FLIGHT SAFETY FOUNDATION

Factual inquiry into the airspace closure above and around eastern Ukraine in relation to the downing of Flight MH17

Flight Safety Foundation

JANUARY 2021

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About Flight Safety Foundation

Flight Safety Foundation is an independent, nonprofit, international organization exclusively chartered to provide impartial research, education, advocacy, and communications in the field of aviation safety. Founded in 1947, the Foundation brings together aviation professionals from all sectors to help solve safety problems facing the industry. With membership throughout the world, the Foundation brings an international perspective to aviation issues for its members, the media and the traveling public.

The Foundation is in a unique position to identify global safety issues, set priorities and serve as a catalyst to address these concerns through data collection and information sharing, training, safety standards, best practices and toolkits. The Foundation strives to bridge proprietary, cultural and political differences in the common cause of advancing global aviation.

Many of the safety issues the Foundation has addressed over the decades have evolved as air travel has grown and technology and training have improved. The stellar safety record of the aviation industry speaks to the progress that has been made.

One of the issues that the Foundation has focused on involves the risk to airliners that fly over conflict zones. Threats to commercial aviation due to hostile activity in conflict regions around the world are a continuing concern. In 2020, there were two such occurrences. On 8 January 2020, Ukraine International Airlines Flight 752 was shot down shortly after takeoff from Tehran Imam Khomeini International Airport, resulting in 176 fatalities. On 4 May 2020, an East African Express Airways aircraft was shot down on approach to Berdale airport in Somalia, resulting in six fatalities.

The Foundation has long been involved in working to mitigate civil aviation conflict zone risk. In August 2014, just weeks after the downing of Malaysia Airlines Flight MH17 over eastern Ukraine, the Foundation's chairman was chosen to lead the International Civil Aviation Organization's (ICAO) Task Force on Risks to Civil Aviation Arising from Conflict Zones. The ICAO Task Force produced important recommendations to mitigate the risks to civil aviation which were incorporated into ICAO's *Risk Assessment Manual for Civil Aircraft Operations Over and Near Conflict Zones*.

The Foundation continues its global campaign on heightened awareness of, and action on, conflict zone risk to civil aviation. Within the context of a still-prominent risk, this report attempts to advance the understanding of risk assessment of attacks from the ground on civil aircraft and on the state processes for integrated airspace security risk assessment.

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Executive Summary

Purpose

Flight Safety Foundation (the Foundation) conducted an inquiry into the circumstances that led to a partial closure of the airspace above and adjacent to eastern Ukraine in the three-month period prior to the 17 July 2014 shoot-down of Malaysia Airlines Flight MH17.

The intent of the inquiry was to analyse airspace closure decisions made by authorities in both Ukraine and the Russian Federation, and to understand the processes used in making those decisions as well as the information on which the decisions were based. The elements of the inquiry are defined further in the Scope.

Background

On 17 July 2014, Flight MH17, flying from Amsterdam to Kuala Lumpur, was downed over eastern Ukraine, where, at the time, an armed conflict was taking place. Tragically, all 298 passengers and crew lost their lives. While there were other losses of airliners as a result of military conflict over the previous decades, the loss of Flight MH17 constituted a watershed moment that galvanized the international community to proactively address the continuing threat to civil aviation arising from conflict zones.

In July 2014, the United Nations Security Council adopted a resolution related to the downing of Flight MH17. This was followed by an International Civil Aviation Organization (ICAO) State letter, issued to draw the attention of ICAO Member States to the international provisions specifying state responsibilities with respect to the safety and security of civil aircraft operating in airspace affected by conflict.

ICAO established a senior-level Task Force to address issues related to the safety and security of civil aircraft operating in airspace affected by conflict. The chairman of the Foundation's Board of Governors was elected as the chairman of the Task Force. The Task Force developed a report, which included recommendations to address the threat of military conflict to civil aviation. It urged the international community to implement protocols to prevent similar events from happening. These recommendations included threat assessment, sharing of threat information, and timely and effective management of aircraft operations and airspace.

The 36-state ICAO Council reviewed the report of the Task Force and in October 2014, approved the conflict zone work program. The Council also unanimously adopted a resolution condemning the downing of Malaysia Airlines Flight MH17 over eastern Ukraine.

The technical investigation into the causes of the Flight MH17 crash was conducted by the Dutch Safety Board (DSB) after Ukraine delegated this authority to the Netherlands. The report of the DSB aimed at answering four key questions:

- What caused the crash of Flight MH17?
- How and why were decisions made to use Flight MH17's flight route?
- How is the decision-making process related to flying over conflict zones generally organized?
- What lessons can be learned from the investigation to improve flight safety and security?

The final report by the DSB was published on 13 October 2015.

Foundation research builds upon the information contained in the DSB's report and attempts to enlarge the scope and deepen understanding of the factual circumstances underlying the airspace restrictions both above the territory of Ukraine and above the territory of the Russian Federation.

Scope

This inquiry is focused on the factual circumstances surrounding the decision-making regarding the closure of airspace above and around eastern Ukraine from 1 March 2014 up to and including the moment of complete closure

of that airspace after the downing of Flight MH17 on 17 July 2014. In addition, this inquiry will provide contextual background, through a representative inventory of state practices 20 to 30 years prior to 2014, regarding the use by civil aviation of airspace above conflict zones.

This inquiry was conducted from April 2020 to January 2021.

The scope of the inquiry did not include drawing (normative) conclusions on the question of whether, prior to the moment of the downing of Flight MH17, responsible authorities did or did not take adequate measures to prevent the downing of the aircraft.

The following elements were covered within the scope of the inquiry:

- A study of previous hostile events and state practice in regard to the use by civil aviation of airspace above conflict zones.
- An inquiry into the facts concerning the closure of airspace above eastern Ukraine as of 1 March 2014 up to and including the moment of complete closure of that airspace subsequent to the downing of Flight MH17 on 17 July 2014.
- An inquiry into the facts concerning the closure of airspace above the territory of the Russian Federation bordering eastern Ukraine as of 1 March 2014 up to and including the moment of complete closure of that airspace subsequent to the downing of Flight MH17 on 17 July 2014.

In this report, in accordance with ICAO and the other referenced sources, the terms "airspace restriction"[1] and "airspace closure"[2] are used interchangeably. Wherever applicable, these terms are used with the addition of their vertical limits.

Inquiry Limitations

There are a number of limitations associated with carrying out this inquiry that should be considered. The limitations are related to the characteristics of the scope, purpose, and approach to the inquiry and to the sources and quality of information available for use in the inquiry. Readers of the report should keep in mind the following:

- The findings about airspace closure decisions in Ukraine and the Russian Federation are based on two specific sources of information: (a) public source information available during 2020 discovered by the Foundation and (b) information received by the Foundation from Ukraine and the Russian Federation through responses to questionnaires. Other sources of information, such as private sources and information from intelligence services, were not available for the inquiry.
- The findings from the hostile events analysis and from the historical conflict zones analysis are based on the information discovered by the Foundation from public sources.
- The inquiry into airspace closure decisions in Ukraine and the Russian Federation is focused on information about: (a) the threat awareness of the authorities responsible for airspace security risk analysis and decision-making and not about the potential threat awareness of other entities within each government, and (b) facts reported publicly by organisations and authorities and does not include conclusions and inferences from these facts made by organisations and authorities.
- The inquiry was carried out remotely due to COVID-19 travel restrictions. The Foundation requested access to engage directly with identified relevant authorities and specialists in Ukraine and the Russian Federation, which would have been possible through teleconferencing or video conferencing. Ultimately, Ukraine and the Russian Federation preferred providing information through written questionnaires developed by the Foundation. Information was transmitted via the respective diplomatic channels. The Foundation does not have visibility on how the information was collected and processed within the relevant authorities in the two countries.
- The process of sending questionnaires, waiting for the written responses and then processing those responses took considerable time and limited the number of iterations to two — the first set of questions to each state and then a set of clarifying questions to each. These circumstances limited the depth of the inquiry.
- While the findings about airspace closure decisions in Ukraine and the Russian Federation and the findings from the historical conflict zones analysis are for the defined time periods ending on 17 July 2014, numerous changes have been implemented since then, including changes initiated by ICAO, sovereign states, aviation authorities, airlines, and air navigation service providers. The findings are not directly transferable to the current practices.
- Because six years have passed since the downing of Flight MH17, it is more challenging to obtain information on procedures, decisions and practices in place at the time in 2014. Key personnel and decision makers who were in place in 2014 may not

[1] As described in ICAO "Air Traffic Services Planning Manual"

[2] As used in ICAO "Aeronautical Information Services Manual"

be in place now. We do not have independent verification about whether our questions were answered by people knowledgeable about the decision-making processes and practices in place prior to the downing of Flight MH17.

Hostile Events Analysis: 1985–2020

At the outset of the project, the Foundation gathered and analysed data on 57 hostile events involving civil aviation in and around conflict zones over a 35-year period beginning in 1985. The period was selected based on the information for the hostile events that the Foundation was able to collect. Included in the sample were intentional and unintentional attacks from the ground on commercial air transport and general aviation operations. Hostile events, as illustrated in Figure 1, are the intentional or unintentional engagement of a capability to attack[3] against civil aviation.

Hostile events are "the tip of the iceberg," and for each hostile event that occurred, there were many more precursor situations that sometimes were and sometimes were not associated with a conflict zone (for example, a terrorist act not in a conflict zone).

In order to study the conflict zones, it is necessary to study their potential worst outcome — hostile events. Additionally, considering that most hostile events are associated with flights in nonrestricted airspace, this part of the inquiry was an important source of information about the failure of state practices to restrict the airspace.

The results of the hostile events analysis show that most hostile events took place over conflict zones when the airspace was not restricted.

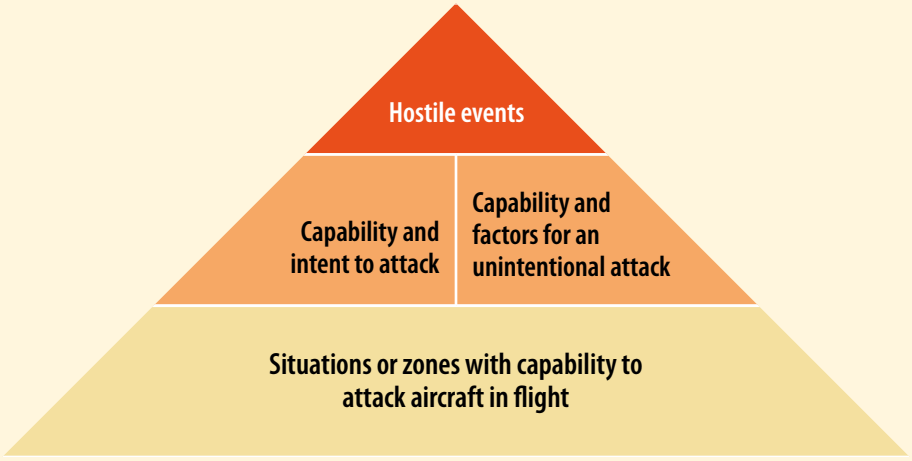
Finding 1: Foundation analysis shows that most of the hostile events involving surface-to-air attacks against civil aviation flights that took place during the period of 1985–2020 could have been prevented by restricting the airspace above or around the conflict zone and by adherence to the restrictions.

The Foundation's research showed that man-portable air defence systems, or MANPADS, usually relatively small, shoulder-launched weapons capable of reaching 15,000 ft, are the most common weapon used against civil aviation. (See, in Figure 2 (p. 5), the number of events in the sample associated with a given capability to attack.) MANPADS generally are easier to obtain and use than larger, non-man-portable surface-to-air missile (SAM) systems, which are technically more complex, more difficult to operate and can reach targets at much higher altitudes.

However, the size of most MANPADS warheads (less than 2 kg [4 lb] for some common MANPADS) means that a catastrophic outcome — i.e., the aircraft being shot down — is not certain. By comparison, the SAM events identified show that a catastrophic outcome from a successful attack is highly probable, at least in part because of the larger warhead (as much as 70 kg [154 lb] in some missiles).

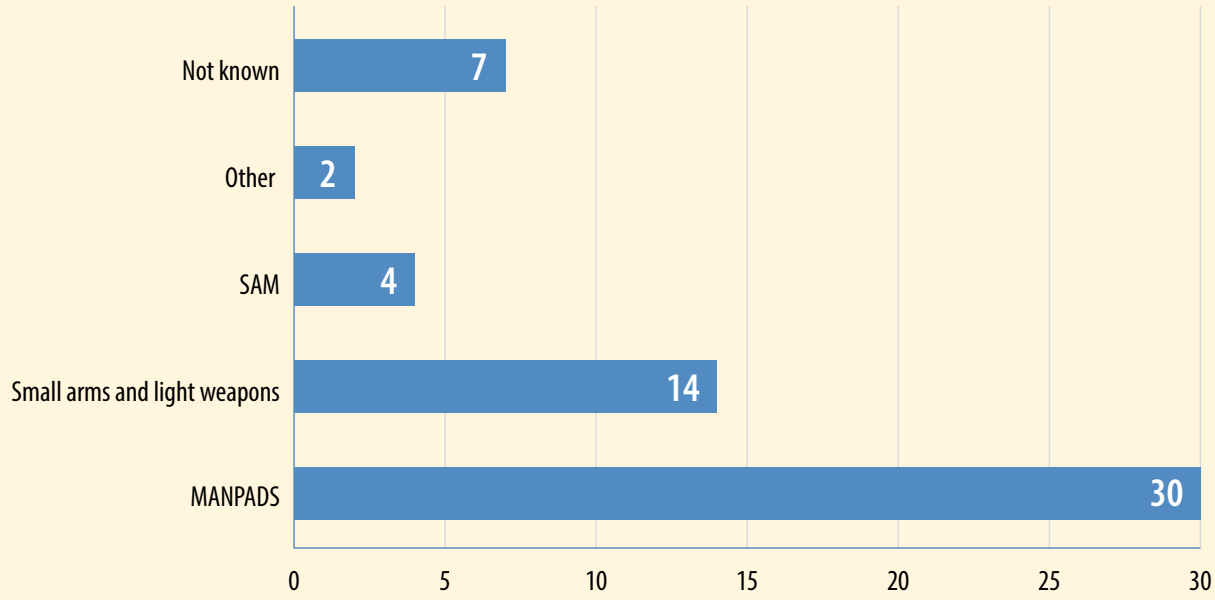
Finding 2: Based on an analysis of reported surface-to-air attacks against civil aviation flights for the period of 1985–2020, MANPADS are the most common weapon used against civil aviation. MANPADS are generally easier to obtain and use than larger, non-portable SAM systems. However, the size of most MANPADS warheads means that a catastrophic outcome is not certain. By comparison, the SAM events identified show that a

Figure 1
Hostile Events Pyramid



[3] E.g., MANPADS or surface-to-air missiles

Figure 2
Number of Events in the Sample Associated With a Given Capacity to Attack



catastrophic outcome from an effective attack is highly probable. The presence of SAMs should therefore be a key indicator in any airspace risk analysis and avoid/overfly decision.

Information about the engagement altitude was found in 34 of the 57 hostile events in the Foundation's "Hostile Events in Civil Aviation" database. Four of the events occurred above Flight Level (FL) 250 and 19 occurred below FL 50. Five occurrences, which are depicted in red in Figure 3 (p. 6), were identified as involving a SAM attack. The occurrences depicted in blue involved a capability to attack other than a SAM.

Table 1 (p. 6) presents information about unintentional attack occurrences extracted from the Foundation database. There are eight such events identified and all but one involved military misidentification of the target's identity and/or intentions. The remaining 49 events involved either an intentional attack or events for which the Foundation did not find information regarding intent.

Conflict Zones Analysis: 1990–2014

Apart from hostile events, the Foundation built an inventory of state practices up to 25 years prior to 2014 regarding the use by civil aviation of airspace above conflict zones. Among other things, the Foundation focused on determining the presence of air defence equipment (both air-to-air and surface-to-air) during a conflict and the restrictions applicable to the use of the airspace.

Within the context of this study, the purpose of the conflict zones analysis was to set data-defined context for other research components by providing an overview of state practices regarding airspace restrictions above and/or around conflict zones.

Conflict zones were selected by choosing those cases in which security risk for civil aircraft above FL 250[4] could be reasonably expected. This was determined by the overall objective of the inquiry, which focuses on threats to civil aviation above airspace that was already closed to civil aviation in Ukraine and the Russian Federation prior to the downing of Flight MH17 and above the altitude where MANPADS can pose a risk.

In total, 16 conflict zones were selected, based on the information available for the studied period and where there was a reasonable expectation, prior to commencing the analysis, of the existence of capability to attack at altitudes above FL 250. The selected conflict zones were reviewed relative to a set of 10 pre-determined "indicators of likelihood of attack," such as the capability to attack a target in flight above FL 250 (e.g., the presence of surface-to-air missiles), the known intent to attack and the missile operators' experience and chain of command. For each of the 16 selected conflict zones, the Foundation researched the actual airspace restrictions and used proprietary risk analysis algorithms to assess the overall likelihood of attack on civil aircraft. The intent was to set data-defined context for other research components by providing an overview of state practices regarding airspace restrictions above and/or around conflict zones. The results of the analysis are summarised in Table 4 (p. 31) of the report.

[4] 25,000 ft (7,600 m)

Continued on p. 7

Figure 3
Altitude Distribution

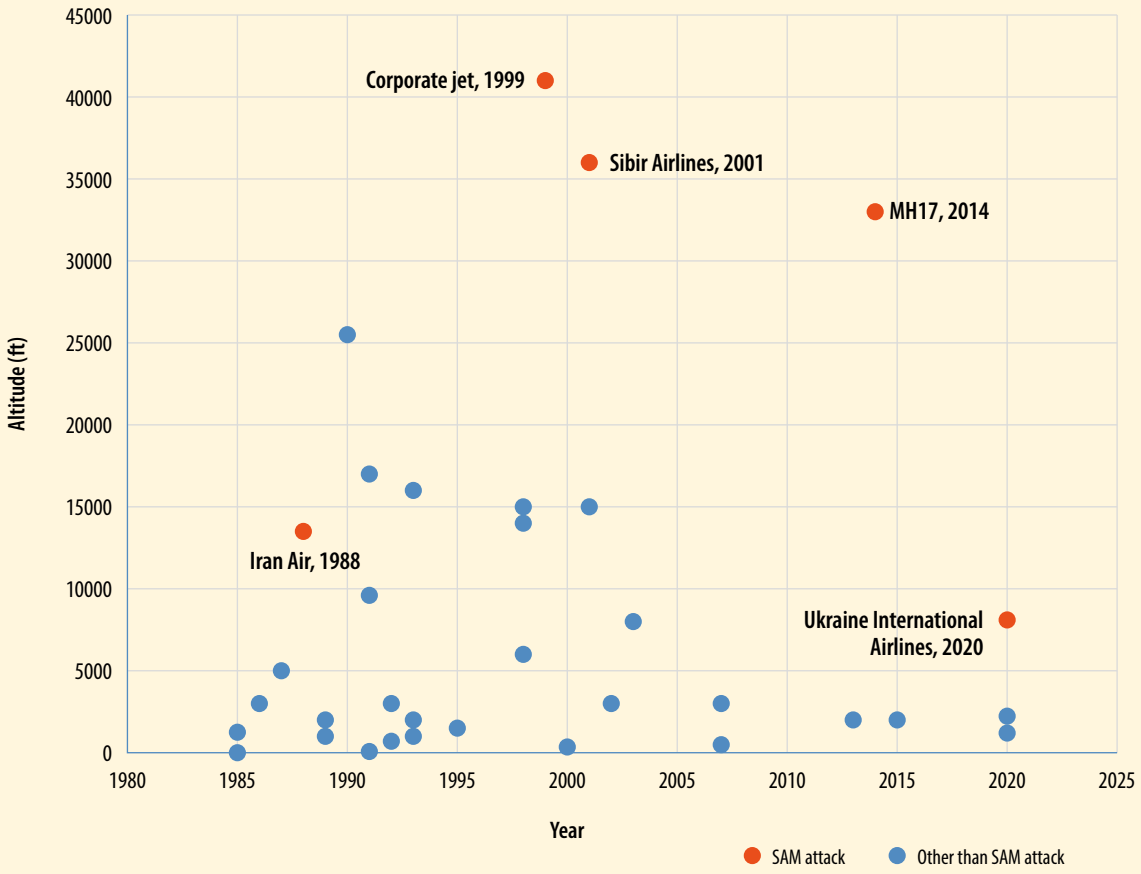


Table 1
Unintentional Acts and Their Context

Date	State	Unintentional Act	Aircraft Operator	Perpetrator	Altitude	Killed/Injured/ Uninjured
11-Jun-87	Afghanistan	Misidentified as a Russian IL14.	Bakhtar Afghan	Hezb-i-Islami	n/k	53/2/0
03-Jul-88	Iran	Military misidentified target as a descending Iranian F-14.	Iran Air	U.S. Navy	13,500 ft	290/0/0
29-Aug-99	Ethiopia	Military targeting error after proceeding into NOTAM closed airspace.	Corporate Jets	Ethiopian Army	FL 410	2/0/0
04-Oct-01	Black Sea	Military exercise missile overshot intended target at 18 nm (33 km) by 140 nm (259 km) after locking onto it.	Sibir Airlines	Ukraine Armed Forces	FL 360	78/0/0
26-Jan-15	Iraq	Probably accidental, rounds from nearby social event.	FlyDubai	n/k	<2,000 ft	0/2/X
08-Jan-20	Iran	Military misidentified aircraft as a hostile target.	Ukraine International	Iranian Armed Forces	8,100 ft	176/0/0
04-May-20	Somalia	Military misidentified going-around aircraft as a suicide plane.		Ethiopian troops as part of AMISOM	2.230 ft	6/0/0
25-May-20	Somalia	Military misidentified aircraft and opened fire.	Aeronav/Kenya School of Flying	Ethiopian troops as part of AMISOM	<1,200 ft	0/0/X

AMISOM = African Union Mission to Somalia; FL = Flight Level; n/k = not known; NOTAM = notice to airmen

The Foundation concluded that restricting the airspace above conflict zones is a very effective measure to reduce the assessed likelihood of attack against civil flights. As illustrated in Figure 4, in the studied sample, there were eight cases in which an entity (the sovereign state or a third party) introduced partial or full airspace restrictions. This comparative assessment of likelihood of attack with and without airspace restrictions reveals that in six of the eight cases where airspace restrictions were introduced, the assessed likelihood of attack against civil aviation was reduced considerably.

However, the Foundation did not find a uniform practice of states closing their own airspace when there were indications of a likelihood of attack against civil aircraft. Of the 16 studied conflict zones, there were only two instances in which the sovereign state responsible for that airspace completely closed its own airspace (Figure 5).

Finding 3: The analysis of selected conflict zones over the period of 1990–2014 did not identify a uniform practice of states closing their own airspace when there were indications of a likelihood of attack against civil aircraft in the context of an armed conflict on the territory of that state.

Finding 4: The analysis of selected conflict zones over the period of 1990–2014 identified that, on the rare occasions when a state restricted its own airspace above FL 250, it was associated with the loss of effective control over the relevant airspace by the state.

Also, when a state does restrict its own airspace above FL 250, or such a restriction is imposed by a third party (such as in the introduction of a "no fly zone" by an entity like the North Atlantic Treaty Organization), the predominant concerns are the security of military operations and of the population rather than the security of civil aviation.

Finding 5: The analysis of selected conflict zones over the period of 1990–2014 identified that whenever a state closed or restricted its own airspace above FL 250, or such a restriction was imposed by a third party, the predominant concerns were the security of military operations and of the population rather than the security of civil aviation.

Airspace Restrictions Over and Around Eastern Ukraine

After setting the wider background of the inquiry by characterising the historical occurrences of hostile events and the state practices of airspace management over conflict zones, the Foundation focused on airspace restrictions in Ukraine and the Russian Federation immediately prior to the downing of Flight MH17. The Foundation considered studying the airspace restrictions timeline and specifics to be important because restrictions are the main outcome of airspace restrictions decision-making, which is the focus of this inquiry.

Both Ukraine and the Russian Federation introduced restrictions on the airspace above and around eastern Ukraine, but neither state completely closed its airspace above or near the conflict zone before the downing of Flight MH17. The airspace in question was first restricted up to FL 260 and subsequently, but before the downing of Flight MH17, up to FL 320. These airspace restrictions were promulgated with notices to airmen (NOTAMs).

The Foundation analysed 1,310 NOTAMs regarding their relevance to the studied area and time. It selected 15 NOTAMs to be analysed in detail.

Figure 4
Eight Cases of Airspace Restrictions

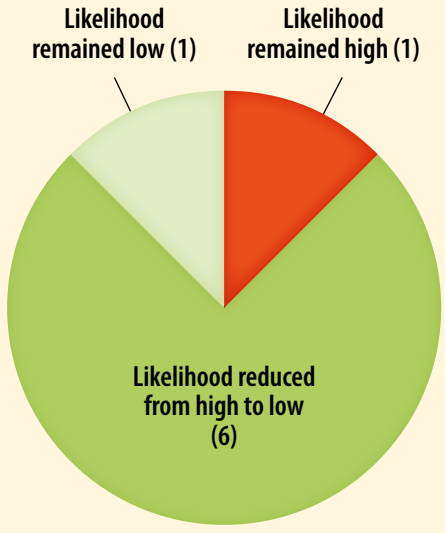
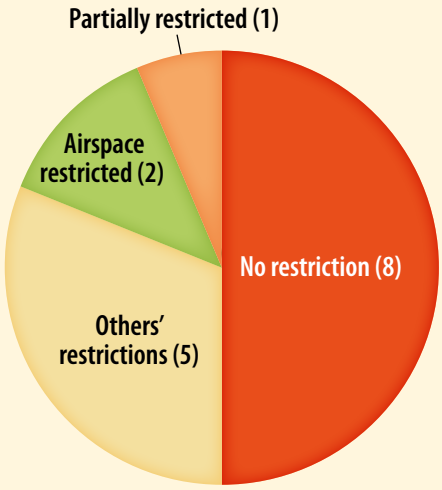


Figure 5
Sample of 16 Conflict Zones



In the NOTAMs in which Ukraine placed a partial restriction on airspace in the Dnepropetrovsk Flight Information Region (FIR), it did not provide any reasons for the restriction or any reference to incidents involving military aircraft in the airspace.

The DSB report on the crash of Flight MH17 provides information about the reasons the Ukrainian authorities restricted the airspace up to FL 260, promulgated with NOTAMs A1255/14 and A1256/14, issued on 5 June 2014. The provided reasons were not related to the security risk from attacks from the ground to civil aircraft overflying the area. The airspace was restricted to enable military aeroplanes to fly at an altitude that was considered safe from attacks from the ground and to eliminate the risk that they would encounter civil aeroplanes, which flew above FL 260, according to the DSB report.

The reasons the Ukrainian authorities increased the upper limit of the restricted airspace to an altitude of 32,000 ft (FL 320) were not provided in the respective NOTAMs (A1492/14 and A1493/14). The DSB report said the reason for increasing the upper limit of the restricted airspace "was intended to increase the altitude buffer between military and civil aircraft."

The Russian Federation, on the other hand, cited international flight safety as a reason when it closed its affected air traffic services (ATS) routes up to FL 320. In two NOTAMs (V6158/14, A2681/14) published on 16 July 2014, the Russian Federation said that to ensure international flight safety, it was closing the ATS routes "*due to combat actions on the territory of Ukraine near the state border with the Russian Federation and the facts of firing from the territory of the Ukraine towards the territory of Russian Federation.*"

Prior to the downing of Flight MH17 on 17 July 2014, the two referenced Russian Federation NOTAMs were the only identified, specific warnings related to the security of civil aviation in the Dnepropetrovsk and Rostov-on-Don FIRs.

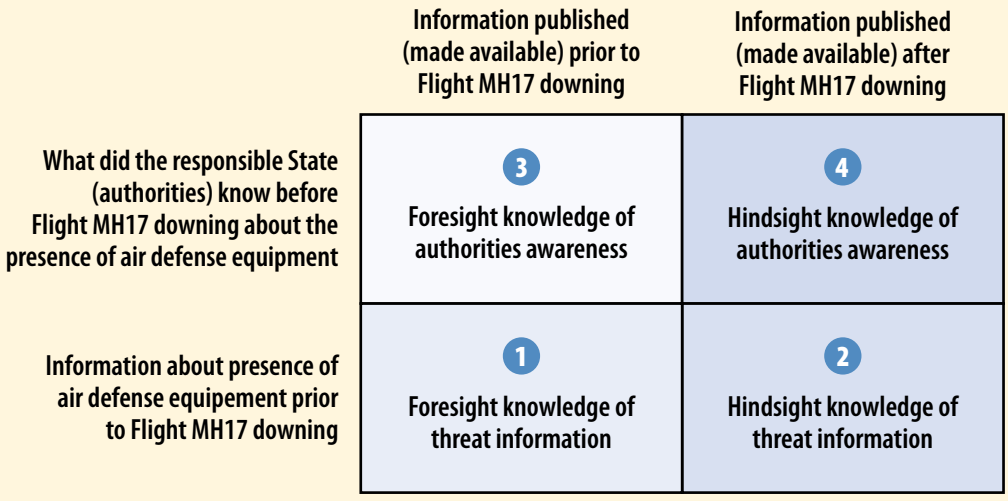
Collecting Information About Ukraine and Russian Federation Threat Awareness

In order to discuss the airspace closure decisions made by authorities in Ukraine and the Russian Federation, the Foundation looked for information about the relevant authorities' threat awareness for the referenced airspace that was not restricted.

The threat information is of different types. In respect to the capability to attack, the threat information can involve what authorities said they knew about the weapons that could pose a potential threat to civil aviation above FL 320. Or it can consist of information about the weapons that was available in the public space, such as on social media, without indications of whether relevant authorities knew about it. The source of information can be traditional media and/or social media or private information from intelligence services. These different types of information imply different degrees of confidence about authority awareness or the veracity of the information. For these reasons, the threat information is categorised conceptually in Figure 6 as follows:

- **Foresight knowledge of threat information: quadrant 1.** This is information that was known prior to the downing of Flight MH17 about the presence of weapons.
- **Hindsight knowledge of threat information: quadrant 2.** This is information that was made known after the downing of Flight MH17 about the presence of weapons. In

Figure 6
Information Collection Framework



general, this type of information gives less confidence about potential threat awareness of relevant authorities because it is just information about what has been seen, heard or otherwise discovered but made known only after the downing of Flight MH17.

- **Foresight knowledge of authorities' awareness: quadrant 3.** This is information that was known prior to the downing of Flight MH17 about what the relevant authorities knew about the presence of weapons. In general, this type of information gives the most confidence about potential threat awareness because it is mainly self-reporting by relevant authorities about their knowledge prior to the downing of Flight MH17 — hence clear of any hindsight bias.
- **Hindsight public knowledge of authorities' awareness: quadrant 4.** This is information that was made known after the downing of Flight MH17 about what the relevant authorities knew before the downing of Flight MH17 about the presence of weapons.

With the above-described four types of information, the Foundation looked at two main sources of information:

- Publicly available information from primarily online media, including Ukrainian and Russian news services and other news aggregation sites, internationally available aviation trade media, government announcements and news releases, as well as information available on social media, including Twitter and Facebook, and in the DSB accident investigation report.
- The responses from Ukraine and the Russian Federation to the standard procedure and threat knowledge questionnaires that were specifically developed for this inquiry and to the subsequent responses to some clarifying questions. The Russian Federation and the Ukrainian governments were approached with and responded to the information collection template containing the questionnaires. Following the analysis of the information received, the Foundation concluded that there are number of questions that remain open and formulated and received answers to some additional clarifying questions.

To ensure a systematic coverage and a comprehensiveness of the information collection, we identified the need to use certain standard process descriptions when drafting the information collection questionnaires. For that purpose, we used the Foundation's "best process" description that is based on our accumulated experience and analyses up to the moment of this inquiry. Namely, the Foundation's integrated standard for airspace security risk assessment, as illustrated in Figure 7, addresses the five main functions to be assigned to one or more different authorities, organised as an integrated process and performed within a given sovereign state.

The Foundation standard defines a statewide process for airspace security risk management that is distributed around different authorities and organisations, yet functional from end to end. In this way, the organisational scope of the process is not restricted to the more traditional perspective of civil-military aviation coordination (e.g,

Figure 7
Flight Safety Foundation Integrated Standard for Airspace Security Risk Assessment

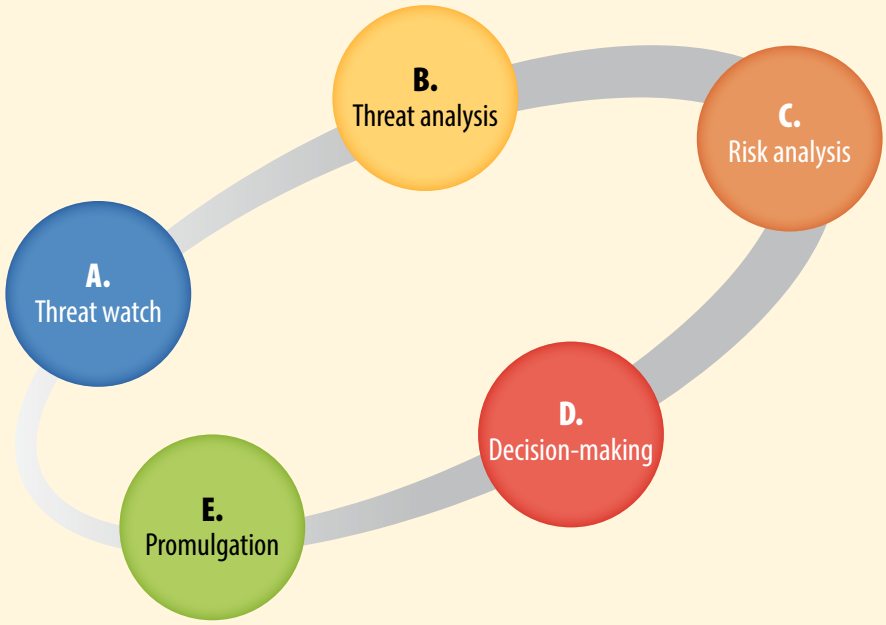
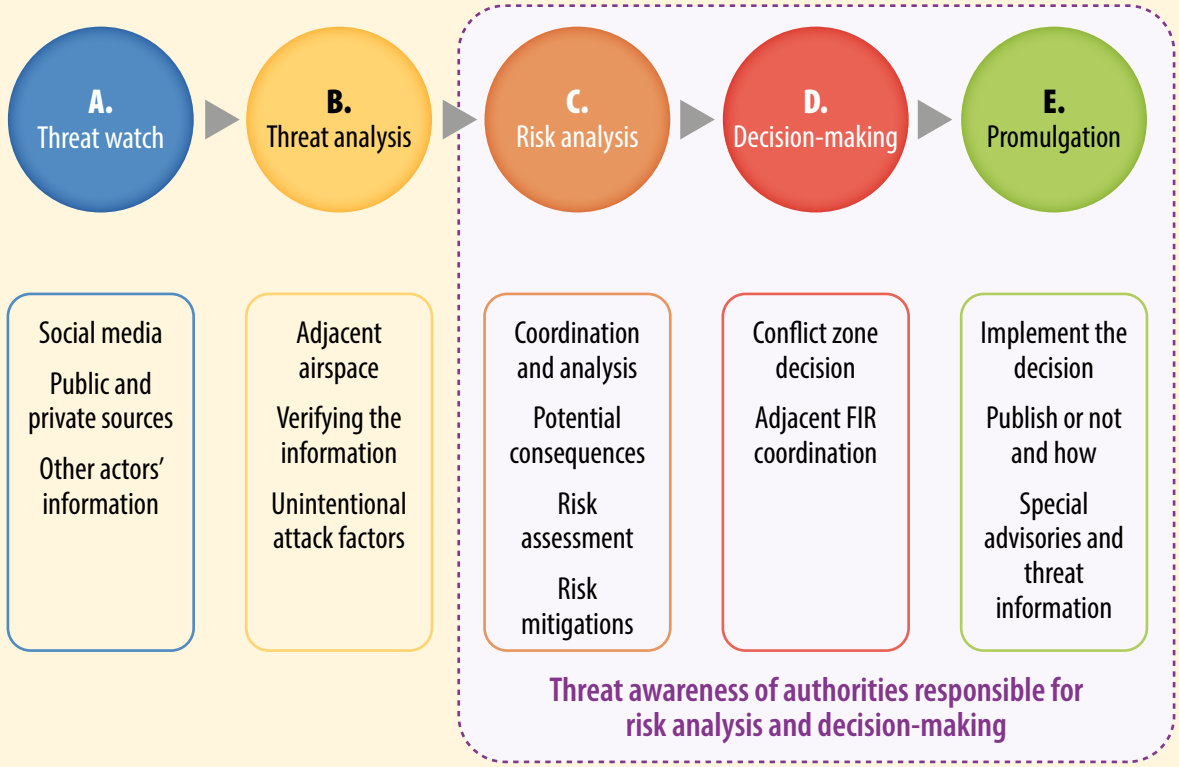


Figure 8
Criterion for Threat Awareness



some state intelligence functions may not be attributed to military authorities).

Each of the five functions of the integrated standard for airspace security risk assessment targets a particular step from the risk assessment process and contains three or four specific sub-functions that are formulated as questions in our questionnaires.

One important part of our inquiry was identifying when information about the threat reaches:

- Those responsible for analysing security risk levels in civil aviation airspace over a conflict zone; and,
- Those establishing restrictions of airspace in a conflict zone.

This is illustrated in Figure 8, which outlines the respective stages of the Foundation's Integrated Standard for Airspace Security Risk Assessment.[5]

Threat information reaching the risk analysis and decision-making steps (C and D) in the process is the Foundation's criterion for threat awareness at the level of the statewide process. Using this criterion, unverified social media posts, other media reports or the potential presence of information in intercepted but unprocessed communications do not represent sufficient facts for realistic threat awareness. This is because verified threat awareness is not available to those responsible for risk analysis and decision-making.

Ukraine Awareness of Threat to Civil Aircraft

The discussion on threat awareness is twofold — a discussion on reported threat awareness (concerning quadrants 3 and 4 in Figure 6) and a discussion on potential threat awareness (concerning quadrants 1 and 2 in Figure 6).

The discussion on the reported threat awareness is about what authorities said they knew about the threat that could reach an altitude higher than FL 320. We studied what authorities said in public (both before and after the downing of Flight MH17) and what they said in response to our questionnaires. This discussion is different from what information was available in the public and private space (on social media, in other publications and in intelligence) about a threat.

The Foundation's research did not find any instances *before* (quadrant 3 in Figure 6) the downing of Flight MH17 in which Ukrainian authorities publicly acknowledged the presence in eastern Ukraine of air defence systems capable of reaching an altitude greater than FL 320.

[5] Each step in the risk assessment process is defined in Section 6.3.

The Foundation identified from information made publicly known *after* (quadrant 4 in Figure 6) the downing of Flight MH17 that some Ukrainian authorities (counterintelligence services) suspected the presence of air defence equipment that could reach high altitudes — "*first information 'hinting' at a Buk launcher in the possession of the non-state forces was received on 14 July and came from counterintelligence units.*"[6] This information corresponds to Group A of the Foundation Standard, namely threat watch, as shown in Figure 8.

However, no facts were found that this information had been verified per the functions in Group B from the Foundation Standard — "*But we could not confirm directly that it was Buk missile launcher that trespassed illegally [in] Ukrainian territory.*"[7] Similarly, no facts were found by the Foundation to indicate that the information was disseminated throughout the statewide process to reach the authorities responsible for risk assessment and decision-making regarding airspace closure.

Finding 6: This inquiry did not find sufficient facts that Ukrainian authorities responsible for analysing security risk levels in civil aviation airspace and those establishing restriction of airspace in a conflict zone[8] were aware of a threat to civil aviation before the downing of Flight MH17.

The discussion of the potential threat awareness is about what information existed in the public and private space (social media, other publications, and intelligence sources) about a weapon. This discussion is not about the reported threat awareness of the relevant authorities (discussed previously).

It is clear from publicly available information that the conflict in eastern Ukraine was in an active combat phase in the weeks prior to the downing of Flight MH17.

Both the Ukrainian military and armed non-state forces were using small arms, heavy calibre machine guns, artillery, anti-tank weapons, tanks and various air defence systems. In addition, Ukraine was employing rotary- and fixed-wing aircraft for transport and attack purposes; Ukraine alleged that Russian aircraft also had been used to attack Ukrainian aircraft. Ukraine apparently had some success attacking non-state ground forces with aircraft and also suffered numerous aircraft losses.

There was a widespread belief among Ukraine and Western states that the Russian Federation was supplying weapons, including heavy weapons, and personnel to support armed non-state forces in the conflict area. But as the DSB report stated: "*despite the Western political and military focus on the conflict, its escalation and its air component, none of the politicians or authorities quoted publicly made a connection between the military developments in the eastern part of Ukraine and risks to civil aviation.*"

There were numerous reports about the presence of heavy weapons in the region, such as tanks, MANPADS, artillery and large calibre machine guns. However, there were few reports in the public space about armed non-state forces possessing weapons with a capability to attack above FL 320.[9] There are conflicting accounts relating to the altitude of a Ukrainian An-26 when it was shot down on 14 July, although the aircraft was thought by some to have been brought down with a SAM system.

The most notable publicly available information about the capability to attack at high altitudes before the downing of Flight MH17 was from social media posts about Buk missile systems. Some of these posts were about the movement of Buk batteries in the Russian territory bordering Ukraine and some were about Buk missile systems being observed in eastern Ukraine a few hours before the downing of Flight MH17. The Foundation acknowledges that these were just a few instances of published social media posts out of probably millions of posts made in the region at that time. It should also be stressed that the veracity of published social media accounts is difficult to establish.

In addition, the Foundation did not identify any information available in the public space prior to the attack that would have verified the reports about the capability to attack above FL 320. The identified number of examples of publicly available information indicating the potential capability to attack above FL 320 were few, relative to the volume of all the publicly available information about the conflict zone at the time.

With hindsight, some facts made available after the downing of Flight MH17 pointed to the possibility for some authorities to have processed information and understood that there may have been a threat to civil aviation. Namely, these are the 150,000 telephone conversations[10] intercepted and the counterintelligence field information discussed previously.

However, without knowing the actual technological capabilities and preparedness to process on time these

[6] 19 July 2014 news conference featuring Vitaly Nayda, the head of counterintelligence for the Ukrainian State Security Service, https://www.youtube.com/watch?v=PWtH8AA42Fc&feature=share

[7] 19 July 2014 news conference featuring Vitaly Nayda, the head of counterintelligence fora the Ukrainian State Security Service https://www.youtube.com/watch?v=PWtH8AA42Fc&feature=share

[8] Responsible authorities are defined in detail in Section 7.2.

[9] For more details see Section 6.2.

[10] On 28 September 2016, during the Joint Investigative Team (JIT) presentation of the first results of the Flight MH17 criminal investigation, it was revealed that more than 150,000 telephone calls were intercepted.

intercepted telephone conversations and social media posts, it is not possible for the Foundation to conclude that the Ukrainian authorities had the means to verify the intelligence and coordinate dissemination of the information so as to form a more accurate assessment of the risk to civil aviation and to completely close the airspace in time to prevent the attack on Flight MH17.

Finding 7: This inquiry did not find sufficient facts that Ukrainian authorities responsible for analysing security risk levels in civil aviation airspace and those establishing restriction of airspace in a conflict zone[11] could have had a proper awareness of the high-altitude threat.

Russian Federation Awareness of Threat to Civil Aircraft

Some of the western part of the Rostov-on-Don FIR airspace of the Russian Federation was in close proximity to the conflict zone in eastern Ukraine. Because of its close proximity to the conflict zone, the airspace could have been affected by a threat to civil aviation originating from a potential presence in the conflict zone of long-range air defence equipment not controlled by government forces.

The possibility of a threat to civil aviation was acknowledged in the Russian Federation's NOTAMs (V6158/14 and A2681/14) closing the airspace up to FL 320. It should be noted that an air defence equipment threat reaching FL 320 could also reach the airspace immediately above FL 320.[12]

The reasons for restricting their airspace, reported by the Russian Federation in an answer to a Foundation question, cited as a justification some statements made by the Ministry of Foreign Affairs of the Russian Federation prior to the Flight MH17 downing. These statements refer to only low-altitude threats of artillery shootings.

Responding to a Foundation query regarding the reason for selecting the upper limit for the airspace restriction, the Russian Federation acknowledged that the airspace has been closed up to FL 320 and that this limit was the same as the one indicated in the Ukrainian NOTAMs A1492/14 and A1493/14 and justified the decision in the fact that "*Rosaviatsiya did not have any other, more or less credible information provided by the Ukrainian side, which would allow to forecast the vertical limit of the hazard zone for civil aviation flights.*"

In response to Foundation's query on this matter, the Russian Federation indicated that authorities did not have any information regarding the presence of air defence equipment in the territory of Ukraine that was not controlled by the armed forces of the Ministry of Defence of Ukraine and that could strike targets in the Rostov-on-Don FIR above FL 250.

The Foundation did not obtain satisfactory clarifications from the Russian Federation about the Russian authorities' knowledge of any intent to attack with air defence equipment that was not controlled by government forces and that could have reached the respective airspace in Rostov-on-Don FIR above FL 250 in eastern Ukraine.

The Foundation's research did not find any other instances in which Russian Federation authorities publicly acknowledged before or after the downing of Flight MH17 the presence in eastern Ukraine of air defence systems capable of reaching an altitude greater than FL 320.

Finding 8: This inquiry did not find sufficient facts that Russian Federation authorities responsible for analysing security risk levels in civil aviation airspace and those establishing restriction of airspace in a conflict zone[13] were aware of a threat to civil aviation before the downing of Flight MH17.

With regards to any Russian Federation potential threat awareness, the information identified in the public space, and already listed in the discussion about Ukraine, was also available to the Russian Federation, including the social media posts. However, it is assumed in this study that the Russian Federation did not have access to intercepted telephone conversations and intelligence information available to the Ukrainian authorities.

Another set of facts from the public information is associated with the Joint Investigation Team (JIT)[14] that points at a request by the non-state armed forces for a Buk and at the transport of a Buk in the Russian Federation and Ukraine. The JIT reported:[15] "After an extensive and labor-intensive comparative investigation, in which many Buk-TELARs were involved, the JIT has come to the conclusion that the Buk-TELAR that shot down Flight MH17 comes from the 53rd Anti-Aircraft Missile Brigade, or the 53rd Brigade from Kursk in the Russian Federation. This 53rd Brigade is a unit of the Russian armed forces." This JIT conclusion has been denied by the Russian Federation.

However, the purpose of the present analysis is to identify if the relevant authorities responsible for risk analysis and decision-making could have had a proper threat awareness irrespective of the origin of the weapon system. The Foundation did not identify sufficient facts to indicate that such threat awareness existed among relevant authorities.

Apart from the discussion on the accessibility of the information, another important aspect of the Russian

[11] Responsible authorities are defined in detail in Section 7.2.

[12] For example, as reported in the DSB report "The Buk surface-to-air missile system is able to engage targets at altitudes up to 70,000 or 80,000 feet."

[13] Responsible authorities are defined in detail in Section 7.2.

[14] The JIT, comprised of representatives from the Netherlands, Australia, Malaysia, Belgium and Ukraine, is conducting a criminal investigation into the crash.

[15] https://www.prosecutionservice.nl/topics/mh17-plane-crash/criminal-investigation-jit-mh17/speakers-text-jit-mh17-press-meeting-24-5-2018

Federation risk analysis and decision-making can be deduced from the Russian Federation standard procedure and decision-making protocols. In response to a Foundation inquiry relating to standard procedures and threat knowledge, the Russian Federation stated that, "*Threats to air traffic safety in the Rostov-on-Don FIR stemmed from the dangerous activities in the area of responsibility of the adjacent Dnepropetrovsk FIR.*" Further, it was also stated that "*all possible risk factors for an unintended attack should be considered*" and that "*such preparations should include an assessment of the risk to civil aircraft operations due to a military conflict or incidents of unlawful interference with civil aviation.*"

After acknowledging the source of the threat in the neighbouring territory and, in general the need to consider all risk factors, the Russian Federation did not acknowledge the responsibility to determine the risk factors for an unintentional attack in Russian Federation airspace originating from the close proximity to the conflict zone in the eastern Ukraine. With respect to the issue of which authorities were responsible, the response was: "*The state responsible for compliance with the rules for the introduction of restrictions on the use of airspace over an armed conflict zone (Ukraine, in relation to the MH17 crash).*"

Finding 9: This inquiry did not find sufficient facts that the Russian Federation authorities responsible for analysing security risk levels in civil aviation airspace and those establishing restriction of airspace in a conflict zone[16] could have had a proper awareness of the high-altitude threat.

[16] Responsible authorities are defined in detail in Section 7.2.

1. Introduction

1.1. Purpose

The Foundation conducted an inquiry[17] into the circumstances that led to a partial closure of the airspace above and adjacent to eastern Ukraine in the three-month period prior to the 17 July 2014 shootdown of Malaysia Airlines Flight MH17.

The intent of the inquiry was to analyse airspace closure decisions made by authorities in both Ukraine and the Russian Federation, and to understand the processes used in making those decisions as well as the information on which the decisions were based.

1.2. Background

On 17 July 2014, Flight MH17, flying from Amsterdam to Kuala Lumpur, was downed over eastern Ukraine where, at the time, an armed conflict was taking place. Tragically, all 298 passengers and crew lost their lives. While there have been other losses of airliners as a result of military conflict over the previous decades, the loss of Flight MH17 constituted a watershed moment that galvanized the international community to proactively address the continuing threat to civil aviation arising from conflict zones.

In July 2014, the United Nations Security Council adopted a resolution related to the downing of Flight MH17. This was followed by an International Civil Aviation Organization (ICAO) State letter, issued to draw the attention of ICAO Member States to the international provisions specifying state responsibilities with respect to the safety and security of civil aircraft operating in airspace affected by conflict.

ICAO established a senior-level Task Force to address issues related to the safety and security of civil aircraft operating in airspace affected by conflict. The chairman of the Foundation's Board of Governors was elected chairman of the Task Force. The Task Force developed a report, which included recommendations to address the threat of military conflict to civil aviation. It urged the international community to implement protocols to prevent similar events in the future. These recommendations included threat assessment, sharing of threat information, and timely and effective management of aircraft operations and airspace.

The 36-state ICAO Council reviewed the report of the Task Force and in October 2014 approved the conflict zone work program. The Council also unanimously adopted a resolution condemning the downing of Malaysia Airlines Flight MH17 over eastern Ukraine.

The technical investigation into the causes of the Flight MH17 crash was conducted by the Dutch Safety Board (DSB) after Ukraine delegated this authority to the Netherlands. The report of the DSB aimed at answering four key questions:

- What caused the crash of Flight MH17?
- How and why were decisions made to use Flight MH17's flight route?
- How is the decision-making process related to flying over conflict zones generally organized?
- What lessons can be learned from the investigation to improve flight safety and security?

The final report by the DSB was published on 13 October 2015. With regard to the first question, the DSB determined that the cause of the crash was the detonation of a warhead above the left side of the cockpit. The weapon used was a 9N314M-model warhead carried on the 9M38 series of missiles, as installed on the Buk surface-to-air (SAM) missile system.

With regard to the second question, the DSB's report provides an overview of the precise flight path followed by Flight MH17 as well as the different airspace restrictions that were imposed over time, both above the territory of Ukraine and above the territory of the Russian Federation. The report also provides information about possible risks for civil aviation in those areas during the relevant period and measures that were taken in that regard.

Foundation research builds upon the information contained in the DSB's report and attempts to enlarge the scope and deepen understanding of the factual circumstances underlying the airspace restrictions both above the territory of Ukraine and above the territory of the Russian Federation.

Civil aviation accidents caused by attack from the ground continue to happen. During 2020, there were two such occurrences. On 8 January 2020, Ukraine International Airlines Flight 752 was shot down shortly after takeoff from Tehran Imam Khomeini International Airport, resulting in 176 fatalities. On 4 May 2020, an East African Express Airways aircraft was shot down on approach to Berdale airport in Somalia, resulting in six fatalities. Threats to commercial aviation due to hostile activity in conflict regions around the world are a continuing concern. The Foundation continues its global campaign to encourage heightened awareness and action on this matter.

[17] This inquiry was commissioned by the Ministry of Foreign Affairs of the Kingdom of the Netherlands, as announced in the letter the Ministry sent to the Netherlands' House of Representatives om 1 May 2020: https://www.rijksoverheid.nl/documenten/kamerstukken/2020/05/01/kamerbrief-inzake-diverse-onderwerpen-inzake-mh17-dossier.

Within the context of a still prominent risk, this report also attempts to advance further the understanding of risk assessment of attack from the ground on civil aircraft and on the state processes for integrated airspace security risk assessment.

1.3. Scope

This inquiry is focused on the factual circumstances surrounding the decision-making regarding the closure of airspace above and around eastern Ukraine from 1 March 2014 up to and including the moment of complete closure of that airspace after the downing of Flight MH17 on 17 July 2014. In addition, this inquiry will provide contextual background, through a representative inventory of state practices 20 to 30 years prior to 2014, regarding the use by civil aviation of airspace above conflict zones.

This inquiry was conducted from April 2020 to January 2021.

The scope did not include drawing (normative) conclusions on the question of whether, prior to the moment of the downing of Flight MH17, responsible authorities did or did not take adequate measures to prevent the downing of the aircraft.

The following elements were covered within the scope of the inquiry:

- A study of previous hostile events and state practice in regard to the use by civil aviation of airspace above conflict zones.
- An inquiry into the facts concerning the closure of airspace above eastern Ukraine as of 1 March 2014 up to and including the moment of complete closure of that airspace subsequent to the downing of Flight MH17 on 17 July 2014.
- An inquiry into the facts concerning the closure of airspace above the territory of the Russian Federation bordering eastern Ukraine as of 1 March 2014 up to and including the moment of complete closure of that airspace subsequent to the downing of Flight MH17 on 17 July 2014.

1.4. Inquiry Limitations

There are a number of limitations associated with carrying out this inquiry that should be considered. The limitations are related to the characteristics of the scope, purpose, and approach to the inquiry and to the sources and quality of information available for use in the inquiry. Readers of the report should keep in mind the following:

- The findings about airspace closure decisions in Ukraine and the Russian Federation are based on two specific sources of information: (a) public source information available during 2020 discovered by the Foundation and (b) information received by the Foundation from Ukraine and the Russian Federation through responses to questionnaires. Other sources of information, such as private sources and information from intelligence services, were not available for the inquiry.
- The findings from the hostile events analysis and from the historical conflict zones analysis are based on the information discovered by the Foundation from public sources.
- The inquiry into airspace closure decisions in Ukraine and the Russian Federation is focused on information about: (a) the threat awareness of the authorities responsible for airspace security risk analysis and decision-making and not about the potential threat awareness of other entities within each government, and (b) facts reported publicly by organisations and authorities and does not include conclusions and inferences from these facts made by organisations and authorities.
- The inquiry was carried out remotely due to COVID-19 travel restrictions. The Foundation requested access to engage directly with identified relevant authorities and specialists in Ukraine and the Russian Federation, which would have been possible through teleconferencing or video conferencing. Ultimately, Ukraine and the Russian Federation preferred providing information through written questionnaires developed by the Foundation. Information was transmitted via the respective diplomatic channels. The Foundation does not have visibility on how the information was collected and processed within the relevant authorities in the two countries.
- The process of sending questionnaires, waiting for the written responses and then processing those responses took considerable time and limited the number of iterations to two — the first set of questions to each state and then a set of clarifying questions to each. These circumstances limited the depth of the inquiry.
- While the findings about airspace closure decisions in Ukraine and the Russian Federation and the findings from the historical conflict zones analysis are for the defined time periods ending on 17 July 2014, numerous changes have been implemented since then, including changes initiated by ICAO, sovereign states, aviation authorities, airlines, and air navigation service providers. The findings are not directly transferable to the current practices.
- Because six years have passed since the downing of Flight MH17, it is more challenging to obtain information on procedures, decisions and practices in place at the time in 2014. Key personnel and decision makers who were in place in 2014 may not

be in place now. We do not have independent verification about whether our questions were answered by people knowledgeable about the decision-making processes and practices in place prior to the downing of Flight MH17.

1.5. Definitions

For the purpose of this report, existing ICAO definitions were adopted [1]. When the following terms are used in this document, they have the following meanings:

Air-to-air missiles (AAMs) — Missiles fired at an aircraft from another aircraft.

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

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.

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; are 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.

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.

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.

In this report, in accordance with ICAO and the other referenced sources, the terms "airspace restriction"[18] and "airspace closure"[19] are used interchangeably. Wherever applicable, these terms are used with the addition of their vertical limits.

[18] As described in ICAO "Air Traffic Services Panning Manual"

[19] As used in ICAO "Aeronautical Information Services Manual"

2. Overall Framework

The conceptual framework for this study is provided in Figure 9 below.

The conceptual framework defines two study spaces: *risk situation* and *state practices*. These study spaces are described below.

Risk situation defines the objective evolution of the circumstances associated with civil aviation security or safety risk above conflict zones. It should be noted that the ICAO definition of *conflict zones (CZ)* is restrictively confined to armed conflict that is occurring or is likely to occur between militarized parties. The conceptual framework acknowledges that there may be *other situations (OS)* that do not fall within the ICAO CZ definition but that can still be associated with civil aviation security threats. An example of an OS is a situation associated with insurgents or terrorists that is not an armed conflict.

A *security threat (ST)* can be associated with conflict zones or other situations and can be assessed with the help of the following groups of indicators:

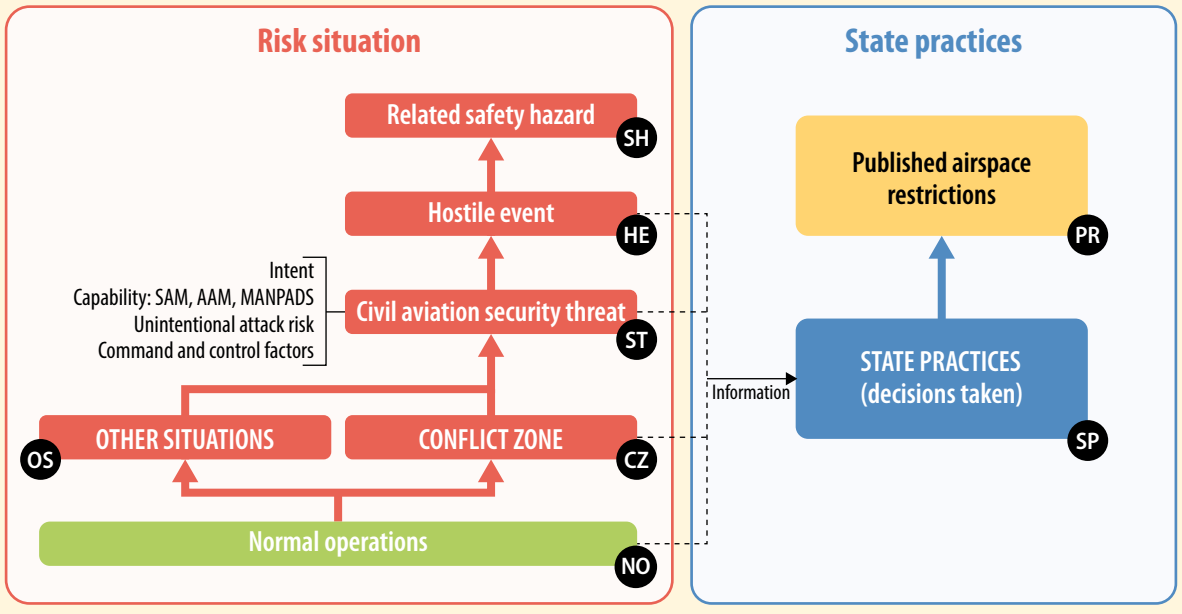
- *Capability to attack* — this study will not exclude other capabilities but will be mainly focused on the presence of long-range SAMs and AAMs that can hit an aircraft flying at cruising level[20].
- *Intent to attack* — the plan for a deliberate act against civil aviation
- *Possibility of an unintentional attack* — shaped by the presence of one or more risk factors.
- *Conflict parties' command and control* — the rigorousness and reliability of the command and control procedures and practices for authorizing a capability launch.

A security threat associated with a security risk situation may be dormant and never materialise. Whenever it is actively manifested, however, the security threat usually materialises in a *hostile event (HE)*. Hostile events are intentional or unintentional engagement of a capability against civil aviation. Hostile events can lead to aircraft damage and/or injuries to flight crew and/or passengers, but also can be inconsequential.

A hostile event and, in some instances, the actions of the involved actors to manage the security threat, can lead to *safety hazards (SH)* that are part of the overall consequence of a risk situation and may need also to be assessed. An example of a safety hazard is a civil flight in dangerous proximity to military flights.

State practices (SP) are the actions of bodies and organisations authorised by the state to manage the airspace over which the state has sovereignty. It should be noted that state practices can be explicitly coded into rules and procedures but also can be an implicitly established way of working.

Figure 9
Study Conceptual Framework



[20] Some anti-aircraft artillery (AAA) systems are capable of reaching cruising levels, but these are generally of lower lethality than SAMs and are discounted from this analysis.

Airspace *published restrictions (PR)*, as part of airspace management practices, are normally promulgated through:

- *Aeronautical Information Publications (AIPs),* which generally are used for information of a permanent or lasting nature, as well as for temporary changes of long duration; or
- *Notices to airmen (NOTAMs),* which are used to disseminate information 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. NOTAMs do not include extensive text and/or graphics.

State practices also may concern airspace over which the state does not have sovereignty and may be directed at aircraft operators that have been issued an air operator certificate (AOC) by that state (authority). In this case, the state may elect to publish various forms of state advisories or restrictions covering operations in particular airspace. These advisories and restrictions are outside the scope of this study.

Optimally, and as shown in Figure 9, for states to determine what type of state practice to apply to a given risk situation, they need to possess information about the elements of the risk situation — such as information about the characteristics of the conflict zone and the level of escalation; information about the existing security threat as determined by the presence of intent, capability, risk factors for an unintentional attack, command and control rigorousness and reliability; and information about previous hostile events.

This study will use the above-defined framework to analyse the threat and the corresponding airspace restrictions.

3. Hostile Events Analysis: 1985–2020

3.1. Purpose of the Hostile Events Analysis

At the outset of the project, the Foundation gathered and analysed data on 57 hostile events involving civil aviation in and around conflict zones over a 35-year period beginning in 1985. The period was selected based on the information for the hostile events that the Foundation was able to collect. Included in the sample were intentional and unintentional attacks from the ground on commercial air transport and general aviation operations. Hostile events, as illustrated in Figure 10, are the intentional or unintentional engagement of a capability to attack[21] against civil aviation.

Within the context of this study, the purpose of the hostile events analysis is twofold: to provide an empirically based context for the study and to inform the selection of conflict zones for further analysis. These two purposes are explained further.

The analysis of civil aviation hostile events would provide the necessary, data-defined context for the conflict zone security risk situation. In order to study the conflict zones, it is necessary to study their potential worst outcome — hostile events. Additionally, considering that most hostile events are associated with flights in nonrestricted airspace, this part of the inquiry was an important source of information about the failure of state practices to restrict the airspace.

The security threat associated with a security risk situation may be dormant and may never materialise. Whenever it is actively manifested, however, the security threat usually materialises in a hostile event. Hostile events, as illustrated in Figure 10 below, are the intentional or unintentional engagement of a capability against civil aviation. Hostile events can lead to hull loss, multiple fatalities, aircraft damage and/or injuries to flight crew and/or passengers, but they also can be inconsequential (i.e., a failed attack).

