

White Paper

Safety and Security in the Cargo Supply Chain:
Prevention, Detection, Management and
Resolution of Risks with Dangerous Goods.

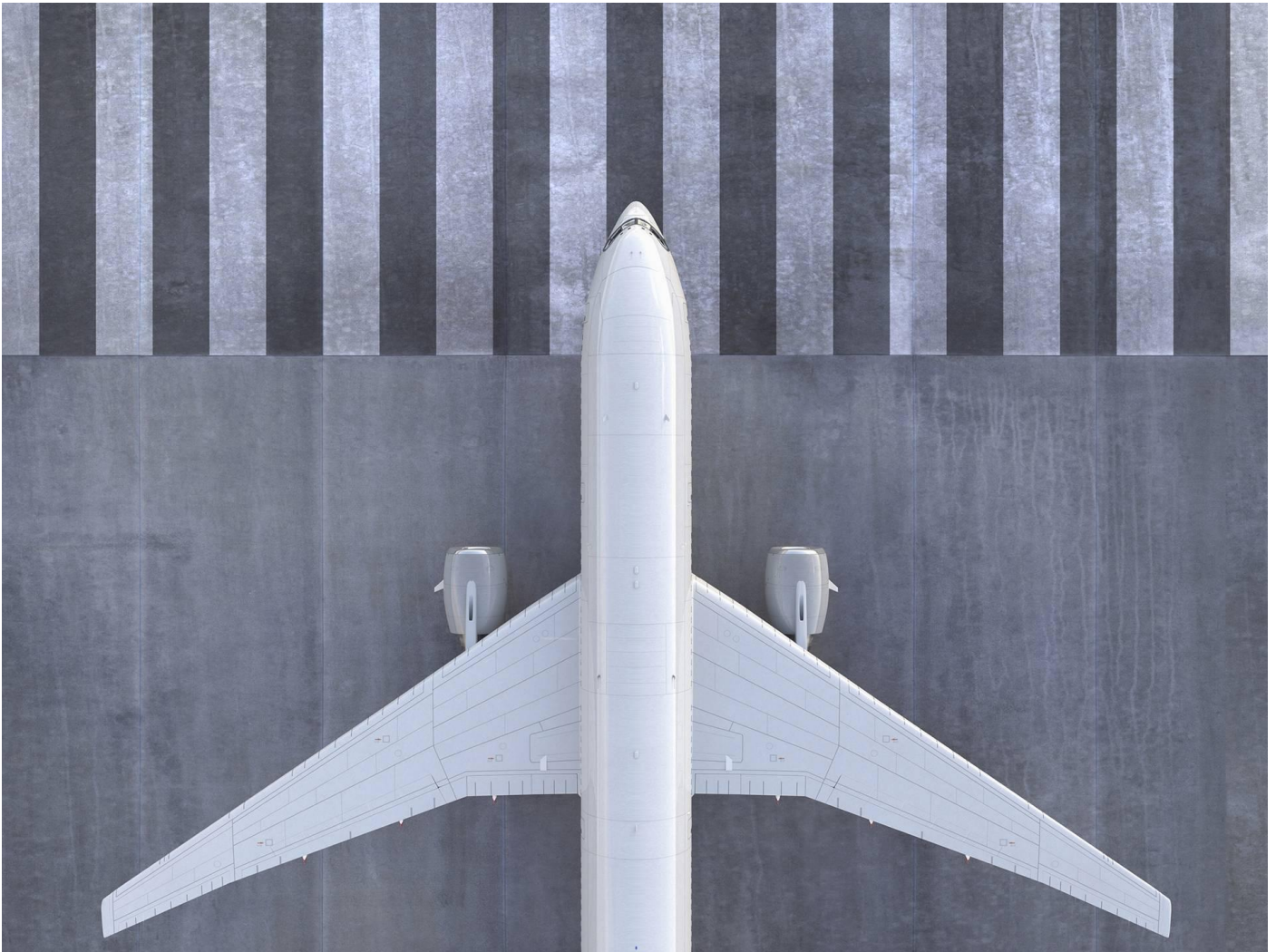


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Executive Summary

The global air cargo and mail supply chain faces an evolving combination of safety and security risks arising from dangerous goods that are undeclared, mis-declared or deliberately weaponized. These risks have intensified with the rapid growth of e-commerce, the widespread use of lithium batteries in consumer products, increasingly complex supply chains and the emergence of improvised incendiary devices targeting cargo operations. More than 80% of dangerous goods occurrences reported to IATA during the referenced period involved undeclared dangerous goods, with lithium batteries and concealed hazardous commodities, including perfumes and aerosols, among the principal concerns.

Dangerous goods are routinely transported safely by air under established international standards. The primary concern is not their legitimate carriage, but the introduction of unauthorized dangerous goods into the supply chain. These include goods that are not declared, are incorrectly or incompletely declared, or are intentionally concealed, modified or weaponized to cause harm. Such occurrences may endanger passengers, crew, ground personnel, aircraft and infrastructure, while exposing operators and other stakeholders to significant operational, regulatory, financial and reputational consequences.

Aviation safety and aviation security are distinct but complementary disciplines. Safety principally addresses accidental harm, regulatory compliance and operational reliability, while security protects civil aviation against intentional and unlawful attacks, or attempted attacks. Their objectives converge where dangerous goods are deliberately concealed, misrepresented or weaponized, and where safety and security incidents may result in similar consequences. Effective risk management therefore requires coordinated action across both disciplines while preserving their respective mandates, competencies and operational priorities.

Existing security controls, including cargo screening, may provide an additional opportunity to identify anomalies and intercept some unauthorized dangerous goods. However, screening should not be regarded as the sole or primary solution. Current cargo screening technologies, certification standards, algorithms and training programmes were primarily developed to detect weapons, explosives and other security threats, presenting potential challenges with dangerous goods detection capability, alarm resolution and the distinction between legitimately consigned dangerous goods and unauthorized dangerous goods. Cargo size, density, packaging and sensitivity may also make conventional screening impracticable or ineffective. Expanding screening responsibilities without defined target priorities, suitable technology, specialist training and sufficient resources could increase false alarms, inspections, costs and operational disruption while diverting attention from core security objectives.

This White Paper therefore advocates a layered, risk-based and supply-chain-wide approach that prevents or identifies unauthorized dangerous goods at the earliest practicable point. States should provide strategic direction, coordinated oversight, harmonized requirements and proportionate enforcement. Collectively, manufacturers, online marketplaces, retailers, shippers, postal operators, freight forwarders, ground handlers, airports and aircraft operators should apply controls appropriate to their responsibilities and risk exposure.

Priority measures include shipper education, competency-based training, enhanced documentation and acceptance controls, commodity and customer profiling, automated data analysis, accurate product information, effective reporting, information sharing, quality assurance, regulatory coordination and appropriate fire-mitigation measures. By integrating safety, security, intelligence, operational controls and supply-chain assurance, stakeholders can reduce unauthorized dangerous goods while maintaining the safe, secure, efficient and economically sustainable movement of global air cargo and mail.



1. Introduction

1.1. Background

Underlying hazards and risks associated with undeclared and mis-declared Dangerous Goods (DGs) in air cargo have increased in recent years, driven in large part by the rapid growth of e-commerce and the widespread use of lithium batteries in Fast-Moving Consumer Goods (FMCG/s). In parallel, the deliberate conversion of incendiary materials into Improvised Incendiary Devices (IIDs) targeting air cargo and global supply chains represents an evolving security threat.

Several high-profile incidents, including lithium battery thermal runaway events and the 2024 IID incidents in Europe highlight the potentially catastrophic consequences for aircraft operators and supply chain resilience. Furthermore, the IID incidents revealed potential gaps and vulnerabilities within the current supply chain system and existing national and international aviation security programs.

These risks have prompted renewed efforts to strengthen detection capabilities. Some industry stakeholders and aviation regulators have proposed using the existing aviation security system as a primary line of defence against safety-related weaknesses in the cargo supply chain which may present various challenges.

1.2. White Paper Purpose

This White Paper is intended to support both industry and government stakeholders by providing essential context and an overview of the similarities and functional differences and objectives between aviation safety and aviation security. It explores the potential benefits and current approaches in security which may be extrapolated and applied in a safety and DGs detection context, juxtaposed with the limitations of screening. Importantly it also considers all participants in the wider cargo supply chain, and their roles in safeguarding aviation. It concludes with a summary of practical measures, highlighting the array of potential options that may support in strengthening cargo supply chains and DGs detection capabilities.

1.3. Problem Statement

The global cargo system faces a persistent and evolving risk from the improper transport of DGs, particularly undeclared and mis-declared (hidden or mis-identified) articles and substances. Additionally, the deliberate weaponization of incendiary materials (which are also by definition DG) into Improvised Incendiary Devices undermines aviation safety and security, potentially exposing passengers, crew and ground staff to hazards, and operators to regulatory, reputational and financial consequences.

Potential coordination gaps between safety, security, regulatory oversight, data intelligence, supply-chain assurance, and operational controls can undermine collective efforts to prevent, detect, and respond to unauthorized dangerous goods (DGs), reinforcing the need for a combined, layered approach. This combined approach must not depend on a single layer as the primary solution.

1.4. Core Challenge

The central challenge may be the absence of a **cohesive, system-wide approach** that integrates:

- **Safety frameworks** (DG compliance and hazard management)
- **Security measures** (screening, other security controls, threat detection, insider risk mitigation)
- **Regulatory oversight** (harmonized, risk-based, and enforceable standards)
- **Data and intelligence sharing** (predictive risk identification and targeting)



- **Supply-chain assurance mechanisms** (trusted actors, certification, validation)
- **Operational controls** (acceptance procedures, handling protocols, escalation processes)

Without integration across these domains, the system remains **reactive, siloed, and vulnerable to exploitation**, particularly by actors seeking to bypass controls.

