

RESEARCH PROJECT EASA.2022.HVP.04

RECOMMENDATIONS TO SUPPORT AN INTEGRATED POLICY AND
DECISION-MAKING PROCESS IN THE FIELD OF SAFETY AND SECURITY AT
NATIONAL AND EU LEVEL D-4.3

Impact of Security Measures on Safety

Research conducted by:



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Contributed to Task 4.3

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CAA International Limited (CAAi) was established in April 2007 as a wholly owned subsidiary of the UK CAA. The UK Civil Aviation Authority (UK CAA) is the UK's specialist aviation regulator, directly reporting to the UK Government's Department for Transport (DfT). Through its skills and expertise, it is recognised as a world leader in its field. CAAi provides access to the UK CAA's wealth of expertise and experience within the five operating groups of the UK CAA (Safety & Airspace Regulation Group, Consumers and Markets Group, Security Group, Strategy and Policy Group and International Group). Its primary focus is providing advisory, training, examination and licencing services to agencies, fellow National Aviation Authorities and industry in over 140 countries. CAAi's work involves assessment and delivery of targeted safety, security and environmental improvements and offer unparalleled expertise stemming from insights into best practices defined by the CAA.



Apave's core business is to help companies and government services managing their technical, environmental and human risks in the areas of Oil & Gas / Nuclear / Industry / Transportation. In aviation, Apave is committed to offering a range of civil and military aviation safety services, covering oversight authority tasks, audits, technical control, training and consulting services, through specialized and dedicated entities. Apave's staff in aviation enjoy extensive knowledge of the International and European regulatory framework, with a focus on Airworthiness, Flight Operations and Safety Management Systems. In 2022 Apave has strengthened its portfolio through the acquisition of Oppida a cyber-security specialist in many highly regulated domains and safety and security exposed businesses. Apave has organised its civil and military aviation risk management consulting services around a unique value proposition with a dedicated entity: Apave Aeroservices (hereafter referred to as "Apave") has been designated in 2009 as the Group centre of excellence to provide risk management solutions to the Aviation community, including aviation authorities, Air Operators, Industry, Maintenance Organisations (MROs - Maintenance, Repair & Overhaul) and Training Organisations.



APSS Software & Services Ltd is part of the Center 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
EACCC	European Aviation Crisis Coordination Cell
ECCSA	European Centre of Cybersecurity in Aviation
ECR	European Central Repository (for occurrence reporting)
ECSP	European Strategic Coordination Platform
GNSS	Global Navigation Satellite System
IATA	International Air Transport Association
ICAO	International Civil Aviation Organisation
SeMS	Security Management System(s)
SES	Single European Sky
SMM	Safety Management Manual (ICAO Doc 9859)
SMS	Safety Management System(s)
SOP	Standard Operating Procedure
UAS	Uncrewed Aerial System

1. Executive summary

Problem area

Effective policy and decision-making underpin the resilient aviation system at both the national and European levels. Safety and security are intrinsically linked, yet policy and decision-making processes in both domains are often developed in isolation with minimum coordination and communication between safety and security experts. At the broadest and most significant scale, we see alignment in safety and security – policy goals both direct the industry towards keeping people safe. However, their respective governance models have developed in parallel, often resulting in fragmented approaches, inefficiencies, and missed opportunities for synergy. A more integrated approach to policy and decision-making is necessary to enhance resilience, and ensure a balanced response to evolving threats and hazards.

In Task 4.2.2, an analysis of existing methodologies in safety and security risk management was conducted, identifying commonalities, gaps, and opportunities for greater alignment. General recommendations were provided to support a more integrated approach to risk management. Building on these insights, this report examines how integrated policy and decision-making can be effectively implemented at both the national and EU levels. Considering existing interdependencies between safety and security measures, policy and decision-making processes at national or EU level should carefully consider the safety consequences of any new or revised security measures. Therefore, the objective of this subtask is to analyse existing practices at national and EU level and develop recommendations for decision makers and policy developers within the scope of safety and security coordination. The focus is on identifying governance structures, frameworks, and decision-making mechanisms that enable a coordinated approach, ensuring that aviation remains both safe and secure in an increasingly complex threat landscape.

2. Methodology

This research project has been conducted in three main phases:

1. Literature Review
 - a. An examination of joint policy making and decision-making procedures in the past decade with respect to aviation safety and aviation security.
 - b. A detailed review of integrated policy making research, including examples of environmental regulation and governance.
2. Regulatory Analysis and Review
 - a. An examination of policy development and decision making for aviation safety at the EU and the national level.
 - b. An examination of policy development and decision making for aviation security at the EU and the national level.
 - c. Case studies into the UK approach for information (cyber) security, where governance is more integrated between safety and security.
 - d. Comparative analysis of interfaces and potential emergent recommendations and future directions.
3. Case Studies
 - a. A review of evidence presented from six case studies of policy integration.

The report thus achieves the following research aims:

- Identify the current level of collaboration between the safety and security domains when policy is developed;
- Map key touchpoints where safety and security intersect during policy development;
- Assess how communication and collaboration are currently undertaken in practice;
- Highlight areas where cross-domain coordination could be strengthened;
- Identify existing tools, frameworks, or mechanisms that facilitate interaction and information exchange between safety and security stakeholders when policy is developed;
- Explore potential barriers to effective coordination and propose possible solutions or enhancements;
- Understand the role of regulatory, institutional, and operational drivers that influence collaboration across both domains.

The task made use of primary and secondary research methods, in an exploratory manner. An overview and evaluation of the assessments performed is listed in the table below. Participants included security advisors, leadership from policy making roles at the national and EU level. The number of participants in the research was small, however, given that this task is an exploratory study aimed at understanding a complex area and identifying themes, this was appropriate. The aim of this task was not to establish statistical significance but rather to understand the nuances of integration challenges and opportunities. Furthermore, aviation safety and security professionals represent a relatively small and highly specialised community – the quality and expertise of the senior professionals engaged mean that the insights carry weight. There were consistent insights about touchpoints and gaps over the engagement with participants. And many influential policy studies in specialised technical domains start with smaller sample sizes for initial concept development – this task is exploratory to inform rather than definitive.

Assessments Performed	Information Collected	Evaluation
Literature review	Existing theoretical frameworks and concepts Historical development of the research area	Strengths: Provides a comprehensive theoretical foundation; identifies research gaps; establishes context; time and cost efficient; accessible.

	<p>Current state of knowledge and any gaps</p> <p>Methodological approaches used in prior studies</p> <p>Key findings and debates in the field</p>	<p>Limitations: Dependent on quality of existing literature; potential bias; secondary data; the review was exploratory and therefore not an exhaustive evaluation.</p>
Focus group	<p>Shared perspectives and consensus points</p> <p>Areas of disagreement or debate</p> <p>Emergent themes</p> <p>Opinions on research hypothesis (e.g. integration definition)</p>	<p>Strengths: Rich data; efficient for gathering multiple perspectives simultaneously; able to explore complex topics.</p> <p>Limitations: Potential for group think and bias; less depth on individual experiences; inhibition for discussion of sensitive topics.</p>
Interviews (verbal, unstructured)	<p>In-depth perspectives and experiences</p> <p>Personal narratives</p> <p>Access to specific expertise</p>	<p>Strengths: Allows for deep exploration of individual experiences; flexibility to follow up on responses; captures nuance; facilitates open disclosure.</p> <p>Limitations: Time-intensive; interviewer bias.</p>
Interviews (written, semi-structured)	<p>Structured responses to predetermined questions</p> <p>Reflective and considered perspectives</p>	<p>Strengths: Allows participants time for thoughtful responses; more cost and time effective than face to face.</p> <p>Limitations: No opportunity for immediate clarification; potential for bias in interpretation; no control over response rates or quality.</p>
Case study meta analysis	<p>Common approaches and themes</p> <p>Variations and outliers</p> <p>Frequency of specific approaches</p> <p>Generalisable findings from particular contexts</p>	<p>Strengths: Increases generalisability of findings; systematic approach; leverages existing detailed research.</p> <p>Limitations: Dependent on quality of case studies; selection bias; have to account for different methodological approaches; may lose some contextual nuance.</p>

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 3 companies:

- CAA International
- Apave Aéroservices
- 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 to develop 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 security-safety 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

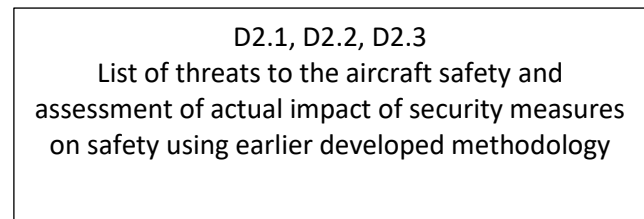
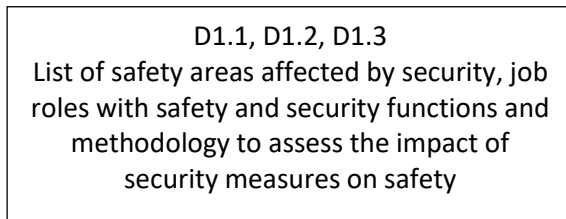
Scope

This report represents deliverable 'D 4.3' of the Impact of Security Measures on Safety (EASA.2022.HVP.04). The aim of this task is to develop recommendations to support an integrated policy and decision-making process in the field of safety and security at national and EU level.

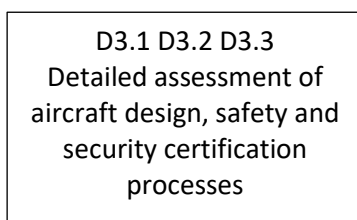
Scope context

The following outline represents a simplified context of this research.

The initial three tasks facilitated the establishment of a foundation for the knowledge base. This included an initial exploration of the interdependencies between safety and security, along with the compilation of a list of safety domains potentially affected by security measures. Additionally, a comprehensive list of security threats that may impact the aircraft safety was also developed. The methodology to assess the impact of security measures was developed in the final sub-task of task 1.



Upon the completion of the methodology development, the assessment phase commenced in task 2. This involved the practical evaluation of the impact of security measures on safety, as well as a direct assessment of certification standards undertaken in task 3.



Recommendations for integrated approach to safety – security risk assessment and management is the final task of this study and is divided in a number of subtasks.

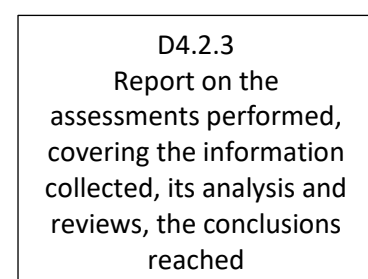
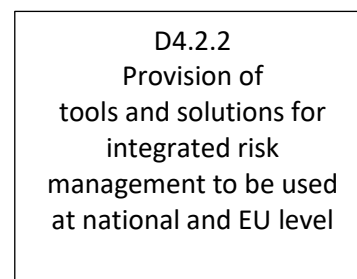
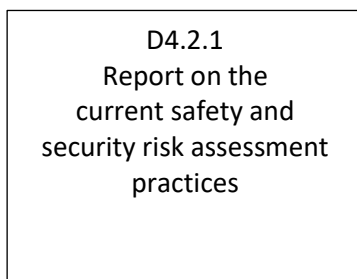
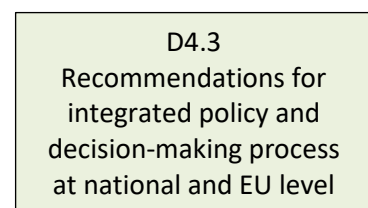
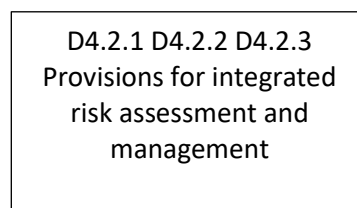
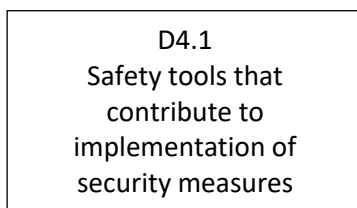


Figure 1. Context of task 4.3 and this research framework.

5. Introduction

Integrated policy approaches have held focus for some time in studies and applications of governance, being held up as a solution to solving complex policy problems (Vince et al., 2024), such as the integration of aviation safety and aviation security. Furthermore, the topic of policy integration has attracted intensified attention following the approval of the United Nations' Agenda 2030 for sustainable development (Howlett & Saguin, 2018). Policy integration is a far-reaching concept, having applications across every topic of governance; integration is a concept encompassing many stakeholders, government agencies, and policies with the goal of solving complex problems (Cejudo & Michel, 2017). Integrated policy making can help in overcoming conflict, inefficiencies, and inconsistencies – all elements highlighted during previous Tasks as being potential issues with the aviation safety-security intersection. However, achieving integration for policy making and decision making is a fundamentally complex task, as multiple governments, multiple levels, different policy contexts, and diverse goals come into play (Howlett & Del Rio, 2015).

The extant research landscape gives an extensive overview of the different aspects and challenges inherent to integrated policy designs (Peters, 2018; Tosun & Lang, 2017). The literature points to a need for more comprehensive analytical approaches and broader comparative research, as well as practical issues about the implementation of integrated designs (Domorenok et al., 2021). What emerges is a focus on the concept of capacity – defined by Howlett and Saguin (2018) as “specific policy and institutional settings allowing for the accomplishment of coherent policy goals and consistent policy instruments.”

