safety–security interdependencies and the job functions affected by these interdependencies.
- **Support the implementation of integrated safety and security (physical and information) training programs:** Develop and promote comprehensive training frameworks that integrate safety and security elements. This should include specific modules to raise awareness about conflicting priorities and how to resolve them effectively. Stakeholders should also receive guidelines, tools and templates to align these programs with their operational needs, which should be promoted at national and or international level to enhance their effectiveness and ensure consistency across the industry.

- **Promote the integration and alignment of Security Management System (SeMS) and Safety Management Systems:** To ensure smooth and efficient coordination between safety and security trainings, aviation organisations should aim to develop integrated management systems. This broader scope could encompass the Information Security Management System (ISMS), ensuring a holistic approach to risks and resource management. The advantages of integrated management systems, such as streamlined processes, better resource allocation, and improved compliance, are explored in more detail in Chapter 6.4.3.

6.4.3 Security Management System

The purpose of a Security Management System (SeMS) is to enable an aviation entity to identify and manage its security risks and be assured that the security measures taken to manage those risks are effective.

The implementation of a SeMS originates from the “safety” side of European aviation regulations (e.g., rules under the EASA Basic Regulation) and is formally required only in the following two operational domains:

- Air navigation services, through Regulation (EU) 2017/373 ATM/ANS.OR.D.010.
- Aerodromes, through Regulation (EU) 139/2014 ADR.OR.D.007, focusing on the security management of operational data.

For the other operational domains, no such requirements related to the implementation of security management systems exist. As the vast majority of aviation stakeholders are subject to security requirements, a Security Management System is often implemented to comply with these requirements. However, given the absence of specific regulatory requirements for such systems in the operational domains listed above, their structure, organisation, procedures, and other elements are not standardised.

It should be noted that the European security regulatory framework does not mandate aviation stakeholders to develop or implement such a system. The only reference to risk management in the security domain (one of the core pillars of a Management System) is the requirement to conduct risk assessments on various matters, as stipulated in Regulation (EU) 2015/1998, without further guidance on their methodology or implementation.

It is therefore up to these stakeholders, sometimes guided by recommendations from their National Aviation Authority (NAA), as is the case in the UK with the CAP1223 manual “*Framework for an Aviation Security Management System (SeMS)*”, to decide whether to implement such a system and to define its scope and operational modalities.

It should also be noted that international bodies, such as IATA through its IOSA certification, mandate the implementation of an SeMS, while ICAO recommends its adoption.

On one hand, the absence of clear and well-defined requirements for all aviation stakeholders to implement an SeMS may result in a lack of standardisation among stakeholders and Member States. On the other hand, data collected from assessments on ATS, and aerodromes highlight the positive impact of SeMS implementation. Conversely, findings from assessments in other operational domains indicate a potential lack of coordination between safety and security aspects, as well as the need to address conflicting safety and security priorities.

As a primary recommendation, requiring the implementation of a SeMS for all aviation stakeholders would enhance the alignment and management of security processes across the industry. This would ensure a baseline standardisation of security management practices, and better alignment of organisations’ SeMS.

Moreover, beyond the implementation of standalone SeMS frameworks, establishing an Integrated Management System (IMS) that incorporates quality, safety, security, and information security management systems would represent an even more advanced and synergistic approach. An IMS would facilitate the holistic management of risks across these interconnected domains, minimise procedural overlaps, and optimise resource use, ultimately reinforcing the coherence and effectiveness of risk management strategies.

For example, Regulations (EU) 2023/203 and 2022/1645, collectively known as “Part-IS,” provide guidance in GM1 IS.I/D.OR.200, which recommends that entities implementing their ISMS should ensure it is *integrated with the entity’s processes and overall management structure or even — at least partially, with safeguards for their respective integrity, and as reasonably applicable — with an overarching management system comprising information security, aviation safety and quality management*”.