1.5. Scope and Applicability

This White Paper was jointly developed by the IATA Cargo and Aviation Security Teams and relevant Boards and Working Groups, incorporating expertise in cargo safety, security, and Dangerous Goods.

It is designed to support:

- IATA members involved in the uplift of air cargo and mail;
- Supply chain partners, including Regulated Agents, Known Consignors, airports, Designated Postal Operators, Freight Forwarders, ground handling agents; and,
- Member States, national authorities, relevant International Organizations, peak industry bodies and other External Service Providers (ESPs).

1.6. Terminology used in this paper

This White Paper is designed for an international audience. Every attempt is made to align terminology used throughout this document with international framework and universally accepted best practices. Individual operators, States or regions may use differing terminology within their jurisdiction or national legislation. Readers must ensure they are aware of and understand any potential differences in terminology and definitions across their operating jurisdictions.

In the context of Dangerous Goods transported as air cargo, undeclared, mis-declared, and weaponized Dangerous Goods represent the highest-risk scenarios for air cargo and broader supply chain operations. For the purposes of this White Paper, these three scenarios are grouped under the umbrella term **"unauthorized Dangerous Goods."** A description of each scenario is provided in the table below.

Term	Core meaning	Typical intent / cause	Presence in air cargo	Primary concern	Example scenarios
Undeclared dangerous goods	Dangerous goods are present in the shipment but not declared at all as dangerous goods.	Often due to lack of knowledge, poor shipper controls, e-commerce errors, concealment to avoid cost or delay, or deliberate non-compliance.	Shipment is presented as general cargo with no Shipper's Declaration, no DG marks/labels, no proper packing instruction references, and no DG acceptance process.	Safety risk because airline, handler, ground staff, and crew does not apply DG controls.	Lithium batteries shipped as "electronics accessories"; aerosols described as "cosmetics"; flammable paint sent as "samples."
Mis-declared dangerous goods	Dangerous goods are declared, but the declaration is wrong, incomplete, misleading, or inaccurate .	May result from incompetence, lack of effective training, poor classification, outdated or improperly prepared SDS, wrong UN number, incorrect packing group, quantity error, or deliberate down-classification.	Shipment may have DG paperwork and labels, but details do not match the actual contents or regulatory requirements.	Safety and compliance risk because the cargo may be handled under the wrong hazard assumptions.	A corrosive liquid declared under the wrong UN number; lithium batteries declared as compliant when they are untested, quantities that exceed permitted limits; flammable liquid declared with an incorrect packing group.
Weaponized dangerous	Dangerous goods are intentionally used, modified,	Deliberate malicious intent: sabotage, terrorism, extortion,	May be hidden, disguised, falsely declared, or embedded	Security threat, potentially involving aviation	A hazardous substance concealed in cargo for malicious release; an



**goods
(Prohibited
Items List)**

combined, or introduced into cargo to create a **security threat or harmful effect**.

targeted harm, or disruption of aviation/cargo systems.

in otherwise legitimate cargo. The DG may be selected or configured to exploit aviation vulnerabilities.

sabotage, harm to people, infrastructure damage, or systemic disruption.

item article altered to initiate fire, toxic exposure, or explosive effect during transport.

2. Strategic Risk Context

2.1. The Evolving Risk

In response to the increasing risks associated with unauthorized Dangerous Goods (DGs) in air cargo, attention has turned towards identifying effective strategies to strengthen detection capabilities. Consequently, there has been some focus on leveraging the existing aviation security system as a single or primary line of defence for safety-related deficiencies in the cargo supply chain.

Although aviation security processes, including cargo screening, where mandated in addition to appropriate security controls - may provide a valuable layer within the broader safety and security framework, cargo screening may have various limitations in detecting DG. These limitations must be clearly understood and carefully considered. In parallel, alternative and complementary safety and security measures should be evaluated to support a more robust, effective, and multilayered risk-mitigation strategy.

As outlined in the Attachment D to Appendix 12 of Doc 8973, while the Technical Instructions provide the training requirements for all personnel engaged in the transport of DGs by air, including screeners for passenger baggage, cargo and mail, one of the learning objectives focuses on what the ICAO guidance defines as "recognition of DGs of high consequence⁴".

High Consequence Dangerous Goods (HCDGs) are defined by the United Nations and integrated into all modal transport standards such as ICAO for air, IMDG (International Maritime Dangerous Goods) for sea and ADR (European Agreement on International Carriage of DGs by roads) for roads. [In the civil aviation context](#), HCDGs have the potential to be misused for a deliberate attack, resulting in serious consequences such as mass casualties or mass destruction. Finally, the ICAO guidance states that screeners should also know the fundamental differences between "high consequence DGs" (or HCDG) and ICAO Annex 17 define "high-risk cargo".

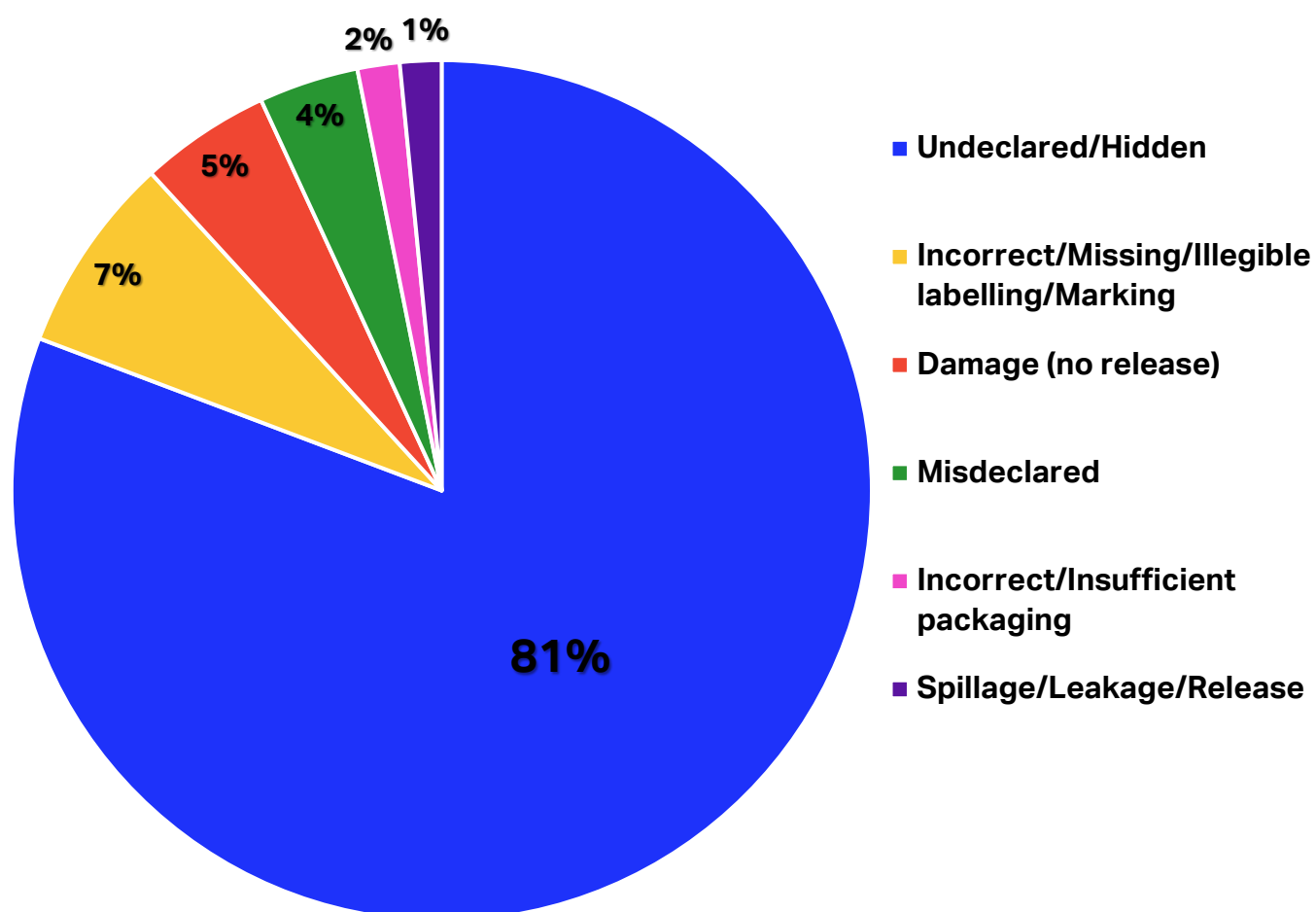
Many industry stakeholders and Original Equipment Manufacturers (OEMs) continue to take proactive measures to mitigate these risks through a range of non-certified initiatives. These include the implementation of practical protective measures, as well as sustained investment in advanced technologies and innovative solutions.

Annex 18 to the Convention on International Civil Aviation and the ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air (Doc 9284) provides for a globally consistent framework for regulatory oversight of DGs handling across all supply chain participants when being transported on aircraft.

This is part of a globally consistent approach to the classification, marking and labelling of DGs on other modes of transport. The structure works well where participants operate in compliance with these provisions. The framework also includes the reporting of instances of accidents and incidents involving dangerous goods, as well as reporting of undeclared and mis-declared DGs. These reporting requirements are designed to assist in strengthening the supply chain.

From the occurrences reported to IATA, **over 80% of reported DGs occurrences in the cargo supply chain originate from undeclared DGs**. The main articles are lithium batteries and concealed hazardous commodities such as perfumes and aerosols.

DG Incidents by Category



Incident Type	Count of SUMMARY
Undeclared/Hidden	2798
Incorrect/Missing/Illegible labelling/Marking	258
Damage (no release)	170
Misdeclared	130
Incorrect/Insufficient packaging	55
Spillage/Leakage/Release	54
Grand Total	3465

Source: IATA - GADM/IDX for the 6-month period of 1 January – 30 June 2025



2.2. Dangerous Goods in Aviation

Dangerous Goods are classed into nine (9) main categories (classes) for all modes of transport including aviation. These classes cover over **3500 different substances and articles**, including explosives, lithium batteries (including power banks), flammable liquids and gases, corrosive substances and radioactive materials.