To this end, it is important to examine the state of play for policy making and decision making with respect to safety and security, in the context of the wider research picture for the study of public policy. Evidence from previous Tasks shows that integration of these topics when it comes to policy making is somewhat limited, and this applies at the international and national level. Paragraph 2.1.1 of ICAO Annex 17 on Aviation Security states that each Contracting State shall have as its primary objective the safety of passengers, crew, ground personnel and the general public in all matters related to safeguarding against acts of unlawful interference with civil aviation. In turn, Paragraph 3.1.1 states that each Contracting State, as the State of the Operator, shall ensure that its commercial air transport operators have established, implemented and maintained a written aircraft operator security programme that meets the requirements of the national civil aviation security programme of the State of the Operator. Implicit in these requirements is the understanding that implementing aviation security measures contributes to the overall safety of civil aviation. While there are instances where security and safety measures overlap and complement each other in civil aviation, there are also areas where the relationship between safety and security requirements may be less evident; whilst a safety regulator must be aware of the over-arching security requirement, the implementation of Annex 17 is not a primary safety accountability. However, it is evident that the activities of a Head of State Operator (and similar global equivalents) will require very significantly enhanced security requirements. These, of course, directly impact some areas of safety regulation.

6. Research Picture

Arild Underdal's 1980 article in *Marine Policy* is generally cited as the first academic treatment of the term 'policy integration', and whilst the term is therefore not novel, we see in modern times that policy making for aviation, both at the global and national scale, is undergoing a transformation in approach to coordination (including, but not limited to, safety and security), with a potential evolution from historically separate regulatory domains toward increasingly integrated frameworks. The drive to integration is important within aviation; increasingly, technological changes such as advancing drone technology and cybersecurity threats, are demanding cross-domain coordination between safety and security, and enhanced information sharing.

Section 6.1 below comprises a review of the literature, beginning with an examination of the institutional landscape, coordination mechanisms, and policy interfaces that have emerged over the past decade, revealing both significant progress and persistent challenges in cross-domain collaboration. The review then assesses other policy areas external to aviation, to synthesise any potential transferrable learnings.

6.1 Literature Review

Four critical intersection points emerge from the literature analysis. These are not exhaustive touchpoints, but represent potential areas for further in-depth research. Cybersecurity integration will be further explored as a case study within this research.

The primary touchpoint is **cybersecurity integration** to existing regulatory structures. There is significant recognition in the research of information security being considered in an integrated way with aviation safety. For example, the 2017 establishment of ECCSA (European Centre for Cyber Security in Aviation) demonstrates institutional recognition of cybersecurity as a safety-security interface requiring coordinated governance. ECCSA is a voluntary, cooperative partnership within the aviation community to better understand the emerging cybersecurity risks in aviation and to provide collective support in dealing with cybersecurity incidents, weaknesses and unauthorised interactions that could potentially affect the sector's resiliency and safety¹. Additionally, NIS2 (Network and Information Systems) is an EU directive that updates the original NIS Directive to establish a high common level of cybersecurity for network and information systems across the European Union. It introduces broader sector coverage, stronger risk management requirements for organisations, more stringent reporting obligations, enhanced enforcement powers for authorities, and personal liability for senior management – cross cutting all domains affected by cyber risks (not just aviation). The goal is to improve the cybersecurity and resilience of essential sectors and supply chains within the EU, with EU Member States required to transpose the Directive into national law². Specifically, within aviation, EASA's Part-IS (Information Security) is a regulation incorporating best practices for civil aviation in respect of information security – a framework allowing entities to manage information security risks with an impact on aviation safety, with the aim of achieving resilience.³ Cyber or information security measures therefore have multiple touchpoints with safety and security domains.

GNSS (Global Navigation Satellite System) interference management represents a second crucial touchpoint, sitting as a subsection within cybersecurity, with a recent surge in jamming/spoofing incidents requiring unprecedented coordination. The January 2024 EASA-IATA joint workshop in Cologne, attended by 120+ participants, exemplifies how geopolitical security threats directly impact aviation safety operations (EASA, 2024a). The resulting four-pillar mitigation strategy encompasses information gathering, prevention, infrastructure management, and inter-agency coordination across traditional domain boundaries.

Crisis response coordination provides a third touchpoint. An example of integration is given by the European Aviation Crisis Coordination Cell (EACCC), particularly demonstrated during the COVID-19 pandemic when EACCC remained activated for 18 months. The EACCC's permanent membership includes representatives from both safety and security domains, creating formal channels for cross-domain policy development during emergencies.

Information sharing protocols constitute the fourth touchpoint, with the European Central Repository (ECR) collecting occurrence data under Regulation 376/2014 now extended to include security-related safety occurrences. However, institutional separation persists, with IATA's 2024 Annual Safety Report noting that security-related incidents are excluded from safety statistics.

Areas for Improvement – Cross Domain Coordination Opportunities

- Information sharing represents the most critical coordination gap. Research identifies fundamental limitations in routine information exchange beyond crisis situations, with safety and security incidents tracked separately despite interdependencies. The institutional separation between EASA's safety mandate and Member State security competences creates coordination gaps that affect policy development effectiveness.

¹ <https://www.easa.europa.eu/en/eccsa>

² [The NIS 2 Directive | Updates, Compliance, Training](#)

³ [Home - Part-IS.eu](#)

- Training and competency development across safety-security interfaces remains underdeveloped. Broader cross-domain competency development for personnel working across safety-security interfaces requires systematic enhancement.
- Risk assessment integration needs strengthening, with industry calling for coordinated safety-security risk assessment processes rather than parallel domain-specific assessments. The current approach creates potential blind spots where risks spanning both domains may be inadequately addressed.

Integration in Other Domains

The development of integrated policies and supporting administrative capacities is shaped by many key factors. Domorenok et al. (2021) argue that the level of strategic motivation (whether integrated approaches are perceived as advantageous, and that organisations possess the relevant knowledge to implement them) is important. They explore a salience vs motivation concept, which could be useful to aviation. This is presented as two assertions: “The more top public servants perceive strategic advantages of and possess sufficient knowledge for replacing traditional sectoral policies with integrated policy mixes, the more intensely they invest resources and efforts in developing specific administrative capacities required by such designs (*strategic motivation* hypothesis). The higher the political salience of EU regional policy in a country/region, associated with the availability of funding, the higher is the public administration’s propensity to adopt the recommended integrated design, including the required policy-settings and capacities (*political salience* hypothesis).” They advocate for three policy integration criteria: coherence, consistency, and coordination.

Table 1 – Adapted from Domoronek et al.

		Political Salience	
		Low	High
Strategic Motivation	Low	Administrative Gap	Window Dressing
	High	Cherry Picking	Full Ownership

Meijers and Stead (2004) list seven key categories of affective factors: organisational, behavioural, political, economic, process, contextual, and issue specific. Vince et al. (2024) identify four conditions that could impact integration: coordination and coherence; accountability, transparency, and legitimacy; resourcing and adequate institutional architecture. Complete policy coherence is rarely achievable (Meijers & Stead, 2004), rather must be seen as a balance between facilitation and blocking factors.

Looking to Environmental Policy Integration (EPI) can provide valuable insights for aviation safety and security integration. Lafferty and Hovden (2002) emphasis that traditional sectoral approaches are insufficient for complex, cross-cutting issues - a principle directly applicable to aviation where safety and security concerns increasingly overlap. Just as environmental objectives cannot be achieved by the environmental sector alone, aviation safety and security require integration across multiple domains including operations, technology, regulation, and human factors. Lafferty and Hovden’s environmental policy integration framework offers a robust conceptual foundation for aviation safety and security integration. Their emphasis on both vertical (sector-specific) and horizontal (cross-sectoral) dimensions provides a practical approach to overcoming traditional silos. Vertical integration indicates the extent to which a particular department has implemented

objectives as central in the wider sum of all the objectives that sector pursues (e.g. is security everyone's responsibility?) Horizontal integration indicates the extent to which a central authority has developed a comprehensive cross-cutting strategy for safety and security (e.g. spanning domains). Lafferty and Hovden (2002) suggest that efforts at vertical integration are more common, and more influential, than efforts at horizontal integration. Most importantly, their recognition that integration requires explicit value hierarchies and strong institutional support offers clear guidance for aviation policymakers seeking to balance safety and security imperatives in an increasingly complex operational environment.

The question for the process of integrating policy is a difficult one, as it requires the change of legacy policy (Domorenok et al., 2021). There is also a risk of not integrating; Howlett et al., (2017) point out that complex policy making scenarios (such as aviation safety and aviation security) face risk of failure when horizontal and vertical dimensions are not well integrated.

The key takeaway is that successful integration requires more than coordination - it demands fundamental changes in how organisations conceptualise, prioritise, and operationalise safety and security objectives. By adapting the EPI framework to aviation contexts, the sector can move beyond reactive, siloed approaches toward proactive, integrated strategies that enhance both safety and security outcomes.

Emergent Themes

Theme 1: The Imperative for Integration

The research establishes a fundamental premise that resonates strongly with aviation policy: sectoral approaches alone are insufficient for addressing complex, cross-cutting challenges. Lafferty and Hovden (2002) argue that just as environmental objectives cannot be achieved by the environmental sector alone, each sector must incorporate broader policy objectives to be effective. This principle directly applies to aviation, where safety and security concerns are inherently interconnected and cannot be effectively managed in isolation. The evolution from treating policy domains as separate to recognising their interdependence mirrors the trajectory needed in aviation. Just as the environmental field moved from being viewed as an add-on to becoming integral to all policy sectors, aviation safety and security must evolve from being managed as distinct domains to being conceived as mutually reinforcing aspects of a comprehensive aviation protection system.

Theme 2: Conceptual Clarity and Definitional Precision

A critical contribution of the literature is the emphasis on conceptual precision. Lafferty and Hovden (2002) and Meijers and Stead (2004) distinguish between policy coordination and true policy integration, defining the latter as involving the incorporation of objectives into all stages of policymaking, systematic evaluation of cross-sectoral impacts, and principled priority given to core concerns. For aviation, this translates into embedding both safety and security considerations throughout the entire aviation system lifecycle - from aircraft design and airport planning through daily operations and incident response. The papers warn against conceptual "slurring" where integration is confused with mere coordination. In aviation terms, having separate safety and security departments that occasionally communicate does not constitute integration. True integration requires fundamental changes in how objectives are conceptualised, prioritised, and operationalised across the aviation ecosystem. However, excessive efforts to integrate can actually have a harmful effect and reduce flexibility (Meijers & Stead, 2004). Policy and decision making integration is a complex task, dependent on multiple factors, requiring a careful balance between facilitators and inhibitors rather than simplistic calls for more integration; in paradigms with differences such as safety and security, the appropriate degree of integration must be considered.

Theme 3: Administrative Capacity as the Foundation

For integrated approaches to work, capacity is very often referred to as an essential concept. A major reason why integration efforts succeed or fail relates to whether the organisations involved have developed the necessary integrative capacity (Vince et al., 2024). Capacity can be defined as resource directed to achieve a policy goal; Domorenok et al. (2021) framework provides crucial insights into the administrative capacities required for successful integration. They identify three essential levels of capacity that directly apply to aviation safety and security integration:

Systems and Tools: In aviation, this would encompass integrated risk assessment methodologies, unified incident reporting systems, and interoperable data platforms that allow safety and security information to be analysed holistically. The creation of comprehensive frameworks that establish coherent cross-domain objectives and consistent implementation instruments is essential.

Organisational Structures: The papers emphasise the need for both vertical integration within sectors and horizontal integration across sectors. For aviation, this means establishing mechanisms within individual organisations (airlines, airports, regulators) while also creating cross-organisational coordination bodies. Clear definition of complementary responsibilities, rather than overlapping or conflicting mandates, emerges as crucial.

Human Resources: Both papers stress that integration requires new competencies and mindsets. Aviation professionals need cross-domain training that enables them to understand and manage safety-security interfaces. This goes beyond technical knowledge to include collaborative skills and the ability to balance potentially competing objectives.

Theme 4: The Two-Dimensional Integration Framework

Lafferty and Hovden's (2002) distinction between vertical and horizontal integration provides a particularly valuable framework for aviation. Vertical integration in aviation would involve individual organisations (airlines, airports, air navigation service providers) incorporating both safety and security objectives throughout their operations. Horizontal integration would require overarching coordination mechanisms at national and international levels, potentially through bodies like ICAO or regional aviation authorities. The research reveals that vertical integration often proceeds more readily than horizontal integration, as it involves fewer actors and can be driven by organisational leadership. However, both dimensions are necessary for comprehensive integration. In aviation, this suggests the need for a dual strategy: supporting individual organisations in developing integrated approaches while simultaneously building the governance structures for system-wide coordination.

Theme 5: Overcoming Integration Barriers

Significant barriers to integration form a key part of the research picture. These include sectoral silos, competing professional cultures, resource constraints, and the complexity of coordinating multiple actors. In aviation, these barriers are compounded by the industry's global nature, diverse stakeholder base, and stringent regulatory environment. The papers suggest that overcoming these barriers requires more than structural changes. It demands a fundamental shift in organisational culture and professional identity. For aviation, this means moving beyond the traditional separation of safety and security professionals to create a new cadre of integrated aviation protection specialists.

Recommendations for Aviation Safety and Security Integration

Based on the frameworks and insights from the academic literature in the field of public policy studies, the following recommendations emerge for advancing integrated aviation safety and security policy:

1. Develop a Comprehensive Integration Strategy: Create a clear vision and roadmap for safety-security integration that addresses both vertical integration within organisations and horizontal integration across the aviation system. This strategy should explicitly acknowledge the overarching objective of safety while ensuring security is not treated as secondary.

2. Build Administrative Capacities Systematically: Following Domorenok et al.'s framework, invest in developing integrated systems and tools (joint risk assessment methodologies, unified reporting systems), organisational structures (cross-functional teams, coordination mechanisms), and human resources (integrated training programs, career pathways).

3. Establish Clear Governance Structures: Create formal mechanisms for safety-security coordination at multiple levels - within organisations, at national levels, and internationally. These should include clear mandates, decision-making protocols, and accountability frameworks.

4. Implement Incremental Integration: Recognise that full integration is a long-term process. Begin with pilot projects in specific areas (such as insider threat programs that address both safety and security) and gradually expand based on lessons learned.

5. Invest in Cultural Change: Beyond structural changes, invest in changing mindsets and professional cultures. This includes joint training programs, integrated performance metrics, and recognition systems that reward collaborative approaches.