The guidance does not explicitly include the Security Management System (SeMS) in this integrated framework. For entities like Aerodrome Operators and Air Navigation Services Providers, which are required to implement SeMS, there are no formal requirements or guidance for integrating SeMS with other existing management systems. This difference may lead to a lack of standardisation or alignment, potentially creating operational silos between security, and other management systems.

The interdependencies between safety and security identified throughout this project, and their measured impact on safety as analysed in this report, highlight the significant and widespread challenge of Management Systems coordination and cooperation. While its impact on safety is not necessarily predominant in magnitude, this challenge emerges as a key issue. Effective coordination between these systems is essential to address potential conflicting safety and security priorities, harmonise training programs, and integrate threats identification processes. This approach ultimately enhances overall safety levels by ensuring that safety and security considerations are aligned and mutually supportive.

Considering the above, it is recommended to promote the integration and coordination of Management Systems.

6.4.4 Influence of operational complexity on human factors and safety performance

The implementation of security measures within the operational landscape increases complexity and often reduces efficiency, indirectly affecting flight safety. This chapter explores the often-overlooked relationship between these factors and safety performance, focusing on their impact on personnel, processes, and systems.

Increased Stress and Cognitive Overload

The rise in operational complexity often introduces additional procedures, steps, and compliance requirements for personnel. This environment can create cognitive overload, particularly for those in time-sensitive, high-stakes roles common in aviation operations. Human factors research consistently shows that individuals under significant mental strain are more susceptible to errors and slower decision-making, especially during emergencies or non-standard situations. When personnel must balance an increasing number of tasks, including security procedures layered onto safety-critical duties, their ability to perform efficiently can be compromised. This heightened complexity can result in lapses in safety protocols, whether due to oversight or mis-prioritisation, with potentially severe consequences for flight safety. Reflecting this concern, EASA’s EPAS safety risk portfolio²⁷ highlights two critical issues: “*Heavy workload and misaligned tasks*” and the “*Impact of degraded levels of attention or vigilance on human performance.*”

Operational Bottlenecks and Pressure

As identified through the Safety Impact Assessment conducted within the scope of this report, security measures require the implementation of additional controls, verification, and implementation of procedures

²⁷ European Plan for Aviation Safety (EPAS) Volume III - Safety Risk Portfolio

that can decrease the operational efficiency. For example, the implementation of baggage reconciliation requirements often leads to schedule disruptions and can result in delays. The same applies to inspections carried out by patrols, which may interrupt ongoing operational tasks and reduce overall efficiency. This decreased operational efficiency can negatively impact safety performance of staff, when they are assigned with safety-critical related tasks. These can result in additional workload, requiring time and availability, in situations which are often timely sensitive such as the flight preparation.

The assessments identified several security measures that may reduce operational efficiency, potentially resulting in a negative impact on safety. For instance, it was found that tasks such as baggage reconciliation, screening processes for staff assigned to safety-related duties (crew members, ground handling personnel, etc.), aircraft security searches and others demand time and resources, during which staff are not able to perform their safety-related tasks.

In such scenarios, staff are often required to work under heightened pressure to compensate for the time spent on security matters, increasing the likelihood of rushed or incomplete conduct of safety or other security duties. This environment not only heightens stress levels but also impairs decision-making and the ability to manage concurrent tasks effectively, ultimately undermining safety standards.

Human Factor: Stress and Fatigue

Stress and fatigue among personnel are significant safety concerns exacerbated by reduced efficiency and heightened complexity. Prolonged exposure to high-stress environments, driven by the dual demands of maintaining security compliance and ensuring smooth operations, can lead to burnout, reduced vigilance, and impaired judgment. In critical aviation contexts, where even minor errors can have catastrophic outcomes, the cumulative effects of stress and fatigue represent a latent risk to safety.