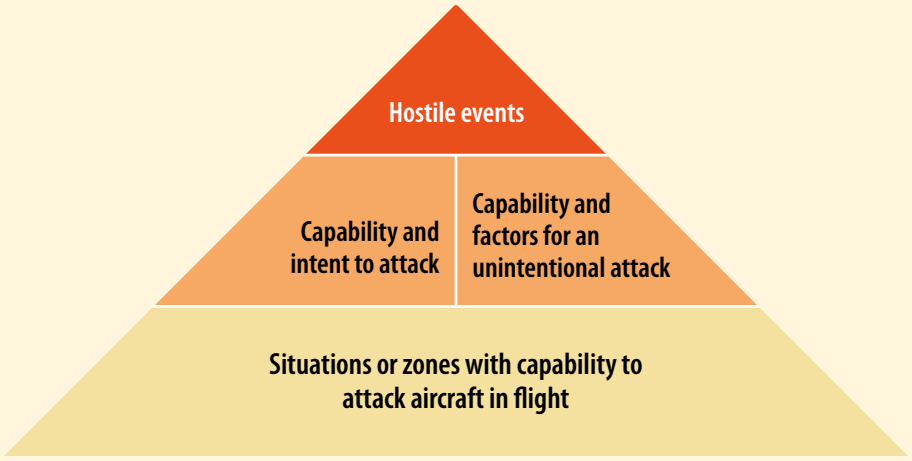
Hostile events are "the tip of the iceberg," and for each hostile event that occurred, there were many more precursor situations that sometimes were and sometimes were not associated with a conflict zone (for example, a terrorist act not in a conflict zone).

For each hostile event that occurred, there were many more precursor situations with factors that could lead to a hostile event — capability and intent to attack and/or capability and factors for an unintentional attack — were present, but the situation did not actually result in a hostile event. This is represented in the security threat layer of the security risk pyramid in Figure 10.

At the bottom of the security risk pyramid, there are multiple states and zones where the capability to attack aircraft in flight exists but where there is neither an intent to attack nor factors for unintentional attack. In general, the higher the situation is on the security risk pyramid, the higher is the associated security risk. One can study all types of situations associated with the above-illustrated security risk pyramid, including its lower layer of "normal situations" or the higher risk situations represented by the upper layers.

This study proposes an analysis of the "tip of the pyramid" — the hostile events. It is acknowledged that this is the least populated layer of the security pyramid, and

Figure 10
Hostile Events Pyramid



[21] E.g. MANPADS or SAMs

because of that, the associated sample will be the smallest. However infrequent, hostile events are the actual manifestation of the security threat and their study, together with the airspace-related information, is necessary but not entirely sufficient for a systematic, fact-based and data-driven study of conflict zone state practices.

The second purpose of the hostile events analysis is to inform the selection of conflict zones for further analysis. Conflict zones belong to the second layer of the security risk pyramid and occur more frequently than hostile events because there are more situations in which both the capability and intent to attack or capability and factors for unintentional attack are present.

The hostile events analysis can clearly indicate some (but not all) conflict zones with either intent to attack or present factors for an unintentional attack.

3.2. Hostile Events Sample

The sample of hostile events was selected in compliance with the following study-specific requirements:

- Attack occurred during the review period, 1985–2020.
- Attack involved civil aviation flights, including commercial air transport (both scheduled and non-scheduled) and general aviation (for example non-commercial business aviation, aerial work and pleasure flying).
- Global scope.
- Attack could be either intentional or unintentional.
- Attacks considered were not restricted to a specific capability to attack (for example, MANPADS or SAMs) in order not to restrict the possibility for comparative analysis.

Using publicly available resources and a dedicated Foundation database of "hostile events in civil aviation" and considering the above-defined scope of the sample, research concluded that there were at least 57 occurrences during the studied period.

An extract from the Foundation database of hostile events is provided in Table 2 (p. 21).

3.3. Airspace Restrictions and Hostile Events

Airspace restrictions analysis is a key element of this study. The results of the hostile events analysis, illustrated in Figure 11 below, show that most hostile events took place over conflict zones when the airspace was not restricted.

There was only one occurrence in the analysed sample (29 August 1999, Ethiopia) that took place in previously closed airspace. In this case, a business jet deviated from its route and flew deep inside the Ethiopian no-fly zone from Eritrea's airspace and was shot down by Ethiopian military with SA2 and/or SA3 SAMs.

Only eight occurrences out of the sample of 57 events are not associated with conflict zone and/or insurgency activity and, because of that, could have not been prevented by an restricting the airspace above and around a conflict zone.

Finding 1: Foundation analysis shows that most of the hostile events involving surface-to-air attacks against civil aviation flights that took place during the period of 1985–2020 could have been prevented by restricting the airspace above or around the conflict zone and by adherence to the restrictions.

3.4. Targeted Aircraft

An analysis of the hostile events indicates that turboprops are a more frequent target than jets, as can be seen

Figure 11
Airspace Restrictions

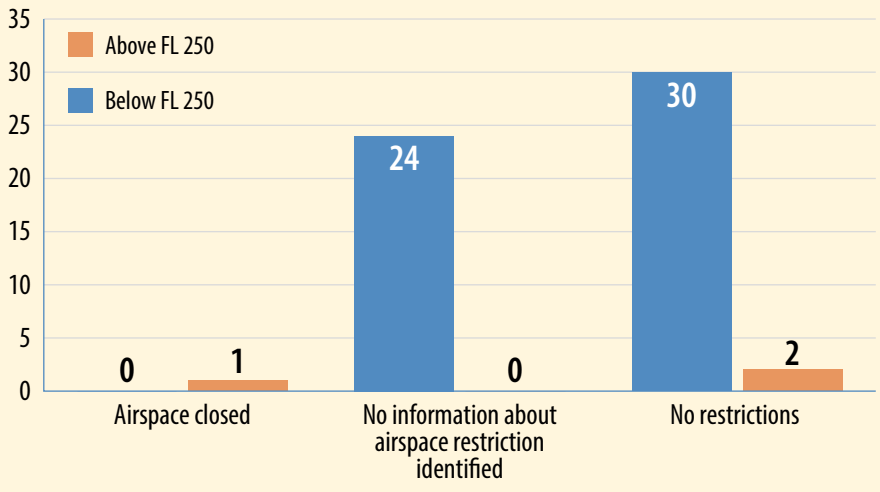


Table 2
An Extract from FSF "Hostile Events in Civil Aviation" Database

Date	State	Consequences	Aircraft Operator	Capability	Perpetrator	Flight phase	Altitude	Type	Killed/Injured/ Uninjured
04-Apr-85	Greece	Fuselage holed, no explosion	Royal Jordanian Airlines	RPG7	Abu Nidal and Black September	Takeoff	Ground	B727	0/0/75
04-Sep-85	Afghanistan	Hit after climbing overhead KDH before setting course, fire, subsequent crash.	Bakhtar Afghan	Shorts Blowpipe	Hezb-i-Islami faction	En route	12,500 ft	AN26	52/0/0
08-Jun-86	Angola	Veer off and wing fire during landing due to damage.	TAAG	UIDM	UNITA	Landing	n/k	L100	0/0/5
16-Aug-86	Sudan	Crashed	Sudan Airways	SA-7	SPLA	Initial climb	<3,000ft	F27	60/0/0
05-May-87	Sudan	Crashed	SASCO Air Charter	MANPADS	SPLA	Initial climb	n/k	C404	13/0/0
11-Jun-87	Afghanistan	Crashed	Bakhtar Afghan	MANPADS	Hezb-i-Islami	En route	n/k	AN26	53/2/0
14-Oct-87	Angola	No. 3 engine hit, caught fire, subsequent crash.	Zimex	MANPADS	MPLA or UNITA	Climb	5,000 ft	L100	6/0/0
06-Nov-87	Mozambique	Crashed	Air Malawi	MANPADS	Mozambique Armed Forces	En route	n/k	SC7	10/0/0
03-Jul-88	Iran	Crashed, missiles fired from ship; flight on airway A59 in accordance with Iranian ATC clearance.	Iran Air	2 x SM2	U.S. Navy	Climb	13,500 ft	A300	290/0/0
10-Dec-88	Pakistan	Crashed	Ariana Afghan	n/k	Pakistan Armed Forces	En route	n/k	AN26	25/0/0
xx Feb-89	Angola	Right wing fire; return to Dundo airport where wing burned off — whole later replaced.	TransAfrik	MANPADS	UNITA	En route	n/k	L100	0/0/X
08-Apr-89	Angola	No. 2 engine disabled and smoke on flight deck; crash landing and fire destroyed aircraft.	TransAfrik	Small arms	UNITA	Approach	<2,000 ft	L100	0/0/4
05-Sep-89	U.S.	Aircraft hit by gunshot while landing, bullet pierced door and grazed passenger's head.	USAir	Small arms		Landing			0/1/??
21-Dec-89	Sudan	Crashed	MSF	SA7	SPLA	Takeoff/ initial climb	<1,000ft	BN2	4/0/0
28-Dec-89	Romania	Crashed after suspected missile exploded in vicinity causing LOC; cause initially hidden by Romania, revealed in 2014.	TAROM	MANPADS	n/k	En route	n/k	AN24	7/0/0

AMISOM = African Union Mission to Somalia; ATC = air traffic control; CAA = civil aviation authority; DRC = Democratic Republic of the Congo; KDH = Ahmad Shah Baba International Airport; LOC = loss of control; MANPADS = man-portable air defence system; MEG = Malange Airport; MLPA = People's Movement for the Liberation of Angola; n/k = not known; NOTAMs = notices to airmen; RTO = rejected takeoff; SPLA = South Sudan People's Defence Forces; UNITA = National Union for the Total Independence of Angola

Table 2
An Extract from FSF "Hostile Events in Civil Aviation" Database *(continued)*

Date	State	Consequences	Aircraft Operator	Capability	Perpetrator	Flight phase	Altitude	Type	Killed/Injured/ Uninjured
05-Jan-90	Angola	Emergency landing after no. 4 engine hit and collateral damage to no. 3engine 3, returned to land.	Angola Air Charter	SA7?	UNITA	Climb	n/k	L100	0/0/7
12-Jun-90	Afghanistan	Two engines shut down, then emergency landing on unpaved runway en-route.	Aeroflot	RaytheonFIM-92 Stinger	n/k	En route	FL255	IL76	0/0/10
13-Feb-91	Angola	Damaged on final, normal landing completed	TransAfrik	n/k	UNITA	Approach	n/k	DC8	n/k
16-Mar-91	Angola	Crashed	TransAfrik	Stinger	UNITA	En route	FL170	L100	9/0/0
29-Mar-91	Angola	Hit left wing/engine; flight completed.	Zimex	MANPADS	UNITA	En route	n/k	DHC6	0/0/11
10-Jul-91	Peru	Both pilots killed by police gunfire just after takeoff, 13 passengers killed in subsequent crash.	Aerochasqui	Small arms	Illegal action by National Police	Initial climb	75ft	C212	15/0/0
10-Sep-91	Rwanda	Minor aircraft damage; flight completed.	Scibe Airlift Cargo Zaire	MANPADS	RPF	En route	n/k	F27	0/0/14
17-Sep-91	Somalia	Empennage hit, temp LOC, recovery and diversion to Djibouti.	Zimex	MANPADS	n/k	En route	9,600 ft	D228	0/0/5
28-Jan-92	Azerbaijan	Attackers targeted aircraft after "assuming" it was carrying weapons.	Azal Azerbaijan Airlines	Heat seeking missile	Armenian Resistance	En route	n/k	MI8	44/0/0
27-Mar-92	Azerbaijan	Middle engine disabled, resultant fire, diversion to Yerevan completed.	Armenian Airlines	Gunfire	Azerbaijan Air Force	Initial climb	n/k	YK40	0/0/34
09-May-92	Azerbaijan	Both pilots injured; aircraft caught fire and diverted to Sisian, Armenia; crash landing.	Ararat Avia	Su25	Azerbaijan Air Force	En route	n/k	YK40	0/0/33
29-May-92	Afghanistan	Missile hit runway ahead of aircraft, one pilot injured by shrapnel from explosion, but landing completed. Afghan president on board.	Ariana Afghan	MANPADS	n/k	Approach	700 ft	T154	0/0/17
27-Aug-92	Turkey	Continued to destination with nine bullet holes in fuselage.	THY	Gunfire	PKK	Initial climb	<3,000 ft	A310	0/0/128
23-Jan-93	Angola	No. 3 propeller blown off, returned to land, no other damage.	TransAfrik	RPG	UNITA	Initial climb	<2,000 ft	L100	0/0/X
26-Apr-93	Angola	Left engine hit, turned back but crew conducted forced landing in field.	for UNWFP	MANPADS	UNITA	En route	FL160	AN12	1/2/5

AMISOM = African Union Mission to Somalia; ATC = air traffic control; CAA = civil aviation authority; DRC = Democratic Republic of the Congo; KDH = Ahmad Shah Baba International Airport; LOC = loss of control; MANPADS = man-portable air defence system; MEG = Malange Airport; MLPA = People's Movement for the Liberation of Angola; n/k = not known; NOTAMs = notices to airmen; RTO = rejected takeoff; SPLA = South Sudan People's Defence Forces; UNITA = National Union for the Total Independence of Angola

Table 2
An Extract from FSF "Hostile Events in Civil Aviation" Database *(continued)*

Date	State	Consequences	Aircraft Operator	Capability	Perpetrator	Flight phase	Altitude	Type	Killed/Injured/ Uninjured
21-Sep-93	Georgia	Missile fired from boat; LOC, crashed.	Transair Georgia	Strela-2 (SA7)	Abkhazian Insurgents	Approach	1,000 ft	T134	27/0/0
22-Sep-93	Georgia	Damaged on short final, crash landed on runway, fire destroyed aircraft.	Orbi Georgian AW	n/k	Abkhazian Insurgents	Approach	n/k	T154	108/24/0
28-Jan-95	Angola	Right engine hit just after takeoff, followed by crash landing.	SAL	Raytheon FIM-92 Stinger	UNITA	En route	<1,500 ft	BE20	2/0/4
02-Sep-98	Angola	Engine fire, initial attempt to divert to MEG but then forced landing.	Permtransavia	MANPADS	UNITA	En route	n/k	AN26	24/0/0
29-Sep-98	Sri Lanka	Crashed	Gomelavia	n/k	LTTE	Climb	FL140	AN24	55/0/0
10-Oct-98	DRC	Attempted crash landing in jungle after the rear engine was struck.	Lignes Aeriennes Congolaises	Strela-2 (SA7)	Tutsi Militia	Climb	<6,000ft	B727	41/0/0
14-Dec-98	Angola	Crashed	Khors Air	n/k	UNITA	En route	FL150	AN12	10/0/0
26-Dec-98	Angola	Crashed	TransAfrik	anti-aircraft missile	UNITA	En route	n/k	L100	14/0/0
02-Jan-99	Angola	Crash landing in enemy-held territory during turnback.	TransAfrik	MANPADS	UNITA	En route	n/k	L100	9/0/0
12-May-99	Angola	Engine hit; forced landing; crew captured by UNITA.	Volga Atlantic AL	MANPADS	UNITA	En route	n/k	AN26	0/0/4
01-Jul-99	Angola	Crashed	Savanair	MANPADS	UNITA	En route	n/k	AN12	1/0/4
29-Aug-99	Ethiopia	Hit by proximity missile after proceeding into NOTAM-closed airspace.	Corporate Jets	SAM	Ethiopian Army Targeting Error	En route	FL410	LJ45	2/0/0
31-Oct-00	Angola	Crashed (UNITA claimed shoot down; CAA and military blamed a technical problem).	Ancargo NS	n/k	UNITA	En route	n/k	AN26	49/0/0
04-Dec-00	Burundi	Flight continued to normal landing, 13 bullet holes in fuselage.	Sabena	gunfire	Insurgents	Approach	350ft	A332	0/2/168
08-Jun-01	Angola	Aircraft from World Food Program hit in one engine; crew regained control and landed safely at Luena.	TransAfrik	anti-aircraft missile	Rebels (Unita admitted the attack)	En route—Approach	FL 150, 15000 ft (16,404 ft)	B727	0/0/3

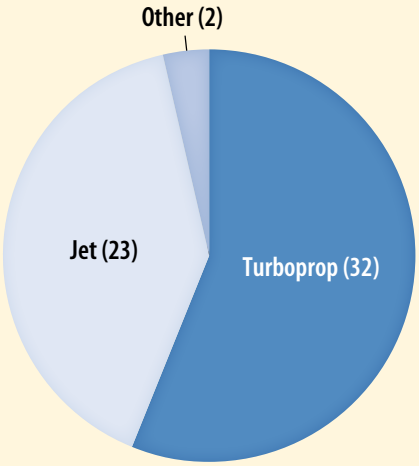
AMISOM = African Union Mission to Somalia; ATC = air traffic control; CAA = civil aviation authority; DRC = Democratic Republic of the Congo; KDH = Ahmad Shah Baba International Airport; LOC = loss of control; MANPADS = man-portable air defence system; MEG = Malange Airport; MLPA = People's Movement for the Liberation of Angola; n/k = not known; NOTAMs = notices to airmen; RTO = rejected takeoff; SPLA = South Sudan People's Defence Forces; UNITA = National Union for the Total Independence of Angola

Table 2
An Extract from FSF "Hostile Events in Civil Aviation" Database *(continued)*

Date	State	Consequences	Aircraft Operator	Capability	Perpetrator	Flight phase	Altitude	Type	Killed/Injured/ Uninjured
04-Oct-01	Black Sea	On Airway B145; crashed, missile fired from Feodosia overshot intended target at 18 nm by 140 nm after locking onto it.	Sibir Airlines	S-200 (SA5c)	Ukraine Armed Forces	En route	FL360	T154	78/0/0
28-Nov-02	Kenya	Missile missed the airplane, no damage; pilot decided to continue to Tel Aviv. Not a conflict zone.	Arkia	2 SA-7 - Strela 2	al-Qaida	Initial climb	3000ft	B757	0/0/271
22-Nov-03	Iraq	Continued with wing fire, no hydraulics, no fight controls; turned back, flapless only thrust-controlled landing, gravity drop for landing gear, runway excursion.	European Air Transport (DHL)	SA14 - Strela 3	Insurgents	Climb	8000ft	A300	0/0/3
09-Mar-07	Somalia	Projectile hit aircraft on the left hand side of fuselage near main landing gear. Fire caused smoke inside the airplane, which landed safely.	TransAVIAexport Airlines	most likely an RPG	Rebels on a boat. Islamist militia claimed the attack	Approach	490 ft	Il-76TD	0/0/15
23-Mar-07	Somalia	Crashed	TransAviaExport Airlines	n/k	Rebels on boat	Initial climb	<3,000 ft	IL76	11/0/0
15-Oct-09	Colombia	Flight.	SADELCA	gunfire	FARC	En route	n/k	DC3	0/1/X
17-Apr-13	Libya	Bullet entered flight deck.	Buraq Air	gunfire	n/k	Approach	2,000ft	B738	0/0/155
24-Jun-14	Pakistan	15-plus bullets; 2 cabin crew,1 passenger hit; passenger died.	PIA	gunfire	n/k	Approach	n/k	A310	1/2/187
26-Jan-15	Iraq	3-4 bullet holes	FlyDubai	Small Arms Fire	n/k	Approach	<2,000ft	B738	0/2/X
08-Jan-20	Iran	Proximity missile; aircraft destroyed,	Ukraine International Airlines	2x TorM1 (SA15)	Iranian Armed Forces	Climb	8,100ft	B738	176/0/0
04-May-20	Somalia	Going around because of animals on or near the runway; soldiers believed it was a suicide plane and shot it down.	African Express Airways or East African Express	ZU-23 anti-aircraft cannon	Ethiopian troops stationed as part of AMISOM	Approach	2.230ft	E120	6/0/0
25-May-20	Somalia	Continued for a landing. All occupants disembarked uninjured. The aircraft sustained damage bybullets penetrating wings and cabin.	Aeronav/Kenya School of Flying	Small arms fire	Ethiopian troops misidentified the aircraft and opened fire	Approach	<1,200ft	L410	0/0/X

AMISOM = African Union Mission to Somalia; ATC = air traffic control; CAA = civil aviation authority; DRC = Democratic Republic of the Congo; KDH = Ahmad Shah Baba International Airport; LOC = loss of control; MANPADS = man-portable air defence system; MEG = Malange Airport; MLPA = People's Movement for the Liberation of Angola; n/k = not known; NOTAMs = notices to airmen; RTO = rejected takeoff; SPLA = South Sudan People's Defence Forces; UNITA = National Union for the Total Independence of Angola

Figure 12
Type of Aircraft



in Figure 12. A possible explanation is that turboprops fly lower and slower than jets, including during their approach to land or initial climb following takeoff. The slower speed and engine signature make them easier to hit with less sophisticated and more readily available weapons (MANPADS vs. SAMs).

While potential launch areas around airports can be more easily secured and protected against attackers, the relatively low cruising altitudes of turboprops are within the engagement altitude limits for some MANPADS. Data reviewed show that of the 32 occurrences involving turboprops, only nine were during approach to land or initial climb phases of flight and 20 were during the en route phase.

Also, turboprop-powered aircraft often are used for humanitarian aid/relief flights and in various government utility operations, which often occur in circumstances where security and political stability are sub-optimal.

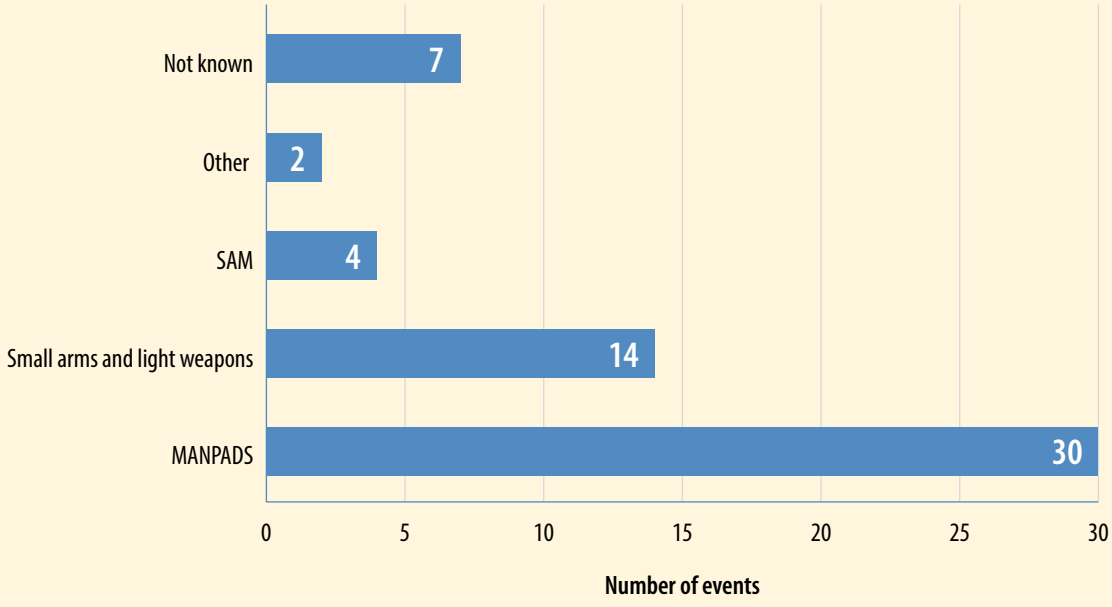
3.5. Capability to Attack

The Foundation's research showed MANPADS are the most common weapon used against civil aviation. Figure 13 shows the number of events in the sample associated with a given capability to attack. MANPADS generally are easier to obtain and use than larger, non-man-portable SAM systems.

However, the size of the warhead for most MANPADS (less than 2 kg for some common MANPADS) and their typical infrared homing guidance, which biases attacks toward aircraft engines, means that a catastrophic outcome (i.e., the aircraft being shot down) is not certain. By comparison, the four SAM events identified (five, including Flight MH17) show that a catastrophic outcome from an effective SAM attack is highly probable, at least in part because of the larger warhead (as much as 70 kg in some missiles).

It also should be noted that small arms attacks against aircraft at lower altitudes likely are the most frequent form of attack simply because of the prevalence of these weapons across the world. However, it is extremely difficult to accurately target an aircraft in flight with small arms, such as assault rifles; any damage tends to be minor; and attacks are difficult to detect. Therefore, it is noted that the number of small arms attacks in our sample may not be representative of the overall population of such events in the world.

Figure 13
Number of Events in the Sample Associated With a Given Capacity to Attack



Finding 2: Based on an analysis of reported surface-to-air attacks against civil aviation flights for the period of 1985–2020, MANPADS are the most common weapon used against civil aviation. MANPADS are generally easier to obtain and use than larger, non-portable SAM systems. However, the size of most MANPADS warheads means that a catastrophic outcome is not certain. By comparison, the SAM events identified show that a catastrophic outcome from an effective attack is highly probable. The presence of SAMs should therefore be a key indicator in any airspace risk analysis and avoid/overfly decision.

3.6. Risk and Capability Engagement Altitude

In 34 of the hostile events in the Foundation "Hostile Events in Civil Aviation" database, information about the engagement altitude was found. The engagement altitude for the hostile events in the Foundation database is presented in Figure 14. The Flight MH17 event is also indicated on the figure for reference.

Three (four, including the Flight MH17 event, which was not considered in the hostile events analysis) of the events occurred above Flight Level (FL) 250 and 19 occurred below FL 50.

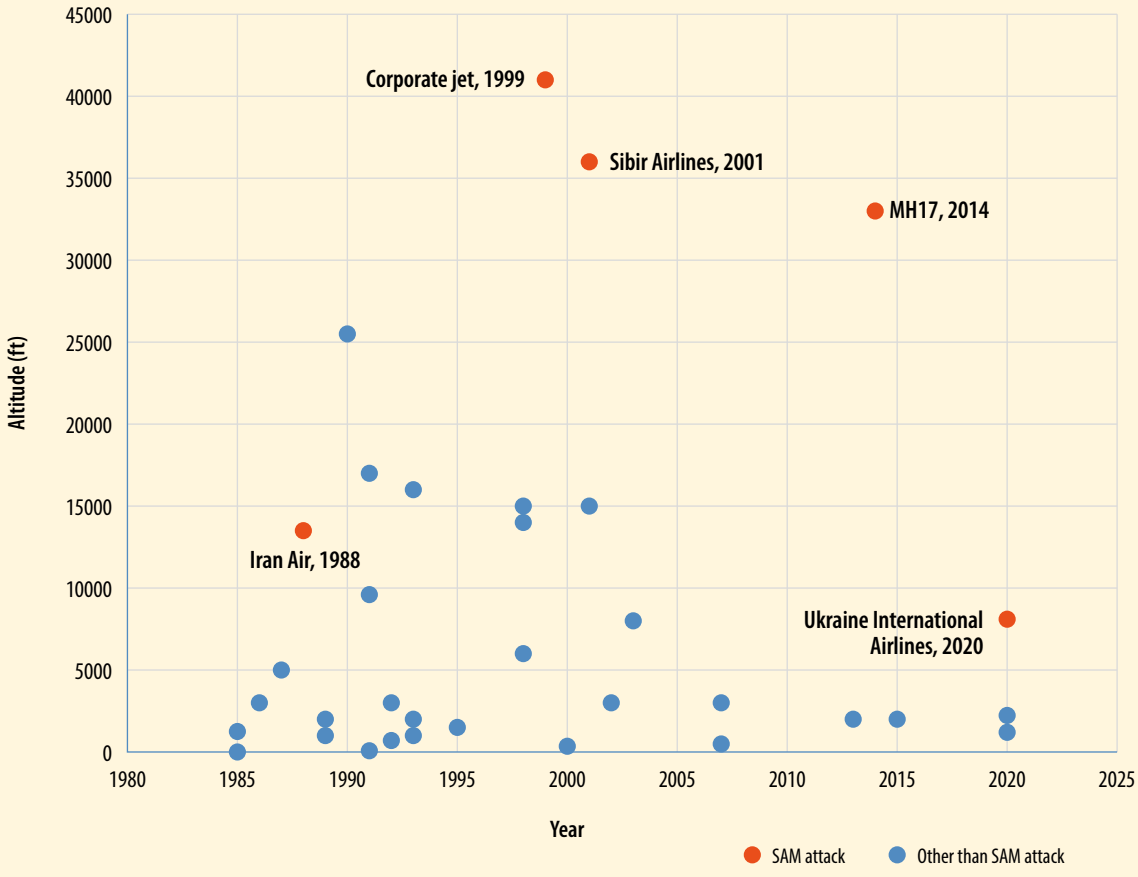
There were five occurrences, depicted in red in Figure 14, identified as involving a SAM attack. Two of these events (Iran Air, 1988, and Ukraine International Airlines, 2020) occurred within the limits of MANPADS engagement altitude. The occurrences depicted in blue involved capability to attack other than a SAM.

From the analysis, it appears that MANPADS range can be greater than sometimes assumed. A U.S. government assessment, published in July 2011, stated that MANPADS could "strike aircraft flying at altitudes up to approximately 15,000 feet at a range of up to 3.2 miles [5.9 km]." However, data associated with a 1990 attack on an IL-76 in Afghanistan recorded its altitude when hit by a U.S.-manufactured Raytheon FIM-92 Stinger MANPADS missile as FL 255. In this case, the missile was fired from high terrain. Therefore, the launch altitude for MANPADS can have a significant effect on their range and maximum engagement altitude.

It can be concluded that a reliable initial assessment of risk to airspace users demands an accurate up-to-date assessment of any effective capability in the hands of potential non-state aggressors and state actors.

The analysis of the engagement altitude, the associated phase of flight and the typical cruising altitude for an involved type of aircraft reveals that FL 250 is well selected

Figure 14
Altitude Distribution



for studying the security risk for aircraft at a cruising level that does not include the risk of MANPADS.

3.7. Intentional vs. Unintentional Attack

The two origins of risk to airspace users are "intentional act" and "unintentional act." State perpetrators' acts are generally associated with the latter explanation. And while irregular perpetrators also make targeting errors, in some regional conflict zones, an intent to bring down civil transport aircraft has featured prominently in their actions.

In terms of consequences, the most difficult to predict risk with the most serious consequences is error by those controlling the offensive capability of well-armed states. Recent history shows that this capability can sometimes be inadequately controlled both during training exercises and when applying the "offensive engagement approval" process in the general context of growing political instability.

Table 3 presents information about unintentional attack occurrences extracted from the Foundation database. There are eight such events identified and all but one involved military misidentification of the target identity and/or intentions. The remaining 49 events involved either an intentional attack or events for which the Foundation did not find information regarding intent.

The capability of "irregular perpetrators" is likely to be less than that of states unless states are pursuing an aggressive policy objective by equipping irregulars with offensive capability much greater than they normally would possess (older versions of MANPADS with less than current front-line capability, for example).

3.8. Hostile Events and Conflict Zone Flights

The analysis of the Foundation database sample suggests that the primary risk of overflying conflict zones at high cruising altitudes is the mis-targeting of long-range air-burst missiles. Based on our sample, these long-range missiles are unlikely to be in the possession of non-state actors.

Information about the risk of flight within a conflict zone is usually disseminated with a NOTAM.

The hostile events analysis identified several conflict zones where either an obvious intent to attack or factors for an unintentional attack existed. These zones, listed below, were considered candidates for further conflict zone analysis as part of the study.

- Afghanistan;
- Georgia during civil war, 1991–1993;
- Iraq;
- Libya;
- Democratic Republic of the Congo; and,
- Nagorno-Karabakh war.

Angola, where a number of attacks occurred, including the TransAfrik event noted above, was reviewed for inclusion, but is not included in the final list because the parties involved did not have a capability to attack aircraft flying at cruise altitude.

Table 3
Unintentional Acts and Their Context

Date	State	Unintentional Act	Aircraft Operator	Perpetrator	Altitude	Killed/Injured/ Uninjured
11-Jun-87	Afghanistan	Misidentified as a Russian IL14.	Bakhtar Afghan	Hezb-i-Islami	n/k	53/2/0
03-Jul-88	Iran	Military misidentified target as a descending Iranian F-14.	Iran Air	U.S. Navy	13,500 ft	290/0/0
29-Aug-99	Ethiopia	Military targeting error after proceeding into NOTAM closed airspace.	Corporate Jets	Ethiopian Army	FL 410	2/0/0
04-Oct-01	Black Sea	Military exercise missile overshot intended target at 18 nm (33 km) by 140 nm (259 km) after locking onto it.	Sibir Airlines	Ukraine Armed Forces	FL 360	78/0/0
26-Jan-15	Iraq	Probably accidental, rounds from nearby social event.	FlyDubai	n/k	<2,000 ft	0/2/X
08-Jan-20	Iran	Military misidentified aircraft as a hostile target.	Ukraine International	Iranian Armed Forces	8,100 ft	176/0/0
04-May-20	Somalia	Military misidentified going-around aircraft as a suicide plane.		Ethiopian troops as part of AMISOM	2.230 ft	6/0/0
25-May-20	Somalia	Military misidentified aircraft and opened fire.	Aeronav/Kenya School of Flying	Ethiopian troops as part of AMISOM	<1,200 ft	0/0/X

AMISOM = African Union Mission to Somalia; n/k = not known; NOTAM = notice to airmen

4. Conflict Zones Analysis: 1990–2014

4.1. Purpose of the Conflict Zones Analysis

Within the context of this study, the purpose of the conflict zones analysis was to set data-defined context for other research components by providing an overview of state practices regarding airspace restrictions above and/or around conflict zones. Among other things, the Foundation focussed on determining the presence of air defence equipment (both air-to-air and surface-to-air) during a conflict and the restrictions that were applicable to the use of the airspace.

4.2. Conflict Zones Sample

Conflict zones were selected in the following manner:

- Based on publicly available information for the major conflict zones in the world.
- Conflict zones were active during the period 1990–2014.
- There was a reasonable expectation, prior to commencing the analysis, of the existence of capability to attack at altitudes above FL 250. As defined previously, the scope of the study is determined by the overall objective of the research related to Flight MH17 and does not include the risk from MANPADS. In this respect, the study scope is restricted to the airspace management state practices for cruising altitudes that are more than 25 000 ft above ground level. FL 250 is also the altitude limit that is often used in state advisories or restrictions for operations in particular airspace with regard to risk associated with MANPADS.

Following the above-outlined study-specific requirements, and including the results of the hostile events analysis, the conflict zones selected for analysis are:

- Bosnian war, 1992–1997.
- Croatian war, 1991–1995.
- Democratic Republic of the Congo — it is to be noted that this conflict zone is the only one from the sample for which the analysis concluded that there was low likelihood of the presence of capability to attack above FL 250. However, the analysis is kept in the sample to provide context and perspective.
- Egypt (Sinai).
- Georgia-Russia, 2008.
- Iraq war, 1991.
- Iraq war, 2003–2011.
- Kosovo, Allied Force 1999.
- Libya, 2011.
- Slovenia, 1991.
- Afghanistan, 2001–present.
- Armenia Azerbaijan.
- Ivory Coast, 2002–2004.
- Indonesia (Aceh), 1990–1998.
- Mali, 2012–2015.

4.3. Conflict Zone Indicators

The situation in each conflict zone was reviewed relative to a set of 10 predetermined "indicators of likelihood of attack," such as the presence of SAMs capable of reaching a target in flight above FL 250.

Each of the indicators is considered as a question with possible answers numbered from 1 to 3. The number of the answer is an indication of likelihood, with 1 indicating, in general and with all other conditions being equal, the lowest likelihood of attack. The higher the number of the answer, the greater is the indication of the likelihood of attack.

The indicators are defined as follows:

A. Parties:
   1. Conflict between states.
   2. Conflict between non-state armed groups and state(s) or civil wars.
   3. Conflict between non-state armed groups.

B. Armed conflict scale and/or tensions:
   1. Terrorism and/or international political tension.
   2. Insurgency (small-scale military activities) and/or medium increasing political tension.
   3. Large-scale military activities and/or heightened international political tension.

C. Military air transport activities – Use of aircraft to transport ground troops or military equipment by at least one party (such aircraft may be difficult to distinguish from civil aircraft, particularly when they operate near airways and close to civil aircraft cruising altitudes):
   1. Military air transport activities not reported.
   2. Occasional use of aircraft to transport ground troops or military equipment.
   3. More than occasional use of aircraft to transport ground troops or military equipment (by at least one party).

D. Military air combat activities – Use of military aircraft in a combat role or for hostile reconnaissance

by at least one party in the conflict. This could include remotely piloted (unmanned) aircraft:

1. No military air combat activities.
2. Small-scale (occasional) military air combat activities and/or some activities above FL 250.
3. Large- to medium-scale military air combat activities and/or regular activities above FL 250.

E. Known attacks:

1. Conflict area without any publicly reported security incidents involving military and civil aviation.
2. Conflict area with a single security-related reported incident/accident involving military (or civil) aviation.
3. Conflict area with multiple reported security-related incidents/accidents involving military (or civil) aviation.

F. Capability to attack by at least one party:

1. No information about capability to attack with range above FL 250.
2. Air-to-air missiles (AAMs) launched from fighter aircraft (and no SAMs) and/or some indication (but not full certainty) of long-range SAMs that can hit an aircraft at cruising level.
3. Long-range SAMs that can hit an aircraft at cruising level.

G. Capability to differentiate between civil and military aircraft:

1. Differentiation supported by radar, electronic identification and non-cooperative target recognition systems measuring signature using acoustic and thermal radiation, radio emissions, radar techniques.
2. Differentiation supported by radar and electronic identification (e.g., identification, friend or foe (IFF); or secondary surveillance radar (SSR).
3. Differentiation supported only by radar tracks.

H. SAM/AAM operators' experience and chain of command:

1. Regular forces.
2. SAMs in the possession of irregular military forces or an absence of robust SAM/AAM command and control procedures for authorizing launch.
3. SAMs in the possession of irregular military forces and an absence of robust SAM/AAM command and control procedures for authorizing launch.

I. Known intent to attack:

1. Known intent to attack military aircraft.
2. Known intent to attack civil aircraft.
3. Communication of intent and a plan to attack civil aircraft or actual attack against civil aircraft.

J. Civil aircraft operations over or close to conflict zone (with and without the airspace restrictions, if any):

1. No air traffic or only occasional traffic.
2. Small to moderate traffic volume (for example, traffic restricted to arrivals and departures to airports).
3. Considerable traffic volume, including international overflights

The 10 indicators belong to groups of indicators defined in Section 2 that characterise the security threat. Each of the 10 indicators can belong to more than one group as follows:

- Capability to attack: indicators D, F and G.
- Intent to attack: indicators E and I.
- Possibility for an unintentional attack: indicators B, C, D, G, H and J.
- Conflict parties' command and control: indicators A, B and H.

One of the indicators, "The capability to attack by at least one party," is used as the primary filter, because the presence of an air defence system (surface-to-air or air-to-air) that can reach aircraft above FL 250 is an enabling risk factor at that altitude. The only possible exception would be an aircraft emergency such as an engine failure requiring a drift-down or an aircraft pressurisation failure leading to an emergency descent within the range of lower altitude capability to attack.

Other indicators of likelihood of attack were considered. Within them are some indirect indicators that are based on others' risk analyses. Examples of such indicators are the behaviour of large airlines and/or airlines with better access to risk information and the information from underwriting companies.

Detailed information about conflict zones is now generated globally by the insurance industry and is used to determine underwriting risk for so-called "war risk insurance" on an hour-by-hour basis. The risk assessments are used to set premiums for a given route, whether for overflight or landing, and underwriters may even refuse to insure an operator if the risk is considered to be unacceptably high. Sudden increases, sustained high premiums or refusals of coverage may therefore provide a useful indicator of overflight risk before formal airspace closures

or NOTAM warnings are issued. Operators will balance insurance costs against the cost of flying a less efficient avoidance route as part of their own risk assessment for a given flight; however, state authorities can lawfully direct their certificated operators to avoid a given area regardless of any efficiency penalties.

The indicators based on the behaviour of airlines and underwriters, although considered important in general, were not retained for the conflict zone risk analysis because of the lack of access to such historical information for the studied conflict zones.

Apart from the conflict zone likelihood of attack, and within the context of this study, there is another important indicator — the indicator of airspace restrictions. This indicator describes when airspace restrictions were introduced, what airspace they affected and how they evolved over time including:

- Restrictions by the sovereign authority (state) responsible for the airspace.
- Restrictions by others — third parties (for example, introducing a no-fly zone) and/or neighbouring states.

4.4. Overview of the Conflict Zone Analysis

Table 4 (p. 31) provides an overview of the analysed conflict zones.

The individual indicators of likelihood of attack (A to J) are coloured to illustrate how each contributes to the overall likelihood of attack. Green boxes indicate a low contribution to the likelihood, red boxes indicate a high contribution to the likelihood and yellow means a medium contribution to the likelihood.

The overall likelihood of attack is defined qualitatively as follows:

- *High* means a very plausible scenario that includes the presence of civil aircraft operations and evidence of capability and intent to attack or high indication of likelihood of unintentional attack.
- *Low* means a scenario with no information about capability to attack or without civil aircraft operations or low indication of unintentional attack.
- *Medium* means a scenario that is not covered by the either the *high* or *low* likelihood to attack definitions.

The overall likelihood of attack is not just a simple aggregation of the 10 indications of likelihood of attack provided by the 10 individual indicators. For example, the indicator "capability to attack by at least one party," apart from influencing the risk factors for an unintentional attack, is also a key filtering factor that, in the beginning of the risk analysis, defines with its indication the subsequent course of the risk analysis. Indeed, if in a given conflict zone there is (certainty of) no capability to attack above FL 250, then there is no need to analyse the other indicators, and the likelihood of attack there can be considered to be low.

Another example of the complex interactions of the indicators and their influence on the likelihood of attack can be illustrated by discussing the "intent to attack" and "capability to attack" indicators. High likelihood of attack is determined not simply by the intent of one of the conflict parties to attack, but also by their capability to attack at that altitude.

Similarly, fusing the information from the six indicators related to the likelihood of unintentional attack only makes sense when military aviation assets are in possession of the enemies of the parties that possess capability.

With the aim of providing an overall assessment of the likelihood of attack in a conflict zone while at the same time addressing all the complexities related to the interactions of the individual indicators in their influence the likelihood of attack, the Foundation used proprietary risk analysis algorithms. The algorithms were parametrised to assess the overall likelihood of attack above FL 250, and the results are provided in Table 4.

Using the algorithms, two sets of assessment were performed — one factoring the civil aviation traffic volume for the situation after introducing the airspace restrictions (if any), and the other for assessing the situation as if airspace restrictions were not in effect. The latter assessment is hypothetical and is not the same as the assessment of the likelihood before the introduction of the airspace restrictions. The reason for that is because before the introduction of airspace restrictions, many of the other indicators were often also different — the military combat activities have not commenced, the armed conflict scale was still to be seen and the attacks on military aircraft were still to be performed.

For each set of assessments, separate "algorithm runs" were performed for each credible capability to attack. Here are some examples of risk scenarios that determine separate runs of the algorithm:

- Long-range SAM capability of one conflict party that could result in intentional or unintentional attack against civil aircraft;
- AAM capability of a party that could result in intentional or unintentional attack against civil aircraft; and,
- A scenario (specific to the mountainous terrain in places like Afghanistan) where MANPADS can reach above FL 250.

The overall likelihood for a given set of algorithm runs is determined by the highest risk assessed for the scenarios within the set. For example, in a given set (with or without airspace restrictions), if the likelihood of attack associated

Table 4
Overview of the Conflict Zone Analysis

		No information		Command and control factors									
		High likelihood indication			Risk factors for an unintentional attack								
		Medium likelihood indication							Capability to attack				
		Low likelihood indication										Intent to attack	
		Overall indication of likelihood of attack above FL 250		A. Parties	B. Armed conflict scale and/or tensions	H. SAM operators' experience and chain of command	C. Military air transport activities	J. Civil aircraft operations (with airspace restrictions)	D. Military air combat activities	G. Capability to differentiate between civil and military aircraft	F. Capability to attack by at least one party	E. Known attacks	I. Known intent to attack (civil a/c)
	Airspace Restrictions above FL 250	With actual airspace restrictions	Without airspace restrictions										
Bosnian war 1992-1997	Others' restrictions												
Croatian war 1991-1995	Partially restricted												
Democratic Republic of the Congo	No restriction												
Egypt (Sinai)	No restrictions												
Georgia-Russia 2008	No restriction												
Iraq war 1991	Others' restrictions												
Iraq war 2003-2011	Others' restrictions												
Kosovo, Allied Force 1999	Others' restrictions												
Libya 2011	Others' restrictions												
Slovenia 1991	Restricted												
Afghanistan 2001- present	No restrictions												
Armenia Azerbaijan	Restricted												
Ivory Coast 2002-2004	No restriction												
Indonesia (Aceh) 1990-1998	No restriction												
Mali 2012-2015	No restriction												
Georgian civil wars 1991-93	No restriction												

with air-to-air unintentional attack is assessed as medium and the likelihood of attack with long range SAMs is assessed as high, then the likelihood of attack for the set is considered high. This is intuitively logical because for an aircraft operator and the general public, what is important is not how the attack will be performed but the likelihood of attack when flying in a given airspace.

4.5. Discussion of the Conflict Zone Analysis

In this section, we analyse the data in Table 4 and draw conclusions based on the historical evidence and our expert analysis.

In analysing these conflict zones, sometimes the evidence and expert interpretations led to clear conclusions, and in other cases, due to lack of information, a conclusion could not be definitively established.

The overview of the conflict zones analysis provided in Table 4 reveals (see the two columns under the common title "Overall indication of likelihood of attack above FL 250") that in the studied sample there are only two conflict zones where a state completely closed its own airspace. These are the conflict zones of "Slovenia, 1991" and "Armenia-Azerbaijan."

In one conflict zone, "Croatian war, 1991–1995," the airspace was partially closed. In five of the analysed conflict zones, the airspace was closed by other states or organisations and not the sovereign state — for example by a U.N. Security Council resolution, as in the case of "Libya, 2011," or by the neighbouring states, as in the case of "Kosovo, Allied Force, 1999."

For eight conflict zones, either there were no airspace restrictions or no information about airspace restrictions could be found.

The analysis of airspace restrictions for the studied sample of 16 conflict zones is illustrated in Figure 15.

Overall, there are 11 conflict zones with medium or high indication of likelihood of attack without airspace restrictions. Of these 11 conflict zones, there was only one instance in which the sovereign state responsible for that airspace introduced airspace restrictions — see Figure 16.

Finding 3: The analysis of selected conflict zones over the period of 1990–2014 did not identify a uniform practice of states closing their own airspace when there were indications of a likelihood of attack against civil aircraft in the context of an armed conflict on the territory of that state.

In the few cases in the sample where states partially or completely closed their airspace, this was often associated with the loss of effective control over the relevant airspace by the state — Yugoslavia with the "Croatian war, 1991–1995" and with "Slovenia, 1991" and the conflict zone "Armenia-Azerbaijan."

Finding 4: The analysis of selected conflict zones over the period of 1990–2014 identified that, on the rare occasions when a state restricted its own airspace above FL 250, it was associated with the loss of effective control over the relevant airspace by the state.

Whenever a state closes or restricts its own airspace above FL 250, or such a restriction is imposed by a third party (such as in the introduction of a "no fly zone" by an entity like the North Atlantic Treaty Organization), the predominant concerns historically have related to the security of military operations, military aircraft traversing airspace, and the protection of ground infrastructure and of the

Figure 15
Sample of 16 Conflict Zones

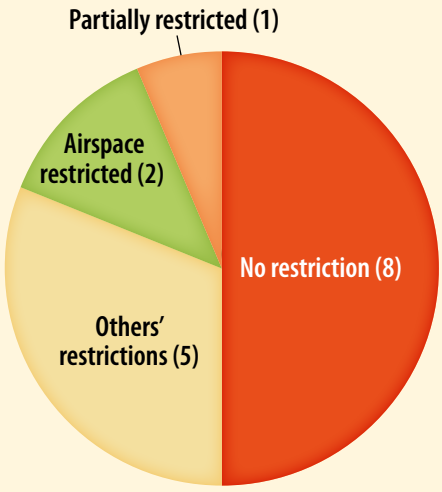
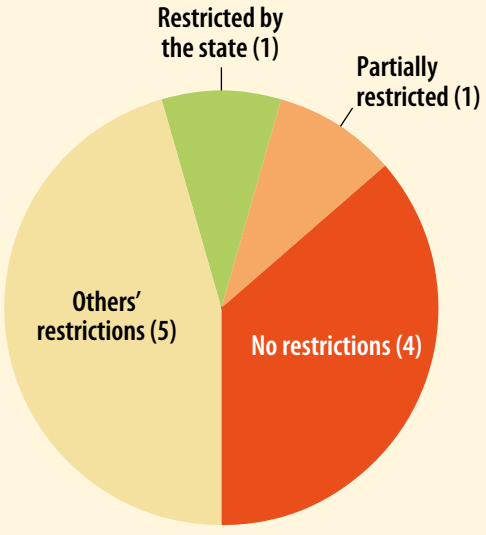


Figure 16
11 Conflict Zones With Medium or High Indications of Likelihood of Attack Without Airspace Restrictions



population rather than the security of the civil aviation. Indeed, looking at the publicly available sources, U.N. Security Council resolutions and/or the introduction of no-fly zones, no information was found referring to the protection of civil aviation whenever airspace was restricted or closed.

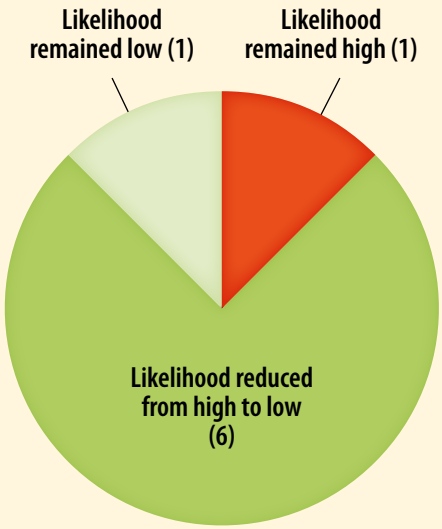
Finding 5: The analysis of selected conflict zones over the period of 1990–2014 identified that whenever a state closed or restricted its own airspace above FL 250, or such a restriction was imposed by a third party, the predominant concerns were the security of military operations and of the population rather than the security of civil aviation.

In the studied sample, there were eight cases in which an entity (the sovereign state or a third party) introduced partial or full airspace restrictions. These restrictions were for the conflict zones "Bosnian war, 1992–1997," "Croatian war, 1991–1995," "Iraq war, 1991," "Iraq war, 2003-2011," "Kosovo, Allied Force, 1999," "Libya, 2011," "Slovenia, 1991" and "Armenia-Azerbaijan."

Two sets of overall indication of likelihood of attack above FL 250 for these conflict zones were compared. These two sets of assessment include one that factors in the civil aviation traffic volume for the situation after introducing the airspace restrictions (if any), and the other that assesses the situation as if airspace restrictions were not in effect.

This comparison reveals that in six of the eight cases in which airspace restrictions were introduced, the assessed likelihood of attack against civil aviation was reduced considerably. (See Figure 17)

Figure 17
Eight Cases of Airspace Restrictions



The likelihood of attack for the conflict zone "Slovenia, 1991" without airspace restrictions was assessed as low, and because of that, it can be argued that the restrictions were not necessary for the purpose of protecting civil aircraft at cruising altitudes above FL 250.

5. Airspace Restrictions Over and Around Eastern Ukraine

5.1. Objectives of the Airspace Restrictions Analysis

After setting the wider background of the inquiry by characterising the historical occurrences of hostile events and the state practices of airspace management over conflict zones, the Foundation focused on airspace restrictions in Ukraine and the Russian Federation immediately prior to the downing of Flight MH17. The Foundation considered studying the airspace restrictions timeline and specifics to be important because restrictions are the main outcome of airspace restrictions decision-making, which is the study focus of this inquiry.

5.2. Scope of the Airspace Restrictions Analysis

The scope of the airspace restrictions analysis is defined as follows:

- The analysed information is from NOTAMs.
- Information was sourced and analysed for the period from 1 March 2014 up to and including the moment of complete closure of the respective airspace subsequent to the downing of Flight MH17 on 17 July 2014.
- The respective airspace is contained in the Dnepropetrovsk Flight Information Region (FIR), UKDV, and in the Rostov-on-Don FIR, URRV (which borders the UKDV FIR).
- The specific focus of the analysis is on the restrictions above FL 250.

5.3. Technical Background

5.3.1. Background

The situation at the time involved several airspace restrictions, introduced by both Ukraine and Russian Federation, of airspace above and around eastern Ukraine. These airspace restrictions were promulgated with NOTAMs. To introduce the technical context of airspace restrictions, what follows is a short overview of airspace restrictions as a measure and of NOTAMs as aeronautical information products that are often used to promulgate this measure.

5.3.2. Airspace Sovereignty, FIRs and ATS Routes

States have sovereignty over the airspace above their territory and exercise complete and exclusive control of it. As provided in reference [2]: "For reasons of safety, a state may impose limitations on the use of its airspace and determine along which routes and at which minimum altitude aircraft may fly within that airspace. The managing state can also partly or fully close its airspace if this is necessary for safety reasons."

Global airspace is divided by ICAO into nine air navigation regions. Airspace is divided further into FIRs. An FIR is an airspace of defined dimensions within which flight information service and alerting service are provided. The nature and scope of air traffic services, which include the flight information service and alerting service, are defined in Annex 11 to the Convention on International Civil Aviation, *Air Traffic Services*. In some cases, FIRs are split vertically into lower and upper sections. The lower section remains referred to as an FIR, but the upper portion is referred to as an upper information region (UIR).

Each FIR is managed by a controlling authority that has responsibility for ensuring that air traffic services are provided to the aircraft flying within it. Smaller countries may have one FIR in the airspace above them and larger countries may have several. Airspace over international waters (e.g., the oceans) is typically divided into FIRs that are delegated to controlling authorities within countries that border it.

Airspace within an FIR is usually divided into airspace structural elements. The airspace structural elements vary in their function, size and classification. Classifications determine the rules for flying within a part of airspace and whether it is controlled or uncontrolled airspace. Aircraft flying in controlled airspace must follow instructions from air traffic controllers. Air traffic control's main purpose is preventing collisions between aircraft. Aircraft flying in uncontrolled airspace are not provided with air traffic control services.

One airspace structural element, particularly important for flights overflying a given territory, is an air traffic services (ATS) route.

An ATS route is a specified route designed for channelling the flow of traffic as necessary for the provision of air traffic services. ATS routes serve a purpose similar to that of roads on the ground. ATS routes are also used to plan the trajectory of flights that are recorded in flight plans.

Flight plans are documents filed by a pilot or flight dispatcher prior to departure which indicate the airplane's planned route or flight path. Flight plan format is specified in ICAO Doc 4444, "Air Traffic Management." Flight plans, among other things, have to ensure that the planned airplane flight trajectory respects all airspace constraints, including airspace restrictions known at the time the flight plan is filed.

5.3.3. Airspace Restrictions

Airspace restrictions can be introduced by sovereign states at different time horizons and different levels of airspace management.

Published airspace restrictions, as part of airspace management practices, are normally promulgated through Aeronautical Information Publications (AIPs) or through

NOTAMs. AIPs are generally used for information of a permanent or lasting nature, as well as for temporary changes of long duration while NOTAMs are used to disseminate information 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.

Airspace restriction for a given airspace can be effectively introduced by describing the three-dimensional boundaries of the airspace and specifying the time validity of the restrictions. In the same way, wherever only ATS routes are used for civil aviation flight planning, the restriction of the ATS route segments that pass through a given airspace has the same effect as restricting the airspace volume.

Airspace restrictions are a key constraint for flight planning. Aircraft operators or specialised third parties plan the flight trajectory considering the constraints imposed by the airspace restrictions. Flight planning is often performed with the help of specialised software applications that process the requested flight trajectory though the airspace and other constraints to find an optimal flight trajectory.

5.3.4. NOTAM

A NOTAM is a notice 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. NOTAMs do not include extensive text and/or graphics.

NOTAMs are issued by national authorities for a number of reasons, such as:

- Hazards such as air shows, parachute jumps and glider or micro-light flying;
- Flights by important people such as heads of state;
- Closed runways, taxiways, etc;
- Unserviceable radio navigational aids;
- Military exercises with resulting airspace restrictions;
- Unserviceable lights on tall obstructions;
- Temporary erection of obstacles near airfields (e.g., cranes).

For reasons of conciseness and precision, NOTAMs are encoded, although the code is usually sufficiently self-evident to allow the user to identify a hazard.

NOTAMs are communicated by the issuing agency using the fastest available means to all addressees for whom the information is assessed as being of direct operational significance, and who would not otherwise have at least seven days' prior notification.

Flight crew access to current NOTAMs during preflight planning may be via airport flight briefing facilities provided for all aircraft operators or via an alternative system provided by their company to provide access only to NOTAMS relevant to their intended flight.

NOTAMs are published using all upper-case letters. NOTAMs comprise up to eight items, which are identified by letters: Q, A, B, C, D, E, F, and G. Individual items are often omitted if unnecessary or inappropriate.

The NOTAM first line contains NOTAM identification (series, sequence number and year of issue), the type of operation (NEW, REPLACE, or CANCEL), as well as a reference to a previously issued NOTAM, if relevant.

Item Q contains a comprehensive description of information contained within the NOTAM. It consists of up to eight fields separated by a stroke (/). This information is repeated in the text of the NOTAM. Some authorities do not include Item Q in NOTAMs.

The first field of Item Q is the abbreviation of the FIR for which the subject of the information in the NOTAM is located geographically. For example, "UKDV" identifies the Dnipropetrovsk FIR.

The second field in Item Q is the NOTAM code. All NOTAM code groups contain a total of five letters and the first letter is always the letter Q. The second and third letters identify the subject, and the fourth and fifth letters denote the status or condition of the subject. For example, QARLC code identifies "subject ATS routes" ("AR") "closed" ("LC"); QRTCA code identifies "temporary restricted area" ("RT") "activated" ("CA"); QRAXX identifies "airspace reservation" ("RA") "in plain language" ("XX"). Another example of Q code from the studied NOTAMs is QFALT that identifies "aerodromes" ("FA") "limited to…" ("LT").

The third field in Item Q identifies the subject traffic. For example, "IV" identifies instrument ("I") and visual ("V") traffic.

The fourth field in Item Q identifies the purpose of the NOTAM. For example, "NBO" identifies: (N), NOTAM selected for the immediate attention of flight crewmembers; (B) , NOTAM of operational significance selected for preflight information bulletin entry; and (O), NOTAM concerning flight operations.

The fifth field in Item Q identifies the scope of the NOTAM. For example, "E" identifies en-route scope.

The sixth and seventh fields in item Q identify lower and upper limits. The lower and upper limits are only expressed in flight levels (FL) and express the actual vertical limits of the airspace area without the addition of buffers. In the case of navigation warnings and airspace restrictions, values entered shall be consistent with those provided under NOTAM Items F and G. For example, "260/320" identifies lower and upper limits from FL 260 to FL 320. If the subject does not contain specific height information, "000" is used for lower and "999" for upper limits as default values.

The eighth field in Item Q identifies the coordinates and/or the radius that defines the subject of the information in

the NOTAM. For example, "4820N03716E119" identifies a circle with centre 4820N and 03716E and radius of 119 nm (220 km).

Item A is the 4-letter ICAO code for the location — the affected aerodrome or FIR for the NOTAM.

Item B is the 10-figure group that indicates the year, month, date and time at which any change to already published information comes into force. Alternatively, the date/time group may be written in plain language.

Item C is the 10-figure group giving the year, month, date and time at which the NOTAM ceases to have effect. Item C may be omitted if the information is permanent, or "PERM" (permanent) or "UFN" (until further notice) may be inserted.

Item D gives the schedule of dates and times when the NOTAM will be active.

Item E describes, in plain language but using simple abbreviations where appropriate, the nature of the event that is the subject of the NOTAM. It is in English but can be abbreviated.

Items F and G, when present, indicate the lower and upper limit of activity of navigation warnings or airspace restrictions. If the lower limit is ground level, Item F is usually omitted, but "SFC" (surface) or "GRD" (ground) may be inserted.

5.4. Analysis of the NOTAMs

The studied NOTAMs were extracted from the European AIS Database (EAD) archive for the studied period (1 March 2014 up to and including the moment of complete closure of the respective airspace subsequent to the downing of Flight MH17 on 17 July 2014). The selected NOTAMs for URRV FIR and UKDV FIR, start from 01 January 2014 to make sure that NOTAMs that had been created earlier and that were still valid after 01 March 2014 are also included in this extraction. The archive facility has limited extraction capabilities as compared to the production system for more recent periods. The initially extracted files included all NOTAMs (i.e., the files were not limited to those involving airspace restrictions above FL 250) because it was not possible to make such a specific extraction from the NOTAM archive. However, the NOTAM text allowed for more filtering to narrow the search as needed for the scope of the analysis.

The search of NOTAMs for the studied period identified 291 NOTAMs for the Dnepropetrovsk UKDV FIR. Of these NOTAMs, 96 concerned airspace restrictions. Airspace restrictions above FL 250 were defined in 39 NOTAMs. Analysis of the geographical coverage of these 39 NOTAMs resulted in the final selection of 15 NOTAMs that were analysed and for which an illustration map was produced.

Similarly, the search of NOTAMs for the studied period identified 1019 NOTAMs for the Rostov-on-Don FIR URRV. Of these NOTAMs, 799 concerned airspace restrictions. Airspace restrictions above FL 250 were defined in 37 NOTAMs. Analysis of the geographical coverage of these 37 NOTAMs resulted in the final selection of two NOTAMs that were analysed and for which an illustration map was produced. The final 15 NOTAMs for UKDV FIR and 2 NOTAMs for URRV FIR are represented in the next sections.

5.5. Adopted Format for NOTAM Description

The 17 NOTAMs analysed are further described separately. Each NOTAM description is provided in a separate subsection of this report that contains the NOTAM content, an illustration map of the restricted airspace elements introduced by the NOTAM (where the illustration is approximate and the maps cannot be used for navigation or other purposes) and the description of the restrictions the NOTAM introduces.

The description of the restrictions includes the validity of the NOTAM, the description of the restriction, the description of any exemptions provided (e.g., for state aircraft) and the altitude limits.

The restrictions promulgated by the studied NOTAMs are two types — restricting ATS routes or restricting three-dimensional area of airspace. The restricted ATS routes are depicted on the illustration map as lines, and the restricted areas are depicted as polygons.

The illustrations of the restrictions of the ATS routes use different colours. These colours do not have any specific significance and are only used to help the reader identify similarity between the different restrictions. For example, the illustrations of the restrictions of NOTAM A0942/14 and NOTAM A0820/14 depict a line in the same colour that illustrate the same restricted ATS route.

5.6. Ukraine Airspace Restrictions Timeline

5.6.1. NOTAM A0820/14, Issued on 24 April 2014

NOTAM content and illustration map

A0820/14 NOTAMN

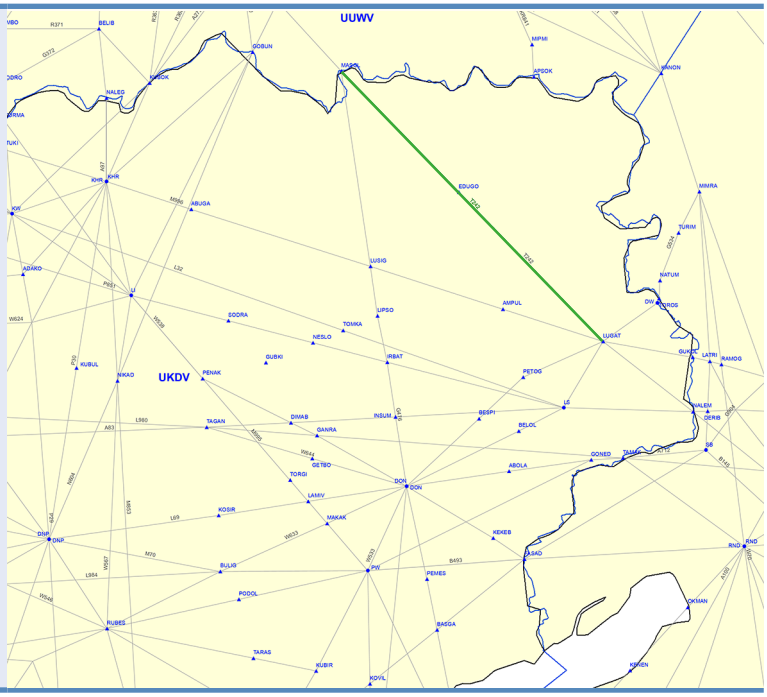
Q) UKDV/QARLC/IV/NBO/E
/100/350/4915N03848E056

A) UKDV B) 1404260400 C) 1405081800

D) DAILY 0400-1800

E) SEGMENT ATS ROUTE MASOL-EDUGO-LUGAT T242 CLOSED.