6. Develop Integrated Performance Measures: Create metrics that capture integration effectiveness, not just domain-specific outcomes. This might include measures of cross-domain information sharing, speed of integrated threat response, or reductions in safety-security conflicts.

7. Ensure Political and Resource Commitment: Successful integration requires sustained political support and adequate resources. Make the business case for integration by demonstrating how it enhances overall aviation system resilience and efficiency.

In terms of overall goal, policy integration aims to provide one integrated policy (as opposed to adjusted sectoral policies) that cross-cuts. This differs from policy coordination and policy cooperation, but does involve both. There are a variety of concepts that are described in the same way as policy integration, such as holistic or joined up governance (Meijers & Steadt, 2004). Policy integration concerns the management of cross-cutting issues in policy-making that transcend the boundaries of established fields, and which do not correspond to the traditional, institutional responsibilities of individual departments. An integrated policy is comprehensive, aggregated, and consistent – however, in terms of adding value to aviation safety and security, perhaps the aim should not be to achieve something which can be conceptually described in such a neat manner, but instead on frameworks that have been judged to give benefit.

6.2 Regulatory Analysis – Setting the Scene

This section will outline aviation safety and aviation security policy and decision making at the EU and National Level.

The legislative regimes from the top (ICAO) down will be described, and then the process for creating policy between modes and at each level is explored.

There will be insights into what influences policymaking and decision making for each area. Then, there will be an evaluation of the level of integration of the current regimes, with respect to safety and security.

Safety Policy and Decision Making

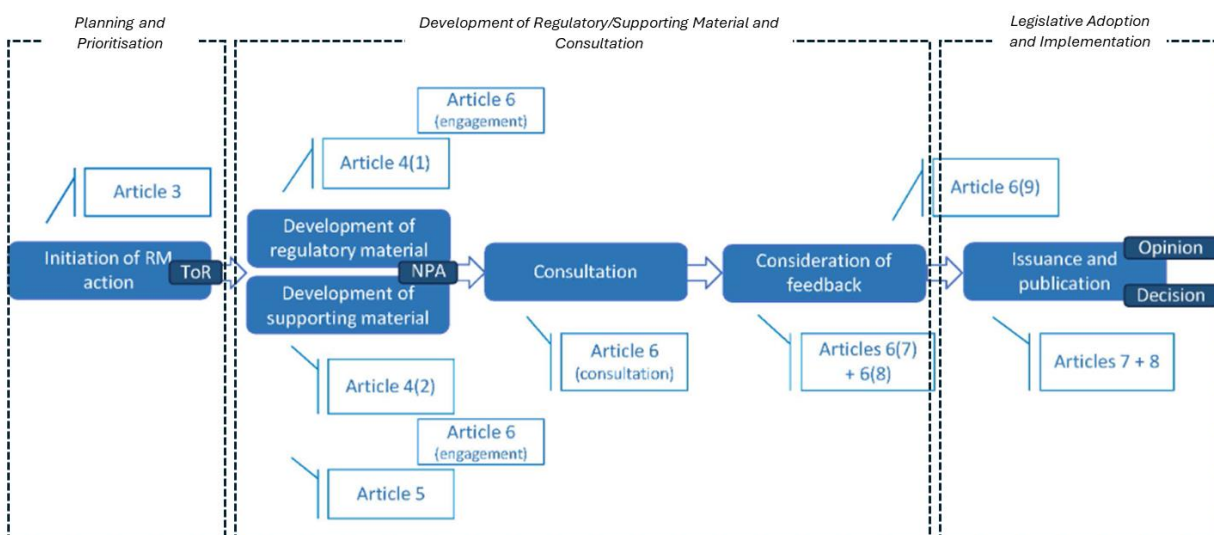
EU

European Union Aviation Safety Agency (EASA)

Like the UK Civil Aviation Authority (CAA), the European Union Aviation Safety Agency (EASA) follows a similar structured Rulemaking process⁴ to develop and implement aviation regulations across EU Member States. EASA Management Board Decision 01-2022⁵ prescribes the procedures to be followed by EASA for the issuing of opinions, certification specifications and other detailed specifications, acceptable means of compliance, and guidance material, as referred to in Article 76(1) and (3) of the Basic Regulation.

Planning and Prioritisation

EASA sets out a rolling 5-year Rulemaking Programme as part of the European Plan for Aviation Safety (EPAS). Article 3 of the EASA Management Board Decision 01-2022 sets out the requirements for the consideration of safety priorities, emerging technologies, and the necessary alignment with EU as well as ICAO standards in accordance with the EPAS.



⁴ [Rulemaking process explained | EASA](#)

⁵ [EASA MB Decision No 01-2022 on the Rulemaking Procedure, repealing MB Decision 18-2015 \(by written procedure\) | EASA](#)

Figure 2. EASA 5-year rule-making programme.

In addition, Article 3 also sets out the requirements for informing the European Commission, the Member States, other affected and interested parties, the EASA Advisory Bodies, experts, and the public when a rulemaking action has been initiated. Information to be shared with such parties shall include a description of the objectives intended to be achieved by the rulemaking action, the working methods intended to be used to develop the regulatory material and reflect the conclusions of the impact assessment(s) conducted to support the inclusion of the rulemaking action in EPAS, as well as the description of the rulemaking action in EPAS.

Development of Regulatory/Supporting Material and Consultation

A Rulemaking Group, composed of EASA experts, industry representatives, national aviation authorities, and independent specialists, is convened to draft the proposal. A Notice of Proposed Amendment (NPA) is then published, inviting input from stakeholders across the board, thereby ensuring that diverse viewpoints are duly considered.

As set out in Article 4, the Executive Director is mandated to develop regulatory material that is firmly anchored in reliable evidence and meticulous analysis, taking into account safety and other risks detailed in EPAS, including any relevant impact assessments and supplementary information shared with Member States and other stakeholders, and ensuring the material is fully in line with the objectives of EPAS, EU law, and international standards such as those from the Chicago Convention and ICAO, as well as the European Commission's Better Regulation agenda. Article 5 requires comprehensive and proportionate impact assessments to be developed to support decision-making, with the Executive Director ensuring that any pre-existing assessments are updated or supplemented as necessary, and that feedback from advisory bodies is duly incorporated. Finally, Article 6 underscores the importance of wide-ranging and transparent engagement and consultation throughout the process, ensuring that Member States, experts, affected parties, and the public are meaningfully involved and that their contributions are openly acknowledged and integrated into the final rulemaking.

Legislative Adoption and Implementation

Article 7 and Article 8 set out the requirements for issuing and publishing EASA's regulatory material. Under Article 7, the Executive Director is tasked with submitting EASA's proposals to the European Commission in the form of opinions for any amendments to the Basic Regulation and its delegated and implementing acts. In doing so, the Director must assess whether a proposed act is of relevance to citizens, thereby justifying its translation and multi-language consultation. Additionally, Certification Specifications, other Delegated Specifications, as well as Acceptable Means of Compliance and Guidance Material are adopted and issued as Executive Director decisions. Article 8 then requires that all these opinions and regulatory outputs be published in the Official Publication of EASA, with full access provided to the underlying supporting material and any public feedback, thus ensuring transparency and accountability in the regulatory process.

Retention of documents

Article 9 sets requirements for documentation of rulemaking is retained indefinitely and in accordance with document and record management policy of EASA and applicable EU law to enable EASA to provide justification for its decisions and to show that the appropriate procedures were followed.

National

UK Aviation Policy and Legislative Development Programme

The UK Civil Aviation Authority (CAA) Aviation Policy and Legislative Development Programme⁶ is a structured framework designed to ensure the effective development, implementation, and review of aviation safety regulations, including Information Security. Conducted in collaboration with the Department for Transport (DfT), this programme aligns with the UK's broader aviation strategy and regulatory principles.

The programme operates within the framework of the Civil Aviation Act 1982⁷, ensuring compliance with international obligations, including those set by the International Civil Aviation Organisation (ICAO). The UK CAA alongside the Secretary of State for Transport provides strategic oversight, while the CAA takes responsible for policy formulation, legislative development, and regulatory enforcement. Only Parliament or in some cases Ministers can amend the law but they do so taking into account the advice of the UK CAA.

UK Regulatory Structure – Legislation

The regulatory structure in the UK, post our departure from the EU, consists of primary, secondary and other legislation (CAPs, BCARs, AMC, GM and CS). At the primary level is the domestic framework which sits across two pillars, domestic legislation (Civil Aviation Act 1982) and assimilated EU law (Basic Regulation (UK Reg (EU) 2018/1139⁸). The CAA's policy and legislative development activity occurs primarily at the secondary legislation level.

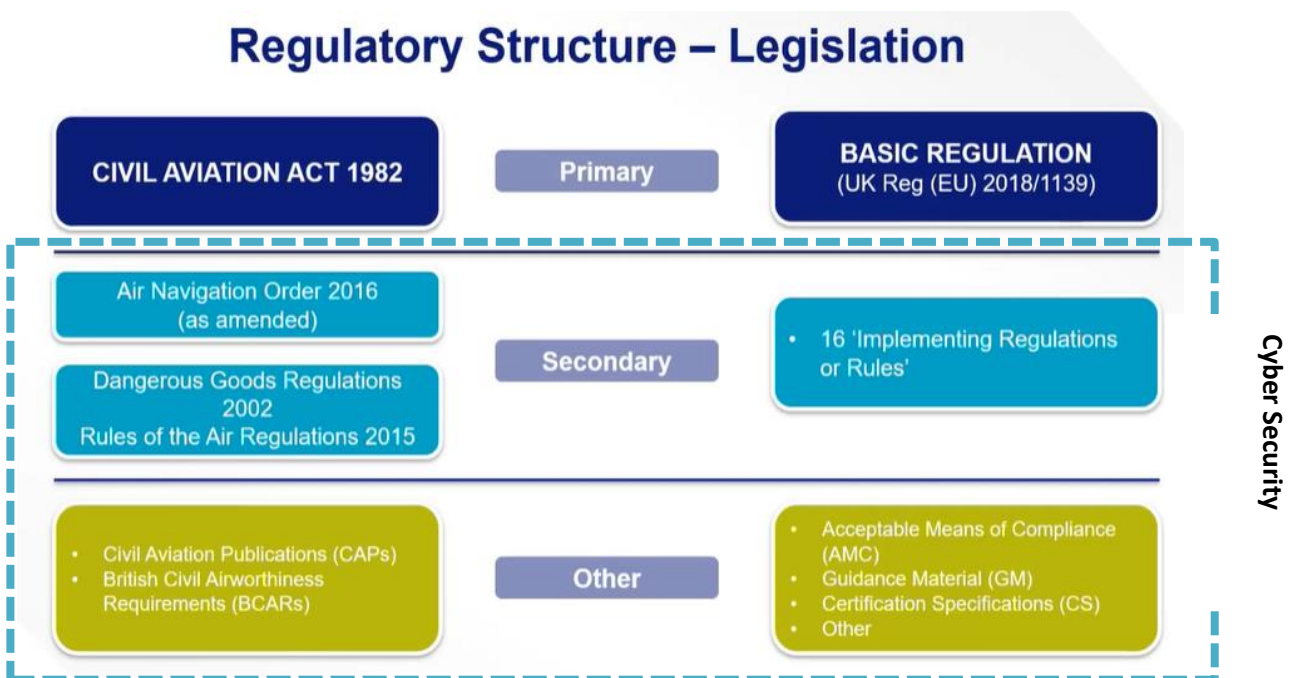


Figure 3. Regulatory structure UK.

Aviation Policy and Legislative Development – Background

The primary statutory obligations from Article 115 of the Basic Regulation requires the CAA to establish transparent procedures for issuing opinions, certification specifications and other detailed specifications, acceptable means, compliance and guidance material referred to in Article 76, subparts 1 and 2.

Article 76, subparts 1 and 3, imposes an obligation on the CAA to assist the Secretary of State by issuing opinions which tells the Secretary of State how we think the law should change and then produce, consult on and publish associated AMC, GM and CS to support any changes.

⁶ <https://www.caa.co.uk/safety-initiatives/how-we-regulate/state-safety-programme/safety-policy-objectives-and-resources/introduction-to-uk-aviation-safety-policy-and-rule-development/>

⁷ <https://www.legislation.gov.uk/ukpga/1982/16/contents>

⁸ <https://regulatorylibrary.caa.co.uk/2018-1139-PDF/PDF.pdf>

The CAA Aviation policy and legislative development process ensures the CAA meets its obligations under Article 115 and provides the supporting governance to ensure legislative changes are sufficiently scrutinised, understood and complied with.

Aviation Policy and Legislative Development Process

The UK CAA Policy and Legislative Development Process sets out the various stages of the policy response to aviation safety issues and opportunities, including those that result in the developing and issuing of our opinions, the development of legislation, and the development of certification specifications and other detailed specifications, acceptable means of compliance, guidance material (“AMC/GM/CS”).

The process has five stages:

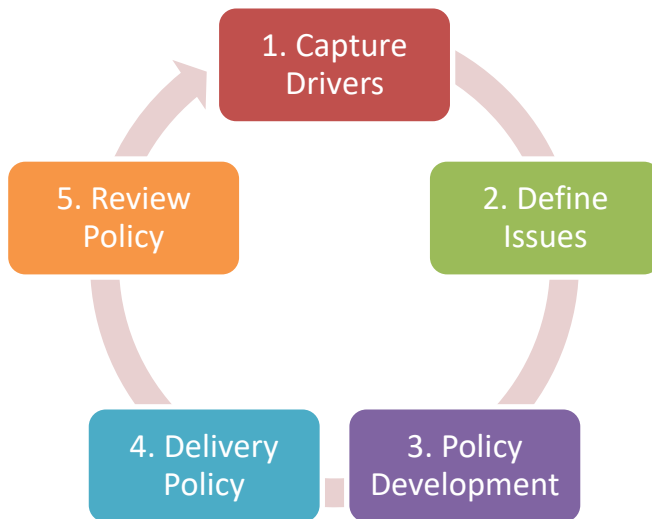


Figure 4. Policy development process.