These items are routinely and safely carried around the world as air cargo, in accordance with the dangerous goods provisions prescribed by ICAO Annex 18 Standards, ICAO Technical Instruction (Doc 9284), IATA IOSA Standards and the IATA Dangerous Goods Regulations (IATA DGR).

Notwithstanding scenarios of mis-declaration and ill intent, it is crucial to make a clear distinction between legitimately carried DGs compared with those that have been intentionally and unlawfully mis-declared, undeclared or weaponized. The instigators of such events are likely to endanger the safety of an aircraft, which could be considered as an offence by the more than 90% of the ICAO Contracting States that have for example ratified the ICAO Montreal Convention (1971) and its Supplementary Montreal Protocol (1988).

As cargo screening technologies, software and algorithms evolve, their ability to detect dangerous goods is expected to improve. This may result in increased interception, verification and physical inspection requirements, placing additional demands on resources. Without appropriate planning and resourcing, these demands could significantly affect screening throughput and disrupt air cargo operations.

This comprehensive approach to combined security and safety screening of all DGs would likely reduce safety-related risks by enabling the detection and removal of unauthorized DGs. However, the operational impact may become financially unviable for airports and security services, and ultimately for operators. Therefore, a proper Operational Risk Management process should be conducted to determine appropriate levels of risk tolerance, to define acceptable levels of residual risks associated with the unauthorized DGs that are not detected by current (and potentially future) security detection systems, when screening is mandated.

2.3. E-commerce, Lithium Batteries and Supply-Chain Complexity

The rapid growth of e-commerce has fundamentally changed the nature of the global air cargo and mail supply chain. Millions of individual shipments are now transported daily through highly complex logistics networks that connect manufacturers, online marketplaces, fulfilment centres, postal operators, freight forwarders, integrators, airlines and final consumers. At the same time, the proliferation of lithium battery-powered products across almost every consumer sector has increased the likelihood that dangerous goods will be presented for transport by individuals and businesses with little or no awareness of applicable transport requirements.

Lithium batteries are now found in an extensive range of products including mobile phones, laptops, tablets, power banks, wearable devices, tools, toys, medical equipment and household appliances. In many cases, batteries are no longer viewed by consumers as dangerous goods but simply as components of everyday products. This shift in perception creates a significant safety challenge as dangerous goods may enter the air transport system without being identified, declared or prepared in accordance with regulatory requirements.

Traditionally, many commercial shipments originated from established manufacturers or distributors with dedicated logistics, quality assurance and regulatory compliance functions. Modern e-commerce models are considerably more diverse. Online marketplaces may connect thousands of independent retailers, small businesses and private individuals directly with consumers located anywhere in the world. In many cases, consignors may have little understanding of dangerous goods classification, marking, labelling or declaration requirements. As a result, products containing lithium batteries, aerosols, perfumes, flammable liquids or other regulated articles may be offered for air transport as ordinary consumer goods.



Not all e-commerce supply chains present the same level of risk. Large-scale fulfilment centre models generally provide greater opportunities to implement safety controls. Under this model, inventory is consolidated within dedicated warehouses operated by retailers, marketplace operators or third-party logistics providers. These facilities can implement product screening processes, dangerous goods identification tools, staff training programs, automated commodity databases and quality assurance activities before a shipment enters the transportation network. The concentration of inventory and shipping activities creates opportunities to identify dangerous goods hazards at scale and remove unauthorized dangerous goods from the supply chain before dispatch.

By contrast, marketplace and direct-to-consumer models may involve thousands of independent sellers each shipping relatively small quantities of products from homes, retail stores or small warehouses. In these environments, the seller may not recognise that the product contains dangerous goods, may not understand aviation transport requirements, or may rely on inaccurate product descriptions generated through online sales platforms. The fragmented nature of these supply chains makes education, oversight and enforcement significantly more challenging.

Traditional acceptance controls remain essential, but the scale of modern e-commerce means that effective risk management increasingly depends on upstream interventions. Product information, digital screening tools, shipper education, automated data analytics and collaborative partnerships between manufacturers, online marketplaces, logistics providers and airlines will play an increasingly important role in identifying dangerous goods before they reach the airport environment.

The postal network introduces additional complexity. Postal services are specifically designed to provide low-cost, accessible and convenient transportation options for individuals and small businesses. Postal operators and designated postal operators play an increasingly important role in shipper education, awareness campaigns, acceptance controls and the early identification of dangerous goods risks before mail enters the aviation network.

Further information on Lithium Batteries is available via the [IATA Cargo](#) and [IATA Aviation Security](#) pages.

2.4. The Weaponization of Dangerous Goods

The deliberate weaponization of incendiary substances into unconventional Improvised Incendiary Devices (IIDs) has emerged as a novel modus operandi targeting air cargo and supply chains.

In July 2024, supply chains were targeted using IIDs concealed within consumer electronic devices and hidden inside cargo consignments. Further incidents were reported later in 2024, and again in 2025. These devices were deliberately engineered to disguise their components. The incendiary charge was composed of readily available consumer materials, supplemented by an additional strip of incendiary substance wrapped around the device to function as a secondary charge. The design enabled the devices to ignite easily, propagate fire, and sustain high-intensity burning over an extended period. The apparent objective was to cause damage to aircraft and disrupt the integrity and continuity of air cargo and supply chains.

These events illustrate the intentional weaponization of DGs, specifically consumer products with incendiary properties (classified as DGs), to target air cargo operations and supply chains.

More information on IIDs can be found in IATA's [IID Guidance Material](#), available for free via the IATA website.



3. Safety and Security: Distinct Disciplines, Shared Outcomes

3.1. Safety vs. Security

Aviation safety is concerned with preventing accidents and unintentional harm in air transport. It focuses on managing risks that arise from technical failures, human error, weather, operational procedures, maintenance, air traffic management, and aircraft design. The goal of aviation safety is to ensure that aircraft operations are conducted reliably and that passengers, crew, cargo, and aircraft are protected from accidental incidents.

Aviation security is concerned with protecting passengers, crew, ground personnel and the general public from deliberate attacks against civil aviation operations. This includes sabotage, hijacking, cyberattacks, insider threats, and any intentional and unlawful attacks against passengers, crew, ground personnel, general public, aircraft, airports, aeronautical installations, supply chains infrastructure, or cargo operations.

In simple terms, aviation safety deals mainly with accidental risks, while aviation security deals with intentional and unlawful attempts of attack.

Aspect	Safety	Security
Nature of Harm	Unintentional accidents and incidents	Intentional actions aimed at causing harm
Presumed mindset	Participants will comply with safety requirements where they see and understand the safety rationale and are aware of the risks of being caught and penalties for non-compliance	Threat actors are active in looking for and exploiting systemic weaknesses and vulnerabilities in operational defenses
Typical Risk Sources	Technical faults, human error, weather, procedures, maintenance, Air Traffic Management and aircraft design	Sabotage, hijacking, cyberattacks, insider threats
Primary Focus	Accident prevention and operational reliability	Protection of civil aviation operations and persons against attempted attacks

3.2. Where Safety and Security Overlap

Despite their differences, there are crucial areas of overlap between Safety and security – which combined are essential to maintaining trust, resilience, and continuity in the aviation system. Indeed, the outcome of a safety incident may be the same as, or similar to, the outcome arising from a security incident.

The overlap between safety and security is especially apparent in areas such as risk management, emergency response, training, reporting, and organizational culture. Both safety and security require the identification of



hazards or threats, assessment of likelihood and impact, application of controls, performance monitoring, occurrence reporting, risk assessments, risk identification and learning from incidents. They also depend on coordination between airlines, airports, regulators, law enforcement, ground handlers, and cargo operators.

In practice, a strong aviation organization treats safety and security as complementary disciplines: safety helps ensure the system functions reliably, while security protects it from deliberate disruption and attacks. Together, safety and security support resilience, continuity, public confidence in aviation and more importantly efficient and economically sustainable civil aviation operations.

3.3. The Concept of Safety in the Cargo Supply Chain

Safety must be integrated throughout the cargo supply chain, particularly because the transport of DGs often begins with parties outside the aviation industry who may not fully understand flight safety considerations. While operators manage operational risks, States and all supply chain participants share responsibility for maintaining aviation safety.

A strong safety culture requires organizations to learn from incidents, analyze data to identify trends and gaps, and implement applicable regulations, guidance, and industry initiatives. Each organization should maintain effective compliance and quality-assurance programmes, supported by appropriate oversight.

Mandatory competency-based training and assessment, including function-specific training, are essential for shippers, freight forwarders, ground handlers, pilots, and other personnel involved in handling DGs. Safety should also be reinforced through digital learning and processes, comprehensive operational documentation, effective incident reporting, and proactive collaboration among upstream and downstream supply chain partners.

3.4. Why a Layered Approach Is Required

A layered approach that combines safety and security is essential for air cargo because risks do not occur in isolation. Multiple layers create redundancy and reduce the chance that one missed weakness leads to a serious outcome.

This combined approach is particularly important because air cargo moves quickly, globally, and through many different stakeholders before reaching an aircraft. Freight forwarders, handlers, operators, shippers, regulated agents, known consignors, customs authorities, safety and security authorities and airport operators all play a role, which means vulnerabilities can appear at several points in the supply chain. A **layered model** helps ensure that risks are identified early, managed consistently, and reassessed as cargo moves from origin to destination. Unlawful dangerous goods ought to be removed from the cargo supply chain at the earliest upstream opportunity.

The shared responsibility between safety and security should be **the protection of civil aviation** - integrating safety and security strengthens the entire air cargo ecosystem and helps prevent disruption, harm, and loss.

4. Role of States and Regulators

4.1. States: Establishing Leadership and Strategic Direction

States play a crucial role in developing, revising and adopting the international aviation safety and security framework governing the carriage of DGs and security across all modes of transport.



