ICAO

Doc 10084

Risk Assessment Manual for Civil Aircraft Operations Over or Near Conflict Zones

Second Edition, 2018

Approved by and published under the authority of the Secretary General

INTERNATIONAL CIVIL AVIATION ORGANIZATION

ICAO

Doc 10084

Risk Assessment Manual for Civil Aircraft Operations Over or Near Conflict Zones

Second Edition, 2018

Approved by and published under the authority of the Secretary General

INTERNATIONAL CIVIL AVIATION ORGANIZATION

Published in separate English, Arabic, Chinese, French, Russian
and Spanish editions by the
INTERNATIONAL CIVIL AVIATION ORGANIZATION
999 Robert-Bourassa Boulevard, Montréal, Quebec, Canada H3C 5H7

For ordering information and for a complete listing of sales agents
and booksellers, please go to the ICAO website at www.icao.int

First edition, 2017
Second edition, 2018

Doc 10084, *Risk Assessment Manual for Civil Aircraft Operations Over or Near Conflict Zones*
Order Number: 10084
ISBN 978-92-9258-458-0

AMENDMENTS

Amendments are announced in the supplements to the *Products and Services Catalogue;* the Catalogue and its supplements are available on the ICAO website at www.icao.int. The space below is provided to keep a record of such amendments.

RECORD OF AMENDMENTS AND CORRIGENDA

AMENDMENTS		
No.	Date	Entered by

CORRIGENDA		
No.	Date	Entered by

TABLE OF CONTENTS

Page

HISTORY AND RELATED WORK IN PROGRESS

In response to the downing of Malaysia Airlines Flight 17 (MH17) on 17 July 2014, the International Civil Aviation Organization (ICAO) took several initiatives, the first of which was to host a special high-level meeting on 29 July 2014 with the Directors General of the Airports Council International (ACI), the Civil Air Navigation Services Organisation (CANSO), and the International Air Transport Association (IATA). This meeting issued a joint statement expressing both the strong condemnation of the use of weapons against a civil aircraft and support for establishing a senior-level task force to address issues related to the safety and security of civil aircraft in airspace flying over or near conflict zones.

The Secretary General of ICAO established the Task Force on Risks to Civil Aviation arising from Conflict Zones (TF RCZ) to advise the Secretariat and, in turn, report to the ICAO Council. The TF RCZ developed a work programme with twelve objectives, including the establishment of a centralized system which would consolidate the available information related to conflict zones. The Second High-level Safety Conference (HLSC 2015), held from 2 to 5 February 2015 at ICAO Headquarters noted the progress and conclusions of the TF RCZ, endorsed its pilot projects and recommended the implementation of these objectives. During its 204th Session, the ICAO Council approved in principle an interim procedure for Member States to establish the Conflict Zone Information Repository (CZIR) as a tool to disseminate information related to risks to civil aviation arising from conflict zones. On 2 April 2015, the ICAO CZIR was launched.

This document, initially drafted under the title *Civil Aircraft Operations Over Conflict Zones* (Restricted), and containing advice from the ICAO Aviation Security Panel Working Group on Threat and Risk (WGTR), was provided to the ICAO Secretariat in 2014 as a contribution to the work of the TF RCZ on the risks for civil aviation of flying over conflict zones at cruising altitudes. The document provided the basis for discussion of this subject at HLSC 2015 and covered the risks from both deliberate and unintentional attacks on civil aircraft. *Civil Aircraft Operations Over Conflict Zones* (Restricted) was first published in November 2016 and reissued in April 2017 as Doc 10084 (Restricted).

The 26th Meeting of the Aviation Security Panel (AVSECP/26) held from 13 to 17 April 2015, considered actions taken by ICAO to review and mitigate the risks to civil aviation arising from conflict zones, including the WGTR's advice, and recommended that ICAO disseminate the advice on the overall risks of overflying conflict zones in order to assist States and industry in making decisions on flying over or near conflict zones — a recommendation that was endorsed by the ICAO Council at the Fourth Meeting of its 205th Session on 15 June 2015.

On 13 October 2015, the Dutch Safety Board published the MH17 Final Report of the accident investigation with safety recommendations to ICAO, IATA, ICAO Member States, and operators. The relevant safety recommendations are presented below.

During the 25th AVSEC World Conference held from 25 to 27 October 2016, held jointly by IATA, ICAO and ACI, existing tools and mechanisms, as well as next generation systems, to share risk-based information relevant to the operation of civil aircraft, were presented.

During its 209th Session, the ICAO Council noted that there had been significant progress on the part of States and industry in developing systems, separate from the CZIR, to share information concerning risks associated with operations over or near conflict zones. In considering these developments and noting the decline in the number of postings in the CZIR, the ICAO Council requested a comprehensive study be undertaken on the availability of tools and mechanisms developed by external entities to share risk-based information. As part of the study, ICAO, in partnership with CANSO, IATA and the International Business Aviation Council (IBAC), launched a survey to determine the

availability and adequacy of information related to risks to civil aviation provided by entities external to ICAO. The survey was held from December 2016 to January 2017.

The analysis of replies provided by aircraft operators and air navigation service providers (ANSPs) revealed that the appropriate information on risks to civil aviation was effectively being made available outside of the CZIR by both States and industry. The study also recognized a significant decline in the number of States making their information related to risks to civil aviation over or near conflict zones available on the CZIR and showed that such information was mostly disseminated through Notices to Airmen (NOTAMs), aeronautical information circulars (AIC), and aeronautical information publication (AIP) supplements. However, the responders to the enquiry revealed a desire to standardize the format in which risk information was made available and a desire to develop solutions allowing for timely and automated access to such information.

Dutch Safety Board MH17 accident investigation relevant safety recommendations

To ICAO:

(1) Incorporate in Standards that States dealing with an armed conflict in their territory shall at an early stage publish information that is as specific as possible regarding the nature and extent of threats of that conflict and its consequences for civil aviation. Provide clear definitions of relevant terms, such as conflict zone and armed conflict.

(3) Update Standards and Recommended Practices related to the consequences of armed conflicts for civil aviation, and convert the relevant Recommended Practices into Standards as much as possible so that States will be able to take unambiguous measures if the safety of civil aviation may be at issue.

To ICAO and IATA:

(5) Encourage States and operators who have relevant information about threats within a foreign airspace to make this available in a timely manner to others who have an interest in it in connection with aviation safety. Ensure that the relevant paragraphs in the ICAO Annexes concerned are extended and made more strict.

To ICAO:

(6) Amend relevant Standards so that risk assessments shall also cover threats to civil aviation in the airspace at cruising level, especially when overflying conflict zones. Risk increasing and uncertain factors need to be included in these risk assessments in accordance with the proposals made by the ICAO Working Group on Threat and Risk.

To States (States of Operator):

(8) Ensure that operators are required through national regulations to make risk assessments of overflying conflict zones. Risk increasing and uncertain factors need to be included in these assessments in accordance with the proposals by the ICAO Working Group on Threat and Risk.

To ICAO and IATA:

(9) In addition to actions already taken, such as the website (ICAO Conflict Zone Information Repository) with notifications about conflict zones, a platform for exchanging experiences and good practices regarding assessing the risks related to the overflying of conflict zones is to be initiated.

In its 210th Session, the Council requested the Secretariat to continue to explore how to improve States' risk-management capabilities, the sharing of risk information concerning operations over or near conflict zones, and relevant assessment processes. This was expected to be achieved through a continuous review of all relevant ICAO Standards and Recommended Practices (SARPs) and guidance material. In addition, the work was to be completed before 2019 in accordance with the outcomes of the 39th Session of the ICAO Assembly held from 27 September to 6 October 2016.

Considering the results from the 25th AVSEC World Conference, the survey conducted by the Secretariat and the decline in the number of postings in the CZIR, the Council noted that the ICAO CZIR had ceased to function as a means to gather and disseminate specific risk-based information concerning operations over or near conflict zones. The Council directed the Secretariat to discontinue the CZIR and provisionally approved the transition of the CZIR into a library of links on the ICAO public website to States' own aeronautical information related to risks to civil aircraft operations over or near conflict zones.

In November 2017, in its 212th Session, the Council noted that in response to the HLSC 2015 objectives, ICAO had implemented a range of initiatives focused on risk mitigation for civil aircraft operations, strengthening risk management capabilities, and sharing risk information related to air operations over or near conflict zones. The Council welcomed recent developments in the aviation sector whereby the information that had been provided on the ICAO web-library of risk-based information was now being provided by other international organizations in real-time. In light of these developments and noting the limited number of links posted on the web-library, the Council decided to discontinue the ICAO web-library of risk-based information and to devote increasing efforts to provide training and capacity-building initiatives in order to assist States to further develop their risk management capabilities as well as multilateral arrangements for the sharing of risk information.

The second edition of Doc 10084 has been further amended to expand the advice for States and operators regarding the risks from surface-to-air missiles (SAMs) and key risk factors to be considered for their own risk assessments. The second edition of Doc 10084 is published under the new name *Risk Assessment Manual for Civil Aircraft Operations over or near Conflict Zones,* in line with its revised content. The enhanced guidance material in the manual is based on existing ICAO provisions and industry practices related to:

a) responsibilities of States, operators and other service providers within States;

b) significant regulatory developments and existing practices since 2014;

c) consolidated source material for conducting risk assessments;

d) outline of risk information sharing mechanisms;

e) guidance to States and operators on what to do with threat and risk information; and

f) existing mechanisms for State-to-operator and/or State-to-State sharing of information.

In order to make the guidance material in this edition of Doc 10084 more accessible for States, aircraft operators, ANSPs, and other entities concerned, and considering that the revised material does not contain any sensitive security information, the Secretariat amended the document's classification from restricted to non-restricted.

Work in progress

This second edition of Doc 10084 takes into account the work in progress of the following future amendments of ICAO provisions:

Annex 6 — *Operation of Aircraft,* Part I: Flight Operations. The need for the operator to ensure that a flight will not be commenced unless it has been ascertained by every reasonable means available that the airspace containing the intended route from aerodrome of departure to aerodrome of arrival, including the intended take-off, destination and en-route alternate aerodrome(s), can be safely used for the planned operation, and where conflict zones are overflown, to conduct a risk assessment and to take appropriate risk mitigation measures to ensure a safe and secure flight.

Annex 11 — *Air Traffic Services.* Coordination of activities potentially hazardous to civil aircraft; the need for the appropriate ATS authority to ensure that a safety risk assessment of the airspace concerned is conducted as soon as practicable for activities potentially hazardous to civil aircraft and that appropriate risk mitigation measures are implemented.

Annex 15 — *Aeronautical Information Services.* A conflict zone is a reportable hazard for air navigation to be promulgated by NOTAM and should include information as specific as possible regarding the nature and extent of threats arising from the conflict and its consequences for civil aviation.

Annex 17 — *Security.* Requirement of the appropriate authority to establish and implement procedures to share, as appropriate, with operators, ANSPs or other entities concerned in a practical, timely manner relevant information to assist them to conduct security risk assessments relating to their operations.

Doc 9859, *Safety Management Manual (SMM)*. Integrated risk management (IRM) focuses on the overall risk reduction of the organization on the different functional systems such as operations, finance, environment, safety and security.

Doc 10088, *Manual on Civil/Military Cooperation in Air Traffic Management.* Review and upgrade of the existing Circular 330, *Civil/Military Cooperation in Air Traffic Management* for coordination between military and civil aviation authorities.

GLOSSARY

ACRONYMS AND ABBREVIATIONS

ACI	Airports Council International
AIC	aeronautical information circular
AIP	aeronautical information publication
ANSP	air navigation service provider
ASP	aviation security programme
ATS	air traffic services
ATM	air traffic management
AVSEC	aviation security
AVSECP	Aviation Security Panel
CANSO	Civil Air Navigation Services Organisation
CCT	Contingency coordination team
Circ	Circular
CZIB	conflict zone information bulletin
CZIR	conflict zone information repository
DfT	Department for Transport
DGAC	Direction Générale de l'Aviation Civile
DG HOME	Directorate-General Migration and Home Affairs
Doc	Document
EASA	European Aviation Safety Agency
EU	European Union
EEAS	European External Action Service
FIR	Flight information region
HLSC	High-level Safety Conference
IATA	International Air Transport Association
IBAC	International Business Aviation Council
ICAO	International Civil Aviation Organization
JTAC	Joint Terrorism Analysis Centre
MANPADS	man-portable air defence systems
MH17	Malaysia Airlines flight MH17
NCASP	National civil aviation security programme
NCTV	National Coordinator for Security and Counterterrorism
NOTAM	Notice to airmen
PANS	Procedures to Air Navigation Services
PARAC	Pole d'Analyse de Risques de l'Aviation Civile
PIB	Pre-flight information bulletin
RCS	Risk Context Statement
RCZ	Conflict Zones Network of Focal Points
SAM	surface-to-air missile
SARPs	Standards and Recommended Practices
SMI	safety management implementation
SMM	Safety Management Manual
SMS	safety management system
SSP	State safety programme
TF RCZ	Task Force on risks to Civil Aviation arising from Conflict Zones
WGTR	Working Group on Threat and Risk

DEFINITIONS

When the following terms are used in this manual, they have the following meanings:

Acceptable level of safety performance (ALoSP). The minimum level of safety performance of civil aviation in a State, as defined in its State safety programme (SSP), expressed in terms of safety performance targets and safety performance indicators.