Capture Drivers

The Capture Drivers stage marks the first step in the UK Civil Aviation Authority’s Aviation Policy and Legislative Development Process, focusing on identifying the key factors that necessitate regulatory change. At this stage, regulatory needs are shaped by a range of drivers, including legal and government priorities, whereby the CAA aligns its statutory functions under the Civil Aviation Act 1982 and the Basic Regulation (UK Reg (EU) 2018/1139) with the overarching government aviation strategy. Moreover, emerging safety issues, accident investigations, and technological advancements all contribute to redefining regulatory priorities. Input from industry and stakeholders is equally vital, any person or organisation may propose an issue be addressed, whether through the development of new law or amendments to existing law, Acceptable Means of Compliance (AMC), Guidance Material (GM), Certification Specifications (CS), or broader policy improvements. Finally, evolving needs in the aerospace landscape, such as changes in airspace management, information security challenges, and shifting operational demands, are also carefully considered, ensuring that the programme remains responsive to the dynamic aviation environment.

Define Issues

Once a regulatory driver has been identified, the Define Issues stage ensures that the proposal is precisely outlined, and its policy objectives and legislative scope are thoroughly delineated before any further development proceeds. In this phase, the CAA undertakes a detailed analysis of the issue, rigorously assessing the associated risks, safety concerns, and technological implications. The matter is then tabled before the Aviation Legislation and Policy Sponsorship (ALPS) Board, which considers it within the broader context of the aviation policy work programme. Throughout this process, industry experts are consulted to refine and focus the issue’s scope, while a comprehensive Regulatory Impact Assessment (IA) is conducted to evaluate potential

consequences and ensure that any proposed changes are fully in line with both UK aviation strategy and international standards.

Policy Development

Following approval from the Programme and Sponsorship (ALPs) Board, the Policy Development stage focuses on formulating the most effective regulatory response. At this point, the CAA carefully evaluates a variety of regulatory options to determine whether the issue necessitates safety promotion, heightened oversight, additional research, or legislative change. Concurrently, policy and guidance documents are drafted, ranging from new legislation and certification specifications to Acceptable Means of Compliance (AMC) and guidance material, ensuring that every proposal is underpinned by a thorough impact assessment that scrutinises both costs and broader implications.

Deliver Policy

The approach to be taken to implementing policies is determined during policy development. Where legislative changes, or Certification Specifications and other detailed specifications changes, or AMC or guidance material changes are considered and developed, then the CAA communicates and promotes the changes on our website and other industry wide communication channels such as SkyWise.

Policy Review

The CAA subjects all policy and legislative changes developed under this programme to post implementation review which will, amongst other things, consider whether the policy is delivering against the original driver and expected outcomes.

Policy Governance



In the UK, two key Board's play a crucial role in the Rulemaking Programme by supporting and driving policy and legislative changes through to parliamentary decision. These are:

The Aviation Legislation Programme Board the strategic board, held quarterly, and made-up of CAA and DfT officials at the director/deputy director general level, and CAA and DfT Policy representatives. The board sets the strategic direction of the rulemaking programme, makes key decisions on the scope and scale of the proposed policy changes whilst considering the emerging policy landscape and ensures the programme reflects DfT aims and CAA values and regulatory principles. And obtains the official ministerial endorsement for proposed policy changes.

Figure 5. Policy governance.

The Aviation Legislation and Policy Sponsorship (ALPs) Board is chaired by a CAA director with members from DfT, Legal teams and CAA representatives and is approve requests to develop primary legislation within the aviation mode, as well as any other regulatory changes fundamentally affecting the structure of the UK's civil aviation legislation.

The board reviews and scrutinises proposed mandates and provides initial approval for the for the development primary and secondary legislation within the aviation mode, as well as any other regulatory changes fundamentally affecting the structure of the UK's civil aviation legislation.

Security Policy and Decision Making at the EU and National Level

EU

EU aviation security policy is developed by the European Commission based on Regulation (EC) No 300/2008, which sets common rules for civil aviation security and can be amended by implementing regulations. Decision-making involves continuous dialogue with Member States and stakeholders like the [Stakeholder Advisory Group on Aviation Security \(SAGAS\)](#). The policy aims to balance security with operational factors by addressing evolving threats, adopting new technologies, and enhancing transparency and cost-effectiveness.

The role of the Stakeholders' Advisory Group on Aviation Security is to advise the Commission in the preparation of legislative proposals and policy initiatives as well as in relation to the implementation of existing legislation. The Group shall be kept informed by the Regulatory Committee on Aviation Security during the entire regulatory process. The Group meets back-to-back with the Committee approximately six times a year and is open to European representative organisations engaged in, or directly affected by, aviation security.

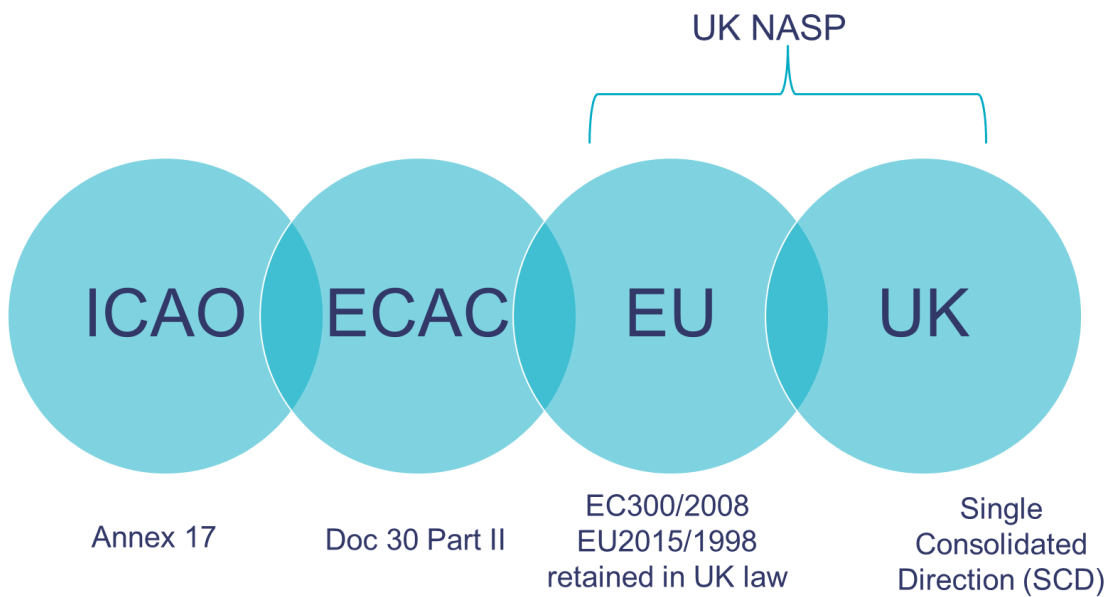
How Policies Are Made

- 1. Threat Monitoring and Risk Assessment:**
The Commission, with Member States, continuously monitors emerging threats and conducts risk mapping exercises to assess threats to civil aviation.
- 2. Strategic Discussions and Gap Analysis:**
The Commission initiates strategic discussions and mapping exercises to evaluate the existing framework and identify areas for improvement.
- 3. Consultation:**
The Commission engages in dialogue with Member States and various stakeholders to gather input and build consensus on policy development.
- 4. Regulatory Framework:**
The Commission develops and amends regulations, such as Regulation (EC) No 300/2008 and its implementing measures, to establish common rules and standards.
- 5. Implementation and Monitoring:**
Member States are responsible for implementing these common rules, and the Commission monitors compliance through inspections and annual reporting.

Key Policy Goals

- **Balancing Security and Operational Efficiency:**
The policy strives to find the right balance between stringent security measures and other factors like travel convenience, privacy, and operational efficiency.
- **Adapting to Evolving Threats:**
Policies are updated to address new risks, by implementing new technologies and security procedures.
- **Enhancing Cargo and Mail Security:**
There are ongoing efforts to improve the security of cargo and mail that is bound for the EU and departs from airports outside the Union.
- **Promoting Transparency and Fairness:**
The policy aims to ensure transparency in the levying of charges at airports and that charges are cost-related and non-discriminatory.

National



The UK policy and decision-making process for aviation security falls into the same rulemaking process as for aviation safety, although the legislative regime is different. UK aviation security policy development is a process led by the [Department for Transport \(DfT\)](#) in consultation with the [Civil Aviation Authority \(CAA\)](#) and the industry, including the [National Aviation Security Committee](#), to analyse threats and risks and formulate policy from first principles or in response to events. The DfT sets the strategic direction, while the CAA provides detailed regulatory requirements and monitors compliance.

The CAA Aviation Security Regulation team develops detailed regulatory requirements and guidance to support UK aviation security policy, providing advice and guidance to the Department for Transport (DfT) as required. The CAA Aviation Security Compliance team undertakes the monitoring and enforcement of the industry's compliance with aviation security requirements. The Secretary of State for Transport remains responsible for aviation security policy and some specific areas including threat analysis, international relations and the making of aviation security directions under Part 2 of the ASA 1982 ('aviation security directions').

This process incorporates intelligence, industry input, and ongoing risk assessments to ensure the UK's aviation sector remains secure, with the DfT's Secretary of State ultimately responsible for overall policy and international matters. Historically, security decision making has been more siloed when it comes to interdependencies and impacts of decision making on safety.

Rulemaking

Aviation safety and aviation security occupy different regulatory frameworks; Task 1 examined specific interdependences between security regulations and safety regulations. Of course, the development of these regulations follows set process, as outlined below.

ICAO rulemaking: [How ICAO Develops Standards](#)

EASA rulemaking: [Rulemaking process explained | EASA](#)

EC rulemaking: [Aviation security policy - European Commission](#)

ECAC guidance: [Security](#)

Although at the international level, ICAO have a set process for developing Standards and Recommended Practices (SARPs), the development of safety standards is done separately from security standards (security is the responsibility of ICAO's Aviation Security Policy Section).

Summary

What emerges from this examination of policy making are some synergistic concepts, namely impact assessment and consultation. Although none of the experts spoken to as part of this research referenced a specific integrated process for policy-making with respect to safety and security, there are tacit processes embedded in decision making at both the EU and national level that could facilitate **an integrated policy and decision-making process in the field of safety and security**.

Governance arrangements for policy and decision making

The key difference behind how national policy and decision making is undertaken in a state will be the governance arrangements within the state. Whilst there are some similarities between states, ultimately each state will have their own arrangements in place, guided by the relevant system approach for aviation security and aviation safety, and who is involved in the wider system (e.g. for risk assessment and regulation). The governance approaches for security and safety may be different in some states.

No two states are likely to have exactly the same system, because it is unlikely to serve the needs of the wider aviation rulemaking approach – for example, the policy and decision-making processes will link to wider regulatory and risk management processes within the state, which feed into policy making.

The key stakeholders involved, depending on the state may include:

- The National Appropriate Authority (NAA), who may be a government department or a separate regulatory body.
- The Regulator, if separate from the NAA
- Other governments departments, if involved
- The state's military
- Intelligence services
- Regulated entities

In some states, the Regulator for safety and security may be two separate organisations. Ultimately, a critical aspect is that every entity and those involved in policy and decision making understand their roles and responsibility, have the legal powers and resources to do so and that the process works for them. In some

states, these roles and responsibilities are set out within formal frameworks – for example this [framework document](#)⁹ in the UK.

“In cases where the policy and decision making for security and safety is completed through different processes and/or by different stakeholder, communication and collaboration between the two systems on cross-over aspects will be the most important driver to providing integration.” – Senior Regulator

Sample approach

Below is an example of how an aviation security policy change may look in a governance arrangement involving multiple stakeholders and split responsibilities.

Organisation	Role in process
Regulated entities	Provide operational input May be consulted on policy and decision making Influence process
Intelligence services	Provide input on threat and risk Inform national risk register Support prioritisation
Regulator (Security)	Undertake legal change to regulation Complete risk assessment and recommendation Provide technical input
Regulator (Safety)	Is consulted and/or informed about change Provides technical input if required Assess impact on safety
National Appropriate Authority – state department	Consider input from other stakeholders Sets/makes policy and decision Communicates policy/decision to other stakeholders

Touchpoints between safety and security

Regardless of governance arrangements, collaboration between the two fields is likely to be the greatest on aspects that require coordination, technical expertise from both sides or where the responsibility does not clearly sit in one area or the other. Examples of this are requirements around Dangerous Goods and In-flight security. The collaboration is often more challenging in states where security and safety governance processes are not integrated or sit with separate entities, making it more difficult to work closely together.

External influences on national policy and decision making

In all states there will be drivers for national policy and decision making that are external to the state’s controllable drivers. Most commonly these may refer to regulatory changes introduced by international or regional bodies with legal applicability in the state, such as ICAO, EASA or the EC. In the aviation security context changes to Annex 17 Standards or the EU regulations will require states to seek to comply, prompting policy considerations.

States may also have bilateral or multilateral agreements in place, which may seek alignment on standards between states. Examples in the security space are one stop security agreements, which are based on the mutual recognition of security standards if enacted both ways. This may require changes in national policy.

⁹ [Civil Aviation Authority framework agreement - GOV.UK](#)

A further driver that states will have little control over in the security domain are significant changes in threat and risk, prompting significant and often quick decision points on how to mitigate changes in the inherent risk or the value of the mitigations in place.

Process for policy and decision making

In most states the policy and decision-making processes are well formed and include a clear process and steps that adhere to the state's legal basis of making policy changes. While this process will differ between states, common element can be found in the different stages, regardless of the exact decision to be made.

The timeframe associated with policy or decision changes can vary significantly, based on the scope of the change, the drivers and therefore urgency of implementing a different process. For example, for policy changes driven by significantly increased residual risks, states will typically wish to act quickly where mitigations can be put in place to reduce the risk.