States therefore have a critical role in strengthening safety across the entire cargo supply chain. One of the biggest hazards in transporting cargo is undeclared DGs, making a consistent, harmonized regulatory framework essential. This framework should be supported by clear guidance material, training, and an oversight entity.

This entity does not have to be the same one that oversees aviation organizations, or regulates the security structure, or the department that manages multi-modal transport integration. Indeed, prior to allocating the task to an existing agency, the State needs to understand the supply chain ecosystem and the interrelationships that are at work between the different departments and regulatory authorities.

4.2. Oversight of the Wider Cargo Supply Chain

Developing an understanding of the dangerous goods supply chain is fundamental to establishing an effective safety framework. States should identify how dangerous goods enter, move through and exit the national cargo and mail system, including the entities involved and the relationships, dependencies and transfer points between them. As hazards may be introduced through product design, manufacturing, packaging, fulfilment, sales or distribution, this system-level understanding enables States to identify where risks arise, assess existing controls, assign responsibilities and target preventative and oversight measures closer to the point at which risk is introduced.

Whatever model of State oversight is established, a proactive and transparent approach must be adopted, including education and outreach programs, with graduated enforcement for addressing violations. Penalties for non-compliance need to be proportionate and consistently applied to all parties within all modes of transport.

States should also prioritize resources based on assessed risk and consideration of an organization's awareness of its upstream customers, third-party audits, high-risk DG, and the varying levels of organizational and personnel maturity. The focus must be on those who take a minimalist approach to safety.

The transportation of DGs by remotely piloted or autonomous aircraft is an emerging challenge. Current packaging standards were developed in an era of manned aviation, but new airspace entrants will have fewer onboard systems, resulting in environmental extremes that exceed existing standards. Other factors include consideration of fire detection and containment, emergency response systems, and the limited DG information that can be made available to first responders in the event of an unmanned aircraft accident.

4.3. Coordination Between Competent Authorities

States will already have a range of regulatory authorities and operational and institutional controls that contribute to dangerous goods safety. These arrangements may serve broader objectives beyond aviation safety and may be administered through different government authorities, industry bodies or regulatory frameworks.

States should map these existing controls to understand where they operate, how effective they are and how they collectively address undeclared or mis-declared dangerous goods and other associated risks. This will support a more coordinated and efficient approach to risk assessment, oversight planning and continuous improvement, while identifying opportunities to strengthen cooperation, information sharing and the use of existing regulatory mechanisms rather than introducing duplicative requirements.

Regardless of the regulatory oversight model adopted, the designated authority should be integrated into the State's aviation safety oversight programme and maintain effective coordination with other relevant regulators. This requires a comprehensive understanding of the aviation cargo and mail supply chain and a structured approach to outreach and oversight that ensures activities are complementary and avoids duplication.



4.4. Establishing a Safety-Focused Regime

Laws and regulations are typically developed in response to identified problems and are often framed in a narrow, prescriptive manner. As a result, inspections and audits tend to focus primarily on compliance with specific requirements, rather than on the broader effectiveness of the system.

Regulators may also be constrained by the limits of their legal mandate, staffing levels, budget, and the activities expressly authorised under national legislation. These constraints often reinforce an approach centred on compliance inspections and enforcement. However, regulators that adopt a more open and collaborative mindset, seeking to understand systemic weaknesses, identify practical operational challenges, and support industry participants in achieving safety improvements, are more likely to build trust and be welcomed as constructive partners in strengthening the overall safety and security environment.

5. Cargo Security Architecture and Its Limitations

5.1. Air Cargo Security: The Need for Flexibility

Air cargo and mail encompass a highly diverse range of commodities, including small parcels, consolidated consignments, oversized or dense cargo, perishables, dangerous goods, high-value items, live animals and pharmaceuticals. Some consignments, such as radiopharmaceuticals and vehicles, may fall within several categories. This diversity is reflected in the wide variety of air cargo operating models and supply chains.

Certain types of special cargo cannot be effectively screened using conventional methods because of their size, nature, sensitivity or packaging. Requiring 100 per cent physical screening may therefore be impractical, ineffective or operationally disruptive. The air cargo security framework must retain sufficient flexibility to achieve the required security outcomes while supporting the safe, secure, compliant and efficient movement of specialized shipments.

Unlike passenger and hold baggage screening, which generally follows more prescriptive procedures, cargo screening personnel are generally empowered to select the most appropriate screening method for the consignment. This flexibility enables security measures to be applied proportionately through risk-based decision-making, regulated supply chain arrangements, alternative screening methods and targeted controls focused on areas of greatest threat.

While existing aviation security frameworks may offer useful synergies, additional supply chain safety oversight responsibilities should not automatically be assigned to authorities or personnel primarily responsible for security. Without careful consideration, the use of existing security screening technologies and processes could divert attention from core security objectives and create operational and financial consequences, including increased false alarms, reduced throughput, interception and verification requirements.

Appropriate operational risk management should therefore determine the appropriate level of risk tolerance, the circumstances in which screening should be required and practicable, and the acceptable residual risk associated with unauthorized dangerous goods that cannot be detected by current or future security systems. This balanced approach helps maintain robust aviation security while facilitating the efficient movement of cargo and supporting global commerce.

5.2. Securing Cargo: Flexible Solutions

At the international level, the need for flexibility is reflected in the cargo security related Standards and Recommended Practices (SARPs) prescribed by Annex 17 – *Aviation Security*. While systematic screening is required for staff (Standards 4.2.5 and 4.2.6), for passengers and cabin baggage (Standards 4.4.1 and 4.4.2) and for



hold baggage (Standards 4.5.1 and 4.5.2) the measures relating to cargo, mail and other goods in Annex 17 are less prescriptive. Personnel engaged in the screening of cargo are afforded a necessary degree of flexibility to determine the most suitable method to be applied to cargo.

- **4.6.1** *'Each Contracting State shall ensure that appropriate security controls, including screening where practicable, are applied to cargo and mail, prior to their being loaded onto an aircraft engaged in commercial air transport operations'.*
- **4.6.10** *'Each Contracting State shall ensure that, where screening of cargo and mail is conducted, screening is carried out using an appropriate method or methods, taking into account the nature of the consignment'.*

5.3. Potential Limitations of Screening

Screening is indeed one of the last barriers in the cargo supply chain to detect and intercept weapons, explosives or other dangerous devices, articles or substances. Effective X-ray screening may offer an opportunity to obtain valuable information about consignment contents that may not otherwise be available or apparent through other means. However, the potential limitations of screening must be understood and carefully evaluated.

The potential limitations are further explained in Appendix E:

5.4. Flexibility in Practice

A range of measures, processes and resources are already available to assist with the detection of unauthorized DGs beyond the application of security screening alone, which are detailed in this paper. When determining the most effective approach to DGs detection, the full suite of available measures should be considered.

While security screening may help detect unauthorized dangerous goods, it should not be regarded as a standalone or primary solution. This is particularly important when considering the limitations of existing screening equipment, including calibration, detection algorithms, screener training and the size, type, sensitivity, weight and volume of air cargo which may preclude screening. A flexible, risk-based approach is therefore essential for ensuring DGs detection is practical, proportionate, viable and effective.

Mitigation measures should be assessed in context with the specific operation, risk profile and types of cargo being carried, combined with the availability and capability of human resources, equipment, technology, and physical security arrangements.

6. Shared Responsibility Across the Cargo Supply Chain

A supply chain approach recognises that dangerous goods safety is strengthened when controls are applied at multiple points throughout the movement of cargo and mail. Manufacturers, retailers, distributors, freight forwarders, postal operators, security agencies, customs authorities, ground handling service providers and operators may all influence whether dangerous goods are correctly identified, classified, prepared and transported. Effective oversight therefore requires coordination between authorities and stakeholders responsible for different parts of the supply chain.

An overview of stakeholder responsibilities is further detailed in Appendix F.

7. Detection of Unauthorized DGs

Appendix A provides an overview of potential measures to prevent the movement of unauthorized DGs. Depending on the entity, many of these measures are already defined or prescribed by existing international SARPs, guidance material, IATA Resolutions and IATA Manuals including ICAO Annex 18 – *The Safe Transport of Dangerous Goods*



by Air, ICAO Annex 17 – *Aviation Security*, ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air (Doc. 9284), IATA Dangerous Goods Regulations (DGR), IATA Operational Safety Audit Standards Manual (ISM), IATA Security Management Systems (SeMS) Manual as well as national legislation.

Operators are responsible for verifying whether implementation of the measure/s is required for their operation under existing national framework to ensure full compliance with all applicable standards and policies.

Implementation should be considered alongside a thorough assessment of the carrier's specific risks, vulnerabilities and environment, inherent to their operation.

The measures are detailed in Appendix A.

8. Conclusion

Unauthorized dangerous goods, whether undeclared, mis-declared or deliberately weaponized, present an evolving risk to the safety, security and resilience of global air cargo and mail. The growth of e-commerce, the widespread use of lithium batteries and increasingly complex supply chains have reinforced the need for coordinated action across the entire cargo ecosystem.

Aviation safety and aviation security are distinct but complementary disciplines. Existing security controls, including cargo screening, may provide an additional opportunity to identify anomalies and intercept certain unauthorized dangerous goods. However, screening technologies, certification standards, algorithms and training programmes may present some limitations in DGs detection, which must be clearly understood. Screening should therefore not be regarded as the sole or primary solution for dangerous goods detection.

A more effective and sustainable response requires a layered, risk-based and supply-chain-wide approach that:

- prevents and identifies unauthorized dangerous goods at the earliest practicable point;
- strengthens shipper awareness, competency, product information and acceptance controls;
- uses shipment data, customer knowledge, commodity profiling and intelligence to target higher-risk activities;
- improves reporting, information sharing and coordination between safety, security, customs, postal and other competent authorities;
- establishes clear responsibilities and proportionate oversight across all supply-chain participants;
- prepares organizations to verify, manage and safely resolve suspected dangerous goods discoveries; and
- maintains appropriate fire-mitigation, emergency-response and quality-assurance measures.