Note.— An acceptable level of safety performance for the State can be demonstrated through the implementation and maintenance of the SSP as well as safety performance indicators and safety performance targets showing that safety is effectively managed, built on the foundation of implementation of existing safety-related SARPs.

Acts of unlawful interference. These are acts or attempted acts such as to jeopardize the safety of civil aviation, including but not limited to:

– unlawful seizure of aircraft;

– destruction of an aircraft in service;

– hostage-taking on board aircraft or on aerodromes;

– forcible intrusion on board an aircraft, at an airport or on the premises of an aeronautical facility;

– introduction on board an aircraft or at an airport of a weapon or hazardous device or material intended for criminal purposes;

– use of an aircraft in service for the purpose of causing death, serious bodily injury, or serious damage to property or the environment; and

– communication of false information such as to jeopardize the safety of an aircraft in flight or on the ground, of passengers, crew, ground personnel or the general public, at an airport or on the premises of a civil aviation facility.

(Aircraft) Operator. In the context of this document, references to the (aircraft) operator refer to those operators subject to ICAO Annex 6 — *Operation of Aircraft,* Parts I, II and III being operators of aeroplanes or helicopters authorized to conduct international commercial air transport operations or involved in international general aviation.

Air navigation services. This term includes air traffic management (ATM), communications, navigation and surveillance systems (CNS), meteorological services for air navigation (MET), search and rescue (SAR) and aeronautical information services/aeronautical information management (AIS/AIM). These services are provided to air traffic during all phases of operations (approach, aerodrome and en route).

Air navigation service provider (ANSP). Any entity providing ATM and/or other air navigation services mentioned in the definition for *Air navigation services*.

Note.— Annex 17 uses the term *Air traffic service provider (ATSP)*. ATSP should be considered synonymous with *ANSP* as used in this manual.

Air-to-air missiles. Missiles fired at an aircraft from another aircraft.

Appropriate ATS authority. The relevant authority designated by the State responsible for providing air traffic services in the airspace concerned.

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.

Civil aircraft. Non-State aircraft (pursuant to Article 3 of the Chicago Convention). This could include passenger airliners, cargo aircraft and business or private jets.

Conflict zones. Airspace over areas where armed conflict is occurring or is likely to occur between militarized parties, and is also taken to include airspace over areas where such parties are in a heightened state of military alert or tension, which might endanger civil aircraft.

Contingency plan. A proactive plan to include measures and procedures addressing various threat levels, risk assessments and the associated security measures to be implemented, designed to anticipate and mitigate events as well as prepare all concerned parties having roles and responsibilities in the event of an actual act of unlawful interference. A contingency plan sets forth incremental security measures that may be elevated as the threat increases. It may be a stand-alone plan or included as part of a Crisis Management Plan.

Hazard. A condition or an object with the potential to cause or contribute to an aircraft incident or accident.

MANPADS (Man-Portable Air Defence Systems). Shoulder-launched surface-to-air missiles. These are widely available in many countries, particularly in conflict areas, portable and can be used with relatively limited training. MANPADS are capable of bringing down aircraft, but not of reaching cruising altitudes.

Overflying. Passing over terrestrial areas (land or sea) at cruising altitude.

Risk. The potential for an unwanted or calculated outcome resulting from an occurrence. Risk can be estimated by considering the likelihood of threats, vulnerabilities and consequences or impacts.

Risk index matrix. A matrix that is used during risk assessment to define the level of risk by considering the category of probability or likelihood against the category of consequence severity. This is a simple mechanism to increase visibility of risks and assist management decision-making.

Risk level. See ***Acceptable level of safety performance (ALoSP).***

Risk mitigation. The process of incorporating defences or preventive controls to lower the severity and/or likelihood of a hazard's or threat's projected consequence.

Safety. The state in which risks associated with aviation activities, related to, or in direct support of the operation of aircraft, are reduced and controlled to an acceptable level.

Service provider. Any organization providing aviation products and/or services. The term thus encompasses approved training organizations that are exposed to safety risks during the provision of their services, aircraft operators, approved maintenance organizations, organizations responsible for type design and/or manufacture of aircraft, engines or propellers, air navigation service providers and certified aerodromes.

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

Surface-to-Air Missiles (SAMs). Any weapon that may be fired at an aircraft from the ground (including MANPADS), but in this context, is taken to mean advanced military equipment that is capable of attacking airborne targets at altitudes of at least 25 000 ft (7 600 m).

State of the Operator. The State in which the operator's principal place of business is located or, if there is no such place of business, the operator's permanent residence.

Threat. A man-made occurrence, individual, entity, or action that has, or indicates, the potential to harm life, information, operations, the environment and/or property.

Vulnerability. Factors or attributes that render an entity, asset, system, network or geographic area open to successful exploitation or attack or susceptible to a given threat or hazard.

RELATED ICAO PUBLICATIONS

ANNEXES

Annex 6 — *Operation of Aircraft*, Part I — International Commercial Air Transport — Aeroplanes
Annex 11 — *Air Traffic Services*
Annex 15 — *Aeronautical Information Services*
Annex 17 — *Security — Safeguarding International Civil Aviation Against Acts of Unlawful Interference*
Annex 19 — *Safety Management*

GUIDANCE MATERIAL

ICAO Aviation Security Global Risk Context Statement (Restricted)
Doc 8126, *Aeronautical Information Services Manual*
Doc 8973 (Restricted), *Aviation Security Manual*
Doc 9426, *Air Traffic Services Planning Manual*
Doc 9433, *Manual concerning Interception of Civil Aircraft*
Doc 9554, *Manual concerning Safety Measures Relating to Military Activities Potentially Hazardous to Civil Aircraft Operations*
Doc 9859, *Safety Management Manual (SMM)*
Doc 9985, *Air Traffic Management Security Manual*
Doc 10088, *Manual on Civil/Military Cooperation in Air Traffic Management* [replaces Circular 330]

Chapter 1

INTRODUCTION

1.1 PURPOSE AND SCOPE

1.1.1 This manual contains advice to States, aircraft operators, (civil and military) air navigation service providers (ANSPs), and other entities deemed appropriate on the subject of risk assessments for civil aircraft operations over or near conflict zones. It contains consolidated guidance to support implementation of relevant ICAO Standards and Recommended Practices (SARPs), ICAO guidance material and industry best practices. It covers the risk from both deliberate acts and unintentional hazards to civil aircraft operations over or near conflict zones.

1.1.2 Noting that States should notify threats and hazards in their sovereign and delegated airspace, and to coordinate activities so as to minimize any such threats and hazards, this manual aims to provide broad advice on the global risks to civil aviation, and from this to identify the main risk factors that could be taken into account by States, aircraft operators, and ANSPs in conducting their own more geographically-specific risk assessments. It is important to note that ultimately the operators and service providers are the entities that will conduct an operational risk assessment specific to the type and extent of their approved operations.

1.1.3 The manual focuses primarily on the risk posed by long-range surface-to-air missiles (SAMs) as these are currently considered to pose the most significant risk to civil aircraft operating over or near conflict zones. However, some of the considerations and conclusions would apply also to air-to-air missiles launched from fighter aircraft. The manual does not cover the risk that arises at lower altitudes (including during take-off and landing phases) from shorter-range SAMs such as Man-Portable Air Defence Systems (MANPADS), which has been the subject of other assessments.[1]

1.1.4 The decision as to whether a civil aircraft will be flown through airspace that could otherwise be considered unsafe relies on the various parties involved, i.e., the State that manages the airspace, aircraft operators, ANSPs, the State of the Operator, ICAO, regional civil aviation authorities, and other stakeholders. This manual describes the roles, responsibilities and/or activities of such parties, which are largely based on the applicable provisions contained in Annex 6 — *Operation of Aircraft*, Annex 11 — *Air Traffic Services*, Annex 15 — *Aeronautical Information Services*, Annex 17 — *Security*, and Annex 19 — *Safety Management*, as well as related guidance material (*ICAO Aviation Security Global Risk Context Statement* (Restricted), Docs 8126, 8973 (Restricted), 9426, 9433, 9554, 9859, 9985, and 10088). The manual also describes the risk assessment processes leading to final decision-making and provides best practice examples drawn from States and industry.

1. *Man-Portable Air Defence Systems (MANPADS)* — Restricted, ICAO, First Edition, July 2015.

Chapter 2

RISKS TO CIVIL AIRCRAFT FROM OPERATIONS OVER OR NEAR CONFLICT ZONES

2.1 SURFACE-TO-AIR MISSILES — CAPABILITY AND PROLIFERATION

2.1.1 The principal weapons of concern for these purposes are those surface-to-air missiles (SAMs) with the capability of reaching aircraft at cruising altitudes (which for these purposes are taken to be altitudes in excess of 25 000 ft (7 600 m) above ground level). These are large, expensive and complex pieces of military equipment which are designed to be operated by trained personnel. There are many different types of systems, with varying capabilities and technologies, but they are all designed to track and destroy military targets in flight. In this context, civil aircraft represent a relatively easy and highly vulnerable target, due to their size and predictable flight paths, and as they are generally neither equipped nor tasked to consider tactically responding to being fired upon.

2.1.2 Many SAMs are mobile and can be moved quickly between locations. Some have sensor systems integrated; others need to be linked to a separate radar sensor to identify targets. Many SAMs are located on warships. It is estimated that there could be more than 70 States around the world that have acquired SAMs as part of their military capability. Other States are interested in acquiring them and there are many ready suppliers, so this number is likely to continue to increase over time. Where older SAMs are currently deployed, they are likely, in future, to be replaced by more advanced and more mobile systems.

2.1.3 It is unlikely that non-State actors will have acquired SAMs direct from manufacturers, but a small number of non-State actors may well have acquired them indirectly. These may either have been passed to them by States or acquired through the seizure of former State assets during or following conflict situations. In either case, they could only be operated as designed — for example, with use of radar to identify the intended target — by fully trained personnel with all the necessary equipment.

2.2 THE HISTORIC THREAT TO CIVIL AVIATION

SAM attacks on civilian aircraft are extremely rare. There are three documented occurrences[1] where the destruction of civilian aircraft has been attributed to SAM attacks (other than MANPADS). There may, of course, have been other launches against civil aircraft that missed their target. In two of the documented cases it is likely the event was unintentional — i.e. the intent was not to destroy a civilian aircraft. The likelihood is that the intended target either was, or had been mistakenly identified as, a military aircraft or remotely piloted (unmanned) aircraft. Two of the known events occurred during periods of military conflict or high tension; the third appears to have occurred during a military training exercise. No documented cases of an intentional SAM attack on a civilian aircraft have been identified to date.

1. Iran Air flight 655 (1988), Siberia Airlines flight 1812 (2001), Malaysia Airlines flight 17 (2014).

2.3 THE RISK OF INTENTIONAL ATTACK

2.3.1 Some terrorist groups are known to have a continuing and active interest in attacking civil aviation. Aircraft are seen as iconic targets whose destruction can have major impacts, not only through loss of life, but also in terms of economic consequences, publicity, political reaction and loss of public confidence. In general, terrorist groups (as opposed to militarized forces) do not currently have access to long-range SAMs (as distinct from MANPADS). However, in making this assessment it is important to stress that:

a) there is a high level of intent among some of these groups to attack aviation and therefore a strong likelihood that they would attempt to use SAMs in this way should the opportunity arise;

b) some of these terrorists are thought to have sufficient resources to acquire SAMs — though they would find it difficult to do so, or to deploy them, without sponsorship and training from States;

c) this position could change rapidly given the fluidity of current political and military events in some regions; and

d) this assessment is based on the information available and may not be complete.

2.3.2 Such terrorist groups tend to operate more freely in areas of conflict where there is a breakdown of State control. Should they at some point succeed in acquiring SAMs, and the capability to operate them, the vulnerability of aircraft using airspace over those areas would be high. The ability to identify and target specific aircraft or aircraft operators with some reliability would be relatively straightforward. The risk to civil aircraft in those circumstances could immediately become high. With regard to the States and non-State actors that currently do have access to SAMs, there is no reason to believe that the intent currently exists to target civil aviation deliberately. However, the last two caveats in 2.3.1 also apply here.

2.3.3 Overall, the current risk to civil aviation from intentional attack is assessed to be low, primarily due to the fact that where intent may exist there is currently no evidence of capability (in terms of hardware and trained personnel). However, this situation could change and should be monitored closely. Possible mitigations for this risk would include:

a) counter-proliferation measures; and

b) avoidance of airspace within range of a possible attack.[2]

2.4 THE RISK OF UNINTENTIONAL ATTACK

2.4.1 Past events, although rare, would suggest there is a higher risk to civil aviation as an unintended target when flying over or near conflict zones, in particular the deliberate firing of a missile whose target is perceived to be a military aircraft, but which either misses its intended target or is based on the misidentification of a civil aircraft. In conflict zones the capability may be high and widespread, but there is arguably little to no intent to target passenger aircraft. The same applies when also taking into account the use of missile defence systems by State actors to shoot down ballistic missiles. This illustrates the complexity of such a threat environment for civil aircraft operations.