Sample approach – policy or decision change



In the above sample approach, each stage is broken down into its own step and may be completed by a different entity:

- Drivers for change may be changes linked to threat and risk (new threat scenario, changed residual risk), drivers such as technology, request by regulated entities or external factors such as international regulatory change.
- The appropriate entity will then go into an assessment and option stage – this is about researching the requirements, impact, change to risk, potential required legal changes, timeframes etc. Collaboration with stakeholders will be undertaken at this stage, including seeking security-safety integration input.
- Out of the above stage will come the formulation of a policy or decision – this may include consideration of the different options set out in the previous stage and align the options with existing national policies.
- The decision point marks the point when a policy agreement or decision is made formally by those with the authority to do so.
- If required, the regulatory framework may require updating to put the policy/decision into effect, following any considerations or timelines agreed. This can require considerable and lengthy legal work, depending on the process in the state. Communication of the change to regulated entities would be required at this point, or at a point before the implementation point is reached.

The implementation point would be when the policy or decision change is required to be operationally effective, depending on the nature of the change. Complex policy changes (e.g. the introduction of new technology) may require complex, multi-year implementation programmes, whereas smaller changes may only require a single implementation date acting as a deadline.

Interfaces

This section will look more closely at the given policymaking and decision-making examples to identify existing touchpoints between safety and security and to suggest possible new interfaces for integration.

There will then be an examination of the key area of cybersecurity, where research shows that integration already exists to some degree. An evaluation of this integration will take place, and an assessment of comms and coordination, and a view on what more opportunities exist to integrate security and safety in each mode.

It is clear that safety and security occupy different governance paradigms; this task aims to provide recommendations for how to support integrated policy and decision making between these different governance paradigms. Therefore, an examination of touchpoints between safety and security, with respect to policymaking, is pertinent. There is limited historic evidence of significant collaboration between the policy making regimes of aviation safety and aviation security. The general processes provided above highlight several potential touchpoints within the process – namely where consultation or impact assessment takes place as part of a policy process.

Additionally, to increase cooperation within the policy and decision-making process, we can look to existing governance models and teams where collaboration is already occurring. To this end, the below diagram is an inexhaustive replication of the structure in a state civil aviation system. The authorities for safety and for security may sit separately, but there are clearly responsibilities that overlap – these are centred around policy, oversight, guidance, and risk management. It is therefore worth examining these specific activity areas for potential areas of safety-security collaboration.



In particular, for oversight, ICAO publish a safety oversight manual and a security oversight manual. These have comparable critical elements. We can see from the comparison table below that the key points defining areas of oversight between safety and security at the ICAO level have considerable overlap in structure and theme (if not in specific content).

Safety Oversight (Doc 9734):

- Primary aviation legislation
- Specific operating regulations
- State civil aviation system and safety oversight functions
- Technical personnel qualification and training

Security Oversight (Doc 10047):

- CE-1: Primary aviation security legislation
- CE-2: Aviation security programmes and regulations
- CE-3: State appropriate authority for aviation security and its responsibilities
- CE-4: Personnel qualifications and training

Cyber Security

Introduction

Cyber security is examined in this research as it is identified as a policy area that crosscuts safety and security. Furthermore, access to the UK cyber team was a driver – facilitating the collection of rich and expert data.

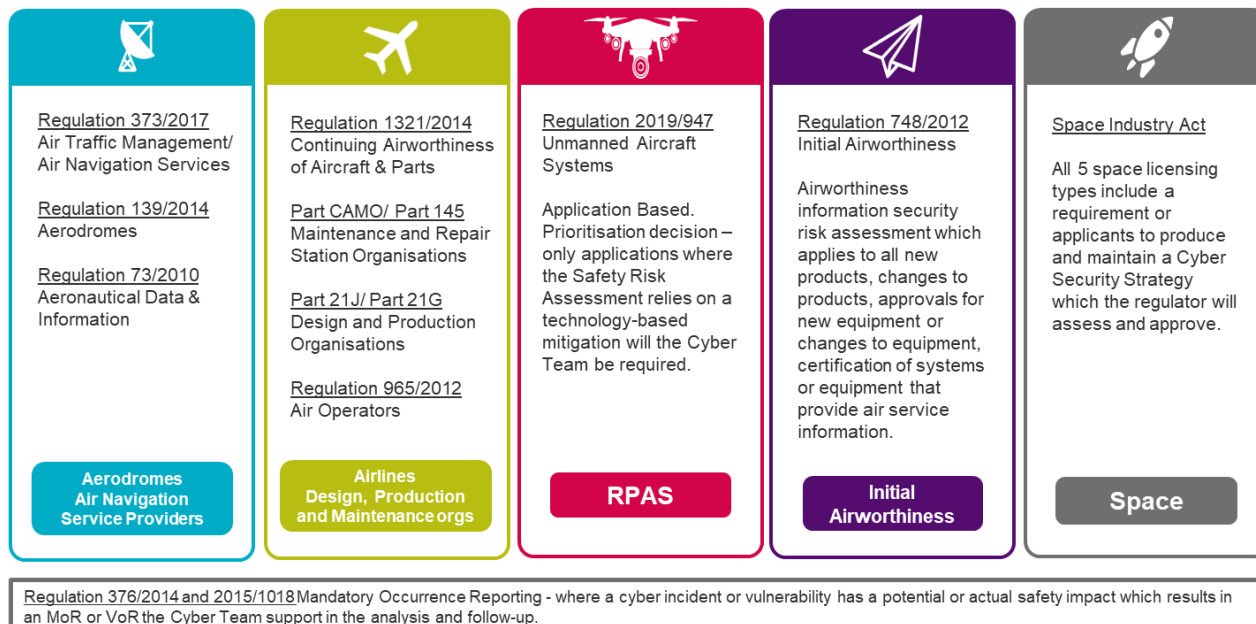
The area of cyber is cross-sectional in its very nature; intentional cyber-attacks (security threats) may affect safety functionalities, and thereby lead to harm to persons or property (Hollerer et al., 2022). Conversely, physical security failures could lead to unauthorised access to systems. Cyber threats have intentionality, but the threat itself is not inherently capable of causing harm.

It is also cross-sectional in its development; *cyber security* is carefully intertwined and has developed with digital systems designed to ensure *safety*. Policy and decision making has to take into account “cyber-resilience” concepts (i.e. reducing harm once an incident has taken place) alongside traditional protective and preventative security measures. With the continual fusion of traditional information systems in the aviation ecosystem, aviation organisations find themselves faced with the non-traditional safety risk of cyber incidents impacting flight operations and safety systems.

Cyber security is embedded across multiple levels of legislation. At its core, primary legislation provides the foundational legal framework by establishing the overarching principles for maintaining safety, protecting against both traditional physical threats and, by extension, digital unlawful interference. Building on this foundation, secondary legislation introduces more detailed measures tailored to the evolving cyber security threat landscape. Additionally, other legislation and policy instruments contribute to this multi-layered approach. Together, these layers create a robust and flexible regulatory ecosystem that upholds aircraft safety and security.

Below is a diagram illustrating an example national framework for statutory obligations under cyber.

Cyber Legal Obligations - Safety



It is clear from this diagram that cyber security touches on numerous safety policy areas. This intersectionality applies throughout various frameworks.

Assessment

We also see newer regulatory frameworks with heavy cross-sectionality, such as EASA Part IS. For any regulatory policy that is cross-cutting, there is the question of regulatory hierarchy and overlap – what might take priority when integrating horizontal and vertical policy? And of course, there are likely to be different risk assessment methodologies and reporting requirements. The cybersecurity domain also highlights how security considerations are being retrofitted into safety-dominated regulatory structures. EASA's mandate expansion to include cybersecurity represents an institutional evolution, but the integration remains incomplete.

The question remains, then, even though a degree of intersectionality is observed, to what degree is policy-making and decision making actually integrated between safety and security?

Previously in the section, the policy and decision-making process for cyber security was described. There are several identified checkpoints where decisions under safety governance and decisions under security governance could take place. However, the research shows that a formalised and specific impact gate is not part of the process. This has led to gaps in coverage.

One specific example can be seen in ATM/ANS.OR.D.010. Here, there is a requirement on air navigation service providers to establish some form of security management system, with physical protection requirements and training provisions. However, air navigation service providers are not necessarily included in any countries National Aviation Security Programme; they are not directed entities. Therefore, there is an element of assumption or trust in the system – i.e. the cyber policy makers concerned with regulations that keep data physically secure are trusting that the security measures are in place and to a standard. However, the security measures may not even apply to the specific locality of an air navigation service provider. This gap could be addressed by better integration. Furthermore, another major issue is treating cyber security as a siloed IT function (Rotas & Steunou, 2025) – this approach becomes a vulnerability in and of itself within a sector as interconnected and digitalised as civil aviation.

NIS2 and PART IS alignment

The cyber regulatory regime clearly cross-cuts safety and security and intersects at several regulatory touchpoints. Although this paints a complex picture, the overall aim of cybersecurity governance could be asserted to be “facilitating cyber-resilience”. There is therefore an alignment of purpose at the top level. Where things become more complex is where certain industry organisations or even regulatory bodies are subject to overlapping requirements that promulgate from different policies.

This complexity could be argued to be apparent when looking at entities in scope of NIS2 and Part IS. NIS2 is an EU directive to enhance cybersecurity and protect critical infrastructure, while Part-IS is aviation sector-specific information security regulation. The relationship is that whilst NIS2 has broad implications for many sectors, Part-IS is a more focussed regulation – but entities could fall in scope of both. The EU is working to determine if compliance with Part-IS can be “credited” towards NIS2 compliance for relevant entities, as Part-IS is considered more comprehensive for critical entities like those in aviation. It is arguable that greater integration at the policy-making stage will help to avoid duplication of requirements and potential confusion and additional work by stakeholders.

Opportunities

Using the cyber area as an example, it is possible to explore areas for better integration. One particular policy area that becomes apparent is within integrated management systems. Management systems apply to many sectors that are subject to cyber provisions, at the both EU and national level. Safety Management Systems (SMS) have already been mandatory in-flight operations for over 10 years. SeMS is not mandatory in the EU regime, but is referenced throughout guidance material. Information security management (ISMS) is increasing in prominence.

There are significant parallels in management systems between safety and security, but having a *system* that is *integrated* is not mandatory. The majority of management systems that are found in aviation are based on ISO 9000, a system family for Quality Management. Specifically, aviation ISMS has a focus on Information security and safety risks with a potential impact on safety. Information security considers both physical and cyber security. Therefore, there is likely an opportunity for collaboration to be explored within the theme of integrated management systems – this could be a policy and decision-making strategy. An initial view on the advantages and disadvantages is made here.

The key drawback is that organisations and authorities may find difficulties in having access to a sufficient number of qualified personnel to initiate and sustain the integration of the management systems, possibly at an increased cost. Hence it could be stated that there will be an economic impact of integrated management systems – this will depend on how robust the current management systems are when addressing risks. There is a risk that some efforts will be duplicated, because a number of organisations are already implementing measures to address cybersecurity or information security risks because of existing legislative acts. This can be mitigated by Member States nominating a national agency responsible for new requirements (this is what is currently happening in the UK in respect of new Information Security Management systems – National Cyber Agency). The authority may allocate oversight tasks to other entities.

To reduce the economic impact and possible duplication of efforts: there should be measures that allow competent authorities to replace, under certain conditions, the requirements with elements contained in other frameworks. To this end, under the UK cybersecurity oversight regime, significant use will be made in the AMC&GM of international standards already used by many organisations. This represents a positive impact of increased coordination and integration.

There are significant benefits that could be realised in a policy decision leading to an integrated approach to management systems. This includes a systematic and standardised approach to address all security risks and incidents with safety impact, across all aviation domains; we are already seeing this as it applies to information security risks. There would also be better coordination between authorities within the Member States: More effective and efficient organisation structures, more consistent regulatory and oversight policies, better coordination when addressing safety and security matters, wider collaboration and exchange of information

between organisations and authorities, better identification of interfaces. And finally, the injection of increased skill and competency into the system should improve overall productivity, efficiency, and effectiveness.

Despite these potential advantages taken from integrated management systems as a policy direction, speaking more generally now, industry perspectives reveal mixed perceptions of collaboration effectiveness. ACI Europe's Aviation Security Committee demonstrates use of internal coordination mechanisms with regular meetings and cross-committee coordination to evaluate cross-sectional impacts (ACI, n.d.). However, ACI point to the 2024 C3 scanner restrictions case study, which highlighted significant coordination failures, with industry criticising the lack of coordinated safety-security assessment and timeline uncertainty (ACI, 2024). Safety and security are sometimes highlighted as "joint priorities", e.g. A4E's support for the EU aviation security framework emphasises that "security is airlines' top priority alongside safety," while, for example, IATA's Security Management System (SeMS) addresses risk-based approaches that increasingly recognise safety-security overlaps (IATA, n.d.). However, practical examples of integration are limited.

Summary

To summarise the regulatory analysis: overall, we see that integration between safety and security in the aviation domain is limited, due to separate governance and policy regimes. Various sources report some degree of integration as being necessary, and there is evidence for when an increasingly collaborative approach has proven useful. The degree of integration is important; it is better to highlight "coordination touchpoints" and have strong communications channels that weave safety decision-making into security policy process and vice versa.

6.3 Case Studies

There is a valuable pool of existing empirical research around the topic of policy integration and decision making. Secondary research was conducted on these studies to identify any commonalities in factors that have supported an integrated approach.

Six case studies were examined, and factors that were identified as supporting integration have been listed below. The policy areas do not relate to aviation, however, we know that the subject of policymaking and decision making within governance studies is transferrable.