FM 3050M AMSL UP TO FL350.



Note: The Illustration is approximate

Restrictions

The NOTAM A0820/14 introduced restrictions:

- Valid from 0400 UTC on 26 April 2014 until 1800 UTC on 08 May 2014.
- For a defined segment of ATS route (MASOL-EDU-GO-LUGAT T242).
- Closed daily from 0400 UTC until 1800 UTC.
- From 3050 m above mean sea level to FL 350 inclusive.

5.6.2. NOTAM A0942/14, Issued on 05 May 2014

NOTAM content and illustration map

A0942/14 NOTAMN

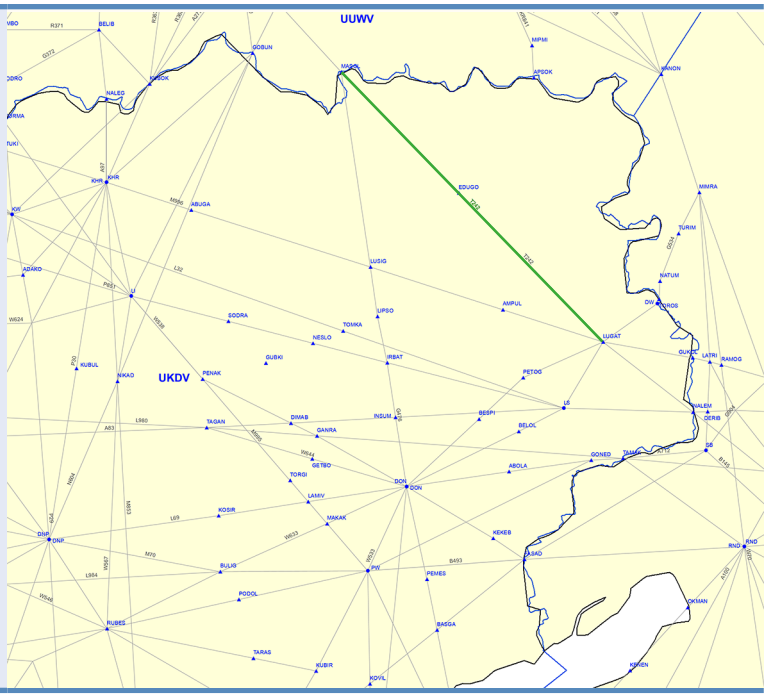
Q) UKDV/QARLC/IV/NBO/E
/100/350/4915N03848E056

A) UKDV B) 1405120400 C) 1405201800

D) DAILY 0400-1800

E) SEGMENT ATS ROUTE MASOL-EDUGO-LUGAT T242 CLOSED.

FM 3050M AMSL UP TO FL350.



Note: The Illustration is approximate

Restrictions

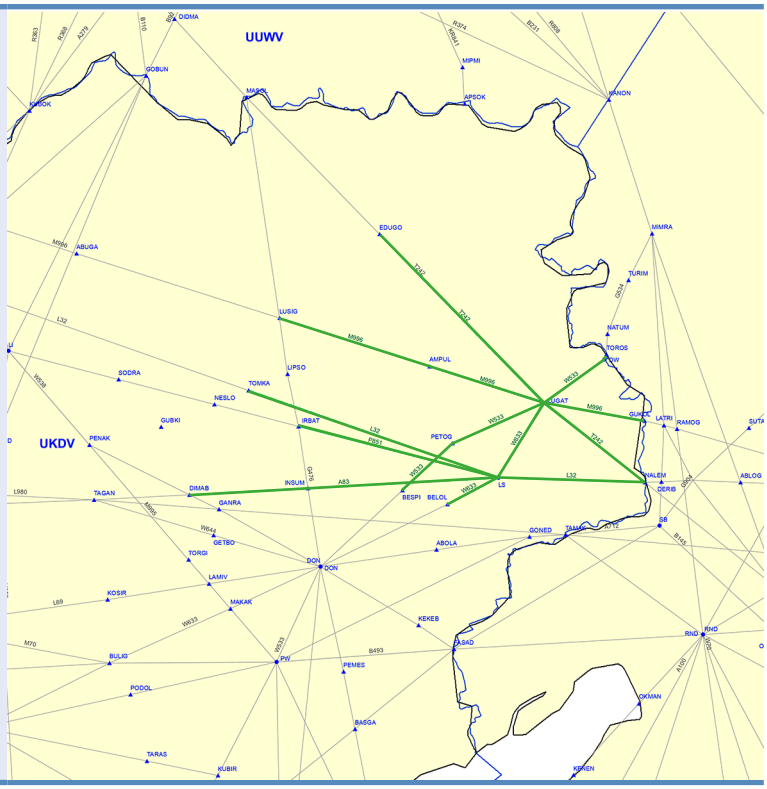
The NOTAM A0942/14 introduced restrictions:

- Valid from 0400 UTC on 12 May 2014 until 1800 UTC on 20 May 2014.
- For a defined segment of ATS route (MASOL-EDU-GO-LUGAT T242).
- Closed daily from 0400 UTC until 1800 UTC.
- From 3050 m above mean sea level to FL 350 inclusive.

5.6.3. NOTAM A1219/14, Issued on 02 June 2014

NOTAM content and illustration map

A1219/14 NOTAMN
Q) UKDV/QARLC/IV/NBO/E
/000/280/4839N03844E069
A) UKDV B) 1406021540 C) 1406031700
E) SEGMENTS ATS ROUTES CLOSED:
LS-DIMAB A83
TOMKA-NALEM L32
AMPUL-LUGAT M996
LUSIG-GUKOL M996
LS-IRBAT P851
EDUGO-NALEM T242
DW-LUGAT W533
TOROS-BESPI W533
BELOL-LUGAT W633
FROM SFC TO FL280.



Note: The Illustration is approximate

Restrictions

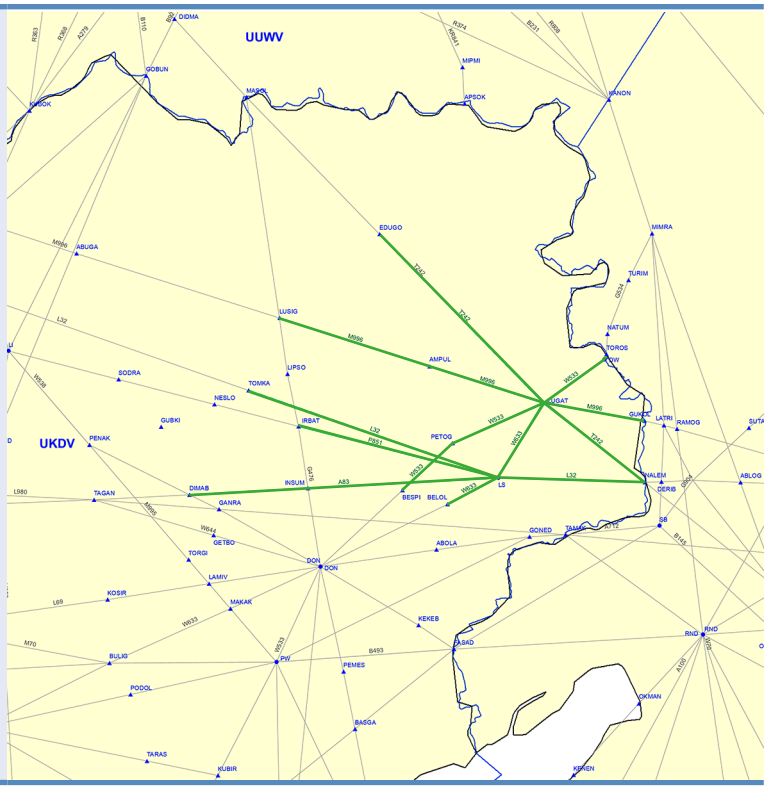
The NOTAM A1219/14 introduced restrictions:

- Valid from 1540 UTC on 02 June 2014 until 1700 UTC on 03 June 2014.
- For defined segments of ATS routes (LS-DIMAB A83, TOMKA-NALEM L32, AMPUL-LUGAT M996, LUSIG-GUKOL M996, LS-IRBAT P851, EDUGO-NALEM T242, DW-LUGAT W533, TOROS-BESPI W533, BELOL-LUGAT W633).
- Closed.
- From surface to FL 280 inclusive.

5.6.4. NOTAM A1229/14, Issued on 03 June 2014

NOTAM content and illustration map

A1229/14 NOTAMN
Q) UKDV/QARLC/IV/NBO/E
/000/280/4839N03844E069
A) UKDV B) 1406031801 C) 1406041700
E) SEGMENTS ATS ROUTES CLOSED:
LS-DIMAB A83
TOMKA-NALEM L32
AMPUL-LUGAT M996
LUSIG-GUKOL M996
LS-IRBAT P851
EDUGO-NALEM T242
DW-LUGAT W533
TOROS-BESPI W533
BELOL-LUGAT W633
FROM SFC TO FL280.



Note: The Illustration is approximate

Restrictions

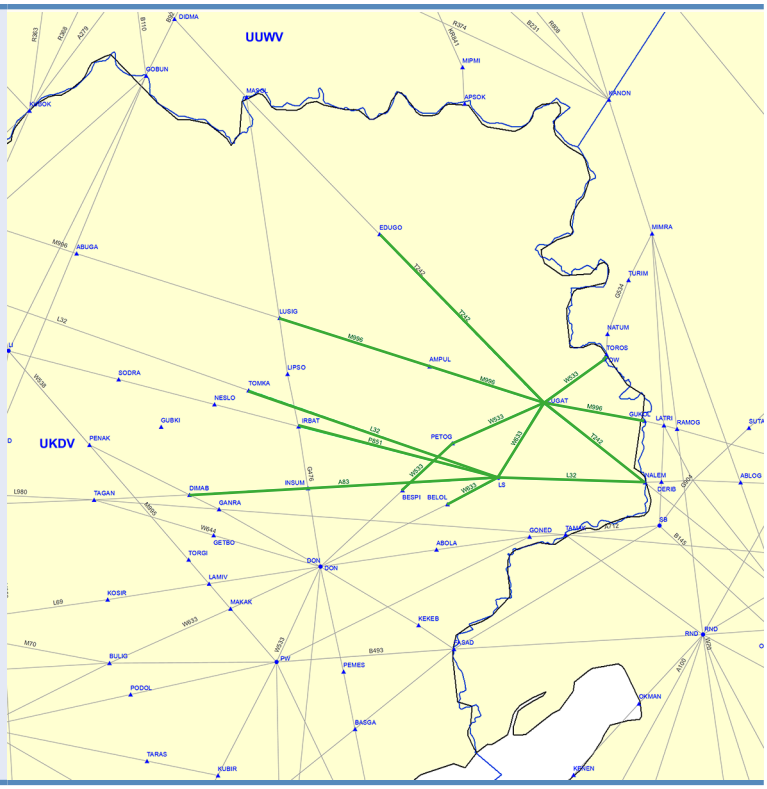
The NOTAM A1229/14 introduced restrictions:

- Valid from 1801 UTC on 03 June 2014 until 1700 UTC on 04 June 2014.
- For defined segments of ATS routes (LS-DIMAB A83, TOMKA-NALEM L32, AMPUL-LUGAT M996, LUSIG-GUKOL M996, LS-IRBAT P851, EDUGO-NALEM T242, DW-LUGAT W533, TOROS-BESPI W533, BELOL-LUGAT W633).
- Closed.
- From surface to FL 280 inclusive.

5.6.5. NOTAM A1231/14, Issued on 04 June 2014

NOTAM content and illustration map

A1231/14 NOTAMN
Q) UKDV/QARLC/IV/NBO/E
/000/280/4839N03844E069
A) UKDV B) 1406041200 C) 1406041700
E) SEGMENTS ATS ROUTES CLOSED:
LS-DIMAB A83
TOMKA-NALEM L32
LUSIG-GUKOL M996
LS-IRBAT P851
EDUGO-NALEM T242
TOROS-BESPI W533
BELOL-LUGAT W633.
FROM SFC TO FL280.



Note: The Illustration is approximate

Restrictions

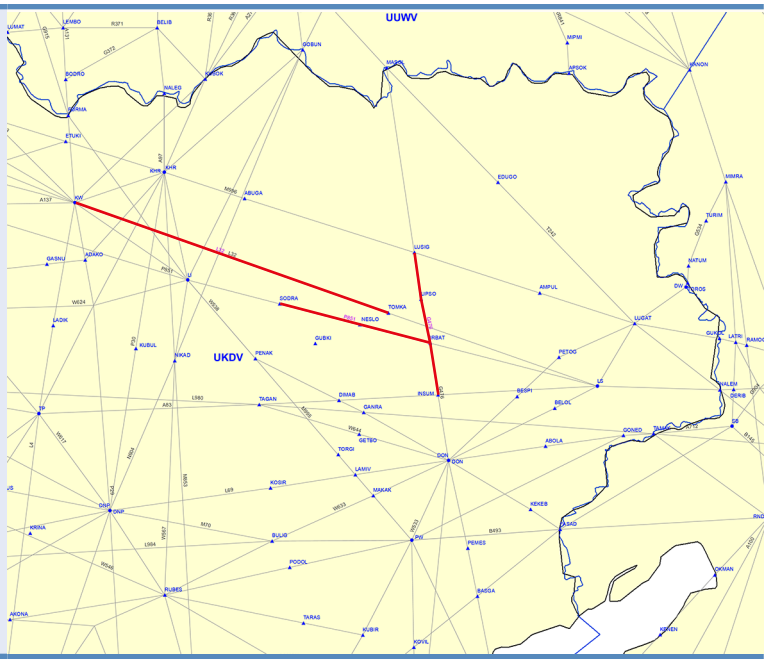
The NOTAM A1231/14 introduced restrictions:

- Valid from 1200 UTC on 04 June 2014 until 1700 UTC on 04 June 2014.
- For defined segments of ATS routes (LS-DIMAB A83, TOMKA-NALEM L32, LUSIG-GUKOL M996, LS-IRBAT P851, EDUGO-NALEM T242, TOROS-BESPI W533, BELOL-LUGAT W633).
- Closed.
- From surface to FL 280 inclusive.

5.6.6. NOTAM A1234/14, Issued on 04 June 2014

NOTAM content and illustration map

A1234/14 NOTAMN
Q) UKDV/QARLC/IV/NBO/E
/000/280/4910N03640E064
A) UKDV B) 1406041600 C) 1406052359
E) SEGMENTS ATS ROUTES CLOSED:
IRBAT-SODRA P851
TOMKA-KW L32
INSUM-LUSIG G476.
FROM SFC TO FL280.



Note: The Illustration is approximate

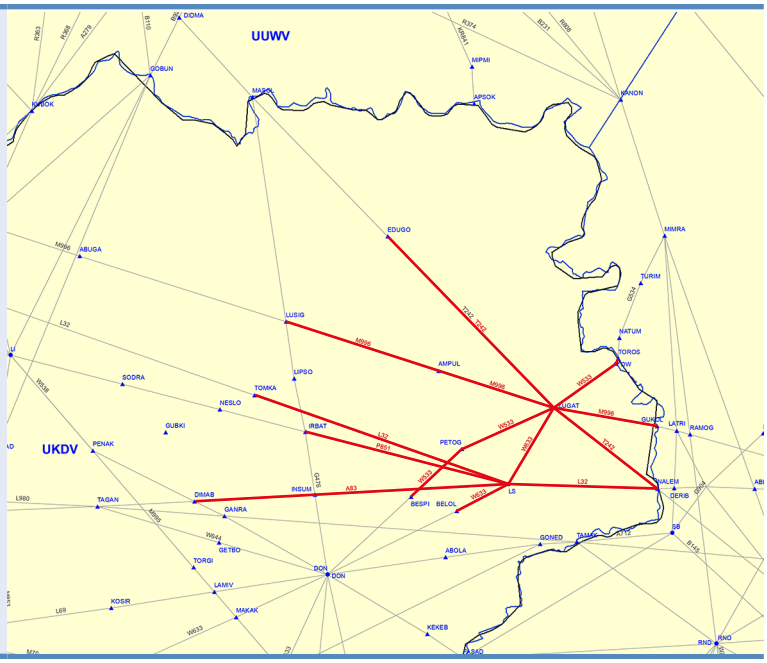
Restrictions

- The NOTAM A1234/14 introduced restrictions:
- Valid from 1600 UTC on 04 June 2014 until 2359 UTC on 05 June 2014.
- For defined segments of ATS routes (IRBAT-SODRA P851, TOMKA-KW L32, INSUM-LUSIG G476).
- Closed.
- From surface to FL 280 inclusive.

5.6.7. NOTAM A1236/14, Issued on 04 June 2014

NOTAM content and illustration map

A1236/14 NOTAMR A1231/14
Q) UKDV/QARLC/IV/NBO/E
/000/280/4839N03844E069
A) UKDV B) 1406041640 C) 1406052359
E) SEGMENTS ATS ROUTES CLOSED:
LS-DIMAB A83
TOMKA-NALEM L32
LUSIG-GUKOL M996
LS-IRBAT P851
EDUGO-NALEM T242
TOROS-BESPI W533
BELOL-LUGAT W633.
FROM SFC TO FL280.



Note: The Illustration is approximate

Restrictions

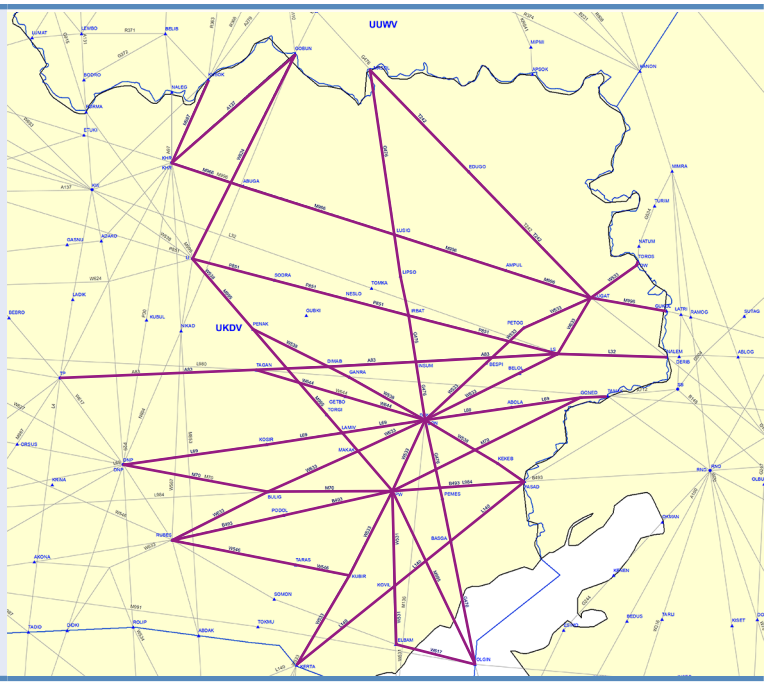
The NOTAM A1236/14 introduced restrictions:

- Valid from 1640 UTC on 04 June 2014 until 2359 UTC on 05 June 2014.
- For defined segments of ATS routes (LS-DIMAB A83, TOMKA-NALEM L32, LUSIG-GUKOL M996, LS-IRBAT P851, EDUGO-NALEM T242, TOROS-BESPI W533, BELOL-LUGAT W633).
- Closed.
- From surface to FL 280 inclusive.

5.6.8. NOTAM A1255/14, Issued on 05 June 2014

NOTAM content and illustration map

A1255/14 NOTAMN
Q) UKDV/QARLC/IV/NBO/E
/000/260/4829N03721E114
A) UKDV B) 1406060000 C) 1406302359
E) SEGMENTS ATS ROUTES CLOSED:
KHR-GOBUN A137 LS-TP A83
RUBES-FASAD B493 OLGIN-MASOL G476
KERTA-FASAD L140 LS-NALEM L32
DNP-GONED L69 PW-FASAD L984
DNP-TAMAK M70 KHR-KUBOK M987
LI-OLGIN M995 KHR-GUKOL M996
LS-LI P851 MASOL-LUGAT T242
PW-ELBAM W531 TOROS-KERTA W533
LI-FASAD W538 RUBES-KUBIR W546
ELBAM-OLGIN W617 GOBUN-LI W624
RUBES-LUGAT W633 DON-TAGAN W644.
FROM SFC TO FL260.



Note: The Illustration is approximate

Restrictions

The NOTAM A1255/14 introduced restrictions:

- Valid from 0000 UTC on 06 June 2014 until 2359 UTC on 30 June 2014.
- For defined segments of ATS routes (KHR-GOBUN A137 LS-TP A83, RUBES-FASAD B493 OLGIN-MASOL G476, KERTA-FASAD L140 LS-NALEM L32, DNP-GONED L69 PW-FASAD L984, DNP-TAMAK M70 KHR-KUBOK M987, LI-OLGIN M995 KHR-GUKOL M996, LS-LI P851 MASOL-LUGAT T242, PW-ELBAM W531 TOROS-KERTA W533, LI-FASAD W538 RUBES-KUBIR W546, ELBAM-OLGIN W617 GOBUN-LI W624, RUBES-LUGAT W633 DON-TAGAN W644).
- Closed.
- From surface to FL 260 inclusive.

5.6.9. NOTAM A1256/14, Issued on 05 June 2014

NOTAM content and illustration map

A1256/14 NOTAMN

Q) UKDV/QRAXX/IV/NBO/W
/000/260/4833N03731E111

A) UKDV B) 1406060000 C) 1406302359

E) TEMPORARY RESERVED AREA BOUNDED BY COORDINATES:

501900N 0364942E 490600N 0365000E 481520N 0360510E

475542N 0355136E 472200N 0363900E 465400N 0370500E

464700N 0373000E 465900N 0382000E 470642N 0381324E

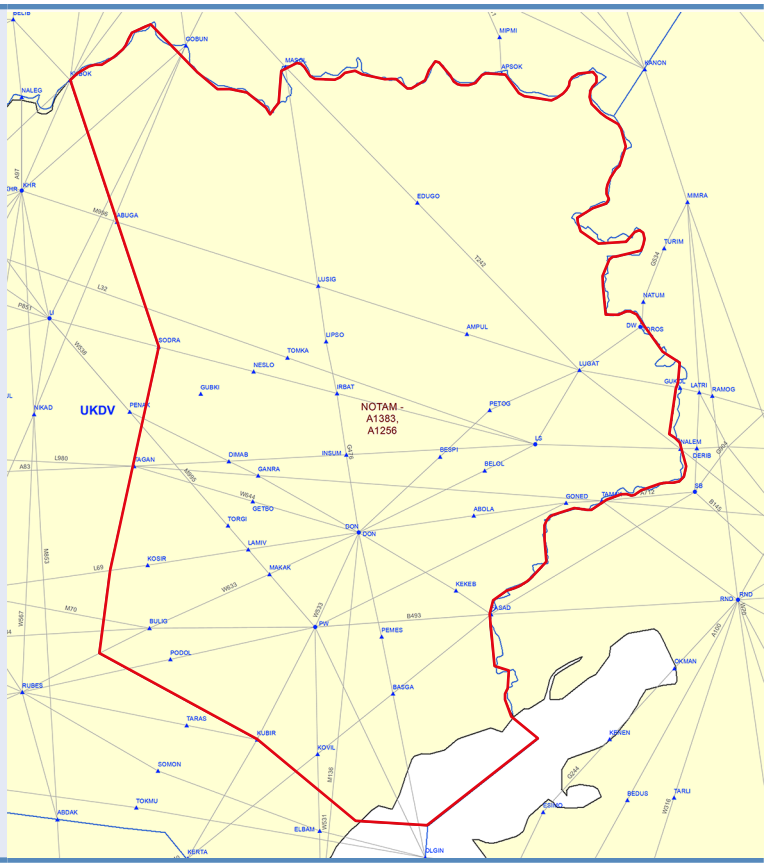
THEN ALONG STATE BOUNDARY UNTIL POINT

501900N 0364942E.

AUTHORIZED FLIGHTS OF STATE ACFT OF UKRAINE.

FOR FLIGHTS OF CIVIL ACFT NEED HAVE PERMISSION HEADQUARTERS OF ARMED FORCES UKRAINE NOT LESS ONE DAY BEFORE FLIGHT.

F) SFC G) FL260)



Note: The Illustration is approximate

Restrictions

- The NOTAM A1256/14 introduced restrictions:
- Valid from 0000 UTC on 06 June 2014 until 2359 UTC on 30 June 2014.
- For a defined by geographic coordinates area bordering Russian Federation.
- From surface to FL 260 inclusive.
- Not applicable for flights of state aircraft of Ukraine.
- Civil aircraft need permission to fly in the area from the headquarter of the armed forces of Ukraine not less than one day before the flight.

5.6.10. NOTAM A1383/14, Issued on 26 June 2014

NOTAM content and illustration map

A1383/14 NOTAMN

Q) UKDV/QRAXX/IV/NBO/W
/000/260/4833N03731E111

A) UKDV B) 1407010000 C) 1407282359

E) TEMPORARY RESERVED AREA BOUNDED BY COORDINATES:

501900N 0364942E 490600N 0365000E 481520N 0360510E

475542N 0355136E 472200N 0363900E 465400N 0370500E

464700N 0373000E 465900N 0382000E 470642N 0381324E

THEN ALONG STATE BOUNDARY UNTIL POINT

501900N 0364942E.

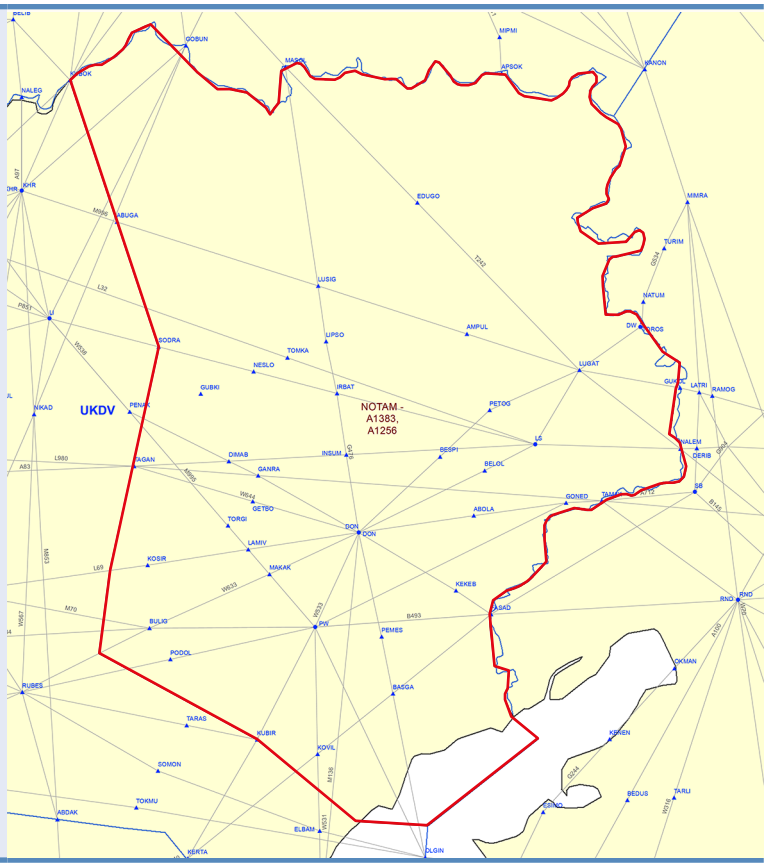
AUTHORIZED FLIGHTS OF STATE ACFT OF UKRAINE.

FOR FLIGHTS OF CIVIL ACFT NEED HAVE PERMISSION

HEADQUARTERS OF ARMED FORCES UKRAINE NOT LESS

ONE DAY BEFORE FLIGHT.

F) SFC G) FL260



Note: The Illustration is approximate

Restrictions

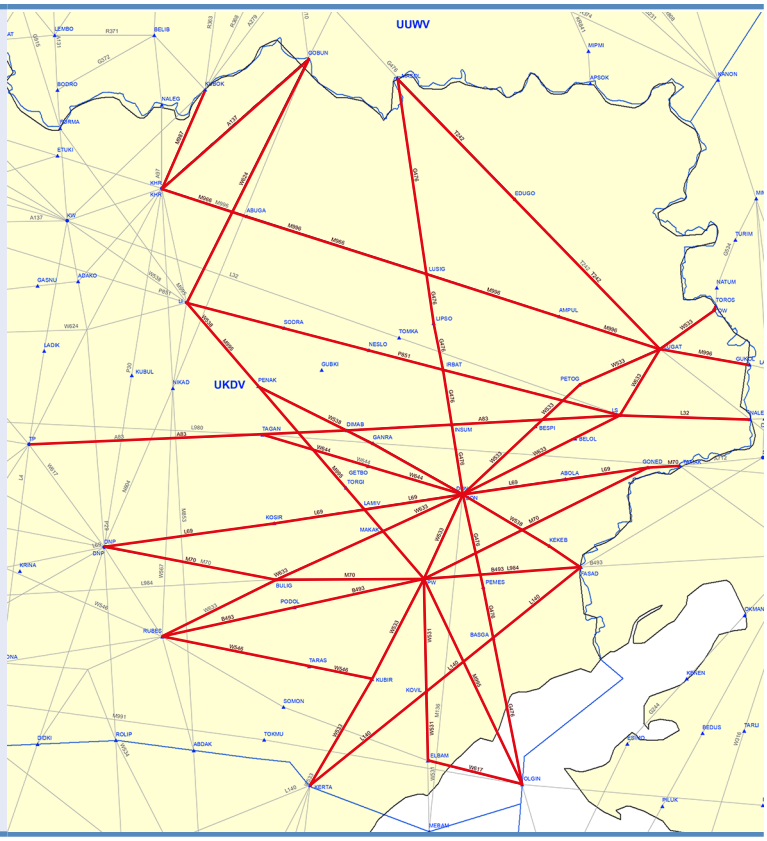
The NOTAM A1383/14 introduced restrictions:

- Valid from 0000 UTC on 01 July 2014 until 2359 UTC on 28 July 2014.
- For a defined by geographic coordinates area bordering Russian Federation.
- From surface to FL 260 inclusive.
- Not applicable for flights of state aircraft of Ukraine.
- Civil aircraft need permission to fly in the area from the headquarters of the armed forces of Ukraine not less than one day before the flight.

5.6.11. NOTAM A1384/14, Issued on 26 June 2014

NOTAM content and illustration map

A1384/14 NOTAMN
Q) UKXX/QARLC/IV/NBO/E /000/260/4829N03721E114
A) UKDV UKFV B) 1407010000 C) 1407282359
E) SEGMENTS ATS ROUTES CLOSED:
KHR-GOBUN A137 LS-TP A83
RUBES-FASAD B493 OLGIN-MASOL G476
KERTA-FASAD L140 LS-NALEM L32
DNP-GONED L69 PW-FASAD L984
DNP-TAMAK M70 KHR-KUBOK M987
LI-OLGIN M995 KHR-GUKOL M996
LS-LI P851 MASOL-LUGAT T242
PW-ELBAM W531 TOROS-KERTA W533
LI-FASAD W538 RUBES-KUBIR W546
ELBAM-OLGIN W617 GOBUN-LI W624
RUBES-LUGAT W633 DON-TAGAN W644.
FROM SFC TO FL260.



Note: The Illustration is approximate

Restrictions

The NOTAM A1384/14 introduced restrictions:

- Valid from 0000 UTC on 01 July 2014 until 2359 UTC on 28 July 2014.
- For defined segments of ATS routes (KHR-GOBUN A137 LS-TP A83, RUBES-FASAD B493 OLGIN-MASOL G476, KERTA-FASAD L140 LS-NALEM L32, DNP-GONED L69 PW-FASAD L984, DNP-TAMAK M70 KHR-KUBOK M987, LI-OLGIN M995 KHR-GUKOL M996, LS-LI P851 MASOL-LUGAT T242, PW-ELBAM W531 TOROS-KERTA W533, LI-FASAD W538 RUBES-KUBIR W546, ELBAM-OLGIN W617 GOBUN-LI W624, RUBES-LUGAT W633 DON-TAGAN W6440).
- Closed.
- From surface to FL 260 inclusive.

5.6.12. NOTAM A1492/14, Issued on 14 July 2014

NOTAM content and illustration map

A1492/14 NOTAMN

Q) UKDV/QRTCA/IV/BO /W /260/320/4822N03807E095

A) UKDV B) 1407141800 C) 1408142359EST

E) TEMPO RESTRICTED AREA INSTALLED WITHIN FIR DNIPROPETROVSK

BOUNDED BY COORDINATES:

495355N 0380155E 485213N 0372209E 480122N 0370253E

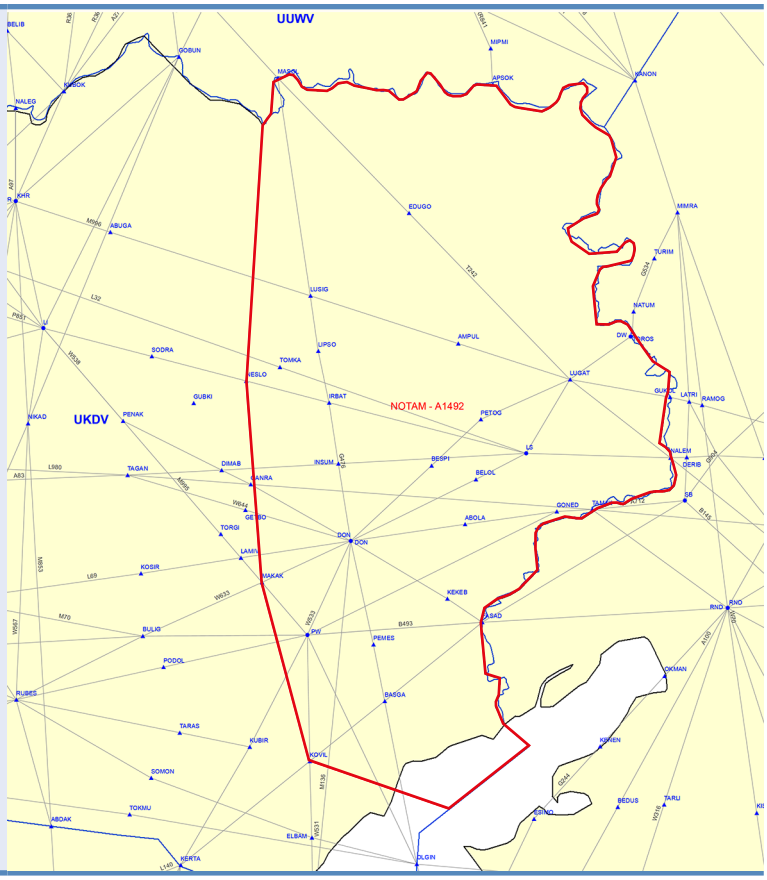
471352N 0365856E 465018N 0374325E 465900N 0382000E

470642N 0381324E THEN ALONG STATE BOUNDARY

UNTIL POINT 495355N 0380155E.

RESTRICTION NOT APPLIED FOR FLIGHTS OF STATE ACFT OF UKRAINE.

F) FL260 G) FL320



Note: The Illustration is approximate

Restrictions

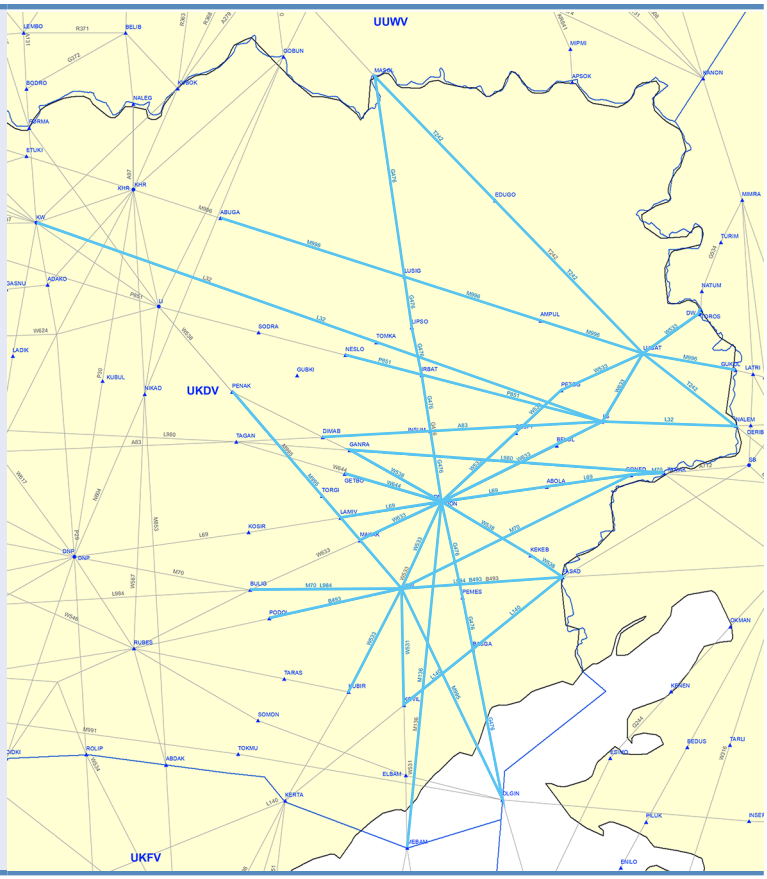
The NOTAM A1492 introduced restrictions:

- Valid from 1800 UTC on 14 July 2014 until 2359 UTC on 14 August 2014 (estimated duration).
- For a defined by geographic coordinates area bordering Russian Federation.
- From FL 260 to FL 320 inclusive.
- Not applicable for flights of state aircraft of Ukraine.

5.6.13. NOTAM A1493/14, Issued on 14 July 2014

NOTAM content and illustration map

A1493/14 NOTAMN
Q) UKDV/QARLC/IV/NBO/E
/260/320/4820N03716E119
A) UKDV B) 1407141800 C) 1408142359EST
E) SEGMENTS OF ATS ROUTES CLOSED:
T242 NALEM MASOL M996 ABUGA GUKOL
G476 MASOL OLGIN W533 TOROS KUBIR
L32 NALEM KW P851 LS NESLO
A83 LS DIMAB L980 GANRA TAMAK
W538 GANRA FASAD W633 LUGAT MAKAK
L69 LAMIV GONED W644 DON GETBO
M70 BULIG TAMAK B493 PODOL FASAD
L984 BULIG FASAD W531 KOVIL PW
M136 MEBAM DON M995 OLGIN PENAK
L140 KOVIL FASAD.
FM FL260 UP TO FL320.



Note: The Illustration is approximate

Restrictions

The NOTAM A1493/14 introduced restrictions:

- Valid from 1800 UTC on 14 July 2014 until 2359 UTC on 14 August 2014.
- For defined segments of ATS routes (T242 NALEM MASOL M996 ABUGA GUKOL, G476 MASOL OLGIN W533 TOROS KUBIR, L32 NALEM KW P851 LS NESLO, A83 LS DIMAB L980 GANRA TAMAK, W538 GANRA FASAD W633 LUGAT MAKAK, L69 LAMIV GONED W644 DON GETBO, M70 BULIG TAMAK B493 PODOL FASAD, L984 BULIG FASAD W531 KOVIL PW, M136 MEBAM DON M995 OLGIN PENAK, L140 KOVIL FASAD).
- Closed.
- From FL 260 to FL 320 inclusive.

5.6.14. NOTAM A1507/14, Issued on 17 July 2014 after the Downing of Flight MH17

NOTAM content and illustration map

A1507/14 NOTAM

Q) UKDV/QRTCA/IV/BO /W
/320/660/4822N03807E095 A) UKDV

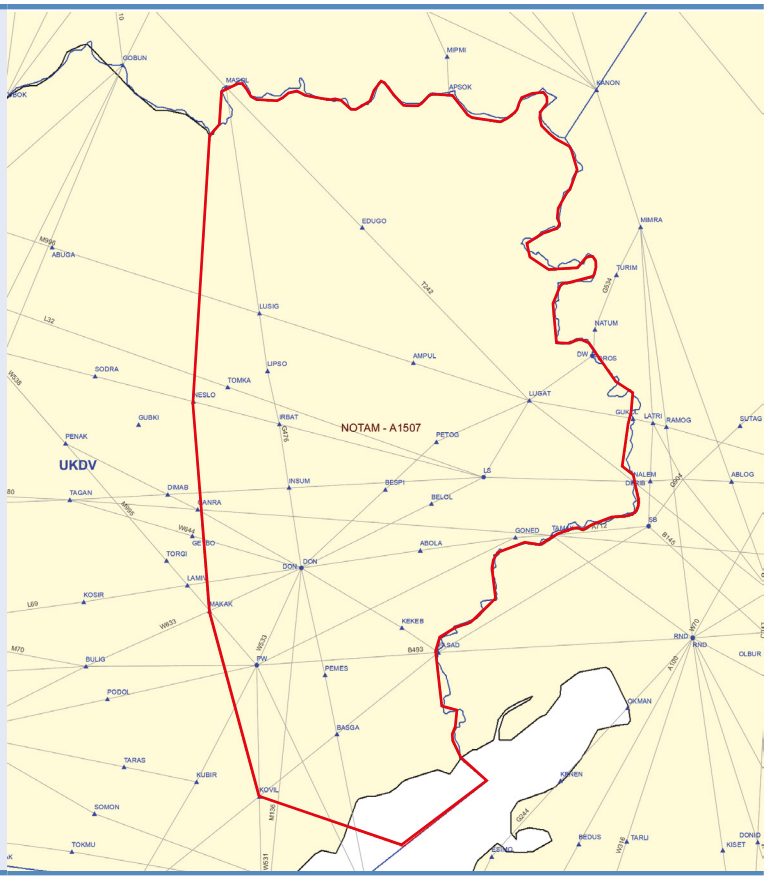
B) 1407171500 C) 1408172359EST

E) TEMPO RESTRICTED AREA INSTALLED WITHIN FIR DNIPROPETROVSK BOUNDED BY COORDINATES :

495355N 0380155E 485213N 0372209E 480122N 0370253E 471352N 0365856E 465018N 0374325E 465900N 0382000E 470642N 0381324E THEN ALONG STATE BOUNDARY UNTIL POINT 495355N 0380155E.

RESTRICTION NOT APPLIED FOR FLIGHTS OF STATE ACFT OF UKRAINE.

F) FL320 G) UNL



Note: The Illustration is approximate

Restrictions

The NOTAM A1507/14 introduced restrictions:

- Valid from 1500 UTC on 17 July 2014 until 2359 UTC on 17 August 2014.
- For a defined by geographic coordinates area bordering Russian Federation.
- Closed.
- From FL 320 to unlimited.
- Not applicable for flights of state aircraft of Ukraine.

5.6.15. NOTAM A1517/14, Issued on 17 July 2014 after the Downing of Flight MH17

NOTAM content and illustration map

A1517/14 NOTAM

Q) UKXX/QRTCA/IV/BO /W /000/660/4801N03731E117

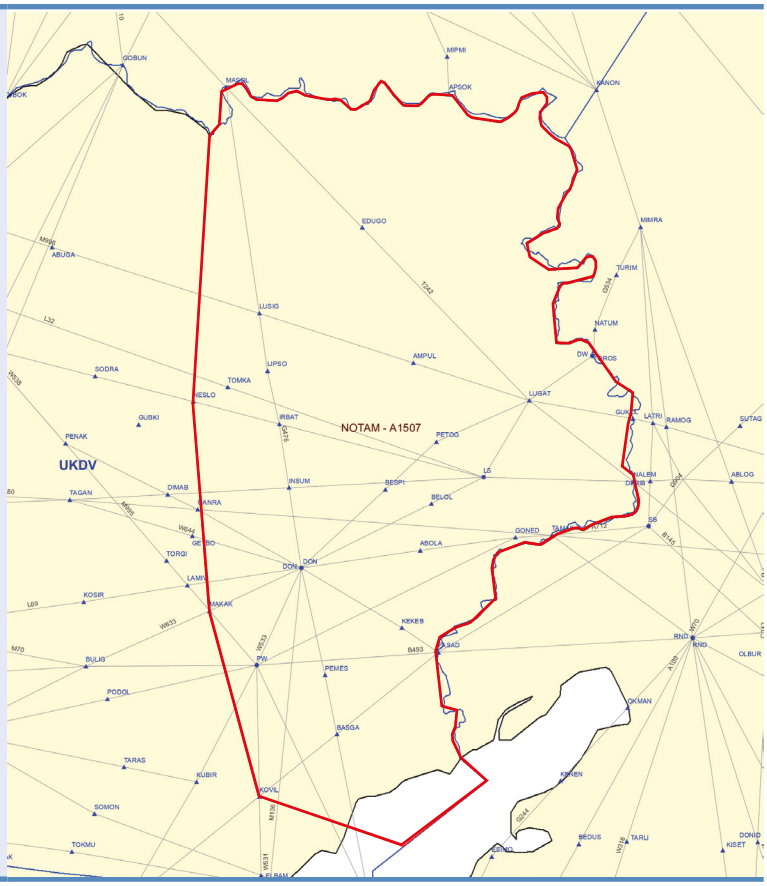
A) UKDV UKFV

B) 1407180005 C) 1408172359

E) TEMPO RESTRICTED AREA BOUNDED BY COORDINATES: 495428N 0380202E 490600N 0365000E 481520N 0360510E 475542N 0355136E 460809N 0370518E 464700N 0373000E 465900N 0382000E 470642N 0381324E

THEN ALONG STATE BOUNDARY UNTIL POINT 495428N 0380202E CLOSED.

F) SFC G) UNL



Note: The Illustration is approximate

Restrictions

The NOTAM A1517/14 introduced restrictions:

- Valid from 0005 UTC on 18 July 2014 until 2359 UTC on 17 August 2014.
- For a defined by geographic coordinates area bordering Russian Federation.
- Closed.
- From surface to unlimited.

5.7. Russian Federation Airspace Restrictions Timeline

5.7.1. NOTAM V6158/14, Issued on 17 July 2014

NOTAM content and illustration map

V6158/14 NOTAMN

Q)URRV/QARLC/IV/NBO/E/000/530/4818N04023E095

A) URRV B) 1407170000 C) 1408312359EST

E) DUE TO COMBAT ACTIONS ON THE TERRITORY OF THE UKRAINE NEAR THE STATE BORDER WITH THE RUSSIAN FEDERATION AND THE FACTS OF FIRING FROM THE TERRITORY OF THE UKRAINE TOWARDS THE TERRITORY OF RUSSIAN FEDERATION, TO ENSURE INTL FLT SAFETY, ATS RTE SEGMENTS CLSD AS FLW:

A100 MIMRA - ROSTOV-NA-DONU VOR/DME (RND), B145 KANON - ASMIL, G247 MIMRA - BAGAYEVSKIY NDB (BA), A87 TAMAK - SARNA, A102 PENEG - NALEM, A225 GUKOL - ODETA, A712 TAMAK - SAMBEK NDB (SB), B493 FASAD - ROSTOV-NA-DONU VOR/DME (RND), B947 TAMAK - ROSTOV-NA-DONU VOR/DME (RND), G118 LATRI - BAGAYEVSKIY NDB (BA), G534 MIMRA - TOROS, G904 FASAD - SUTAG, R114 BAGAYEVSKIY NDB (BA)-NALEM.

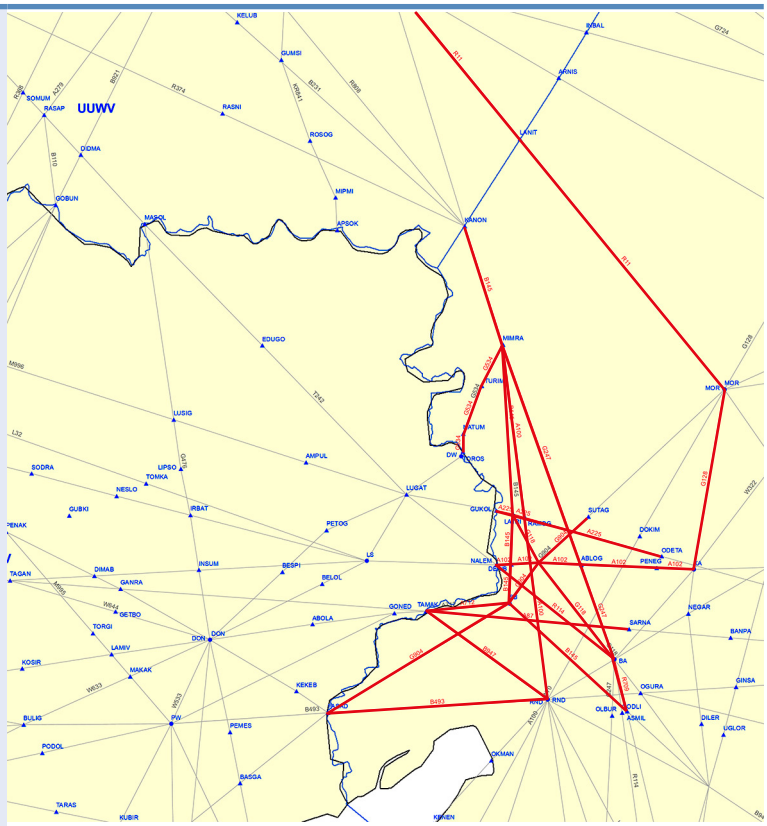
SFC - FL320.

DEP FM/ARR TO ROSTOV-NA-DONU AD TO/FM MOSCOW FIR CARRIED OUT ALONG ATS RTE G128 KONSTANTINOVSK NDB (KA) - MOROZOVSK VOR/DME (MOR) AND R11 MOROZOVSK VOR/DME (MOR) - BUTRI ON ASSIGNED FL.

DEP FM ROSTOV-NA-DONU AD TO DNEPROPETROVSK FIR CARRIED OUT ALONG ATS RTE A102 KONSTANTINOVSK NDB (KA) - NALEM ON FL340 AND ABOVE.

ARR TO ROSTOV-NA-DONU AD FM DNEPROPETROVSK FIR CARRIED OUT ALONG ATS RTE A712 TAMAK - SAMBEK NDB (SB) THEN DCT KONSTANTINOVSK NDB (KA) ON FL330 AND ABOVE.

F)SFC G)FL530)



Note: The Illustration is approximate

Restrictions

The NOTAM V6158/14 introduced restrictions:

- Valid from 0000 UTC on 17 July 2014 until 2359 UTC on 31 August 2014.
- Reason provided was "due to combat actions on the territory of Ukraine near the state border with the Russian Federation and the facts of firing from the territory of the Ukraine towards the territory of Russian Federation, to ensure international flight ATS routes closed as follows:
  - A100 MIMRA - ROSTOV-NA-DONU VOR/DME (RND), B145 KANON - ASMIL, G247 MIMRA - BAGAYEVSKIY NDB (BA), A87 TAMAK - SARNA, A102 PENEG - NALEM, A225 GUKOL - ODETA, A712 TAMAK - SAMBEK NDB (SB), B493 FASAD - ROSTOV-NA-DONU VOR/DME (RND), B947 TAMAK - ROSTOV-NA-DONU VOR/DME (RND), G118 LATRI - BAGAYEVSKIY NDB (BA), G534 MIMRA - TOROS, G904 FASAD - SUTAG, R114 BAGAYEVSKIY NDB (BA)-NALEM — from surface to FL320.
  - Departures from/arrivals to Rostov-on-Don arrivals departures to/from Moscow FIR carried out along ATS route G128 KONSTANTINOVSK NDB (KA) - MOROZOVSK VOR/DME (MOR) AND R11 MOROZOVSK VOR/DME (MOR) - BUTRI — on assigned FL.
  - Departures from Rostov-on-Don arrival departures to Dnepropetrovsk FIR carried out along ATS route A102 KONSTANTINOVSK NDB (KA) - NALEM on FL340 and above.
  - Arrivals to Rostov-on-Don arrivals departures from Dnepropetrovsk FIR carried out along ATS route 712 TAMAK - SAMBEK NDB (SB) then

direct to THEN DCT KONSTANTINOVSK NDB (KA) on FL330 and above.

- From surface to FL 530.

Items F and G as well as the information in the sixth and seventh fields in item Q identify lower and upper limits as surface and FL 530. This, in fact, means total closure of the airspace. Item E, which describes the nature of the restriction, in fact describes four different restrictions and specifies different altitude limits for each of them. Specifically, for the restrictions affecting ATS routes that are in the area bordering Ukraine, the first part of item E defines surface to FL 320 as height limits.

As provided in reference [3] about the information in items F and G:

"*These items are normally applicable to navigation warnings or airspace restrictions and are usually part of the PIB entry.*"

It is to be noted that reference [3] was published in 2018 and prior to that, the referred provisions were not with the status of "procedures." For example, reference [4], published in 2003, provides:

"*Items F) and G). These items are normally applicable to navigation warnings or airspace restrictions, but can be used for any other applicable subjects, and are usually part of the PIB entry.*"

5.7.2. NOTAM A2681/14, Issued on 16 July 2014

NOTAM content and illustration map

A2681/14 NOTAMN

Q) URRV/QFALT/IV/NBO/A /000/999/4716N03949E005

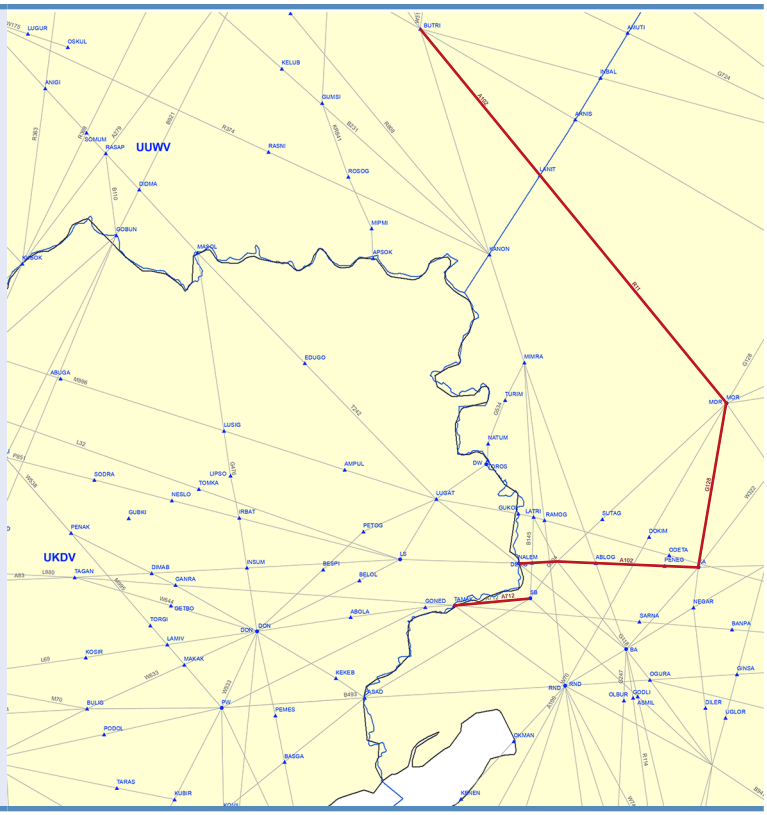
A) URRR B) 1407170000 C) 1408312359EST

E) DUE TO COMBAT ACTIONS ON THE TERRITORY OF THE UKRAINE NEAR THE STATE BORDER WITH THE RUSSIAN FEDERATION AND THE FACTS OF FIRING FROM THE TERRITORY OF THE UKRAINE TOWARDS THE TERRITORY OF RUSSIAN FEDERATION, TO ENSURE INTL FLT SAFETY DEP FM/ARR TO ROSTOV-NA-DONU AD TO/FM MOSCOW FIR CARRIED OUT ALONG ATS RTE:

G128 KONSTANTINOVSK NDB (KA) - MOROZOVSK VOR/DME (MOR) AND R11 MOROZOVSK VOR/DME (MOR) - BUTRI ON ASSIGNED FL.

DEP FM ROSTOV-NA-DONU AD TO DNEPROPETROVSK FIR CARRIED OUT ALONG ATS RTE A102 KONSTANTINOVSK NDB (KA) - NALEM ON FL340 AND ABOVE.

ARR TO ROSTOV-NA-DONU AD FM DNEPROPETROVSK FIR CARRIED OUT ALONG ATS RTE A712 TAMAK - SAMBEK NDB (SB) THEN DCT KONSTANTINOVSK NDB (KA) ON FL330 AND ABOVE.



Note: The Illustration is approximate

Restrictions

The NOTAM A2681/14 introduced restrictions:

- Valid from 0000 UTC on 17 July 2014 until 2359 UTC on 31 August 2014.
- Reason provided was "due to combat actions on the territory of Ukraine near the state border with the Russian Federation and the facts of firing from the territory of the Ukraine towards the territory of Russian Federation, to ensure international flight safety departures from/arrivals to Rostov-na-Donu."
- For arrivals and departures to/from Moscow FIR that are carried out along the ATS routes:
  - G128 KONSTANTINOVSK NDB (KA) - MOROZOVSK VOR/DME (MOR) AND R11 MOROZOVSK VOR/DME (MOR) - BUTRI - Restricted on assigned FL.
  - Departures from Rostov-on-Dan arrivals and departures to Dnepropetrovsk FIR carried out along ATS route A102 KONSTANTINOVSK NDB (KA) — NALEM — on FL340 and above.
  - Arrivals to Rostov-on-Dan arrivals and departures from Dnepropetrovsk FIR carried out along ATS route A712 TAMAK - SAMBEK NDB (SB) then direct to KONSTANTINOVSK NDB (KA) — on FL 330 and above.

5.8. Summary of the Airspace Restriction Timeline Prior to the Downing of Flight MH17

This section describes the timeline of 13 selected NOTAMs for UKDV FIR and two NOTAMs for URRV FIR that were issued prior to the downing of Flight MH17. Each NOTAM was described separately previously in this report but, in Table 5 below, we provide an overall summary of the timeline. There are two NOTAMs for UKDV FIR that are included in the individual descriptions of NOTAMs previously in this report, but which are not included here because they were issued after the downing of Flight MH17 and have no relevance to its trajectory. Those two NOTAMs promulgated closure of the airspace.

Each of the selected NOTAMs is described with the date on which it was issued, its identification number, period of validity, reference to the restriction it imposes and the upper and lower limits of the restriction. Additionally, in the table, there are three more descriptors for each NOTAM — concerning the overlap of the Flight MH17 trajectory with the NOTAM restriction. The horizontal overlap descriptor whether the Flight MH17 trajectory passed through the geographical region of the restriction, without considering the altitude or the time of the restriction. For example, NOTAM A1256/14 close an area that overlaps with the Flight MH17 planned trajectory and because of that, the horizontal overlap descriptor is "yes." Similarly, the altitude and time overlap descriptors specify whether the altitude and time validity of the restriction concern the Flight MH17 trajectory. In the case of NOTAM A1256/14, the restricted airspace upper limit is FL 260 and the time

Table 5
NOTAM Restrictions Timeline

Date	NOTAM	Valid from	Valid until	Restriction	Lower limit	Upper limit	Overlap with MH17 trajectory		
							Horizontal	Altitude	Time
24-April-14	A0820/14 Ukraine	04:00 UTC 26-April-14	18:00 UTC 08 May 2014	Segment of ATS route closed daily 04:00-18:00 UTC	3,050 meters above mean sea level	FL 350	No	No	No
05-May-14	A0942/14 Ukraine	04:00 UTC 12-May-14	18:00 UTC 20-May-14	Segment of ATS route closed daily 04:00-18:00 UTC	3,050 meters above mean sea level	FL 350	No	No	No
02-June-14	A1219/14 Ukraine	15:40 UTC 02-June-14	17:00 UTC 03-June14	Segment of ATS route closed	Surface	FL 280	No	No	No
03-June-14	A1229/14 Ukraine	18:01 UTC 03-June-14	17:00 UTC 04June-14	Segment of ATS route closed	Surface	FL 280	No	No	No
04-June-14	A1231/14 Ukraine	18:01 UTC 03-June-14	17:00 UTC 04-June-14	Segment of ATS route closed	Surface	FL 280	No	No	No
04-June-14	A1234/14 Ukraine	16:00 UTC 04-June-14	23:59 UTC 05-June-14	Segment of ATS route closed	Surface	FL 280	No	No	No
04-June-14	A1236/14 Ukraine	16:40 UTC 04-June-14	23:59 UTC 05-June-14	Segment of ATS route closed	Surface	FL 280	No	No	No
05-June-14	A1255/14 Ukraine	00:00 UTC 06-June-14	23:59 UTC 30-June-14	Segment of ATS route closed	Surface	FL 260	No	No	No
05-June-14	A1256/14 Ukraine	00:00 UTC 06-June-14	23:59 UTC 30-June-14	Area closed	Surface	FL 260	Yes	No	No
26-June-14	A1383/14 Ukraine	00:00 UTC 01-July-14	23:59 UTC 28-July-14	Area closed	Surface	FL 260	Yes	No	Yes
26-June-14	A1384/14 Ukraine	00:00 UTC 01-July-14	23:59 UTC 28-July-14	Segment of ATS route closed	Surface	FL 260	No	No	Yes
14-July-14	A1492/14 Ukraine	18:00 UTC 14-July-14	23:59 UTC 14-Aug-14	Area closed	FL 260	FL 320	Yes	No	Yes
14-July-14	A1492/14 Ukraine	18:00 UTC 14-July-14	23:59 UTC 14-Aug-14	Segment of ATS route closed	FL 260	FL 320	Yes	No	Yes
16-July-14	V6158/14 Russia	00:00 UTC 17-July-14	23:59 UTC 3-Aug-14	Segment of ATS route closed	n/k	n/k	Yes	n/k	Yes
16-July-14	A2681/14 Russia	00:00 UTC 17-July-14	23:59 UTC 3-Aug-14	Segment of ATS route closed	FL 330/340	-	No	Yes	Yes

ATS = air traffic services; FL = flight level; n/k = not known; NOTAM = notice to airmen; UTC = coordinated universal time

of the validity of the restriction is before the downing of Flight MH17; because of that, the altitude and time overlap descriptors are "no."

The last two rows in the table provide a description of the two selected NOTAMs issued by the Russian Federation. In the case of these two NOTAMs, the overlap of the NOTAM restriction is assessed against what Flight MH17's trajectory would have been if the aircraft was not downed. In other words, it is an assessment of the extrapolated trajectory on the basis of the flight plan.

In the table, for NOTAM V6158/14 the lower and upper limits of the restriction validity it is noted "n/k" — signifying "not known." This is because, as explained further in the detailed description of this NOTAM, there are internal contradictions about its altitude limits.

Of particular interest for the purpose of this inquiry are the airspace restrictions prior to the downing of Flight MH17 for which there was a horizontal overlap of their boundaries with either the trajectory of Flight MH17 or its extrapolated trajectory. In fact, these are restrictions for the geographical area where Flight MH17 was downed. The following is a summary of these restrictions.