States should provide strategic direction, harmonized requirements, coordinated oversight and proportionate enforcement. Manufacturers, marketplaces, retailers, shippers, postal operators, freight forwarders, ground handlers, airports, screening providers and aircraft operators must apply controls appropriate to their responsibilities and risk exposure.

Ultimately, no single stakeholder, authority, process or technology can address this challenge in isolation. Progress will depend on collective accountability, effective cooperation and the integration of safety, security, regulatory oversight, data intelligence, operational controls and supply-chain assurance. By applying these measures as mutually reinforcing layers, the aviation community can reduce the risk from unauthorized dangerous goods while maintaining the safe, secure, efficient and economically sustainable movement of air cargo and mail.



9. Additional Resources

A range of additional resources, guidance and training material is summarized in **Appendix B**.

10. Disclaimer

The document is designed to be a summary guide only, supported by relevant contextual material. The measures outlined in this document are not exhaustive. Air carriers and supply chain entities are responsible for ensuring they comply with all relevant national and international aviation safety and security requirements.

11. Acronyms

ACAS	Air Cargo Advance Screening
AOSP	Aircraft Operator Security Program
AVSEC	Aviation Security
AWB	Air Waybill
CAA	Civil Aviation Authority
CCTV	Closed-Circuit Television
COMAT	Company Material
DG	Dangerous Goods
DGR	Dangerous Goods Regulation
EDD	Explosives Detection Dog
EDS	Explosives Detection System
ESP	External Service Provider
ETD	Explosive Trace Detection
ETOE	Extraterritorial Office of Exchange
FCC	Fire-Containment Cover
FMCG	Fast-Moving Consumer Goods
FRC	Fire-Resistant Container
GADM	Global Aviation Data Management
GHS	Globally Harmonized System of Classification and Labelling of Chemicals
GHSP	Ground Handling Service Provider
IASR	IATA Annual Security Report
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
ICHM	IATA Cargo Handling Manual
ICS2	Import Control System 2
IDX	Incident Data Exchange
IED	Improvised Explosive Device
IID	Improvised Incendiary Device
IOSA	IATA Operational Safety Audit
ISAGO	IATA Safety Audit for Ground Operations
ISARPs	IOSA Standards and Recommended Practices
ISM	IOSA Standards Manual
MSDS	Material Safety Data Sheet



NCASP	National Civil Aviation Security Program
OEM	Original Equipment Manufacturer
PHS	Physical Inspection (screening method)
QA	Quality Assurance
QC	Quality Control
SARPs	Standards and Recommended Practices
SDS	Safety Data Sheet
SeMS	Security Management System
SMS	Safety Management System
SOP	Standard Operating Procedure
SSP (safety)	State Safety Programme
SSPs (security)	Supplementary Station Procedures
TI	Technical Instructions
ULD	Unit Load Device
UN	United Nations
UPU	Universal Postal Union
WCO	World Customs Organization

12. Glossary of Terms

Act of Unlawful Interference

Acts or attempted acts such as to jeopardize the safety of civil aviation, including but not limited to those acts defined by ICAO Annex 17 or Member States

Air Waybill

Document made out by or on behalf of the shipper which evidences the contract between the shipper and carrier(s) for carriage of goods over routes of the carrier(s)

Appropriate Authority (for aviation security)

The authority designated by a State within its administration to be responsible for the development, implementation and maintenance of the National Civil Aviation Security Programme.

Aviation Security

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

Baggage

The personal property of passengers or crew carried on an aircraft by agreement with the operator.

Cargo

Any revenue or non-revenue shipment of goods or property other than mail, stores and accompanied or mishandled baggage that is transported on an aircraft and is not consumed or used during flight.

Revenue cargo—Cargo that is transported on an aircraft for commercial purposes; generates revenue for the operator.

Non-revenue cargo—Cargo that is transported on an aircraft for non-commercial purposes; does not generate revenue for the operator.

Note: *COMAT (Company Material) is non-revenue cargo.*



Note: In IOSA/ISAGO standards, non-revenue cargo and revenue cargo are identically addressed, for the purposes of handling, loading, securing and transporting.

Note: In the IOSA/ISAGO standards 'mail' is considered to be an item of 'cargo': therefore, any reference to cargo also includes mail.

Cargo Aircraft

An aircraft, other than a passenger aircraft, that is carrying cargo.

Cargo Facility

Any facility where cargo acceptance and/or cargo handling operations are conducted.

Consignee

The person whose name appears on the Air Waybill or in the shipment record as the party to whom the goods are to be delivered by the carrier

Consignment

(Which is equivalent to the term "Shipment"). One or more pieces of goods accepted by the carrier from one shipper at one time and at one address, receipted for in one lot and moving on one Air Waybill or shipment record to one consignee at one destination address

Consignor

The entity or individual who initiates the movement or transport of the goods.

Dangerous Goods

Articles or substances which are capable of posing a risk to health, safety, property or the environment

Designated Operator

National postal operators tasked by their government to fulfil the government's obligations under the UPU treaties

External Service Provider

An external organization engaged by the operator to perform certain operational functions contracted by the operator

Freight Forwarder

A supply chain entity that receives, coordinates and organizes the movement of shipments for carriage by air on behalf of other companies

Goods

See 'Cargo'

High-risk Cargo or Mail

Cargo or mail that is deemed to pose a threat to civil aviation as a result of specific intelligence; or shows anomalies or signs of tampering which give rise to suspicion.

Individual

A private person tendering goods for shipment who is not pursuing commercial aims on behalf of a company

Known Cargo

A shipment of cargo accepted by a regulated agent, a known consignor or operator directly from a regulated agent, operator or known consignor, to which appropriate security controls (that may include screening) have already been applied, and which is thereafter protected from unlawful interference, **or**

A shipment of unknown cargo that has been subjected to appropriate security controls, made "known", and which is thereafter protected from unlawful interference.

Known Consignor

An originator of shipments for transportation by air who has established business with a regulated agent or an Operator on the basis of having demonstrated satisfaction of specific requirements for safe transportation of



cargo.

Mail

Dispatches of correspondence and other items tendered by and intended for delivery to postal services in accordance with the rules of the Universal Postal Union (UPU).

Operational Function

A job, duty or task that is performed by personnel of an operator/provider as part of, or in direct support of the operator's aircraft operations.

Passenger Aircraft

An aircraft that carries passengers.

Screening

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

Note: Certain dangerous articles or substances are classified as dangerous goods by Annex 18 and the associated Technical Instructions for the Safe Transport of Dangerous Goods by Air (Doc 9284) and must be transported in accordance with those instructions. In addition, the Aviation Security Manual (Doc 8973 — Restricted) provides a list of prohibited items that must never be carried in the cabin of an aircraft.

Secure Cargo

The cargo that has been screened using appropriate methods of screening by a regulated agent, or if it originates from a known consignor approved by the appropriate authorities, and that remains in the custody of the secure supply chain protected from unlawful interference until it is loaded on board the aircraft and thereafter at transfer and transit points.

Secure Supply Chain

The interconnected security procedures that are applied to cargo consignments to maintain the integrity of such a consignment from the point where screening or other security controls are applied until it arrives at its last airport of arrival, including through transit and/or transfer points.

Security Management System (SeMS)

The documented system of an operator and/or a provider that delivers ground handling services for an operator, which is based on threat assessment to ensure security operations:

- Consistently fulfill all requirements mandated in the applicable national civil aviation security program(s);
- Are conducted in the most efficient and cost-effective manner considering the operational environment.

Shipment

One or more packages of cargo accepted by an operator from one shipper at one time and at one address, received in one lot for transport to one receiving entity at one destination address.

Shipper

The entity or individual who initiates the trade in goods.

Unauthorized Interference

Interference that occurs when:

- Any item for transport on an aircraft (e.g. baggage, cargo, mail, stores, catering equipment) that has been accepted for transport by an operator and subjected to security controls subsequently is in contact with a person who has not been screened and/or does not have authorized access to security restricted/sterile areas where such items are stored and handled.
- There is unauthorized access to passengers, the aircraft and/or property of the operator that are in security restricted/sterile areas by a person who has not been screened and/or does not have authorized access to such restricted/sterile areas.

**Unknown Cargo**

A shipment of cargo that has not been subjected to the appropriate security controls, that may include screening, or subjected to unlawful interference while in the custody of the secure supply chain.

Unsecure Cargo

Any consignment that has not been secured in accordance to the "Secure Cargo" requirements, meaning not appropriately screened by a regulated agent, nor subjected to appropriate security controls by a known consignor approved by the appropriate authorities, nor protected from unlawful interference throughout the security supply chain from the point where screening or other security controls are applied until it arrives at its last point of arrival, including through transit and transfer points.





Appendix A

Measures to Prevent Carriage of Un-authorized DGs

1. Documentation & Data Analysis

- a. **Shipper history and risk profiling:** Data analysis and integration to ensure appropriate vetting of new shippers, identification of poor compliance history and potentially higher risk commodities
- b. **Automated keyword screening:** Applied to Air Waybills and commercial invoices to identify potentially higher risk commodities (e.g. "battery", "engine", "chemical", "sample")
- c. **Commodity vs. route plausibility checks:** Cargo type inconsistent with origin/destination or shipper profile
- d. **SDS/MSDS:** Cross-check of the Safety Data Sheet (SDS) or Material Safety Data Sheet (MSDS) against declared contents
- e. **Weight verification:** Comparison of declared weight vs. actual weights vs. typical or expected commodity weight

2. Acceptance & Handling

- a. **Detection and removal through safety screening** in conjunction with or supplemental to security screening processes (without detriment to their primary function of preventing acts of unlawful interference) including via existing visual x-ray screen techniques and by automated x-ray detection capabilities.
- b. **Enhanced cargo acceptance checklists:** Developed for higher-risk commodities (e.g. electronics, machinery, personal effects, e-commerce)
- c. **Physical package integrity checks:** For evidence of tampering, leaks, stains, corrosion, strong odors, bulging.
- d. **Query general cargo if certain GHS labels are present**

Products bearing the following GHS labels ARE classified as dangerous goods:



Note: A product bearing the GHS corrosive label (depicted far right above) is NOT classified as dangerous goods if the signal word 'Danger' and hazard statement 'causes serious eye damage' applies.