Country	Policy Area	Integration Support Factors
Germany	Environmental Policy Integration	<ul style="list-style-type: none"> • “German Environmental Index”: relative scoring system indicating how far/short sectors have come in contributing to overall goal achievement • “Conference of Environment Ministers”: group to coordinate strategy and policy within the sector across different levels of governance • Formally defining environmental policy as “cross-sectoral”
Canada	Environmental Policy Integration	<ul style="list-style-type: none"> • Independent review of sectoral strategies by a dedicated body • Enhancing verticality by horizontal operations • “Leaders Forum on Sustainable Development” to improve overall coordination • Government recognition that horizontal steering is necessary for effective integration
Scotland	Sustainable Urban Development	<ul style="list-style-type: none"> • Bottom-up self-assessment exercise, supported by tools and guidance • Regular meetings • Institution of a “Scottish Coordination Group” and “Joint Programme Monitoring Committee” • Supporting integration with briefings, guidance, and coaching
Veneto	Sustainable Urban Development	<ul style="list-style-type: none"> • Improving common information systems • Specifically enhancing coordination between the regional and local levels • Providing templates and technical notes, increasing local awareness about advantages of an integrated approach • Keeping relevant leadership roles (mayors) informed about opportunities offered by EU funding and integration • Creation of a dedicated unit to coordinate cross-sectoral policy activity • Setting up a coordination committee and coordination working group, meeting every 2-3 months • Generating a “coordination culture” • Deploying training initiatives to increase local authority knowledge on integrated strategies

		<ul style="list-style-type: none"> • Strategic motivation of top public servants (chief public servant knowledge was a strong moderative factor on implementation)
EU	Integrated Coastal Zone Management	<ul style="list-style-type: none"> • Focus on intersectional coordination rather than traditional sector by sector management • Holistic, multi-disciplinary ecosystem based planning • Dynamic, continuous, iterative, evolutionary problem-solving approach • Creation of new governance structures to accommodate stakeholder participation and conflict resolution • Securing intergovernmental agreement as a pre-condition for moving forward in policy mix design and implementation
Australia	Marine Conservation	<ul style="list-style-type: none"> • Recognition of lack of communication, coordination, and cooperation between decision makers as resulting in unfavourable outcomes and taking actions to ameliorate them • Creation of an Authority to liaise and coordinate policy with other government agencies

A clear commonality that emerges is the creation of some sort of coordination body to facilitate information exchange, coordination, and perhaps integration between disparate technical areas or departments. Indeed, Domorenok et al., (2021) points to a mix of knowledge, political, and financial resources becoming powerful drivers for creating specific capacity that is required by integrated policy designs.

At the extreme end of integration, it could be considered to set up an individual and independent department to overview safety and security interdependencies. At the EU level, and indeed, at the national level, this research does not point to this being a necessary step. Furthermore the capacity does not exist. However, taking this solution from EPI case studies and applying it at the industry level would potentially have more benefits. Stakeholders in the focus group reported that having security experts on safety committees and vice versa helps with information transfer and cooperation. Therefore, at the local level, there is likely to be a benefit to this extreme end of functional integration. One recommendation could be to set up a specific department or job role to monitor safety and security coordination.

7. Discussion

This section summarises key findings from the literature review, stakeholder engagement, and regulatory review exercise.

In aviation, we recognise a complex system. This is echoed in the environmental policy integration literature, where it is argued that the environmental sector alone will not be able to secure environmental objectives, and that *each sector* must take on board environmental policy objectives if these are to be achieved (Lafferty & Hovden, 2002). Adapting this research further, three over-arching aims for integration in aviation can be suggested:

- Achieve the requisite level of safety and security
- Remove any contradictions between safety and security policies
- Realise mutual benefits and the goal of making policies mutually supportive

Policy integration in safety-security implies:

- The incorporation of safety and security objectives into all stages of policymaking in the discrete areas of safety and security, with specific recognition of this goal as a guiding principle for the planning and execution of policy;
- Accompanied by an attempt to aggregate presumed safety or security consequences into an overall evaluation of policy, and a commitment to minimise contradictions between sectoral policies by giving principled priority. (Adapted from Lafferty and Hovden, 2002).

Belcher et al., (2025) argue for an interdisciplinary approach – for aviation safety and security this would mean utilising insights from, and taking account of, all the diverse areas which are affected by, and affect, aviation safety and security. It feels obvious to state that when working on the question of supporting integration, the diverse context and priorities of every area being integrated needs to be considered. Integration is by definition an assimilation of practice – to do this without understanding each silo would undoubtedly lead to issues. Attaining better policy integration involves adopting policy tools capable of overcoming or avoiding conflicts and contradictions in policy mixes (Howlett et al., 2017).

This is not an easy task to achieve, due to the complexity of the aviation system. “When acknowledgement is made as to the complexity, the extent of uncertainty that pervades the aviation sector can be described as deep.” (Belcher et al., 2025). “Deep uncertainty” is described as a circumstance: where analysts do not know, or the parties to a decision cannot agree on, 1) the appropriate conceptual models that describe the relationships among the key driving forces that will shape the long-term future, 2) the probability distributions used to represent uncertainty about key variables and parameters in the mathematical representations of these conceptual models, and/or 3) how to value the desirability of alternative outcomes. In particular, the long-term future may be dominated by factors that are very different from the current drivers and hard to imagine based on today's experiences. – this would appear to be reflective of the aviation industry with reference to safety and security.

The current level of collaboration at the EU level is functional but minimal. Research and participants did not identify any active risks, however, there would be clear benefits to an appropriate degree of integration – namely better holistic risk management, and minimising future cross domain policy impacts.

The current level of collaboration at the national level is dependent on a state's individual governance model. Generally, we see that safety and security are not well integrated from a policy and governance perspective, although there are states where the same agency will hold responsibility for policy and oversight. Generic decision-making processes at the state level will include an impact assessment stage – this is where coordination between safety and security does occur, although the research has shown that there is not often an explicit reference to safety-security dependencies or integration and that consideration for other policy areas during national decision making is more implicit in the process.

The key touchpoint for safety-security intersection is primarily the impact assessment phase during policy making. The research shows that communication and collaboration do take place through decision making processes (impact assessments), however, these are not formally identified as checks on safety-security interdependencies.

The level of integration emerges as an important discussion point. Several participants highlight a desire for coordination and cooperation, rather than full integration. There are several policy areas where integration could be more important or could require a higher level of coordination, namely cybersecurity, remotely piloted air systems, and dangerous goods. Domorenok et al., (2021) highlight that studies of integration following a policy perspective have focussed on things like enhancing coherence, complementarity, and coordination. With this in mind, clearly measures which work to enhance these relationary concepts are key to supporting an integrated approach.

There is a risk of gaps in policy making and adding risk to the system where the potential cross cutting impacts are not understood. Cross-domain coordination should therefore be strengthened – recommendations are made to this effect in section 8, including identification of specific and practical tools. These recommendations are made from the assessment of integration within aviation policy at the EU and national level, and from the wider research picture. Policy integration is complex and contingent (Jordan and Lenschow, 2010), and there are a few best practices that can be shared between jurisdictions – recommendations should draw from various spheres of governance.

Integrated (risk) management systems have emerged as a potential policy direction that would facilitate further collaboration and integration between safety and security. Integrated management systems would follow in the footsteps of information management systems; EASA's Part IS deploying to the European system and, at the national level, we have the case of UK ISMS. Here we have strong evidence for the potential capabilities and limitations of such a management system, including where safety and security concepts are dealt with more holistically through the joined-up issue of information security. This is supported by Tjorhom (2010), who states there should be a focus on the management and social frameworks when it comes to policy integration. The design of safety/security culture and SeMS/SMS by their very nature makes them cross sectional. It could be argued that the tacit aim of such a management system is a step towards integration, or at least better cooperation and coordination.

Tjorhom (2010) also highlights that relationships between national and supranational risk governance models can generate challenges for risk management. As aviation is set out with extensive numbers of executive actors within different organisations, there can be challenges and opportunities presented in this complexity. Opportunities for integration can come in the form of formal structures for participation, but integrating and implementing different contextual knowledge within the EU's rule framework is highlighted as challenge in this research. Risk governance could then hold the potential for creating structures and processes to meet the challenges of risk assessment and risk management in complex systems. Risk governance focusses on the interplay amongst concerns such as governmental interests and business initiatives for executing the requisite actions to reach a desirable risk level.

When it comes to inhibitors of integration, the main barrier to effective coordination is a lack of integrative capacity. Similarly to organisational culture, it appears that effective integration is also more easily achieved when there is senior buy-in. And, whilst not necessarily a direct barrier to integration, there is also a distinct lack of evidence in how to measure the effectiveness of any integrated policy and decision-making process.

In order to resolve the capacity/resourcing barrier, it is worth examining where practical, deployable resources overlap between safety and security. There could potentially be further alignment within the areas of oversight, such as alignment of safety and security oversight and compliance to save resource. This builds on the identified similarities in ICAO oversight guidance for safety and for security.

To facilitate integration, the integrating parties need to have an understanding of terminology. A clear example of this is present in the cyber case; the world of information or cybersecurity has its own set of terminology, well-known in the information technology field. This IT technical terminology sometimes uses identical words

as civil aviation, but with a slightly different meaning. Therefore, discussions to bring the relevant elements of aviation security, aviation safety and cybersecurity closer together require a clear overview of key terms as used in their specific context.

We see in the case study that the UK cyber team, subject to safety governance, sit within the UK's Aviation Security Directorate. There are examples of security expertise being embedded into safety policy roles and vice versa. Furthermore, the UK cyber oversight model was set up independently of specific safety or security governance and takes a holistic view between the two spheres.

Safety and security policy are too different to integrate completely. Policymakers have specific and expert knowledge. The key question of how to support an integrated approach lies in examining the true value of integration, the level of required integration, and then facilitating this desired level through organisational good practice. Jordan and Lenschow (2010) insist that measurement of outcome effectiveness is a very difficult task, and, furthermore, this difficulty is enhanced in immature research spheres (such as safety and security policy integration). Any assistance that can be provided to guide industry and policymakers is therefore a positive step.

8. Recommendations

This section takes the literature review, the regulatory analysis at the EU and national level, the exploration of the UK cybersecurity model, and meta-analysis of integrated policy approaches, to identify specific recommendations, aimed at the EU and national level, for supporting integrated policy making and decision making between aviation safety and aviation security.

Four main recommendations emerge from this research.

1. Evaluate current level of integration (self-assessment tool)

Integration can be described in many ways, and measured at various levels. Given that the research shows some level of integration is desirable for policy making, the starting point for EU and national governance should be an evaluation and assessment of the current level of integration when it comes to policy and decision making between aviation safety and aviation security. With this in mind, this task has output a starting point for an “integration self-assessment tool”, which can be applied at the EU, national, and entity level, for responsible parties to assess the level of integration within their system. Whilst the objective of this tool is certainly to allow an evidence-based, standardised appraisal of integration, it also has the aim of increasing awareness of integration as an issue and to promote integration-forward thinking. It is recognised that entities at the inter and intranational level are very diverse, and therefore the tool is intended to be deployed flexibly and adaptably.

2. Identify the benefits and level of integration desirable

This task has described a varying level of desire for integration, and a varying level of appropriateness for different levels of integration. Therefore, the second recommendation is that any entity looking to support integrated policy making should identify what level of integration is most appropriate, crystallise the benefits that may be realised, and set out a clear strategy or roadmap for achieving this level of integration.

3. Promote specific organisational practices

One of the most overwhelmingly clear directions that comes from this task is the fact that integration is wholly dependant on good business and organisational practice, specifically in areas of collaboration and communication. To this end, it is strongly recommended that, in order to support integration, the EU and national policy makers take into account the key organisational factors listed below. All of these have been identified and verified in the research as factors that will contribute to the facilitation of integration.

4. Set up specific roles to manage integration

A commonly observed solution to support integration is highlighted as setting up a specific department or role to manage integration. This solution appears as a facilitation factor in many case studies. Indeed, the UK policy making model has a specific rule making department that oversees coordination and cross-policy impacts. Therefore, the final overarching recommendation made in this task is for policy and decision makers to consider the creation of a specific function, role, or department to oversee integration. The process of involving parties must be organised in ways that encourage participation.

Additional Recommended Tools

A series of specific tools are also recommended to support these recommendations.

EASA Methodology for Assessing the Impact of Security Measures on Aviation Safety – Task 1.3A

It is recommended that any entity looking to support an integrated policy and decision-making approach uses the EASA methodology for assessing the impact of security on safety (guidance is provided in Task 1.3A).

This guidance provides practical instructions on applying the EASA methodology for assessing the impact of security measures on aviation safety. Its purpose is to ensure that both operators and regulators can systematically identify, evaluate, and document how security requirements may influence safety outcomes, operational performance, and risk management processes. By doing so, it promotes:

- consistency in assessments across organisations and States;
- transparency in decision-making, with clear evidence supporting choices;
- integration of safety and security management, helping to avoid unintended consequences of security measures;
- continuous improvement by capturing lessons learned and feeding them back into safety and security oversight.

The expected benefit is a more holistic, risk-based approach to aviation operations and decision-making process where security and safety are no longer treated as separate domains but as interdependent elements of one system.

Deploy Integrated Risk Management – Task 4.2.2

Effective risk management is fundamental to ensuring both the safety and security of aviation operations. In both domains, the identification of threats and hazards, along with a robust risk assessment process, plays a central role in maintaining operational integrity and resilience. However, despite their interdependencies, safety and security risk management frameworks have traditionally evolved separately, leading to potential gaps in coordination, inefficiencies in resource allocation, and challenges in achieving a true visibility of all risks.

To take a broad view, the purpose of policy in aviation safety and security is to mitigate risk – risk management processes therefore must be linked to policy decision making, either driving change or being influenced by change. When managing risks in an integrated way, a more comprehensive or holistic risk picture will emerge, which will likely assist in policy and decision making.

Task 4.2.2 proposed an integrated safety and security risk management methodology as well as tools and solution that will support efficient management of interrelated risks – this output can be used to assist entities in appropriately including integrated risk management in policy making between safety and security.

Cross-Sectoral Policy and Decision Tracker

Where this does not already exist, EU and national aviation policymakers should adopt a comprehensive “policy and decision tracker” system, which is inclusive of multiple policy areas (safety and security), to strengthen safety-security governance through improved transparency and coordination.