On 5 June 2014, NOTAM A1256/14, issued by Ukraine, promulgated airspace restrictions to civil aviation in the airspace area above the eastern part of Ukraine from the ground up to 26,000 ft (FL 260). The restrictions were valid from 0000 UTC on 06 June. At the same time, NOTAM A1255/14 promulgated airspace restrictions for ATS route segments in the same part of Ukraine, valid from the same time and to the same altitude as the area restriction. As reported by reference [2]: "*This enabled military aeroplanes to fly at an altitude that was considered safe from attacks from the ground and eliminated the risk that they would encounter civil aeroplanes, which flew above FL 260. The authorities automatically assumed that aeroplanes flying at a higher altitude than that considered safe for military aeroplanes, were also safe.*"

On 26 June 2014, NOTAMs A1383/14 and A1383/14, issued by Ukraine, extended the time validity of the airspace restrictions of NOTAMs A1256/14 and A1255/14 from 1 July until and including 28 July 2014.

On 14 July 2014, NOTAMs A1492/14 and A1493/14, issued by Ukraine and valid from 18:00 UTC 14-July increased the upper limit of the restricted airspace imposed on civil aviation to 32,000 ft (FL320). In comparison with NOTAM A1255/14 that was issued on 5 June, NOTAM A1493/14 introduced airspace restrictions above a smaller area (covering the same part in the east part of Ukraine, bordering the Russian Federation but less area to the west). Similarly, in comparison with NOTAM A1256/14, NOTAMs A1492/14 introduced restrictions to more ATS route segments. As reported by reference [2]: "*The exact underlying reason for this decision remains unclear.*"

On 16 July 2014, NOTAMs V6158/14 and A2681/A, issued by the Russian Federation, promulgated airspace restrictions to civil aviation in the Rostov-on-Don FIR airspace area that borders the Dnipropetrovsk FIR area in the eastern part of Ukraine. The restrictions were valid from 0000 UTC on 17 July. Both NOTAMs refer to the armed conflict in the eastern part of Ukraine as the reason for their issue: "*Due to combat actions on the territory of the Ukraine near the state border with the Russian Federation and the facts of firing from the territory of the Ukraine towards the territory of the Russian Federation, to ensure intl flt safety* [international flight safety]."

However, in NOTAM V6158/14, there are some contradictions about the lower and upper limits of the restriction. Items F and G, as well as the information in the sixth and seventh fields in item Q, identify lower and upper limits as surface and FL 530. This, in fact, means total closure of the airspace. Item E, which describes the nature of the restriction, outlines four different restrictions and specifies different altitude limits for each of them. For the restrictions affecting ATS routes that are in the area bordering Ukraine, the altitude limits provided in item E of the NOTAM are the same as the altitude limits of NOTAMs A1492/14 and A1493/14 issued by Ukrainian authorities — FL 320.

The contradiction in the altitude limits of NOTAM V6158/14 was apparently not identified or not identified as critical during the flight planning of the Flight MH17 trajectory when the software analysed the trajectory against the airspace constraints. It is to be noted, as reported in reference [2], that not only Malaysia Airlines, but almost all airlines, including airlines domiciled in the Russian Federation, that used routes over the conflict zone continued to do so during the period in which the armed conflict was expanding into the airspace, and the contradiction in the altitude limits of NOTAM V6158/14 was immaterial in their flight route planning.

In summary:

- Both Ukraine and the Russian Federation issued restrictions on the airspace above and around eastern Ukraine, but neither state completely closed their airspace above or near the conflict zone at that time. The situation at the time involved several airspace restrictions, introduced by both Ukraine and the Russian Federation, of airspace above and around eastern Ukraine. The airspace in question was first restricted up to FL 260 and subsequently, but before the downing of Flight MH17, up to FL 320.
- In the NOTAMs in which Ukraine placed a partial restriction on airspace in the Dnepropetrovsk FIR, it did not provide any reasons for the restriction nor any reference to incidents involving military aircraft in the airspace.

- The DSB report on the crash of Flight MH17 provides information about the reasons the Ukrainian authorities restricted the airspace up to FL 260 promulgated with NOTAMs A1255/14 and A1256/14 issued on 05 June 2014. The provided reasons were not related to the security risk from attacks from the ground to civil aircraft overflying the area. The airspace was restricted to enable military aeroplanes to fly at an altitude that was considered safe from attacks from the ground and to eliminate the risk that they would encounter civil aeroplanes, which flew above FL 260, according to the DSB report.
- The reasons the Ukrainian authorities increased the upper limit of the restricted airspace to 32,000 ft (FL 320) were not provided in the respective NOTAMs (A1492/14 and A1493/14). The DSB report provided that increasing the upper limit of the restricted airspace "was intended to increase the altitude buffer between military and civil aircraft."
- The Russian Federation, on the other hand, cited international flight safety as a reason when it closed its affected ATS routes up to FL 320. In two NOTAMs (V6158/14, A2681/14) published on 16 July 2014, the Russian Federation said that to ensure international flight safety, it was closing the ATS routes "*due to combat actions on the territory of Ukraine near the state border with the Russian Federation and the facts of firing from the territory of the Ukraine towards the territory of Russian Federation*."
- Prior to the downing of Flight MH17 on 17 July 2014, the two referenced Russian Federation NOTAMs were the only identified, specific warnings related to the security of civil aviation in the Dnepropetrovsk and Rostov-on-Don FIRs.

6. Collecting and Analysing Information About Ukraine and Russian Federation Threat Awareness

6.1. Information Collection Framework

In order to discuss the airspace closure decisions made by authorities in Ukraine and the Russian Federation, the Foundation looked for information about the relevant authorities' threat awareness for the referenced airspace that was not restricted.

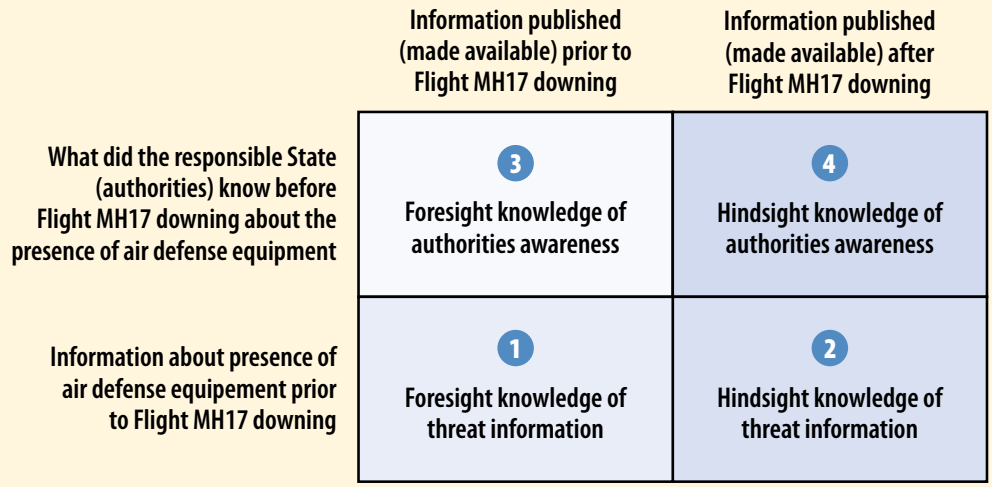
The threat information is of different types. In respect to capability to attack, the threat information can be about what authorities said they knew about the weapons that could pose a potential threat to civil aviation above FL 320. Or it can consist of information about the weapons that appeared in the public space (such as on social media) without indications of whether relevant authorities knew about it. The source of information can be traditional and/or social media or it can be private information from intelligence services. These different types of information imply different degrees of confidence about authority awareness or the veracity of the information. For these reasons, the threat information is categorised conceptually in Figure 18 as follows:

- **Foresight knowledge of threat information: quadrant 1.** This is information that was known prior to the downing of Flight MH17 about the presence of weapons.
- **Hindsight knowledge of threat information: quadrant 2.** This is information that was made known after the downing of Flight MH17 about the presence of weapons. In general, this type of information gives less confidence about potential threat awareness of relevant authorities because it is information about what has been seen, heard or otherwise discovered, but, in this case, it was made known only after the downing of Flight MH17.
- **Foresight knowledge of authorities' awareness: quadrant 3.** This is information that was known prior to the downing of Flight MH17 about what the relevant authorities knew about the presence of weapons. In general, this type of information gives the most confidence about potential threat awareness because it is mainly self-reporting by relevant authorities about their knowledge prior to the downing of Flight MH17 — and therefore clear of any hindsight bias.
- **Hindsight public knowledge of authorities' awareness: quadrant 4.** This is information that was made known after the downing of Flight MH17 about what the relevant authorities knew *before* the downing of Flight MH17 about the presence of weapons.

With the above-described four types of information, the Foundation looked at two main sources of information:

- Publicly available information from primarily online media, including Ukrainian and Russian news services and other news aggregation sites, internationally available aviation trade media, government announcements and news releases; and information available on social media, including Twitter and Facebook.
- The responses from Ukraine and the Russian Federation to the standard procedure and threat knowledge

Figure 18
Information Collection Framework



questionnaires that were specifically developed for this inquiry and to the subsequent responses to some clarifying questions. The Russian Federation and the Ukrainian governments were approached with and responded to the information collection template containing the questionnaires. Following the analysis of the information received, the Foundation concluded that there were a number of questions that remained open and formulated and received answers to some additional clarifying questions.

6.2. Public Information Collection and Analysis

6.2.1. Objective, Process and Structure

The objective of this part of the study was to perform an inquiry to establish an overview of what information was publicly available in Ukraine and the Russian Federation — prior to the moment of the downing of Flight MH17 — about the presence of air defence equipment that had a reach beyond that part of the airspace (above FL 320) that was closed to civil aviation and which therefore could pose a threat to civil aviation. That would mean that, because of the partial closure of the airspace by Ukraine, MANPADS were no longer a threat to civil airliners transiting the airspace, apart from the hypothetical case of an emergency landing.

To perform this inquiry, the Foundation analysed information available primarily in online media, including Ukrainian and Russian news services and other news aggregation sites, internationally available aviation trade media, government announcements and news releases, as well as information available on social media, including Twitter and Facebook. Where it was determined that certain articles or social media posts were duplicated or published by multiple outlets, efforts were made to access the article/post via the original media in which they were published.

Information that was not available in English was translated using Google Translate.

The timeframe for the analysis was early June 2014 until the moments just before the downing of Flight MH17. Post-Flight MH17 investigative media reports and post-event aggregations of social media posts made in the days before the downing of Flight MH17 also were reviewed to get a comprehensive picture of what was known publicly before the event. The analysis was conducted as objectively as possible and with an awareness that hindsight bias could impact the results of this analysis, or of the results of the post-event reporting and inquiries.

The Foundation conducted a review of what was publicly known in Ukraine and the Russian Federation about the threat to aircraft flying above FL 250. We first examined what information was in the public space about the conflict and then what information was in the public space about the presence of air defence equipment in eastern Ukraine that had a capability to attack beyond that part of the airspace that was closed to civil aviation. Factual information gathering efforts focused specifically on the UKDV Dnipropetrovsk FIR, which covers the airspace in eastern Ukraine.

For the purposes of this study, the information collected about what was publicly known in Ukraine and the Russian Federation about the threat to aircraft is systematically covering the four threat information categories from Figure 18.

6.2.2. Sources of Information

Before the downing of Flight MH17, information about the conflict in eastern Ukraine was widely available publicly, both in traditional media outlets and on social media platforms. Military and diplomatic developments and the situation on the ground in eastern Ukraine were written about extensively in the international media as well as by national news services/websites in Ukraine and the Russian Federation. Articles, videos, photographs and other imagery appeared regularly in news outlets including the Guardian, Al Jazeera, Reuters, New York Times, BBC, Washington Post, TASS, Interfax News Agency, UNIREX, 62.ua, Kyiv Post and Financial Times. Articles and other information also were published on nontraditional, news- and information-oriented media platforms, such as Mashable and Buzzfeed. Information, videos and photos related to the conflict in eastern Ukraine also were posted in social media platforms like Twitter and Facebook.

Aviation media, referred to as trade media, also published numerous articles about the conflict and its impact. Trade media focuses its coverage on specific industries and usually is consumed by people and organizations within the industry covered (in this case airlines, aviation and transportation regulators, air navigation service providers [ANSPs], aviation-related organizations such as ICAO and the International Air Transport Association [IATA], and by other aviation stakeholders) as well as by general media organisations looking for deeper insight into aviation issues and/or material for articles. Trade media outlets that published eastern Ukraine-related articles during the period under review included FlightGlobal, Aviation International News and Aviation Week.

6.2.3. Findings and Analysis: Publicly Available Conflict Information

The situation on the ground in eastern Ukraine in the weeks prior to 17 July was one of escalating military conflict that made attacks on military aviation likely and posed at least a nominal threat to local civil aviation. On 20 June 2014, the online Kyiv Post published an Interfax-Ukraine article under the headline "*Aviation Service revokes certificate from three airports in eastern Ukraine*

until situation stabilizes."[22] Interfax-Ukraine, a subsidiary of the Moscow-based Interfax News Agency, reported that the authority said the airports, which it did not identify, were closed by relevant NOTAM.

The brief article also reported the following: "*At the same time, the airspace above Donbas is open. The service said that UkSATSE [Ukraine State Air Traffic Services Enterprise] fully ensures the safety of air traffic over the territory. There are restrictions on movement of aircraft in the border area of 100 km– flights at altitudes below 7,900 meters are banned*."

At the beginning of July, a reported 10-day truce in the region was ended, likely increasing tensions and military action in the area. In an editor's note on 2 July 2014, the Kyiv Post said that Ukrainian President Petro Poroshenko had resumed, on 1 July, a military offensive against the armed non-state forces in eastern Ukraine, ending a 10-day declared truce that Ukrainian authorities said was violated more than 100 times by the irregular forces, who killed 27 Ukrainian troops.

Separately, Voice of America (VOA) reported on 7 July that Poroshenko had refused to extend what it described as a "*unilateral cease-fi*re" and ordered troops to advance.[23] The Kyiv Post, VOA and other media outlets reported that Ukrainian forces were making progress in attempts to regain control of the region.

Airstrikes were a significant element of Ukraine's military effort against the armed non-state forces. For example, on 13 July, the National Security and Defence Council of Ukraine (RNBO) said in a briefing that the "*active phase*" of the anti-terrorist operation (ATO) in eastern Ukraine was in process and that the day before the air force had made five airstrikes against the opposition. According to RNBO spokesman Andriy Lysenko, "*The first airstrike was directed at a terrorist stronghold near Lysychansk. Several dozens of militants were struck, as well as their equipment. The second airstrike was fired at a militant base near Holmovskyi, Horlivskyiraion. Up to 30 terrorists, 2 'Grad' systems, 2 anti-aircraft installations and 6 military machines were destroyed. The third airstrike was fired at a concentration of militants near Rovenky; up to 10 terrorists were killed, a 'Grad' system was destroyed and several military machines taken out of order. The fourth strike was aimed at a militant base near Torez. Data on the amount of casualties is being ascertained. The fifth airstrike was performed near the barrow of Savur-mohyla, near Donetsk. A stronghold with a group of terrorists, armored vehicles, munitions and weapons was struck. Data on the amount of their casualties is being ascertained*."[24]

At the same time, the armed non-state forces made clear through their statements and actions the intent to target Ukrainian military aircraft. Multiple Ukrainian military aircraft flying in eastern Ukraine were shot down by armed non-state forces and these events were widely reported. Aviation Week & Space Technology magazine reported in its 23 June 2014 issue that the Ukraine military had lost a mix of 10 fixed-wing and rotary-wing aircraft since early May 2014.[25]

The weapons used against the Ukrainian aircraft were variously reported to be rockets, rocket-propelled grenades, anti-aircraft weapons, a large calibre machine gun, shoulder-fired missiles, and surface-to-air missiles. It is unclear to the Foundation researchers whether references to surface-to-air missiles refer to SAM systems, to the smaller MANPADS, or a combination of the two. Reported events reviewed included the following:

- On 29 May 2014, CNN.com reported that acting Ukrainian President Oleksandr Turchynov told the country's parliament that a Ukrainian military helicopter had been shot down near Slovyansk with a rocket-propelled grenade, that at least 14 people were killed and that armed non-state forces claimed responsibility.[26]
- In a mid-June article that referenced the reported downing of Ukrainian military helicopters, the New York Times said that the armed non-state forces first said they used rocket-propelled grenades "*but later admitting to possessing guided missiles*."[27]
- On 3 June 2014, the Kyiv Post published a report from Russia's Interfax News Agency that the self-proclaimed "*people's mayor*" of Sloviansk said that armed non-state forces there had shot down a Ukrainian military Su-25, which is a single seat, twin engine jet aircraft used for close air support, and a helicopter.[28]
- On 14 June 2014, the Ukrainian Ministry of Defence released a statement that on the night of 13–14 June, armed non-state forces fired an anti-aircraft weapon and large calibre machine gun at an Air Force IL-76

[22] https://www.rnbo.gov.ua/files/2014/RNBO_map_21_07_eng.jpg

[23] https://www.voanews.com/europe/retreating-ukraine-rebels-dig-donetsk

[24] http://mediarnbo.org/2014/07/15/nsc-news-analysis-center-briefing-at-12-00-july-13-2014/?lang=en

[25] *Aviation Week and Space Technology*, p. 27, 23 June 2014.

[26] https://www.cnn.com/2014/05/29/world/europe/ukraine-crisis/index.html

[27] https://www.nytimes.com/2014/06/15/world/europe/ukraine.html?

[28] https://www.kyivpost.com/article/content/ukraine-politics/heavy-fighting-in-eastern-ukraine-as-government-restarts-active-phase-of-anti-terror-operation-350453.html

transport aircraft landing at Luhansk airport.[29] The Kyiv Post reported on 14 June that 49 servicemen were killed in the attack. It also reported that Ukrainian Foreign Minister Andriy Deshchysia wrote on Twitter that the plane had been hit by a rocket.[30] In its reporting on the attack, The New York Times said that the aircraft had been brought down by a "*shoulder-fired missile*," but quoted the military wing of the Ukrainian prosecutor general's office as saying the IL-76 was brought down with an "*antiaircraft rocket system*."[31] The New York Times also reported that "*[s]eparatists from the self-declared People's Republic of Luhansk confirmed that they had shot down the jet and said that all military airplanes in the area, which is near the border with Russia, were targets.*"

- On 24 June, a Ukrainian Mi-8 helicopter was shot down outside the "*rebel-held*" city of Solviansk when it was hit be a rocket shortly after takeoff, according to BBC and other reports. [32] In its reporting, the Kyiv Post said the helicopter had been brought down by armed non-state forces "*using surface-to-air-missiles*."[33] According to the report, it was the third Ukrainian MI-8 to have been shot down since mid-April.
- On 12 July, Interfax-Ukraine reported that the self-proclaimed Donetsk People's Republic claimed to have shot down a Ukrainian Su-25, but the Ukrainian government denied the report.[34]

For the purposes of this study, the most significant of the pre-Flight MH17 attacks on Ukraine's military aircraft occurred on 14 July, when a twin-turboprop An-26 military transport was shot down near Luhansk. In a statement available on its website, the Ukrainian Ministry of Defence said the aircraft was flying at an altitude of 6,500 m (21,327 ft), that its defeat by a MANPADS was impossible, and that the aircraft "*was shot down by another, more powerful missile weapon, which was probably used from the Russian Federation.*" (Google Translate)[35]

The RNBO said in a 14 July briefing: "*The airplane was apparently flying at 6,500 meters, a height at which no portable Zenit rocket launcher that is available to the terrorists today could have hit the craft. That is, the AN-26 was hit from a more powerful weapon that was used most likely from inside Russian Federation territory. Based on available data provided by the Ukrainian pilots, two versions are possible: the shot came from a modern ground-to-air Pantsyr [Armor] gun or from a homing rocket of the X-24 air-to-air class from a Russian aircraft that could have taken off from Milierovo Airport.*"[36]

However, a London-based defence analyst said in an Associated Press report on the An-26 downing that the aircraft likely was not flying at 6,500 meters, but a lower altitude, and that the An-26 probably was shot down by a MANPADS.[37]

In the "Review report arising from the crash of flight MH17" the Dutch Review Committee for the Intelligence and Security Services reported that, "*According to the MIVD, the wreckage and the eyewitnesses supported the fact that the aircraft was shot out of the air by a MANPADS from Ukrainian territory. This would only have been possible if the Antonov were flying substantially lower than 6,200 or 6,500 metres. Another possibility was that a short-range, vehicle- borne anti-aircraft system had been used. The MIVD's information does indicate the use of a powerful anti-aircraft system.*" This report is published in the appendices of the Dutch Safety Board Flight MH17 investigation report.

On 15 July, the RNBO said in a briefing that the commission set up to determine why the AN-26 crashed had completed its investigation and would report the results separately. Significantly, during the same briefing, the RNBO said that because of the investigation, ATO flights were being temporarily halted.[38] The flights were resumed shortly thereafter.[39]

The Foundation found no information in the public space that would indicate intent to attack civilian aircraft.

6.2.4. Statements from Ukraine and the Russian Federation

As the situation on the ground in eastern Ukraine intensified in the weeks before the downing of Flight MH17, the governments of Ukraine and the Russian Federation

[29] https://www.mil.gov.ua/news/2014/06/14/vijskovo-transportnij-litak-povitryanih-sil-zbrojnih-sil-ukraini-il-76/

[30] https://www.kyivpost.com/article/content/war-against-ukraine/ukraines-politicians-and-foreign-diplomats-react-emotionally-to-the-bloodiest-day-in-war-against-separatism-351848.html

[31] https://www.nytimes.com/2014/06/15/world/europe/ukraine.html?_r=0

[32] https://www.bbc.com/news/world-europe-28002993

[33] https://www.kyivpost.com/article/content/ukraine-politics/toll-rises-to-174-killed-with-deaths-of-23-servicemen-from-june-19-24-353645.html

[34] https://www.kyivpost.com/article/content/ukraine-politics/donetsk-separatists-say-they-shot-down-ukrainian-military-plane-kyiv-denies-claim-355767.html

[35] https://www.mil.gov.ua/news/2014/07/14/chleni-ekipazhu-litaka-povitryanih-sil-zs-ukraini-an-26-vijshli-na-zvyazok-z-generalnim-shtabom/

[36] http://mediarnbo.org/2014/07/15/nsc-news-analysis-center-briefing-at-17-00-july-14-2014/?lang=en

[37] https://www.usnews.com/news/world/articles/2014/07/14/fierce-fighting-near-rebel-held-city-in-ukraine

[38] http://mediarnbo.org/2014/07/15/nsc-news-analysis-center-briefing-at-17-00-july-15-2014/?lang=en

[39] https://www.kyivpost.com/article/content/ukraine-politics/ukrainian-air-force-flights-in-anti-terrorist-operation-area-resumed-356248.html

made frequent statements, often blaming each other for the ongoing conflict.

The Ukraine government regularly released information about the conflict, such as which units were involved in combat and where, what progress was made against the armed non-state forces, the number of combat casualties among Ukraine's military and police forces, and sometimes names and photos of the dead and wounded. It also alleged that Russian weapons and other equipment was moving from the Russian Federation into eastern Ukraine.

On 9 July, Interfax-Ukraine reported (as published in the Kyiv Post) RNBO spokesman Andriy Lysenko saying Ukraine had "*unquestionable evidence*" that Russia was supporting illegal armed formations.[40] "*In particular, yesterday during a press conference in Donetsk, the leaders of the militants confirmed that they receive armoured vehicles, artillery systems, antitank, anti-aircraft and small arms from Russia. We have reported this many times. Now the militants themselves have openly admitted it,*" he said at a briefing in Kyiv. On the same day, the Ukrainian Ministry of Defence said that armed non-state forces tried to deploy two BM-21 Grad multiple rocket launchers to attack ATO force positions.

On 11 July, six days before the downing of Flight MH17, the RNBO released a map on its website that showed "*the situation in the Eastern regions of Ukraine*."[41] The map purported to represent the situation on the ground in the Luhansk and Donetsk oblasts, with areas controlled by the government and areas under the control of armed non-state forces delineated. Also marked were airports, sites of battles and the general location of armed non-state forces. (An updated map released on 21 July 2014 showed the Flight MH17 crash site located within a section of the Donetsk Oblast that was under the control of armed non-state forces.[42])

Ukraine also made a number of public statements about capturing weapons and munitions used by, or intended for use by, armed non-state forces operating in the region. On 11 July, the Ukrainian Defence Ministry said the ATO forces seized four armoured vehicles, three tanks, three Grad multiple rocket launchers and mortars, an IMR combat engineering vehicle, 31 MANPADS, 26 anti-tank guided missiles (ATGMs), 101 small arms and nearly 300,000 rounds of ammunition for them, as well as 27 anti-tank and anti-personnel mines.[43] While the report mentioned MANPADS it did not mention SAMs.

The UNIAN news agency reported on 13 July that a convoy of 100 units of equipment tried to enter Ukraine from Russia near the village of Izvarine in the Luhansk region.[44] The information was attributed to an RNBO spokesman at a press briefing.

Ukraine also passed information to observers. In a 15 July article in the Kyiv Post, it was reported that "*a senior military Ukrainian officer speaking to the [Organization for Security and Co-operation in Europe (OSCE) Special Monitoring Mission (SMM)] on 13 July, stated that a column of tanks and other military hardware had entered Ukraine from the Russian Federation at the Zelenopillia border crossing point on that day.*"[45]

In a 15 July article about dozens of tanks, self-propelled artillery and two armoured personnel carriers moving from Luhansk to Donetsk, Zik reported that Ukraine's presidential administration deputy head Valery Chaly said the conflict looks increasingly like a Russian invasion of Ukraine.[46] On the same day, Interfax-Ukraine reported that an RNBO spokesman said that Russia continues to "*concentrate its troops on the state border of Ukraine.*"

"*The battle for control over the state border of Ukraine continues,*" the RNBO said on 17 July. "T*he situation has been deteriorating as the Russian Federation continues to build up its Armed Forces near the Ukrainian border. More and more attacks on the positions of Ukraine's border units and ATO forces are coming from within Russian territory.*"[47]

For its part, the Russian Federation issued a number of complaints about Ukrainian forces attacking customs and border checkpoints along the Ukraine-Russia border and Ukrainian artillery shells landing in the Russian Federation. Statements issued by the Federation's Ministry of Foreign Affairs (MFA) often included details on casualties among Ukraine and Russian civilians, as well as descriptions of damage to buildings and infrastructure.

On 28 June, the Russian Federation "*expressed a decisive protest with regard to such provocations of Ukraine, which grossly violate the fundamental principles of international law*" after a Russia border checkpoint purportedly was attacked by Ukrainian forces.[48] "*We are especially concerned*

[40] https://www.kyivpost.com/article/content/war-against-ukraine/lysenko-security-council-has-more-evidence-of-russias-sponsoring-militants-355334.html

[41] https://www.rnbo.gov.ua/files/2014/RNBO_map_11_07_eng.jpg

[42] https://www.rnbo.gov.ua/files/2014/RNBO_map_21_07_eng.jpg

[43] https://www.kyivpost.com/article/content/war-against-ukraine/defense-ministry-ukrainian-forces-seize-large-amount-of-militants-arms-in-donetsk-region-355624.html

[44] https://www.unian.ua/politics/939080-kolona-zi-100-odinits-tehniki-vnochi-namagalasya-prorvatis-v-ukrajinu-z-rosiji-rnbo.html

[45] https://www.kyivpost.com/article/content/war-against-ukraine/situation-in-luhansk-and-donetsk-regions-remains-volatile-osce-356153.html

[46] https://zik.ua/en/news/2014/07/15/34_tanks_34_spags_and_2_apcs_marched_from_luhansk_to_donetsk_eyewitness_report_506051

[47] http://mediarnbo.org/2014/07/17/nsc-news-analysis-center-briefing-at-17-00-july-17-2014/?lang=en

[48] https://www.mid.ru/tr/press_service/spokesman/official_statement/-/asset_publisher/t2GCdmD8RNIr/content/id/53734

that there were Ukrainian refugees, nationals of that country there at that time," the MFA said. "*Missiles also hit the nearby populated areas in the territory of the Russian Federation.*"

In a statement on 10 July about Ukrainian forces firing artillery at the Gukovo checkpoint on the border, the MFA said: "*If such cases are repeated, all the responsibility for their consequences will be imposed on the Kiev authorities.*"[49]

On 12 July, TASS reported the MFA as saying, "*Russia demands Ukraine stop shelling of the Russian territory and violating the Russian border*" after Russian border guards came under small arms fire.

The MFA issued a statement on 13 July alleging the Ukrainian army had shelled Donetsk in Russia's Rostov region with high explosive shells, killing one Russian national and serious injuring two others. In a protest lodged with a Ukrainian diplomat, the MFA said, "*Russia insists again that Ukraine immediately takes decisive measures to stop any provocations of this kind.*" The MFA also said the incident shows that tensions in the area of the Russia-Ukraine border "*have dangerously escalated and may have irreversible consequences, for which Ukraine will be held responsible.*"[50]

A tweet attributed to the MFA's Twitter account (@mfa_Russia) said, "*Russia vows tough response to Ukraine's military border shelling.*"

On 14 July, Russia invited OSCE observers to the Donestsk and Gukovo checkpoints on the Russia-Ukraine border "*in a show of good will and without waiting for ceasefire,*" the MFA said in a statement.[51] "*We are convinced that this step will contribute to the creation of favourable conditions for an end to the violence as soon as possible and the start of an inclusive and transparent Ukraine-wide dialogue according to the Geneva Statement of the 17 April and the Berlin Declaration of the 2 July,*" the ministry said.

Russia also complained of attacks by Ukrainian forces on areas of eastern Ukraine controlled by armed non-state forces. "*The approaches to the Nikolayevka Village, 15 km from Slavyansk, are subjected to massive shooting by Grad multi-launch missile systems, tanks and mortars,*" the MFA said on 2 July.[52] A day earlier, it had said, "*Let us recall the criminal air strike on the 2 June by Ukrainian Air Forces on the building of the Lugansk regional administration, which killed 8 people and injured 28.*"[53] On 5 July, the MFA referenced Ukrainian security forces using heavy armaments and military aviation, "*as a result of which civilians, including children, die.*"[54]

6.2.5. Presence of Air Defence Systems in Eastern Ukraine

A variety of heavy weapons were reported to be present in eastern Ukraine.

The OSCE said in the 16 May OSCE Daily Report that the head of the regional police reported that armed non-state forces in the area comprised about 1,000 individuals armed with a variety of weapons, from Kalashnikov assault rifles to anti-aircraft missile launchers.

In late May 2014, it was reported that Ukrainian military aircraft attacked armed non-state forces that had seized Donetsk airport and that a combat helicopter had destroyed a "*surface-to-air missile system at the airport that was being used by*" the armed non-state forces.[55]

In early June 2014, then-U.K. Prime Minister David Cameron was reported to have said that armed non-state forces in eastern Ukraine were being supplied with sophisticated weapons, such as MANPADS.[56] "*What I said to (Russian) President Putin is that … it is noticeable that the so-called rebels have, for instance, very technical, hi-tech weapons such as* MANPADS *(portable surface-to-air missiles) and it is hard to believe that they can be coming from anywhere else*," Cameron said in the British Parliament.[57]

Also in June, The New York Times reported the U.S. State Department had said that three T-64 tanks, several BM-21 multiple rocket launchers and other military vehicles had been sent to the armed non-state forces from across the border with the Russian Federation near Luhansk, supporting accusations made by the Ukrainian government.[58]

The newspaper also reported that then-U.S. Secretary of State John Kerry called Russian Foreign Minister Sergey V. Lavrov to "*complain about Russia's arms shipments*" to the non-state forces in eastern Ukraine. Also, the State

[49] https://www.mid.ru/en/foreign_policy/news/-/asset_publisher/cKNonkJE02Bw/content/id/678085

[50] https://www.mid.ru/tr/press_service/spokesman/official_statement/-/asset_publisher/t2GCdmD8RNIr/content/id/677956?p_p_id=101_INSTANCE_t2GCdmD8RNIr&_101_INSTANCE_t2GCdmD8RNIr_languageId=en_GB

[51] https://www.mid.ru/en/foreign_policy/news/-/asset_publisher/cKNonkJE02Bw/content/id/677907

[52] https://www.mid.ru/en/foreign_policy/news/-/asset_publisher/cKNonkJE02Bw/content/id/679164

[53] https://www.mid.ru/en/foreign_policy/news/-/asset_publisher/cKNonkJE02Bw/content/id/679741

[54] https://www.mid.ru/en/foreign_policy/news/-/asset_publisher/cKNonkJE02Bw/content/id/678686

[55] https://www.kyivpost.com/article/content/war-against-ukraine/ukraine-jets-bomb-gunmen-seized-donetsk-airport-349476.html

[56] https://uk.reuters.com/article/uk-ukraine-crisis-britain-russia/cameron-points-finger-at-russia-over-hi-tech-arms-in-ukraine-idUKKBN0EM17320140611

[57] https://uk.reuters.com/article/uk-ukraine-crisis-britain-russia/cameron-points-finger-at-russia-over-hi-tech-arms-in-ukraine-idUKKBN0EM17320140611

[58] https://www.nytimes.com/2014/06/15/world/europe/ukraine.html?_r=0

Department released photographs of three Russian tanks it said were sent from southwest Russia to Ukraine. In response to the call, Russia's MFA released a summary of the call, but it did not specifically the address subject of weapons crossing the border from Russia into Ukraine.

Around the same time, Al Jazeera America quoted a U.S. State Department spokesperson as saying, "*Ukraine's interior minister said three tanks crossed the border from Russia yesterday. … Internet videos showed this same type of tank that departed southwest Russia moving through multiple cities in eastern Ukraine.*"[59]

In late June 2014, U.S. Air Force Gen. Philip M. Breedlove, at the time the supreme allied commander Europe of the North Atlantic Treaty Organization (NATO), said that the armed non-state forces in eastern Ukraine were being supplied with heavy anti-aircraft weapons.[60] He also said that training missions being carried out by forces from the Russian Federation along the eastern Ukraine border included the use of vehicle-borne anti-air missiles. The U.S. Naval Institute News, which reported Breedlove's comments on its website on 30 June 2014, also said, "*But despite the confirmed deliveries of the anti-aircraft weapons and training by Russian forces, Breedlove was wary of making the connection between the separatists' weapon stockpiles and the recent shootdown of Ukrainian military aircraft.*"

In response to Breedlove's comments, the Russian Federation MFA said, "*We believe that it is absolutely inadmissible, when such a highly ranked military representative becomes drawn into the information and propaganda campaign, distributing false data about the situation on the Russian-Ukrainian border.*"[61]

The then-U.S. Ambassador to Ukraine Geoffrey Pyatt described the Russian frontier as "*a sieve for tanks and missile systems, and MANPADS and money and mercenaries and all kinds of instability.*"[62]

The Ukrainian military possessed SAM systems, including Buk M-1 missile launchers, and while the armed non-states forces did not operate aircraft, there was concern that Ukrainian anti-aircraft defence systems had been seized by the armed non-sate forces. In late June, there was a report that a Ukrainian SAM system had been captured by armed non-state forces. The Kyiv Post reported on 30 June that armed non-state forces had seized control of "*military unit No. A-1402*" in Donetsk.[63] The report described the unit as a surface-to-air missile regiment equipped with Buk self-propelled missile systems.

An ATO spokesman confirmed a "*partial capture*" of the military unit. The spokesman confirmed the Buk unit was located in the A-1402 unit, but said it was not working. When asked if the attackers could fix the unit, he said, "*I don't think they need it.*"[64]

On 13 July, the Kyiv Post reported, "*Columns of dozens of armoured personnel vehicles, artillery and Grad rocket systems were observed moving north from the seaside city of Mariupol and west from the direction of Krasnoarmiysk towards Donetsk this week.*"[65]

Between 13 July and 15 July, both the UNIAN News Agency (translated using Google Translate) and ZIK reported dozens of pieces of heavy equipment, including tanks, self-propelled artillery, and armoured personnel carriers in the Luhansk region.[66, 67]

After the An-26 was shot down on 14 July, a Kyiv Post journalist tweeted a link from the "*presidential website*" that the transport was shot down by an advanced missile system "*likely from Russia*." On 15 July, Pyatt tweeted that Russia had transferred ex-USSR military equipment to fighters around Donetsk. Also on 15 July, Pyatt tweeted there was no evidence that Russian support for the armed non-state forces had ceased.

Information on weapons system in or near eastern Ukraine also could be found on Twitter. In late June, a journalist tweeting under the Twitter handle *@Julian-Roepcke* said, "*#Breaking #Russia moving the "9K37M1 Buk"(?!?!) system through #Stary_Oskol towards #Ukraine.*" The tweet included a link to a YouTube video that no longer is available. The next day, *@JulianRoepcke* tweeted "*#BREAKINGNEWS THE "9K37M1 BUK CONVOY MADE IT TO THE #UKRAINIAN_BORDER IN #BELGOROD OBLAST.*" On 16 July, he tweeted that the Russian army had moved "*high end #SAM systems to the Ukr. NORTHERN border.*"

Another Twitter source, *@ostro_v*, as reported and translated into English during the Flight MH17 criminal prosecution in the court sessions of the District court of The Hague said, "*In Donetsk, at the Intersection of Ilyich Avenue at 9.15, there was a "Buk" on a tractor, surrounded*

[59] http://america.aljazeera.com/articles/2014/6/13/ukraine-retakes-mariupol.html

[60] https://news.usni.org/2014/06/30/u-s-european-commander-russia-supplying-anti-aircraft-weapons-ukrainian-separatists

[61] https://www.mid.ru/en/foreign_policy/news/-/asset_publisher/cKNonkJE02Bw/content/id/679236

[62] https://www.kyivpost.com/article/content/ukraine-politics/as-america-celebrates-pyatt-touts-us-ukraine-successes-354593.html

[63] https://www.kyivpost.com/article/content/ukraine-politics/militants-claim-control-over-air-defense-regiment-in-donetsk-353995.html

[64] https://www.62.ua/news/565758/zahvacennyj-v-donecke-boevikami-dnr-zenitnyj-raketnyj-kompleks-buk-v-nerabocem-sostoanii

[65] https://www.kyivpost.com/article/content/ukraine-politics/civilians-caught-in-the-crossfire-as-rockets-rain-down-on-rebel-held-cities-355836.html

[66] https://www.unian.ua/politics/939080-kolona-zi-100-odinits-tehniki-vnochi-namagalasya-prorvatis-v-ukrajinu-z-rosiji-rnbo.html

[67] https://www.kyivpost.com/article/content/war-against-ukraine/zik-34-tanks-and-34-spags-marched-from-luhansk-to-donetsk-eyewitness-says-356121.html

by militiamen." The tweet was posted at 12:34 on 17 of July 2014, a few hours before the downing of Flight MH17.[68]

Also available online on Censor.net.ua was a video of Russian tanks at the Donbas arena, home of the Shakhtar Donetsk professional football club from Donetsk, Ukraine. According to Censor.net, on July 15 there were three tanks and self-propelled artillery near the stadium.

On 28 September 2016, during the Joint Investigative Team (JIT) presentation of the first results of the Flight MH17 criminal investigation, it was revealed that more than 150,000 telephone calls were intercepted. The Foundation does not know if, in the period prior to the downing of Flight MH17, Ukrainian security services were equipped, prepared and directed to process these calls and identify potential threats.

One relevant intercepted conversation was shared during Flight MH17 criminal prosecution in the court sessions of the District court of The Hague:[69]

"*The next morning, 17 July 2014, at 09.23.13, Dubinskiy again called Semenov. Dubinskiy said his Buk-M had arrived that night and needed to be transported in Semenov's convoy. Dubinskiy asked where the Buk should be taken so it could join the convoy.*

"*At 09.54.08, in a telephone conversation with Kharchenko, Dubinskiy told him to go to Pervomaiske and set himself up there. His orders were to guard 'the thing' which he would soon be 'driving' and, after that, to stay in reserve. Dubinskiy told him that Pulatov would also be coming to him.*

"*In a telephone conversation that followed this one, one minute later, Dubinskiy ordered Pulatov to go with Kharchenko and the others to the area around Pervomaiske and Pervomaiskyi. His job was to guard and 'organise' the Buk which was now being 'driven' by Kharchenko. Pulatov was told to ensure the Buk was guarded and organised, and to keep an open corridor so as to ensure a smooth delivery.*

"*At 12.42.57 Pulatov called Kharchenko. Kharchenko told Pulatov that he and the 'toy' were near the Furshet, a supermarket in the centre of Snizhne. Pulatov asked him to wait there, saying that he would come to him.*

"*Shortly after flight MH17 was downed, at 16.48.44, Kharchenko called Dubinskiy, saying that they were 'on the spot' and had just downed a Sushka. Dubinskiy ordered Kharchenko to come 'here' and to leave a company in charge of guarding the Buk.*

"*Kharchenko: We are on the spot. We've already brought down one Sushka.*

"*Dubinskiy: Well done! Attaboys! Well… You've brought down one Sushka. Well done! Lionia, tell me…*"

6.2.6. Post Flight MH17 Assessments

Evidence of a Buk Battery in Donetsk

In the hours and days after the downing of Flight MH17 on 17 July, there were multiple reports about a Buk missile system or systems being seen in eastern Ukraine. An advisor to Ukraine's minister of internal affairs said on the 112 Ukraine television channel that the Ukrainian military had "*recorded the fact*" of the missile's launch. He also said there was a large amount of military equipment in the region, "*including the Buk missile system, which was spotted today in the morning in the area of Ternovoye.*"[70] Interfax Ukraine also cited a Ukrainian official as saying that in the morning of 17 July, before Flight MH17 was shot down, local residents had seen the Buk being transferred to Torez to Snezhnoe.[71]

Immediately after the downing, one of the leaders of the Donetsk's People's Republic, said through his VK account, "*We did warn you, do not fly in our sky,*" according to a 17 July article on Mashable.[72] The post was deleted when word began to circulate that the plane shot down was an airliner and not a Ukrainian military aircraft. Another DPR leader denied his forces had a weapon capable of bringing down an airliner.[73]

In its early articles on the Flight MH17 downing, The Guardian reported that a military specialist who monitors social media in Ukraine said an armed non-state force had been sighted with a Buk system at Torrez just hours before the event.[74] The Guardian article also said an Associated Press reporter reported seeing a Buk in Snizhne. In the same article, The Guardian reported that armed non-state forces "*based in eastern Ukraine are said to have been shooting at planes and helicopters with Buk missiles over the last week in an attempt to achieve mastery of the airspace.*"

Three days after the downing, U.S. Secretary of State John Kerry said that social media reports and U.S. surveillance put the missile system in question in the vicinity of the crash before the downing. "*It is pretty clear that this was a system from Russia, transferred to separatists. We know with confidence that the Ukrainians did not have such*

[68] https://www.prosecutionservice.nl/topics/mh17-plane-crash/prosecution-and-trial/court-sessions-june-2020/investigation-on-the-main-scenario

[69] https://www.prosecutionservice.nl/topics/mh17-plane-crash/prosecution-and-trial/court-session-26-june-2020

[70] https://interfax.by/news/policy/v_mire/1161813/

[71] Ibid

[72] https://mashable.com/2014/07/17/malaysia-airlines-ukraine-russia-rebel/

[73] Ibid

[74] https://www.theguardian.com/world/2014/jul/17/malaysian-airlines-plane-buk-missile

a system anywhere near the vicinity at that point of time," Kerry was quoted as saying.[75]

On 19 July 2014, at a news conference in Kiev, Vitaly Nayda, the head of counterintelligence for the Ukrainian State Security Service, showed a photograph of Buk system on a street in Torez, Ukraine. He also showed photos of a Buk system and other military vehicles heading to the Ukraine border with the Russian Federation. In response to a question, he said the armed non-state forces operating in eastern Ukraine possessed at "*least three Buk M-1*" missile systems because three systems crossed back across the border into the Russian Federation early on the morning of 18 July. In response to another question, Nayda said the first information "*hinting*" at a Buk launcher in the possession of the armed non-state forces was received on 14 July and came from counterintelligence units who got the information from the field. "*But we could not confirm directly that it was Buk missile launcher that trespassed illegally [in] Ukrainian territory*," he said.[76, 77]

On 22 July, The Guardian reported: "*[A]s several witnesses told the Guardian, they had seen what appeared to be a Buk missile launcher in the vicinity of the crash site last Thursday (17 July). … The sightings back up a number of photographs and videos posted online that put the Buk system close to the crash site on the day of the disaster. Just before lunchtime last Thursday, prior to the Malaysia Airlines plane's takeoff, a Buk was driven through Gagarin Street, one of the central thoroughfares of Torez, witnesses said.*"[78]

The Financial Times said the background to the downing included "*a concerted anti-aircraft campaign waged by rebel militias in eastern Ukraine.*" The article also said that on 29 June, an official account of the Donetsk armed non-state group tweeted a picture of Buk missile launcher accompanied by text that said the launch was in their possession.[79] The website Vesti.ru published an article on 29 June under the headline "*The sky over Donetsk will be protected by Buk anti-missile systems*" about the capture of the A-1402 air defence unit previously referenced.[80] At his 19 July news briefing, Nayda said the captured Buk system was not operational, having been disabled in March 2014.

Bellingcat Investigation

Before the official accident investigation was completed by the Dutch Safety Board, the most compelling investigative report was published by Bellingcat, which describes itself as an "*independent international collective of researchers, investigators and citizen journalists using open source and social media investigation to probe a variety of subjects.*" Bellingcat's 35-page investigative report, which was released on 8 November 2014, concluded:

"*It is the opinion of the Bellingcat MH17 investigation team that there is undeniable evidence that separatists in Ukraine were in control of a Buk missile launcher on July 17th and transported it from Donetsk to Snizhne on a transporter. The Buk missile launcher was unloaded in Snizhne approximately three hours before the downing of MH17 and was later filmed minus one missile driving through separatist-controlled Luhansk.*"[81]

"*The Bellingcat MH17 investigation team also believes the same Buk was part of a convoy travelling from the 53rd Anti-Aircraft Missile Brigade in Kursk to near the Ukrainian border as part of a training exercise between June 22nd and July 25th, with elements of the convoy separating from the main convoy at some point during that period, including the Buk missile launcher filmed in Ukraine on July 17th. There is strong evidence indicating that the Russian military provided separatists in eastern Ukraine with the Buk missile launcher filmed and photographed in eastern Ukraine on July 17th.*"[82]

The Bellingcat report, "*Origin of the Separatists' Buk, A Bellingcat Investigation,*" traces the Buk system's movements in Donetsk on 17 July using photographs and videos posted on social media sites. Bellingcat said its investigators used a variety of tools to establish where the images were recorded and the approximate time.

"*Along with these eyewitness reports [social media postings], journalists have since visited the city and received confirmation of the convoy sightings on July 17. Journalists from the Guardian and Buzzfeed visited Torez on July 22nd and interviewed locals who confirmed both the time and route the Buk missile launcher took through Torez on the way to Snizhne along the H21 motorway,*" the report said.[83]

Much of the Bellingcat report was dedicated to tracking the Buk launcher, then part of a larger convoy, as it moved from Kursk, Russia, to the Ukrainian border as part of a training exercise in the latter half of June 2014. "*Using a wide variety of open sources, it has been possible for the Bellingcat MH17 investigation team to collect evidence of the movements of the convoy, the purpose of the convoy,*

[75] https://www.theguardian.com/world/2014/jul/20/mh17-kerry-evidence-ukrainian-separatists

[76] https://www.youtube.com/watch?v=PWtH8AA42Fc&feature=share

[77] https://www.wsj.com/articles/ukraine-knew-of-separatists-air-defense-capabilities-say-officials-1405781508

[78] https://www.theguardian.com/world/2014/jul/22/ukraine-sightings-missile-launcher-mh17

[79] https://www.ft.com/content/7efea166-0e68-11e4-b1c4-00144feabdc0

[80] https://www.vesti.ru/article/1850793

[81] https://www.bellingcat.com/news/uk-and-europe/2014/11/08/origin-of-the-separatists-buk-a-bellingcat-investigation/

[82] Ibid

[83] Ibid

its links to the 53rd Brigade, and evidence that confirms that one of the Buk missile launchers in the convoy was the same Buk missile launcher filmed and photographed in Ukraine on July 17, 2014, travelling from Donetsk to Luhansk through separatist-controlled territory in eastern Ukraine."[84]

Again, Bellingcat investigators pieced together videos, photos and other social media posts to track and verify the movements of the convoy and of the specific Buk launcher that has been implicated in the downing of Flight MH17.

The videos of the convoy moving from Kursk to the border with Ukraine were available online before the shootdown. The same missile launcher reportedly was later transported back to the Russian Federation with a missile missing.

Dutch Safety Board

In its accident report, the Dutch Safety Board noted reports that circulated in the media, including social media, in the months prior to 17 July, about the presence of weapons, including surface to air missiles, in the possession of the armed non-state forces fighting the Ukraine government in the eastern part of the country. The DSB report also noted the concerns expressed by Western diplomats, politicians and military leaders about weapons possibly being supplied by the Russian Federation to armed non-state forces in eastern Ukraine.

"*The precise nature, scope and operational level of the military capacities of the various parties involved in the conflict around 17 July 2014 are not easy to establish by the Dutch Safety Board, even in retrospect. Although various media reported on the possible weapons capability in the area in the months prior to the crash, they do not constitute validated and verified information. In addition, based on open sources it is not possible to establish with certainty what equipment was involved and to what extent this equipment was operational*," the DSB report says.

Flight MH17 Joint Investigation Team (JIT)

The JIT, comprised of representatives from the Netherlands, Australia, Malaysia, Belgium and Ukraine, is conducting a criminal investigation into the crash. As a result of the investigation, the Dutch Prosecution Service is prosecuting four individuals for their involvement in bringing down Flight MH17.[85]

The JIT has concluded that Flight MH17 was brought down by a missile launched from a Buk Telar transported from the Russian Federation to a farm field in eastern Ukraine and that, at the time of the downing, was controlled by the armed non-state forces. After firing, the Buk was transported back to Russia missing a missile.

The JIT investigation verified a number of the Bellingcat findings regarding the source of the Buk Telar in Kursk and its ultimate destination in Ukraine.

"*After an extensive and labor-intensive comparative investigation, in which many BUK-TELARs were involved, the JIT has come to the conclusion that the BUK-TELAR that shot down flight MH17 comes from the 53rd Anti Aircraft Missile Brigade, or the 53rd Brigade from Kursk in the Russian Federation. This 53rd Brigade is a unit of the Russian armed forces. In 2014, the 53rd Brigade consisted of three operational battalions. It employs several hundred people in staff, supporting and operational units*," the JIT said.[86] "*Earlier, the investigation collective Bellingcat came up with the same conclusion*."

The JIT investigation determined through intercepted telephone conversations that during the days prior to 17 July, "*the pro-Russian fighters mentioned that they needed better air defence systems to defend themselves against these [Ukrainian military] air strikes. In this respect, a BUK was discussed explicitly. Fact is that a BUK has a higher range than the air defence systems in use by the separatists at that moment, such as the Strela and Igla*."[87]

6.3. Standard Procedures Questionnaire

To ensure systematic coverage and comprehensive information collection, we identified the need to use certain standard or good process descriptions when drafting the information collection questionnaires. For that purpose, we used the Foundation best process description that is based on our accumulated experience and analyses up to the moment of this inquiry.

Namely, the Foundation's integrated standard for airspace security risk assessment, as illustrated in Figure 19 (p. 68), addresses the five main functions to be assigned to one or more different authorities, organised as an integrated process and performed within a given sovereign state:

A. Threat watch — roles, responsibilities, procedures and processes for monitoring for potential threats to civil aviation.

B. Threat analysis — roles, responsibilities, procedures and processes for threat analysis, including capability of attack, intent to attack, risk factors for unintentional attack, and for validating the information.

C. Risk analysis — roles, responsibilities, procedures and processes for analysing the security risk including potential consequences.

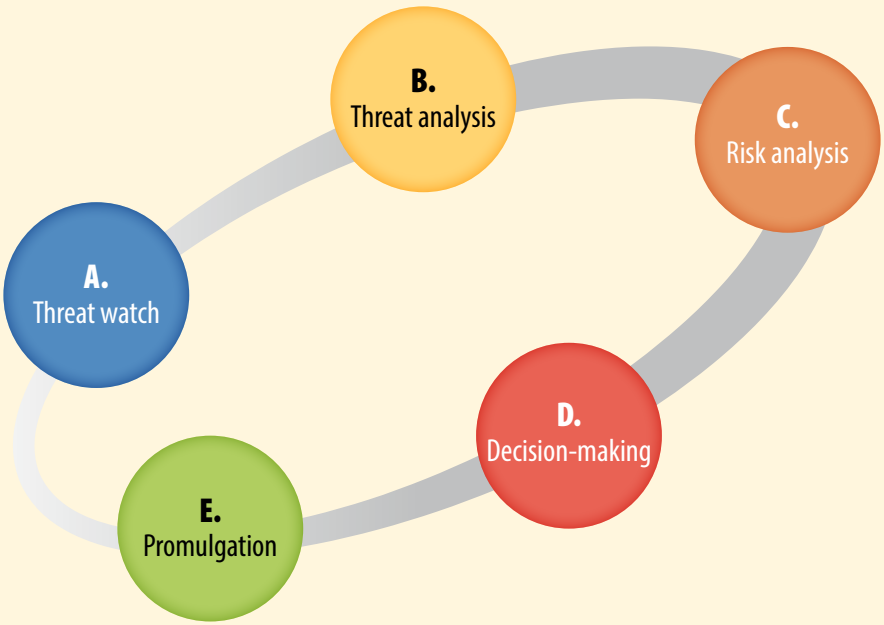
[84] Ibid

[85] https://www.prosecutionservice.nl/topics/mh17-plane-crash/criminal-investigation-jit-mh17

[86] https://www.prosecutionservice.nl/topics/mh17-plane-crash/criminal-investigation-jit-mh17/speakers-text-jit-mh17-press-meeting-24-5-2018

[87] https://www.prosecutionservice.nl/topics/mh17-plane-crash/criminal-investigation-jit-mh17jit-presentation-first-results-mh17-criminal-investigation-28-9-2016

Figure 19
Flight Safety Foundation Integrated Standard for Airspace Security Risk Assessment



D. Decision-making — roles, responsibilities, procedures and processes for airspace management in relation to security threats to civil aviation, including deciding airspace restrictions and closure of airspace.

E. Promulgation — roles, responsibilities, procedures and processes for communicating airspace management decision-making, including decisions on the communication tools (e.g., NOTAMs) used, composition of the communication message and verification of adherence to international standards and procedures for aeronautical information.

The Foundation standard defines a statewide process for airspace security risk management that is distributed around different authorities and organisations yet functional from end to end. In this way, the organisational scope of the process is not restricted to the more traditional perspective of civil-military aviation coordination (e.g., some state intelligence functions may not be attributed to military authorities).

Each of the five functions of the integrated standard for airspace security risk assessment targets a particular step from the risk assessment process and contains three or four specific sub-functions that are formulated as questions in the Foundation questionnaires.

The questions used in the inquiry are:

A. Threat watch:

- **Q1 — Social media:** Is information in social media including information about capability of attack and/or intent to attack civil aircraft, used as a trigger for security threat analysis for civil aviation?
- **Q2 — Public and private sources:** What are the sources of public and private threat information and what are the processes for gathering information relative to civil aviation security (including in a conflict zone)?
- **Q3 — Other actors' information:** What is the level of involvement of airlines, air navigation service providers (ANSPs), the military, adjacent states and/or other states publishing advisories in gathering information about aviation security (including information for conflict zones)?

B. Threat analysis:

- **Q4 — Adjacent airspace:** What are the procedures for routine review and analysis of NOTAMs, security warnings and airspace restrictions for adjacent FIRs to ensure civil aircraft security?
- **Q5 — Verifying the information:** What is the process for deciding on source credibility and for verifying information, including information on capability of attack and intent to attack, relative to an active armed conflict that could impact civil aviation?
- **Q6 —Unintentional attack factors:** What are the determining risk factors for unintentional attack that may result in civil aviation not being allowed to fly over a conflict zone? For example, scale of the conflict, military air transport or air combat activities, previous attacks against aircraft, level of training and

experience of SAM operators, level of robustness of command and control mechanism for authorising launch, civil aviation flight proximity to strategic assets, technical capability of SAMs to distinguish between civil and military aircraft.

C. Risk analysis:

- **Q7 — Coordination and analysis:** What organizations are involved, how do they coordinate, and what is the process for determining acceptable security risk levels in civil aviation airspace over a conflict zone? Note: These are general security level targets to be met, if specified, that are not specific to an event or situation.
- **Q8 — Potential consequences:** What is the process of determining how civil aviation can be affected based on threat information in a conflict zone? For example, what part of the airspace, what altitudes or types of aircraft?
- **Q9 — Risk methodology:** What analysis methodology or risk matrix is used to assess the likelihood of a threat presenting itself and the potential consequences for civil aircraft flying over the conflict zone?
- **Q10 — Risk mitigations:** What is the process to determine security mitigations that would permit civil aviation to overfly a conflict zone?

D. Decision-making:

- **Q11 — Normal times decision-making:** What are your normal (not during conflict) criteria for establishing restriction or segregation of airspace and what are the coordination procedures both internally and externally?
- **Q12 — Conflict zone decision-making:** What are the decision processes for security of airspace, including establishing restriction or segregation of airspace in a conflict zone? What are the ANSP and military coordination procedures for active civil flights and their safety?
- **Q13 — Adjacent FIR coordination:** What organisations are involved and what are the procedures for coordinating airspace restrictions in the conflict zone among adjacent FIRs?

E. Promulgation:

- **Q14 — Publish or not, and how:** What is the process to decide if there is a need for aeronautical information publication and to choose the communication tool for it (e.g., NOTAMs, AIC)?
- **Q15 — Verify and validate:** What organisations are involved in and what are the processes used to prepare, verify if ICAO Aeronautical Information Service procedures and terminology are used, validate for correctness and transmit aeronautical information to its users (e.g., airlines and ANSPs)?
- **Q16 — Special advisories and threat information:** What are the procedures for disseminating civil aviation security threat information to operators within and outside the conflict zone FIR?

In total, 16 question groups (as listed above) were formulated in the questionnaire. In addition, five detailed questions were asked for each of the 16 question groups:

- **Answer:** Provide a brief overall answer to the question.
- **Responsible:** Describe which authorities/organisations are responsible for the activities associated with the respective question.
- **References:** Provide specific references to legislation, requirements and other provisions that define the responsibilities and the process.
- **Process and timeline:** Describe the process (including its inputs/outputs) to perform the associated activities, including the processing time.
- **Changes after 17 July 2014[88]:** Describe the changes, if any, to the requirements and the process that took place after 17 July and the reasons for the change.

6.4. Threat Knowledge Questionnaire

To perform the inquiry into whether Ukraine and the Russian Federation knew of the presence of air defence equipment in eastern Ukraine that had a reach beyond the part of the airspace that was closed for civil aviation and therefore could pose a threat to civil aviation, we developed a questionnaire similar to the one described above. While the standard procedures questionnaire described above probed the statewide airspace security risk assessment process in general, the threat knowledge questionnaire described below asked how the integrated airspace security risk assessment actually worked from 01 March 2014 until just prior to the Flight MH17 downing. The questions used in the threat knowledge questions are as follows:

- Describe what civil aviation threat information on social media about the presence of air defence equipment or intent to attack was identified by which authority.
- Describe what other sources of civil aviation threat information about the presence of air defence equipment and intent to attack were identified by which authority.

[88] After the downing of Flight MH17

- Describe specifically what airlines, ANSPs, the military, adjacent states, or other states publishing advisories were used as a source for what information about security risk for civil aircraft.
- Describe what civil aviation security threat information was identified by which authority based on the NOTAMs, security warnings and airspace restrictions for adjacent FIRs.
- How was the security threat information verified, how was the source judged for credibility, and by what authority/organisation? What were the results of the credibility decision and the verification?
- Describe what risk factors for unintentional attack were identified by what authority/organisation.
- Describe what organisations determined the acceptable security risk levels for civil aircraft. How this was determined and what were the determined acceptable security levels?
- Describe the impact analysis results, if any — how civil aviation can be affected based on threat information — for airspace, altitudes or type of aircraft.
- Describe if and how risk was assessed and what levels of security risk were determined for what airspace, what altitudes or what type of aircraft.
- Describe if and what security mitigations were determined that would permit civil aviation to overfly the conflict zone.
- Describe who made what decisions for security of airspace, including establishing restriction or segregation of airspace.
- Describe what coordination took place between the ANSP and the military regarding the security threats.
- Describe if and how the airspace restrictions were coordinated with the adjacent FIRs and what organisations were involved in the coordination.
- Describe how it was decided if there was a need for aeronautical information publication and how the communication tool (e.g., NOTAMs, aeronautical information circular) was chosen.
- Describe what organisations were involved in the aeronautical information preparation, verification of whether ICAO AIS procedures and terminology were used, and validation for correctness and transmission of aeronautical information to users.
- Describe if and how civil aviation security threat information, apart from the AIS, was disseminated to operators within and outside the conflict zone FIR.

6.5. Inquiry Into Ukraine Standard Procedures and Threat Knowledge

For the purpose of information collection, the Ukrainian government identified a focal point within its Ministry of Foreign Affairs. An information collection template was sent to the identified focal point. The information collection template integrated in one table both the standard procedures questionnaire and the threat knowledge questionnaire.

Ukraine responded to the questionnaire, and the responses as received are included in Appendix D. Hereafter, we provide a question-by-question discussion about the responses received.

Q1 — Social media threat watch

The response confirms that information from "*open sources, including social media*" is used in the assessment of threats to civil aviation "*in accordance with relevant regulatory documents*."

The document provided by Ukraine as Annex 3 to the responses says that the input information for the State Aviation Administration and Integrated Civil-Military System "*for detection of possible threats for civil aircraft operation is the information provided by the Military Force Operation HQ* [headquarters] *and/or appropriate command/control military units*." The document further says that information received from open sources is "*verified by intelligence*." The response does not explicitly answer the question about whether the information in social media is used *as a trigger* for analysis of threats to civil aviation.

Many organisations are identified as responsible for the process. Apart from the Security Service, Ministry of Defence and Ministry of Internal Affairs, the response also identifies as responsible the State Aviation Administration, airport operators, aircraft operators and ANSPs. The response does not explain how all these organisations are responsible for social media monitoring and identification of potential threat information.

According to the response, the State Aviation Administration of Ukraine "*constantly conducts a general assessment of threats to civil aviation security on the basis of information received from the Security Service of Ukraine; Ministry of Ukraine; Ministry of Internal Affairs of Ukraine; Foreign Intelligence Service of Ukraine; airport operators; aircraft operators; air navigation service providers; and other sources, social media included.*"

In respect to the situation prior to the downing of Flight MH17, the response notes that the State Aviation Administration of Ukraine "*used information on threats to civil aviation security from the Ministry of Defence of Ukraine, law enforcement and intelligence agencies of Ukraine, and other sources.*" The response says that the "*information is the one marked 'For official use (restricted)"*

but also notes that the information "*is specified in the final report on the investigation of the air crash of Malaysia Airlines' Boeing 777-200.*"

There is no information provided in the answer regarding what social media civil aviation threat information about the presence of air defence equipment or intent to attack was identified by which authority.

For this report, it is of specific interest what social media threat information was available to which organisation prior to the downing of Flight MH17, including social media posts about Buk missile systems being seen. For example, @ostro_v, as reported and translated into English during the Flight MH17 criminal prosecution in the court sessions of the District court of The Hague, said, "*In Donetsk, at the Intersection of Ilyich Avenue at 9.15, there was a "Buk" on a tractor, surrounded by militiamen.*" The tweet was posted at 12:34 on 17 of July 2014, a few hours before the downing of Flight MH17.[89]

Additionally, it is of interest what and when the social media threat information was analysed, validated and propagated to those responsible for threat analysis in the State Aviation Administration of Ukraine.

Based on the analysis of the response, it was decided to ask a clarifying question seeking information about what social media threat information was identified by which organisation prior to the downing of Flight MH17.