Products bearing the following GHS labels (and none of the above) are NOT classified as dangerous goods:





- e. **DG Acceptance Checks:** Verification of proper DG marks, labels and UN packaging
- f. **Randomized inspections:** Deployment of enhanced randomized inspections to avoid predictability
- g. **Refusal/escalation:** Defined procedures for incomplete or inconsistent documentation including retention of rejected acceptance checklists and/or voluntary reporting to national authority.

3. Onboard Fire Mitigation

- a. **Fire Resistant Containers:** Where feasible, the use of Fire-Resistant Containers (FRC),
- b. **Fire Containment Covers:** Where feasible, the use of Fire-Containment Covers (FCC) to wrap pallets and Unit Load Devices (ULD)
- c. **Fire Containment Bags:** : Where feasible, the use of fire containment bags and other similar devices and material

4. Staff Training & Awareness

- a. **Initial and recurrent DG training commensurate with the functions for which personnel are responsible must be delivered to:**
 - a. Shippers of DG
 - b. Personnel that perform functions aimed at ensuring DG are transported in accordance with the requirements, for example those making air cargo reservations or handling cargo
 - c. Acceptance Staff
 - d. Warehouse and ramp personnel
- b. **Reporting Culture:** Promotion of an embedded culture that includes non-punitive reporting procedures, where feasible, and encourages the reporting of any inadvertent safety or security related human error, incidents or accidents
- c. **Communication:** Timely and documented information flow to frontline personnel regarding past safety/security incidents, internal alerts, posters and advisories and lessons learned from past DG or security findings

5. Screener Training

- a. **Recurrent DG awareness training:** Delivered to aviation security screeners
- b. **DGs recognition:** Training delivered to aviation security screeners on the identification and recognition of DGs.

6. Shipper & Forwarder Engagement

- a. **Intellectual Property Crime:** Targeted outreach with high-risk sectors (e.g. e-commerce) to ensure goods containing lithium batteries are UN 38.3 Test Summary compliant, to prevent carriage of counterfeit and substandard lithium batteries



- b. **Escalation:** Clear penalties and corrective actions for mis-declaration, including potential termination of customer accounts and contracts for continued, systemic or deliberate non-compliance
- c. **Awareness:** DG declaration reminders and guidance provided at booking stage

7. Intelligence, Reporting & Oversight

- a. **Internal Reporting:** Promotion of an embedded culture that includes non-punitive reporting procedures, where feasible, and encourages the reporting of any inadvertent safety or security-related human error, incidents, accidents and undeclared DGs discoveries
- b. **Reporting to Authorities:** Relevant safety and security incidents are reported to national authorities in a timely manner
- c. **Report analysis and Review:** An embedded and robust safety and security reporting mechanism to ensure review and analysis of reports to identify root cause, trends, determine corrective actions and monitor effectiveness
- d. **Information sharing:** Where appropriate and to the extent possible, information pertaining to safety and security incidents is shared with national authorities, other airlines, airports, ESPs, and trade associations, which may include use of the [IATA Global Aviation Data Management \(GADM\)](#) platform.

8. Quality Management

- a. **Quality Assurance:** Implementation of an internal monitoring and evaluation process focused on ensuring quality DGs and security standards are met, including those outsourced to ESPs.
- b. **Quality Control:** Implementation of a process to detect non-compliances in DGs and security-related executed processes, including those outsourced to ESPs. This should include, where relevant, proactive inspections following DGs and security incidents and alerts.
- c. **ICAO TI and IATA DGR:** Proactive compliance monitoring against the ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air and the IATA Dangerous Goods Regulations.
- d. **Enforcement:** Implementation of punitive measures to address deliberate or systemic non-compliance or negligence regarding the carriage of DGs, including referral of fines onto the ESP, where relevant, in accordance with the Conditions of Carriage for Cargo.



Appendix B

Challenges with Unauthorised Dangerous Goods Detection:

Undeclared and Hidden Dangerous Goods

A significant proportion of DG accidents and incidents result from **mis-declared or undeclared consignments** containing DGs, often arising from:

- Lack of shipper awareness or intentional non-compliance
- Documentation supporting correct classification being inaccurate or unavailable
- Recommended practices aimed at cargo acceptance staff being alert to the presence of hidden DG afford limited ability to conduct effective safety screening
- Limited data transparency and weak risk-targeting capabilities

Fragmented Oversight Across Cargo Supply Chain Actors

The air cargo ecosystem includes multiple non-airline participants including:

- Shippers / Packers
- Freight forwarders
- Designated Postal Operators
- Ground Handling Agents
- Cargo Terminal Operators
- Security Screening Providers
- Security Providers
- Regulated Agents and Known Consignors

These entities perform critical functions across the air cargo supply chain, including cargo packaging, acceptance, consolidation, handling, safety and security screening/application of security controls, and processing. However, legislative framework and regulatory oversight often focus primarily on the air carrier, rather than broader range of supply chain participants. Consequently, this may expose other key entities within the supply chain to:

- Inconsistent, limited or no regulatory oversight
- Varying levels of competency, capability, and DGs/security awareness
- Divergent standards and practices across jurisdictions
- Unenforceable undertakings

Regulators themselves face constraints, including:

- Limited authority beyond national jurisdictions (and sometimes limited to “on-airport” only)
- Resource and capability gaps, especially given the sheer number of entities across the air cargo system
- Lack of harmonized frameworks and coordinated enforcement mechanisms

This may result in a **fragmented oversight model**, where accountability is diffuse and systemic risk is not effectively managed at a global scale.



Appendix C

International Framework

Chicago Convention Annex 17 – Aviation Security

First adopted in 1974, and now at its 18th Amendment, Annex 17 sets the Standards and Recommended Practices (SARPs) for the prevention of acts of unlawful interference against civil aviation, including cargo and mail security:

- **Appropriate security controls, including screening where practicable:** The application of screening, where practicable, and other security controls on cargo and mail.
- **Secure supply chain:** States must establish supply chain security, including approval of regulated agents and/or known consignors where they implement screening or other cargo/mail controls.
- **Protection of Secured Cargo and mail:** Once secured, cargo and mail must be protected from unauthorized interference from the point of screening or other security controls are applied until aircraft departure.
- **High-Risk Cargo and Mail:** Enhanced security measures must be applied to high-risk cargo or mail¹ to mitigate associated threats associated with it.

Chicago Convention Annex 18 – The Safe Transport of Dangerous Goods by Air

First adopted in 1983, and now at its 12th Amendment, Annex 18 sets the Standards and Recommended Practices for the safe transport of DGs by air, applicable to international civil aircraft operations.

- **Technical Instructions (Tis) are central:** States must comply with ICAO Doc 9284 Technical Instructions, that are designed to amplify the basic provision of Annex 18 and are binding on States. The TIs provide detailed, binding requirements for classification, packing, marking, labelling, documentation and handling, which are based on the multi-modal framework of the United Nations Model Regulations on the Transport of DGs with consistency and relevancy across all modes of transport.
- **Clear responsibilities:** Shippers must ensure DGs are permitted, correctly classified, packed, marked, labelled and documented; operators must perform an acceptance check, conduct inspections for damage/leakage, loading, stowage, segregation, securing, and the provision of emergency response information to personnel. Postal operators must establish controls over the introduction of dangerous goods into air mail. The whole supply chain must apply security measures to prevent theft or misuse of DG.
- **Safety oversight & prevention:** States must establish national operating regulations and sufficient competent personnel enabling the grant of specified approvals; conduct of oversight, inspection and enforcement processes; and investigation of accidents and incidents.

Chicago Convention Annex 19 – Safety Management

First adopted in 2013, now at its 2nd Amendment, Annex 19 unifies safety requirements into a single framework, defining the obligations of States to implement State Safety Programmes (SSP) and aviation organizations to maintain Safety Management Systems (SMS). Aviation security is mentioned in Annex 19 under the Management of safety risks for States and the Safety risk assessment and mitigation provisions for service providers (as defined under chapter 3.3.2 in Annex 19).

¹ ICAO Annex 17 Definition for High-risk cargo or mail. Cargo or mail which is deemed to pose a threat to civil aviation as a result of specific intelligence; or shows anomalies or signs of tampering which give rise to suspicion.



IATA Dangerous Goods Regulations

First compiled in 1953 as the Restricted Articles Regulations, the current IATA Dangerous Goods Regulations (DGR) is used as global, industry-standard guidelines for transporting dangerous goods by air. Recognized by all major airlines and widely used by other parties in the cargo supply chain, they are used as an effective and practical guide in how DGs are classified, packed, marked, labelled, and documented and offered for transport to ensure compliance with global safety standards.



Appendix D

Cargo Screening Methods – Potential Limitations

X-ray screening

- Owing to the significant variance in air cargo including size, shape, weight and density, a significant percentage of global air cargo is not screened via x-ray
- In accordance with the provisions of ICAO Annex 17, States shall establish regimes or a supply chain security process, that rely on approved regulated agents and/or know consignors, with such entities involved in implementing screening or other security controls to secure air cargo
- Existing cargo x-ray screening equipment, technology and supporting software and algorithms were not initially designed or calibrated and thus not certified to detect DGs
- A list of the highest priority and highest risk DGs has not yet been developed by DG subject-matter experts making it harder to target potentially higher-risk substances.
- The level and depth of training on DGs recognition and detection provided to personnel operating the equipment varies between States.