2.4.2 There are also well established mitigations in place through existing airspace management, surveillance, navigation and communication systems which, if they are operating correctly, should enable civilian aircraft flying through controlled airspace to be readily identified. Therefore, at the global level the risk of unintentional attack is also

2. It is noteworthy that the hazardous range may well exceed territorial boundaries and the airspace above it.

assessed as low. However, this risk may vary significantly over time, and from place to place, as a result of events, and higher levels of risk are particularly associated with overflying areas of armed conflict.[3]

2.4.3 This guidance therefore attempts to identify the specific factors which seem most likely to be associated with an elevated level of risk of an unintentional SAM attack on a civil aircraft, to support States, aircraft operators and ANSPs in conducting their own, geographically-specific risk assessments. These risk factors are presented in Appendix A.[4] Possible mitigations for this risk would include:

a) conduct of specific risk assessments by States and/or aircraft operators and/or ANSPs to inform routeing decisions for operating over or near conflict zones or other areas of high tension and/or sensitivity;

b) provisions by ICAO and/or States and/or other entities of guidance and appropriate information (including information about the results of assessments done by others) that would assist in making those risk assessments, or in making routeing decisions; and

c) avoidance by civil aircraft of airspace over conflict zones where the risk of unintentional attack is assessed as unacceptably high.

2.4.4 There could also be some risk of unintentional attacks on civil aviation from SAM tests or training launches conducted by military forces, and as noted above, there is evidence of at least one aircraft being hit under these circumstances in the past. However, it is understood that large numbers of such launches take place each year without incident. Therefore, this risk is considered to be low provided such tests or training launches are conducted in closed airspace, as is usually the case, with robust planning and supervision, and proper notification to civil aviation entities.

2.5 AIR–TO–AIR ATTACKS

2.5.1 The risk factors (and mitigations) associated with an unintentional attack using air-to-air missiles launched by a military aircraft, due to misidentification of civilian aircraft flying in combat zones or zones of high tension/sensitivity, would be broadly similar to those for SAMs, except that:

a) military aircraft are less likely to be available to non-State actors; and

b) military pilots are considered less likely to misidentify a civilian aircraft as a military target.

2.5.2 Such air-to-air attacks could also occur as a deliberate act where a civilian aircraft is perceived by State authorities as a potential means of terrorist attack, usually because it has reported an unlawful interference incident on board (e.g. breach of the cockpit or hijack) or is exhibiting suspicious behaviour (e.g. not communicating with Air Traffic Control or deviating from its air traffic control clearance). The risk of terrorists successfully commandeering an aircraft for use as a weapon is assessed in the *ICAO Aviation Security Global Risk Context Statement* (Restricted), and instances of failed communication, which occur relatively frequently, are normally resolved successfully by use of standard intervention procedures in accordance with ICAO's *Manual concerning Interception of Civil Aircraft* (Doc 9433).

---

3. In the case of MANPADS in areas of conflict and proliferation, see the *ICAO Aviation Security Global Risk Context Statement* (Restricted) for the assessment of the residual risks.
4. Appendix A does not cover the risk factors for civil aircraft operations associated with missile defence systems as mentioned in 2.4.1.

Chapter 3

ROLES OF PARTIES CONCERNED AND PROMULGATION OF INFORMATION

INTRODUCTION

This chapter describes the roles of the various parties involved in the decision-making process related to flying over or near conflict zones, the associated provisions for promulgation of information, and current practices. The described parties involved are: the State that manages the airspace, the aircraft operator, the ANSP, the State of the Operator, ICAO, the regional civil aviation authorities, and other stakeholders.

ROLES OF THE PARTIES CONCERNED

3.1 THE STATE THAT MANAGES THE AIRSPACE

3.1.1 States play a major role in providing various parties with essential risk information related to the airspace above conflict zones that feed into their decision-making processes. States are required under Annex 17 to keep under constant review the level and nature of threats to civil aviation in their territory and the airspace above it, and adjust their security programmes accordingly based upon a security risk assessment. National intelligence agencies should support national systems for addressing risks arising from conflict zones and should support the State's contribution to the sharing of threat information.

3.1.2 Given a State's exclusive sovereignty of airspace over its territory, overflight in sovereign airspace can only be conducted in accordance with authorization given by the State concerned. Each State can also prohibit or restrict use of the airspace over its sovereign territory, fully or partially, for reasons of military necessity or public safety, but no State can compel another State to do so.

3.1.3 Based on the information available, the State or States responsible for providing air traffic services (ATS) should identify the geographical area of the conflict zones, assess the hazards/threats or potential hazards/threats to international civil aircraft operations, and determine whether such operations in or through the area of conflict should be avoided or may be continued under specified conditions. An international NOTAM containing the necessary information, advice and safety measures to be taken should then be issued and subsequently updated in light of developments. All those concerned with initiating and issuing of NOTAM should be aware of the provisions governing the duration of the published NOTAM in Annex 15. The promulgation of information is further addressed in Section 3.8.

3.1.4 According to Annex 11, the responsibility for instituting special measures, such as contingency plans, to ensure the safety of international civil aircraft operations remains with the State(s) responsible for providing ATS in the airspace or delegated airspace affected by the conflict, even in cases where coordination is not initiated or completed.

3.1.5 In the event of armed conflict or the potential for armed conflict, States whose military forces are engaged in the conflict must initiate the coordination process. If the necessary information and/or the development of contingency planning is not forthcoming from the States whose authorities are engaged in the armed conflict between militarized parties, the State or States responsible for providing ATS should ascertain the nature and scope of the hazards or

potential hazards from other sources, such as aircraft operators, associations of the civil airline industry, airline pilots, civil air navigation service providers, air traffic controllers, adjacent or other States with additional information, or in some cases the relevant ICAO Regional Office in order to support the conduct of a risk assessment, if required.

3.1.6 Principally, the need for any safety measures will depend on the results of the risk assessment conducted by the State or States responsible for providing ATS. Flight operations by civil aircraft through the airspace should only be allowed to continue if the risks can be mitigated to an acceptable level.

3.1.7 The civil aviation authority should as a matter of best practice, when establishing airspace restrictions due to a known or probable threat, request the support of the appropriate military authority and/or any other relevant authority in performing the risk assessment. To ensure effective implementation of national policy, a State should establish a joint high-level policy body that will be responsible for oversight, implementation and application of collaborative air traffic management. The high-level body should also have responsibility for continually monitoring the output of national collaborative processes to ensure that both civil and military needs are considered. It should also collaborate with other adjacent or affected States.

3.1.8 If civil aircraft operations through the area are allowed, immediate attention should be given by the States concerned to special arrangements regarding:

- coordination between military authorities, security authorities and ATS units;
- briefings of personnel;
- identification of civil aircraft by military units;
- issuance of warnings and navigational advice; and
- air traffic restrictions.

3.2 AIRCRAFT OPERATOR

3.2.1 In determining the flight routes to use, aircraft operators should as a matter of best practice ensure that flights will not commence unless risk assessments are carried out and appropriate mitigation actions are taken to ensure the safety and security of the aircraft on the intended route from the aerodrome of departure to the aerodrome of arrival, including the intended take-off, destination and en-route alternate aerodromes. This includes assessing the airspace over or near areas where there is armed conflict posing a risk to civil aviation. In planning the conduct of operations through areas of armed conflict or the potential for armed conflict, operators should give due regard to (but not be limited to):

- any additional fuel required for in-flight diversion out of the conflict area;
- any deferred item in accordance with the minimum equipment list, if applicable for take-off and departure from the conflict zone without refuelling;
- consideration of emergency and non-normal procedures, such as depressurization and engine failure;
- availability and serviceability of aircraft equipment needed to facilitate identification of the aircraft by military units;

- use of procedures and means to ensure that the pertinent authorities are advised of the flight plan; and

- ensuring monitoring of the appropriate frequencies.

3.2.2 The absence of any restrictions in foreign airspace should not preclude the operator from making its own determination on the safety/security risks of the airspace to be flown through. Various information sources can be used (e.g. government advisories, other aircraft operators, open-source intelligence) including in-house departments tasked with flight route management.

3.2.3 Operators have a need to know of any airspace restrictions or (potential) hazards/threats that affect the safety of their operations. This material includes available information and recommendations on conflict zones which should be incorporated into their risk assessment and decision-making processes. Operators should furthermore share their own risk assessment information with their national authorities and are encouraged to share this information with other operators and service providers.

3.2.4 The operator should ensure that there is a mechanism to facilitate the necessary information, and advice is updated and passed to the pilot-in-command in real time. While this information can nearly always be provided before take-off, in some instances, because of rapidly changing circumstances, it must be provided in-flight in a similar way as information is provided en-route for in-flight re-planning, as this could result in a change to the intended route. The collection of relevant information is further addressed in 4.3.

3.2.5 Flight crews should maintain extra vigilance when operating over, or near, the area of an armed conflict. For example maximum effort should be taken to facilitate identification of the aircraft by military units (i.e. weather radar, transponder, radio altimeter, lighting) and ensure that appropriate radio communication frequencies are monitored.

3.3 AIR NAVIGATION SERVICE PROVIDER

3.3.1 The planning for and the execution of ATS is essentially a national responsibility unless agreements have been concluded among States to conduct this planning and execution as a joint effort for a defined area covering more than one State, or for areas where no sovereign rights are exercised (e.g. the high seas). It is therefore of prime importance that both the planning and execution of ATS be done so that optimum uniformity is maintained to the largest possible extent.

3.3.2 Annex 11 requires the ATS authority to develop and promulgate contingency plans for implementation in the event of disruption, or potential disruption, of ATS and related supporting services in the airspace for which they are responsible for the provision of such services. Contingency plans may include a temporary deviation from the regional air navigation plans. When necessary, ICAO provides assistance with the development of such contingency plans in close coordination with the ANSPs responsible for the provision of services in adjacent portions of airspace and with the airspace users concerned.

3.3.3 The ANSP should as a matter of best practice conduct a risk assessment for activities potentially hazardous to civil aircraft and ensure that appropriate risk mitigation measures are implemented. This involves working closely with military and other security authorities with regard to activities that may affect flights of civil aircraft and civil-military coordination in the event of an armed conflict affecting civil aviation.

3.4 STATE OF THE OPERATOR

3.4.1 The primary objective of States with regard to international civil aviation security is to assure the protection and safety of passengers, crew, ground personnel and the general public in all matters related to safeguarding against acts of unlawful interference with civil aviation.

3.4.2 Under the oversight of their respective State regulatory authority, aircraft operators are responsible for their operations. The guiding principle for such operations is the use of risk management, and the State should maintain adequate ongoing oversight of aircraft operators, including monitoring of their risk management systems. In the event that a State has no risk management systems, or is in the process of promulgating risk management regulations, it is expected that the existing oversight and monitoring process will ensure the risk assessments, including those for operating over or near conflict zones.

3.4.3 To meet the primary objective as mentioned in 3.4.1, States establish an organization and structure to ensure the safety, regularity and efficiency of flights. The organization, structure and considerations differ from State to State. Some national aviation authorities provide information, issue recommendations or restrict their aircraft operators from overflying foreign airspace deemed to be unsafe. In some States these advisories and restrictions are promulgated through the aeronautical publications (NOTAM, AIP supplements, or AIC) of the State directed to its own operators for operations within and outside the State's sovereign airspace. This is in contrast to airspace advisories and restrictions which are published by a State for its own sovereign or delegated airspace over high seas only or due to the lack of any such aeronautical publications. Appendix C provides information about the differences between the formats of guidance provided by States.

3.5 INTERNATIONAL CIVIL AVIATION ORGANIZATION (ICAO)

3.5.1 In the event of disruption of ATS and related supporting services affecting international civil aviation operations wherein the authorities cannot adequately discharge the responsibility as referred to in 3.1.4 and 3.3.2 under Annex 11, ICAO will initiate and coordinate appropriate contingency action with the States and ANSPs responsible for airspace adjacent to the airspace affected by the disruption and in close consultation with the international organizations concerned.

3.5.2 One mechanism for such close coordination is the establishment of Contingency Coordination Teams (CCTs). A Regional CCT should be established in accordance with the State and ANSP contingency plans and, where developed, in accordance with regional contingency plans.

3.5.3 A regional ATM contingency plan can be used for each contingency as the main platform for sharing of information related to conflict zones and other issues such as weather phenomena or volcanic ash clouds that would affect ATM operations across the region. Such a plan is also activated in cases when operators decide to circumnavigate the affected airspace(s) which might increase significantly the air traffic movement in other airspace(s). The plan should include coordination and implementation of contingency measures to overcome the associated challenges affecting ATM.

3.5.4 ICAO and IATA have established a regional CCT in the Middle East and North Africa regions. This is possible due to the involved States' and airspace users' confidence in the CCT framework and the high level of cooperation and the commitment to ensure safety and continuity of air transport. As such, several contingency/temporary ATS routes and ATM measures have been implemented in a timely manner to accommodate safely the air traffic flow changes (See Appendix D, Example 1).