Q2 — Public and private sources threat watch

The response states that "*Information from all available sources is used to assess threats to civil aviation security in accordance with relevant regulatory document.*" The response provides a list of many organisations, including "*international civil aviation organisations*" but does not elaborate on which organisation is responsible for collecting what type of public and private information.

In respect to the situation prior to the downing of Flight MH17, the response repeats the answer to Q1 while adding the "*civil aviation authorities of foreign states* [and] *international civil aviation organizations*" as sources of threat information used by the State Aviation Administration of Ukraine. The response notes again that that the information "*is specified in the final report on the investigation of the air crash of Malaysia Airlines' Boeing-777-200.*"

The document provided by Ukraine as Annex 3 to the responses says, "*Military Force Operation HQ and/or appropriate command/control military units obtain information from intelligence and combat units. It is able to detect the threats stemming from weapon involved in the conflict.*" As reported in the document, the obtained information is validated "*by intelligence*" and used by the State Aviation Administration and Integrated Civil-Military System as input in the detection of possible threats.

For this report, it is of specific interest what information was available to which organisation prior to the downing of Flight MH17, including:

- Information about what weapon was used in the attack on a Ukraine An-26 military transport aircraft that occurred on 14 July.
- Threat information contained in 150,000 intercepted telephone conversations mentioned on 28 September 2016 during the JIT presentation of the first results of the Flight MH17 criminal investigation, namely the exchange in the morning of 17 July 2014 between Dubinskiy, Semenov, Kharchenko and Pulatov about the presence in eastern Ukraine of a Buk-M.[90]
- Threat information described by Vitaly Nayda, the head of counterintelligence for the Ukrainian State Security Service, on 19 July 2014 at a news conference in Kiev that the first information "hinting" at a Buk launcher in the possession of the armed non-state forces was received on 14 July.

Based on the analysis of the response, it was decided to ask a clarifying question seeking information on what public and private sources of threat information were identified by which organisation prior to the downing of Flight MH17.

Q3 — Other actors' information threat watch

The response states, "*National airlines, air navigation service providers, the military and law enforcement agencies are involved in gathering information about aviation security.*" The response does not elaborate on the actual process and timeline but says again that the "*State Aviation Administration of Ukraine constantly conducts a general assessment of threats to civil aviation security.*"

In respect to the situation prior to the downing of Flight MH17, the response notes again that the information "*is specified in the final report on the investigation of the air crash of Malaysia Airlines' Boeing* 777-200."

Q4 — Adjacent airspace threat analysis

The response states, "*Information pertaining to NOTAMs, security warnings and airspace restrictions for adjacent flight information regions (FIRs) is constantly reviewed and analyzed in accordance with relevant regulatory documents.*"

The response says that the "*State Aviation Administration of Ukraine; Security Service of Ukraine; Ministry of Defense of Ukraine; aircraft operators; air navigation service providers constantly review and analyze NOTAMs, security*

[89] https://www.prosecutionservice.nl/topics/mh17-plane-crash/prosecution-and-trial/court-sessions-june-2020/investigation-on-the-main-scenario

[90] https://www.prosecutionservice.nl/topics/mh17-plane-crash/prosecution-and-trial/court-session-26-june-2020

warnings and airspace restrictions for adjacent flight information regions."

In respect to the situation prior to the downing of Flight MH17, the response notes again that the information "*is specified in the final report on the investigation of the air crash of Malaysia Airlines' Boeing-777-200.*"

Q5 — Threat analysis: Verifying the information

The response states that "*information on threats to civil aviation security is analyzed, verified and assessed in accordance with relevant regulatory documents.*"

The document provided by Ukraine as Annex 3 to the responses says that the information obtained by the Military Force Operation HQ and/or appropriate command/control military units is verified "*by intelligence*." As the responses identify more actors that can be potential sources of threat information, including airport operators, ANSPs and aircraft operators, it is not clear if all the information is verified "*by intelligence*" before the State Aviation Administration of Ukraine performs threat and risk analysis.

The response notes that the information on possible threats "*to aircraft flights in areas of military conflicts is intelligence one*" and that the procedure for determining the reliability of the source of information depends on the method of obtaining such information and the type of information source. It is further noted that this information is classified.

In respect to the situation prior to the downing of Flight MH17, the response notes that the information was analysed, verified and assessed by the "*Security Service of Ukraine, the ministry of Defence of Ukraine, and the Foreign Intelligence Service of Ukraine*." It is further noted that this information is classified.

For this report, and without prejudice to the classified information, it is of specific interest what information was transmitted to the State Aviation Administration of Ukraine for threat analysis and when.

Based on the analysis of the response, it was decided to ask a clarifying question seeking to understand what verified and unverified threat information became known by the State Aviation Administration of Ukraine.

Q6 — Threat analysis: Risk factors for unintentional attack

The response says, "*According to relevant regulatory documents, all factors that pose a potential threat to civil aviation security are taken into account when establishing restrictions, prohibitions and terms on the use of airspace over or near areas of military conflicts.*"

Many organisations are identified as responsible for the process. Apart from the Security Services, Ministry of Defence, Foreign Intelligence Service of Ukraine and Ministry of Internal Affairs, the response also identifies as responsible the State Aviation Administration and ANSPs.

The response does not provide information on what risk factors for unintentional attack were identified by what authority/organisation prior to the downing of Flight MH17. The response only notes, "*According to the established procedures, on the basis of available information, appropriate restrictions and prohibitions on the use of airspace were established.*"

For this report, it is of specific interest if the State Aviation Administration of Ukraine, within the process of "*constantly conducting a general assessment of threats*," also assesses the risk factors of unintentional attack and what specifically this assessment was prior to the downing of Flight MH17.

Based on the analysis of the response, it was decided to ask a clarifying question seeking information on what risk factors for unintentional attack became known by the State Aviation Administration of Ukraine and how the associated security risk was assessed?

Q7 — Risk analysis: Coordination and analysis of acceptable security risk levels

Much like previous questions, the response notes that "*the State Aviation Administration of Ukraine constantly conducts a general assessment of threats to civil aviation security in coordination with the Security Service of Ukraine; Foreign Intelligence Service of Ukraine; Ministry of Defense of Ukraine; Ministry of Internal Affairs of Ukraine [and] air navigation service providers*" and that the detailed information is specified in the final report of the investigation of the Flight MH17 crash.

In respect to the situation prior to the downing of Flight MH17, the response notes again that the information "*is specified in the final report on the investigation of the air crash of Malaysia Airlines' Boeing-777-200.*" The same statement is provided by Ukraine as an answer to the detailed question about how the process actually worked prior to the downing of Flight MH17 in all the next question groups and is not repeated in the following discussion.

Q8 — Risk analysis: Potential consequences

The response states that "*the State Aviation Administration of Ukraine constantly conducts a general assessment of threats to civil aviation security on the basis of information received from the Security Service of Ukraine, Foreign Intelligence Service of Ukraine; Ministry of Defence of Ukraine; Ministry of Internal Affairs of Ukraine [and] air navigation service providers, and makes a decision on establishing restrictions, prohibitions and terms on the use of airspace.*"

The document provided by Ukraine as Annex 3 to the responses notes, while referring to the threat information provided from military units, that "*the nature of the threat, the volume of the airspace which is hazardous to civil aircraft, and the expected period of the threat existence are*

indicated." This information implies that part of the potential consequences is determined already by the military units as threat information provider.

Q9 — Risk analysis: Risk methodology

The response notes that "*an analysis methodology or risk matrix used to assess the likelihood of a threat and potential consequences for civil aircraft has been developed and approved in accordance with relevant regulatory documents.*"

In respect to the situation prior to the downing of Flight MH17, the specific question is if and how the risk was assessed and what levels of security risk were determined. As reported previously, the State Aviation Administration of Ukraine was responsible to "*constantly conduct a general assessment of threats to civil aviation security.*"

Additionally, the information provided by the Ukraine as Annex 3 says that the information about the identified threats or potential threats for civil aircraft operations "*arising from armed conflict zone is immediately to be provided*" to the State Aviation Administration of Ukraine and Integrated Civil Military System *"by Military Force Operation HQ and/or appropriate command/control military units.*"

Q10 — Risk analysis: Risk mitigations

The response notes, "*In accordance with the legislation, the State Aviation Administration of Ukraine constantly conducts a general assessment of threats to civil aviation security on the basis of information received from the Security Service of Ukraine; Foreign Intelligence Service of Ukraine; Ministry of Defense of Ukraine; Ministry of Internal Affairs of Ukraine, air navigation service providers, and makes a decision on establishing restrictions, prohibitions and terms on the use of airspace.*"

Q11 — Decision-making: Normal times decision-making

The response notes, "*Prohibitions or restrictions on the use of airspace are established by the State Aviation Administration of Ukraine or the authorities involved in the Joint Civil-Military System at the request of the competent authorities and users of airspace.*"

Q12 — Decision-making: Conflict zone decision-making

The response notes, "*Procedures for decision-making and civil- military coordination in the introduction of bans, restrictions and terms on the use of airspace are established in accordance with relevant regulatory documents*" The response further notes that the "*prohibitions or restrictions on the use of airspace are established by the State Aviation Administration of Ukraine or the authorities involved in the Joint Civil-Military System at the request of the competent authorities and users of airspace.*"

Additionally, the document provided by Ukraine as Annex 3 to the responses says that, based on the information received from Military Force Operation HQ and/or appropriate command/control military units, the State Aviation Administration of Ukraine and the Joint Civil-Military System "*will urgently set an appropriate restriction, where the civil aircraft flights are prohibited.*"

Further, the "*area which is hazardous to civil aircraft*" is defined through:

- "*assessment of type of military operations;*
- "*determination the geographical area of the conflict;*
- "*determination of weapon that has been identified in the area of the conflict;*"
- "*location of the Ukrainian military combat units and its[their] weapon that are involved in armed conflict;*
- "*determination of the maximum vertical and horizontal measures of effective range of the weapon;*
- "*determination the area which is affected by weapon as sum of determined geographical conflict area dimensions and affected vertical and horizontal range of weapon;*
- "*determination of buffer taking into consideration national requirements regarding segregation dangerous activity from civil aircraft operations, possible changes of military operations and time needed for proper modification of airspace restriction;*
- "*permanent analysis and assessment of information regarding situation near and within area of conflict to ensure that established restriction protects civil aircraft operations.*"

Q13 — Decision-making: Adjacent FIR coordination

The response notes that the information "*pertaining to restrictions on the use of airspace is published in aeronautical information documents and provided to the competent authorities of adjacent states.*"

Q14 — Promulgation: Publish or not, and how

The response notes that "*Aeronautical information is published by the decision of the State Aviation Administration of Ukraine in coordination with the state authorities concerned.*"

Q15 — Promulgation: Verify and validate

The response notes that the State Aviation Administration of Ukraine, the Ministry of Defence of Ukraine, and air navigation service providers *"in accordance with their competence, check draft documents of aeronautical information published by the Aeronautical Information Service (AIS) according to the decision of the State Aviation Administration of Ukraine and provided to airspace users.*"

Q16 — Promulgation: Special advisories and threat information

The response notes, "*The procedure for conveying information on threats to civil aviation security to airspace users is determined and carried out by the State Aviation Administration of Ukraine [and] the Ministry of Defense of Ukraine, including via air navigation service providers.*"

Following the analysis of the information received from Ukraine, we concluded that a number of questions remain open. However, to respect the timeline of our inquiry, we decided to concentrate only on specific clarifying questions.

All questions refer to:

- Information, knowledge or decisions immediately prior to the downing of Flight MH17.
- The airspace of eastern Ukraine in the Dnipropetrovsk FIR (UKDV).
- The following clarifying questions (CQs) were formulated and subsequently communicated to Ukraine. By the time this report was finalised, a response to the clarifying questions from Ukraine had not been received.

The answers from Ukraine to the clarifying questions were received after the requested time for providing a response and when the content of this report had been already finalised. Therefore, the responses to the clarifying questions were only cross-checked against the findings of the report but no discussion or other content in respect of the clarifying questions to Ukraine were provided in this report. The responses from Ukraine as received are included in Appendix E.

CQ1 — On 17 July 2014, before the downing of Flight MH17, a post from @ostro_v (as reported and translated into English during the Flight MH17 criminal prosecution court sessions at The Hague) said, "*In Donetsk, at the Intersection of Ilyich Avenue at 9.15, there was a "Buk" on a tractor, surrounded by militiamen.*" Was that Twitter post known about prior to the downing of Flight MH17 and by which state authorities?

CQ2 — Apart from what is referred to in CQ1, what other social media threat information about the presence in eastern Ukraine of air defence equipment that was not controlled by government forces and which could have reached the respective airspace in UKDV FIR above Flight Level 250 was identified, when and by which authority? This includes social media posts about a BUK missile system being seen.

CQ3 — What weapon was used in the attack on a Ukraine An-26 military transport aircraft that occurred on 14 July? What knowledge of this weapon did the authorities responsible for security risk analysis have prior to the downing of the Flight MH17?

CQ4 — What authority or authorities knew prior to the downing of Flight MH17 about the threat information contained in the 150,000 intercepted telephone conversations mentioned on 28 September 2016, during the Joint Investigative Team (JIT) presentation of the first results of the Flight MH17 criminal investigation, namely the exchange in the morning of 17 July 2014 between Dubinskiy, Semenov, Kharchenko and Pulatov about [the] presence in eastern Ukraine of Buk-M?

CQ5 — What authority or authorities knew prior to the downing of Flight MH17 about the threat information described by Vitaly Nayda, the head of counterintelligence for the Ukrainian State Security Service, on 19 July 2014 at a news conference in Kiev, that the first information "*hinting*" at a Buk launcher in the possession of the armed non-state forces was received on 14 July? Did State Aviation Administration of Ukraine know prior to the downing of Flight MH17 about this information?

CQ6 — Apart from what is referred to in CQ1, CQ3, CQ4 and CQ5, what other threat information about the presence in eastern Ukraine of air defence equipment that was not controlled by government forces and which could have reached the respective airspace in UKDV FIR above Flight Level 250 was identified, when and by which authority prior to the downing of Flight MH17?

CQ7 — What intent to attack aircraft in eastern Ukraine with air defence equipment that was not controlled by government forces and which could have reached the respective airspace in UKDV FIR above Flight Level 250 was identified, when and by which authority prior to the downing of Flight MH17?

CQ8 — What threat information about the presence of air defence equipment in eastern Ukraine that was not controlled by government forces and which could have reached the respective airspace in UKDV FIR above Flight Level 250 was known and how did it become known by the State Aviation Administration of Ukraine prior to the downing of Flight MH17? How was the associated security risk assessed and what airspace management decision was taken?

CQ9 — What risk factors for unintentional attack became known by the State Aviation Administration of Ukraine prior to the downing of Flight MH17 and how did this information affect their security risk assessment?

CQ10 — The Netherland DSB investigation report notes that, "*After an emergency beacon was activated at around 1320, indicating that flight MH17 had crashed, UkSATSE made the decision at 1500, at the tactical level, to also restrict the airspace above FL 320.*" It could be deduced that UkSATSE was responsible for threat and risk analysis, but the responses received notes that "*the State Aviation Administration of Ukraine constantly conducts a general assessment of threats to civil aviation security.*" In that respect, which authority was responsible prior to the

downing of Flight MH17 for the threat and risk analysis and assessment?

6.6. Inquiry into Russian Federation Standard Procedures and Threat Knowledge

For the purpose of information collection and in a manner similar to the approach with Ukraine, the Russian Federation government was approached with the information collection template.

The Russian Federation responded with a letter with responses to the questionnaire. The responses from the Russian Federation as received are included in Appendix B. Hereafter, we provide a question-by-question discussion on the received responses. The following discussion on the received responses is based on analysis of the responses provided in Russian and on the unofficial translation in English.

Q1 — Social media threat watch

The response highlights, and basically repeats ICAO guidance and notes some documentation but does not directly answer the question. The referenced ICAO documents are manuals that in the ICAO nomenclature of documents contain guidance material, which is advisory in nature. This study is not a normative analysis of compliance but, as some of the references used in the answers from the Russian Federation are ICAO documents, we have used content from these documents as a context in our discussion of the responses.

ICAO Doc 9554, Manual Concerning Safety Measures Relating to Military Activities Potentially Hazardous to Civil Aircraft Operations and Guidance on Civil/Military Cooperation in Air Traffic Management, deals with safety measures relating to military activities potentially hazardous to civil aircraft operations. Its focus is on coordination between military authorities and ATS authorities and units, identification of civil aircraft, warnings and navigational assistance and air traffic restrictions. One part in the document deals with special measures in the event of armed conflicts or the potential of armed conflicts. It includes a provision that "*the responsibility for instituting special measures to ensure the safety of international civil aircraft operations remains with the States responsible for providing air traffic services in the airspace affected by the conflict, even in cases where co-ordination is not initiated or completed.*" The reference is to "*airspace affected by the conflict*" and not only restricted to the airspace above the conflict. Although the "*responsibility for initiating the co-ordination process rests with the States whose military forces are engaged in the conflict*" it is clearly outlined that action should be taken "*…even in cases where co-ordination is not initiated or completed.*" The fact that the Russian Federation issued NOTAMs restricting Russian Federation airspace referenced ongoing conflict in the neighbouring state is an indication that a threat originating from neighbouring state territory was identified.

ICAO Doc 9554 further provides that, "*Based on the information which is available, the State responsible for providing air traffic services should identify the geographical area of the conflict, assess the hazards or potential hazards 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.*" This text is used verbatim from the Russian Federation response to the question.

It is clear that the State affected by the conflict should use the information that it is available. However, there is no information provided in the answer regarding if and what social media civil aviation threat information about the presence of air defence equipment or intent to attack was identified by which authority. Also, no information was provided in the answer about if, in general, information in social media is used as a trigger for security threat analysis, which authority is responsible for it and how the process works. In terms of responsible authority, the answer only provides that these are "[c]*ompetent authorities that exchange information related to aviation security*."

Q2 — Public and private sources threat watch

The response highlights ICAO guidance. Information was provided by the Russian Ministry of Foreign Affairs, noting that information about the presence of air defence systems in the region should have been provided by the competent authorities of Ukraine on whose territory an armed conflict took place. It was stated as a response to Q2 that there were threats to civil aviation safety in the Rostov-on-Don FIR that originated from "*hazardous activities in the area of responsibility of the adjacent Dnepropetrovsk FIR.*"

The sources of the threat information used by Rosaviatsiya, the Federal Air Transport Agency "*when taking a decision to issue NOTAMs V6158/14 and A2681/14 on 16 July, 2014*" are identified by the answers as "*information provided by the Russian Ministry of Foreign Affairs, according to which it was possible to conclude that the rules for the use of airspace of the Russian Federation had been violated.*" Three specific statements of the Ministry of Foreign Affairs of the Russian Federation were identified in the response as sources — statement No. 1570 of 28 June 2014, statement No. 1678 of 10 July 2014 and statement No.1688 of 13 July 2014. When examining the content of the referenced statements, it was observed that the threats described in the statements were about low altitude artillery and high explosive shell shootings. However, the restrictions introduced by the Russian Federation were up to FL 320, not commensurate to the referenced low altitude threat.

There is also no information provided in the answer about which authority is responsible for the public and private sources threat watch and how the process works. In terms of responsible authority, the answer only provides that these are "[c]*ompetent authorities that exchange information related to aviation security*."

Q3 — Other actors' information threat watch

The information provided yields little about the actual process, but states clearly that airlines, ANSPs, and adjacent States have no role in the production of information. It was reported that Rosaviatsiya produces information based on receiving information on military activity hazardous to flight safety.

It was stated that Rosaviatsiya promulgated restriction while "*Airlines, military or other organizations were not involved in the issuance of NOTAMs V6158/14 and A2681/14*." This does not correspond to provisions in the referenced ICAO Doc 9554, which says, "*If the necessary information is not forthcoming from the States whose military authorities are engaged in the armed conflict, the State responsible for providing air traffic services should ascertain the nature and scope of the hazards or potential hazards from other sources, such as aircraft operators, the International Air Transport Association (IATA) and the International Federation of Air Line Pilots' Associations (IFALPA), adjacent States or in some cases the relevant ICAO regional office*."

Q4 — Adjacent airspace threat analysis

The Federal State Unitary Enterprise "State Air Traffic Management Corporation of the Russian Federation" manages the process, and there are several documents driving the process for routine review and analysis of NOTAMs. The rules are reported to be contained in the document "Organization of Planning the Use of Airspace of the Russian Federation." The answer highlighted again that the only threats identified "*to air traffic safety in the Rostov-on-Don FIR originated from hazardous activities in the area of responsibility of the adjacent FIR of Dnepropetrovsk.*" The reason for restricting the Russian airspace with NOTAMs V6158/14 and A2681/14 was "[b]*ased on the available reliable information*." There are no further explanations about what this "*reliable information*" was, but there is a reference to the statements from Russian Federation Ministry of Foreign Affairs that were quoted above in the answer to Q2.

Q5 — Threat analysis: Verifying the information

The response notes that there is no reason to doubt the information coming from the Russian Ministry of Foreign Affairs.

Rosaviatsiya was identified in the response as the responsible authority for threat information verification and for deciding on the source credibility.

There is an important addition to the already quoted statements of the Ministry of Foreign Affairs. The addition points to the actual decision-making process to restrict the airspace, namely, "*The initiative to issue NOTAMs V6158/14 and A2681/14 concerning the Rostov-on-Don FIR came on July 12, 2014 from the Rosaviatsiya Southern Interregional Territorial Administration (responsible for the Rostov-on-Don FIR) due to the aggravated situation in the areas bordering on Ukraine, the use of various types of weapons by the Ukrainian armed forces*."

Q6 — Threat analysis: Risk factors for unintentional attack

The response highlights that "[a]*ll possible risk factors for an unintended attack should be considered*" and that "[s]*uch preparations should include an assessment of the risk to civil aircraft operations due to a military conflict or incidents of unlawful interference with civil aviation*."

The response does not provide information about which authority in the Russian Federation is responsible for determining the risk factors for unintentional attack for the (adjacent to the conflict zone) airspace that is affected by the conflict. Instead, the response states that this should be "[t]*he state responsible for compliance with the rules for the introduction of restrictions on the use of airspace over an armed conflict zone (Ukraine, in relation to the MH17 crash).*"

The response notes that adherence by Ukraine to ICAO rules in force at the time of the crash "*would have allowed the aviation authorities of Ukraine to come to a decision on the need to stop civil aviation flights over the conflict zone and avoid the crash of flight MH17.*"

Further, the response notes that "[i]*nformation, including the official one, about the presence of a certain type of weapons in the conflict zone, as well as incidents with the use of these weapons, should have been considered sufficient by Ukraine to make decisions.*" This implies that there was available and "*sufficient*" threat information for Ukraine to make a decision "*on the need to stop civil aviation flights over the conflict zone and avoid the crash of flight MH17.*" A question arises about whether such information was known by the Russian Federation. This was raised in the set of clarifying questions submitted after the analysis of the questionnaire responses and described later in this report. Clarifying questions were asked about knowledge of both capability and intent to attack.

Q7 — Risk analysis: Coordination and analysis of acceptable security risk levels

Much like the answer to Q6, the response notes that the "*responsibility for initiating the coordination process lies with the State on whose territory an armed conflict is taking place*." Further, information is provided again about the reasons for airspace restriction: "*NOTAMs V6158/14 and*

A2681/14 with restrictions on the use of the airspace of the Rostov-on-Don FIR were issued due to the hostilities on the territory of Ukraine near the state border with the Russian Federation, as well as the shelling of Russian territory from the territory of Ukraine."

Q8 — Risk analysis: Potential consequences

The response refers to ICAO documents and notes that Rosaviatsiya used information from the Russian Foreign Ministry to develop the NOTAM "[d]*ue to the hostilities ongoing on the territory of Ukraine near the state border with the Russian Federation.*"

There is no actual response as to the "*process*" used or as to the responsible authorities.

Q9 — Risk analysis: Risk methodology

The response notes that it is not known what process Ukraine used, further accentuating its position to point to Ukraine for many parts of the airspace security risk assessment process without considering the role of the adjacent states with airspace affected by the conflict. There are notes that information can be found in the answers to question Q7 and Q8.

Q10 — Risk analysis: Risk mitigations

The response repeats reference to ICAO and notes that information can be found in the answers to question Q5 and Q12.

Q11 — Decision-making: Normal times decision-making

The response notes the presence of several documents that should contain the information requested including, but not limited to, "*Organization of Planning the Use of Airspace of the Russian Federation.*" Some high-level information is provided regarding the general process for "*organisation of the use of airspace.*"

As responsible authorities, the response names Rosaviatsiya and Federal State Unitary Enterprise "State Air Traffic Management Corporation of the Russian Federation." Additionally, "*A user of airspace whose activity poses a threat to the safety of airspace use*" is also identified with the responsible authorities.

Q12 — Decision-making: Conflict zone decision-making

The response again drives responsibility to Ukraine, noting that there were no armed conflicts in the Rostov-on-Don Flight Information Region (FIR). It was stated that the conflict zone decision-making process "*has no differences from the one specified in the answer to question Q11.*"

The threat from the proximate conflict zone was again established as a legitimate reason to close the airspace: "*the imposition of restrictions … was motivated by the reaction to hazardous activities for flights in the neighboring State.*" Further, it is stated that the "*initiative to issue NOTAMs V6158/14 and A2681/14 related to the Rostov-on-Don FIR came from the Southern Interregional Territorial Administration of Rosaviation on July 12, 2014, due to the aggravated situation in the border areas with Ukraine, the use of various types of weapons by the Ukrainian armed forces (statements of the Ministry of Foreign Affairs of Russia No. 1570 dated June 28, 2014, No. 1678 dated July 10, 2014, No. 1688 dated July 13, 2014).*"

Based on the analysis of the response, it was decided to ask a clarifying question seeking information on the precise threat that required airspace restriction over the territory of the Russian Federation up to FL 320 but not above.

The consideration for the clarifying question is based on the references to the statements (1570-28-06-2014, 1678-10-07-2014 and 1688-13-07-2014) of the Ministry of Foreign Affairs of the Russian Federations that refer to low-altitude artillery shootings.

Q13 — Decision-making: Adjacent FIR coordination

The response notes the area of flight information in which the armed conflict was taking place was not in the Russian Federation. Therefore, it reiterates the position that Russia had no responsibility for "*safe passage*" through an FIR outside its jurisdiction. There is a long argument about the Ukrainian restriction of airspace above FL 320 while reserving the airspace underneath for military aviation operations. The argument provided by the Russian Federation is that FL 320 and FL 330 are separated by 1,000 ft, which in reduced vertical separation airspace (RVSM) is not sufficient vertical separation between non-RVSM and RVSM-equipped and certified aircraft. This argument is not related to the subject and the scope of this study.

Q14 — Promulgation: Publish or not, and how

The response repeats the reference to various documents and answers in Q11 and Q12.

Responsible authorities are identified as:

- Federal Air Transport Agency (Rosaviatsiya);
- Federal State Unitary Enterprise "State Air Traffic Management Corporation of the Russian Federation"; and,
- Federal State Unitary Enterprise "Aeronautical Information Centre" Airspace user, whose activities create a hazard to the safe use of airspace.

Q15 — Promulgation: Verify and validate

The response notes that information is contained in various referenced documents. In terms of verification and validation, it was only stated that "*after receiving raw*

aeronautical data and raw aeronautical information, the aeronautical information authority shall verify, register and process them" and that "[i]f the raw aeronautical data and raw aeronautical information do not meet the requirements, the aeronautical information authority shall send them back to the providers (compilators) of raw aeronautical data and raw aeronautical information for refinement."

Q16 — Promulgation: Special advisories and threat information

The response references ICAO guidance and other documentation and notes the process for producing NOTAMs. It mentions that the Russian aircraft operators are responsible for collecting and disseminating information.

Following the analysis of the information received from the Russian Federation, we concluded that there are a number of questions that remain open. However, to respect the timeline of our inquiry, we decided to concentrate only on some CQs. The CQs were formulated and subsequently communicated to the Russian Federation.

The Russian Federation replied with a letter containing responses to the clarifying questions. The responses from the Russian Federation as received are included in Appendix C. Hereafter, we provide a question-by-question discussion of the received responses. The discussion is based on analysis of the responses provided in Russian and on the unofficial translation in English.

CQ1 — What threat information about the presence of air defence equipment in eastern Ukraine that was not controlled by government forces and which could have reached the respective airspace in URVV FIR above Flight Level 250 was identified, when and by which authority?

The response clearly answers that "*Russian authorities did not have any information regarding the presence of air defence equipment on the territory of Ukraine that was not controlled by the armed forces of the Ministry of Defence of Ukraine and which could hit targets in the Rostov-on-Don FIR above FL 250.*"

The response also notes that "*Rosaviatsiya identified a threat to flight safety itself due to Ukraine's regular shooting of the Russian border areas.*"

Additionally, the response provides that "*it is incorrect to focus only on threats posed exclusively by air defence systems capable of hitting targets at high altitudes.*" However, security risk for civil aviation at low altitude is outside the scope of this inquiry.

The response also provides discussion, in the same manner as the answers to the questionnaire mentioned earlier, that the way the buffer zone for protecting the military operations has been defined by Ukraine would, in accordance with the relevant Ukrainian provisions for RVSM airspace, require 600 m (2,000 ft) separation between the upper limit of the reserved airspace and aircraft above it. However, this issue is outside the scope of the present inquiry. Moreover, air defence equipment that can reach FL 330 would be reasonably expected to be able to reach FL 340 as well.

CQ2 — What intent to attack with air defence equipment in eastern Ukraine that was not controlled by government forces and which could have reached the respective airspace in URVV FIR above Flight Level 250 was identified, when and by which authority?

The response says, "*When taking a decision to issue NOTAM V6158/14, the Russian airspace authorities did not have information that governmental or non-governmental entities on the territory of Ukraine deployed air defence equipment capable of downing aircraft at high altitudes in the conflict zone and could use it in the armed conflict by mistake or negligence.*"

The answer does not respond to the question about known intent but provides an answer to another question — about knowledge of air defence equipment deployment.

What can also be seen in the answer is that it is not referring to the defined time period in the request to the Russian Federation, namely "*for the period of 1 March 2014 and up to and including the moment of complete closure of the airspace subsequent to the downing of MH17.*" Instead, the answer restricts the referenced time to "[w]*hen taking a decision to issue NOTAM V6158/14.*" That NOTAM was issued on 16 July 2014 and it is not known when exactly the decision to issue it was taken.

Additionally, the question asks about knowledge of any authority and the answer refers only to "*the Russian airspace authorities.*"

In summary, it can be concluded that the question about Russian authorities' knowledge of intent to attack was not answered.

CQ3 — What were the specific reasons for restricting the airspace with NOTAM V6158/14, why were there several restrictions in one NOTAM, and to which of the restrictions in the NOTAM apply the items F) and G), specifying surface as lower height limit and FL 530 as upper height limit?

As a reason for airspace closure, the response references the Russian Ministry of Foreign Affairs "*information concerning the risks to people and objects on the territory of the Russian Federation.*" This information as provided in the answers to the other questions is on the basis of some statements from the Russian Ministry of Foreign Affairs, where the threat is identified as low-level artillery shootings. For the specific reason to close the airspace, the answer refers again to the reasons provided in NOTAM V6158/14: "*Due to combat actions on the territory of the Ukraine near the state border with the Russian Federation*

and the facts of firing from the territory of the Ukraine towards the territory of the Russian Federation."

In respect to the altitude restrictions in NOTAM V6158/14, the response provides that the relevant airway restriction for Flight MH17's planned trajectory was from ground surface to FL 320 as provided in item E) of the NOTAM. The response answers that the information in the NOTAM items Q), F) and G) for restriction from ground to FL 530 Is "*concerning the use of the arrival/exit routes to and from the Rostov-on-Don airport*" that are not related to Flight MH17's planned trajectory. The Russian language version of the answer provides explanation about the upper limit of FL 530 as the maximum available Flight Level as per the Russian Federation Aeronautical Information Publication (AIP).

CQ4 — NOTAM V6158/14 promulgated, among other things, a restriction with an upper height limit of FL 320, referring to "*the facts of firing from the territory of the Ukraine towards the territory of Russian Federation.*" What was the precise threat that required airspace restriction over the territory of the Russian Federation up to FL 320 but not above, considering that in the references you provided the statements (1570-28-06-2014, 1678-10-07-2014 and 1688-13-07-2014) of the Ministry of Foreign Affairs of the Russian Federations refer to low-altitude artillery shootings?

The answer highlights that the Ukrainian NOTAMs used to restrict the airspace did not provide the reason for it.

The answer highlights some instances of GPS signal jamming over eastern Ukraine, reported by "*Russian air companies*" and reported airspace violations.

The answer points again to the Russian Ministry of Foreign Affairs statements about low-level threats as a reason for airspace closure.

The answer explained the selection of FL 320 as an upper limit to the airspace restriction, "*same as in the Ukrainian NOTAMs A1492/14 and A1493/14,*" because "*Rosaviatsiya did not have any other, more or less credible information provided by the Ukrainian side, which would allow [it] to forecast the vertical limit of the hazard zone for civil aviation flights.*"

7. Discussion on Ukraine and Russian Federation Threat Awareness

7.1. Discussion Framework

This section discusses the Foundation's observations regarding Ukraine and Russian Federation threat awareness prior to the downing of Flight MH17. The threat was associated with the presence of air defence equipment in eastern Ukraine that could reach civil aircraft operating above the airspace that was closed to them. Discussion of the publicly available information about the capability to attack which could have contributed to threat awareness for the relevant authorities is related mainly to quadrants 1 and 2 from Figure 18 and discussion regarding what relevant Ukrainian and Russian Federation authorities knew about the threat **is related to quadrants 3 and 4.**

One important part of our inquiry was identifying when information about the threat reached:

- Those responsible for analysing security risk levels in civil aviation airspace over a conflict zone, and
- Those establishing restrictions of airspace in a conflict zone.

This is illustrated in Figure 20, where the respective stages from the Foundation's Integrated Standard for Airspace Security Risk Assessment are outlined.

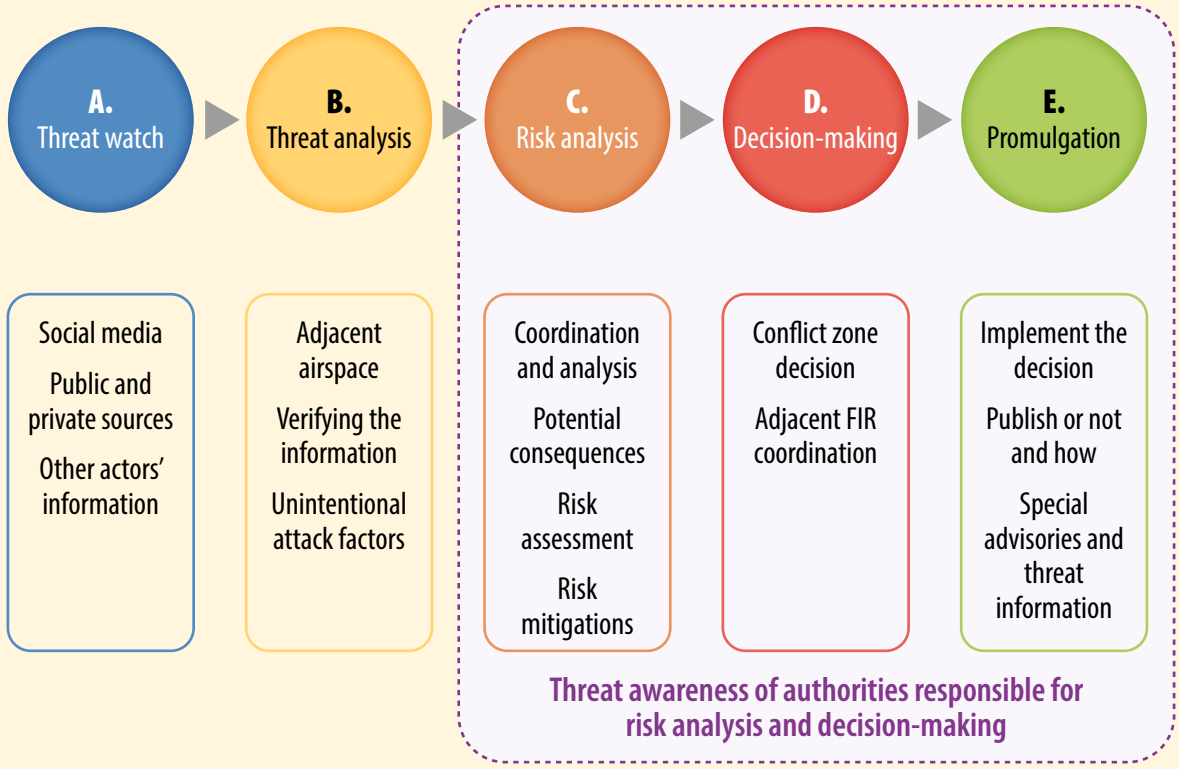
Threat information reaching the Risk Analysis and Decision-Making steps (C and D) in the process is the Foundation's criterion for threat awareness at the level of the statewide process. Using this criterion, unverified social media posts, other media reports or the potential presence of information in intercepted but unprocessed communications do not represent sufficient facts for realistic threat awareness. This is because verified threat awareness is not available to those responsible for risk analysis and decision-making.

7.2. Risk Analysis and Decision-Making Responsibilities

To use the criterion for threat awareness at the level of the statewide process in a reliable manner, it is necessary to identify which authorities are responsible for assessing security risk levels in civil aviation airspace and which are responsible for establishing restrictions or segregations of airspace in a conflict zone.

With respect to Ukraine, UkSATSE and SASU, as stated in the DSB Investigation report section 6.1, are responsible for airspace management at the tactical, pre-tactical and strategic levels. As noted in 6.2 of the DSB report — the process for threat analysis and coordination for

Figure 20
Criterion for Threat Awareness



the airspace below FL 260 involved discussion between Ukrainian military authorities and UkSATSE about the accidents involving military aeroplanes being shot down and a request on 5 June 2014 from the military authorities "*…to restrict civil aviation's use of the airspace below FL260 to protect military aircraft from these attacks and to be able to give priority to air force operations…*."

In summary, the overall process as described in the DSB report was "*…that the Ukrainian Air Force submitted the request to UkSATSE for further processing of the temporary airspace restriction below FL260. UkSATSE processed this request and sent it to the military authorities for verification. Once the General Staff agreed to the details, it sent the request to the Ukrainian aviation authority, SASU.*"

It is important to note that the process referenced in the DSB report did not describe any analysis of the threat to civil aviation but instead considered the military authorities' analysis of the threat to military aviation. "*…[T]hose responsible at UkSATSE stated that they had no influence on the decision to restrict the use of airspace*," the report said.

In the responses Ukraine provided to the standard procedure and decision-making questionnaire, SASU was clearly identified as the authority that "*constantly conducts a general assessment of threats to civil aviation security on the basis of information received from the Security Service of Ukraine; Ministry of Defence of Ukraine; Ministry of Internal Affairs of Ukraine; Foreign Intelligence Service of Ukraine; airport operators; aircraft operators; air navigation service providers; and other sources, social media included.*"

From the statement in the DSB report that "*[a]fter an emergency beacon was activated at around 13.20, indicating that flight MH17 had crashed, UkSATSE made the decision at 15.00, at the tactical level, to also restrict the airspace above FL320.*" It could be deduced that UkSATSE was among the authorities responsible for the airspace closure decision-making related to civil aircraft security risk. This was confirmed[91] through answers to our directed questions — "*Prohibitions or restrictions on the use of airspace are established by the State Aviation Administration of Ukraine or the authorities involved in the Joint Civil-Military System at the request of the competent authorities and users of airspace.*"

Additionally, the DSB report said that "*UkSATSE has the mandate to close or restrict parts of the airspace for brief periods of time at the tactical level. Airspace closures and restrictions at the strategic or pre-tactical levels are coordinated by Ukraerocenter and the State Aviation Administration (SASU) in close cooperation with the General Staff of the Armed Forces. SASU exercises decisive authority with regard to airspace closures.*"

With respect to the Russian Federation, the risk analysis and decision-making authorities have been identified from the responses received to the standard procedure and decision-making questionnaire. No answer was provided relative to the responsible authorities for risk analysis.

For the security of airspace decision processes in the Russian Federation, including establishing restriction or segregation of airspace in a conflict zone, the identified authorities are:

- The Federal Agency for Air Transport (Rosaviatsiya). Rosaviatsiya is the Russian government agency responsible for overseeing the civil aviation industry in Russia. It is also called the Russian Federation Civil Aviation Administration.
- Federal State Unitary Enterprise "*State Air Traffic Management Corporation of the Russian Federation.*"
- As reported in the response: "*A user of airspace whose activity poses a threat to the safety of airspace use.*"

7.3. Risk Assessment

As part of a systemic assessment of threat awareness, the intent of this analysis is to understand if it was theoretically possible for the risk to commercial aviation to be assessed in the specific circumstances leading up to the downing of Flight MH17.

Threat, as per the Foundation methodology, is composed of four distinct factors (that collectively may give rise to threat to civil aviation): capability, intent, possibility for an unintentional attack and the conflict parties' command and control. Capability includes weapon technical means and human capacity and capability to operate the technical system. Without the intent to use the capability, there is no threat unless the use of the capability is accidental. Whilst the use of a weapon system can be deliberate at the operator level, this may be contrary to the true intent at a political-military strategic level.

It is key to note that the continuous assessment of the security risk for civil aviation defined in the Foundation's Integrated Standard for Airspace Security Risk Assessment uses as inputs information about the four distinct factors of the threat and not only information about capability to attack. Indeed, one may not have information about capability to attack but all the other factors may combine in a way that increases the assessed risk levels to close to critical. In other words, a state may not be aware of a capability to attack and still can perform a meaningful risk analysis.

It follows also that awareness of a capability is not sufficient in itself to fully inform a judgment about the risk of an attack. Without indications of intent, such as unconstrained hostilities (e.g. war) or political statements, any judgment of risk must consider other factors, including whether the capability is under suitable control.

[91] Considering that the DSB report identified Integrated Civil-Military ATM System of Ukraine "*… as part of the UkSATSE air traffic control service*"

Lack of suitable control would be a significant aggravating factor and, similarly, poor operator training would arguably increase the risk of a possibility of unintentional attack. The question then arises as to how a controlling authority could come to a valid conclusion on risk without access to sophisticated and timely intelligence.

To understand the risk, Table 6 (p. 83) provides an overview of the indicators of likelihood of attack for the airspace of Ukraine and the Russian Federation in the same format the other conflict zones were investigated. This presentation can also allow those interested to compare the different assessments.

There are some important caveats to be introduced here.

Two assessments were made — one with hindsight knowledge and one with foresight knowledge.

The assessment made with hindsight knowledge is a reflection after the fact, in which the results of how the situation evolved are known and many of the associated factors have surfaced over time. This is not the same as the situation seen in foresight from the perspective of a reasonable person that:

- Detects many weak signals that are shaping countless possibilities on how the situation may evolve in the future, and
- Needs to make a decision under pressure of time and with limited information.

Another caveat relates to the Foundation's use of a contemporary risk assessment methodology and algorithms that were not available at the time. The hindsight caveat is the most crucial. Because the hindsight analysis was performed after the event, it relies on the view of a knowledgeable person who possessed all the information. However, much of the most relevant information only became available after the downing of Flight MH17, and that knowledge would at the time have been distributed amongst several authorities. For example, because it is now known that Flight MH17 was downed by a missile, the capability to attack clearly existed at the time whether this was known to the authorities or not.

The hindsight assessment describes the risk that would have been assessed had all the information detection, processing and coordination functioned perfectly. This understanding will allow the reader to assess the now exposed gaps against an ideally functioning process.

With this hindsight in mind, the situation in each airspace (Ukrainian and Russian Federation) was reviewed relative to the set of 10 pre-determined "*indicators of likelihood of attack*."

In the specific case of the Russian Federation assessment, apart from the risk factors in the adjacent Ukrainian airspace, the physical proximity and the range of the threat indicates that the conflict zone was close enough to affect Russian Federation airspace.

In the Foundation algorithm, the capability to attack by at least one party is used as the primary indicator of likelihood of attack, because the presence of an air defence system that can target aircraft above FL 250 is the key enabling risk factor. As mentioned above, it is considered that long-range SAMs capable of hitting an aircraft at cruising level were present

The next indicator of likelihood of attack relates to civil aircraft operations over or close to a conflict zone at high altitude; based on the information provided in the DSB investigation report, it is accepted that there was substantial traffic volume, including international overflights.

Another key indicator of likelihood of attack in the algorithm sequence involves known intent to attack. It is clear from reviewing publicly available information that armed non-state forces operating in eastern Ukraine had the motivation and intent to target Ukrainian military aircraft operating in the region. Those forces also repeatedly demonstrated their capability to successfully attack helicopters and low-flying fixed-wing military aircraft with an assortment of weapons, including MANPADS and other anti-aircraft defence systems. There were no known attacks on civilian aircraft in the region and no publicly available information about intent to attack civil aviation.

The next indicator of likelihood of attack involves military aviation activities, and more specifically, the fact that military aviation was being operated by Ukrainian government forces and there was more than occasional use of military aircraft to transport ground troops or military equipment.

There was a widely reported conflict between a state (Ukraine) and armed non-state forces. The armed conflict involved medium to large scale military activities and heightened political tension.

The risk assessment algorithm subsequently examines the risk factors for unintentional attack. The studied situation shown in Table 6, apart from the already mentioned indicators, assesses SAM operators' experience and the chain of command and capability to differentiate between civil and military aircraft. When in the algorithm we assess the scenario of an unintentional attack, and considering that the attack actually took place, these factors with hindsight are assessed to be to be low level of control and marginal capability to differentiate between civil and military aircraft.

Finally, it seems unlikely that there were large or medium scale military air combat activities above FL 250 in the airspace above eastern Ukraine.

In the hindsight assessment, the analysed set of risk factors for unintentional attack, in their aggregation, point to a very high likelihood for unintentional attack and high risk at high altitudes without airspace restriction. This resultant risk is illustrated in the Table 6 column "Overall indication of likelihood of attack above FL 320" in the sub-column "Without airspace restrictions."

Table 6
Overview of the Conflict Zone Hindsight and Foresight Analyses

		No information		Command and control factors									
		High likelihood indication			Risk factors for an unintentional attack								
		Medium likelihood indication							Capability to attack				
		Low likelihood indication										Intent to attack	
		Overall indication of likelihood of attack above FL 320		A. Parties	B. Armed conflict scale and/or tensions	H. SAM operators' experience and chain of command	C. Military air transport activities	J. Civil aircraft operations (with airspace restrictions)	D. Military air combat activities	G. Capability to differentiate between civil and military aircraft	F. Capability to attack by at least one party	E. Known attacks	I. Known intent to attack (civil a/c)
	Airspace Restrictions above FL 320	With actual airspace restrictions	Without airspace restrictions										
Hindsight Assessment													
Assessment of the likelihood of attack in eastern Ukraine airspace	No restrictions												
Assessment of the likelihood of attack in Russian Federation airspace	No restrictions												
Foresight Assessment with low indication of capability to attack													
Assessment of the likelihood of attack in eastern Ukraine airspace	No restrictions												
Assessment of the likelihood of attack in Russian Federation airspace	No restrictions												
Foresight Assessment with medium indication of capability to attack													
Assessment of the likelihood of attack in eastern Ukraine airspace	No restrictions												
Assessment of the likelihood of attack in Russian Federation airspace	No restrictions												
Foresight Assessment with medium indication of capability to attack													
Assessment of the likelihood of attack in eastern Ukraine airspace	No restrictions												
Assessment of the likelihood of attack in Russian Federation airspace	No restrictions												

In the assessment scenario that includes the actual airspace restrictions, the aggregated likelihood for unintentional attack is still very high and the overall likelihood of attack is high because the actual airspace restrictions are up to FL 320 and the overflying aircraft are still exposed to the threat. This resultant risk is illustrated in the Table 6 column "Overall indication of likelihood of attack above FL 320" in the sub-column "With actual airspace restrictions."

Knowing that Flight MH17 was downed, in hindsight, it is no surprise that the risk assessment algorithms concluded that the likelihood of attack was high and there was a need for Ukrainian and Russian Federation authorities to close the airspace.

Therefore, the Foundation performed a second assessment — a foresight assessment — from the perspective of the reasonably available information prior to the downing of Flight MH17. The indicators about SAM operators' experience and the chain of command and capability to differentiate between civil and military aircraft are assessed to be to be low level of control and marginal capability to differentiate between civil and military aircraft. As described in the analysis of conflict zones during the 1990–2014 period, even without the hindsight knowledge of the attack, and to be conservative in the risk assessment, we could consider the indicator to be associated with irregular forces that do not have an organised specific reporting channel, a protocol for authorising SAM attack or a capability to differentiate between civil and military aircraft as regular military forces would have.

The main difference from the already described assessment with hindsight knowledge using the set of 10 pre-determined "*indicators of likelihood of attack*" is the information available about the capability to attack civil aviation above FL 320.

As shown in Table 6, the aggregated risk factors for an unintentional attack and command and control factors (that are the same for the hindsight and for the foresight assessments) are almost at the maximum possible level. In such a situation, the assessed risk is therefore extremely sensitive to any information about capability to attack.

In such a situation, following the Foundation's methodology, the indicator of capability to attack should not be considered as a binary choice of "*present*" or "*not present.*" Instead, the indicator of capability to attack should be considered as a likelihood range. If the capability to attack indicator is assessed as low, then the overall risk would be also low. But if the indicator of capability to attack is assessed as medium or high, then (considering that almost all the other factors are high) the resultant overall likelihood of attack will also be high — see Table 6. This makes the discussion about threat awareness very crucial for understanding the risk management.

In summary, the Foundation finds that in a situation in which risk is highly dependent on an uncertain factor such as capability to attack, the risk assessment should take the side of caution when there is information about capability to attack that is not necessarily certain and validated but that is characterised to be above a pre-defined threshold level of certainty — e.g. unverified intelligence reports.

7.4. Ukraine Awareness of Threat to Civil Aircraft

The discussion on the threat awareness is twofold — a discussion on reported threat awareness (concerning Quadrants 3 and 4 in Figure 18) and a discussion on the potential threat awareness (concerning Quadrants 1 and 2 in Figure 18).

The discussion on the reported threat awareness is about what authorities said they knew about the threat at an altitude above FL 320. We studied what authorities said in public (both before and after the downing of Flight MH17) and their responses to our questionnaires. This discussion is different from what information was available in the public and private space about a threat (social media, other publications and intelligence).

The Foundation's research did not find any instances *before* (quadrant 3 in Figure 18) the downing of Flight MH17 in which Ukrainian authorities publicly acknowledged the presence in eastern Ukraine of air defence systems capable of reaching an altitude greater than FL 320.

The Foundation identified from information made publicly known **after** (quadrant 4 in Figure 18) the downing of Flight MH17 that some Ukrainian authorities (counterintelligence services) suspected the presence of air defence equipment that could reach high altitudes — "*first information 'hinting' at a Buk launcher in the possession of the non-state forces was received on 14 July and came from counterintelligence units.*"[92] This information corresponds to Group A from the Foundation Standard, namely threat watch as shown in Figure 20.

However, no facts were found that this information had been verified per the functions in Group B from the Foundation Standard — "*But we could not confirm directly that it was Buk missile launcher that trespassed illegally [in] Ukrainian territory.*"[93] Similarly, no facts were found by the Foundation that the information was disseminated through the statewide process to reach the authorities responsible for risk assessment and decision-making regarding airspace closure.

Finding 6: This inquiry did not find sufficient facts that Ukrainian authorities responsible for analysing security risk levels in civil aviation airspace and those

[92] https://www.youtube.com/watch?v=PWtH8AA42Fc&feature=share

[93] https://www.youtube.com/watch?v=PWtH8AA42Fc&feature=share

establishing restriction of airspace in a conflict zone[94] were aware of a threat to civil aviation before the downing of Flight MH17.

The discussion on the potential threat awareness is about what information existed in the public and private space about a weapon. This discussion is not about the reported threat awareness of relevant authorities (already discussed previously).

It is clear from publicly available information that the conflict in eastern Ukraine was in an active combat phase in the weeks prior to the downing of Flight MH17.

Both the Ukrainian military and armed non-state forces were using small arms, heavy calibre machine guns, artillery, anti-tank weapons, tanks, and various air defence systems. In addition, Ukraine was employing rotary- and fixed-wing aircraft for transport and attack purposes; Ukraine alleged that Russian aircraft also had been used to attack Ukraine aircraft. Ukraine apparently had some success attacking non-state ground forces with aircraft and also suffered a number of aircraft losses.

There was a widespread belief among Ukraine and Western states that the Russian Federation was supplying weapons, including heavy weapons, and personnel to support armed non-state forces in the conflict area. But as the DSB report stated, "*despite the Western political and military focus on the conflict, its escalation and its air component, none of the politicians or authorities quoted publicly made a connection between the military developments in the eastern part of Ukraine and risks to civil aviation.*"

There were numerous reports about the presence of heavy weapons in the region, such as tanks, MANPADS, artillery and large calibre machine guns. However, there were relatively few reports in the public space about armed non-state forces possessing weapons with a capability to attack above FL 320. For example, there are conflicting accounts relating to the altitude at which a Ukrainian An-26 was flying when it was shot down on 14 July, although the aircraft was thought by some to have been brought down with a SAM system.

The most notable publicly available information about the capability to attack at high altitudes before the downing of Flight MH17 was from social media posts about Buk missile systems. Some of these posts were about the movement of Buk batteries in Russian territory bordering Ukraine and some were about Buk missile systems being observed in eastern Ukraine a few hours before the downing of Flight MH17. The Foundation acknowledges that these were just a few instances of published social media posts out of probably millions of posts from the region at that time. It should also be stressed that it is difficult to establish the veracity of published social media accounts.

In addition, the Foundation did not identify any information available in the public space that would have verified the reports about the capability to attack above FL 320 prior to the Flight MH17 attack taking place. The identified number of cases of publicly available information indicating the potential presence of capability to attack above FL 320 were occasional relative to the volume of all the publicly available information about the conflict zone at the time.

With hindsight, some facts made available after the downing of Flight MH17 pointed to the possibility for some authorities to have processed information and understood that there may have been a threat to civil aviation. Namely, these are some of the 150,000 telephone conversations[95] intercepted and the counterintelligence field information discussed previously.

However, without knowing the actual technological capabilities, preparedness and direction to process on time these intercepted telephone conversations and social media posts, it is not possible for the Foundation to conclude that the Ukrainian authorities had the means to verify the intelligence and coordinate dissemination of the information so as to form a more accurate assessment of the risk to civil aviation and to have completely closed the airspace in time to prevent the attack on Flight MH17.

Finding 7: This inquiry did not find sufficient facts that Ukrainian authorities responsible for analysing security risk levels in civil aviation airspace and those establishing restriction of airspace in a conflict zone[96] could have had a proper awareness of the high-altitude threat.

7.5. Russian Federation Awareness of Threat to Civil Aircraft

Some of the western part of the Rostov-on-Don FIR airspace of the Russian Federation was near the conflict zone in the eastern Ukraine. Because of its close proximity to the conflict zone, the airspace could have been affected by a threat to civil aviation originating from a potential presence in the conflict zone of long-range air defence equipment not controlled by government forces.

The possibility of a threat to civil aviation was acknowledged in NOTAMs (V6158/14 and A2681/14) issued by the Russian Federation that closed the airspace up to FL 320. It should be noted that an air defence equipment threat reaching FL 320 could also reach the airspace immediately above FL 320.[97]

[94] Responsible authorities are defined in detail in Section 7.2.

[95] On 28 September 2016, during the Joint Investigative Team (JIT) presentation of the first results of the Flight MH17 criminal investigation, it was revealed that more than 150,000 telephone calls were intercepted.

[96] Responsible authorities are defined in detail in Section 7.2.

[97] For example, as reported in the DSB report "*The Buk surface-to-air missile system is able to engage targets at altitudes up to 70,000 or 80,000 feet.*"

The reasons for restricting their airspace, reported by the Russian Federation in an answer to a Foundation directed question, cited statements made by the country's Ministry of Foreign Affairs prior to the downing of Flight MH17. These statements refer only to low altitude threats from artillery.

Responding to a Foundation query regarding the reason for selecting the upper limit for the airspace restriction, the Russian Federation acknowledged that the airspace was closed up to FL 320 and that this altitude limit was the same as the one indicated in the Ukrainian NOTAMs A1492/14 and A1493/14 and that "*Rosaviatsiya did not have any other, more or less credible information provided by the Ukrainian side, which would allow to forecast the vertical limit of the hazard zone for civil aviation flights.*"

In response to the Foundation's query on this matter, the Russian Federation indicated that authorities did not have any information regarding the presence of air defence equipment on the territory of Ukraine that was not controlled by the armed forces of the Ministry of Defence of Ukraine and which could strike targets in the Rostov-on-Don FIR above FL 250.

The Foundation did not obtain satisfactory clarifications from the Russian Federation about any of the Russian authorities' knowledge of intent to attack with air defence equipment that was not controlled by government forces and which could have reached the respective airspace in Rostov-on-Don FIR above FL 250 in eastern Ukraine.

The Foundation's research did not find any other instances where Russian Federation authorities publicly acknowledged before or after the downing of Flight MH17 the presence in eastern Ukraine of air defence systems capable of reaching an altitude of greater than FL 320.

Finding 8: This inquiry did not find sufficient facts that Russian Federation authorities responsible for analysing security risk levels in civil aviation airspace and those establishing restriction of airspace in a conflict zone[98] were aware of a threat to civil aviation before the downing of Flight MH17.

With regard to any Russian Federation potential threat awareness, the information identified in the public space, and already listed in the discussion about Ukraine, was also available to the Russian Federation, including the social media posts. However, it is assumed in this study that the Russian Federation did not have access to intercepted telephone conversations and intelligence information available to the Ukrainian authorities.

Another set of facts from the public information is associated with the JIT[99] that points to a request by the armed non-state forces for a Buk and to the movement of a Buk in the Russian Federation and Ukraine. The JIT reported[100]: "*After an extensive and labor-intensive comparative investigation, in which many BUK-TELARs were involved, the JIT has come to the conclusion that the BUK-TELAR that shot down flight MH17 comes from the 53rd Anti Aircraft Missile Brigade, or the 53rd Brigade from Kursk in the Russian Federation. This 53rd Brigade is a unit of the Russian armed forces.*" This JIT conclusion has been disputed and denied by the Russian Federation.

However, the purpose of the present analysis is to identify if the relevant authorities responsible for risk analysis and decision-making could have had a proper threat awareness irrespective of the origin of the of the weapon system. The Foundation did not identify sufficient facts that such threat awareness existed to relevant authorities.

Apart from the discussion on the accessibility of the information, another important aspect of the Russian Federation risk analysis and decision-making can be deduced from the Russian Federation standard procedure and decision-making protocols. In response to a Foundation inquiry relating to standard procedures and threat knowledge, the Russian Federation stated: "*Threats to air traffic safety in the Rostov-on-Don FIR stemmed from the dangerous activities in the area of responsibility of the adjacent Dnepropetrovsk FIR.*" Further, it was stated that "[a]*ll possible risk factors for an unintended attack should be considered*" and that "[s]*uch preparations should include an assessment of the risk to civil aircraft operations due to a military conflict or incidents of unlawful interference with civil aviation.*"

After acknowledging the source of the threat in the neighbouring territory and, in general the need to consider all risk factors, the Russian Federation did not acknowledge the responsibility to determine the risk factors for an unintentional attack in Russian Federation airspace originating from the close proximity to the conflict zone in the eastern Ukraine. With respect to the issue of which authorities were responsible, the response was: "*The state responsible for compliance with the rules for the introduction of restrictions on the use of airspace over an armed conflict zone (Ukraine, in relation to the MH17 crash).*"

Finding 9: This inquiry did not find sufficient facts that Russian Federation authorities responsible for analysing security risk levels in civil aviation airspace and those establishing restriction of airspace in a conflict zone[101] could have had a proper awareness of the high-altitude threat.

[98] Responsible authorities are defined in detail in Section 7.2.

[99] The JIT, comprised of representatives from the Netherlands, Australia, Malayasia, Belgium and Ukraine, is conducting a criminal investigation into the crash.

[100] https://www.prosecutionservice.nl/topics/mh17-plane-crash/criminal-investigation-jit-mh17/speakers-text-jit-mh17-press-meeting-24-5-2018

[101] Responsible authorities are defined in detail in Section 7.2.