While the security measures assessments presented in Chapter 6.3, acknowledge that certain security measures increase operational complexity and decrease efficiency, the associated negative impacts on staff performance have been further confirmed through a survey conducted among crew members. 44% of respondents indicated “Moderately” and 37% “Significantly” when asked, “*During daily operations, to what extent do increased complexity and reduced efficiency negatively impact staff performance in terms of human factors (such as distractions from SOPs, fatigue, stress, pressure, etc.)?*”.

A related survey of ground personnel within the scope of the study “*Aircraft Ground Handling and Human Factors*”²⁸, further emphasised the significance of human factors, identifying them as the most frequently perceived contributors to accidents, incidents, and errors on the ramp. According to this study, the top three contributing personal factors were time pressure, stress, and fatigue.

Distraction and Conflicting Priorities

Another indirect safety concern arising from operational inefficiencies and complexity is the risk of distraction leading to task interruption, which poses a threat to personnel performing critical safety tasks. For instance, ground staff may be required to conduct last-minute baggage reconciliation before a flight departs, which can require a considerable amount of unforeseen time and effort. During this process, their attention may be diverted from performing aircraft turnaround check, or verifying that the baggage is secured in the hold, or other safety related tasks.

Similarly, a cabin crew member performing a routine safety check, such as verifying that all safety equipment is properly secured, could be interrupted by the need to control the ID of a non-passenger attempting to enter the aircraft. This diversion of attention could lead to omissions in the safety check.

Such interruptions not only delay critical safety tasks but also increase the likelihood of safety hazards being missed, which could jeopardise the overall safety of the flight.

²⁸ NLR-CR-2010-125 - Aircraft Ground Handling and Human Factors - A comparative study of the perceptions by ramp staff and management

Additionally, conflicting priorities between security and safety measures can create confusion, as staff must reconcile different demands serving safety or security purposes. For example, in single cabin crew operations during turnaround, the crew member is required to constantly monitor the main door to control access for non-passengers, while also being responsible for conducting pre-departure safety inspections of emergency equipment located away from the door. This forces them to prioritise between safety and security tasks, potentially neglecting one in favour of the other.

Moreover, the urgency to expedite delayed operations may further exacerbate this issue. When pressure mounts to meet departure schedules, staff may be forced to accelerate safety checks or security protocols, increasing the risk of procedural shortcuts that could jeopardise flight safety.

7. Conclusion

This report aimed to assess the impact of security measures on aviation safety by determining both the nature and magnitude of this impact.

Through a comprehensive assessment process, the study identified the overall impact of the selected security measures, with a specific focus on quantifying their negative effects where applicable. Recommendations have been developed to mitigate the adverse impacts identified, with the goal of ensuring that security measures contribute to a safer and more efficient aviation environment.

While only a few measures were found to have a direct negative impact, the majority revealed indirect potential negative effects. These effects were consistently associated with three key safety indicators: increased operational complexity, decreased operational efficiency, and the increased complexity of required training. Although these negative effects are more diffuse and indirect in nature, they may introduce safety risks and must be carefully considered and addressed. The findings highlight the importance of recognising these subtle impacts, which, though not immediately apparent, can significantly affect personnel performance and overall safety.

In conclusion, while security measures are vital for safeguarding aviation, their potential impact on safety must be carefully balanced and managed to ensure that the broader goals of both safety and security are not inadvertently compromised.

Finally, as a secondary objective, this report also aimed to evaluate the safety impact assessment methodology developed within the scope of this project on a larger scale. This evaluation will support the methodology's enhancement before it is disseminated to aviation stakeholders and National Aviation Authorities. The methodology, along with tailored guidelines for its use, will help these entities in assessing the safety impact of upcoming security measures.