3.6 REGIONAL CIVIL AVIATION AUTHORITIES

As outlined below, the regional civil aviation authority of the European Union has set up a conflict zone risk assessment information alerting system for its member States.[1]

European Union (EU)

3.6.1 In 2015 the European High Level Task Force on conflict zones proposed to set up a Conflict Zone Alerting System at European Level, through cooperation among Member States, European institutions, the European Aviation Safety Agency (EASA) and other aviation stakeholders to share and distribute intelligence information on risks arising from conflict zones.

3.6.2 The objective of the alerting system is to join up available information sources and conflict zone risk assessment capabilities, to enable the timely publication of information and recommendations on conflict zone risks for the benefit of all European Member States, operators and passengers. The alerting system complements national infrastructure mechanisms, where these exist, by adding, when possible, a European-level common risk picture and corresponding recommendations. The two important enablers of this alerting system are:

1) The "common EU risk assessment process" facilitated by the Directorate-General Migration and Home Affairs (DG HOME) with the support of Member States. The Commission (DG HOME) organizes regular meetings, at least on a quarterly basis, with Member States and European External Action Service (EEAS) in order to elaborate common EU risk assessments on conflict zones. The so-called "DG HOME working group" has developed a risk assessment methodology, shares confidential threat information and discusses every airspace of concern with the aim of reaching consensus on the risk level.

2) The role to be played by the "Conflict Zones Network of Focal Points", the so-called RCZ Network. The RCZ Network is composed of focal points from EASA, the European Commission, EEAS and focal points designated by the EU Member States who volunteer to contribute. This network serves as a platform for sharing information on national risk assessments and advice regarding operation over conflict zones and for consultation on draft EASA conflict zones information publications (CZIBs).

3.6.3 EASA acts as coordinating entity for activities not directly under European Commission responsibility and initiates the drafting, consultation and publication of CZIBs both in cases of availability and unavailability of a common EU risk assessment.

3.6.4 In case of availability of a common EU risk assessment when a "high" risk level has been concluded, EASA will initiate the drafting of a CZIB which, in some cases, may contain an operational recommendation. Such recommendations are non-mandatory and do not constitute flight prohibitions. In case of availability of a common EU risk assessment when a risk level lower than high has been concluded, the drafting of a CZIB highlighting the availability of national publications, when these exist, will be considered. In the case of unavailability of a common EU risk assessment, the publication of CZIBs will be considered when a sudden emerging threat occurs in order to share threat information that may be relevant for operators to take into account in their risk assessments. Validation of the threat information will be sought through the RCZ Network and, whenever relevant, reference to national publications will also be added within the CZIB. The EASA information on conflict zones website also contains a conflict zones map. Appendix D (Example 2) contains the process diagram of the EU conflict zone alerting system.

1. ICAO encourages regional civil aviation authorities that are willing to share this information to be included in future amendments of this manual.

3.7 OTHER STAKEHOLDERS

3.7.1 Among the twelve objectives of the work programme of the TF RCZ is the objective for the industry to improve processes to share operationally derived risk information, taking into consideration ways in which safety occurrences are shared. The tasks associated with this objective are:

a) establish a centralized industry information-sharing framework/system to collect and disseminate information regarding operational risks associated with operations over or near conflict zones;

b) consolidate best practices and create industry governance provisions for the sharing of information through this industry system to ensure that any operational information provided is adequately protected and used solely for the intended purpose; and

c) contingent upon a centralized system accessible to all relevant stakeholders, including States and industry, establish a link to the centralized global information system to complete two-way communication.

3.7.2 With reference to 3.5.4, ICAO and IATA have succeeded in addressing effectively several challenges in the Middle East and North Africa regions related to conflict zones by establishing a regional CCT. The CCT functions as a platform for promulgating information related to conflict zones between the various parties involved using formal communication mechanisms as well as social media (See Appendix D, Example 1).

PROMULGATION OF INFORMATION

3.8 PROVISION OF AERONAUTICAL INFORMATION

Aeronautical Information Publication (AIP)

3.8.1 The AIP contains aeronautical information of a permanent nature as well as temporary changes of long duration to this information. Temporary changes of longer duration (three months or longer) and information of short duration which contain extensive text and/or graphics are normally published as AIP Supplements. The AIP forms the basic element of the aeronautical information products supplied by Aeronautical Information Services. The products also include the amendment service to the AIP, AIP Supplements, NOTAM, pre-flight information bulletins (PIB), Aeronautical Information Circulars (AIC), checklists and lists of valid NOTAM.

Notice to airmen (NOTAM)

3.8.2 A NOTAM is a notice distributed by means of telecommunication containing information concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to personnel concerned with flight operations.

3.8.3 A NOTAM is originated and issued promptly whenever the information to be distributed is of a temporary nature and of short duration or when operationally significant permanent changes, or temporary changes of long duration are made at short notice, except for extensive text and/or graphics. NOTAM should be published for a number of reasons, including:

1) the presence of hazards outside promulgated sites which affect air navigation (including obstacles, military exercises, displays, races and major parachuting events); and

2) as matter of best practice, the presence of threats from a conflict zone, which is considered a reportable hazard for air navigation, including information as specific as possible regarding the nature and extent of threats arising from the conflict and its consequences for civil aviation.

3.8.4 The use of a NOTAM arises from the State's responsibility to provide aeronautical information about its sovereign and delegated airspace under Annex 15. Most States have dedicated entities responsible for issuing aeronautical information, usually by (national) ANSPs.

Aeronautical Information Circular (AIC)

3.8.5 An AIC is a notice containing information that does not qualify for the origination of a NOTAM or for inclusion in the AIP, but which relates to flight safety, air navigation, technical, administrative or legislative matters.

State advisories and industry solutions

3.8.6 Since the downing of flight MH17, several existing tools and mechanisms to share risk-based information relevant to the operation of civil aircraft, as well as next generation systems, have been developed by States and the industry. States have been primarily relying on existing mechanisms such as NOTAMs, AICs and AIP to disseminate information. However, private sector solutions are being developed, and increasingly States are employing secure web-based solutions to disseminate risk information available in an automated format with the intent to facilitate queries by end users. These systems rely on different sources and technologies and use a variety of different formats and structures for the content. Some systems presented rely on a network of local points of contact that provide real-time and first-hand information which, in turn, is validated using other sources, including information provided by States and industry partners, and is made available as aggregated risk information. Other information-sharing products use automated systems to collect data from a variety of available sources including NOTAMs, AICs and AIPs, as well as security information derived from public and private sector sources.[2]

2. Such as: http://safeairspace.net/, www.ospreyflightsolutions.com.

Chapter 4

CONDUCTING RISK ASSESSMENTS FOR FLYING OVER OR NEAR CONFLICT ZONES

4.1 INTRODUCTION

4.1.1 Armed conflicts pose an unpredictable risk to civil aircraft operations, in particular where the State is not in control of the territory below its sovereign or delegated airspace. The information on the presence and type of weaponry in such areas, as well as the information on who controls them, can be classified or otherwise not be readily available. These facts convey a variety of risk factors that need to be appropriately considered in any operational risk assessment process.

4.1.2 The characteristics of armed conflicts require a risk assessment process that should appropriately consider both security and safety elements. Although security and safety assessments are different in nature, and follow distinct processes, they need to be complementary. The integration of these two types of assessment is also necessary to consider any possible cross-interference between the two. Security deals with the intentional act to commit an act of unlawful interference, whereas safety is concerned with the management of hazards stemming from unintentional negative impact on the performance of the systems related to the operation. A comprehensive risk assessment process will address all potential actions involving implications for civil aircraft operations over or near conflict zones.

4.1.3 Security assessments are, in general, more qualitative in nature as they need to determine threats based on the intent and capability of involved actors. Such assessments encompass the inclusion, validation and evaluation of available security intelligence and include determination on whether there is a credible threat of an intentional act of unlawful interference against a flight so as to jeopardize its safety. Where such intent cannot be determined, intelligence information about military capabilities may nonetheless be a valuable source for the identification of hazards that could pose an unintentional risk to civil aviation. The available information on existing threats and hazards is the necessary input to the risk assessment process which serves to inform decisions on whether to continue civil aircraft operations over or near conflict zones.

4.1.4 A complete risk assessment is based on an assessment of threat likelihood, consequence, vulnerability and hazards. However, when looking at the risk associated with flying over or near conflict zones, some general assumptions can be made. First, it can be assumed that the reasonable worst-case consequences of successfully downing a passenger aircraft are high, based upon the loss of life and economic repercussions of the attack. Secondly, it can be assumed that for the vast majority of civil aircraft[1] there are no mitigating actions available once it is on a dedicated flight path at cruising altitude when a SAM is deployed. Therefore, the most important risk factor when discussing conflict zones is the threat. The threat likelihood, which is derived from looking at intent and capability of an attack when flying over or near a conflict zone, either intentional or otherwise, is the key driver of the risk assessment and will determine the mitigating actions to be taken, if any. Any mitigating actions to reduce vulnerability will need to take place prior to the flight reaching the conflict zone, so understanding the threat in advance of the operation is the key factor. As such, the risk assessment guidance will focus heavily on a prior threat assessment, starting with the collection of relevant information from any available sources.

1. There are very few civil aircraft that carry anti-missile systems.

4.1.5 For reference, risk assessment methodologies for all risk inputs — threats, hazards, consequences, and vulnerabilities — are included in the Appendices. Additional risk assessment guidance for security is contained in:

- the *ICAO Aviation Security Global Risk Context Statement* (Restricted);
- ICAO Doc 8973, *Aviation Security Manual* (Restricted), Appendix 37;
- ICAO Doc 9985, *Air Traffic Management Security Manual* (Restricted).

Additional risk assessment guidance for safety is contained in ICAO's *Safety Management Manual (SMM)* (Doc 9859) and is complemented by the Safety Management Implementation (SMI) website which serves as a repository for the sharing of examples and tools.

4.2 RISK ASSESSMENT CYCLE

The collection of relevant information, the subsequent threat analysis, the security risk assessment, the hazard identification, the safety risk assessment, and lastly the risk determination constitute necessary steps in the continuous risk assessment cycle (see Figure 4-1). This cycle involves specific processes and decisions to address all aspects of risk exposure. A detailed description and flow chart (Figure 4-2) of the process is outlined in the following section. Emphasis is placed on the ready availability of appropriate information which is a prerequisite for a functioning risk assessment process. The outcome is unique for each aircraft operator or service provider, based on individual risk tolerance.

Figure 4-1. Risk assessment cycle

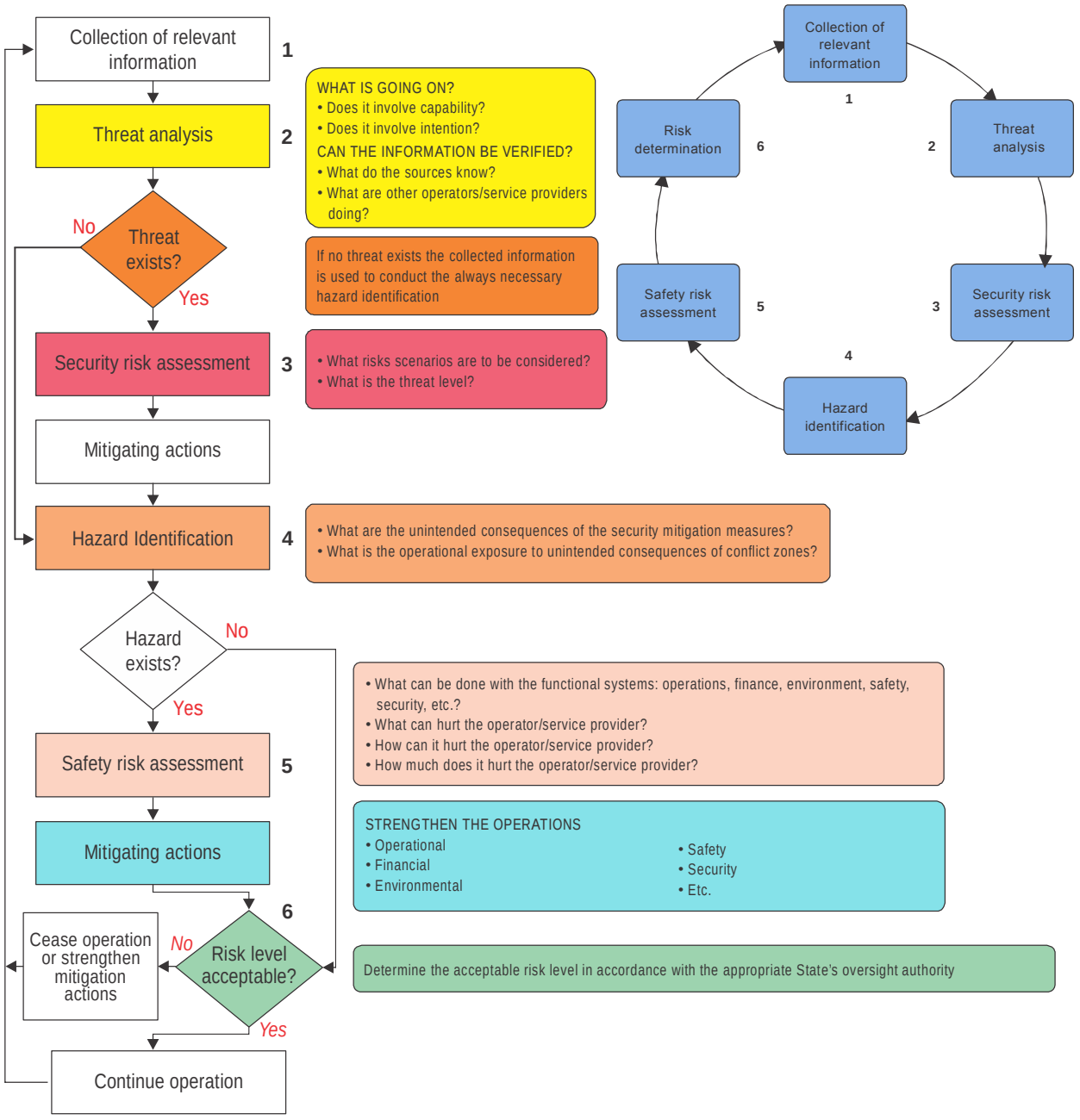


Figure 4-2. Flow chart of the risk assessment cycle for operators and service providers

4.3 COLLECTION OF RELEVANT INFORMATION

4.3.1 Relevant information and intelligence to determine existing threats and hazards may not always be readily available to States, aircraft operators, and ANSPs. States may obtain such information through direct intelligence gathering or through the exchange and sharing of such information with partner States. This information, where available and disseminated, should be the primary source for operators and service providers to conduct their own risk assessment, but should not be considered in isolation if other sources are available.