This centralised tracking system would function as a dynamic risk register for policy development, capturing all safety and security regulatory initiatives from inception through to implementation. Each tracked items should include clear identification of drivers for change (such as ICAO standards, accident investigation recommendations, or technological advances); consultation methods and other stakeholder engagement; current status across defined development stages; and links to associated documentation.

Key benefits would include reduced regulatory fragmentation through increased visibility of parallel initiatives and creation of an institutional memory that preserves decision rationales. The system should integrate both legislative and non-legislative developments, including amendments to certification specifications, acceptable

means of compliance, and guidance materials. The degree of information sharing for certain policy decision that are security sensitive would have to be considered – in the case of rulemaking in the UK, the policy tracker has integrated both security and safety policy changes (although the security changes are not made publicly available).

For effective implementation, the tracker must be regularly updated, with clear ownership assigned for each project. It should accommodate varying project timescales, from immediate safety directives to long-term strategic initiatives. Integration with existing risk management frameworks would enable correlation between identified safety risks and corresponding regulatory responses.

Regulatory Guidebook

EU and national aviation authorities should develop a comprehensive “Security-Safety Policy Integration Guidebook” to bridge the traditional divide between aviation safety and security policymaking, to help to ensure coherent, efficient regulatory outcomes while avoiding unintended consequences. This guidebook should be seen as similar in goal to other regulatory frameworks and guidance, e.g. the UK’s Better Regulation Framework or the EC’s Better Regulation Toolbox¹⁰ – but with specific focus on integration between safety and security. One of the outputs of this research is that awareness of integration as a potential benefit is an important step, therefore providing information and guidance as a first step is critical.

Key components of this guidance would include:

1. An integrated risk assessment framework
A joined up methodology for evaluating risks that span both domains, as per evidence in Task 4.2.2.
2. Stakeholder mapping and consultation protocols
Including clear processes for engaging both safety and security communities, ensuring expertise from both domains informs policy development.
3. Decision synchronisation tools
Practical templates for joint safety-security impact assessment, including guidance on including coordination checkpoints throughout policy development stages.
4. Methods for building administrative capacity
Following Domorenok et al.'s framework, and in addition to the content above, guidance on the importance on developing competence and the resources required to drive appropriate integration.

Self-Assessment

For regulators, self-assessment will help to identify gaps where safety and security policies inadvertently work against each other, or where coordination between different regulatory bodies could be strengthened. For industry stakeholders, it will provide a framework for assessing how well various internal processes integrate these two critical domains, potentially revealing opportunities for cost savings or operational improvements. Meijers and Stead (2004) provide some strong indicators for integration, which have been adapted in the creation of the evaluation tool.

It is appreciated that the usefulness of the tool will depend largely on how it is used – ability to address real pain points, generate actionable insights, and demonstrate clear value in terms of improved safety/security outcomes or on costs would all be highly useful outputs. However, the tool has also been designed to be used adaptably and has the concurrent goal of raising awareness. Aviation is a heavily regulated and risk-averse industry, therefore stakeholders will value tools that have clear practical applications and regulatory backing.

¹⁰ [EC Better Regulation Toolbox](#)

Integration Roadmap

The literature and case studies point to the importance of developing an integration strategy, that takes into account the level of integration that will provide the most benefit. Policymakers should seek strategies that are robust rather than optimal, and analyse integration using twin dimensions of horizontality and verticality; the strategy should be a clear vision for safety-security integration that addresses both vertical integration within organisations and horizontal integration across the aviation system. This strategy should explicitly acknowledge the overarching objective of safety while ensuring security is not treated as secondary.

It is also critically important to recognise that full integration is a long-term process. Policy makers could begin with pilot projects in specific areas (such as insider threat programs that address both safety and security) and gradually expand based on lessons learned. Underdal (1980) has some useful advice in this area: “All significant consequences of policy decisions are recognised as premises for the decision, where policy options are evaluated on the basis of their effects on some aggregate measure of utility, and where the different policy elements are in accord with each other.”

Organisational Practice

There are a handful of good organisational practices that have been identified as supportive of an integrated approach. Entities should work to deploy these practices, which link in well with the existing goals of security and safety management systems. These include cultural changes; beyond structural changes, invest in changing mindsets and professional cultures. This includes joint training programs, integrated performance metrics, and recognition systems that reward collaborative approaches; performance metrics; create metrics that capture integration effectiveness, not just domain-specific outcomes. This might include measures of cross-domain information sharing, speed of integrated threat response, or reductions in safety-security conflicts. It is important to note that the current level of evidence for outcomes is sparse, and therefore any directive should also be followed with a review process (Jordan & Lenshow, 2010). Finally, securing management commitment and resourcing is essential; integration requires sustained political support and adequate resources. It will be important to make the business case for integration by demonstrating how it enhances overall aviation system resilience and efficiency.

These practices should include:

1) Governance & Stakeholder Involvement

- Consistent and regular involvement of key accountable stakeholders in decision making
- Inclusion of a wide range of perspectives, perceptions and values in decision making
- Top level decisions should encompass input from the relevant contextual knowledge of actors at all the levels of the system

2) Transparency, Measurement & Reporting

- Quantitative, indicator-based targets relating specifically to security and safety coordination goals
- Regular reporting of the state of safety and security policy change within and between the sectors

3) Foresight & Analytical Methods

- Consider use of novel approaches such as computational modelling and LLMs

4) Human Factors & Culture

- Involvement as empowerment to improve engagement; actors within the system are able to respond with confidence, with their experience, competence and contribution valued

5) Practitioner Expertise & Capability Building

- Have a holistic approach that underlines the significance of involving practitioners according to their actual expertise
- Enhance specific individual knowledge and capabilities by developing and involving expertise, competencies, and mindsets compatible with integrated policy designs

6) Policy Integration & Coordinated Frameworks

- Integration is better achieved when policy makers strongly commit to key policy ideas and establish frameworks supporting coordinated activities

- Include procedural tools such as public participation and stakeholder funding in policy mixes to integrate existing (and sometimes rival) initiatives into a cohesive strategy

Please refer to Annex D for a list of good organisational practices to support integration in policy and decision-making.

9. Conclusion

The frameworks provided by the literature review and case studies examined in this paper offer valuable guidance for conceptualising and implementing integrated approaches to aviation safety and security. Their emphasis on moving beyond coordination to true integration, building comprehensive administrative capacities, and managing the complex dynamics of multi-objective policy systems provides a roadmap for aviation policymakers.

The key insight is that integration is not simply about better coordination between existing safety and security functions. It requires fundamental changes in how we conceive, organise, and manage aviation protection. By adapting these policy integration frameworks to the specific context of aviation, the industry can move toward a more resilient, efficient, and effective approach to managing the complex safety and security challenges of modern aviation.

Within the aviation industry, key areas for integration can be seen around remotely piloted air systems, dangerous good, crisis management, and cyber or information security. Cyber security was explored in depth as part of this task, owing to its cross-sectional nature and the amount of regulation that has touchpoints with safety and security regimes. The cyber security policy case study from the UK highlights where safety and security have been considered with an integrated stance. Recommendations for integrated policy and decision making, at the national and international level, should build on the information security approach.

In policy and decision-making at the EU and national level more generally, there is no specific integration of safety and security, however, there are checkpoints during the policy development process – namely impact assessment and consultation – where interdependencies and between-sector effects would be considered.

There are a number of gaps identified in policy making due to lack of coordination, which add risk to the aviation system. Therefore, recommendations are made to support a more integrated or coordinated approach; these recommendations centre around an assessment of current levels of integration, an identification of the level of integration required and strategy development, improving organisational practice such as communication, and setting up specific roles to oversee integration and facilitate coordination between safety and security.

Success will require sustained commitment, adequate resources, and a willingness to challenge traditional boundaries and working methods. However, as the research demonstrates, the alternative - continued fragmentation and sectoral approaches - is increasingly inadequate for addressing the interconnected challenges facing complex policy domains. For aviation safety and security, integration is not just desirable; it is essential for meeting the protection challenges of the 21st century.

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11. Annex A: Stakeholder interview

One-on-one interviews were conducted as part of this research to provide qualitative insights, practical experiences, and expert opinions that help contextualise and validate theoretical frameworks. Questions aimed to validate what the most commonly implemented methodologies are, what are the challenges and what would be possible integration issues. The interviews also aimed to assess the level of cooperation and communication between these domains and explore interactions between regulators and industry.

Methodology used

	Regulator	Industry
Safety	<ul style="list-style-type: none"> ICAO methodology, ERCS Bowtie and ERCS additionally 5x5 matrix ERCS Adapted ICAO methodology that includes more specific definition of both likelihood, severity and adapted definition of risk 	<ul style="list-style-type: none"> (airport) - customised bowtie used to analyse risks and barriers and 5x5 matrix to assess the level of risk
Security	<ul style="list-style-type: none"> ICAO methodology and Lean Sigma to complement the methodology Adapted ICAO methodology, quantitative methods used ICAO methodology and ERCS for conflict zones, cargo, implemented security measures, exemptions, drones, jamming and spoofing; guidance to prioritisation also provided by intelligence ICAO RCS methodology used and ERCS - it is a qualitative assessment that considers compliance rates; through risk assessments submitted by the industry it is evident that industry conducts integrated management of risks as risk logs contain both safety and security issues; ISO methodology for change management 	<ul style="list-style-type: none"> (air carrier) - ERCS approach is used. There is an integrated risk management system. Security utilises safety methodology where the input is security related and considers intent and capability; safety prioritisation is used as all risks assessments follow the same safety process with the exclusion of threat assessment. (air carrier) – ISO 31000 standard; 5x5 matrix to define risk level with consideration of likelihood and severity and 4 levels of risk

Use of software and technology

	Regulator	Industry
Safety	<ul style="list-style-type: none"> No specific technology, manual process Bowtie application but also internal software for data collection and analysis 	<ul style="list-style-type: none"> (airport) SMS software that includes hazard library (air carrier)
Security	<ul style="list-style-type: none"> No specific software No specific tools – manual process Manual process with use of excel spreadsheet No No No 	<ul style="list-style-type: none"> (air carrier) – There are no specific tools for the process, however a dashboard with all risks that include safety, and security is used to review the risks, issues and data. Dashboard contains links to specific risk assessments PDF pages. (air carrier) excel spreadsheet however in the process of selecting a suitable software

Safety and security risk management integration

	Regulator	Industry
Safety	<ul style="list-style-type: none"> Separate process Separate processes 	<ul style="list-style-type: none"> (airport) separately managed
Security	<ul style="list-style-type: none"> Separate process Separate process Some areas are assessed in an integrated manner – conflict zones, jamming, spoofing, drones related issues and counter drone system, unruly passenger In process of better integration between two domains; specific unit created to communicate between two domains however there are to different processes Challenge in integration in relation to likelihood which in security is related to intent; harmonisation of approach and terminology is possible whilst risk appetite will remain different; different regulatory regimes where in safety there is more flexibility and AMCs and alternative means of compliance are standard and security is 	<ul style="list-style-type: none"> (air carrier) – Integrated safety and security risk assessment and management. For security the first step in security domain is focused on intent. (air carrier) – at the moment two separate processes however communication between departments exist also because the airline is small

	much stricter not allowing for different ways to achieve the outcome,	
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Risk information sharing between safety and security

	Regulator	Industry
Safety	<ul style="list-style-type: none"> At high level all risks are reviewed and considered Annually security department is invited to participate in information exchange meeting; information exchange in the area of unruly passenger also a project that assesses the safety tools for security purposes High level risk information is shared through Internal Review Meetings undertaken as part of risk based oversight activity 	<ul style="list-style-type: none"> (airport) joined meetings where general information is shared between two domains however it is still seen as working in silos; responsibilities around drones not clear as in some occasions this falls within security and others it is part of safety; different methodology is also used for risk assessment process; implementation of part-is as it was originally included in national aviation security programme, which results in lack of relevant information sharing between safety and security as security programme cant be shared with safety professional;
Security	<ul style="list-style-type: none"> Efforts to brake silos are underway comparing to few years ago when there was a silo between two domains – now different approach is taken – always question if there is impact on safety – positive ‘contamination’ in different departments Security risk is not internally shared with safety, however there are risks that are shred, for example for overflying conflict zones (no formal process for information sharing), unruly passenger Risks related to conflict zones, spoofing and jamming, counter UAS are shared Communication between safety and security exist despite safety and security being governed by two separate organisations- quarterly meetings are taking place (security is not shares but conflict zones, check that the airline has a security manager); 	<ul style="list-style-type: none"> (air carrier) – All risks are considered in one system. (air carrier) – risk shared at safety review board meetings monthly; risks identified in each domain but once specific risk that may impact safety is identified than the information is shared with relevant department so it may be assesses also for safety

Guidance in the area of risk management - regulators and industry

	Regulator	Industry
Safety	<ul style="list-style-type: none"> Industry is free to use the most appropriate method; some links and EASA documents are available on the website to share best practice. Risk level is not shared but safety issues are. Information available through the website with specific bowtie examples and other additional information 	<ul style="list-style-type: none"> (airport) minimum guidelines provided by the competent authority; there was initiative from the regulator to organise best practice workshop for other industry members and share our risk assessment methodology
Security	<ul style="list-style-type: none"> Occasional workshops and information sharing initiatives. Level of information sharing with industry depends on the assessment. Annual assessment is not shared with industry some best practices and arrange meetings/workshops about assessment practices Security risk information shared with the industry through Security and Facilitation Council of which industry is part of; best practices regarding risk assessments are shared and occasional meetings or workshops with the industry ICAO and ERCS methodologies are shared with the industry additionally annual workshop with certified aviation security managers about the methodology as well as the current risks; biweekly meeting with biggest airports to share current threat level; authority provides ASM training to industry managers and training on risk management is part of this 	<ul style="list-style-type: none"> (air carrier) – No (air carrier) – no, government aligns NIST regulations to PART -IS, not much guidance from the authority in relation to best practice in the field of prioritisation of safety and information security risks; during oversight visits there is only one way communication when the regulator asks about how issues are resolve however it would be desirable to also receive advice on the best practice