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Annex 1 – SIA Step 3 – Safety Impact Assessment Template

#XX – “Security Measure”	
Operational Domain	-
Safety Area	-
Security Measure to be assessed	
Regulatory reference & Title	
Description	
Impact Assessment STEP A – Indicators Selection	
<p><i>The objective is the selection of safety indicators applicable to the security measure under assessment and description of rationale for the selection of indicators.</i></p> <p><i>The table below includes a set of indicators with the objective to identify relevant elements that confirm the impact on safety of the security measure.</i></p> <p><i>Please select negative safety indicators, then positive safety indicators. If no safety indicators have been selected, please select neutral safety indicators, to confirm the neutral impact of the security measure.</i></p>	
Negative Safety Indicators for security measures	
Forces safety non-compliance, contradicting safety rules	<input type="checkbox"/>
Decreases implementation of safety rules by making compliance more difficult	<input type="checkbox"/>
Decreases safety awareness	<input type="checkbox"/>
Develops latent conditions whereby safety can be compromised	<input type="checkbox"/>
Creates actual decrease of safety standards	<input type="checkbox"/>
Decreases efficiency of systems and equipment (aircraft, air traffic, aerodrome)	<input type="checkbox"/>
Causes deterioration of system and/or equipment (aircraft, air traffic, aerodrome)	<input type="checkbox"/>
Increases maintenance requirements (aircraft, air traffic, aerodrome)	<input type="checkbox"/>
Negative impact on staff performance in terms of human factors causing decline in safety performance	<input type="checkbox"/>
Decreases operational efficiency	<input type="checkbox"/>
Increases operational complexity	<input type="checkbox"/>
Increases complexity of required training (safety or security)	<input type="checkbox"/>
Decreases efficiency of emergency operations/ procedures	<input type="checkbox"/>
Decreases efficiency of standard operating procedures	<input type="checkbox"/>
Introduces additional challenges in safety management	<input type="checkbox"/>
Introduces additional challenges in management of emergency situations	<input type="checkbox"/>
Introduces safety hazard	<input type="checkbox"/>
Reduces or impacts on safety data collection	<input type="checkbox"/>
Positive safety indicators for security measures	
Facilitate compliance with safety rules	<input type="checkbox"/>
Increases implementation of safety rules	<input type="checkbox"/>
Increases safety awareness	<input type="checkbox"/>
Offers opportunity for safety improvement or leads to actual safety improvement	<input type="checkbox"/>
Increases efficiency of systems and equipment (aircraft, air traffic, aerodrome)	<input type="checkbox"/>
Reduces aircraft maintenance requirements	<input type="checkbox"/>
Improves staff performance in terms of human factors	<input type="checkbox"/>
Increases operational efficiency	<input type="checkbox"/>
Reduces maintenance requirements (aircraft, air traffic, aerodrome)	<input type="checkbox"/>
Reduces operational complexity	<input type="checkbox"/>
Reduces complexity of required safety training	<input type="checkbox"/>
Increases efficiency of emergency operations/ procedures (aircraft, air traffic, aerodrome)	<input type="checkbox"/>
Increases efficiency of standard operating procedures (aircraft, air traffic, aerodrome)	<input type="checkbox"/>

Provides additional safety benefits	<input type="checkbox"/>
Improves safety management	<input type="checkbox"/>
Allow for reduction of safety hazard	<input type="checkbox"/>
Enables increased data collection	<input type="checkbox"/>
Improves emergency management	<input type="checkbox"/>
Decreases the possibility of conflicting safety – security priorities	<input type="checkbox"/>
[OPTIONAL] – Neutral safety indicators for security measures	
Does not affect compliance with safety procedures (implementation of safety rules)	<input type="checkbox"/>
Does not affect safety awareness	<input type="checkbox"/>
Does not contribute to tangible safety enhancements nor diminishes safety	<input type="checkbox"/>
Does not affect efficiency of systems and equipment (aircraft, air traffic, aerodrome)	<input type="checkbox"/>
Does not affect maintenance requirements (aircraft, air traffic, aerodrome)	<input type="checkbox"/>
Does not affect staff performance in terms of human factors	<input type="checkbox"/>
Does not affect operational efficiency	<input type="checkbox"/>
Does not affect operational complexity	<input type="checkbox"/>
Does not affect complexity of required training (safety, security)	<input type="checkbox"/>
Does not affect efficiency of emergency operations/ procedures (aircraft, air traffic, aerodrome)	<input type="checkbox"/>
Does not affect efficiency of standard operating procedures (aircraft, air traffic, aerodrome)	<input type="checkbox"/>
Does not offer additional safety benefits	<input type="checkbox"/>
Has no impact on safety management	<input type="checkbox"/>
Does not affect emergency management	<input type="checkbox"/>
Has no impact on data collection	<input type="checkbox"/>
Does not introduce conflicting safety – security priorities	<input type="checkbox"/>
Does not reduce or increase safety hazard	<input type="checkbox"/>