4.3.2 Aircraft operators and ANSPs may collect relevant information (Step 1 on the flow chart in Figure 4-2) through a variety of available formal and informal sources. There is a clear benefit to cross-validating available information in order to establish a comprehensive risk picture.

Aeronautical information

Most risk information is provided in the form of operating advisories and restrictions in either NOTAMs, AIP supplements, or AICs. These advisories and restrictions concern publications of a State's own sovereign or delegated airspace, or publications directed to its own operators for operations within and outside the State's sovereign airspace.

State — Operator information mechanisms

States may provide relevant information in a discreet and non-public fashion to service providers under their oversight responsibility. The exchange of appropriate information may be conducted through various levels of formality and include non-public details with high value for operational risk assessments.

Membership networks

Informal networks are available to operators through operator alliance networks and commercial entities offering membership to information exchange platforms. Such networks enable a relatively free exchange of information gathered by individual members of the network. The value of the information exchanged through a membership network may be higher than publicly available open source information, as it can provide a certain level of confidentiality to the sources.

Aerodromes

Other sources for local information are the various resident departments, agencies, and other entities at aerodromes with an operational relevance for the conduct of a flight. Such information may be made available directly to the aircraft operator or further disseminated through alliance networks.

Open source

Open source information such as newspapers, magazines, television and information from social media platforms may be used to identify potential threats to the operator's flight routes and destinations. Possible means to stay up to date about risks to the aviation sector and other developments related to security throughout the world are to subscribe to daily newsletters and to regularly consult databases. However, the use of the media as an important source of public information could also introduce a "geographical bias", in which the risks of flying over or near conflict zones that are remote from the operator's geographical home area are not identified.

4.4 THREAT ANALYSIS

4.4.1 Threat analysis focuses primarily on the evaluation of existing intent and capability, based on the information collected, to determine the presence of an intentional act of unlawful interference that could cause the loss of lives. The evaluation of likelihood may be inherently more difficult for threats than for hazards. This is because threat includes a component of intent which is generally not quantifiable, and therefore its assessment is based on qualitative narratives. In many cases information about intent may be classified, for example, because it comes from intelligence sources. Information about capability may also be security classified where it comes from intelligence or military sources; however, such information may to some extent be found in the public domain. Both quantitative and qualitative methods are available to this process, and a combination of historical data as well as scenario-building should be applied to appropriately assess likelihood. Qualitative methods can help to consider, for example, the likelihood of the threat increasing over time or uncertainties that need to be taken into account.

4.4.2 To properly analyse threat, a large amount of data may have to be sorted through, categorized, and scored against existing parameters. When conducting a threat assessment, as part of a larger risk assessment, having clear definitions of the severity of risk inputs is key. These definitions should be established and understood prior to conducting any part of a risk assessment, ensuring a consistent understanding of the relative likelihood of a threat when conducted across a number of scenarios. Appendix A contains a threat scoring methodology example. More examples of these can be found in the ICAO *Aviation Security Global Risk Context Statement* and the ICAO *Aviation Security Manual* (Doc 8973), but creation and application of risk assessments may be dependent upon the operating environment of the State and/or operator and should be developed locally, taking due account of this or any other locally applicable guidance.

4.4.3 If a credible threat can be determined as a result of threat analysis (Step 2 on the flow chart in Figure 4-2), an appropriate security risk assessment (Step 3) must be conducted to determine the feasibility of a continued operation over or near a conflict zone. Where there is capability, but no intent can be established to commit a deliberate act, the available threat information may nevertheless be used to identify appropriate hazards, including any that may arise as unintended consequences of mitigating actions.

4.5 HAZARD IDENTIFICATION

Any information gathered for the conduct of a threat analysis may also be used to identify hazards related to the operation over or near conflict zones. Hazards in this context relate to the operational exposure to unintended consequences emanating from areas with conflict. This includes the identification of existing operational hazards (e.g. weather, high terrain), but also hazards resulting directly from the conflicts (e.g. separation from military traffic, availability of air traffic services). Furthermore, the hazard identification process (Step 4) should also focus on the identification of any unintended consequences that may result from mitigating actions taken in response to an identified threat (e.g. fuel calculations to maintain higher single engine ceiling, or additional fuel for longer routings to avoid conflict zones). Appendix B contains an example of safety risk assessment methodology guidance material.

4.6 RISK ASSESSMENT

4.6.1 The risk assessment process aims to determine the existing risk, focusing on likelihood, vulnerability and consequences of identified threats and hazards. However, as stated in 4.1.4, for the security risk assessment the assumption can be made that the consequences of an aircraft being attacked by a SAM are likely to include the loss of the aircraft and all on board, as well as possible additional casualties on the ground and wider economic costs. Nor are the available mitigating actions and resulting vulnerabilities likely to vary. This is different for the safety risk assessment (Step 5) in terms of unintended consequences of mitigating actions against the threat as stated in 4.5. Furthermore, the

risk assessment process serves as a mechanism to determine the acceptability of the residual risk and to prioritize, identify and establish mitigating actions to lessen the risk. This will help to define if an operation can be continued or needs to be suspended.

4.6.2 There are several ways in which a risk assessment can be conducted. The specific process undertaken by a State, operator or service provider is dependent upon a number of factors, including resources, information that is available, and information that can be collected. Regardless of the risk methodology selected, there are certain characteristics that need to be met, including clearly defined risk inputs, a set scoring methodology for risk, and an understanding of what is an acceptable level of risk.

4.6.3 It is important that the initial assessment of the existing risk be based on the existing threats and hazards without considering any mitigation actions. This allows the determination of whether any measures can and should be applied to reduce the existing risk, and if so, which ones. Because risk assessment is a cyclical process, the residual risk needs to be evaluated in the same way as the initial risk assessment was conducted after any possible mitigation actions have been identified and their implementation factored in. It should be noted that consequences associated with hazards are determined in terms of severity and impact to the affected State, aircraft operators or service providers (Step 6). They should be evaluated by considering loss of lives and equipment, financial loss, reputational impact and other relevant factors.

4.6.4 The illustrative risk assessment process in Figure 4-2 is an inclusive mechanism to determine the correlated operational risk from operations over or near conflict zones and serves as enabler for an informed risk-based decision on the continuation of affected operations. The six components — collection and sharing of relevant information, threat analysis, security risk assessment, hazard identification, safety risk assessment, and risk determination — are complementary in nature and build on interfaces designed to address appropriately any unintended consequences of applied mitigation strategies. It is important to consider this process as a continuous mechanism that should be an ongoing activity. Emphasis is placed on the availability of appropriate information which is the prerequisite for a functioning risk assessment process.

4.6.5 The described risk assessment process is designed as a mechanism that is continuously applied to the relevant operation and initiated by changes in the operating environment or specific time intervals. Furthermore, the process is cyclical and does not conclude with the determination of risk acceptability. The outcomes of the assessment are re-integrated in the volume of available information and applied in the execution of the successive process.

4.6.6 The outcome of the risk assessment process is individual for each operation and may vary between States and between operators and service providers based on the same information, for example, due to different risk acceptability. It is therefore important that the acceptable operational risk may need to be defined in a dialogue between the State and the operators and service providers under the State's oversight authority.

4.6.7 Additional mitigation actions may need to be developed where the determined operational risk level exceeds the organization's risk tolerance. Thus if the determined operational risk is not acceptable, the process needs to identify effective and efficient measures to lower the risk to an acceptable level. These measures are intended to strengthen operation and should be implemented in the functional domain which is most relevant to the identified concern (e.g. a security-related high operational risk may best be addressed through the implementation of mitigating actions in the security domain, whereas a safety-related high risk can be addressed through measures in that domain). However, as noted above, in the case of a potential SAM attack on civil aircraft, the only mitigation action available is likely to be avoidance of the affected airspace. At the same time, implementation of effective mitigating actions may create indirect vulnerabilities that must be monitored by the entity conducting the measures. For example, avoiding airspace over or near a conflict zone may cause greater air traffic in other flight routes, and any safety implications of that must be assessed. Additionally, flying at higher altitudes may require more fuel or a decrease in the aircraft payload. Understanding the costs, benefits, and toll on resources is a key factor when determining mitigation actions.

4.7 THE ROLE OF THE STATE

4.7.1 As previously discussed, any risk assessment requires the availability of appropriate information and results in the determination of risk tolerance. Although there is a requirement in Annex 17 for a State to constantly review the level and nature of threats to civil aviation within its territory, including the airspace above it, as well as a requirement to have established a process to make such information available to its aircraft operators and service providers, there are differences in how each State may implement these requirements.

4.7.2 The spectrum of a State's involvement in the risk assessment and decision-making process to determine acceptable risk may vary from no involvement at all to the promulgation of regulations limiting or prohibiting certain operations. Furthermore, there are differences in how relevant information in support of risk assessments, and possible regulations, are promulgated by States. The extent of information and methods of dissemination largely depend on a State's own capability to gather and process appropriate information as well as its legal powers and duties as regards issuing prohibitive and limiting regulations.

4.7.3 Appendix C provides existing examples of varying degrees of State involvement in the risk assessment and acceptability process for aircraft operations over or near conflict zones. Appendix D provides examples of how some organizations or State authorities share relevant information with other States, aircraft operators and service providers. Example 3 in Appendix D provides a State's civil aviation threat information sharing agreement.

Appendix A

SECURITY RISK ASSESSMENT FACTORS, INFORMATION, SOURCES, METHODOLOGY AND CONCEPT

KEY RISK FACTORS TO BE TAKEN INTO ACCOUNT IN CONDUCTING A RISK ASSESSMENT FOR OPERATIONS OVER OR NEAR CONFLICT ZONES

1. In order to assist the conduct of relevant, geographically-specific risk assessments by States or aircraft operators, the factors which seem most likely to be associated with an elevated level of risk in relation to an attack on overflying civil aircraft using SAMs are presented in this Appendix.

2. As noted in Chapter 2, the risk of an unintentional attack against civilian aircraft is low, but will vary significantly from place to place as a result of events on the ground.

3. The local presence of SAMs is clearly a pre-condition for such an attack. However, complete and reliable information on the military deployment of SAMs will not be available in many cases. Also, their availability is widespread and growing, and many of them are highly mobile. This is therefore only likely to be a useful factor in assessing risk if their presence in an area can be ruled out with high confidence.

4. The existence of armed conflict, internal or external, in an area over which a flight is operating is a significant risk factor. This should be taken to include the threat of conflict where the parties are on a high state of military alert or heightened tension (see Glossary, *Conflict zones*). At any given time, however, the areas (which may include areas over the high seas) that are subject to conflict may be numerous and widespread.

5. For this reason, it may be useful to identify more specific and refined criteria in assessing the risk of an unintentional attack. In that context, when flying over or near conflict zones where it may be assumed that SAMs are available to a party engaged in the conflict, the most important risk factors are considered to be:

a) use of military aircraft in a combat role or for hostile reconnaissance by at least one party in the conflict. Increasingly this could include remotely piloted (unmanned) aircraft;

b) use of aircraft to transport ground troops or military equipment by at least one party (such aircraft may be more difficult to distinguish from civil aircraft, particularly where operating near air corridors and close to civil aircraft cruising altitudes);

c) poorly trained or inexperienced personnel operating SAMs. (This may also be associated with the absence of robust command and control procedures for authorizing launch and is likely to increase the risk of misidentification of civil aircraft.) This risk may be difficult to evaluate, but is likely to be the highest where SAMs may have been acquired by non-State actors;

d) lack of effective air traffic management over the relevant airspace, for example, perhaps due to a conflict situation, or the State responsible for that airspace not being in full control of its own territory, or not able to fulfil its air traffic control, coordination and promulgation obligations; and

e) routeing passes over or close to locations or assets of high strategic importance that may be considered vulnerable to aerial attack in a conflict situation.