Biggest challenges of the risk management

	Regulator	Industry
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Safety	<ul style="list-style-type: none"> Data analysis requires substantial resources In terms of integration of safety and security different systems used by each domain, in terms of data collecting, storing and analysis. 	<ul style="list-style-type: none"> (airport) diversity of risk matrices and risk prisonisations and the overall process when risk need to be completed in cooperation with different stakeholders, in this case ANS is difficult as it is not fully standardised and combined approach is required; attempts undertaken by the regulator of introducing standardised risk matrix for the industry were not successful and not considered suitable as it was contradictory with the requirement of the risk ownership; increasing number of regulations that are coming from different regulatory bodies; every new regulation need to undergo a change management process and therefore also risk assessment; these are usually very lengthy and time consuming, this results in high resources requirements
Security	<ul style="list-style-type: none"> Issues with standardisation of the process; and subjectivity of the assessment which was to some extent resolved by adding quantification system; information sharing and accessibility of intelligence information (information sharing between law enforcement and the regulator even if there are specific channels of communication; highly sensitive/classified information may be difficult to use even internally) Access to accurate and reliable information; even thou ICAO recommends information sharing between States, in practice this cooperation is really difficult and often relies on personal contacts and personal rapports with States; information relating to third countries is very difficult to obtain as the States do not share this willingly Risk and regulations for cyber security and information security (since three different regulatory bodies are involved – airlines have to undergo three separate oversight visits which are security, safety and national critical infrastructure) introduction of threat into the ERCS which does not apply well to security consideration of human factors in the risk assessment process skills and knowledge in the area of security risk assessment process 	<ul style="list-style-type: none"> (air carrier) – Confidence that all threat relevant information is available. The entity needs to proactively ask for threat information but has no certainty that nothing that may be relevant will be omitted. Even though threat information sharing is fairly good, it still could be improved to give more confidence. (air carrier) – scoping risk assessment for information security considering different interfaces and connections between involved parts

Desired improvements

	Regulator	Industry
Safety	<ul style="list-style-type: none"> Integrated process is the future of aviation as organisation should have a clear overview of all risks which include business risks, safety and security risks 	<ul style="list-style-type: none"> (airport) - competent authority should be able to question and challenge the organisation's risk appetite; current system is more compliance driven rather than safety driven whereby the authority reviews within the SMS if the safety case was conducted and if the issue is within our safety limits or risk rather than assessing risk tolerance level as well
Security	<ul style="list-style-type: none"> Collective assessment of risk with participation of law enforcement and intelligence unit, for example specific team that will assess the risk in cooperation with law enforcement; ICAO RCS risk methodology is found very useful. General aviation threat and risk information sharing platform like European Information Sharing and Cooperation Platform on Conflict Zones, would enhance information availability Develop more structured approach to risk assessment as currently there is no specific standardised one At very basic level upskill staff and develop risk assessment skills and knowledge 	<ul style="list-style-type: none"> (air carrier) – Proactive threat information sharing by law enforcement would be desired where the information does not have to be requested but is provided on regular basis. (air carriers) – standardisation similar to aviation safety should be achieved in information security risk field to remove subjectivity; one board where all safety domains including information security can showcase and overview their risks and at high level risks can be discussed and prioritised at organisational level. At the moment information security risks may sometimes conflict with safety risks and high-level conversation about which one should be prioritised would be useful; information sharing between airlines in the field of information security would help as we could collectively learn and increase awareness – for example more participation in ISACs - Information Sharing and Analysis Centres

Value of integrated process

	Regulator	Industry
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Safety	<ul style="list-style-type: none"> Integrated process is the future and would be very valuable, however due to both domain using different internal systems to store and review data it will take time to implement change 	<ul style="list-style-type: none"> (airport) integrated data management system exists; there would be value in having the same system for risk management considering that the input is different – the process between the input and output should be the same;
Security	<ul style="list-style-type: none"> Better integration of safety and security risk management in areas that are currently between safety and security like cyber, conflict zones, counter UAS and UAS regulation would be beneficial however integration is not suitable for all areas of aviation security Not possible due to the national set up whereby aviation security is governed by Home Affairs and is part of law enforcement / intelligence unit Integration possible at high level of management of risk whilst specific context of risk assessment in security varies significantly due to 'intent'; additionally integration at lower level would not bring additional value – scenarios are different the skills are different – so the value would be in completing some of the assessments with the participation of both parties rather than integrating into one assessment ; high level risk register for safety and security would be beneficial 	<ul style="list-style-type: none"> (air carrier) – Integrated safety and security risk assessment and management. For security the first step in security domain is focused on intent. (air carrier) – alignment may be difficult and standardisation of the process between interfacing entities or even only between airlines

Additional comments

	Regulator	Industry
Safety	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> (airport) development of a mature relationship between the regulator and industry is important where the industry is able to directly speak to the responsible staff from the authority and is able to challenge, discuss and openly share ideas; additionally, all stakeholders are invited to participate in the risk assessment process once a month where the responsible change managers are invited-different risks and changes are discussed during this meetings; would be more efficient and beneficial if the auditors could be trained for both safety and security audits; integration or alignment of safety and security regulatory framework for aerodromes would be beneficial – at the moment these regulation are done by different entities, in different formats
Security	<ul style="list-style-type: none"> specific team for safety and security communication would be desirable for better communication and cooperation. Integration is common at entity level however within the regulator this would be much more difficult due to organisational structure of the CAA; no clear value in integrated risk management but enhanced information sharing and communication in the field of risk would be much appreciated; information sharing at European level would be desirable and is recommended by ICAO, however in practice this is very challenging due to the nature of sensitive information and involvement of national security bodies or law enforcement that are not able to share this type of information ECAC risk management workshop is very useful, and we attend regularly A project organised within the regulator to assess what safety mechanisms can be used in security with the first one being ERCS 	<ul style="list-style-type: none"> (air carrier) – Suit of EASA safety regulations are much more descriptive and account for required roles and accountability also provide acceptable means of compliance and guidance material, whilst security regulations are much more limited in this area. This could be compared to have only EASA Basic Regulation to manage safety. (air carrier) – authority leadership in the area of best practice of risk trade-off between safety and information security would be beneficial

12. Annex B: Integration Self-Assessment

Aviation Safety-Security Integration Self Assessment Tool for Policy Makers

This self-assessment tool is design to help EU and national policy makers evaluate current levels of integration between aviation safety and security policy making, whilst encouraging reflection on integration as a strategic concept. It aims to:

- Assess your organisation's current integration maturity
- Identify strengths and gaps in coordination mechanisms
- Stimulate strategic thinking about integration as a core competency
- Provide actionable insights for improvement

The tool addresses both internal coordination within your organisation and external coordination with other agencies and jurisdictions.

Instructions: Rate each statement on a scale of 1-5, where:

1 = Not at all / never

2 = Rarely / minimal extent

3 = Sometimes / moderate extent

4 = Often / significant extent

5 = Always / full extent

Part A: Systems and Tools Integration

A1 Cross-Sectoral Policy Framework

1. We have a dedicated aviation safety-security integration strategy that spans multiple years and establishes clear cross-domain goals.
2. Our policy documents explicitly address the interdependencies between safety and security measures.
3. We use standardised frameworks/templates when developing policies that ensure both safety and security considerations are addressed in all aviation policy decision making

A2 Technical Systems Integration

4. Our risk management systems can process and analyse both safety and security data in an integrated manner.
5. We have interoperable IT systems that allow safety and security teams to share data and insights seamlessly.
6. Our monitoring and reporting systems provide integrated dashboards showing both safety and security performance indicators.

Subtotal: _____ / 30

Part B: Organisational Structures

B1 Coordination Mechanisms

7. We have established committees, working groups, or other bodies that regularly coordinate between safety and security functions and bring together safety and security stakeholders.
8. We have defined processes for sharing relevant information between safety and security teams.
9. Decision-making processes require joint safety-security impact assessment before policy approval.

B2 Organisational Design

10. Our organisational chart clearly shows the relationship and interaction points between safety and security functions.
11. Responsibilities for integrated safety-security outcomes are clearly defined and assigned to specific roles.
12. We have dedicated liaison positions or units responsible for safety-security coordination.

Subtotal: _____ / 30

Part C: Human Performance and Collaborative Culture

C1 Competency

13. Staff receive regular training on both safety and security principles, regardless of their primary domain.
14. We have cross-functional training programmes that build skills in integrated risk management and coordination techniques.
15. We actively promote initiatives that help staff think across safety-security boundaries.
16. Career development paths encourage experience in both safety and security domains

C2 Collaborative Culture

17. Joint safety-security teams work on projects requiring integrated approaches.
18. Staff from safety and security teams regularly participate in each other's meetings and planning sessions.

Subtotal: _____ / 30

Part D: Cultural and Structural Facilitators

D1 Cultural Facilitators

19. There is a widely perceived need for safety-security integration amongst staff and leadership.
20. Senior leadership actively supports and advocates for better coordination or integrated approaches.
21. Integration efforts respect and preserve the unique expertise of safety and security professionals – both domains maintain their professional identity when working towards common goals.
22. There is a shared commitment to protecting aviation.

23. Historical relations between safety and security teams have been positive and collaborative.

24. Success stories of safety-security integration are recognised and celebrated within the organisation.

D2 Structural Facilitators

25. Safety and security functions are physically or digitally located to enable easy interaction.

26. Informal networks and information exchange exist between safety and security professionals.

Subtotal: _____ / 40

Part E: External Coordination

E1 Stakeholder Coordination

27. We regularly collaborate with other equivalent government departments or agencies on safety-security integration.

28. Our industry or regulatory stakeholders receive guidance on safety-security integration.

29. We have appropriate mechanisms for sharing information and coordinating with external stakeholders.

E2 Multi-Level Governance

30. We have strategies to coordinate across local, national, and EU jurisdictions (as appropriate).

31. Regional and local authorities understand and implement integrated approaches – we make effort to ensure the reasoning for our policy and decision making is understood at all levels.

32. Feedback mechanisms exist to ensure policy integration works at all governance levels.

Subtotal: _____ / 30

Part F: Potential Barriers

33. Competing priorities between safety and security
Different priorities create tension between safety and security approaches

34. Lack of common professional language
Technical differences make communication difficult between safety and security professionals

35. Concerns about loss of organisational identity
Integrations efforts are seen as threatening distinct safety or security identities

36. Inadequate communication mechanisms
Current systems do not support effective information sharing

37. Structural differences between safety and security functions
Organisational differences make coordination difficult (e.g. excessive process, centralisation, fragmentation)

38. Costs outweighing perceived benefits

The effort required for integration seems greater than the benefits

39. Knowledge limitations

Over-specialisation prevents staff from understanding cross-domain issues

40. Lack of awareness

There is a lack of awareness of the problems or risks that lack of integration might cause

Subtotal

(Lower score indicates fewer barriers)

Scoring and Interpretation

Overall Integration Score

Parts A-E Total: _____ / 160

Part F (Barriers): _____ / 40 (Reverse score: 40 – your total = _____)

Overall Score: _____ / 20

Interpretation Guide

160-200: Strong integration – your organisation demonstrates advanced coordination between safety and security policy making

120-159: Good integration – a solid foundation with opportunities for enhancement

80-119: Moderate integration – some coordination exists but significant gaps remain

40-79: Limited integration – coordination is ad hoc with substantial barriers

Below 40: Minimal integration – safety and security operate largely in isolation

Reflection Questions

Based on your assessment, consider:

Strengths: In which areas did you score highest? How can these strengths be leveraged to improve other areas?

Priorities: Which low-scoring areas would have the greatest impact if improved?

Barriers: Which barriers (Part F) are most significant in your context? What strategies could address them?

External factors: How do regulatory frameworks, political priorities, or resource constraints affect your integration efforts?

Next steps: What specific actions could your organisation take to enhance safety-security integration over the next 6-12 months?

What surprised you most about your organisations integration maturity?

What would “excellent” safety-security integration look like in your context?

What support would you need from other regulatory institutions to advance integration?

Additional Considerations

Legislative context: Remember that safety and security operate under different legislative regimes. Integration should focus on coordination at appropriate touchpoints rather than a full merger of functions.

Stakeholder engagement: Consider how industry stakeholders, other agencies, and international partners could support integration efforts.

Continuous improvement: Integration is an ongoing process. Regular assessment can help track progress and identify emerging opportunities and challenges.

NOTE: This tool should be adapted to your specific organisational context and regulatory environment. Assessment criteria are included as guidance only and should be subject to your own local interpretation. Consider conducting the assessment as a group exercise to build consensus and shared understanding.

13. Annex D: Key Thematic Recommendations

Key Recommendations Lifted from the Academic Literature on Policy Integration

Aviation Application:

- Embedding both safety and security considerations from initial design through operations
- Assessing how security measures impact safety (and vice versa)
- Establishing clear hierarchies when safety and security objectives conflict
- Establish statutory requirements for safety-security integration
- Create independent bodies to audit integrated approaches
- Implement regular review cycles for integrated policies
- Define clear institutional mandates avoiding overlap

Institutional Architecture:

- Create a high-level coordinating body for safety-security integration
- Establish clear reporting lines between safety and security departments
- Develop integrated risk assessment methodologies

Policy Development:

- Mandate integrated safety-security impact assessments for all new regulations
- Develop unified training programs addressing both domains
- Create integrated performance indicators

Operational Integration:

- Implement joint safety-security management systems
- Establish integrated incident reporting and analysis
- Develop unified emergency response procedures
- Establish integrated governance at international (ICAO), regional, and national levels
- Create mechanisms for sharing best practices in integration
- Develop standardised integration assessment tools
- Implement peer review processes for national integration efforts
- Percentage of incidents with both safety and security dimensions
- Time to resolve safety-security conflicts
- Number of integrated policies and procedures
- Staff competency in both domains
- Stakeholder satisfaction with integrated approaches
- Regular review and update of integration frameworks
- Investment in research on safety-security interfaces
- Development of new tools and methodologies
- Building an integration-oriented culture

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