Impact Assessment STEP B – Rationale Explanations

The second part is to explain the rationale and provide qualitative information that will be assessed once all stakeholders completed their assessments. Essentially, this entails responding to the fundamental question: **“Why was this indicator selected?”**

The rationale section should offer a comprehensive overview of the reasoning behind the selection of relevant indicators. Addressing the following questions can guide the identification of pertinent information to be included in this section.

Supporting questions for negative indicators:

- Are there any available data sources, such as incident reports, pertaining to the specific issue being assessed?
- What potential safety issues are anticipated in the event of implementing the proposed security measures?
- Are there any known conflicting safety requirements associated with the assessed security measure?
- Are there any identified duplications of regulatory requirements that might lead to divergent requirements in the future?
- For existing security measures, what mitigating measures or training is currently implemented or required to reduce any negative effects on safety?
- In the case of new security measures, what mitigating measures or training is anticipated or deemed necessary to prevent negative impacts on safety?
- Is the staff trained to handle potential issues arising from conflicting priorities?

Supporting questions for positive indicators:

- What potential benefits are expected upon the implementation of the proposed new security measures?
- Does this security measure support any known safety requirements?
- Are there any available data sources pertaining to the specific issue being assessed?

Upon completion of step 3 actions, the assessment should be returned to the assessor. All provided answers will be compiled into a comprehensive report, facilitating the scoring of the overall impact.

Rationale for negative indicators (if any):

Rationale for positive indicators (if any):

Rationale for neutral indicators (if applicable):

Annex 2 – SIA Step 4 – Impact Rating

STEP 4 – Impact Rating	
LOW NEGATIVE IMPACT	
Does not lead to an accident or an incident however is contrary to safety requirements	<input type="checkbox"/>
Negative impact was identified but there is no evidence	<input type="checkbox"/>
Additional training is not required to counter negative impact	<input type="checkbox"/>
No actual or anticipated safety measures required to counter the impact	<input type="checkbox"/>
Minor consequences on safety	<input type="checkbox"/>
Security measure creates latent conditions where safety issue may develop	<input type="checkbox"/>

STEP 4 – Impact Rating	
MEDIUM NEGATIVE IMPACT	
May lead to an incident (other than serious) within the meaning of Regulation (EU) No 996/2010	<input type="checkbox"/>
Training is required to ensure safety not compromised	<input type="checkbox"/>
Some mitigating measures are required to counter the impact on safety	<input type="checkbox"/>
Some evidence of impact supported by occurrence reports	<input type="checkbox"/>
Impact on operating procedures	<input type="checkbox"/>

STEP 4 – Impact Rating	
HIGH NEGATIVE IMPACT	
Severe consequences – may lead to an aircraft accident or serious incident within the meaning of Regulation (EU) 996/2010	<input type="checkbox"/>
Direct impact on the aircraft / aircraft operation (flight crew, ATM, aerodrome), aircraft critical systems and equipment	<input type="checkbox"/>
There is a documented history of accidents resulting from this security measure	<input type="checkbox"/>
Robust evidence of negative impact (for existing security measures) in form of occurrence reports and root cause analysis	<input type="checkbox"/>
High number of mitigating measures is required in form of procedures, training and (if applicable) equipment to counter negative impact on safety	<input type="checkbox"/>



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