Physical Examination (open-box screening)

- Time consuming and resource intensive
- May endanger screener safety and security
- Not permitted without authorization from the shipper in many jurisdictions
- Requires dangerous goods packaging to be restored by trained personnel
- For airmail, the air carrier is generally not permitted to open a receptacle

Explosive Trace and Explosive Dog Detection

- Dangerous Goods may not have a detectable scent and the very large array of DGs substances and their signature scents may present a challenge

Training and Certification

- Due to the functional separation of safety and security processes, and depending on the jurisdiction, personnel operating or utilizing the above equipment and screening methods may not be trained or certified to detect DGs.

Human Factors

- The primary role of an aviation security screener is to detect threat items or substances that may be used to commit an act of unlawful interference. Expanding AVSEC screener roles and responsibilities into the DGs domain may dilute and divert attention away for their primary task which is security.



Appendix E

The Shared Responsibility – Stakeholder Responsibilities

A supply chain approach strengthens dangerous goods safety by applying controls throughout the movement of cargo and mail. Effective oversight requires coordination among all authorities and stakeholders involved. The desired role for responsibilities of the key stakeholders are outlined below.

Manufacturers and Product Originators

The supply chain starts with manufacturers and given that dangerous goods classification is applicable to all modes of transport, the very first movement of that product from factory to warehouse, is the first movement in the supply chain.

Manufacturers and product originators represent the earliest opportunity to prevent dangerous goods non-compliances from entering the supply chain. Decisions made during product design, testing, packaging, labelling, and distribution directly influence whether downstream logistics providers can correctly identify and transport the product.

For example, a manufacturer of lithium battery-powered consumer electronics should ensure UN 38.3 test summaries are readily available to distributors, freight forwarders, and shippers. Similarly, chemical manufacturers should provide accurate and current Safety Data Sheets (SDS) that clearly identify transport classifications, packing groups, and subsidiary risks. Failure to provide this information often results in misclassification, mis-declaration, or delays during transport acceptance.

Whether a manufacturer is involved in the production of articles, chemicals or products, they have a critical role to play in the cargo supply chain, especially in maintaining appropriate product standards and certification. Assessing the appropriate classification and providing readily available information to other parties in the supply chain, in the form of safety data sheets, technical documents, and classification test reports is essential.

Packaging testing laboratories and packaging suppliers

Packaging testing laboratories and packaging suppliers perform a critical assurance function by validating that packaging designs meet applicable performance standards and are capable of safely containing dangerous goods during transport.

A recurring challenge within the supply chain is the availability of counterfeit or non-compliant packaging that display fraudulent UN specification markings. For example, a shipper may unknowingly procure packaging from an online marketplace that bears UN markings but has never undergone certification testing. The packaging may fail during routine handling, resulting in leakage, contamination, or fire risk.

To strengthen supply chain integrity, packaging suppliers should maintain auditable production controls, provide clear closure instructions, and enable customers to verify the authenticity of packaging certification. Consideration should also be given to digital verification mechanisms, such as serialisation, QR codes, or electronic certification records, enabling regulators and supply chain participants to validate packaging compliance quickly.

The multi-modal usage of dangerous goods packaging materials lends this task to be primarily allocated to an agency other than the CAA.



Shippers

Shippers are often the party with the greatest knowledge of the commodity being offered for transport and therefore represent one of the most important defences against unauthorized dangerous goods entering the supply chain.

The complexity of modern supply chains means that many shippers transport products that may only contain ancillary dangerous goods. Examples include pharmaceuticals packed with dry ice, temperature-monitoring devices containing lithium batteries, automotive spare parts containing airbags, or veterinary shipments requiring refrigerated packaging systems. While these dangerous goods may not be the primary product being transported, their presence must still be properly identified and declared in order for other supply chain participants to be aware of the hazards that they are handling.

Retail and e-commerce shippers should implement product review processes that identify dangerous goods before products are listed for sale. This is particularly important for power banks, replacement batteries, electronic devices, aerosols, cosmetics, paints, and cleaning products, which frequently appear in undeclared dangerous goods discoveries.

Shippers are at the start of the transportation chain and have a critical role to play in supply chain safety. They must ensure regulatory compliance, maintain staff competency, and verify proper classification.

Postal Operators and Airmail

Postal operators play an essential role in the global cargo and logistics ecosystem, providing individuals, small businesses and e-commerce merchants with an accessible and cost-effective means of moving goods domestically and internationally. Unlike traditional cargo supply chains, which generally rely on established commercial relationships and contractual arrangements, postal networks accept small volumes from a diverse customer base, including private individuals and occasional consignors. While this accessibility delivers significant social and economic benefits, it also presents distinct challenges in managing dangerous goods risks.

A substantial proportion of e-commerce shipments, particularly low-value consumer goods and direct-to-consumer sales, moves through postal channels. The widespread use of lithium battery-powered products, combined with limited awareness of dangerous goods requirements, increases the risk of undeclared or unauthorized items entering the mail stream. Common examples include power banks, spare lithium batteries, electronic devices, vaping products, aerosols and perfumes. In many cases, consignors do not deliberately circumvent the requirements but are simply unaware that the items are regulated.

Postal operators therefore provide an important upstream defence against the introduction of unauthorized dangerous goods into aviation. Effective measures may include customer awareness campaigns, robust acceptance procedures, staff training, mail profiling, digital declaration tools, parcel inspection and targeted controls for higher-risk commodities. As e-commerce volumes continue to grow, investment in education and early identification mechanisms will become increasingly important.

The international postal system operates under a framework that is distinct from, but complementary to, the aviation system. The Universal Postal Union (UPU), a specialized agency of the United Nations, establishes international postal standards and facilitates the exchange of mail between countries. However, once mail is transported by air, it must also comply with the applicable international aviation safety and security requirements.

Dangerous goods in airmail are therefore subject to both postal and aviation requirements. ICAO Annex 18 and the ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air establish the conditions under which dangerous goods may be transported, including specific provisions for equipment containing lithium batteries in the mail. ICAO Annex 17 also establishes aviation security requirements for mail before it is loaded onto an aircraft. Postal operators must consequently ensure that mail entering the air transport system complies with relevant UPU and ICAO requirements.



Effective risk management requires close cooperation among civil aviation authorities, postal regulators, customs administrations, postal inspection authorities, postal operators and airlines. Because dangerous goods risks may arise before an item reaches an airport or designated postal operator, coordinated oversight, information sharing and joint outreach can help identify emerging trends and improve compliance. This cooperation is particularly important for cross-border e-commerce, online marketplaces and direct-to-consumer fulfilment models.

The international mail system also increasingly includes **Extraterritorial Offices of Exchange (ETOE)**s, which are facilities established by a postal operator outside its home country to collect, process and dispatch international mail and e-commerce shipments. ETOEs may operate similarly to fulfilment centres, consolidation hubs or commercial logistics facilities, handling large volumes of parcels from multiple retailers and online merchants. This model can increase exposure to undeclared dangerous goods, particularly lithium battery-powered devices and other commonly traded consumer products.

ETOE should therefore be subject to the same dangerous goods awareness, acceptance controls, screening, staff training and quality assurance measures as other entities introducing mail into the air transport system. Effective cooperation and oversight among postal authorities, designated postal operators, civil aviation authorities, airlines and host States are essential to ensure consistent application of dangerous goods requirements throughout the international postal network

Airmail and Dangerous Goods

While international mail is exchanged under the framework established by the Universal Postal Union (UPU), any item transported aboard an aircraft remains subject to the applicable provisions of ICAO Annex 17, ICAO Annex 18 and the ICAO Technical

Postal inspection authorities and designated postal operators are uniquely positioned to identify recurring patterns of non-compliance within mail streams. Analysis of mail seizure data, undeclared dangerous goods discoveries and emerging commodity trends can provide valuable intelligence to both aviation and postal regulators. Integrating this information into safety and security reporting processes can support a more proactive, intelligence-driven approach to managing dangerous goods risks.

As postal and e-commerce volumes continue to expand, postal operators, designated operators, postal inspection authorities and aviation stakeholders must work collaboratively to ensure that dangerous goods awareness, detection and prevention measures evolve alongside emerging business models and consumer purchasing behaviours.

Freight Forwarders

Freight forwarders occupy a unique position between shippers and aircraft operators and may have greater visibility of a customer's shipping behaviour, product portfolio and compliance history than other supply chain participants. This enables them to identify potential risks before cargo reaches the airport.



A fundamental element of supply chain safety is **knowing the customer**. Forwarders should understand each customer's business activities, commodities and regulatory compliance history, including whether their product range contains dangerous goods. Regular customers should be reviewed periodically to identify changes in products, suppliers, business activities or fulfilment methods that may introduce new risks. This knowledge enables proportionate controls and allows resources to be focused where they are most effective.

Itinerant, occasional and one-off customers require particular attention, as they may have limited awareness of dangerous goods requirements. Forwarders should therefore establish tailored onboarding and education measures, such as commodity-based booking questions, digital declarations, targeted guidance, mandatory acknowledgement of responsibilities and escalation procedures for commonly mis-declared or high-risk commodities, including batteries, electronics, chemicals, machinery, aerosols and samples.

Long-term relationships with shippers can further strengthen compliance. Through regular engagement, forwarders can explain regulatory requirements, share lessons from incidents and support corrective action. This collaborative approach builds trust and improves the forwarder's understanding of the customer's products, packaging methods and operational changes.

Digitalization can support earlier and more consistent identification of unauthorized dangerous goods. Freight forwarding platforms can integrate booking interfaces, customer and product data, electronic air waybills and airline systems. Automated keyword recognition, commodity databases and shipment profiling can flag potentially relevant descriptions, such as batteries, electronic devices, chemicals, engines, samples or medical equipment, for additional review. Integration with airline systems can also identify dangerous goods requirements, operator variations and commodity restrictions at the time of booking rather than at physical acceptance.