6. As noted above, knowledge that SAMs are in the possession of a terrorist group that is known or suspected to be likely to launch an intentional attack on civil aircraft would strongly indicate the need to avoid all airspace that may be within range of attack from areas where such groups are able to freely deploy them.

RELEVANT INFORMATION AND POSSIBLE SOURCES

1. Bearing in mind the key risk factors identified to be taken into account when conducting a risk assessment, States or aircraft operators wishing to conduct their own assessment of the risk of flying over or near a particular zone of conflict or high tension may wish to understand:

a) the types of military equipment available to the parties and, in particular, the likelihood that they may have access to SAMs. This might be evidenced by reporting of the use of missile attacks against military aircraft;

b) the broader military capabilities of parties. Larger State military actors would be more likely to have access to SAMs and the training to use them. At the same time they are likely to have more robust command and control regimes and be better trained in target identification than non-State actors;

c) the nature of the conflict, and in particular whether one side was reported to be using, or was considered likely to use, air power against the other;

d) indications or notifications of the loss of effective control over the relevant airspace by the State or organization responsible for providing air navigation services; and

e) specific areas or locations that may be of particular strategic importance or sensitivity in the context of the conflict, such as key infrastructure or sites of military importance, and which might therefore be considered as likely targets for air attack and are more likely to be guarded by SAMs.

2. Those who do not have reliable access to this sort of information may wish to consider subscribing to services provided by organizations that specialize in providing information and analysis about conflict and security issues. Some aircraft operators are known to be already using such information and analysis to inform their risk assessments.

3. Open source websites can also be used to gather relevant information that could be used in undertaking a risk assessment. In some cases, a membership is necessary to achieve full access.

SECURITY RISK ASSESSMENT METHODOLOGY AND CONCEPT

(Source: Doc 8973 – *Aviation Security Manual*)

1. A risk assessment method is described in this section. This method should assist States and relevant authorities in carrying out their own risk assessment of possible and/or potential concerns and threats in a logical, consistent and clear manner. The same methodology is used by the ICAO *Global Risk Context Statement* (RCS), which serves as a tool for developing evidence-based risk assessments and modifying possible mitigation actions that States may implement to achieve risk-based security programmes.

2. It is readily acknowledged that the responsibility for assessing the nature and level of threat to civil aviation within a State may be delegated to another entity, such as an intelligence service or a military component, and not to the civil aviation authority. This guidance material is provided primarily to assist States in meeting their requirements under Annex 17 to conduct risk assessment processes for civil aviation. The relevant authorities responsible for threat and risk assessment should collaborate in adapting this model as necessary to fit a State's particular circumstances.

3. The described risk assessment method is comparable to existing good practices for risk management systems, adapted to take account of the particular issues associated with the threat from terrorism. The risk assessment process comprises three elements as follows:

a) analysis of plausible threats, likelihoods and consequences;

b) residual risk assessment; and

c) recommendations for further risk-based work and possible mitigation.

4. The key components for completion of the risk assessment are:

a) threat scenario — identification and description of a credible attack comprising a target;

b) likelihood of an attack — the probability or likelihood of that attack being attempted, based on terrorist intentions and capabilities but NOT taking into account current security measures;

c) consequences — the nature and scale of the consequences of the specific attack, in human, economic, political and reputational terms under a reasonable worst-case scenario;

d) current mitigating measures — the relevant SARPs (which may not all be in Annex 17 and which it is normally assumed are being effectively applied; where that is clearly not the case, the residual risk will be higher), national civil aviation security programmes (NCASPs), aviation security programmes (ASPs) and any other factors which assist in mitigating the threat. It is assumed that no threat can be entirely mitigated;

e) residual vulnerability — the extent of the remaining vulnerabilities once the current mitigating measures have been taken into account;

f) residual risk — the overall risk which remains, assuming current mitigating measures have been implemented, taking account of threat likelihood and consequences; and

g) possible additional mitigation — identified measures that Member States, ICAO or others may implement to further mitigate residual risks where necessary.

5. It is important that the risk assessment identify the possible or potential scenarios carefully, being specific and thorough in considering each form of threat. Threats could be directed at air traffic control facilities or navigational equipment, as well as aircraft, including different forms of aviation, such as general aviation, passenger aircraft and cargo-only aircraft. The means and methods by which a threat could be carried out should also be evaluated. This would include how a weapon or explosive device could be constructed or concealed, the means by which it might be conveyed (e.g. whether person- or vehicle-borne) and by whom (e.g. a staff member, passenger or member of the public), how it could be concealed, and how it could be activated or utilized in order to perpetrate an act of unlawful interference.

6. Likelihood, consequences and vulnerability may be scored on a five-point scale from HIGH to LOW. The general meanings of the scores, in each case, are given below.

7. For likelihood:

a) HIGH means a very plausible scenario, with an actual attack of this kind having occurred in the past few years, or strong evidence of capability, intent and planning;

b) MEDIUM-HIGH means a clearly plausible scenario, with relatively recent examples or evidence of early attack planning or hostile reconnaissance;

c) MEDIUM means an essentially plausible scenario, with some evidence of intent and capability and possibly some examples, but no evidence of current attack planning;

d) MEDIUM-LOW means a scenario for which there are no, or no recent, examples, but some evidence of intent, yet with a method apparently not sufficiently developed for a successful attack scenario or probably superseded by other forms of attack; and

e) LOW means a theoretically plausible scenario but with no examples or signs of attack or attack planning, and a theoretical intent but no apparent capability.

8. For consequences, the scores mean that, in a realistic worst-case scenario, the consequences can be expected to be along the lines in Table A-1.

Table A-1. Consequences under each likelihood category

Consequences			
Likelihood	**Human**	**Economic**	**Other**
HIGH	Hundreds of deaths	Billions of dollars	Severe disruption to services and confidence in the aviation system
MEDIUM-HIGH	Some but not all of the HIGH consequences above		
MEDIUM	Tens of deaths	Tens or hundreds of millions of dollars	Substantial disruption to services and confidence in the aviation system
MEDIUM-LOW	Some but not all of the MEDIUM consequences above		
LOW	Possibly some deaths and injuries	Some economic impact	Some disruption to services and confidence in the aviation system

9. For vulnerability:

a) HIGH means no mitigating measures are in general effect, either because there is no Annex 17 requirement or because no realistic effective measures are available;

b) MEDIUM-HIGH means that mitigation has a limited scope and that important areas and aspects of the risk are not covered by Annex 17, NCASPs and ASPs requirements or measures in general effect;

c) MEDIUM means that features of both MEDIUM-HIGH and MEDIUM-LOW are present;

d) MEDIUM-LOW means that mitigating measures are generally in place, but they may be immature or only partially effective. For instance, the broad national requirements may be in place for all areas and aspects, but they are capable of being further developed or better implemented in practice; and

e) LOW means that clear Annex 17, NCASPs and/or ASPs requirements exist and that mitigating measures generally regarded as effective are in widespread use.

10. Each plausible scenario identified is then given a residual risk score on a five-point scale based on a combination of the assessed scores for likelihood, consequences and vulnerability.

11. Each score enables each threat scenario to be ranked on a five-point scale in terms of residual risk. This relative ranking is not a perfect science and involves some elements of judgement, but it reflects a consensual analysis based on the information available at the moment. The final rankings should inform policy-making. Local circumstances differ, and States should take into account all credible risks in their national risk assessments. In addition, the different elements of the risk assessment may evolve over time, for example, if there is a change in the threat picture or if new mitigating measures are implemented, and it is therefore important to keep these assessments under periodic review.

Appendix B

EXAMPLE OF A SAFETY RISK ASSESSMENT METHODOLOGY

(Source: Doc 9859 – *Safety Management Manual (SMM)*)

1. Safety risk probability

1.1 Safety risk probability is the likelihood that a safety consequence or outcome will occur. It is important to envisage a variety of scenarios so that all potential consequences can be considered. The following questions can assist in the determination of probability:

a) Is there a history of occurrences similar to the one under consideration, or is this an isolated occurrence?

b) What other equipment or components of the same type might have similar issues?

c) What is the number of personnel following, or subject to, the procedures in question?

d) What is the exposure of the hazard under consideration? For example, during what percentage of the operation is the equipment or activity in use.

1.2 Taking into consideration any factors that might underlie these questions will help when assessing the probability of the hazard consequences in any foreseeable scenario.

1.3 An occurrence is considered foreseeable if any reasonable person could have expected the kind of occurrence to have happened under the same circumstances. Identification of every conceivable or theoretically possible hazard is not possible. Therefore, good judgment is required to determine an appropriate level of detail in hazard identification. Service providers should exercise due diligence when identifying significant and reasonably foreseeable hazards related to their product or service.

Note.— Regarding product design, the term "foreseeable" is intended to be consistent with its use in airworthiness regulations, policy, and guidance.

1.4 Table B-1 presents a typical safety risk probability classification table It includes five categories to denote the probability related to an unsafe event or condition, the description of each category, and an assignment of a value to each category. This example uses qualitative terms; quantitative terms could be defined to provide a more accurate assessment. This will depend on the availability of appropriate safety data and the sophistication of the organization and operation.

Table B-1. Safety risk probability table

Likelihood	Meaning	Value
Frequent	Likely to occur many times (has occurred frequently)	5
Occasional	Likely to occur sometimes (has occurred infrequently)	4
Remote	Unlikely to occur, but possible (has occurred rarely)	3
Improbable	Very unlikely to occur (not known to have occurred)	2
Extremely improbable	Almost inconceivable that the event will occur	1

Note.— This is an example only. The level of detail and complexity of tables and matrices should be adapted to the particular needs and complexities of each organization. It should also be noted that organizations might include both qualitative and quantitative criteria.

2. Safety risk severity

2.1 Once the probability assessment has been completed, the next step is to assess the severity, taking into account the potential consequences related to the hazard. Safety risk severity is defined as the extent of harm that might reasonably be expected to occur as a consequence or outcome of the identified hazard. The severity classification should consider:

a) fatalities or serious injury which would occur as a result of:

   i) being in the aircraft;

   ii) having direct contact with any part of the aircraft, including parts which have become detached from the aircraft; or

   iii) having direct exposure to jet blast; and

b) damage:

   i) damage or structural failure sustained by the aircraft which:

      1) adversely affects the structural strength, performance or flight characteristics of the aircraft;

      2) would normally require major repair or replacement of the affected component;

   ii) damage sustained by ATS or aerodrome equipment which:

      1) adversely affects the management of aircraft separation; or

      2) adversely affects landing capability.

2.2 The severity assessment should consider all possible consequences related to a hazard, taking into account the worst foreseeable situation. Table B-2 a typical safety risk severity table. It includes five categories to denote the level of severity, the description of each category, and the assignment of a value to each category. As with the safety risk probability table, this table is an example only.

Table B-2. Example safety risk severity table

Severity	Meaning	Value
Catastrophic	• Aircraft/equipment destroyed • Multiple deaths	A
Hazardous	• A large reduction in safety margins, physical distress or a workload such that operational personnel cannot be relied upon to perform their tasks accurately or completely • Serious injury • Major equipment damage	B
Major	• A significant reduction in safety margins, a reduction in the ability of operational personnel to cope with adverse operating conditions as a result of an increase in workload or as a result of conditions impairing their efficiency • Serious incident • Injury to persons	C
Minor	• Nuisance • Operating limitations • Use of emergency procedures • Minor incident	D
Negligible	• Few consequences	E

3. Safety risk tolerability

3.1 The safety risk index rating is created by combining the results of the probability and severity scores. In the example above, it is an alphanumeric designator. The respective severity/probability combinations are presented in the safety risk assessment matrix in Table B-3. The safety risk assessment matrix is used to determine safety risk tolerability. Consider, for example, a situation where the safety risk probability has been assessed as Occasional (4), and the safety risk severity has been assessed as Hazardous (B), resulting in a safety risk index of (4B).

Table B-3. Example safety risk matrix

Safety Risk		Severity				
Probability		**Catastrophic A**	**Hazardous B**	**Major C**	**Minor D**	**Negligible E**
Frequent	5	5A	5B	5C	5D	5E
Occasional	4	4A	4B	4C	4D	4E
Remote	3	3A	3B	3C	3D	3E
Improbable	2	2A	2B	2C	2D	2E
Extremely improbable	1	1A	1B	1C	1D	1E

Note.— In determining the safety risk tolerability, the quality and reliability of the data used for the hazard identification and safety risk probability should be taken into consideration.