Appendix A
Conflict zones case studies

Bosnian war 1992–1997	
Likelihood of attack indicators	
A. Parties: 1. Conflict between states. 2. Conflict between non-state armed groups and state(s) or civil wars. 3. Conflict between non-state armed groups.	**Conflict between non-state armed groups and state(s) or civil wars.** **Conflict between states.** *The conflicting parties in the Bosnian war were: Croatia, Bosnia and Herzegovina, Herzeg-Bosnia, Republika Srpska, Serbian Krajina, Western Bosnia, FR Yugoslavia.* *NATO Operation Deny Flight and Operation Deliberate Force.*
B. Armed conflict scale and/or tensions: 1. Terrorism and/or international political tension. 2. Insurgency (small-scale military activities) and/or medium increasing political tension. 3. Large-scale military activities and/or heightened international political tension.	**Large-scale military activities and/or heightened international political tension.** *There were more than 20 large military operations or battles during the war, including the siege of Sarajevo.* *On 29 August 1995 Operation Deliberate Force was launched by NATO involving 400 aircraft and over 3,515 sorties. It continued until 20 September 1995.*
C. Military air transport activities: 1. Military air transport activities not reported. 2. Occasional use of aircraft to transport ground troops or military equipment. 3. More than occasional use of aircraft to transport ground troops or military equipment by at least one party.	**More than occasional 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 airways and close to civil aircraft cruising altitudes).** *In 1992 the United Sates recognized the independence of Bosnia and Herzegovina and soon after began airlifting food and supplies from Italy.* *United Nations forces took control of the Sarajevo airport and authorized an international airlift of humanitarian supplies.* *United States launched Operation Provide Promise on 3 July 1992 to provide airlift.*
D. Military air combat activities: 1. No military air combat activities. 2. Small-scale (occasional) military air combat activities and/or some activities above FL 250. 3. Large- to medium-scale military air combat activities and/or regular activities above FL 250	**Large- to medium-scale military air combat activities.** *Military combat activities involving multiple reginal parties and NATO.*
E. Known attacks: 1. Conflict area without publicly reported security incidents involving military and civil aviation. 2. Conflict area with single security-related reported incident/accident involving military (or civil) aviation. 3. Conflict area with multiple reported security-related incidents/accidents involving military (or civil) aviation.	**Conflict area with multiple reported security-related incidents/accidents involving military (or civil) aviation.** *On 3 September 1992 an Italian Air Force (Aeronautica Militare Italiana) G.222 was shot down when approaching Sarajevo airfield while conducting a United Nations relief mission. It crashed 18 miles (29 km) from the airfield.* *On 28 February 1994, six Republika Srpska Air Force J-21 Jastreb jets were engaged, and four of them shot down, by NATO warplanes from the U.S. Air Force* *On 16 April 1994 a Sea Harrier of the UK Royal Navy 801 Naval Air Squadron, operating from the aircraft carrier HMS Ark Royal, was brought down by a Igla-1 surface-to-air missile fired by the Army of Republika Srpska while attempting to bomb two Bosnian Serb tanks over Gorazde.* *On 28 May 1995 a Mi-17 was shot down by a missile from an 2K12 Kub mobile SAM launcher. The attack killed the Bosnian Minister Irfan Ljubijankić, a few other politicians, and the helicopter's Ukrainian crew.* *On 2 June 1995 a US Air Force F-16C was shot down at 6000 meters altitude by a missile launch from an 2K12 Kub mobile SAM launcher.* *On 30 August 1995 a French Air Force Dassault Mirage 2000N was shot down by SAM-14 or DCA after bomb release on munition storage — Deny Flight mission.*
F. Capability to attack by at least one party: 1. No information for capability to attack with range above FL 250. 2. Air-to-air missiles launched from fighter aircraft (and no SAMs). 3. Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level.	**Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising altitude.** *2K12 Kub mobile SAM. The 2K12 "Kub" (NATO reporting name: SA-6 "Gainful") mobile surface-to-air missile system is a Soviet low to medium-level air defence system designed to protect ground forces from air attack.*

Bosnian war 1992–1997 *(continued)*	
G. Capability to differentiate between civil and military aircraft: 1. Differentiation supported by radar, electronic identification and non-cooperative target recognition systems measuring signature using acoustic and thermal radiation, radio emissions, radar techniques. 2. Differentiation supported by radar and electronic identification (e.g., identification, friend or foe (IFF), secondary surveillance radar (SSR). 3. Differentiation supported only by radar tracks.	**Differentiation supported only by radar tracks — for some of the armed forces.**
H. SAM/AAM operators' experience and chain of command: 1. Regular forces. 2. SAMs in the possession of irregular military forces OR an absence of robust SAM/AAM command and control procedures for authorizing launch. 3. SAMs in the possession of irregular military forces AND an absence of robust SAM/AAM command and control procedures for authorizing launch.	**SAMs in the possession of poorly trained, inexperienced personnel OR an absence of robust command and control procedures for authorizing launch.** *The SAMs (2K12 Kub mobile SAM) were in possession of the Army of Republika Srpska forces.*
I. Known intent to attack: 1. Known intent to attack military aircraft. 2. Known intent to attack civil aircraft. 3. Communication of intent and a plan to attack civil aircraft or actual attack against civil aircraft.	**Known intent to attack military aircraft.** *See the incidents and accidents reported in section E.*
J. Civil aircraft operations over or close to conflict zone (with and without the airspace restrictions if any): 1. No or occasional traffic. 2. Small to moderate traffic volume (for example restricted to arrivals and departures to airports). 3. Considerable traffic volume, including international overflights.	**No or occasional traffic after the restrictions.** *Before the airspace closure the airspace of Bosnia and Herzegovina was characterized by considerable overflight traffic volume, with overflights from Turkey, Greece, Middle East and Asia Pacific to Central and Western Europe.*
Airspace Closure	
Airspace restrictions Describes when airspace restrictions were introduced, what airspace they affected and how they evolved over time including: • Restrictions by the responsible for the airspace sovereign authority (the state). • Restrictions by others — third parties and/or neighboring states.	**1. Restrictions by the responsible for the airspace sovereign authority (the state)** *None* **2. Others** *Note:* *Closure of the whole airspace for civil flights occurred in 1992.* *Airspace below FL285 was closed from 1997.*
Reasons for airspace restrictions Describes the reasons for airspace restrictions, weapons known to be in the area and their range/capabilities, what traffic was vulnerable, known or suspected intent to attack civil aviation and whether there was concern about unintentional attack.	*Reason for airspace closure of Bosnia and Herzegovina was the war, which started in Bosnia and Herzegovina 6 April 1992. Bosnia and Herzegovina independence was proclaimed in March 1992. There were no aviation authorities in Bosnia and Herzegovina who would issue any official document.* *The former Yugoslavia had SAMs and there was threat of their use. In addition, NATO was in the air.* *Signing of the Dayton peace accord in November 1995 enabled negotiation on limited opening of Bosnia and Herzegovina airspace — upper airspace above FL 285 in 1997. Lower airspace was closed at NATO's request. NATO used this airspace for their operations.*

Bosnian war 1992–1997 *(continued)*	
Decision-making Describes the source(s) of the threat information; who made the decision regarding the restrictions and with whom was the decision coordinated; was the decision-making process different from the normal or standard airspace decision-making process.	*The first step in the closure of airspace was done indirectly. Namely, the two neighboring states, the former Federal Republic of Yugoslavia (FRY) (successor Serbia), and Croatian aviation authorities stopped the traffic to/from Bosnia and Herzegovina. This essentially closed the airspace for international traffic.* *In March 1993, the United Nations passed Resolution 816, which banned all flights over Bosnia-Herzegovina not authorized by the United Nations. It also authorized NATO to enforce the ban on military flights by shooting down violators. At the request of UN Security Council, NATO declared 'Operation Deny Flight' and a 'no fly zone'.* *In 1997 FRY, Croatia, Bosnia and Herzegovina and NATO signed agreement on the opening of the airspace above FL285 for commercial air traffic. It was agreed that ATM would be provided by Belgrade and Zagreb ACCs, while Search and Rescue was provided by Bosnia and Herzegovina. Operational boundary for the traffic above FL285 was on the old FIR boundary between Belgrade and Zagreb FIR. It was 40NM west of Sarajevo and Mostar. The whole airspace below FL 285 was controlled by NATO Stabilization Forces (SFOR).*
Promulgation Describes how the restrictions were published, number of the NOTAMs if available, AIS.	*FRY and Croatia published NOTAMs (references not available).* *NATO published information as well (references not available).* *Opening of the airspace above FL285 was done by the NOTAM coordinated between FRY, Croatia and supported by the assistance of EUROCONTROL (references not available).*
Notes Other relevant information	*LOAs were signed between all actors in the opening of Bosnia and Herzegovina airspace for civilian traffic.* **References:** *U.S. Central Intelligence Agency,* Yugoslavia: Military Dynamics of a Potential Civil War, *March 1991* *U.S. Central Intelligence Agency,* Combat forces in former Yugoslavia, *July 1993* *Daniel L. Haulman, Air Force historical Research Agency,* MANNED AIRCRAFT LOSSES OVER THE FORMER YUGOSLAVIA, 1994–1999, *October 2009* *Jaffe S.,* Airspace Closure and Civil Aviation, *2015*

Croatian war 1991–1995	
Likelihood of attack indicators	
A. Parties: 1. Conflict between states. 2. Conflict between non-state armed groups and state(s) or civil wars. 3. Conflict between non-state armed groups.	**Conflict between non-state armed groups and state(s) or civil wars.** *The conflicting parties in the Croatian war from 1991 until 1995 were Croatia, Federal Republic of Yugoslavia, Serbian Autonomous Oblast of Krjina, Serbian Autonomous Oblast of Eastern Slavonia, Baranja and Western Syrmia, Republika Srpska, Serbian Autonomous Oblast of Western Slavonia.* *The war lasted from 31 March 1991 until 12 November 1995.* *This conflict was fought by the defence forces of the Croatian government initially against the Yugoslav Army (JNA) until 1992 and local Serbian forces formed as the self-declared Republic of Serbian Krajina (RSK) until 1995.*
B. Armed conflict scale and/or tensions: 1. Terrorism and/or international political tension. 2. Insurgency (small-scale military activities) and/or medium increasing political tension. 3. Large-scale military activities and/or heightened international political tension.	**Insurgency or small-scale military activities.** *The Yugoslav People's Army tried to keep Croatia within Yugoslavia by occupying all of Croatia.* *After this was unsuccessful self-proclaimed proto-state Republic of Serbian Krajina (RSK) was established within Croatia.* *After the ceasefire of January 1992 and international recognition of the Republic of Croatia as a sovereign state the United Nations Protection Force (UNPROFOR) was deployed.* *The military activities became largely intermittent in the following three years.* *In 1995, Croatia launched two major offensives known as Operation Flash and Operation Storm, and effectively the war was ended.*
C. Military air transport activities: 1. Military air transport activities not reported. 2. Occasional use of aircraft to transport ground troops or military equipment. 3. More than occasional use of aircraft to transport ground troops or military equipment by at least one party).	**Occasional use of aircraft to transport ground troops or military equipment.**
D. Military air combat activities: 1. No military air combat activities. 2. Small-scale (occasional) military air combat activities and/or some activities above FL 250. 3. Large- to medium-scale military air combat activities and/or regular activities above FL 250	**Small-scale (occasional) military air combat activities.**
E. Known attacks: 1. Conflict area without publicly reported security incidents involving military and civil aviation. 2. Conflict area with single security-related reported incident/accident involving military (or civil) aviation. 3. Conflict area with multiple reported security-related incident/accident involving military (or civil) aviation.	**Conflict area with multiple reported security-related incidents/accidents involving military (or civil) aviation.** *On 23 August 1991 Croatian forces shot down two Yugoslav G-2 Galeb fighter aircraft using shoulder-launched anti-aircraft missiles.* *On 27 December 1991, the Croatian An-2 was shot down during a bombing mission by a SA-6 SAM missile by Republika Srpska.* *On 7 January 1992, an Italian Army Agusta-Bell AB-206L LongRanger helicopter, operating as a European Community Monitor Mission and carrying five European Community observers was downed by a Yugoslav Air Force Mikoyan-Gurevich MiG-21,* *On 31 July 1994 Air Ukraine An-26 was shot down and crashed.*

Croatian war 1991–1995 *(continued)*	
F. Capability to attack by at least one party: 1. No information for capability to attack with range above FL 250. 2. Air-to-air missiles launched from fighter aircraft (and no SAMs). 3. Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level.	**Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising altitude.** ***Federal Republic of Yugoslavia:*** *At the start of the war, the Yugoslav national air defence force possessed more than 100 search radars, eight battalions of SA-2s, six battalions of SA-3s, one battalion of SA-5s, four battalions of SA-6/11s, and 15 regiments of anticraft guns. For support of army, there were also SA-9, SA-13 mobile IR-guided SAMs, and thousands of SA-7 and SA-16 shoulder-fired SAMs.* *S-75 Dvina (NATO reporting name SA2) is a Soviet-designed, high-altitude air defence system with engagement altitude of 82,000ft.* *S-125 Neva/Pechora (NATO reporting name SA3) mobile surface-to-air missile system is a Soviet-made SAM system with engagement altitude of 59,000 ft.* *S-200 (NATO reporting name SA-5) is a very long range, medium-to-high altitude SAM system to defend large areas from bomber attack or other strategic aircraft. It has an engagement altitude of 130,000 ft.* *2K12 Kub mobile SAM. The 2K12 "Kub" (NATO reporting name: SA-6 "Gainful") low- to medium-level air defence system designed to protect ground forces from air attack with engagement altitude, depending on the modification, of up to 46,000ft.* *Other capabilities for lower altitudes: 9K32 Strela-2 (SA-7), 9K31 Strela-1 (SA-9), 9K35 Strela-10 (SA-13), 9K34 Strela-3 (SA-14), 9K310 Igla-1 (SA-16) and mobile AAA batteries (multiple types).* ***Republika Srpska*** *2K12 Kub mobile SAM. The 2K12 "Kub" (NATO reporting name: SA-6 "Gainful") mobile surface-to-air missile system is a Soviet low to medium-level air defence system designed to protect ground forces from air attack.* ***Croatian Army:*** *The Croatian Army was developed and equipped during the war.*
G. Capability to differentiate between civil and military aircraft: 1. Differentiation supported by radar, electronic identification and non-cooperative target recognition systems measuring signature using acoustic and thermal radiation, radio emissions, radar techniques. 2. Differentiation supported by radar and electronic identification (e.g., identification, friend or foe (IFF), secondary surveillance radar (SSR). 3. Differentiation supported only by radar tracks.	**Differentiation supported only by radar tracks.**
H. SAM/AAM operators' experience and chain of command: 1. Regular forces. 2. SAMs in the possession of irregular military forces OR an absence of robust SAM/AAM command and control procedures for authorizing launch. 3. SAMs in the possession of irregular military forces AND an absence of robust SAM/AAM command and control procedures for authorizing launch.	**SAMs in the possession of poorly trained, inexperienced personnel OR an absence of robust command and control procedures for authorizing launch.**
I. Known intent to attack: 1. Known intent to attack military aircraft. 2. Known intent to attack civil aircraft. 3. Communication of intent and a plan to attack civil aircraft or actual attack against civil aircraft.	**Known intent to attack military aircraft.** *See the incidents and accidents reported in section E.*

Croatian war 1991–1995 *(continued)*	
J. Civil aircraft operations over or close to conflict zone (with and without the airspace restrictions if any): 1. No or occasional traffic. 2. Small to moderate traffic volume (for example restricted to arrivals and departures to airports). 3. Considerable traffic volume, including international overflights.	**Small to moderate traffic volume.** *Considerable traffic volume before the restrictions.*
Airspace Closure	
Airspace restrictions Describes when airspace restrictions were introduced, what airspace they affected and how they evolved over time including: • Restrictions by the responsible for the airspace sovereign authority (the state). • Restrictions by others — third parties and/or neighboring states.	**1. Restrictions by the responsible for the airspace sovereign authority (the state)** **None** **2. Others** *Partial restriction.* *Croatian airspace was closed for eight months, starting from August 1991 preceded on 25 June 1991 by a declaration of independence by Croatia.*
Reasons for airspace restrictions Describes the reasons for airspace restrictions, weapons known to be in the area and their range/ capabilities, what traffic was vulnerable, known or suspected intent to attack civil aviation and whether there was concern about unintentional attack.	*References not found.*
Decision-making Describes the source(s) of the threat information; who made the decision regarding the restrictions and with whom was the decision coordinated; was the decision-making process different from the normal or standard airspace decision-making process.	*References not found.*
Promulgation Describes how the restrictions were published, number of the NOTAMs if available, AIS.	*References not found.*
Notes Other relevant information	**References:** *U.S. Central Intelligence Agency,* Yugoslavia: Military Dynamics of a Potential Civil War, *March 1991* *Adria Airways* Kronika *1991* *U.S. Central Intelligence Agency,* Combat forces in former Yugoslavia, *July 1993* *Daniel L. Haulman, Air Force historical Research Agency,* MANNED AIRCRAFT LOSSES OVER THE FORMER YUGOSLAVIA, 1994–1999, *October 2009*

Democratic Republic of the Congo (DRC)	
Likelihood of attack indicators	
A. Parties: 1. Conflict between states. 2. Conflict between non-state armed groups and state(s) or civil wars. 3. Conflict between non-state armed groups.	**Conflict between non-state armed groups.** *Second Congo War, pitting Congolese forces against rebels and soldiers backed by Uganda and Rwanda, ended in 2002/2003. In 2013, a UN offensive force and Congolese army defeated rebel group M23 Movement. However, more than 100 armed groups, such as the Allied Democratic Forces (ADF), which was driven out of Uganda in the late 1990s, are believed to operate in the eastern region of the DRC. ADF has pledged allegiance to ISIL (ISIS) but researchers say there is no evidence of close collaboration. More than 16,000 UN peacekeepers are stationed in the country as part of what is described as a stabilization mission. There also is tension with neighbouring Rwanda.*
B. Armed conflict scale and/or tensions: 1. Terrorism and/or international political tension. 2. Insurgency (small-scale military activities) and/or medium increasing political tension. 3. Large-scale military activities and/or heightened international political tension.	**Insurgency or small-scale military activities.** *DRC military is primarily ground-based. DRC military and UN Peacekeepers are battling insurgent groups in eastern DRC.*
C. Military air transport activities: 1. Military air transport activities not reported. 2. Occasional use of aircraft to transport ground troops or military equipment. 3. More than occasional use of aircraft to transport ground troops or military equipment by at least one party).	**Occasional use of aircraft to transport ground troops or military equipment.** *DRC military currently has about a dozen transport aircraft.* *UN peacekeeping force has 11 fixed wing and 30 rotary wing aircraft.*
D. Military air combat activities: 1. No military air combat activities. 2. Small-scale (occasional) military air combat activities and/or some activities above FL 250. 3. Large- to medium-scale military air combat activities and/or regular activities above FL 250	**No military air combat activities.** *Insurgents not known to have aircraft. DRC forces have six fixed wing and eight rotary wing attack aircraft, but most combat activities seem restricted to ground operations.*
E. Known attacks: 1. Conflict area without publicly reported security incidents involving military and civil aviation. 2. Conflict area with single security-related reported incident/accident involving military (or civil) aviation. 3. Conflict area with multiple reported security-related incident/accident involving military (or civil) aviation.	**Conflict area with single reported security-related incident/accident involving military (or civil) aviation.** *In Oct. 1998, a 727 crashed after reportedly being struck by a MANPADS while in-flight. Various accounts put death toll at 40 or 41. (In a 1999 incident, a Fokker F27 was struck by gunfire and a possible RPG while parked at an airport.)*
F. Capability to attack by at least one party: 1. No information for capability to attack with range above FL 250. 2. Air-to-air missiles launched from fighter aircraft (and no SAMs). 3. Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level.	**No information about capability to attack with range above FL 250** *DRC military has 53 "rocket projectors," which are most likely RPGs.*
G. Capability to differentiate between civil and military aircraft: 1. Differentiation supported by radar, electronic identification and non-cooperative target recognition systems measuring signature using acoustic and thermal radiation, radio emissions, radar techniques. 2. Differentiation supported by radar and electronic identification (e.g., identification, friend or foe (IFF), secondary surveillance radar (SSR). 3. Differentiation supported only by radar tracks.	**NA**

Democratic Republic of the Congo (DRC) *(continued)*	
H. SAM/AAM operators' experience and chain of command: 1. Regular forces. 2. SAMs in the possession of irregular military forces OR an absence of robust SAM/AAM command and control procedures for authorizing launch. 3. SAMs in the possession of irregular military forces AND an absence of robust SAM/AAM command and control procedures for authorizing launch.	**Regular forces, primarily ground forces, and no evidence of SAMs.**
I. Known intent to attack: 1. Known intent to attack military aircraft. 2. Known intent to attack civil aircraft. 3. Communication of intent and a plan to attack civil aircraft or actual attack against civil aircraft.	**Know intent to attack military aircraft.** *Assume that insurgents/rebels would attack DRC military aircraft if opportunity presented itself.*
J. Civil aircraft operations over or close to conflict zone (with and without the airspace restrictions if any): 1. No or occasional traffic. 2. Small to moderate traffic volume (for example restricted to arrivals and departures to airports). 3. Considerable traffic volume, including international overflights.	**Moderate traffic volume, mainly restricted to arrivals and departures.** *Most traffic seems to be internal or with other countries in the region.*
Airspace Closure	
Airspace restrictions Describes when airspace restrictions were introduced, what airspace they affected and how they evolved over time including: • Restrictions by the responsible for the airspace sovereign authority (the state). • Restrictions by others — third parties and/or neighboring states.	**1. Restrictions by the responsible for the airspace sovereign authority (the state)** **None.** **2. Others** *None.* ***Note:*** *DRC has not issued any NOTAMs referring to the conflict.* *FAA previously has issued warnings to U.S. operators advising them to make sure they are informed about the current situation before flying in that area, but there are no current (June 2020) warnings active.* *EASA does not currently have any Conflict Zone Information Bulletins active regarding the DRC.*
Reasons for airspace restrictions Describes the reasons for airspace restrictions, weapons known to be in the area and their range/capabilities, what traffic was vulnerable, known or suspected intent to attack civil aviation and whether there was concern about unintentional attack.	*References not found.*
Decision-making Describes the source(s) of the threat information; who made the decision regarding the restrictions and with whom was the decision coordinated; was the decision-making process different from the normal or standard airspace decision-making process.	*References not found.*
Promulgation Describes how the restrictions were published, number of the NOTAMs if available, AIS.	*References not found.*
Notes Other relevant information	*In 2015, DRC signed an agreement with Harris Corp. to upgrade the country's ATC system.*

Egypt (Sinai)	
Likelihood of attack indicators	
A. Parties: 1. Conflict between states. 2. Conflict between non-state armed groups and state(s) or civil wars. 3. Conflict between non-state armed groups.	**Conflict between non-state armed groups and state(s) or civil wars.** *Ongoing conflict pitting Egyptian armed forces, including army, air force and police, against IS of Iraq and Levant (ISIL) and Wilayah Sinai. Wilayat Sinai emerged as a terrorist organization in the Sinai Peninsula following a popular uprising and subsequent overthrow of President Hosni Mubarak in 2011.* *In November 2014, Wilayat Sinai declared its allegiance to the Islamic State and has since claimed responsibility for numerous attacks, including an attack on a mosque that killed more than 300 people, the April 2017 attack on Coptic churches that killed at least 44 people, the December 2016 attack on a Coptic chapel in Cairo that killed at least 25 people, and the October 2015 downing (with a planted IED) of a Russian A321 that killed all 224 people aboard.*
B. Armed conflict scale and/or tensions: 1. Terrorism and/or international political tension. 2. Insurgency (small-scale military activities) and/or medium increasing political tension. 3. Large-scale military activities and/or heightened international political tension.	**Insurgency (small-scale military activities) and/or medium increasing political tension.** *In addition to attacks referenced in A., two coordinated attacks in one day in Oct. 2014 killed 33 Egyptian security personnel in the Sinai Peninsula. Rocket propelled grenades were used in one of the attacks.* *Scale and pace of operations increased in 2018 during government offensive prior to presidential election.* *Scale of conflict has been influenced by pressure from other States, including the U.S. and Israel.*
C. Military air transport activities: 1. Military air transport activities not reported. 2. Occasional use of aircraft to transport ground troops or military equipment. 3. More than occasional use of aircraft to transport ground troops or military equipment by at least one party).	**More than occasional use of aircraft to transport ground troops or military equipment** *Egypt has a more than 40 C-130Hs and C-295 cargo transports, as well as smaller utility aircraft. Use likely dictated by launching of govt. offensives and/or in response to attacks by insurgents.*
D. Military air combat activities: 1. No military air combat activities. 2. Small-scale (occasional) military air combat activities and/or some activities above FL 250. 3. Large- to medium-scale military air combat activities and/or regular activities above FL 250	**Large- to medium-scale military air combat activities and/or regular activities above FL 250** *Egyptian AF has a range of fighters (including F-16s, Mirages, Rafales and MiG-29s) and attack helicopters and has been accused of using air launched cluster bombs in Sinai.* *Media reports include a number of references to air attacks, including one that killed eight Mexican tourists.* *There also have been reports of Israeli warplanes attacking ISIL in Sinai with the secret approval of Egypt; Egypt has denied the reports.*
E. Known attacks: 1. Conflict area without publicly reported security incidents involving military and civil aviation. 2. Conflict area with single security-related reported incident/accident involving military (or civil) aviation. 3. Conflict area with multiple reported security-related incident/accident involving military (or civil) aviation.	**Conflict area with multiple reported security-related incidents/accidents involving military (or civil) aviation.** *In addition to claimed IED attack on a Russian airliner in 2015, current FAA background information says in June 2015 ISIS fired rockets toward El Gora Airport (HEGR) in northern Sinai, fired at Egyptian military aircraft with small arms and used MANPADS to shoot down a military helicopter flying at low altitude.* *In late 2013, the Dutch government informed Dutch carriers about a threat specifically targeting civil aviation.* *Although MANPADS have not been used to target civil aircraft in the Sinai, extremists/militants could potentially do so at any time with little or no warning, says FAA.*
F. Capability to attack by at least one party: 1. No information for capability to attack with range above FL 250. 2. Air-to-air missiles launched from fighter aircraft (and no SAMs). 3. Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level.	**Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level.** *Egyptian navy has ships equipped with French-made VL (vertically launched)-MICA SAMs that can reach 30,000 ft* *Egyptian military also has long-range, Russian-made SAMs and a large fleet of a fighter aircraft, including F-16s, Mirages, Rafales and MiG-29s.*

Egypt (Sinai) *(continued)*	
G. Capability to differentiate between civil and military aircraft: 1. Differentiation supported by radar, electronic identification and non-cooperative target recognition systems measuring signature using acoustic and thermal radiation, radio emissions, radar techniques. 2. Differentiation supported by radar and electronic identification (e.g., identification, friend or foe (IFF), secondary surveillance radar (SSR). 3. Differentiation supported only by radar tracks.	**Differentiation supported by radar, electronic identification and non-cooperative target recognition systems measuring signature using acoustic and thermal radiation, radio emissions, radar techniques.** *Egyptian military has differential capability. Unknown for ISIL.*
H. SAM/AAM operators' experience and chain of command: 1. Regular forces. 2. SAMs in the possession of irregular military forces OR an absence of robust SAM/AAM command and control procedures for authorizing launch. 3. SAMs in the possession of irregular military forces AND an absence of robust SAM/AAM command and control procedures for authorizing launch.	**Regular forces** *Egypt has a modern, well-equipped military. Scattered media reports allege that ISIS/ISIL may possess a few SAMs, but that has not been confirmed.*
I. Known intent to attack: 1. Known intent to attack military aircraft. 2. Known intent to attack civil aircraft. 3. Communication of intent and a plan to attack civil aircraft or actual attack against civil aircraft.	**Communication of intent and a plan to attack civil aircraft or actual attack against civil aircraft.** *ISIL laid claim to the Oct. 2015 downing of a Russian airliner with an IED planted on board, which, if true, demonstrates an intent to attack civil aircraft.*
J. Civil aircraft operations over or close to conflict zone (with and without the airspace restrictions if any): 1. No or occasional traffic. 2. Small to moderate traffic volume (for example restricted to arrivals and departures to airports). 3. Considerable traffic volume, including international overflights.	**No information available**
Airspace Closure	
Airspace restrictions Describes when airspace restrictions were introduced, what airspace they affected and how they evolved over time including: • Restrictions by the responsible for the airspace sovereign authority (the state). • Restrictions by others — third parties and/or neighboring states.	**1. Restrictions by the responsible for the airspace sovereign authority (the state)** *None* **2. Others** *None* ***Note:*** *Airspace restrictions and warnings regarding the Cairo FIR (bellow FL 250/260), particularly involving the northern Sinai region, have been issued since 2014 by Egypt, EASA, Germany the U.S. and U.K.* *EASA Conflict Zone Information Bulletin current in effect (June 2020)* *FAA KICZ NOTAM A0040/20 in effect until March 2021*
Reasons for airspace restrictions Describes the reasons for airspace restrictions, weapons known to be in the area and their range/capabilities, what traffic was vulnerable, known or suspected intent to attack civil aviation and whether there was concern about unintentional attack.	*A since cancelled EASA SIB advised against operating lower than 25,000 ft AGL because of a threat from "dedicated aircraft weaponry." Germany advised operators not to plan and conduct flights below FL260 "due to potentially hazardous situation within FIR Cairo; also warned of potential risk during takeoff/landing at all north Sinai airports within FIR Cairo.* *Current FAA NOTAM says: "plan to exercise extreme caution during flight operations due to ongoing fighting between military forces and extremist/militant elements and the continuing extremist threat to civil aviation, which involves a variety of anti-aircraft-capable weapons, including MANPADS, anti-tank missiles, small-arms fire, and indirect fire weapons, such as mortars and rockets targeting aircraft and Sinai airports. "*

Egypt (Sinai) *(continued)*	
Decision-making Describes the source(s) of the threat information; who made the decision regarding the restrictions and with whom was the decision coordinated; was the decision-making process different from the normal or standard airspace decision-making process.	
Promulgation Describes how the restrictions were published, number of the NOTAMs if available, AIS.	*FAA KICZ NOTAM A0040/20* *EASA CZIB-2017-09R5*

Georgia-Russia 2008	
Likelihood of attack indicators	
A. Parties: 1. Conflict between states. 2. Conflict between non-state armed groups and state(s) or civil wars. 3. Conflict between non-state armed groups.	**Conflict between non-state armed groups and state(s) or civil wars.** *The conflicting parties in the Georgia-Russia war in 2008 were Georgia, Russia and the Russian-backed self-proclaimed republics of South Ossetia and Abkhazia.* *The war lasted from 7 until 12 of August 2008.* *This conflict took place in the Transcaucasia region.*
B. Armed conflict scale and/or tensions: 1. Terrorism and/or international political tension. 2. Insurgency (small-scale military activities) and/or medium increasing political tension. 3. Large-scale military activities and/or heightened international political tension.	**Large scale military activities.** *In July and August 2008 there was growing tension between Georgian and South Ossetian Forces. On 8 August Georgia launched an air and land assault on Tskhinvali. The Russians responded with air attacks on Georgian forces and Russian forces entered South Ossetia.*
C. Military air transport activities: 1. Military air transport activities not reported. 2. Occasional use of aircraft to transport ground troops or military equipment. 3. More than occasional use of aircraft to transport ground troops or military equipment by at least one party).	**Occasional use of aircraft to transport ground troops or military equipment.**
D. Military air combat activities: 1. No military air combat activities. 2. Small-scale (occasional) military air combat activities and/or some activities above FL 250. 3. Large- to medium-scale military air combat activities and/or regular activities above FL 250	**Large- to medium-scale military air combat activities and/or regular activities above FL 250.** *After initial use Georgian forces almost completely withdrew their aircraft.*
E. Known attacks: 1. Conflict area without publicly reported security incidents involving military and civil aviation. 2. Conflict area with single security-related reported incident/accident involving military (or civil) aviation. 3. Conflict area with multiple reported security-related incident/accident involving military (or civil) aviation.	**Conflict area with multiple reported security-related incidents/accidents involving military (or civil) aviation.** *Russia lost six planes in Georgia. Friendly forces likely shot down three or four of the six aircraft Russia lost in the war. "Identify Friend or Foe" (IFF) systems didn't work.* *On 8 August 2008 Russian Su-25 was shot down after it came under friendly fire from a MANPADS as it was overflying the positions of Russian troops in South Ossetia.* *On 9 August 2008 Russian Tu-22M3 heavy bomber was shot down by Georgian Air Defenses (possibly by Buk-M1 SAM).* *On 9 August 2008 Russian Su-24M frontline bomber was shot down from a Georgian Air Defenses.* *On 9 August 2008 Russian Su-25 was hit by a Georgian MANPADS that hit the left engine; subsequently, while returning to base at an altitude of 1000 meters, a second MANPADS missile struck the right engine, leaving the plane without thrust and the aircraft crashed.* *On 9 August 2008 Russian Su-25 attack aircraft was shot down by friendly fire. It was hit from a Russian ZSU-23-4 Shilka self-propelled air defense artillery system covering the Gufti bridge.* *On 9 August 2008 Russian Su-24M frontline bomber aircraft was shot down by friendly fire.* *On 11 August 2008 Russian Su-25 attack aircraft was shot by friendly fire. SU-25 attacked by mistake Russian forces and Russian soldiers returned fire from man-portable SAM systems. One of the missiles damaged the plane's right engine, which burst into flames. The aircraft was barely able to return to its base.*

Georgia-Russia 2008 *(continued)*	
F. Capability to attack by at least one party: 1. No information for capability to attack with range above FL 250. 2. Air-to-air missiles launched from fighter aircraft (and no SAMs). 3. Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level.	**Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising altitude.** *Russian Federation possess multiple types of surface-to-air missiles (SAMs) that can hit an aircraft at cruising altitude. However, there were reports that Russian military forces in the war did not have long-range surface-to-air missiles that could be fired beyond the air-defence zones of an adversary.* *At least one 9K37 Buk was captured by Russian and Russian backed forces during the war.* ***Georgia:*** *9K37 Buk (NATO reporting name SA-11 Gadfly, SA-17 Grizzly) is a Soviet medium-range SAM designed to counter cruise missiles, smart bombs, fixed- and rotary-wing aircraft, and unmanned aerial vehicles. It has an engagement altitude of 20,000ft.* *9K330 Tor (NATO reporting name SA-15 "Gauntlet") is a Soviet all-weather low to medium altitude, short-range surface-to-air missile system designed for destroying airplanes, helicopters, cruise missiles, precision guided munitions, unmanned aerial vehicles and short-range ballistic threats. It has an engagement altitude of 46,000ft.* *SPYDER (Surface-to-air PYthon and DERby) is an Israeli short and medium range mobile air defence system. It has an engagement altitude of 30,000 ft or 52,000 ft depending on the modification.* *S-125 Neva/Pechora (NATO reporting name SA3) is Soviet-made a mobile SAM system with engagement altitude of 59,000 ft.* *Other capabilities include up to three Osa-AK/AKM SAM system batteries, a large number of man-portable SAM systems, as well as a few C-60 57-mm anti-aircraft guns, ZU-23-2 twin 23-mm anti-aircraft guns, and ZSU-23-4 Shilka quad 23-mm self-propelled anti-aircraft gun systems.*
G. Capability to differentiate between civil and military aircraft: 1. Differentiation supported by radar, electronic identification and non-cooperative target recognition systems measuring signature using acoustic and thermal radiation, radio emissions, radar techniques. 2. Differentiation supported by radar and electronic identification (e.g., identification, friend or foe (IFF), secondary surveillance radar (SSR). 3. Differentiation supported only by radar tracks.	**Differentiation supported by radar and electronic identification (e.g. identification, friend or foe (IFF), SSR).** *The Georgian air-defence early-warning and command-control tactical system was linked via Turkey to a NATO Air Situation Data Exchange (ASDE), which provided Georgia with intelligence during the conflict.*
H. SAM/AAM operators' experience and chain of command: 1. Regular forces. 2. SAMs in the possession of irregular military forces OR an absence of robust SAM/AAM command and control procedures for authorizing launch. 3. SAMs in the possession of irregular military forces AND an absence of robust SAM/AAM command and control procedures for authorizing launch.	**SAMs in the possession of irregular military forces OR an absence of robust command and control procedures for authorizing launch.** *At least one 9K37 Buk was captured by Russian and Russian-backed forces during the war.*
I. Known intent to attack: 1. Known intent to attack military aircraft. 2. Known intent to attack civil aircraft. 3. Communication of intent and a plan to attack civil aircraft or actual attack against civil aircraft.	**Known intent to attack military aircraft.** *See the incidents and accidents reported in section E.*

Georgia-Russia 2008 *(continued)*	
J. Civil aircraft operations over or close to conflict zone (with and without the airspace restrictions if any): 1. No or occasional traffic. 2. Small to moderate traffic volume (for example restricted to arrivals and departures to airports). 3. Considerable traffic volume, including international overflights.	**Moderate traffic volume, mainly restricted to arrivals and departures.**
Airspace Closure	
Airspace restrictions Describes when airspace restrictions were introduced, what airspace they affected and how they evolved over time including: • Restrictions by the responsible for the airspace sovereign authority (the state). • Restrictions by others — third parties and/or neighboring states.	**1. Restrictions by the responsible for the airspace sovereign authority (the state)** *None* **2. Others** *No information found* *No NOTAMs issued by Georgia regarding the conflict were identified. It is assumed that airspace above FL 250 was not restricted to civil aviation.*
Reasons for airspace restrictions Describes the reasons for airspace restrictions, weapons known to be in the area and their range/ capabilities, what traffic was vulnerable, known or suspected intent to attack civil aviation and whether there was concern about unintentional attack.	*n/a*
Decision-making Describes the source(s) of the threat information; who made the decision regarding the restrictions and with whom was the decision coordinated; was the decision-making process different from the normal or standard airspace decision-making process.	*n/a*
Promulgation Describes how the restrictions were published, number of the NOTAMs if available, AIS.	*n/a*
Notes Other relevant information	***References:*** *"Air power in Russia's Georgian campaign August 2008,"* Pathfinder, *Air power development centre bulletin, October 2008* *Pukhov R., T*he Tanks of August, Centre for Analysis of Strategies and Technologies Moscow, *Russia, 2010* *Cohen A., Hamilton R.,* The Russian military and the Georgian war: lessons and implications, *Strategic Studies Institute, US Army War College, June 2011*

Iraq war 1991	
Likelihood of attack indicators	
A. Parties: 1. Conflict between states. 2. Conflict between non-state armed groups and state(s) or civil wars. 3. Conflict between non-state armed groups.	**Conflict between non-state armed groups and state(s) or civil wars.** *The Persian Gulf War, also known as "The Gulf War," was a conflict between Iraq and 34 other countries, led by the United States. The conflicting parties were: The Allied Coalition Forces consisting of 34 nations and the Iraqi Armed Forces (Army, Air Force, Navy, Iraqi Republican Guard).* *The conflict started with the invasion of Kuwait by Iraq on August 2, 1990, with the Allied Coalition military offensive beginning January 16, 1991. The official ceasefire was declared February 28, 1991.*[102]
B. Armed conflict scale and/or tensions: 1. Terrorism and/or international political tension. 2. Insurgency (small-scale military activities) and/or medium increasing political tension. 3. Large-scale military activities and/or heightened international political tension.	**Large-scale military activities.** *The Allied Coalition's Operation Desert Storm involved approximately 750,000 troops. The coalition aerial strike-force comprised over 2,250 combat aircraft (including 1,800 US aircraft). By contrast, the Iraqi Forces were estimated to be 1,000,000 personnel, having 934 combat-capable aircraft (including trainers) of which 550 were operational.* *The air campaign of the Gulf War was an extensive aerial bombing campaign. The Coalition of the Gulf War flew over 100,000 sorties, dropping 88,500 tons of bombs, widely destroying military and civilian infrastructure.*[103]
C. Military air transport activities: 1. Military air transport activities not reported. 2. Occasional use of aircraft to transport ground troops or military equipment. 3. More than occasional use of aircraft to transport ground troops or military equipment by at least one party).	**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 airways and close to civil aircraft cruising altitudes).** *More than 145 C-130 aircraft deployed in support of Desert Shield/Desert Storm. The C-130s flew 46,500 sorties and moved more than 209,000 people and 300,000 tons of supplies within the theater. C-141 aircraft operated 8,536 strategic airlift missions, followed by the C-5 with 3,770; the KC-10 with 379 and the C-9 with 209. UK C-130, VC10 and L1011 Tristar also operated across the operational area.*
D. Military air combat activities: 1. No military air combat activities. 2. Small-scale (occasional) military air combat activities and/or some activities above FL 250. 3. Large- to medium-scale military air combat activities and/or regular activities above FL 250	**Military air combat activities.** *Military combat activities involving the Allied Coalition and the Iraqi Air Force.*
E. Known attacks: 1. Conflict area without publicly reported security incidents involving military and civil aviation. 2. Conflict area with single security-related reported incident/accident involving military (or civil) aviation. 3. Conflict area with multiple reported security-related incident/accident involving military (or civil) aviation.	**Conflict area with multiple reported incidents/accidents involving military (or civil) aviation.** *Military armed conflict existed throughout the airspace. UNSCR 678 authorised use of all necessary means to force Iraqi forces out of Kuwait after 15 Jan 1991. Widely reported by international media.*
F. Capability to attack by at least one party: 1. No information for capability to attack with range above FL 250. 2. Air-to-air missiles launched from fighter aircraft (and no SAMs). 3. Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level.	**Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level.** *Both parties in this conflict had the capability to hit civilian aircraft in the region with SAM and air-to-air missiles.*[104]

[102] Mockaitis, Thomas R.: Iraq War Encyclopedia ABC-CLIO, 2013

[103] https://en.wikipedia.org/wiki/Gulf_War_air_campaign

[104] Mockaitis, Thomas R.: Iraq War Encyclopedia ABC-CLIO, 2015, pg.18

Iraq war 1991 *(continued)*	
G. Capability to differentiate between civil and military aircraft: 1. Differentiation supported by radar, electronic identification and non-cooperative target recognition systems measuring signature using acoustic and thermal radiation, radio emissions, radar techniques. 2. Differentiation supported by radar and electronic identification (e.g., identification, friend or foe (IFF), secondary surveillance radar (SSR). 3. Differentiation supported only by radar tracks.	**Differentiation supported by radar and electronic identification (e.g. identification, friend or foe (IFF), SSR).**
H. SAM/AAM operators' experience and chain of command: 1. Regular forces. 2. SAMs in the possession of irregular military forces OR an absence of robust SAM/AAM command and control procedures for authorizing launch. 3. SAMs in the possession of irregular military forces AND an absence of robust SAM/AAM command and control procedures for authorizing launch.	**Regular forces.** *While the actual war lasted a brief time, there was evidence of command and control breakdown of the Iraqi military in the latter stages of the conflict.*
I. Known intent to attack: 1. Known intent to attack military aircraft. 2. Known intent to attack civil aircraft. 3. Communication of intent and a plan to attack civil aircraft or actual attack against civil aircraft.	**Known intent to attack military aircraft.** *An effective state of war existed through the period.*
J. Civil aircraft operations over or close to conflict zone (with and without the airspace restrictions if any): 1. No or occasional traffic. 2. Small to moderate traffic volume (for example restricted to arrivals and departures to airports). 3. Considerable traffic volume, including international overflights.	**Small to moderate traffic volume.** *Several factors greatly reduced the amount of traffic in Iraqi airspace during the wartime months. The combination of restrictions and, among other things, large increases in insurance rates encouraged many operators to route around the region.*[105]
Airspace Closure	
Airspace restrictions Describes when airspace restrictions were introduced, what airspace they affected and how they evolved over time including: • Restrictions by the responsible for the airspace sovereign authority (the state). • Restrictions by others — third parties and/or neighboring states.	**1. Restrictions by the responsible for the airspace sovereign authority (the state)** *No information found* **2. Others** *The Iraqi airspace had been severely restricted by a combination of sanctions into/out of Iraq, as well as restrictions imposed by the UN regarding overflights. In September of 1990, UN resolution 670 established restrictions of operations into and out of Iraq, allowing only UN humanitarian operations.*[106] *During the conflict, the Allied Command limited overflights to those above FL200 and restricted certain airways.* *The two no-fly zones, one in the north and another in the south of Iraq, were unilaterally created by the US, Britain and France soon after the 1991 Gulf War. Iraq was banned from using all aircraft, including helicopters, in the air exclusion zones.*

[105] Jafe, Steven D.: Airspace Closure and Civil Aviation, Routledge, 2015, pg. 177

[106] https://digitallibrary.un.org/record/97522?ln=en

Iraq war 1991 *(continued)*	
Reasons for airspace restrictions Describes the reasons for airspace restrictions, weapons known to be in the area and their range/ capabilities, what traffic was vulnerable, known or suspected intent to attack civil aviation and whether there was concern about unintentional attack.	*Military wartime operations area.*
Decision-making Describes the source(s) of the threat information; who made the decision regarding the restrictions and with whom was the decision coordinated; was the decision-making process different from the normal or standard airspace decision-making process.	*No documentation of decisions by Iraqi government can be found. The airspace limitations were driven by UN, Allied, US and European authorities. Certain restrictions existed limiting traffic above FL200, with numerous sectors prohibited.*
Promulgation Describes how the restrictions were published, number of the NOTAMs if available, AIS.	*NOTAM and EUROCONTROL AIM.*
Notes Other relevant information	

Iraq war 2003–2011	
Likelihood of attack indicators	
A. Parties: 1. Conflict between states. 2. Conflict between non-state armed groups and state(s) or civil wars. 3. Conflict between non-state armed groups.	**Conflict between non-state armed groups and state(s) or civil wars.** *The Iraq War, also known as the Second Gulf War or Operation Freedom, began on 20 March 2003 when the U.S., joined by the U.K. and several coalition allies, launched a "shock and awe" bombing campaign. In December of 2011, the US announced "official withdrawal" of troops from Iraq.*[107] *Conflict related to a destabilization of the nation and region continues to this day.*
B. Armed conflict scale and/or tensions: 1. Terrorism and/or international political tension. 2. Insurgency (small-scale military activities) and/or medium increasing political tension. 3. Large-scale military activities and/or heightened international political tension.	**Large-scale military activities.** *At the time of invasion, the Allied forces were comprised of 1801 aircraft and approximately 767,000 troops. The overall number of sorties flown in the decade of war is not available. However, there were a 20, 228 sorties flown during the initial phases of the war between March 19 and April 18, 2003.* *The status of the Iraqi Air Force was poorly documented in the open literature. The capabilities of the Iraqi Forces were greatly impacted by the Gulf War and a total of 390 aircraft were believed to be operational at the end of 2002.*[108] *The International Institute for Strategic Studies estimated the Iraqi troops prior to the 2003 invasion to number 538,000 (Iraqi Army 375,000, Iraqi Navy 2,000, Iraqi Air Force 20,000 and air defense 17,000, the paramilitary Fedayeen Saddam 44,000, and Republican Guard 80,000.*[109]
C. Military air transport activities: 1. Military air transport activities not reported. 2. Occasional use of aircraft to transport ground troops or military equipment. 3. More than occasional use of aircraft to transport ground troops or military equipment by at least one party).	**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 airways and close to civil aircraft cruising altitudes).** *A wide array of allied military transport aircraft numbering more than 800 were deployed to support the invasion in 2003.* *The Iraqi Air Force was not a factor in the conflict.*
D. Military air combat activities: 1. No military air combat activities. 2. Small-scale (occasional) military air combat activities and/or some activities above FL 250. 3. Large- to medium-scale military air combat activities and/or regular activities above FL 250	**Military air combat activities.** *Large scale military air combat activities across Iraq and in neighbouring countries and sea areas (not Syria or Iran).*
E. Known attacks: 1. Conflict area without publicly reported security incidents involving military and civil aviation. 2. Conflict area with single security-related reported incident/accident involving military (or civil) aviation. 3. Conflict area with multiple reported security-related incident/accident involving military (or civil) aviation.	**Conflict area with multiple reported incident/accident for military (or civil) aviation.** *Military conflict existed throughout the airspace, widely reported by international media.*
F. Capability to attack by at least one party: 1. No information for capability to attack with range above FL 250. 2. Air-to-air missiles launched from fighter aircraft (and no SAMs). 3. Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level.	**Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level.** *Both parties in this conflict had the capability to hit civilian aircraft in the region.* *Coalition forces deployed multiple fighters with a capability to attack air targets at all altitudes.*

[107] Mockaitis, Thomas R.: Iraq War Encyclopedia ABC-CLIO, 2013

[108] https://www.airforcemag.com/PDF/MagazineArchive/Magazine%20Documents/2003/July%202003/0703Numbers.pdf

[109] https://en.wikipedia.org/wiki/2003_invasion_of_Iraq#Preparations_for_war

Iraq war 2003–2011 *(continued)*	
G. Capability to differentiate between civil and military aircraft: 1. Differentiation supported by radar, electronic identification and non-cooperative target recognition systems measuring signature using acoustic and thermal radiation, radio emissions, radar techniques. 2. Differentiation supported by radar and electronic identification (e.g., identification, friend or foe (IFF), secondary surveillance radar (SSR). 3. Differentiation supported only by radar tracks.	**Differentiation supported by radar, electronic identification and non-cooperative target recognition systems measuring signature using acoustic and thermal radiation, radio emissions, radar techniques.**
H. SAM/AAM operators' experience and chain of command: 1. Regular forces. 2. SAMs in the possession of irregular military forces OR an absence of robust SAM/AAM command and control procedures for authorizing launch. 3. SAMs in the possession of irregular military forces AND an absence of robust SAM/AAM command and control procedures for authorizing launch.	**Regular forces.** *Capability existed on both sides.*[110] *Extensive use of SAMs by the Iraqi military. Iraq fired approximately 1,600 radar guided SAMs during the invasion, failing to down a single allied aircraft.* *US Patriot batteries mistakenly shot down a UK Tornado GR4 and a USN FA-18 in separate friendly fire incidents.*
I. Known intent to attack: 1. Known intent to attack military aircraft. 2. Known intent to attack civil aircraft. 3. Communication of intent and a plan to attack civil aircraft or actual attack against civil aircraft.	**Known intent to attack military aircraft.** *Iraqi military forces were openly motivated to attack allied aircraft. Reports indicate that Saddam Hussein personally encouraged the shooting of allied aircraft, offering $5000 to any unit that shot down a US aircraft and $2500 to any soldier capturing a pilot.*
J. Civil aircraft operations over or close to conflict zone (with and without the airspace restrictions if any): 1. No or occasional traffic. 2. Small to moderate traffic volume (for example restricted to arrivals and departures to airports). 3. Considerable traffic volume, including international overflights.	**Small to minimal traffic volume.** *Iraq airspace was closed to civilian traffic at the beginning of the war. Coalition forces, in collaboration with ICAO and other stakeholders, opened the airspace to civil overflights in August 2003, leading to overflight traffic increasing. However, the development of optional routes around the airspace limited the number.*
Airspace Closure	
Airspace restrictions Describes when airspace restrictions were introduced, what airspace they affected and how they evolved over time including: • Restrictions by the responsible for the airspace sovereign authority (the state). • Restrictions by others — third parties and/or neighboring states.	**1. Restrictions by the responsible for the airspace sovereign authority (the state)** *No information found* **2. Others** *Several national aviation authorities and third-party organisations closed Iraq airspace to civilian traffic at the beginning of the war. Coalition forces, in collaboration with ICAO and other stakeholders opened the airspace to civil overflights in August 2003.*
Reasons for airspace restrictions Describes the reasons for airspace restrictions, weapons known to be in the area and their range/capabilities, what traffic was vulnerable, known or suspected intent to attack civil aviation and whether there was concern about unintentional attack.	*Military operations area.*
Decision-making Describes the source(s) of the threat information; who made the decision regarding the restrictions and with whom was the decision coordinated; was the decision-making process different from the normal or standard airspace decision-making process.	*No documentation of decisions by Iraqi government can be found. The airspace limitations were driven by national organisations outside Iraq and by international coalition forces.*

[110] Mockaitis, Thomas R.: Iraq War Encyclopedia ABC-CLIO, 2015, pg.18

Iraq war 2003–2011 *(continued)*	
Promulgation Describes how the restrictions were published, number of the NOTAMs if available, AIS.	*NOTAM and EUROCONTROL AIM.* *ICAO*
Notes Other relevant information	

Kosovo–Allied Force 1999	
Likelihood of attack indicators	
A. Parties: 1. Conflict between states. 2. Conflict between non-state armed groups and state(s) or civil wars. 3. Conflict between non-state armed groups.	**Conflict between non-state armed groups and state(s) or civil wars.** **Conflict between states.** *The conflicting parties in the Kosovo war were: Kosovo Liberation Army, Republic of Kosovo, Federal Republic of Yugoslavia and NATO (since 24 March 1999). It started in late February 1998 and lasted until 11 June 1999.* *In early 1998, violence erupted within Kosovo between Yugoslavian (Serb) forces and the Kosovo Liberation Army (KLA). United Nations Security Council Resolution 1199, passed on 23 September 1998, demanded a ceasefire in Kosovo. On 13 October 1998, NATO's North Atlantic Council authorized activation orders for air strikes. The crisis intensified in November and December 1998. NATO launched Operation Allied Force on 24 March 1999.*
B. Armed conflict scale and/or tensions: 1. Terrorism and/or international political tension. 2. Insurgency (small-scale military activities) and/or medium increasing political tension. 3. Large-scale military activities and/or heightened international political tension.	**Large-scale military activities.** *Operation Allied Force involved close to 1000 NATO aircraft in an air campaign that lasted 78 days. NATO flew more than 38,000 sorties, of which 10,484 were strike sorties.*
C. Military air transport activities: 1. Military air transport activities not reported. 2. Occasional use of aircraft to transport ground troops or military equipment. 3. More than occasional use of aircraft to transport ground troops or military equipment by at least one party).	**More than occasional 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 airways and close to civil aircraft cruising altitudes).** *3 x AWACS overland orbits manned 24-hrs.* *EC–130s served as Airborne Battlefield Command and Control Center (ABCCC).* *C–17, C–5 Galaxy and C–130 were used to transport cargo into certain airfields.*
D. Military air combat activities: 1. No military air combat activities. 2. Small-scale (occasional) military air combat activities and/or some activities above FL 250. 3. Large- to medium-scale military air combat activities and/or regular activities above FL 250	**Large- to medium-scale military air combat activities.** *Military combat activities involving multiple regional parties and NATO.*
E. Known attacks: 1. Conflict area without publicly reported security incidents involving military and civil aviation. 2. Conflict area with single security-related reported incident/accident involving military (or civil) aviation. 3. Conflict area with multiple reported security-related incident/accident involving military (or civil) aviation.	**Conflict area with multiple reported incident/accident for military (or civil) aviation.** *On 24 March 1999 two Yugoslav Air Force MiG-29s were shot down by two USAF F-15Cs with AMRAAM missiles. Different sources claim one of the MiG-29s was downed by friendly ground fire.* *On 24 March 1999, during Operation Allied Force, a Dutch F-16AM J-063 shot down a Yugoslavian MiG-29 with an AMRAAM missile. The pilot of the stricken jet ejected safely.* *On 26 March 1999 two Yugoslavian MiG-29s were shot down by two USAF F-15Cs with AMRAAM missiles.* *On 27 March 1999 an American F-117A Nighthawk stealth bomber was shot down over Belgrade by a Soviet-made S-125E SAM. The pilot ejected safely and the plane's wreckage was recovered by Serbian special forces.* *On 2 May 1999 a USAF F-16CG was shot down over Serbia. It was downed by an S-125 Neva SAM (NATO: SA-3) near Nakucani. The pilot ejected and was later rescued by a combat search-and-rescue mission.* *On 4 May 1999 a lone Yugoslav MiG-29 attempted to intercept a large NATO formation that was returning to base. It was engaged by a pair of USAF F-16CJs from the 78th Fighter Squadron and shot down with an AIM-120, killing the pilot. The falling wreckage was hit by a Strela 2M fired by the Yugoslav army in error.* *On 4 May 1999 a Yugoslav Mi-8T was shot down by a French Super Etendard.*

Kosovo–Allied Force 1999 *(continued)*	
F. Capability to attack by at least one party: 1. No information for capability to attack with range above FL 250. 2. Air-to-air missiles launched from fighter aircraft (and no SAMs). 3. Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level.	**Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level.** *Both parties in this conflict had the capability to hit civilian aircraft in the region.* ***Federal Republic of Yugoslavia:*** *S-75 Dvina (NATO reporting name SA2) is a Soviet-designed, high-altitude air defence system with engagement altitude of 82,000 ft.* *S-125 Neva/Pechora (NATO reporting name SA3), that shot down American F-117A Nighthawk stealth bomber, F-16 and possibly some UAVs, mobile surface-to-air missile system is a Soviet surface to air missile system with engagement altitude of 59,000 ft.* *2K12 Kub mobile SAM. The 2K12 "Kub" (NATO reporting name: SA-6 "Gainful") low to medium-level air defence system designed to protect ground forces from air attack with engagement altitude, depending on the modification, of up to 46,000ft.* *Other capabilities for lower altitudes: 9K32 Strela-2 (SA-7), 9K31 Strela-1 (SA-9), 9K35 Strela-10 (SA-13), 9K34 Strela-3 (SA-14), 9K310 Igla-1 (SA-16) and mobile AAA batteries (multiple types)* *Air-to-air missiles launched from fighter aircraft.* *Multiple NATO fighters with radar and IR AAMs.* *SAM capability for warships in the region — DDGs (guided missile destroyers) protecting the carrier group.*
G. Capability to differentiate between civil and military aircraft: 1. Differentiation supported by radar, electronic identification and non-cooperative target recognition systems measuring signature using acoustic and thermal radiation, radio emissions, radar techniques. 2. Differentiation supported by radar and electronic identification (e.g., identification, friend or foe (IFF), secondary surveillance radar (SSR). 3. Differentiation supported only by radar tracks.	**Differentiation supported by radar and electronic identification (e.g. identification, friend or foe (IFF), SSR).**
H. SAM/AAM operators' experience and chain of command: 1. Regular forces. 2. SAMs in the possession of irregular military forces OR an absence of robust SAM/AAM command and control procedures for authorizing launch. 3. SAMs in the possession of irregular military forces AND an absence of robust SAM/AAM command and control procedures for authorizing launch.	**Regular forces.**
I. Known intent to attack: 1. Known intent to attack military aircraft. 2. Known intent to attack civil aircraft. 3. Communication of intent and a plan to attack civil aircraft or actual attack against civil aircraft.	**Known intent to attack military aircraft.** *See the incidents and accidents reported in section E.*
J. Civil aircraft operations over or close to conflict zone (with and without the airspace restrictions if any): 1. No or occasional traffic. 2. Small to moderate traffic volume (for example restricted to arrivals and departures to airports). 3. Considerable traffic volume, including international overflights.	**No civil aircraft operations during the airspace restrictions.** *Considerable traffic volume, including international overflights prior the restrictions.* *The airspace of Federal Republic of Yugoslavia was characterized by considerable overflight traffic volume, with overflights from Turkey, Greece, Middle East and Asia Pacific to Central and Western Europe.*

Kosovo–Allied Force 1999 *(continued)*	
Airspace Closure	
Airspace restrictions Describes when airspace restrictions were introduced, what airspace they affected and how they evolved over time including: • Restrictions by the responsible for the airspace sovereign authority (the state). • Restrictions by others — third parties and/or neighboring states.	**1. Restrictions by the responsible for the airspace sovereign authority (the state)** *No information found* **2. Others** *24 Mar 1999–10 June 1999* *The entire airspace of Federal Republic of Yugoslavia, Slovenia, Croatia, Bosnia and Herzegovina, FYROM, parts of southern Hungary, western Romania and Bulgaria, northern Greece, entire airspace over Albania and almost entire airspace over Adriatic Sea was closed.* *The airspace closure was immediately associated with Operation Allied Force and there were no prior airspace restrictions for the period of escalation starting in 1998.* *The airspace of Federal Republic of Yugoslavia was opened for civilian traffic in Sep 1999.* *An air security zone, including the airspace of Kosovo, remained closed for civil aircraft until 3 April 2014.*
Reasons for airspace restrictions Describes the reasons for airspace restrictions, weapons known to be in the area and their range/capabilities, what traffic was vulnerable, known or suspected intent to attack civil aviation and whether there was concern about unintentional attack.	*NATO air strikes.* *NATO aircraft and Tomahawk missiles from the air and Federal Republic of Yugoslavia air defence systems from the ground.* *US Navy Carrier Air Group in Adriatic Sea.*
Decision-making Describes the source(s) of the threat information; who made the decision regarding the restrictions and with whom was the decision coordinated; was the decision-making process different from the normal or standard airspace decision-making process.	*Decision to close the described airspace came from all neighbouring states in order to stop the traffic to/from/over Federal Republic of Yugoslavia.* *Technical support provided by EUROCONTROL. All flight plans to/from and over Federal Republic of Yugoslavia were rejected.*
Promulgation Describes how the restrictions were published, number of the NOTAMs if available, AIS.	*NOTAM and EUROCONTROL AIM.* *A substantial preparation with the inclusion of all states whose airspace was used by NATO air forces.* *EUROCONTROL participated in coordination and provided technical support.*
Notes Other relevant information	***References:*** *U.S. Central Intelligence Agency,* Yugoslavia: Military Dynamics of a Potential Civil War, *March 1991* *U.S. Central Intelligence Agency,* Combat forces in former Yugoslavia, *July 1993* *Daniel L. Haulman,* Air Power History, *"The U.S. Air Force in the Air War Over Serbia 1999," Summer 2015* *Daniel L. Haulman, Air Force historical Research Agency,* MANNED AIRCRAFT LOSSES OVER THE FORMER YUGOSLAVIA, 1994–1999, *October 2009*

Libya 2011	
Likelihood of attack indicators	
A. Parties: 1. Conflict between states. 2. Conflict between non-state armed groups and state(s) or civil wars. 3. Conflict between non-state armed groups.	**Conflict between non-state armed groups and state(s) or civil wars.** **Conflict between states.** *The conflicting parties in the Kosovo war were: Kosovo Liberation Army, Republic of Kosovo, Federal Republic of Yugoslavia and NATO (since 24 March 1999). It started in late February 1998 and lasted until 11 June 1999.* *In early 1998, violence erupted within Kosovo between Yugoslavian (Serb) forces and the Kosovo Liberation Army (KLA). United Nations Security Council Resolution 1199, passed on 23 September 1998, demanded a ceasefire in Kosovo. On 13 October 1998, NATO's North Atlantic Council authorized activation orders for air strikes. The crisis intensified in November and December 1998. NATO launched Operation Allied Force on 24 March 1999.*
B. Armed conflict scale and/or tensions: 1. Terrorism and/or international political tension. 2. Insurgency (small-scale military activities) and/or medium increasing political tension. 3. Large-scale military activities and/or heightened international political tension.	**Large-scale military activities.** *Operation Allied Force involved close to 1000 NATO aircraft in an air campaign that lasted 78 days. NATO flew more than 38,000 sorties, of which 10,484 were strike sorties.*
C. Military air transport activities: 1. Military air transport activities not reported. 2. Occasional use of aircraft to transport ground troops or military equipment. 3. More than occasional use of aircraft to transport ground troops or military equipment by at least one party).	**More than occasional 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 airways and close to civil aircraft cruising altitudes).** *3 x AWACS overland orbits manned 24-hrs.* *EC–130s served as Airborne Battlefield Command and Control Center (ABCCC).* *C–17, C–5 Galaxy and C–130 were used to transport cargo into certain airfields.*
D. Military air combat activities: 1. No military air combat activities. 2. Small-scale (occasional) military air combat activities and/or some activities above FL 250. 3. Large- to medium-scale military air combat activities and/or regular activities above FL 250	**Large- to medium-scale military air combat activities.** *Military combat activities involving multiple regional parties and NATO.*
E. Known attacks: 1. Conflict area without publicly reported security incidents involving military and civil aviation. 2. Conflict area with single security-related reported incident/accident involving military (or civil) aviation. 3. Conflict area with multiple reported security-related incident/accident involving military (or civil) aviation.	**Conflict area with multiple reported incident/accident for military (or civil) aviation.** *On 24 March 1999 two Yugoslav Air Force MiG-29s were shot down by two USAF F-15Cs with AMRAAM missiles. Different sources claim one of the MiG-29s was downed by friendly ground fire.* *On 24 March 1999, during Operation Allied Force, a Dutch F-16AM J-063 shot down a Yugoslavian MiG-29 with an AMRAAM missile. The pilot of the stricken jet ejected safely.* *On 26 March 1999 two Yugoslavian MiG-29s were shot down by two USAF F-15Cs with AMRAAM missiles.* *On 27 March 1999 an American F-117A Nighthawk stealth bomber was shot down over Belgrade by a Soviet-made S-125E SAM. The pilot ejected safely and the plane's wreckage was recovered by Serbian special forces.* *On 2 May 1999 a USAF F-16CG was shot down over Serbia. It was downed by an S-125 Neva SAM (NATO: SA-3) near Nakucani. The pilot ejected and was later rescued by a combat search-and-rescue mission.* *On 4 May 1999 a lone Yugoslav MiG-29 attempted to intercept a large NATO formation that was returning to base. It was engaged by a pair of USAF F-16CJs from the 78th Fighter Squadron and shot down with an AIM-120, killing the pilot. The falling wreckage was hit by a Strela 2M fired by the Yugoslav army in error.* *On 4 May 1999 a Yugoslav Mi-8T was shot down by a French Super Etendard.*

Libya 2011 *(continued)*	
F. Capability to attack by at least one party: 1. No information for capability to attack with range above FL 250. 2. Air-to-air missiles launched from fighter aircraft (and no SAMs). 3. Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level.	**Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level.** *Both parties in this conflict had the capability to hit civilian aircraft in the region.* ***Armed Forces of the Libyan Arab Jamahiriya:*** *Crotale, SA-7 Grail, SA-9/SA-13 SAMs, and AA guns in Army service. A separate Air Defence Command had SA-2 Guideline, SA-3 Goa, SA-5 Gammon, and SA-8b Gecko, plus guns.* *S-75 Dvina (NATO reporting name SA2) is a Soviet-designed, high-altitude air defence system with engagement altitude of 82,000 ft. S-75 — 6 Brigades with 18 launchers each;* *S-125 Neva/Pechora (NATO reporting name SA3) mobile surface-to-air missile system is a Soviet SAM system with engagement altitude of 59,000 ft. S125 — 9 Brigades with 12 launchers each;* *S-200 (NATO reporting name SA-5) is a very long range, medium-to-high altitude SAM system to defend large areas from bomber attack or other strategic aircraft with engagement altitude of 130,000 ft. S-200– 8 battalions of six launchers each at four sites and an estimated 380 missiles.* *The Crotale EDIR ("InfraRed Differential Ecartometry") is an all-weather short-range anti-air missile, originally developed by France, which can be used to intercept low-flight anti-ship missiles and aircraft with engagement altitude of up to 30,000 ft. Crotale — nine acquisition and 27 firing units.* *The 9K33 Osa (NATO reporting name SA-8 Gecko) is a mobile, low-altitude, short-range tactical surface-to-air missile system designed in the Soviet Union with engagement altitude of 39,000 ft. 9K33 Osa/ SA-8 Gecko — 50* *9K38 Igla (NATO reporting name SA-18 Grouse) is a Russian/Soviet man-portable infrared homing surface-to-air missile with and engagement altitude of 11,000 ft. 9K38 Igla — 380;* *50 2K12 Kub mobile SAM. The 2K12 "Kub" (NATO reporting name: SA-6 "Gainful") low to medium-level air defence system designed to protect ground forces from air attack with engagement altitude, depending on the modification, of up to 46,000 ft.* *Other capabilities for lower altitudes: 200 9K34 Strela-3 (SA-14) — 278;* ***The National Transitional Council of Libya — The National Liberation Army:*** *9K32 Strela-2 (SA-7)* ***NATO:*** *NATO had the capability to hit civilian aircraft in the region.*
G. Capability to differentiate between civil and military aircraft: 1. Differentiation supported by radar, electronic identification and non-cooperative target recognition systems measuring signature using acoustic and thermal radiation, radio emissions, radar techniques. 2. Differentiation supported by radar and electronic identification (e.g., identification, friend or foe (IFF), secondary surveillance radar (SSR). 3. Differentiation supported only by radar tracks.	**Differentiation supported only by radar tracks.** **NATO had more sophisticated capabilities to differentiate.**
H. SAM/AAM operators' experience and chain of command: 1. Regular forces. 2. SAMs in the possession of irregular military forces OR an absence of robust SAM/AAM command and control procedures for authorizing launch. 3. SAMs in the possession of irregular military forces AND an absence of robust SAM/AAM command and control procedures for authorizing launch.	**Regular forces.**