The objective should be to move dangerous goods identification progressively upstream, using customer knowledge, shipment data and product intelligence rather than relying solely on acceptance checks or security screening. Effective collaboration should extend beyond contractual obligations and include shared safety responsibilities, timely information exchange, coordinated corrective action and participation in wider industry initiatives. This supply chain approach can improve safety and compliance while reducing delays and strengthening trust across the cargo community.

Ground Handling Service Providers

Ground handling service providers (GHSPs) represent one of the final opportunities to identify dangerous goods discrepancies before cargo is loaded onto an aircraft. Their safety role extends beyond physical handling and includes the verification of documentation, cargo condition, packaging integrity, and compliance with acceptance procedures

Ground handlers must work in close partnership with operators. In a strengthened supply chain environment, they will benefit from knowledge of their freight forwarder partners' experience, maturity, and regulatory compliance. Adopting a quality assurance framework will assist the GHSP in strengthening the supply chain links with their partners.

Ground handlers should assess their forwarder's level of engagement and oversight with shippers to address any gaps regarding dangerous goods. As the ground handler is often the local agency that represents the airline, additional scrutiny of shipper-built unit load devices (ULD) is recommended to ensure compliance with all applicable requirements, including employee training and assessment programs, ULD airworthiness assessments, maintenance, load distribution, and restraint.



Airports and Cargo Communities

IATA promotes the airport as the local point of convergence for the air cargo ecosystem, rather than simply as infrastructure. Airports bring together airlines, freight forwarders, ground handling service providers, cargo terminal operators, customs and security authorities, postal operators, regulators and emergency responders. Although airports may not directly handle or transport dangerous goods, they provide the infrastructure, governance and operational environment in which these activities take place. They are therefore well positioned to facilitate collective action, improve safety and security, and support the sustainable growth of the local cargo community.

Effective dangerous goods risk management requires strong airport-level governance and coordination. Incidents such as lithium battery fires, chemical spills, undeclared dangerous goods or suspected improvised incendiary devices may affect multiple organizations, disrupt airport operations, place demands on emergency services and restrict terminal or runway availability. Risks must therefore be understood and managed collectively.

Airports may consider establishing an Airport Dangerous Goods Committee or Cargo Safety Working Group comprising representatives from relevant stakeholders. Such forums can support the exchange of information on incidents, lessons learned, emerging threats, regulatory developments and local operational challenges. They can also facilitate the development of coordinated procedures and responses to dangerous goods incidents and related security events.

Airport infrastructure should support the safe and secure temporary storage of dangerous goods awaiting acceptance, consolidation, transfer, customs processing or uplift. Facility requirements should reflect storage duration, cargo volumes, commodity types and proximity to other operations. Relevant measures may include:

- Dedicated and segregated storage areas
- Environmental controls and ventilation
- Spill containment and fire detection systems
- Controlled access and appropriate separation distances
- Dedicated inspection areas and optimized cargo flows
- Rapid access for emergency responders

Airports handling significant volumes of lithium batteries, dry ice, radioactive materials or other specialist dangerous goods may benefit from purpose-built facilities. Effective design can reduce unnecessary cargo movements while improving safety, security, operational efficiency and regulatory compliance.

Dangerous goods scenarios should also be incorporated into airport emergency plans and regularly exercised. These scenarios may include lithium battery thermal runaway, chemical spills, toxic releases, fires, radioactive material incidents and suspected weaponized dangerous goods. Exercises involving airlines, cargo operators, Airport Rescue and Fire Fighting Services, security personnel, law enforcement and other relevant stakeholders can validate procedures, identify capability gaps and strengthen coordination before an actual event occurs.

Dangerous goods oversight should be integrated into the airport's Safety Management System. Incorporating dangerous goods hazards, occurrence reporting, trend analysis and risk assessments into existing processes can improve visibility of cargo-related risks and support informed, risk-based decision-making. This reinforces the principle that dangerous goods safety is a shared responsibility across the airport community.

Security-by-design principles should similarly be incorporated into new cargo facilities and major redevelopment projects. Measures may include controlled access, segregation of secure and non-secure cargo, vehicle controls,



CCTV, intrusion detection, automated detection technologies and, where appropriate, blast-resilient design. Safety and security requirements should be considered together to ensure that infrastructure supports both the safe handling of dangerous goods and the prevention of security incidents.

Initiatives already emerging at some cargo hubs include pharmaceutical communities, lithium battery handling programmes, cargo trust communities and collaborative information-sharing arrangements. These demonstrate how airports can facilitate collective risk management and help stakeholders address challenges that no single organization can manage effectively alone.

By integrating governance, infrastructure, emergency preparedness, safety management and security planning, airports can strengthen the resilience of the cargo supply chain and help ensure that dangerous goods risks are identified and mitigated before they affect aviation operations.

Aircraft Operators

ICAO Annex 6 obligates States to ensure that each of their operators establishes policies and procedures for the transport of items in the cargo compartment, which include the conduct of a specific safety risk assessment. The risk assessment must consider (among other things) the hazards associated with the properties of the items to be transported and safety of the supply chain.

For operators, an effective cargo safety strategy should extend beyond acceptance checks. It should incorporate assessments of shipper maturity, freight forwarder oversight arrangements, airport infrastructure, handling agent capability, quality assurance outcomes, and historical occurrence data. Operators should use these inputs to identify routes, commodities, and customers presenting elevated risk.

For example, an operator may apply enhanced oversight to routes with high volumes of e-commerce shipments containing lithium batteries or conduct additional audits of service providers supporting rapidly expanding cargo markets. Operators may also consider a lower-level oversight at ports where there is an active trust communities or where there are information-sharing initiatives, and digital data exchange programs that improve supply chain visibility and support earlier identification of undeclared or mis-declared dangerous goods.

Operators should work with their agents to apply a graduated, risk-based approach that dedicates more resources to forwarders and shippers classified as higher risk or less experienced. This also includes verifying that shipper-built ULDs are accepted only when there is sufficient confidence in meeting standards for ULD serviceability assessment and repair, load distribution and restraint, and compliance with cargo and regulatory requirements, including special loads, DGs, live animals, and



Appendix F

Resources, Guidance and Reference Material

The below table outlines a range of resources, guidance and training material that may further assist air carriers in understanding and addressing DG and security risks

International Civil Aviation Organization (ICAO)	
	
Document Title	Purpose
<u>Annex 17-Aviation Security</u>	Internationally agreed set of provisions to prevent and suppress all acts of unlawful interference against civil aviation
<u>Annex 8-Airworthiness of Aircraft</u>	Internationally agreed set of provisions that define the minimum basis for the recognition by States of Certificates of Airworthiness for the purpose of flight of aircraft of other States into and over their territories
<u>Annex 18-Safe Transport of Dangerous Goods by Air</u>	Internationally agreed set of provisions governing the safe transport of dangerous goods by air
<u>Aviation Security Manual (Doc 8973 – Restricted)</u>	Guidance on the implementation of Annex 17 SARPs
<u>Technical Instructions for The Safe Transport of Dangerous Goods by Air (Doc 9284)</u>	Detailed instructions necessary for the safe international transport of dangerous goods by air
<u>Global Aviation Security Plan (GASep) (Doc 10118)</u>	Strategic document to guide States, industry, and ICAO in their efforts to enhance aviation security, with six Global Priority Areas
Aviation Security Global Risk Context Statement (Doc 10108 – Restricted)	Global aviation security risk assessment, including a global threat picture

International Air Transport Association (IATA)	
	
Document Title	Purpose
<u>Security Management Systems Manual (SeMS)</u>	Manual to support the development and implementation of SeMS and improve overall security performance and communication
<u>IATA Cargo Handling Manual (ICHM)</u>	The ICHM covers the entire shipping process door-to-door, describing the operating procedures standard in every stage of the chain in plain language



<u>IOSA Standards Manual (ISM)</u>	Contains the IOSA standards, recommended practices (ISARPs), and associated guidance material, which make up the assessment criteria for the <u>IOSA Audit</u> , and used by operators to successfully prepare for an audit
<u>IATA - Dangerous Goods Regulations (DGR)</u>	The DGR helps you classify, mark, pack, label and document dangerous shipments and hazardous materials in compliance with air transport regulations.
<u>IATA Annual Security Reports</u>	IATA's comprehensive Annual Security Reports (IASR) highlighting key issues within aviation security. The IASRs are a comprehensive readout of IATA's efforts, canvassing aviation security locally, regionally and globally.

International Air Transport Association (IATA) Training 	
Training Title	Purpose
<u>IATA Aviation Security Training</u>	IATA offers a comprehensive suite of aviation security training
<u>IATA Cargo and Logistics Courses</u>	IATA offers a comprehensive suite of cargo and logistics courses
<u>IATA Dangerous Goods</u>	IATA offers a comprehensive suite of Dangerous Goods training
<u>IATA Safety Training</u>	IATA offers a comprehensive suite of Safety training

Other Resources	
Document Title	Purpose
<u>World Customs Organization SAFE Framework of Standards</u>	Establishes standards that provide supply chain security and facilitation at a global level to promote certainty and predictability
<u>ICAO and WCO – Moving Air Cargo Globally</u>	Identifies the roles and responsibilities of these various air cargo entities and highlights how they can work together effectively to secure air cargo and mail within the regulatory framework
<u>Universal Postal Union – Postal Security – General Security Measures</u>	General security measures that define the minimum physical and process security requirements applicable to critical facilities within the postal network



Universal Postal Union – Postal Security – Office of exchange and international airmail security	Defines minimum requirements for securing operations relating to the transport of international mail
US. Customs and Border Protection – Air Cargo Advance Screening Implementation Guide	Detailed requirements and steps for ACAS filers to file pre-loading data with ACAS
European Commission Import Control System, 2 (ICS2) guidance	ICS2 information and guidance, including requirements for ICS2 filers to file pre-loading data with ICS2
European Commission - Recurrent/supplementary training for security personnel (Restricted)	IID and security training information and awareness