3.2 The index obtained from the safety risk assessment matrix should then be exported to a safety risk tolerability table that describes — in a narrative form — the tolerability criteria for the particular organization. Table B-4 presents an example of a safety risk tolerability table. Using the example above, the criterion for safety risk assessed as 4B falls in the "intolerable" category. In this case, the safety risk index of the consequence is unacceptable. The organization should therefore take risk control action to reduce:

a) the organization's exposure to the particular risk, i.e., reduce the probability component of the risk to an acceptable level;

b) the severity of consequences related to the hazard, i.e., reduce the severity component of the risk to an acceptable level; or

c) both the severity and probability so that the risk is managed to an acceptable level.

3.3 Safety risks are conceptually assessed as acceptable, tolerable or intolerable. Safety risks assessed as initially falling in the intolerable region are unacceptable under any circumstances. The probability and/or severity of the consequences of the hazards are of such a magnitude, and the damaging potential of the hazard poses such a threat to safety, that mitigation action is required or activities are stopped.

Table B-4. Example of safety risk tolerability

Safety risk index range	Safety risk description	Recommended action
5A, 5B, 5C, 4A, 4B, 3A	INTOLERABLE	Take immediate action to mitigate the risk or stop the activity. Perform priority safety risk mitigation to ensure additional or enhanced preventative controls are in place to bring down the safety risk index to tolerable.
5D, 5E, 4C, 4D, 4E, 3B, 3C, 3D, 2A, 2B, 2C, 1A	TOLERABLE	Can be tolerated based on the safety risk mitigation. It may require management decision to accept the risk.
3E, 2D, 2E, 1B, 1C, 1D, 1E	ACCEPTABLE	Acceptable as is. No further safety risk mitigation required.

Appendix C

DIFFERENCES BETWEEN THE GUIDANCE PROVIDED BY STATES IN THE RISK ASSESSEMENT PROCESS[1]

1. States play a major role in decision-making processes related to conflict zones because they usually have more possibilities for aggregating intelligence than do aircraft operators, ANSPs and other concerned organizations. Operators and ANSPs normally choose from the available flight routes. The ICAO Secretariat has contacted a number of States[2] to provide information on their risk assessment mechanisms, and this Appendix reflects the mechanisms that were shared to date. ICAO encourages States that are willing to do so to share this information to be included in future amendments of this Appendix.

2. The differences between States are characterized by two extremes as illustrated in Figure C-1. One extreme involves States in which the authorities do not, or virtually do not, provide any guidance for the aircraft operators and ANSPs; while the other extreme involves States in which the authorities play a profoundly regulatory role. In between, there are States that go no further than (informally) providing operators with information and States that issue recommendations. These advisories and restrictions concern publications produced by a State about its own sovereign or delegated airspace over high seas, or publications directed to its own operators for operations within and outside the State's sovereign airspace. There are, broadly speaking, four types of practices, as follows:

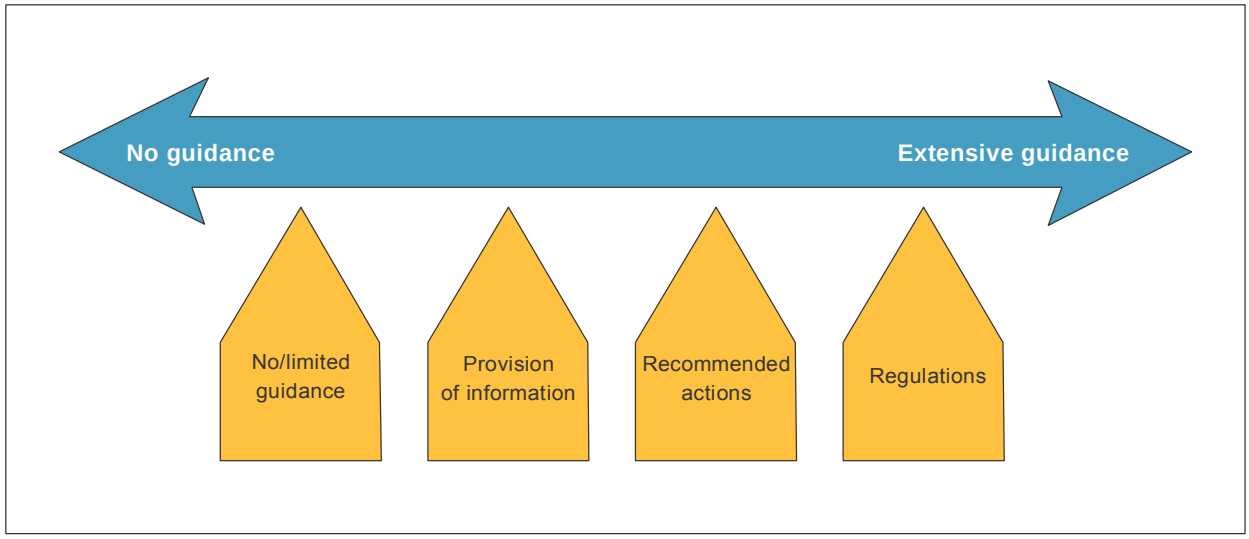


Figure C-1. Differences between authorities in the degree of guidance they offer [source: Dutch Safety Board]

1. Based on the MH17 Crash Final Report – Dutch Safety Board.
2. Argentina, Australia, Brazil, Canada, China, France, Japan, Malaysia, Netherlands, New Zealand, Nigeria, Republic of Korea, Russian Federation, Senegal, Singapore, South Africa, United Arab Emirates, United Kingdom, and the United States.

Example 1: No or limited guidance from the authorities

The national authorities do not interfere or they strictly limit their interference in the selection of flight routes of their aircraft operators, which may involve flight in foreign airspace over or near conflict zones. In such a State, for example, the authorities focus solely on domestic security. This also applies to aerodromes. Authorities in these States do not advise their own operators or provide them with information about flying over or near foreign conflict zones. A State that adopts a detached role considerably reduces the chance of its aircraft operators and ANSPs being able to receive confidential information related to the potential lack of safety along one of its flight routes. This increases the need for those operators and ANSPs to actively aggregate relevant information, and not all of them have equivalent resources for doing so. When the lack of resources are not counterbalanced with outsourcing or other means, this will result in less than optimal risk assessments.

Example 2: Information provided by the authorities

These national authorities provide their operators and ANSPs with threat-related information to support the operator's or ANSP's threat analysis, risk assessment and decision-making processes. The way in which authorities provide information in this practice differs from one State to another, and may involve formal or informal means, such as:

- the national authority provides operators and ANSPs with *informal* information only to support their risk assessment and decision-making processes. Unofficial (informal) information is aggregated by means of personal relationships, and trust plays a major role in these types of informal contacts; in many cases, it concerns information that originates from the intelligence services, which must be protected. As a result, it is possible that not all operators and ANSPs have access to the same information sources.

- the national authority provides operators and ANSPs with information on a *formal* basis. In this case, there is a formal procedure that regulates the provision of information and the handling of confidential information. Information is provided via an officially designated contact at a government service. Operators and ANSPs can also report any information they may have to this contact.

Netherlands

The Expert group has representatives of several national airlines, intelligence services, state authorities, the Ministry of Foreign Affairs and is chaired by the National Coordinator for Security and Counterterrorism (NCTV) and co-chaired by the Director of the Civil Aviation Department of the Ministry of Infrastructure and the Environment. The Expert group meets on a regular basis or ad hoc when there is concrete information about a specific and immediate threat to civil aviation. The airlines will be informed immediately through or in consultation with the NCTV. The airline representatives provide information about the choices they make when planning their routes and preparing flights, based on information they have collected internally and via contacts with other airlines. The authorities check what information is available at their level and eventually what other States have for information. The Expert group is also used to prepare the input for the European meetings, coordinated by the European Commission and to discuss feedback. This information is used by EASA to draft Conflict Zone Information Bulletins (CZIB).

The airlines remain responsible for their own risk assessments and decisions. The government has no legal power to force airlines not to fly in a specific part of airspace outside the national airspace. The Netherlands has not developed a national website but is making use of the EASA website with the CZIBs.

Example 3: Recommendations provided by the authorities

National authorities not only (informally) provide their national operators with threat-related information, but also provide aviation-specific risk analyses or issue a recommendation based on this information. Some States also issue formal (whether urgent or not) recommendations and warnings, e.g., in the form of NOTAMs or AICs, about destinations and flight routes outside the State's own airspace. The operators include this advice in their decision-making process.

France

The French Risk Assessment Unit (Pôle d'Analyse du Risque pour l'Aviation Civile - PARAC) from the Direction Générale de l'Aviation Civile (DGAC), performs risk analysis to support decision-making of the French government. Some risk analyses are made available to the operators, on a need-to-know basis. Regarding to the specific risk arising from conflict zone overflights, the PARAC, based on the intelligence made available by the relevant services, publishes some NOTAMs, gathered in a single AIC, which include three levels:

1. Recommendation not to enter into a given airspace;
2. Recommendation for overflight of a given airspace above a certain altitude; or
3. Recommendation for overflight of a given airspace with specific vigilance.

Example 4: Regulation by the authorities

Regulation by the national authorities. For example, authorities can prohibit operators based in that State from flying to specific destinations or from using (part of) foreign airspace. Based on the State's intelligence and threat and risk analyses, the information is issued in the form of NOTAMs or as an emergency order. States that can impose overflight bans on their aircraft operators offer an additional mechanism for limiting risks, although such States may use these tools only exceptionally since they represent a shift in the distribution of risk responsibility from the operators to national authorities. This may be appropriate where, for example, the State is aware of relevant information that it is not able to disseminate more widely to be factored into operators' own risk assessments.

United Kingdom

The Department for Transport (DfT) receives intelligence and threat analyses from the Joint Terrorism Analysis Centre (JTAC), which was set up in 2003 and is staffed by various United Kingdom intelligence organizations and government departments. JTAC gathers raw intelligence and uses it to identify trends, including implications for the civil aviation sector, before making the threat analyses available to DfT. DfT then translates the airspace threats identified by JTAC into a risk analysis and, based upon this, makes the advice available to all United Kingdom aircraft operators as a basis for their own risk assessments. If necessary, DfT can take several steps, including issuing NOTAMs to United Kingdom aircraft operators. Depending on the risk level identified in an area, NOTAMs may take the form of:

1. Low-level risk. Warning: "Operators urged to conduct their own risk assessments and take the information provided into account";

2. Medium-level risk. Advice: "Guidance to avoid", DfT advises aircraft operators not to overfly or only overfly above a certain specified altitude; or

3. High-level risk. Legally-binding direction: "Aircraft operators shall not enter the airspace".

United States

The Federal Aviation Administration (FAA) monitors, evaluates, and responds to situations such as those in which a conflict or fighting, heightened tensions, military or paramilitary action, terrorist activity, and/or other weapons-related hazards may pose a risk to the safety of United States civil aviation operating in airspace managed by another State. The FAA will conduct a risk-based assessment of the potential hazard to United States civil aviation using an internal methodological framework and available intelligence threat information from across the United States government. In appropriate circumstances, the FAA may engage with the appropriate authorities of other States regarding hazards to United States civil aviation operating in airspace managed by those States or by other States. If the FAA determines that a hazard to United States civil aviation exists and that sufficient protective measures have not or may not have been taken by the State responsible for managing the affected airspace, the FAA may issue a flight advisory or prohibition for United States civil aviation, as appropriate. FAA flight advisories and prohibitions issued due to hazards to United States civil aviation operations in airspace managed by another State may take the following forms:

1. Advisory Notice to Airmen (NOTAM): Advises United States civil aviation of a risk to their operations in a specified area; does not prohibit United States civil aviation operations;

2. Flight Prohibition NOTAM: Issued as an emergency order of the FAA Administrator that prohibits United States civil flight operations in specified areas; or

3. Flight Prohibition Special Federal Aviation Regulation (SFAR): Issued as a follow-up action to a flight prohibition NOTAM, unless the hazard to United States civil aviation has abated. Prohibits United States civil flight operations in specified areas; published as a United States federal regulation.

Note: The Office of the Secretary of Transportation of the United States Department of Transportation prohibits foreign air carriers from carrying their United States code-sharing partners' code on any flight that enters, departs, or transits airspace of any area for whose airspace the FAA has issued a flight prohibition.

Appendix D

EXAMPLES OF HOW ORGANIZATIONS OR STATES SHARE INFORMATION BETWEEN STATES, AIRCRAFT OPERATORS, AND SERVICE PROVIDERS FOR EXCHANGE AND PROMULGATION OF INFORMATION

Example 1: Contingency Coordination Team (CCT)

ICAO-IATA CCT for the Middle East and North Africa

1. The ICAO Middle East (MID) Office upon receipt of information from any source (IATA, States, media, internal or external source, etc.) initiates the coordination with ICAO, IATA and the States concerned and closely monitors the situation. The notification procedures are reflected in Table D-1. A CCT would be established once the conclusion had been reached that one was needed.