Libya 2011 *(continued)*	
I. Known intent to attack: 1. Known intent to attack military aircraft. 2. Known intent to attack civil aircraft. 3. Communication of intent and a plan to attack civil aircraft or actual attack against civil aircraft.	**Known intent to attack military aircraft.** *See the incidents and accidents reported in section E.*
J. Civil aircraft operations over or close to conflict zone (with and without the airspace restrictions if any): 1. No or occasional traffic. 2. Small to moderate traffic volume (for example restricted to arrivals and departures to airports). 3. Considerable traffic volume, including international overflights.	**No or occasional traffic after the restrictions.** **Moderate traffic volume, including international overflights prior the restrictions.** *The infrastructure of Libya's air traffic control has largely been destroyed and only sporadic military air activities are conducted. On 18 March the Libyan airspace was closed from some neighbours.*
Airspace Closure	
Airspace restrictions Describes when airspace restrictions were introduced, what airspace they affected and how they evolved over time including: • Restrictions by the responsible for the airspace sovereign authority (the state). • Restrictions by others — third parties and/or neighboring states.	**1. Restrictions by the responsible for the airspace sovereign authority (the state)** *No information found* **2. Others** *On 18 March the Libyan airspace was closed, supported by countries with neighbouring airspace, to all traffic, reacting to a U.N. resolution.* *Beginning in early November 2011, a step-by-step approach has been followed for a safe transition of airspace, owing to the coordination between ICAO, EUROCONTROL, and the respective civil aviation authorities concerned (Malta, Tunisia, Egypt and Libya) and air traffic services over the central Mediterranean high seas and Libyan territory, as follows:* *Phase 1. The current situation, following the end of the no-fly zone in November, allowed the reopening of the main airports of Tripoli International, Tripoli Mitiga, Sabha, Benghazi and Misratah to civilian traffic.* *Phase 2. On 1 February 2012, two contingency north/south overflight routes were opened, allowing gradually increasing traffic as deemed necessary. The remaining routes will be released by the Libyan Civil Aviation Authority as soon as the operational conditions are fulfilled.* *Phase 3. From 1 April to 3 May 2012, aviation authorities added more routes to the overflight system, and reopened new airports on a regular basis with their associated contingency routes.*
Reasons for airspace restrictions Describes the reasons for airspace restrictions, weapons known to be in the area and their range/capabilities, what traffic was vulnerable, known or suspected intent to attack civil aviation and whether there was concern about unintentional attack.	*UN Security Council Resolution 1973 was adopted on 17 March 2011. The resolution authorised member states to establish and enforce a no-fly zone over Libya, and to use "all necessary measures" to prevent attacks on civilians. The resolution was the legal basis for military intervention by the forces of NATO.*
Decision-making Describes the source(s) of the threat information; who made the decision regarding the restrictions and with whom was the decision coordinated; was the decision-making process different from the normal or standard airspace decision-making process.	*Decision to close the described airspace came from all neighbouring states.* *Technical support provided by EUROCONTROL.*
Promulgation Describes how the restrictions were published, number of the NOTAMs if available, AIS.	*NOTAM and EUROCONTROL actions.*
Notes Other relevant information	*References:* *UN Security Council, Resolution 1973 (2011), 17 March 2011* *UN Security Council, Resolution 2009 (2011), 16 September 2011* *Jaffe S.*, Airspace Closure and Civil Aviation, *2015*

Slovenia 1991	
Likelihood of attack indicators	
A. Parties: 1. Conflict between states. 2. Conflict between non-state armed groups and state(s) or civil wars. 3. Conflict between non-state armed groups.	**Conflict between non-state armed groups and state(s) or civil wars.** *The conflicting parties in the Slovenian war in 1991 were Slovenia and Yugoslavia. The belligerents Slovenian Territorial Defence and Slovenian police on one side and the Yugoslav People's Army on the other side.* *The war lasted from 27 June 1991 until 7 July 1991, when the Brioni Accords were signed.*
B. Armed conflict scale and/or tensions: 1. Terrorism and/or international political tension. 2. Insurgency (small-scale military activities) and/or medium increasing political tension. 3. Large-scale military activities and/or heightened international political tension.	**Insurgency or small-scale military activities.**
C. Military air transport activities: 1. Military air transport activities not reported. 2. Occasional use of aircraft to transport ground troops or military equipment. 3. More than occasional use of aircraft to transport ground troops or military equipment by at least one party).	**Occasional use of aircraft to transport ground troops or military equipment.**
D. Military air combat activities: 1. No military air combat activities. 2. Small-scale (occasional) military air combat activities and/or some activities above FL 250. 3. Large- to medium-scale military air combat activities and/or regular activities above FL 250	**Small-scale military air combat activities.**
E. Known attacks: 1. Conflict area without publicly reported security incidents involving military and civil aviation. 2. Conflict area with single security-related reported incident/accident involving military (or civil) aviation. 3. Conflict area with multiple reported security-related incident/accident involving military (or civil) aviation.	**Conflict area with single reported incident/accident involving military (or civil) aviation.** *On 27 June 1991, the Slovenian Territorial Defence shot down two Yugoslav People's Army helicopters with SA-7 missiles.*

Slovenia 1991 *(continued)*	
F. Capability to attack by at least one party: 1. No information for capability to attack with range above FL 250. 2. Air-to-air missiles launched from fighter aircraft (and no SAMs). 3. Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level.	**Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising altitude.** ***Federal Republic of Yugoslavia:*** *At the start of the war, the Yugoslav national air defence force possessed more than 100 search radars, eight battalions of SA-2s, six battalions of SA-3s, one battalion of SA-5s, four battalions of SA-6/11s, and 15 regiments of anticraft guns. For support of the army, there were also SA-9, SA-13 mobile IR-guided SAMs, and thousands of SA-7 and SA-16 MANPADS.* *S-75 Dvina (NATO reporting name SA2) is a Soviet-designed, high-altitude air defence system with engagement altitude of 82,000 ft.* *S-125 Neva/Pechora (NATO reporting name SA3) mobile surface-to-air missile system is a Soviet-made SAM system with engagement altitude of 59,000ft.* *S-200 (NATO reporting name SA-5) is a very long range, medium-to-high altitude SAM system to defend large areas from bomber attack or other strategic aircraft. It has an engagement altitude of 130,000ft.* *2K12 Kub mobile SAM. The 2K12 "Kub" (NATO reporting name: SA-6 "Gainful") low- to medium-level air defence system designed to protect ground forces from air attack with engagement altitude, depending on the modification, of up to 46,000 ft.* *Other capabilities for lower altitudes: 9K32 Strela-2 (SA-7), 9K31 Strela-1 (SA-9), 9K35 Strela-10 (SA-13), 9K34 Strela-3 (SA-14), 9K310 Igla-1 (SA-16) and mobile AAA batteries (multiple types).* ***Slovenian Territorial Defence:*** *9K31 Strela-1 (SA-9) is a mobile, short-range, low altitude infra-red guided surface-to-air missile system and shoulder-fired 9K32 Strela-2 (SA-7).*
G. Capability to differentiate between civil and military aircraft: 1. Differentiation supported by radar, electronic identification and non-cooperative target recognition systems measuring signature using acoustic and thermal radiation, radio emissions, radar techniques. 2. Differentiation supported by radar and electronic identification (e.g., identification, friend or foe (IFF), secondary surveillance radar (SSR). 3. Differentiation supported only by radar tracks.	**Differentiation supported by radar and electronic identification (e.g., identification, friend or foe (IFF), secondary surveillance radar (SSR).**
H. SAM/AAM operators' experience and chain of command: 1. Regular forces. 2. SAMs in the possession of irregular military forces OR an absence of robust SAM/AAM command and control procedures for authorizing launch. 3. SAMs in the possession of irregular military forces AND an absence of robust SAM/AAM command and control procedures for authorizing launch.	**Regular forces.**
I. Known intent to attack: 1. Known intent to attack military aircraft. 2. Known intent to attack civil aircraft. 3. Communication of intent and a plan to attack civil aircraft or actual attack against civil aircraft.	**Known intent to attack military aircraft.** *See the incidents and accidents reported in section E.*

Slovenia 1991 *(continued)*	
J. Civil aircraft operations over or close to conflict zone (with and without the airspace restrictions if any): 1. No or occasional traffic. 2. Small to moderate traffic volume (for example restricted to arrivals and departures to airports). 3. Considerable traffic volume, including international overflights.	**No or occasional traffic.** **Moderate traffic volume, including international overflights prior the restrictions.**
Airspace Closure	
Airspace restrictions Describes when airspace restrictions were introduced, what airspace they affected and how they evolved over time including: • Restrictions by the responsible for the airspace sovereign authority (the state). • Restrictions by others — third parties and/or neighboring states.	**1. Restrictions by the responsible for the airspace sovereign authority (the state)** *On 26 June, at 1330, the Ljubljana airport and the airspace above Slovenia was closed by the federal air traffic control.* *The federal air traffic control closed FIR Zagreb on 31 August at 15:00.* *On 1 September at 0930 FIR Zagreb was opened.* *On 15 September FIR Zagreb was again closed at 14:52.* *After the airports in Ljubljana and Zagreb were closed, and because of the serious threat of further attacks in Slovenia by the federal army, high increases in insurance premiums for individual flights in Croatia and because of all the general uncertainties, the management of Adria Airways decided to transfer its operations abroad after 8 July 1991. Adria aircraft landed at airports in Klagenfurt, Frankfurt and Vienna.* *On 15 January 1992 an agreement was reached with Austria for provision of air traffic control in Slovenian airspace. At midnight on 22 January 1992 Slovenian airspace was opened when an agreement between Slovenian and Austrian aviation authorities came into force.* *The Ljubljana airport was shutdown, with rare exceptions, until February 1992.*
Reasons for airspace restrictions Describes the reasons for airspace restrictions, weapons known to be in the area and their range/capabilities, what traffic was vulnerable, known or suspected intent to attack civil aviation and whether there was concern about unintentional attack.	*The reason for the initial restrictions was "technical shortcomings."* *The closure of airspace followed immediately after 25 June when Slovenia passed its act of independence and coincided with a plan the Slovenian government had already put into action to seize control of the republic's border posts and the international airport.*
Decision-making Describes the source(s) of the threat information; who made the decision regarding the restrictions and with whom was the decision coordinated; was the decision-making process different from the normal or standard airspace decision-making process.	*The Brioni Declaration stated in the paragraph on air transport that there is only one air traffic control for the whole of Yugoslavia and that all domestic and international air traffic through Yugoslavia would be supervised and provided by the competent federal authority.* *Subsequently, in January 1992 Slovenia agreed with Austria for the provision of air traffic control.*
Promulgation Describes how the restrictions were published, number of the NOTAMs if available, AIS.	*References not found.*
Notes Other relevant information	***References:*** *U.S. Central Intelligence Agency,* Yugoslavia: Military Dynamics of a Potential Civil War, *March 1991* *Adria Airways* Kronika *1991* *U.S. Central Intelligence Agency,* Combat forces in former Yugoslavia, *July 1993* *Daniel L. Haulman, Air Force historical Research Agency,* MANNED AIRCRAFT LOSSES OVER THE FORMER YUGOSLAVIA, *1994–1999, October 2009*

Afghanistan 2001–present	
Likelihood of attack indicators	
A. Parties: 1. Conflict between states. 2. Conflict between non-state armed groups and state(s) or civil wars. 3. Conflict between non-state armed groups.	**Conflict between non-state armed groups and state(s) or civil wars.**
B. Armed conflict scale and/or tensions: 1. Terrorism and/or international political tension. 2. Insurgency (small-scale military activities) and/or medium increasing political tension. 3. Large-scale military activities and/or heightened international political tension.	**Insurgency (small-scale military activities) and/or medium increasing political tension.**
C. Military air transport activities: 1. Military air transport activities not reported. 2. Occasional use of aircraft to transport ground troops or military equipment. 3. More than occasional use of aircraft to transport ground troops or military equipment by at least one party).	**More than occasional use of aircraft to transport ground troops or military equipment by at least one party).**
D. Military air combat activities: 1. No military air combat activities. 2. Small-scale (occasional) military air combat activities and/or some activities above FL 250. 3. Large- to medium-scale military air combat activities and/or regular activities above FL 250	**Small-scale (occasional) military air combat activities and/or some activities above FL 250.**
E. Known attacks: 1. Conflict area without publicly reported security incidents involving military and civil aviation. 2. Conflict area with single security-related reported incident/accident involving military (or civil) aviation. 3. Conflict area with multiple reported security-related incident/accident involving military (or civil) aviation.	**Conflict area with multiple reported security-related incident/accident involving military (or civil) aviation.**
F. Capability to attack by at least one party: 1. No information for capability to attack with range above FL 250. 2. Air-to-air missiles launched from fighter aircraft (and no SAMs). 3. Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level.	**Air-to-air missiles launched from fighter aircraft (and no SAMs).** *Afghan fighter presence 1989-2001, anti-aircraft artillery (AAA) capable of reaching cruising levels and MANPADS that, because of the specific high terrain, could reach cruising altitudes as well.* *2001 — Coalition fighter presence.*
G. Capability to differentiate between civil and military aircraft: 1. Differentiation supported by radar, electronic identification and non-cooperative target recognition systems measuring signature using acoustic and thermal radiation, radio emissions, radar techniques. 2. Differentiation supported by radar and electronic identification (e.g., identification, friend or foe (IFF), secondary surveillance radar (SSR). 3. Differentiation supported only by radar tracks.	**Differentiation supported by radar, electronic identification and non-cooperative target recognition systems measuring signature using acoustic and thermal radiation, radio. (Applicable only to coalition forces)** **CAUTION: Use of MANPADS and AAA by insurgent or irregular forces limited to visual differentiation**

Afghanistan 2001–present *(continued)*	
H. SAM/AAM operators' experience and chain of command: 1. Regular forces. 2. SAMs in the possession of irregular military forces OR an absence of robust SAM/AAM command and control procedures for authorizing launch. 3. SAMs in the possession of irregular military forces AND an absence of robust SAM/AAM command and control procedures for authorizing launch.	**SAMs in the possession of irregular military forces AND an absence of robust SAM/AAM command and control procedures for authorizing launch** *Residual Strela and Stinger MANPADS, plus possible AAA.*
I. Known intent to attack: 1. Known intent to attack military aircraft. 2. Known intent to attack civil aircraft. 3. Communication of intent and a plan to attack civil aircraft or actual attack against civil aircraft.	**Known intent to attack military aircraft.** **Known intent to attack civil aircraft.** *Multiple engagements by Pakistan forces of Afghan aircraft straying into northern Pakistan airspace during late 1980s.* *https://www.nytimes.com/1988/11/22/world/afghanistan-reports-30-dead-on-plane-downed-by-pakistan.html* *Multiple engagements of military traffic by irregular forces within Afghanistan during Russian occupation up to 1989.* *Multiple low-altitude engagements by irregular forces since 2001.*
J. Civil aircraft operations over or close to conflict zone (with and without the airspace restrictions if any): 1. No or occasional traffic. 2. Small to moderate traffic volume (for example restricted to arrivals and departures to airports). 3. Considerable traffic volume, including international overflights.	**Considerable traffic volume, including international overflights.**
Airspace Closure	
Airspace restrictions Describes when airspace restrictions were introduced, what airspace they affected and how they evolved over time including: • Restrictions by the responsible for the airspace sovereign authority (the state). • Restrictions by others — third parties and/or neighboring states.	**1. Restrictions by the responsible for the airspace sovereign authority (the state)** *No information found* **2. Others** *No information found* ***Note:*** *No formal airspace closures. Area was voluntarily avoided by civil traffic during Soviet occupation. Coalition air ops from 2001* *India permanent NOTAM dated 3 Apr 2001, overflight of Taliban-held territory prohibited, traffic would be denied future access to Indian airspace. Still valid. (VI G0047/01)* *Extant overflight warnings by NOTAM from USA,UK, France, Germany, advising min altitude 25,000 AGL, (FL330 for USA and Germany) https://www.easa.europa.eu/domains/air-operations/czibs/czib-2017-08r5*
Reasons for airspace restrictions Describes the reasons for airspace restrictions, weapons known to be in the area and their range/capabilities, what traffic was vulnerable, known or suspected intent to attack civil aviation and whether there was concern about unintentional attack.	*Presence of anti-aviation weapons within Kabul FIR. USA NOTAM references potential for engagement by certain MANPADS below FL 330.*
Decision-making Describes the source(s) of the threat information; who made the decision regarding the restrictions and with whom was the decision coordinated; was the decision-making process different from the normal or standard airspace decision-making process.	***National advisories only. Standard decision-making from appropriate national authorities.*** *No warnings issued by Afghan government.*

Afghanistan 2001–present *(continued)*	
Promulgation Describes how the restrictions were published, number of the NOTAMs if available, AIS.	*NOTAM, AIS. Germany NOTAM: B0437/20. USA A0038/20. UK AIP ENR 1.4.5 valid from 8 Oct 2015 https://www.aurora.nats.co.uk/htmlAIP/Publications/2018-11-08-AIRAC/html/eAIP/EG-ENR-1.1-en-GB.html*
Notes Other relevant information	***References:*** *Jaffe S.,* Airspace Closure and Civil Aviation*, 2015*

Armenia Azerbaijan	
Likelihood of attack indicators	
A. Parties: 1. Conflict between states. 2. Conflict between non-state armed groups and state(s) or civil wars. 3. Conflict between non-state armed groups.	**Conflict between states.** **Conflict between non-state armed groups and state(s) or civil wars.** *After the 2016 Armenian–Azerbaijani clashes, in which an estimated 350 troops and civilians from both sides were killed, Azerbaijan declared a unilateral cease fire (the clashes started when Azerbaijani forces launched strikes to regain control of territory controlled by the Armenia-backed breakaway Nagorno-Karabakh.)* *The two countries are still technically at war and the Azerbaijani government regularly threatens to retake Nagorno-Karabakh by military force* *The Four-Day War, or April War, began along the Nagorno-Karabakh line of contact on 1 April 2016 with the Nagorno-Karabakh Defense Army, backed by the Armenian Armed Forces, on one side and the Azerbaijani Armed Forces on the other.* *The clashes have been defined as "the worst" since the 1994 ceasefire agreement signed by Nagorno-Karabakh, Azerbaijan and Armenia.*
B. Armed conflict scale and/or tensions: 1. Terrorism and/or international political tension. 2. Insurgency (small-scale military activities) and/or medium increasing political tension. 3. Large-scale military activities and/or heightened international political tension.	**Large-scale military activities and/or heightened international political tension.**
C. Military air transport activities: 1. Military air transport activities not reported. 2. Occasional use of aircraft to transport ground troops or military equipment. 3. More than occasional use of aircraft to transport ground troops or military equipment by at least one party).	**More than occasional 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 airways and close to civil aircraft cruising altitudes).** *The scale of the military actions, the number of forces and combat equipment involved, such as heavy artillery, including use of cluster munition, tanks, air forces and suicide drones, as well as the statements of Azerbaijani officials clearly indicate that the events of 2–5 April were not a spontaneous escalation, but a carefully planned and prepared military operation, aimed at resolving the Karabakh conflict by the use of force.*
D. Military air combat activities: 1. No military air combat activities. 2. Small-scale (occasional) military air combat activities and/or some activities above FL 250. 3. Large- to medium-scale military air combat activities and/or regular activities above FL 250	**Small-scale military air combat activities.**
E. Known attacks: 1. Conflict area without publicly reported security incidents involving military and civil aviation. 2. Conflict area with single security-related reported incident/accident involving military (or civil) aviation. 3. Conflict area with multiple reported security-related incident/accident involving military (or civil) aviation.	**Conflict area with multiple reported security-related incident/accident involving military (or civil) aviation.** *February 2017 — Fighting flares up in Nagorno-Karabakh between the Azerbaijani army and ethnic Armenian troops along the line separating them.* *Azerbaijan's air force was composed of 45 combat aircraft which were often piloted by experienced Russian and Ukrainian mercenaries from the former Soviet military. They flew mission sorties over Karabakh with such sophisticated jets as the MiG-25 and Sukhoi Su-24 and with older-generation Soviet fighter bombers, such as the MiG-21.* *Several were shot down over the city by Armenian forces and according to one of the pilots' commanders, with assistance provided by the Russians. Many of these pilots risked the threat of execution by Armenian forces if they were shot down. The setup of the defense system severely hampered Azerbaijan's ability to carry out and launch more air strikes.* *Azerbaijani fighter jets attacked civilian airplanes too. An Armenian civil aviation Yak-40 plane traveling from Stepanakert airport to Yerevan with total of 34 passengers and crew was attacked by an Azerbaijani SU-25. Though suffering engine failure and a fire in rear of the plane, it eventually made a safe landing in Armenian territory*

Armenia Azerbaijan *(continued)*	
F. Capability to attack by at least one party: 1. No information for capability to attack with range above FL 250. 2. Air-to-air missiles launched from fighter aircraft (and no SAMs). 3. Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level.	**Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising altitude.** *Azerbaijani MiG-25 was shot down near Cherban on 20 August 1992 by an SA-7A MANPADS.* *Azerbaijani Su-22 was shot down on 19 February 1994 over Verdenisskiy by an SA-14 MANPADS.* *Azerbaijani Su-25 flown by Kurbanov was shot down over Mkhrdag on 13 June 1992 by a MANPADS.* *Azerbaijani Su-25 shot down near Malibeili on 10 October 1992 using MANPADS.* ***Azerbaijan**: BUK SAM, S-300PMU2, Perchora-T 2M SAM* ***Armenia**: BUK, OSA, Pechora-T2M, 2K11Krug, SA-13 Gopher, KUB-M-3, S-300PS, S-300PT-1*
G. Capability to differentiate between civil and military aircraft: 1. Differentiation supported by radar, electronic identification and non-cooperative target recognition systems measuring signature using acoustic and thermal radiation, radio emissions, radar techniques. 2. Differentiation supported by radar and electronic identification (e.g., identification, friend or foe (IFF), secondary surveillance radar (SSR). 3. Differentiation supported only by radar tracks.	**Differentiation supported by radar and electronic identification (e.g., identification, friend or foe (IFF), secondary surveillance radar (SSR).**
H. SAM/AAM operators' experience and chain of command: 1. Regular forces. 2. SAMs in the possession of irregular military forces OR an absence of robust SAM/AAM command and control procedures for authorizing launch. 3. SAMs in the possession of irregular military forces AND an absence of robust SAM/AAM command and control procedures for authorizing launch.	**Regular forces.** *Azerbaijan's Defense Ministry said its forces on May 15, 2017 "destroyed an Osa air defense system along with its crew." The ministry added that the system's deployment near the line of control was a "provocation" and a threat to Azerbaijani aircraft.* *All versions of the 9K33 feature all-in-one 9A33 transporter erector launcher and radar (TELAR) vehicles which can detect, track and engage aircraft independently or with the aid of regimental surveillance radars. The six-wheeled transport vehicles BAZ-5937 are fully amphibious and air transportable. The road range is about 500 km.*
I. Known intent to attack: 1. Known intent to attack military aircraft. 2. Known intent to attack civil aircraft. 3. Communication of intent and a plan to attack civil aircraft or actual attack against civil aircraft.	**Communication of intent and a plan to attack civil aircraft or actual attack against civil aircraft — reference 1991 hostile events sample.**
J. Civil aircraft operations over or close to conflict zone (with and without the airspace restrictions if any): 1. No or occasional traffic. 2. Small to moderate traffic volume (for example restricted to arrivals and departures to airports). 3. Considerable traffic volume, including international overflights.	**No traffic after the restrictions.** **Moderate traffic volume, mainly restricted to arrivals and departures to airports prior to the restrictions.**
Airspace Closure	
Airspace restrictions Describes when airspace restrictions were introduced, what airspace they affected and how they evolved over time including: • Restrictions by the responsible for the airspace sovereign authority (the state). • Restrictions by others — third parties and/or neighboring states.	**1. Restrictions by the responsible for the airspace sovereign authority (the state)** *Restricted* A0024/11 NOTAMN Q) UBBA/QRPXX/IV/NBO/W /000/999/3936N04642E045 A) UBBA B) 1102111240 C) PERM E) ACCORDING TO AIP OF AZERBAIJAN REPUBLIC REF.ENR 5.1 DUE TO CONFLICT SITUATION THE PROHIBITED AREA UBP3 GND/UNL IS ESTABLISHED OVER THE TERRITORY OF THE NAGORNY KARABAKH AND CONTROLLED BY THE MINISTRY OF DEFENSE OF THE REPUBLIC OF AZERBAIJAN. INTERCEPTION OF OFFENDERS BY THE AIR FORSE IS MANDATORY ACTION F) GND G) UNL

Armenia Azerbaijan *(continued)*	
Reasons for airspace restrictions Describes the reasons for airspace restrictions, weapons known to be in the area and their range/ capabilities, what traffic was vulnerable, known or suspected intent to attack civil aviation and whether there was concern about unintentional attack.	*Conflict*
Decision-making Describes the source(s) of the threat information; who made the decision regarding the restrictions and with whom was the decision coordinated; was the decision-making process different from the normal or standard airspace decision-making process.	
Promulgation Describes how the restrictions were published, number of the NOTAMs if available, AIS.	ICAO NOTAM A0024/11 NOTAMN Q) UBBA/QRPXX/IV/NBO/W /000/999/3936N04642E045
Notes Other relevant information	***References:*** *wikipedia.org. wikipedia.org/wiki/missile_system* *Wordpress.com Russian supplied defense systems* *Hoge, James F. (2010).* The Clash of Civilizations: The Debate. *Council on Foreign Relations,* Eastern Europe, Russia and Central Asia. *London: Europa Publications. 2002. p. 77., cfr.org*

Ivory Coast 2002–2004	
Likelihood of attack indicators	
A. Parties: 1. Conflict between states. 2. Conflict between non-state armed groups and state(s) or civil wars. 3. Conflict between non-state armed groups.	**Conflict between non-state armed groups and state(s) or civil wars.** *Official government forces, the National Army (FANCI), also called loyalists, formed and equipped essentially since 2003.* *Mercenaries recruited by president Gbagbo:* • *Belarusian pilots;* • *Former combatants of Liberia, including under-17 youths, forming the so-called "Lima militia";* • *New Forces (Forces Nouvelles, FN), ex-northern rebels;* • *Liberian government forces;* • *French military forces: troops sent within the framework of Operation Unicorn and under UN mandate (UNOCI);* • *Soldiers of the Economic Community of West African States (ECOWAS), White helmets, also under the UN;* • *NATO forces.*
B. Armed conflict scale and/or tensions: 1. Terrorism and/or international political tension. 2. Insurgency (small-scale military activities) and/or medium increasing political tension. 3. Large-scale military activities and/or heightened international political tension.	**Insurgency or small-scale military activities.** *Mutiny in Abidjan by soldiers unhappy at being demobilized grows into full-scale rebellion, with Ivory Coast Patriotic Movement rebels seizing control of the north. They launched attacks in many cities, including Abidjan. Attacks were launched almost simultaneously in most major cities; the government forces maintained control of Abidjan and the south, but the new rebel forces had taken the north and based themselves in Bouake. Particular importance for the case study is the 2004 French–Ivorian clashes that represent air-to-air capability to attack.*
C. Military air transport activities: 1. Military air transport activities not reported. 2. Occasional use of aircraft to transport ground troops or military equipment. 3. More than occasional use of aircraft to transport ground troops or military equipment by at least one party).	**More than occasional 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 airways and close to civil aircraft cruising altitudes).** *Evidence of NATO and French mobilized and airborne force movement and deployments.*
D. Military air combat activities: 1. No military air combat activities. 2. Small-scale (occasional) military air combat activities and/or some activities above FL 250. 3. Large- to medium-scale military air combat activities and/or regular activities above FL 250	**Small-scale (occasional) military air combat activities.** *Military combat activities involving multiple regional parties and NATO.* *French forces conducted attacks on airports destroying SU25s and helicopters are shot down.*
E. Known attacks: 1. Conflict area without publicly reported security incidents involving military and civil aviation. 2. Conflict area with single security-related reported incident/accident involving military (or civil) aviation. 3. Conflict area with multiple reported security-related incident/accident involving military (or civil) aviation.	**Conflict area with multiple reported security-related incidents/accidents involving military (or civil) aviation.** *On 4 November 2004, Gbagbo ordered the counter-offensive to the rebel town of Bouaké to be backed by air strikes. France does not react but on 5 November put three Dassault Mirage F.1 jet fighters based in nearby Gabon on standby.* *On 6 November, two Ivorian Sukhoi Su-25 bombers, crewed by two Belarusian mercenaries and two Ivorian pilots, fired on the Ivorian rebels led by Issiaka Ouattara. One of the bombers attacked the French peacekeeping position in the town at 1 pm, killing nine French soldiers and wounding 31. The Ivorian government claimed the attack on the French was unintentional, but the French insisted that the attack had been deliberate.*
F. Capability to attack by at least one party: 1. No information for capability to attack with range above FL 250. 2. Air-to-air missiles launched from fighter aircraft (and no SAMs). 3. Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level.	**Air-to-air missiles launched from fighter aircraft (and no SAMs).**

Ivory Coast 2002–2004 *(continued)*	
G. Capability to differentiate between civil and military aircraft: 1. Differentiation supported by radar, electronic identification and non-cooperative target recognition systems measuring signature using acoustic and thermal radiation, radio emissions, radar techniques. 2. Differentiation supported by radar and electronic identification (e.g., identification, friend or foe (IFF), secondary surveillance radar (SSR). 3. Differentiation supported only by radar tracks.	**Differentiation supported by radar and electronic identification (e.g., identification, friend or foe (IFF), secondary surveillance radar (SSR).**
H. SAM/AAM operators' experience and chain of command: 1. Regular forces. 2. SAMs in the possession of irregular military forces OR an absence of robust SAM/AAM command and control procedures for authorizing launch. 3. SAMs in the possession of irregular military forces AND an absence of robust SAM/AAM command and control procedures for authorizing launch.	**Regular forces.**
I. Known intent to attack: 1. Known intent to attack military aircraft. 2. Known intent to attack civil aircraft. 3. Communication of intent and a plan to attack civil aircraft or actual attack against civil aircraft.	**Known intent to attack military aircraft.**
J. Civil aircraft operations over or close to conflict zone (with and without the airspace restrictions if any): 1. No or occasional traffic. 2. Small to moderate traffic volume (for example restricted to arrivals and departures to airports). 3. Considerable traffic volume, including international overflights.	**Moderate traffic volume, mainly restricted to arrivals and departures to airports prior to the restrictions.**
Airspace Closure	
Airspace restrictions Describes when airspace restrictions were introduced, what airspace they affected and how they evolved over time including: • Restrictions by the responsible for the airspace sovereign authority (the state). • Restrictions by others — third parties and/or neighboring states.	**1. Restrictions by the responsible for the airspace sovereign authority (the state)** *No information found* **2. Others** *No information found* ***Note:*** *Airport closures likely during raids*
Reasons for airspace restrictions Describes the reasons for airspace restrictions, weapons known to be in the area and their range/capabilities, what traffic was vulnerable, known or suspected intent to attack civil aviation and whether there was concern about unintentional attack.	
Decision-making Describes the source(s) of the threat information; who made the decision regarding the restrictions and with whom was the decision coordinated; was the decision-making process different from the normal or standard airspace decision-making process.	**State authorities and on-site commanders had the authority to make assessments and decisions regarding military threats.**

Ivory Coast 2002–2004 *(continued)*	
Promulgation Describes how the restrictions were published, number of the NOTAMs if available, AIS.	*No evidence of airspace closures or restrictions other than those cited for Port Bouët Airport.*
Notes Other relevant information	***References:*** *"Cote d'Ivoire, since 2002." Acig.org.* *"Civil War in Côte d Ivoire (Ivory Coast Civil War)." The Polynational War Memorial, www.war-memorial.net. Retrieved 5 June 2017.* *Asante, Molefi Kete (2014).* The History of Africa: The Quest for Eternal Harmony. *New York and London: Routledge.* *State.gov*

Indonesia (Aceh) 1990–1998	
Likelihood of attack indicators	
A. Parties: 1. Conflict between states. 2. Conflict between non-state armed groups and state(s) or civil wars. 3. Conflict between non-state armed groups.	**Conflict between non-state armed groups and state(s) or civil wars.** *Conflict was between the separatist Free Aceh Movement (GAM), which wanted autonomy, and the Indonesian state, which wanted centralized control.* *Separatist struggle waged for more than 30 years. After a period of dormancy, GAM re-emerged in the late 1980s, after sending combatants to Libya for training, by attacking police stations and military installations.*
B. Armed conflict scale and/or tensions: 1. Terrorism and/or international political tension. 2. Insurgency (small-scale military activities) and/or medium increasing political tension. 3. Large-scale military activities and/or heightened international political tension.	**Insurgency or small-scale military activities.** *In 1989, Jakarta responded to the expansion of GAM (some of the guerrillas were trained in Lybia) by launching a large-scale counter insurgency campaign. Aceh was officially transformed into a 'Military Operations Area' (Daerah Operasi Militer, DOM), widely understood as the imposition of martial law, for the next decade. Some scholars, however, question whether the DOM designation is correct. Unclear how many Indonesian troops were stationed in Aceh during DOM, but most sources estimate that about 12,000 security forces personnel were involved.* *DOM formally lifted in 1998.*
C. Military air transport activities: 1. Military air transport activities not reported. 2. Occasional use of aircraft to transport ground troops or military equipment. 3. More than occasional use of aircraft to transport ground troops or military equipment by at least one party).	**Occasional use of aircraft to transport ground troops or military equipment.** *Indonesian Air Force, as of 2002, contained two squadrons of C-130s, a number of small transport and rotary-wing aircraft; and three Boeing 737s used for sea surveillance.*
D. Military air combat activities: 1. No military air combat activities. 2. Small-scale (occasional) military air combat activities and/or some activities above FL 250. 3. Large- to medium-scale military air combat activities and/or regular activities above FL 250	**Small-scale (occasional) military air combat activities and/or some activities above FL 250.** *Indonesian Air Force operated a mix of Western- and Russian-built aircraft, including F-5s, F-16s and Su-30s.* *No information could be found on extent to which these and other combat aircraft were used.*
E. Known attacks: 1. Conflict area without publicly reported security incidents involving military and civil aviation. 2. Conflict area with single security-related reported incident/accident involving military (or civil) aviation. 3. Conflict area with multiple reported security-related incident/accident involving military (or civil) aviation.	**Conflict area without publicly reported security incidents involving military and civil aviation.** *Low-flying Indonesian military helicopters and fixed-wing observation planes likely would have been GAM targets, but no incidents uncovered during research. Military or civil aircraft operating at cruise altitude would have been out of the reach of insurgent weapons.*
F. Capability to attack by at least one party: 1. No information for capability to attack with range above FL 250. 2. Air-to-air missiles launched from fighter aircraft (and no SAMs). 3. Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level.	**Air-to-air missiles launched from fighter aircraft (and no SAMs).** *Heaviest weapons GAM rebels possessed were grenade launches and MANPADS* *Indonesian military has a mix of Western- and Soviet/Russian-made weapons systems, including naval vessels with SAMs and combat aircraft with air-to-air and air-to-ground attack capability.*
G. Capability to differentiate between civil and military aircraft: 1. Differentiation supported by radar, electronic identification and non-cooperative target recognition systems measuring signature using acoustic and thermal radiation, radio emissions, radar techniques. 2. Differentiation supported by radar and electronic identification (e.g., identification, friend or foe (IFF), secondary surveillance radar (SSR). 3. Differentiation supported only by radar tracks.	**No sufficient information** *Indonesian military and civil authorities have ability to differentiate. No indication that GAM could differentiate.*

Indonesia (Aceh) 1990–1998 *(continued)*	
H. SAM/AAM operators' experience and chain of command: 1. Regular forces. 2. SAMs in the possession of irregular military forces OR an absence of robust SAM/AAM command and control procedures for authorizing launch. 3. SAMs in the possession of irregular military forces AND an absence of robust SAM/AAM command and control procedures for authorizing launch.	**Regular forces.** *Indonesia has traditional military command structure.* *GAM rebels were irregular forces with some training from Libya.*
I. Known intent to attack: 1. Known intent to attack military aircraft. 2. Known intent to attack civil aircraft. 3. Communication of intent and a plan to attack civil aircraft or actual attack against civil aircraft.	**Known intent to attack military aircraft.** *In 2000, which is two years after the period in review, two chartered aircraft carrying oil field workers were hit by small arms fire, including one aircraft that was hit while it was taxiing, resulting in two injuries.*
J. Civil aircraft operations over or close to conflict zone (with and without the airspace restrictions if any): 1. No or occasional traffic. 2. Small to moderate traffic volume (for example restricted to arrivals and departures to airports). 3. Considerable traffic volume, including international overflights.	**Considerable traffic volume, including international overflights.** *Because of the number of islands in the Indonesian archipelago, the country has a well-developed and busy air transport system. Its proximity to Singapore and Malaysia, both of which have a lot of aviation traffic, and its location in a fast-growing region of the world result in a great deal of traffic. Indonesia tightly controls overflights.*
Airspace Closure	
Airspace restrictions Describes when airspace restrictions were introduced, what airspace they affected and how they evolved over time including: • Restrictions by the responsible for the airspace sovereign authority (the state). • Restrictions by others — third parties and/or neighboring states.	**1. Restrictions by the responsible for the airspace sovereign authority (the state)** *No information found* **2. Others** *No information found*
Reasons for airspace restrictions Describes the reasons for airspace restrictions, weapons known to be in the area and their range/capabilities, what traffic was vulnerable, known or suspected intent to attack civil aviation and whether there was concern about unintentional attack.	
Decision-making Describes the source(s) of the threat information; who made the decision regarding the restrictions and with whom was the decision coordinated; was the decision-making process different from the normal or standard airspace decision-making process.	*Information on decision-making during this period was not available, but generally speaking it is a process complicated by the proximity of Singapore and Malaysia and the high level of air traffic in the region. According to at least one document, Indonesia's military pilots must seek clearance from ATC at Singapore's Changi Airport before taking off on training flights. There is tension between Singapore and Indonesia over FIRs and control of sovereign airspace.*
Promulgation Describes how the restrictions were published, number of the NOTAMs if available, AIS.	

Indonesia (Aceh) 1990–1998 *(continued)*	
Notes Other relevant information	***References:*** *Miller, Michelle Ann. "The Conflict in Aceh: context precursors and catalysts,"* Accord *20, p. 12–15.* *Pan, Esther, Backgrounder, "Indonesia: The Aceh Peace Agreement," last updated 15 Sept. 2005.* *Rabasa, Angel and Haseman, John,* The Military and Democracy in Indonesia: Challenges, Politics and Power, *Rand National Security Research Division, 2002.* *Schulze, Kirsten E.,* The Free Aceh Movement: Anatomy of a Separatist Organization*, Policy Studies 2, East-West Center, ISBN 1-932728-03-1 (online version), 2004.* *Developing Countries Studies Center, "Singapore FIR Takeover Plan: Avoid the 1995 Experience," accessed 12 June 2020.*

Mali 2012–2015	
Likelihood of attack indicators	
A. Parties: 1. Conflict between states. 2. Conflict between non-state armed groups and state(s) or civil wars. 3. Conflict between non-state armed groups.	**Conflict between non-state armed groups and state(s) or civil wars.** *In January 2012 the Northern Mali Conflict or Mali Civil War started when several insurgent groups (mainly MNLA [National Movement for the Liberation of Azawad] and Ansar Dine) began fighting against the Malian government for independence for north Mali. On 5 April the MNLA proclaimed the independence of northern Mali from the rest of the country. However, by 17 July 2012, the MNLA had lost control of most of northern Mali's cities. The government of Mali asked for foreign military help to re-take the north. On 11 January 2013, the French military began operations against the Islamists. Forces from other African Union states were deployed shortly after. By 8 February, the Islamist-held territory had been re-taken by the Malian military, with help from the international coalition. However, attacks against the Malian military continued until a peace deal between the government and Tuareg rebels was signed on 18 June 2013. On 26 September 2013 the rebels pulled out of the peace agreement and fighting continued. Despite a peace accord was signed on 15 April 2015, low-level fighting continues.*
B. Armed conflict scale and/or tensions: 1. Terrorism and/or international political tension. 2. Insurgency (small-scale military activities) and/or medium increasing political tension. 3. Large-scale military activities and/or heightened international political tension.	**Insurgency (small-scale military activities) and/or medium increasing political tension.** *French military intervention: Operation Serval from 11 January 2013 till 15 July 2014.* *US forces arrived in Niger in early 2013 to support the French military intervention in Mali; 150 US personnel set up a surveillance drone operation over Mali that was conducted out of Niamey. As of 2017, there are about 800 US troops in Niger, the majority of whom are construction crews working to build up a second drone base in northern Niger.*
C. Military air transport activities: 1. Military air transport activities not reported. 2. Occasional use of aircraft to transport ground troops or military equipment. 3. More than occasional use of aircraft to transport ground troops or military equipment by at least one party).	**More than occasional use of aircraft to transport ground troops or military equipment**
D. Military air combat activities: 1. No military air combat activities. 2. Small-scale (occasional) military air combat activities and/or some activities above FL 250. 3. Large- to medium-scale military air combat activities and/or regular activities above FL 250	**Small-scale (occasional) military air combat activities and/or some activities above FL 250.**
E. Known attacks: 1. Conflict area without publicly reported security incidents involving military and civil aviation. 2. Conflict area with single security-related reported incident/accident involving military (or civil) aviation. 3. Conflict area with multiple reported security-related incident/accident involving military (or civil) aviation.	**Conflict area with multiple reported security-related incidents/accidents involving military (or civil) aviation.** *In January one Malian Air Force MIG-21 jet was shot down by the Tuareg.* *On 11 January 2013, a French Army Gazelle helicopter was shot down by small arms fire.*
F. Capability to attack by at least one party: 1. No information for capability to attack with range above FL 250. 2. Air-to-air missiles launched from fighter aircraft (and no SAMs). 3. Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level.	**Air-to-air missiles launched from fighter aircraft (and no SAMs).**

Mali 2012–2015 *(continued)*	
G. Capability to differentiate between civil and military aircraft: 1. Differentiation supported by radar, electronic identification and non-cooperative target recognition systems measuring signature using acoustic and thermal radiation, radio emissions, radar techniques. 2. Differentiation supported by radar and electronic identification (e.g., identification, friend or foe (IFF), secondary surveillance radar (SSR). 3. Differentiation supported only by radar tracks.	**Differentiation — fighter jets.**
H. SAM/AAM operators' experience and chain of command: 1. Regular forces. 2. SAMs in the possession of irregular military forces OR an absence of robust SAM/AAM command and control procedures for authorizing launch. 3. SAMs in the possession of irregular military forces AND an absence of robust SAM/AAM command and control procedures for authorizing launch.	**Regular forces.**
I. Known intent to attack: 1. Known intent to attack military aircraft. 2. Known intent to attack civil aircraft. 3. Communication of intent and a plan to attack civil aircraft or actual attack against civil aircraft.	**Known intent to attack military aircraft.**
J. Civil aircraft operations over or close to conflict zone (with and without the airspace restrictions if any): 1. No or occasional traffic. 2. Small to moderate traffic volume (for example restricted to arrivals and departures to airports). 3. Considerable traffic volume, including international overflights.	**Small to moderate traffic volume (for example restricted to arrivals and departures to airports).**

Mali 2012–2015 *(continued)*	
Airspace Closure	
Airspace restrictions Describes when airspace restrictions were introduced, what airspace they affected and how they evolved over time including: • Restrictions by the responsible for the airspace sovereign authority (the state). • Restrictions by others — third parties and/or neighboring states.	**1. Restrictions by the responsible for the airspace sovereign authority (the state)** *No information found* **2. Others** *No information found* ***Note:*** *27/02/2017 The Algerian CAA has published in 2012 airspace closures along their southern border due to the conflict.* ***FAA (27/02/2017)*** *Feb 27th, 2017: The FAA issued warnings for Kenyan and Malian airspace, warning US operators of the potential dangers in operating through both the Nairobi and Malian FIR's.* *Published on Feb 26th, the new advice also adds new language with clarification of the type of weapons and phases of flight that the FAA is concerned about, specifically:* • *fire from small arms,* • *indirect fire weapons (such as mortars and rockets), and* • *anti-aircraft weapons such as MANPADS.* *The scenarios considered highest risk include:* • *landings and takeoffs,* • *low altitudes, and* • *aircraft on the ground.* *The FAA uses the same wording for both Kenya and Mali.* *The updated guidance is intended for US operators and FAA License holder.* ***Warnings are addressing flights below FL300/2607250*** ***2017 (referring to EASA CZIB No 2017-01R1 and FAA warning*** ***EASA 29/04/2020–31/1072020*** *This CZIB was issued on the basis of information available to EU Member States and EU institutions.* *The presence of terrorist groups with access to anti-aviation weaponry is assessed to pose a HIGH risk to operations within the portion of the Niamey FIR, which is situated above Mali territory, at altitudes below FL 250. Terrorist groups continue attacks on the country with the risk of mortar shelling on airstrips and airports.* *Additionally, the Agency draws the attention of the aviation community to the above referenced information, copies of which are attached to this CZIB.* ***France (AIC 08/20) 09/04/2020–ongoing*** *From 09/04/2020 and until further notice, French air carriers and aircraft owners registered in France are requested to ensure that their aircraft maintain at all times a flight level above or equal to FL320 in the part of the Niamey FIR (DRRR) located above the Malian territory.*
Reasons for airspace restrictions Describes the reasons for airspace restrictions, weapons known to be in the area and their range/capabilities, what traffic was vulnerable, known or suspected intent to attack civil aviation and whether there was concern about unintentional attack.	*Rebels were expected to possess MANPADS* *With instability in the Sahel-Saharan region, fears were growing al-Qaeda in the Islamic Maghreb's (AQIM) could have acquired portable surface-to-missiles from Libya.*
Decision-making Describes the source(s) of the threat information; who made the decision regarding the restrictions and with whom was the decision coordinated; was the decision-making process different from the normal or standard airspace decision-making process.	
Promulgation Describes how the restrictions were published, number of the NOTAMs if available, AIS.	*AIC, warnings by FAA, EASA CZIB*

Mali 2012–2015 *(continued)*	
Notes Other relevant information	***References:*** *https://www.eurasiareview.com/31012012-loose-libyan-missiles-threaten-air-traffic/* *https://safeairspace.net/mali/* *https://www.easa.europa.eu/domains/air-operations/czibs/czib-2017-01r7* *https://ops.group/blog/fresh-warnings-as-faa-clarifies-weapons-risk-in-kenya-mali-airspace/* *https://www.reuters.com/article/us-libya-arms-un/libya-arms-fueling-conflicts-in-syria-mali-and-beyond-u-n-experts-idUSBRE93814Y20130409*

Georgian Civil Wars 1991–1993	
Likelihood of attack indicators	
A. Parties: 1. Conflict between states. 2. Conflict between non-state armed groups and state(s) or civil wars. 3. Conflict between non-state armed groups.	**Conflict between non-state armed groups and state(s) or civil wars.** *Conflict involved multiple players during the period in question; first it involved the newly independent state of Georgia against separatists from South Ossetia, which had previously declared itself an autonomous Soviet Republic. A three-way power struggle involving Georgian, Ossetian and Soviet military forces broke out. The first democratically elected president of Georgia lost power in a coup; his armed attempts to regain power were later defeated. Also during this time, separatists from the Abkhasia region, with help from Russian troops, fought against Georgia.*
B. Armed conflict scale and/or tensions: 1. Terrorism and/or international political tension. 2. Insurgency (small-scale military activities) and/or medium increasing political tension. 3. Large-scale military activities and/or heightened international political tension.	**Large-scale military activities and/or heightened international political tension.** *Armed conflict involved multiple players, including Russia, and military equipment left over from the Soviet military.*
C. Military air transport activities: 1. Military air transport activities not reported. 2. Occasional use of aircraft to transport ground troops or military equipment. 3. More than occasional use of aircraft to transport ground troops or military equipment by at least one party).	**More than occasional use of aircraft to transport ground troops or military equipment by at least one party.**
D. Military air combat activities: 1. No military air combat activities. 2. Small-scale (occasional) military air combat activities and/or some activities above FL 250. 3. Large- to medium-scale military air combat activities and/or regular activities above FL 250	**Large- to medium-scale military air combat activities and/or regular activities above FL 250** *Georgian Su-25s flew more than 200 sorties during conflict in Abkhazia region.* *Helicopters also were used extensively.*
E. Known attacks: 1. Conflict area without publicly reported security incidents involving military and civil aviation. 2. Conflict area with single security-related reported incident/accident involving military (or civil) aviation. 3. Conflict area with multiple reported security-related incident/accident involving military (or civil) aviation.	**Conflict area with multiple reported security-related incidents/accidents involving military (or civil) aviation.** *A number of military aircraft, including both fighters and helicopters, were shot down during the conflicts.* *Two civil type aircraft, a Tu-134 and a Tu-154, also were attacked on consecutive days in Sept. 1993, resulting in 135 fatalities.*
F. Capability to attack by at least one party: 1. No information for capability to attack with range above FL 250. 2. Air-to-air missiles launched from fighter aircraft (and no SAMs). 3. Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level.	**Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level.** *Long-range SAMs were in the Georgian arsenal and Georgian military aircraft were brought down by what are believed to have been SAMs, leading to speculation that Russian military units were supporting separatists.*
G. Capability to differentiate between civil and military aircraft: 1. Differentiation supported by radar, electronic identification and non-cooperative target recognition systems measuring signature using acoustic and thermal radiation, radio emissions, radar techniques. 2. Differentiation supported by radar and electronic identification (e.g., identification, friend or foe (IFF), secondary surveillance radar (SSR). 3. Differentiation supported only by radar tracks.	

Georgian civil wars 1991–1993 *(continued)*	
H. SAM/AAM operators' experience and chain of command: 1. Regular forces. 2. SAMs in the possession of irregular military forces OR an absence of robust SAM/AAM command and control procedures for authorizing launch. 3. SAMs in the possession of irregular military forces AND an absence of robust SAM/AAM command and control procedures for authorizing launch.	**Regular forces** *SAMs also possibly in the possession of irregular forces and/or irregular forces supported by regular forces.*
I. Known intent to attack: 1. Known intent to attack military aircraft. 2. Known intent to attack civil aircraft. 3. Communication of intent and a plan to attack civil aircraft or actual attack against civil aircraft.	**Communication of intent and a plan to attack civil aircraft or actual attack against civil aircraft.** *A Tu-134 and a Tu-154 in flight were attacked by separatists in Sept. 1993 resulting in 135 fatalities.*
J. Civil aircraft operations over or close to conflict zone (with and without the airspace restrictions if any): 1. No or occasional traffic. 2. Small to moderate traffic volume (for example restricted to arrivals and departures to airports). 3. Considerable traffic volume, including international overflights.	**Small to moderate traffic volume (for example restricted to arrivals and departures to airports).**
Airspace Closure	
Airspace restrictions Describes when airspace restrictions were introduced, what airspace they affected and how they evolved over time including: • Restrictions by the responsible for the airspace sovereign authority (the state). • Restrictions by others — third parties and/or neighboring states.	**1. Restrictions by the responsible for the airspace sovereign authority (the state)** *No information found* **2. Others** ***Note:*** *During the period there were civil aircraft shot down in the airspace over Abkhazia.*
Reasons for airspace restrictions Describes the reasons for airspace restrictions, weapons known to be in the area and their range/capabilities, what traffic was vulnerable, known or suspected intent to attack civil aviation and whether there was concern about unintentional attack.	*No information available.*
Decision-making Describes the source(s) of the threat information; who made the decision regarding the restrictions and with whom was the decision coordinated; was the decision-making process different from the normal or standard airspace decision-making process.	*No information available.*
Promulgation Describes how the restrictions were published, number of the NOTAMs if available, AIS.	*No information available.*
Notes Other relevant information	***References:*** *Web.archive.org* *U.S. Institute of Peace, The Intra-Georgian civil war and The Georgian-Abkhas conflict, accessed June 2020.*

Appendix B
Questionnaire Responses:
Russian Federation standard procedures and threat knowledge

This appendix contains the responses received from the Russian Federation to standard procedures and threat knowledge questionnaire. The responses are provided as received without additional editing or modification. *Note: Unofficial translation from Russian.*

Q1. Is information in social media used as a trigger for security threat analysis for civil aviation, including information about capability of attack and/or intend to attack civil aircraft?

Answer:

Analysis of flight safety threats is carried out on the basis of ICAO documents which address flight safety in the areas of military and other kinds of danger for civil aviation, including ICAO Doc 9554.

Responsible:

Competent authorities that exchange information related to aviation security.

References:

Aeronautical Information Services Manual, ICAO Doc 8126, Sixth Edition, 2003.

Manual Concerning Safety Measures relating to Military Activities Potentially Hazardous to Civil Aircraft Operations, ICAO Doc 9554, First Edition 1990.

Air Traffic Services Planning Manual, ICAO Doc 9426, First Edition (Provisional), 1984.

Process and timeline:

Preparations for activities that pose a potential hazard to civil aircraft over the territory of states or the open sea are coordinated with relevant competent air traffic service authorities. This coordination is carried out sufficiently in advance to ensure timely publication of information concerning such activities in accordance with existing regulations.

Such coordination is aimed at providing optimal conditions that will allow to avoid the creation of hazards for civil aircraft and minimize interference with the normal conduction of flights by such aircraft. If activities that pose a potential hazard to civil aircraft are conducted on a regular or ongoing basis, special committees should be established, as appropriate, to ensure the necessary coordination of the needs of all stakeholders.

States should make preparations, if necessary, to ensure that timely action is taken in case of unforeseen circumstances. Such preparations should include a risk assessment to civil aircraft due to a military conflict or acts of unlawful interference with civil aviation. Preparatory activities should include development of special contingency plans in case of natural disasters, public health emergencies, military conflicts or acts of unlawful interference in the activities of civil aviation, which may affect the use of airspace for flights of civil aircraft and/or provision of air traffic services and support services.

Authorized air traffic service bodies organize and implement close cooperation with the military authorized bodies responsible for activities that may affect the flights of civil aircraft. Air traffic service authorities and relevant military authorities reach an agreement regarding the immediate exchange of information related to the safe and unhindered performance of civil aircraft flights.

Based on the information available, the state responsible for air traffic service should determine the geographic area of the conflict, assess the danger or potential danger to civil aircraft of international aviation and determine whether to avoid flights in or through the conflict area or whether flights may continue under certain conditions. Thereafter, an international NOTAM containing necessary information, recommendations and security measures to be taken should be issued; it should be updated as events evolve.

In general, planning is a dynamic process in which facts are identified, existing or newly proposed methods are checked and information is sought. It is also an ongoing process that requires insight, imagination and courage to interpret existing data and to develop concepts in order to prove and defend one's beliefs. […] Due attention should also be paid to the often conflicting requirements with regard to special military flights and allocation of some airspace for national security.

Actual implementation:

Describe here what social media civil aviation threat information about presence of air defense equipment or intent to attack was identified by which authority.

Information is used in accordance with ICAO rules.

Changes after 17 July 2014:

The use of Doc 10084 "Risk Assessment Manual for Civil Aircraft Operations Over or Near Conflict Zones."

Q2. What are the sources of public and private threat information and the processes for gathering information relative to civil aviation security (including in a conflict zone)?

Answer:

The source selection process is described in ICAO documents. Recommended procedures with regard to collection and use of information on threats originating from armed conflict zones are discussed in ICAO Doc 9554.

The threats to air traffic safety in the Rostov-on-Don FIR originated from hazardous activities in the area of responsibility of the adjacent Dnepropetrovsk FIR. There were no armed conflicts within Rostov-on-Don flight information region (FIR).

Responsible:

Competent authorities that exchange information related to aviation security.

References:

Aeronautical Information Services Manual, ICAO Doc 8126, Sixth Edition, 2003.

Manual Concerning Safety Measures relating to Military Activities Potentially Hazardous to Civil Aircraft Operations, ICAO Doc 9554, First Edition 1990.

Air Traffic Services Planning Manual, ICAO Doc 9426, First Edition (Provisional), 1984.

Process and timeline:

The final DSB report does not contain analysis of the extent to which Ukraine's actions met the ICAO standards. It only contains a reference to the fact that "the initiative to restrict airspace use originated from the military authorities" and that "based on Ukrainian legislation, there were no grounds for full closure of the airspace above the eastern part of Ukraine to civil aviation" (paragraphs 6.2 and 6.3 of the final DSB report).

When taking a decision to issue NOTAMs V6158/14 and A2681/14 on 16 July, 2014, Rosaviatsiya used information provided by the Russian Ministry of Foreign Affairs, according to which it was possible to conclude that the rules for the use of airspace of the Russian Federation had been violated:

a) Shooting at checkpoint Gukovo with missiles also hitting the nearby populated areas in the territory of the Russian Federation (statement No. 1570 of 28 June 2014);

b) Another shooting at checkpoint Gukovo (statement No. 1678 of 10 July 2014);

c) The Ukrainian Army shelled Donetsk, in the Rostov Region, using high-explosive shells, a missile hit a residential house, one person died (statement No.1688 of 13 July 2014).

Actual implementation:

Describe here what other sources of civil aviation threat information about presence of air defense equipment and intent to attack was identified by which authority.

Information about the presence of air defense systems in the region should have been provided by the competent authorities of Ukraine on whose territory an armed conflict took place. Information on the required actions on the Ukrainian part can be found in the answer to Q1.

Changes after 17 July 2014:

Based on the available reliable information, the Russian side issued NOTAMs V6158/14 and A2681/14 to provide secure flights within Rostov-on-Don FIR.

Q3. What is the level of involvement of airlines, air navigation service providers (ANSPs), the military and adjacent states or other states publishing advisories in gathering information about aviation security (including information for conflict zones)?

Answer:

The source selection process is described in ICAO documents. Recommended procedures with regard to collection and use of information on threats originating from armed conflict zones are discussed in ICAO Doc 9554.

Information on the basis for the issuance of NOTAMs V6158/14 and A2681/14 is contained in the answer to Q2.

Responsible:

The competent authorities and the procedure for their interaction are considered in ICAO documents (references to some documents are given below).

References:

Aeronautical Information Services Manual, ICAO Doc 8126, Sixth Edition, 2003.

Manual Concerning Safety Measures relating to Military Activities Potentially Hazardous to Civil Aircraft Operations, ICAO Doc 9554, First Edition 1990.

Air Traffic Services Planning Manual, ICAO Doc 9426, First Edition (Provisional), 1984.

Process and timeline:

Airlines, military or other organizations were not involved in the issuance of NOTAMs V6158/14 and A2681/14.

Rosaviatsiya practices to release urgent information reports and instructions for the Russian exploiters of aircraft in case of receiving information on the military activity hazardous to flight safety. For instance, Rosaviatsiya's telegrams containing information on tense situation in India's, Pakistan's and Afghanistan's airspace (information of 27 February 2019), hazardous situation to flight safety in Yemen's airspace (information of 3 April 2015), and in Libya's airspace (information of 2 February 2015).

Actual implementation:

Describe specifically what airlines, air navigation service provider (ANSP), the military and adjacent states or other states publishing advisories were used as a source for what information about security risk for civil aircraft.

Information provided by the Russian Ministry of Foreign Affairs was used to issue NOTAMs V6158/14 and A2681/14 (See the answer to Q2).

Changes after 17 July 2014:

Issuance of NOTAMs V6158/14 and A2681/14 due to reasons mentioned in the answer to Q2.

Q4. What are the procedures for routine review and analysis of NOTAMs, security warnings and airspace restrictions for adjacent flight information regions (FIRs) to ensure civil aircraft security?

Answer:

The process conforms to ICAO rules.

Responsible:

Federal State Unitary Enterprise "State Air Traffic Management Corporation of the Russian Federation."

References:

Federal Rules on the Use of the Air Space of the Russian Federation approved by Order of the Government of the Russian Federation No. 138 of 11 March 2010.

Federal Aviation Rules "Organization of Planning the Use of Airspace of the Russian Federation" approved by Order of the Ministry of Transport of the Russian Federation No. 6 of 16 January 2012.

Process and timeline:

Coordination of airspace use is carried out in order to ensure the activity declared by airspace users depending on the evolving air, meteorological, air navigation situation and in accordance with state priorities in airspace use.

Strategic, pre-tactical and tactical (current) planning of airspace use, as well as coordination of airspace use is based on information:

- reports on plans (schedules, timing) of airspace use, including reports on plans for international and domestic flights of aircraft on air traffic service routes, flights of aircraft outside air traffic service routes and use of restricted areas;
- on permissions (issued by corresponding federal executive bodies) for international flights and on cancellation of such permissions;
- on prohibitions and restrictions on the use of airspace;
- on permissions to use airspace in prohibited zones and restricted zones from persons in whose interests such zones are established, and on cancellation of such permissions;
- on the movement of aircraft in airspace;
- on the beginning and end of activities related to the use of airspace that are not related to the performance of flights by aircraft.

Actual implementation:

Describe what civil aviation security threat information was identified by which authority based on the NOTAMs, security warnings and airspace restrictions for adjacent fight information regions FIRs.

When planning the use of airspace, Ukraine's NOTAM restrictions on the use of flight levels for flights on air routes entering the airspace of the Russian Federation were applied. There were no other warnings on aviation security from Ukraine.

The proximity of possible flight altitudes of Ukrainian military aircraft (according to Ukraine's NOTAMs 1492/14 and 1493/14) up to level 320 (for example, for flight MH17 at level 330) was a sufficient reason for the aviation authorities of Ukraine to close the airspace over the armed conflict zone.

The threats to air traffic safety in the Rostov-on-Don FIR originated from hazardous activities in the area of responsibility of the adjacent FIR of Dnepropetrovsk. There were no armed conflicts in the flight information region (FIR) of Rostov-on-Don. Based on the available reliable information, the Russian side issued NOTAMs V6158/14 and A2681/14 to ensure flight safety in the Rostov-on-Don FIR.

Changes after 17 July 2014:

NOTAMs V6158/14 and A2681/14 were issued for the reasons indicated in the answer to question Q2.

Q5. What is the process for deciding on the source credibility and for verifying information, including information on capability of attack and intent to attack, relative to an active armed conflict that could impact civil aviation?

Answer:

The Russian Federation used the information of the Russian Ministry of Foreign Affairs for NOTAMs V6158/14 and A2681/14.

Responsible:

Federal Air Transport Agency (Rosaviatsiya).

References:

Instructions for the development, establishment, introduction and removal of temporary and local regimes, as well as short-term restrictions, approved by Order of the Ministry of Transport of Russia No. 171 dated June 27, 2011.