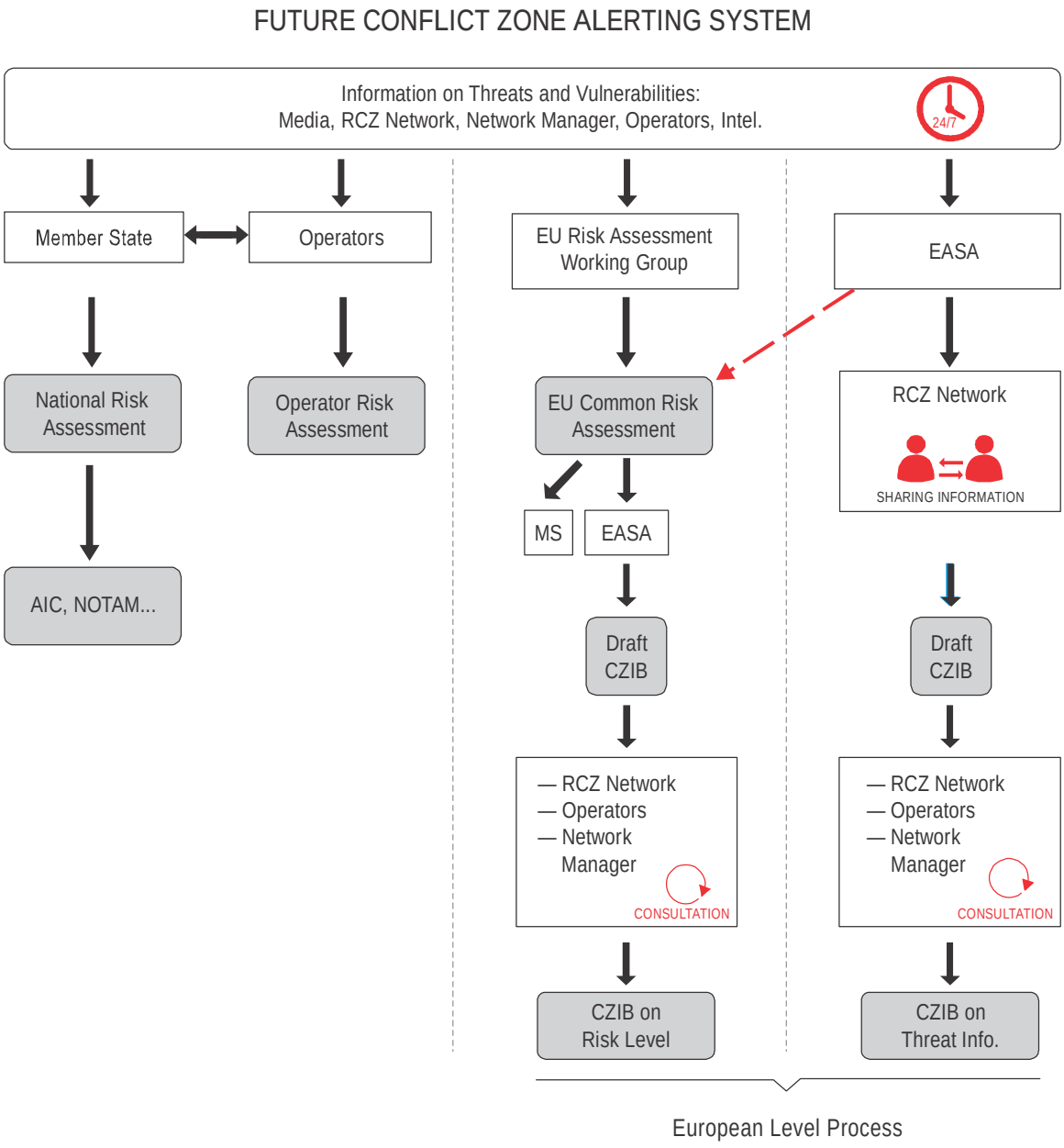
2. The CCT should be composed of ICAO (Headquarters and the Regional Offices concerned) and IATA as permanent members in addition to the States concerned and international and regional organizations. The CCT's scope, participation and duration depend on the contingency event and the associated impact on the air operations across the MID Region or on the interregional cross-border operations of the Middle East air carriers.

3. The ICAO MID Office maintains close liaison with the States concerned in accordance with the procedures in Table D-1, activates/deactivates the CCTs, issues updates, and conducts teleconferences and face-to-face meetings as required. From its side, IATA coordinates with the operators in order to address the operators' views and needs and keeps close coordination with the ICAO MID Office.

Table D-1. Notification/coordination process

Airspace avoidance				
Operators	**Airline actions**	**IATA actions**	**ICAO MID Office**	**States/ANSPs**
Monitor global activities that have an effect on flight operations (currently in place)	NONE	NONE	NONE	NONE
Review State activity that requires operator safety and security review (currently in place)	Notify IATA as to effected FIR and factors under review. (security and/or safety)	When more than [30%] of operators reporting, notify ICAO MID	Call for the Contingency Coordination Team (CCT)	NONE
Identify specific factors and pending trigger events (currently in place)	Inform IATA on review findings and possible trigger events	Inform CCT on findings and number of operators reporting	Notify effected States/ANSP on number of operators reviewing current activity	NONE
Event triggered: review avoidance options and select avoidance scenario	Inform IATA of selected scenario and volume/initial timelines.	Inform CCT	Notify effected States/ANSP of scenario and volume/timelines	Review scenario and give feedback on feasibility
48 hours prior to activation of planned avoidance re-routes	Notify IATA	Notify CCT	Notify effected States/ANSP	Prepare NOTAMS and avoidance scenario
24 hours prior to activation of planned avoidance re-routes	Notify IATA	Notify CCT	Notify effected States/ANSP	Publish NOTAMs

Example 2: European High-Level Task Force on Conflict Zones



Notes:
The three workflows, which are presented in parallel, are iterative and interdependent.
The red dashed line means that EASA will initiate the request for a common risk assessment towards Commission services, if possible on a short-term basis.

Example 3: Voluntary Civil Aviation Threat Information Sharing Agreement

Voluntary agreement between [name State, operators, and other parties] to ensure at the national level that threat information is shared between the government and [national] operators so that the operators can carry out a thorough risk analysis based in part on this information in order to ensure the safety of their flight operations.

Parties:

1) The State [name], represented in this matter by: [name(s) of person(s) involved]
   hereinafter referred to as “the government”.

2) [name of operator(s)], represented in this matter by [name of person],

3) [name of operator(s)], represented in this matter by [name of person],

4) Etc.

   hereinafter referred to as “the operators”.

5) [optional: national airline pilot association, represented in this matter by the president]

hereinafter jointly referred to as the Parties.

Considering:

- that the operators are responsible for determining their own flight routes;
- that it is of great importance that the operators have access to useful, accurate and relevant threat information so that flights can be operated as safely as possible;
- that the government works to ensure that the International Civil Aviation Organization (ICAO) and [name(s) of other (regional) civil aviation organization(s)] explicitly include “flying over conflict zones” in the risk assessment which is part of the safety management system that operators are required to have in place under international regulations;
- that the operators cannot through their own investigations gain access to all non-public threat information that is relevant to civil aviation;
- that the government, specifically the Intelligence and Security Services (“the services”), does not have a legal duty (and consequently has no special powers) to carry out independent investigations into the flight safety of foreign airspace with regard to civil aviation or into the safety of flying to and from foreign airports;
- that relevant threat information may be incidentally collected by the government during the course of other investigations;
- [any relevant regulatory national obligations regarding the Intelligence and Security Services;]
- that it is important in such cases for the operators to receive the information, or a summary or analysis thereof, so that they can include it in their risk analysis for the safe operation of flights;

- that it is also important for the operators to be able to share information from their own sources with each other and with the government;

- that the Parties consider it important to secure their agreements regarding the exchange of available threat information relevant to civilian aviation between the government and the operators;

- that the services have a good working relationship with the operators;

- that the State ensures that the services have at their disposal the capacity and resources needed to implement the voluntary agreement;

- [optional: that the national airline pilot association, as the professional association of pilots, considers a proper information exchange, at least as laid down in this voluntary agreement, essential for its members to be able to practice their profession;

- that the national airline pilot association has an interest in an efficient sharing of information for the safety of aviation, but has no operational responsibility for the actual exchange of information;]

- that regular consultations should take place between the Parties for the purpose of exchanging threat information;

- that the Parties wish to lay down further arrangements concerning their cooperation in this voluntary agreement.

Agree as follows:

Article 1
(Definitions)

The following definitions are used in this voluntary agreement:

1) Threat information: personal information, relevant in the context of this voluntary agreement, to which the Parties have access and which, on the basis of analysis, they believe points to a situation that poses a risk to civil aviation;

2) Expert group: the “civil aviation threat information” expert group;

3) Steering group: the “civil aviation threat information” steering group.

Article 2
(Aim of this voluntary agreement)

The aim of this voluntary agreement is to ensure at a national level that the government and the operators share threat information so that the operators can carry out a thorough risk analysis, based in part on this information, in order to ensure the safety of their flight operations outside [State] airspace.

Article 3
(Establishing a civil aviation threat information steering group and expert group)

1) The Parties agree to establish a civil aviation threat information steering group. Each party appoints a representative to participate in the steering group.

2) The government and the operators agree to establish a civil aviation threat information expert group. Each participant appoints one or more representatives to participate in the expert group. In light of the confidential nature and classification level of the information, all representatives must be in possession of a declaration of no objection for civil aviation, or must have been screened at a comparable or higher level.

Article 4
(Working method)

1) The steering group is tasked with ensuring that the voluntary agreement is implemented properly and making adjustments if there is reason to do so.

2) The expert group is tasked with sharing and discussing non-public threat information that is relevant to civil aviation in a confidential setting. This applies to both acute and specific threat information and non-acute and non-specific threat information.

3) In order to carry out the task referred to in paragraph 4(2), the operators provide the expert group with any threat information they have and share information about the choices they make concerning flight routes over conflict zones on the basis of their safety management system. It is an obligation for all participating operators to share information regarding their actual route networks.

4) Operators also share route information for existing and planned routes with the government member or members of the expert group twice a year.

5) In order to carry out the task referred to in paragraph 4(2) and on the basis of, inter alia, the information referred to in paragraphs 4(3) and 4(4), the government provides the expert group with any threat information or other information it has received from various sources which, on the basis of analysis, it believes points to a situation which poses a possible risk to aviation security.

6) The expert group also:

a) deals with policy matters that are relevant in the context of the voluntary agreement, including methods for sharing information and coordinating input in international forums ([names of forums]);

b) discusses contingency plans and submits non-urgent questions and/or findings; and

c) requests specific information from operators, for example, about certain regions or airports.

7) As soon as the services have concrete information about a specific and immediate threat to civil aviation, the operators will be informed at once through or in consultation with [name of responsible national entity]. The expert group can then call an ad hoc meeting to further discuss this threat information.

8) The Parties provide the expert group with the threat information and information about the choices they make on the basis of it, but the Parties are not responsible for ensuring the information shared is correct, reliable or complete. Other Parties use this information at their own risk and responsibility.

Article 5
(Meetings)

1) Steering group and expert group meetings are chaired by the [name of responsible national entity] and co-chaired by the [name of responsible national entity].

2) The steering group meets at least once a year.

3) In principle, the expert group meets once every three months and can hold ad hoc meetings at the request of any of the participants.

Article 6
(Confidentiality)

The Parties undertake to keep the information shared in the context of this voluntary agreement confidential and to refrain from disclosing any part or all of it to third parties, unless they are required to do so by law, court judgment or this voluntary agreement.

Article 7
(Enforceability)

This voluntary agreement is not legally enforceable.

Article 8
(Disputes)

All disputes between Parties relating to the present agreement are settled in close consultation between the Parties without the involvement of the courts.

Article 9
(Amendments and termination)

1) If circumstances arise that could warrant amendments to the present agreement, including expanding the number of Parties, the steering group will discuss whether amendment is necessary.

2) Amendments to the present agreement must be approved by the Parties in writing.

3) Any Party can terminate the present agreement with immediate effect by informing the chair of the steering/expert group in writing.

4) If one Party terminates the agreement, it will remain in effect for the other Parties in so far as the substance and spirit of the agreement do not dictate otherwise.

5) The provisions in Article 6 of this voluntary agreement continue to apply after termination.

Article 10
(Entry into force and duration)

1) This voluntary agreement enters into force for a period of five years from the date of signature by the last Party.

2) The Parties will evaluate the implementation and effectiveness of this voluntary agreement every year, starting one year after it enters into force.

3) The Parties agree to hold consultations about continuing the voluntary agreement no later than three months before the end of the period referred to paragraph 10(1).

4) The provisions in Article 6 of this agreement continue to apply after termination.

Article 11
(Publication in the [name of governmental source])

1) The text of this voluntary agreement will be published in the [name of governmental source] no later than one month after the agreement enters into force.

2) If this voluntary agreement is amended, paragraph 11(1) applies mutatis mutandis.

3) If this voluntary agreement is terminated, notice will be given in the [name of governmental source].

Article 12
(Final provisions)

This voluntary agreement may be cited as “Voluntary agreement on sharing information regarding threats to civil aviation”.

Agreed and signed on [date] respectively by the Parties to this agreement.

— END —

ISBN 978-92-9258-458-0