Joint Order of Federal Air Navigation Agency (Rosaeronavigatsya) and the Ministry of Transport of Russia No. 139/202 "On the organization of activities to issue notices to aviation personnel (NOTAM)" dated December 29, 2007.

Manual Concerning Safety Measures Relating to Military Activities Potentially Hazardous to Civil Aircraft Operations, ICAO Document No. 9554, First Edition 1990.

Process and timeline:

The texts of statements by the Russian Ministry of Foreign Affairs: No. 1570 of June 28, 2014, No. 1678 of July 10, 2014, and No. 1688 of July 13, 2014 were published on the Russian Foreign Ministry official website.

Actual implementation:

How was the security threat information verified, the source judged for credibility, and by what authority / organization? What were the results of the credibility decision and the verification?

Rosaviatsiya has no reason to doubt the reliability of the information officially published by the Russian Ministry of Foreign Affairs, which was used to issue NOTAMs in accordance with ICAO rules.

Changes after 17 July 2014:

The initiative to issue NOTAMs V6158/14 and A2681/14 concerning the Rostov-on-Don FIR came on July 12, 2014 from the Rosaviatsiya Southern Interregional Territorial Administration (responsible for the Rostov-on-Don FIR) due to the aggravated situation in the areas bordering on Ukraine, the use of various types of weapons by the Ukrainian armed forces (statements by the Russian MFA No. 1570 of June 28, 2014, No. 1678 of July 10, 2014, and No. 1688 of July 13, 2014).

Q6. What are the determining risk factors for unintentional attack that may not allow civil aviation to fly over a conflict zone? For example, scale of the conflict, military air transport or air combat activities, previous attacks against aircraft, level of training and experience of SAM operators, level of robustness of command and control mechanism for authorizing launch, civil aviation flight proximity to strategic assets, technical capability of SAMs to distinguish between civil and military aircraft.

Answer:

Threats to air traffic safety in the Rostov-on-Don FIR stemmed from the dangerous activities in the area of responsibility of the adjacent Dnepropetrovsk FIR, where an armed conflict was taking place, which required coordination of the relevant Ukrainian authorities.

Information, including official one, about the presence of a certain type of weapons in the conflict zone, as well as incidents with the use of these weapons, should have been considered sufficient by Ukraine to make decisions.

For making decisions, the procedures described in ICAO documents, including Document No. 9554, should be used.

Consistent adherence by Ukraine to ICAO rules (in force at the time of the crash) would have allowed the aviation authorities of Ukraine to come to a decision on the need to stop civil aviation flights over the conflict zone and avoid the crash of Flight MH17.

Responsible:

The state responsible for compliance with the rules for the introduction of restrictions on the use of airspace over an armed conflict zone (Ukraine, in relation to the Flight MH17 crash).

References:

Manual Concerning Safety Measures Relating to Military Activities Potentially Hazardous to Civil Aircraft Operations, ICAO Document No. 9554, First Edition 1990.

Civil/Military Cooperation in Air Traffic Management, ICAO Circular No. 330.

Process and timeline

All possible risk factors for an unintended attack should be considered. ICAO instruments require interoperability between military and civilian authorities. States should undertake preparatory measures as necessary to ensure that contingencies are dealt with in a timely manner. Such preparations should include an assessment of the risk to civil aircraft operations due to a military conflict or incidents of unlawful interference with civil aviation. Preparatory activities should include the development of special contingency plans for military conflicts or acts of unlawful interference with civil aviation that may affect the use of airspace for civil aircraft and/or the provision of air traffic and support services.

ICAO documents state that, whatever the circumstances of a crisis, the development of contingency plans would greatly contribute to an increased level of coordination between civilian and military bodies.

The first step in the normal coordination process is transmission or delivery of a message detailing the proposed activity to the appropriate authority or ATM units. This message should describe the nature of the activity, geographical area(s) affected, including its/their horizontal and vertical dimensions, the anticipated date(s), start time and duration of the activity, any special security measures to be undertaken when necessary; and the means and methods of coordination between the military units involved and ATM units concerned, including the use of radio communications.

Where feasible, a flight level should be established at or above which civil aircraft can continue to operate normally without being exposed to hazards. In areas where most civil aircraft will be in the en-route phase, this flight level should ideally be at or below the lowest cruise level normally used.

Actual implementation:

Describe what risk factors for unintentional attack were identified by what authority / organization. See examples of risk factors listed in Q6.

The aviation authorities of Ukraine had to adhere to the procedures described, in particular, in ICAO documents.

Information on the reasons for and process of deciding to issue NOTAMs V6158/14 and A2681/14 is contained in the answer to questions Q5 and Q12.

Changes after 17 July 2014:

There were no changes.

Q7. What organizations are involved, how do they coordinate, and what is the process for determining acceptable security risk levels in civil aviation airspace over a conflict zone?

Note: These are general security level targets to be met if specified, that are not specific to an event or situation.

Answer:

The process should be in conformity with ICAO regulations, including ICAO Document 9554.

The Russian Federation used the information of the Russian Ministry of Foreign Affairs for NOTAMs V6158/14 and A2681/14.

There were no armed conflicts in the Rostov-on-Don flight information region (FIR). The armed clashes took place on the territory of Ukraine.

Responsible:

Authorized bodies of the State on whose territory an armed conflict has arisen (Ukraine, in relation to the Flight MH17 crash).

References:

Manual Concerning Safety Measures Relating to Military Activities Potentially Hazardous to Civil Aircraft Operations, ICAO Document No. 9554, First Edition 1990.

Civil/Military Cooperation in Air Traffic Management, ICAO Circular No. 330.

Process and timeline:

Responsibility for initiating the coordination process lies with the State on whose territory an armed conflict is taking place. States providing air traffic management in conflict-affected airspace are responsible for taking special measures to ensure the safety of international operation of civil aircraft, even when coordination has not been initiated or completed. Based on the information available, the State responsible for air traffic management should define the geographic area of the conflict, assess the hazard or potential hazard to the international operation of civil aircraft, and determine whether flights in or over the conflict area should be avoided or may continue subject to certain conditions. Then an international NOTAM should be issued containing the necessary information, recommendations and security measures to be taken; it should be updated subsequently to follow the developments.

Actual implementation:

Describe what organisations determined the acceptable security risk levels for civil aircraft. How this was determined and what were the determined acceptable security levels?

There were no armed conflicts within the Rostov-on-Don FIR. NOTAMs V6158/14 and A2681/14 with restrictions on the use of the airspace of the Rostov-on-Don FIR were issued due to the hostilities on the territory of Ukraine near the state border with the Russian Federation, as well as the shelling of Russian territory from the territory of Ukraine.

Changes after 17 July 2014:

There were no changes in the Russian regulations.

Q8. What is the process of determining how civil aviation can be affected based on threat information in a conflict zone? For example, what part of the airspace, what altitudes or types of aircraft?

Answer:

The process must be in conformity with ICAO regulations, including Document No. 9554.

Responsible:

Competent authorities and airspace users exchanging information related to aviation safety.

References:

Aeronautical Information Services Manual, ICAO Document No. 8126, Sixth Edition, 2003.

Manual Concerning Safety Measures Relating to Military Activities Potentially Hazardous to Civil Aircraft Operations, ICAO Document No. 9554, First Edition 1990.

Process and timeline:

Rosaviatsiya used information from the Russian Foreign Ministry for NOTAMs V6158/14 and A2681/14.

Actual implementation:

Describe what were the impact analysis results, if any—how civil aviation can be affected based on threat information — what airspace, what altitudes or type of aircraft.

NOTAMs V6158/14 and A2681/14 included a text to explain the reason for issuing the NOTAM, "Due to the hostilities ongoing on the territory of Ukraine near the state border with the Russian Federation, as well as the shelling of Russian territory from the territory of Ukraine," and their scope was also defined.

Changes after 17 July 2014:

Based on the available reliable information, the Russian side issued NOTAMs V6158/14 and A2681/14 to ensure flight safety in the Rostov-on-Don FIR.

Q9. What analysis methodology or risk matrix is used to assess the likelihood of a threat presenting itself and the potential consequences for civil aircraft flying over the conflict zone?

Answer:

The process should be in line with ICAO rules, including document No. 9554.

The armed conflict took place on the territory of Ukraine, so it is not known how the Ukrainian authorities conducted the relevant analysis and risk assessment.

Responsible:

Competent authorities of the State on the territory of which the armed conflict took place (Ukraine, in relation to Flight MH17 plane crash).

References:

Aeronautical Information Services Manual, ICAO document No. 8126, Sixth Edition — 2003.

Manual Concerning Safety Measures Relating to Military Activities Potentially Hazardous to Civil Aircraft Operations, ICAO document No. 9554, First Edition — 1990.

Process and timeline:

See the answers to Q7 and Q8.

Actual implementation:

Describe if and how risk was assessed and what levels of security risk were determined for what airspace, what altitudes or what type of aircraft.

See the answers to Q7 and Q8.

Changes after 17 July 2014:

Information on the reasons for and the decision process of releasing NOTAMs V6158/14 and A2681/14 can be found in the answers to question Q5 and Q12.

Q10. What is the process to determine security mitigations that would permit civil aviation to overfly a conflict zone?

Answer:

The process should be in line with ICAO rules, including document No. 9554.

Responsible:

Competent authorities and airspace users exchanging information related to aviation security.

References:

Aeronautical Information Services Manual, ICAO document No. 8126, Sixth Edition — 2003.

Manual Concerning Safety Measures Relating to Military Activities Potentially Hazardous to Civil Aircraft Operations, ICAO document No. 9554, First Edition — 1990.

Actual implementation:

Describe if and what security mitigations were determined that would permit civil aviation to overfly the conflict zone.

See answers to Q7, Q8 and Q9.

Changes after 17 July 2014:

Information on the reasons for and the decision process of releasing NOTAMs V6158/14 and A2681/14 can be found in the answers to question Q5 and Q12.

Q11. What are your normal (not during conflict) criteria for establishing restriction or segregation of airspace and what are the coordination procedures both internally and externally?

Answer:

The process is in line with ICAO rules.

Responsible:

- Rosaviatsiya
- Federal State Unitary Enterprise "State Air Traffic Management Corporation of the Russian Federation"
- A user of airspace whose activity poses a threat to the safety of airspace use.

References:

Federal Law No. 60-FZ, "The Aviation Code of the Russian Federation" of March 19, 1997.

Chapter VI, "Prohibition or restriction of the use of airspace" of the Federal Rules on the Use of the Air Space of the Russian Federation approved by the Decree of the Government of the Russian Federation No. 138 of March 11, 2010.

Federal Aviation Regulations, "Organization of Planning the Use of Airspace of the Russian Federation" approved by Order of the Ministry of Transport of Russia No. 6 dated January 16, 2012.

Guidelines for the development, establishment, introduction and removal of temporary and local regimes, as well as short-term restrictions, approved by Order of the Ministry of Transport of Russia No. 171 dated June 27, 2011.

Joint order of Rosaeronavigation and the Ministry of Transport of Russia from No. 139/202 "On the Organization of activity on publication of notices for the aviation personnel (NOTAM)" dated December 29, 2007.

Process and timeline:

Organization of the use of airspace provides for safe, cost-effective and regular air traffic, as well as other activities to use airspace. The organization of the use of airspace is carried out by the authorized body in the field of airspace use, the authorities of the unified system of air traffic management, as well as bodies of users of airspace — air traffic service (flight management) in the designated zones and areas. The use of airspace or certain areas thereof may be prohibited or restricted.

If there is a need to use airspace by two or more airspace users at the same time, prohibition or restriction of their activities in certain areas of the airspace of the Russian Federation in accordance with state priorities in the use of airspace is established by introducing temporary and local regimes, as well as short-term restrictions.

Submissions for the establishment of temporary and local regimes shall be submitted by users of airspace via the aircraft terrestrial data transmission network and telegraph messages or in hard copy, including facsimile communication to the relevant centers of the Unified System. The submissions shall provide reliable and complete information on the planned activities to use airspace.

The terms are determined by the Guidelines for the development, establishment, introduction and removal of temporary and local regimes, as well as short-term restrictions, approved by Order of the Ministry of Transport of Russia No. 171 dated June 27, 2011.

The coordination of the use of airspace ensures efficient and flexible use and includes:

- ensuring the safety of airspace use in case of changes in the air, meteorological and aeronautical environment through the implementation of the authorities of the Unified System centers on air space redistribution in accordance with the state priorities;
- timely introduction and removal of bans and restrictions in the optimal airspace related to temporary and local regimes, as well as short-term restrictions;
- providing an opportunity to use the airspace of restricted areas, the validity of which is limited by time period.

Actual implementation:

Not applicable—no answer required.

Changes after 17 July 2014:

There were no changes to the regulatory documents

Q12. What are the decision processes for security of airspace, including establishing restriction or segregation of airspace in a conflict zone? What are the ANSP and military coordination procedures for active civil flights and their safety?

Answer:

The process is in line with ICAO rules.

There were no armed conflicts in the Rostov-on-Don Flight Information Region (FIR).

Responsible:

- Rosaviatsiya
- Federal State Unitary Enterprise "State Air Traffic Management Corporation of the Russian Federation"
- A user of airspace whose activity poses a threat to the safety of airspace use.

References:

Federal Law No. 60-FZ "The Aviation Code of the Russian Federation" of March 19, 1997.

Chapter VI "Prohibition or restriction of the use of airspace" of the Federal Rules on the Use of the Air Space of the Russian Federation approved by the Decree of the Government of the Russian Federation No. 138 of March 11, 2010.

Federal Aviation Regulations "Organization of Planning the Use of Airspace of the Russian Federation" approved by Order of the Ministry of Transport of Russia No. 6 dated January 16, 2012.

Guidelines for the development, establishment, introduction and removal of temporary and local regimes, as well as short-term restrictions, approved by Order of the Ministry of Transport of Russia No. 171 dated June 27, 2011.

Joint order of Rosaeronavigation and the Ministry of Transport of Russia from No. 139/202 "On the Organization of activity on publication of notices for the aviation personnel (NOTAM)" dated December 29, 2007.

Manual Concerning Safety Measures Relating to Military Activities Potentially Hazardous to Civil Aircraft Operations, ICAO document No. 9554, First Edition — 1990.

Process and timeline:

The process has no differences from the one specified in the answer to question Q11.

Procedures for issuing NOTAMs on changes in air navigation data that need to be issued immediately are further defined in the Joint order of Rosaeronavigation and the Ministry of Transport of Russia from No. 139/202 "On the Organization of activity on publication of notices for the aviation personnel (NOTAM)" dated December 29, 2007.

Actual implementation:

Describe who took what decisions for security of airspace, including establishing restriction or segregation of airspace. Describe what coordination took place between the ANSP and military regarding the security threats.

Since March 1, 2014 and up to the present time, there has been no armed conflict in the Rostov-on-Don Flight Information Region (FIR). The imposition of restrictions (NOTAMs V6158/14 and A2681/14) on the use of part of the airspace of the Rostov-on-Don FIR was motivated by the reaction to hazardous activities for flights in the neighbouring State.

The airspace above the conflict zone was above the territory of Ukraine, therefore, decisions on flight safety should have been made by Ukrainian competent authorities.

Based on the information which is available, the State responsible for air traffic services should identify the geographical area of the conflict, assess the hazards or potential hazards 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 security measures should then be issued. If the necessary information is not provided by States whose military authorities are involved in an armed conflict, the State responsible for providing air traffic control is advised to establish the nature and degree of hazard or potential hazard from other sources, such as aircraft operators, IATA, IFALPA, neighbouring States or ICAO.

The initiative to issue NOTAMs V6158/14 and A2681/14 related to the Rostov-on-Don FIR came from the Southern Interregional Territorial Administration of Rosaviation on July 12, 2014 due to the aggravated situation in the border areas with Ukraine, the use of various types of weapons by the Ukrainian armed forces (statements of the Ministry of Foreign Affairs of Russia No. 1570 dated June 28, 2014, No. 1678 dated July 10, 2014, No. 1688 dated July 13, 2014).

NOTAM should contain information on the hazard that is the subject of the message. Based on this, a text explaining the reason for issuing NOTAM was included in NOTAMs V6158/14 and A2681/14: "Due to the hostilities ongoing on the territory of Ukraine near the state border with the Russian Federation, as well as the shelling of Russian territory from the territory of Ukraine."

Changes after 17 July 2014:

There were no changes.

Q13. What organisations are involved and what are the procedures for coordinating airspace restrictions in the conflict zone among adjacent FIRs?

Answer:

The area of flight information in which the armed conflict was taking place was not in the Russian Federation.

Ukraine has not published information about the reasons for the restrictions imposed by NOTAM.

Responsible:

Competent authorities and airspace users exchanging information related to aviation security.

References:

Aeronautical Information Services Manual, ICAO document No. 8126, Sixth Edition — 2003.

Manual Concerning Safety Measures Relating to Military Activities Potentially Hazardous to Civil Aircraft Operations, ICAO document No. 9554, First Edition — 1990.

Process and timeline:

Aeronautical data and information should be complete, timely and of the required quality. In the presence of sources of hazard to air navigation, as well as the establishment of prohibited areas, hazardous areas or zones of restriction, the issuance of NOTAMs is required.

The text of a NOTAM is generated using the values/uniform abbreviated phraseology required for the ICAO NOTAM code, supplemented by ICAO abbreviations, dash numbers, discriminant, indexes, callsigns, frequencies, numbers and plain text [1].

NOTAMs shall contain information about the hazard, operating condition or mode of operation of the means that are the subject of the message.

An example of information on the hazard to be included in NOTAMs relating to an armed conflict zone is given in Appendix "B" of the document [2].

Actual implementation:

Describe if and how the airspace restrictions were coordinated with the adjacent FIRs and what organisations were involved in the coordination.

Ukraine has full sovereignty over its airspace. There was no additional information from the Ukrainian aviation authorities about the hazards other than those published in Ukrainian issued NOTAMs.

Published by the Russian side NOTAMs on July 16, 2014 were available for the Ukrainian side (see the answer to question Q12).

Changes introduced after 17 July 2014:

According to the DSB Final Report, the investigation found that Ukraine had made a decision to issue NOTAMs to restrict access to the airspace below FL320 based on the necessity to "set additional buffer zone FL260-FL320 in order to ensure flight safety of civil aircraft related to operations of the state aircraft of Ukraine within the prohibited airspace" (para. 6.3, p. 196 of the DSB Final Report).

The contents of NOTAMs does not allow to set the altitude for a buffer zone.

According to the latest NOTAM issued by Ukraine on 14 July 2014, military aircraft could operate at the levels up to FL320, resulting in a 300-meter altitude difference between a military aircraft and a civil aircraft flying at an altitude of 10050 meters (Flight MH17 was at FL330), which complied with the reduced vertical separation minimum (RVSM). Furthermore, FL320 is part of the RVSM airspace that is subject to the ICAO rules establishing special security measures and requirements for aircraft on-board equipment, cabin crew and ground personnel training, as well as accuracy and reliability characteristics of the ground equipment.

Military aircraft do not fall under the requirements for the on-board equipment for RVSM flights. Besides, military aircraft are not subject to the height keeping requirements. Therefore, they cannot fly in RVSM airspace without special procedures applied.

Paragraph 5.2.5. of the Manual on a 300 m (1000 ft) Vertical Separation Minimum Between FL 290 and FL 410 Inclusive (ICAO Doc 9574) points out the need to develop procedures to accommodate military flight operations that do not meet the equipment requirements but are carried out at FL 290. Possible methods include:

a) the provision of temporary airspace reservations;

b) the provision of block altitudes;

c) the provision of special routes applicable only to military aircraft; and

d) the provision of special routes applicable to air traffic requiring a 600 m (2 000 ft) VSM above FL 290.

Therefore, Ukraine, when issuing a NOTAM permitting military aircraft flights at the levels up to FL320 inclusive, failed to consider or implement the ICAO requirements in question. UkSATSE and the civil aviation authority of Ukraine had to make a decision prohibiting the use of airspace by civil aircraft above the armed conflict zone.

Q14. What is the process to decide if there is a need for aeronautical information publication and to choose the communication tool for it (e.g. NOTAMs, AIC)?

Response:

The process is consistent with the ICAO rules.

Responsible:

- Federal Air Transport Agency (Rosaviatsiya)
- Federal State Unitary Enterprise "State Air Traffic Management Corporation of the Russian Federation"
- Federal State Unitary Enterprise "Aeronautical Information Centre"
- Airspace user, whose activities create a hazard to the safe use of airspace.

References:

Federal Law No. 60-FZ "The Air Code of the Russian Federation" of 19 March 1997.

Federal Rules for the Use of the Airspace of the Russian Federation approved by Resolution No. 138 of the Government of the Russian Federation of 11 March 2010.

Federal Aviation Regulations "Airspace Use Planning in the Russian Federation" approved by Order No. 6 of the Ministry of Transport of the Russian Federation of 16 January 2012.

Instruction on the development, establishment, implementation and removal of temporary, local and short-term restrictions approved by Order No. 171 of the Ministry of Transport of the Russian Federation of 27 June 2011.

Joint order No. 139/202 of the Federal Aeronautical Agency and the Ministry of Transport of the Russian Federation on "Organizing the Issuance of Notice to Airmen (NOTAMs)" of 29 December 2007.

Process and timeline:

The process is described in the response to Q11.

To ensure planning of airspace use, the Unified System centers employ an aviation ground data and telegraph network, public telephone network, restricted telephone and/or telegraph network, and the Internet, as well as receive information in paper format, including fax. Planning of airspace use is carried out in the Unified System centers equipped with automated airspace use planning systems using the said systems.

Actual implementation:

Describe how it was decided if there is a need for aeronautical information publication and how it was chosen what communication tool for it (e.g. NOTAMs AIC).

The decision-making process regarding the issuance of NOTAMs V6158/14 and A2681/14 is described in the response to Q12.

Changes introduced after 17 July 2014:

No changes have been introduced.

Q15. What organisations are involved in and what are the processes to prepare, verify if ICAO AIS procedures and terminology are used, validate for correctness and transmit aeronautical information to the users of it (e.g. airlines and ANSPs)?

Response:

The process is consistent with the ICAO rules.

Responsible entity:

- Federal State Unitary Enterprise "State Air Traffic Management Corporation of the Russian Federation"
- Federal State Unitary Enterprise "Aeronautical Information Centre"

References:

Aeronautical Information Services Manual, ICAO Doc 8126, Sixth Edition, 2003.

Manual Concerning Safety Measures Relating to Military Activities Potentially Hazardous to Civil Aircraft Operations, ICAO Doc 9554, First Edition, 1990.

Federal Aviation Regulations "Requirements for legal entities and individual entrepreneurs performing commercial air transport operations. Form of and procedure for issuing a document verifying compliance of legal entities and individual entrepreneurs performing commercial air transport operations with the requirements set out in federal aviation regulations" approved by Order No. 246 of the Ministry of Transport of the Russian Federation of 13 August 2015.

Federal Aviation Regulations "Preparation for and performance of civil aircraft operations in the Russian Federation" approved by Order No. 128 of the Ministry of Transport of the Russian Federation of 31 July 2009.

Procedure for production and rules for provision of aeronautical information approved by Order No. 305 of the Ministry of Transport of the Russian Federation of 31 October 2014.

Process and timeline:

Production of aeronautical information includes compilation (generation) of raw aeronautical data and raw aeronautical information, their submission to the aeronautical information authority, subsequent processing and verification by the aeronautical information authority and transmission to the users of the official aeronautical data and official aeronautical information, processors of the official aeronautical data and official aeronautical information, and providers of the official aeronautical information and official aeronautical data. After receiving raw aeronautical data and raw aeronautical information, the aeronautical information authority shall verify, register and process them for inclusion in the AIP of Russia, Annex to the AIP of Russia, notices transmitted via communication channels and containing information about the condition of the aeronautical equipment and airspace structure elements that are crucial to be timely warned of for the personnel involved in the performance of aircraft operations, and NOTAMs and AICs, as well as provision to the users of the official aeronautical data and official aeronautical information, processors of the official aeronautical data and official aeronautical information, and providers of the official aeronautical data. If the raw aeronautical data and raw aeronautical information do not meet the requirements, the aeronautical information authority shall send them back to the providers (compilators) of raw aeronautical data and raw aeronautical information for refinement.

Actual implementation:

Please describe the organizations involved in the preparation of aeronautical information, verification of the use of the ICAO AIS procedures and terminology, and validation of the correctness and transmission of the aeronautical information to its users.

- Federal Air Transport Agency (Rosaviatsiya)
- Federal State Unitary Enterprise "State Air Traffic Management Corporation of the Russian Federation"
- Federal State Unitary Enterprise "Aeronautical Information Centre"

Changes introduced after 17 July 2014:

No changes have been introduced.

Q16. What are the procedures for disseminating civil aviation security threat information to operators within and outside the conflict zone FIR?

Response:

The process is consistent with the ICAO rules.

Responsible:

- Aircraft operator
- Federal State Unitary Enterprise "State Air Traffic Management Corporation of the Russian Federation"
- Federal State Unitary Enterprise "Aeronautical Information Centre"

References:

Aeronautical Information Services Manual, ICAO Doc 8126, Sixth Edition, 2003.

Manual Concerning Safety Measures Relating to Military Activities Potentially Hazardous to Civil Aircraft Operations, ICAO Doc 9554, First Edition, 1990.

Federal Aviation Regulations "Requirements for legal entities and individual entrepreneurs performing commercial air transport operations. Form of and procedure for issuing a document verifying compliance of legal entities and individual entrepreneurs performing commercial air transport operations with the requirements set out in federal aviation regulations" approved by Order No. 246 of the Ministry of Transport of the Russian Federation of 13 August 2015.

Federal Aviation Regulations "Preparation for and performance of civil aircraft operations in the Russian Federation" approved by Order No. 128 of the Ministry of Transport of the Russian Federation of 31 July 2009.

Procedure for preparation and rules for provision of aeronautical information approved by Order No. 305 of the Ministry of Transport of the Russian Federation of 31 October 2014.

Process and timeline:

The aeronautical information authority publishes aeronautical information documents containing official aeronautical information and official aeronautical data. Official aeronautical information is issued as a NOTAM if the raw aeronautical information is of temporary and short-term nature or if permanent or long-term temporary changes that are important in terms of operation are urgently introduced, with the exception of extensive text and/or graphic materials. The aeronautical information authority issues NOTAMs, as well as checklists of valid NOTAMs and NOTAM checklists. NOTAMs are transmitted as one communication message via AFS.

Russian aircraft operators, including those performing international flights, shall ensure provision of aeronautical information to the cabin crews. In case of commercial air transport operations, the operator ensures during the preparation for the flight that the cabin crew is provided with aeronautical and meteorological information.

Actual implementation:

Please describe whether and, if so, how the civil aviation security threat information was disseminated to operators within and outside the conflict zone FIR?

All users of the airspace of the Russian Operation were sent NOTAM V6158/14 via the AFTN channel in telegram No. 141707 of 16 July 2014 and NOTAM A2681/14 in telegram No. 161709 of 16 July 2014.

Changes introduced after 17 July 2014:

No changes have been introduced.

Appendix C
Clarifying Questions Responses from Russian Federation

This appendix contains the responses received from the Russian Federation to clarifying questions. The responses are provided as received without additional editing or modification. *Note: Unofficial translation from Russian.*

CQ1. What threat information about the presence of air defence equipment in eastern Ukraine that was not controlled by government forces and which could have reached the respective airspace in URVV FIR above Flight Level 250 was identified, when and by which authority?

Answer:

The Russian authorities did not have any information regarding the presence of air defense equipment on the territory of Ukraine that was not controlled by the armed forces of the Ministry of Defence of Ukraine and which could hit targets in the Rostov-on-Don FIR above FL 250.

Statements by Ukraine's officials implied that Ministry of Defence of Ukraine delivered different types of weapons, including combat aircraft, to the armed conflict zone. In accordance with ICAO Rules, Ukrainian authorities were responsible for obtaining, analyzing and disseminating flight safety information over armed conflict zone.

NOTAMs (A1383/14, A1384/15, A1492/14, A1493/14) issued by Ukraine mentioned only flights of state aircraft as a source of threat to flight safety of civil aircraft. The real situation in eastern Ukraine differed from the information presented in NOTAMs. Therefore, as it was outlined in the answer to Q2 of the Questionnaire of 4 September 2020, Rosaviatsiya identified a threat to flight safety itself due to Ukraine's regular shooting of the Russian border areas.

We would deem it important to draw the Flight Safety Foundation's attention to the fact that it is incorrect to focus only on threats posed exclusively by air defense systems capable of hitting targets at high altitudes when assessing flight safety risks over eastern Ukraine. The same mistake was made in the final DSB report where the analysis of the actions and decisions taken by the Ukrainian side was focused on the speculation that the AN-26 aircraft of the Armed Forces of Ukraine had been downed on 14 July 2014 with some "heavy weapon" (pages 181–185, Section 5.3).

The final DSB report concludes that the reason why Ukraine restricted the use of the airspace below FL320 remains unclear (page 10, Subsection "Ukraine's airspace management," paragraph two).

In April 2014, the Ukrainian authorities declared areas in eastern Ukraine "an anti-terrorist operation zone." Regulation on the Use of Airspace of Ukraine approved by the Cabinet of Ministers of Ukraine Resolution No. 401 of 29 March 2002 (https://zakon.rada.gov.ua/laws/show/401-2002-%D0%BF#Text) did not provide for procedures in case of internal armed conflicts.

As it was found out during the investigation of Flight MH17 crash, due to the operational use of the aircraft of the Armed Forces of Ukraine (MIG-29, SU-27, SU-25 aircraft), larger airspace in Denepropetrovsk FIR was reserved by issuing NOTAMs from 29 June to 14 July 2014 by the necessity to set "a buffer zone" FL260-FL320 (page 196, Section 6.3, paragraph two).

Regulation No. 401 of 29 March 2002 contains a definition of the term "a buffer zone" which is a part of the airspace around restricted areas, hazardous areas, prohibited areas and areas related to temporarily reserved airspace intended to ensure safety requirements while carrying activities related to the use of airspace in the mentioned areas and beyond them. However, Regulation No. 410 of 29 March 2002 does not describe the order of buffer zones settings.

Ukraine did not publish information regarding "the buffer zone" around the conflict zone. Moreover, NOTAMs A1492/14 and A1493/14 issued by the Ukraine did not prohibit state aircraft to fly between FL260 and FL320. In this connection, it is still unclear how the Ministry of Defence of Ukraine was going to provide and the Ukraerocenter to control the observance of the so-called "buffer zone."

Clarifications concerning the reasons for issuing NOTAMs A1492/14 and A1493/14 on setting "a buffer zone" provided during the investigation of Flight MH17 crash, give grounds for assuming that military activity in the armed conflict zone related to the military aviation flights was more dangerous than it was reflected in NOTAMs.

In accordance with para. 12.2. of the Rules for the Performance of Flights and Air Traffic Management in the Airspace of Ukraine with a Reduced Vertical Separation Minimum approved by Order of the Ministry of Transport of Ukraine No. 9 of 11 January 2002, "The required vertical separation minimum between the vertical limits of the restricted and reserved airspace and other aircraft not engaged in such activities and flying in airspace with RVSM should be: 600 meters (2000 feet) above the upper limit of the zone of the aforementioned activities for the upper limits at FL290 and above; …"(https://zakon.rada.gov.ua/laws/show/z0041-02#Text).

Therefore, given FL320 which is, according to NOTAMs A1492/14 and A1493/14, the upper limit of the restricted zone, civil aircraft could fly in this area at no less than FL340, i.e. Flight MH17 authorised by the Ministry of

Internal Affairs of Ukraine at FL330 did not answer the safety requirements over the armed conflict zone. The investigation conducted by the DSB did not establish the reason why the Ministry of Internal Affairs of Ukraine allowed the Flight MH17 to proceed at an altitude lower than provided for by the Ukrainian legislation.

CQ2. What intent to attack with air defence equipment in eastern Ukraine that was not controlled by government forces and which could have reached the respective airspace in URVV FIR above Flight Level 250 was identified, when and by which authority?

Answer:

When taking a decision to issue NOTAM V6158/14, the Russian airspace authorities did not have information that governmental or non-governmental entities on the territory of Ukraine deployed air defense equipment capable of downing aircraft at high altitudes in the conflict zone and could use it in the armed conflict by mistake or negligence.

Responsibility for assessing the intent to use air defense equipment by governmental and non-governmental armed groups on the territory of Ukraine rests with the Ukrainian authorities. This follows from the recommendations given in para. 10.2 of ICAO Document 9554: "The responsibility for initiating the co-ordination process rests with the States whose military forces are engaged in the conflict. The responsibility for instituting special measures to ensure the safety of international civil aircraft operations remains with the States responsible for providing air traffic services in the airspace affected by the conflict, even in case where co-ordination is not initiated or completed."

CQ3. What were the specific reasons for restricting the airspace with NOTAM V6158/14, why were there several restrictions in one NOTAM, and to which of the restrictions in the NOTAM apply the items F) and G), specifying surface as lower height limit and FL530 as upper height limit?

Answer:

In the period from March to August 2014 analysed by the Foundation, there were no armed conflicts on the territory of the Russian Federation adjacent to the state border with Ukraine. However, statements by the Russian Ministry of Foreign Affairs provided information concerning the risks to people and objects on the territory of the Russian Federation and in its airspace and in this regard, Rosaviatsiya took preventive flight safety measures (issuance of NOTAMSs V6158/14 and A2681/14).

The specific reason for airspace restrictions imposed by NOTAM V6158/14 is stated in the field E) of the NOTAM: "Due to combat actions on the territory of the Ukraine near the state border with the Russian Federation and the facts of firing from the territory of the Ukraine towards the territory of the Russian Federation…." This explanation was included in the NOTAM subject to the requirements of ICAO Rules, including para. 6.3.8. of ICAO Document 8126 and recommendations given in Appendix B to ICAO Document 9554.

Items Q), F) and G) of NOTAM V6158/14 stated that it applied to the airspace from the ground to FL530. However, regarding the airway sections adjacent to the state border of the Russian Federation listed in the field E), the stated height limit was "SFC — FL320" which corresponded to the upper limit on the use of airways in NOTAMs A1492/14 and A1493/14 published earlier (on 14 July 2014) by Ukraine.

The difference in the upper limit values of the airspace restrictions is related to the information published in the second part of the field E) of the NOTAM, concerning the use of the arrival/exit routes to and from the Rostov-on-Don airport from and to the Dnepropetrovsk flight information region (FIR), with FL340 and above stated (FL330 and above respectively). Therefore, when writing the NOTAM, the maximum value of the highest possible FL530 for the airways sections used for the departure (arrival) from (to) the Rostov-on-Don airport, was chosen.

Flight MH17 following airway L980 in the airspace of Ukraine to the compulsory reporting point TAMAK and further, according to the flight plan, from the waypoint TAMAK, following airway A87 in the Russian airspace, was subject to NOTAM V6158/14 restrictions for the airspace below FL 320 (airway section "A87 TMAK — SARNA" stated in NOTAM V6158/14).

The content of the field E) of NOTAM V6158/14 consists of two parts the first one concerns restrictions on airway sections, while the second one concerns those on approach and exit routes to and from the area of Rostov-on-Don airport (URRR). Meanwhile, the second part regarding Rostov-on-Don airport was repeated in NOTAM A2681/14.

CQ4. NOTAM V6158/14 promulgated, among other things, a restriction with an upper height limit of FL320 referring to "…the facts of firing from the territory of the Ukraine towards the territory of Russian Federation…." What was the precise threat that required airspace restriction over the territory of the Russian Federation up to FL320 but not above, considering that in the references you provided the statements (1570-28-06-2014, 1678-10-07-2014 and 1688-13-07-2014) of the Ministry of Foreign Affairs of the Russian Federations refer to low altitude artillery shootings?

Answer:

NOTAMs A1383/14, A1384/14, A1387/14, A1389/14, A1492/14, and A1493/14 issued by the Ukrainian side did not contain information concerning the nature of the

military actions as required by the ICAO Rules, including para. 6.3.8. of ICAO Document 8126 and recommendations given in Appendix B to ICAO Document 9554. From the Ukrainian NOTAMs, it formally followed that they were in order to ensure state aviation flights.

However, the use of different types of weapons and methods of warfare (flights with the use of combat aviation weapons; tanks and artillery shooting; jamming support) in close proximity to the territory of the Russian Federation, not declared in the NOTAM, pointed to the fact that the Ukrainian authorities did not fulfil the requirements of the ICAO Rules, according to which, co-ordination is aimed at providing optimal conditions which allow to avoid the creation of hazards to civil aircraft and minimizing interference with the normal flight operations of such aircraft.

For instance:

- On 24 April 2014, one of the Russian air companies informed Rosaviatsiya of disappearing GPS signal when flying within the Dnepropetrovsk FIR area of responsibility. Navigation equipment resumed its work after entering the airspace of the Russian Federation;
- On 5 June 2014, the Ukrainian plane SU-27 violated the state border by trespassing over the Russian border and going 1.5km deep into the Russian territory in the area of the populated area Kuybyshevo (the Rostov region). On 12 June 2014, in the same area, a MI-8 helicopter with Ukrainian symbols flying at the height of 50m trespassed into the airspace of the Russian Federation going up to 3km deep into it (extract from the Statement by the Russian MFA No. 1422 of 14 June 2014).

As it was mentioned earlier in the answers to Questions No. 1 and 2, proceeding from the information in the latest statements by the Russian MFA (No. 1570 of 28 June 2014, N0. 1678 of 10 July 2014, No. 1688 of 13 July 2014), Rosaviatsiya decided to partially close the airspace in the Rostov-on-Don FIR area of responsibility.

FL320 was taken as the limit for the NOTAM V6158/14, same as in the Ukrainian NOTAMs A1492/14 and A1493/14. The decision to set a vertical limit of FL320 was taken as Rosaviatsiya did not have any other, more or less credible information provided by the Ukrainian side, which would allow to forecast the vertical limit of the hazard zone for civil aviation flights.

Appendix D
Questionnaire Responses:
Ukraine standard procedures and threat knowledge

This appendix contains the responses received from Ukraine to standard procedures and threat knowledge questionnaire. The responses are provided as received without additional editing or modification.

Q1. Is information in social media used as a trigger for security threat analysis for civil aviation, including information about capability of attack and/or intend to attack civil aircraft?

Answer:

Information from open sources, including social media, is used in the assessment of threats to civil aviation security in accordance with relevant regulatory documents.

Responsible:

- State Aviation Administration of Ukraine;
- Security Service of Ukraine;
- Ministry of Defense of Ukraine;
- Ministry of Internal Affairs of Ukraine;
- Foreign Intelligence Service of Ukraine;
- airport operators;
- aircraft operators;
- air navigation service providers.

References:

Law of Ukraine "On the State Civil Aviation Security Program" dated February 20, 2003 No 545-IV;

Law of Ukraine "On Combating Terrorism" dated March 20, 2003 No 638-IV (as amended).

Decree of the President of Ukraine "On Regulations regarding the Anti-Terrorist Center and its coordination groups at the regional bodies of the Security Service of Ukraine" dated April 14, 1999 No 379/99 (as amended).

Order of the Ministry of Transport and Communications of Ukraine "On Approval of the Guidance to Assess the Level of Threat to Civil Aviation Security of Ukraine" dated 11.05.2007 No 390 (restricted), registered by the Ministry of Justice of Ukraine on May 25, 2007, registration No 542/13809 (as amended).

These documents are developed in accordance with relevant ICAO provisions, in particular Annex 17 and ICAO Doc 8973.

Process and timeline:

In accordance with the legislation, the State Aviation Administration of Ukraine constantly conducts a general assessment of threats to civil aviation security on the basis of information received from the Security Service of Ukraine; Ministry of Defense of Ukraine; Ministry of Internal Affairs of Ukraine; Foreign Intelligence Service of Ukraine; airport operators; aircraft operators; air navigation service providers; and other sources, social media included.

Actual implementation:

Describe here what social media civil aviation threat information about presence of air defense equipment or intent to attack was identified by which authority.

According to the established procedures, the State Aviation Administration of Ukraine used information on threats to civil aviation security from the Ministry of Defense of Ukraine, law enforcement and intelligence agencies of Ukraine, and other sources. This information is the one marked "For official use (restricted)." The information mentioned above is specified in the final report on the investigation of the air crash of Malaysia Airlines' Boeing-777-200. https://www.onderzoeksr aad.nl/en/page/3546/crash-mh17-17-july-2014.

Changes after 17 July 2014:

Have been improved in line with updated ICAO Standards and Recommended Practices, Annex 17 to the Chicago Convention on International Civil Aviation, and current legislation. In particular, the following have been adopted:

- Amendments to the laws of Ukraine "On the Security Service of Ukraine," "On Combating Terrorism," "On Counterintelligence Activities," "On Operational and Investigative Activities";
- State Civil Aviation Security Program, approved by the Law of Ukraine, dated March 21, 2017 No. 1965-VIII;
- Order of the Ministry of Infrastructure of Ukraine "On Approval of the Guidance to Assess the Level of Threat to Civil Aviation Security of Ukraine," dated 17.06.2020 No356 registered by the Ministry of Justice of Ukraine on 01.10.2020, registration No 960/35243

Q2. What are the sources of public and private threat information and the processes for gathering information relative to civil aviation security (including in a conflict zone)?

Answer:

Information from all available sources is used to assess threats to civil aviation security in accordance with relevant regulatory documents. Also, when assessing the threats to civil aviation security, they consider the information pertaining to restrictions on flights in certain areas from international civil aviation organizations and civil aviation authorities of other states (Along with this, attention ought to be paid to the fact that at the time the air crash occurred, there was no concept or definition for a "conflict zone").

Responsible:

- State Aviation Administration of Ukraine;
- Security Service of Ukraine;
- Ministry of Defense of Ukraine;
- Ministry of Internal Affairs of Ukraine;
- Foreign Intelligence Service of Ukraine;
- airport operators; aircraft operators;
- air navigation service providers;
- civil aviation authorities of foreign states;
- international civil aviation organizations.

References:

Law of Ukraine "On the State Civil Aviation Security Program" dated February 20, 2003 No 545-IV;

Law of Ukraine "On Combating Terrorism" dated March 20, 2003 No 638-IV (as amended).

Decree of the President of Ukraine "On Regulations regarding the Anti-Terrorist Center and its coordination groups at the regional bodies of the Security Service of Ukraine" dated April 14, 1999 No 379/99 (as amended).

Order of the Ministry of Transport and Communications of Ukraine "On Approval of the Guidance to Assess the Level of Threat to Civil Aviation Security of Ukraine" dated 11.05.2007 No 390 (restricted), registered by the Ministry of Justice of Ukraine on May 25, 2007, registration No 542/13809 (as amended).

These documents are developed in accordance with relevant ICAO provisions, in particular Annex 17 and ICAO Doc 8973.

Process and timeline:

In accordance with the legislation, the State Aviation Administration of Ukraine constantly conducts a general assessment of threats to civil aviation security on the basis of information received from the Security Service of Ukraine; Ministry of Defense of Ukraine; Ministry of Internal Affairs of Ukraine; Foreign Intelligence Service of Ukraine; airport operators; aircraft operators; air navigation service providers; civil aviation authorities of foreign states; international civil aviation organizations.

Actual implementation:

Describe here what other sources of civil aviation threat information about presence of air defence equipment and intent to attack was identified by which authority.

According to the established procedures, the State Aviation Administration of Ukraine used information on threats to civil aviation security from the Ministry of Defense of Ukraine, law enforcement and intelligence agencies of Ukraine, civil aviation authorities of foreign states; international civil aviation organizations. This information is the one marked "For official use (restricted)." The information mentioned above is specified in the final report on the investigation of the air crash of Malaysia Airlines' Boeing-777-200. https://www.onderzoeksr aad.nl/en/page/3546/crash-mh17-17-july-2014.

Changes after 17 July 2014:

National regulations and procedures pertaining to gathering and analyzing information about threats to civil aviation security have been improved in line with updated ICAO Standards and Recommended Practices, Annex 17 to the Chicago Convention on International Civil Aviation, and current legislation. In particular, the following have been adopted:

- amendments to the laws of Ukraine "On the Security Service of Ukraine," "On Combating Terrorism," "On Counterintelligence Activities," "On Operational and Investigative Activities";
- State Civil Aviation Security Program, approved by the Law of Ukraine, dated March 21, 2017 No. 1965-VIII;
- Order of the Ministry of Infrastructure of Ukraine "On Approval of the Guidance to Assess the Level of Threat to Civil Aviation Security if Ukraine," dated 17.06.2020 No 356 registered by the Ministry of Justice of Ukraine on 01.10.2020, registration No 960/35243

Q3. What is the level of involvement of airlines, air navigation service providers (ANSPs), the military and adjacent states or other states publishing advisories in gathering information about aviation security (including information for conflict zones)?

Answer:

National airlines, air navigation service providers, the military and law enforcement agencies are involved in gathering information about aviation security. According to relevant regulatory documents, information received from adjacent or other states (if available) is taken into consideration as well.

(Along with this, attention ought to be paid to the fact that at the time the air crash occurred, there was no concept or definition for a "conflict zone").

Responsible:

- State Aviation Administration of Ukraine;
- Security Service of Ukraine;
- Ministry of Defense of Ukraine;
- Ministry of Internal Affairs of Ukraine;
- Foreign Intelligence Service of Ukraine;
- airport operators; aircraft operators;
- air navigation service providers;
- civil aviation authorities of foreign states;
- international civil aviation organizations.

References:

Law of Ukraine "On the State Civil Aviation Security Program" dated February 20, 2003 No 545-IV;

Law of Ukraine "On Combating Terrorism" dated March 20, 2003 No 638-IV (as amended).

Decree of the President of Ukraine "On Regulations regarding the Anti-Terrorist Center and its coordination groups at the regional bodies of the Security Service of Ukraine" dated April 14, 1999 No 379/99 (as amended).

Order of the Ministry of Transport and Communications of Ukraine "On Approval of the Guidance to Assess the Level of Threat to Civil Aviation Security of Ukraine" dated 11.05.2007 No 390 (restricted), registered by the Ministry of Justice of Ukraine on May 25, 2007, registration No 542/13809 (as amended).

These documents are developed in accordance with relevant ICAO provisions, in particular Annex 17 and ICAO Doc 8973.

Process and timeline:

In accordance with the legislation, the State Aviation Administration of Ukraine constantly conducts a general assessment of threats to civil aviation security on the basis of information received from the Security Service of Ukraine; Ministry of Defense of Ukraine; Ministry of Internal Affairs of Ukraine; Foreign Intelligence Service of Ukraine; airport operators; aircraft operators; air navigation service providers; civil aviation authorities of foreign states; international civil aviation organizations.

Actual implementation:

Describe specifically what airlines, air navigation service provider (ANSP), the military and adjacent states or other states publishing advisories were used as a source for what information about security risk for civil aircraft.

According to the established procedures, the State Aviation Administration of Ukraine used information on threats to civil aviation security from national airlines, air navigation service providers, the military and law enforcement agencies, considering information from adjacent or other states (if available) as well.

This information is the one marked "For official use (restricted)." The information mentioned above is specified in the final report on the investigation of the air crash of Malaysia Airlines' Boeing-777-200. https://www.onderzoeksraa d.nl/en/page/3546/crash-mh17-17-july-2014.

Changes after 17 July 2014:

National regulations and procedures pertaining to gathering and analyzing information about threats to civil aviation security have been improved in line with updated ICAO Standards and Recommended Practices, Annex 17 to the Chicago Convention on International Aviation, and current legislation. In particular, the following have been adopted:

- amendments to the laws of Ukraine "On the Security Service of Ukraine," "On Combating Terrorism," "On Counterintelligence Activities," "On Operational and Investigative Activities";
- State Civil Aviation Security Program, approved by the Law of Ukraine, dated March 21, 2017 No. 1965-VIII;
- Order of the Ministry of Infrastructure of Ukraine "On Approval of the Guidance to Assess the Level of Threat to Civil Aviation Security of Ukraine," dated 17.06.2020 No 356, registered by the Ministry of Justice of Ukraine on 01.10.2020, registration No 960/35243

Q4. What are the procedures for routine review and analysis of NOTAMs, security warnings and airspace restrictions for adjacent flight information regions (FIRs) to ensure civil aircraft security?

Answer:

Information pertaining to NOTAMs, security warnings and airspace restrictions for adjacent flight information regions (FIRs) is constantly reviewed and analyzed in accordance with relevant regulatory documents.

Responsible:

- State Aviation Administration of Ukraine;
- Security Service of Ukraine;
- Ministry of Defense of Ukraine;
- aircraft operators;
- air navigation service providers;
- EUROCONTROL.

References:

Law of Ukraine "On the State Civil Aviation Security Program" dated February 20, 2003 No 545-IV;

Rules of aeronautical information service provision (Order of the Ministry of Transport and Communications of Ukraine (dated 01.07.2004 No564).

Regulation on Use of Airspace of Ukraine, approved by the decree of the Cabinet of Ministers of Ukraine, dated 29.03.2002 No 401

These documents are developed in accordance with relevant ICAO provisions, in particular Annexes 11, 15 and 17, Doc 8973, Doc 9554, Doc 8126, Cir 330

Process and timeline:

State Aviation Administration of Ukraine; Security Service of Ukraine; Ministry of Defense of Ukraine; aircraft operators; air navigation service providers constantly review and analyze NOTAMs, security warnings and airspace restrictions for adjacent flight information regions (FIRs). EUROCONTROL analyzes such information in order to provide centralized services related to flight planning and air traffic flow management.

Actual implementation:

Describe what civil aviation security threat information was identified by which authority based on the NOTAMs, security warnings and airspace restrictions for adjacent fight information regions FIRs.

According to the established procedures, the State Aviation Administration of Ukraine; Security Service of Ukraine; Ministry of Defense of Ukraine; aircraft operators; air navigation service providers constantly review and analyse NOTAMs, security warnings and airspace restrictions for adjacent flight information regions (FIRs). EUROCONTROL analyzes such information in order to provide centralized services related to flight planning and air traffic flow management. The information mentioned above is specified in the final report on the investigation of the air crash of Malaysia Airlines' Boeing-777-200. https://www.onderzoeksraa d.nl/en/page/3546/crash-mh17-17-july-2014.

Changes after 17 July 2014:

National regulations and procedures pertaining to gathering and analyzing information about threats to civil aviation security have been improved in line with updated ICAO Standards and Recommended Practices, Annexes 11, 15, 17 to the Chicago Convention on International Civil Aviation, Doc 10084, Doc 10066, and current legislation. In particular, the following have been adopted:

- State Civil Aviation Security Program, approved by the Law of Ukraine, dated March 21, 2017 No. 1965-VIII;
- Order of the Ministry of Infrastructure of Ukraine "On Approval of the Guidance to Assess the Level of Threat to Civil Security Aviation of Ukraine," dated 17.06.2020 No356 registered by the Ministry of Justice of Ukraine on 01.10.2020, registration No 960/35243;
- New edition of the Regulations on Use of Airspace of Ukraine, approved by the decree of the Cabinet of Ministers of Ukraine, dated 06.12.2017 No 954.
- "Rules of the Use of Airspace of Ukraine," approved by the Order of the State Aviation Administration of Ukraine and the Ministry of Defense of Ukraine, dated 11.05.2018 No 430/210, registered by the Ministry of Justice of Ukraine on 14.09.2018, registration No 1056/32508;
- Aviation Regulations of Ukraine "Aeronautical Information Service Provision," approved by the Order of the State Aviation Administration of Ukraine dated on 13.05.2019 No 582, registered by the Ministry of Justice of Ukraine on 09.07.2019, registration No 760/33731;
- Aviation Regulations of Ukraine "Air Traffic Service," approved by the Order of the State Aviation Administration of Ukraine, dated 16.04.2019 No 475, registered by the Ministry of Justice of Ukraine on 04.07.2019, registration No 727/33698.

Q5. What is the process for deciding on the source credibility and for verifying information, including information on capability of attack and intent to attack, relative to an active armed conflict that could impact civil aviation?

Answer:

Information on threats to civil aviation security is analyzed, verified and assessed in accordance with relevant regulatory documents (additional information is provided in Appendix 3).

Responsible:

- Security Service of Ukraine;
- Ministry of Defense of Ukraine;
- Foreign Intelligence Service of Ukraine

References:

The detailed process of gathering, analyzing, verifying and assessing information is classified. The general provisions related to this process are specified in the following legislative documents:

- Laws of Ukraine "On Combating Terrorism," "On the Security Service of Ukraine" (as amended), "On Operational and Investigative Activities" (as amended), "On Counterintelligence activities" (as amended);
- Decree of the President of Ukraine "On the Regulations regarding the Anti-Terrorist Center and its coordination groups at the regional bodies of the Security Service of Ukraine," dated April 14, 1999 No 379/99 (as amended).
- Regulations on the unified state system of prevention, response and cessation of terrorist acts and minimization of their consequences, approved by the resolution of the Cabinet of Ministers of Ukraine, dated February 18, 2016 No 92.
- Order of the Ministry of Transport and Communications of Ukraine "On Approval of the Guidance to Assess the Level of Threat to Civil Aviation Security of Ukraine" dated 11.05.2007 No 390 (restricted), registered by the Ministry of Justice of Ukraine on May 25, 2007, registration No 542/13809 (as amended);
- classified internal departmental documents.

Process and timeline:

Information on possible threats to aircraft flights in areas of military conflicts is intelligence one. The procedure for determining the reliability of the source of information depends on the method of obtaining such information and the type of information source. This information is classified.

Actual implementation:

How was the security threat information verified, the source judged for credibility, and by what authority / organization? What were the results of the credibility decision and the verification?

The information was analyzed, verified and assessed by the Security Service of Ukraine, the Ministry of Defense of Ukraine, and the Foreign Intelligence Service of Ukraine. This information is classified.

Changes after 17 July 2014:

Based on the adopted Decree of the President of Ukraine dated 30.03.2018 No 116/2018 "On approval of the Resolution of the National Security and Defense Council "On large-scale anti-terrorist operation in Donetsk and Luhansk regions" (restricted), the Law of Ukraine dated 21.06.2018 No 2469-VIII "On the National Security of Ukraine," Law of Ukraine dated 17.09.2020 No 912-IX "On Intelligence," appropriate amendments have been made to the following legislation:

- Laws of Ukraine "On Combating Terrorism," "On the Security Service of Ukraine," "On Operational and Investigative Activities," "On Counterintelligence activities";
- State Civil Aviation Security Program, approved by the Law of Ukraine, dated March 21, 2017 No. 1965-VIII.
- Decree of the President of Ukraine "On the Regulations regarding the Anti-Terrorist Center and its coordination groups at the regional bodies of the Security Service of Ukraine," dated April 14, 1999 No 379/99 (as amended).
- Regulations on the unified state system of prevention, response and cessation of terrorist acts and minimization of their consequences, approved by the resolution of the Cabinet of Ministers of Ukraine, dated February 18, 2016 No 92.

Ukraine has adopted the Order of the Ministry of Infrastructure of Ukraine "On Approval of the Guidance to Assess the Level of Threat to Civil Aviation Security of Ukraine" dated 17.06.2020 No356, registered by the Ministry of Justice of Ukraine on 01.10.2020, registration No960/35243.

Also, some classified internal departmental documents have been amended.

Q6. What are the determining risk factors for unintentional attack that may not allow civil aviation to fly over a conflict zone? For example, scale of the conflict, military air transport or air combat activities, previous attacks against aircraft, level of training and experience of SAM operators, level of robustness of command and control mechanism for authorizing launch, civil aviation flight proximity to strategic assets, technical capability of SAMs to distinguish between civil and military aircraft.

Answer:

According to relevant regulatory documents, all factors that pose a potential threat to civil aviation security are taken into account when establishing restrictions, prohibitions and terms on the use of airspace over or near areas of military conflicts. (Along with this, attention ought to be paid to the fact that at the time the air crash occurred, there was no concept or definition for a "conflict zone"). (Additional information is provided in Appendix 3).

Responsible:

- State Aviation Administration of Ukraine;
- Security Service of Ukraine;
- Foreign Intelligence Service of Ukraine;
- Ministry of Defense of Ukraine;
- Ministry of Internal Affairs of Ukraine;
- air navigation service providers.

References:

Regulation on Use of Airspace of Ukraine, approved by the decree of the Cabinet of Ministers of Ukraine, dated 29.03.2002 No 401

Law of Ukraine "On the State Civil Aviation Security Program" dated February 20, 2003 No 545-IV;

Order of the Ministry of Transport and Communications of Ukraine "On Approval of the Guidance to Assess the Level of Threat to Civil Aviation Security of Ukraine" dated 11.05.2007 No 390 (restricted), registered by the Ministry of Justice of Ukraine on May 25, 2007, registration No 542/13809 (as amended).

These documents are developed in accordance with relevant ICAO provisions, in particular Annexes 11 and 17, Doc 8973, Doc 9554, Doc 9433, Cir 330

Process and timeline

In accordance with the legislation, the State Aviation Administration of Ukraine constantly conducts a general assessment of threats to civil aviation security on the basis of information received from Security Service of Ukraine; Foreign Intelligence Service of Ukraine; Ministry of Defense of Ukraine; Ministry of Internal Affairs of Ukraine, air navigation service providers, and make a decision on establishing restrictions and prohibitions on the use of airspace.

The information mentioned above is specified in the final report on the investigation of the air crash of Malaysia Airlines' Boeing-777-200. https://www.onderzoeksraad.nl/en/page/3546/crash-mh17-17-july-2014

Actual implementation:

Describe what risk factors for unintentional attack were identified by what authority / organization. See examples of risk factors listed in Q6

According to the established procedures, on the basis of available information, appropriate restrictions and prohibitions on the use of airspace were established.

Changes after 17 July 2014:

National regulations and procedures pertaining to gathering and analyzing information about threats to civil aviation security, risk assessment and implementation of prohibitions, restrictions and terms on the use of airspace, have been improved in line with updated ICAO Standards and Recommended Practices Annexes 11, 17 to the Chicago Convention on International Civil Aviation, Doc 10084, and current legislation. In particular, the following have been adopted:

- Laws of Ukraine "On Combating Terrorism," "On the Security Service of Ukraine," "On Operational and Investigative Activities," "On Counterintelligence activities."
- Ukraine has adopted the following legislative documents:
- State Civil Aviation Security Program, approved by the Law of Ukraine, dated March 21, 2017 No. 1965-VIII;
- Order of the Ministry of Infrastructure of Ukraine "On Approval of the Guidance to Assess the Level of Threat to Civil Aviation Security of Ukraine," dated 17.06.2020 No356 registered by the Ministry of Justice of Ukraine on 01.10.2020, registration No 960/35243;
- New edition of the Regulations on Use of Airspace of Ukraine, approved by the decree of the Cabinet of Ministers of Ukraine, dated 06.12.2017 No 954.
- "Rules of the Use of Airspace of Ukraine," approved by the Order of the State Aviation Administration of Ukraine and the Ministry of Defense of Ukraine, dated 11.05.2018 No 430/210, registered by the Ministry of Justice of Ukraine on 14.09.2018, registration No 1056/32508;
- Aviation Regulations of Ukraine "Air Traffic Service," approved by the Order of the State Aviation Administration of Ukraine, dated 16.04.2019 No 475, registered by the Ministry of Justice of Ukraine on 04.07.2019, registration No 727/33698.

Q7. What organizations are involved, how do they coordinate, and what is the process for determining acceptable security risk levels in civil aviation airspace over a conflict zone?

Note: These are general security level targets to be met if specified, that are not specific to an event or situation.

Answer:

According to relevant regulatory documents, the process of determining the acceptable level of civil aviation safety risks is carried out within appropriate coordination based on an analysis of available threat information (along with this, attention ought to be paid to the fact that at the time the air crash occurred, there was no concept or definition for a "conflict zone").

Responsible:

- State Aviation Administration of Ukraine;
- Security Service of Ukraine;
- Foreign Intelligence Service of Ukraine;
- Ministry of Defense of Ukraine;
- Ministry of Internal Affairs of Ukraine;
- air navigation service providers.

References:

Regulation on Use of Airspace of Ukraine, approved by the decree of the Cabinet of Ministers of Ukraine, dated 29.03.2002 No 401

Law of Ukraine "On the State Civil Aviation Security Program" dated February 20, 2003 No 545-IV;

Law of Ukraine "On Combating Terrorism" dated March 20, 2003 No 638-IV (as amended);

Order of the Ministry of Transport and Communications of Ukraine "On Approval of the Guidance to Assess the Level of Threat to Civil Aviation Security of Ukraine" dated 11.05.2007 No 390 (restricted), registered by the Ministry of Justice of Ukraine on May 25, 2007, registration No 542/13809 (as amended).

These documents are developed in accordance with relevant ICAO provisions, in particular Annexes 11 and 17, Doc 8973, Doc 9554, Doc 9433, Cir 330

Process and timeline:

In accordance with the legislation, the State Aviation Administration of Ukraine constantly conducts a general assessment of threats to civil aviation security in coordination with the Security Service of Ukraine; Foreign Intelligence Service of Ukraine; Ministry of Defense of Ukraine; Ministry of Internal Affairs of Ukraine, air navigation service providers.

The information mentioned above is specified in the final report on the investigation of the air crash of Malaysia Airlines' Boeing-777-200. https://www.onderzoeksraad.nl/en/page/3546/crash-mh17-17-july-2014.

Actual implementation:

Describe what organisations determined the acceptable security risk levels for civil aircraft. How this was determined and what were the determined acceptable security levels?

According to the established procedures, the detailed information is specified in the final report on the investigation of the air crash of Malaysia Airlines' Boeing-777-200. https://www.onderzoeksr aad.nl/en/page/3546/crash-mh17-17-july-2014.

Changes after 17 July 2014:

National regulations and procedures regarding risk assessment in relation to threats to civil aviation security have been improved in line with updated ICAO Standards and Recommended Practices, Annexes 11, 17 to the Chicago Convention on International Civil Aviation, Doc 10084, and current legislation. In particular, the following have been adopted:

- Laws of Ukraine "On Combating Terrorism," "On the Security Service of Ukraine," "On Operational and Investigative Activities," "On Counterintelligence activities."

Ukraine has adopted the following legislative documents:

- Law of Ukraine "On the specifics of state policy to ensure the state sovereignty of Ukraine in the temporarily occupied territories in Donetsk and Luhansk regions" dated January 18, 2018 No 2268-VIII;
- State Civil Aviation Security Program, approved by the Law of Ukraine, dated March 21, 2017 No. 1965-VIII;
- Order of the Ministry of Infrastructure of Ukraine "On Approval of the Guidance to Assess the Level of Threat to Civil Aviation Security of Ukraine," 17.06.2020 No356 registered by the Ministry of Justice of Ukraine on 01.10.2020, registration No 960/35243;
- New edition of the Regulations on Use of Airspace of Ukraine, approved by the decree of the Cabinet of Ministers of Ukraine, dated 06.12.2017 No 954.
- "Rules of the Use of Airspace of Ukraine," approved by the Order of the State Aviation Administration of Ukraine and the Ministry of Defense of Ukraine, dated 11.05.2018 No 430/210, registered by the Ministry of Justice of Ukraine on 14.09.2018, registration No 1056/32508;
- Aviation Regulations of Ukraine "Air Traffic Service," approved by the Order of the State Aviation Administration of Ukraine, dated 16.04.2019 No 475, registered by the Ministry of Justice of Ukraine on 04.07.2019, registration No 727/33698.

Q8. What is the process of determining how civil aviation can be affected based on threat information in a conflict zone? For example, what part of the airspace, what altitudes or types of aircraft?

Answer:

The process of determining how civil aviation can be affected based on threat information has been implemented on the basis of relevant regulatory document (Additional information is provided in Appendix 3). (Along with this, attention ought to be paid to the fact that at the time the air crash occurred, there was no concept or definition for a "conflict zone").

Responsible:

- State Aviation Administration of Ukraine;
- Security Service of Ukraine;
- Foreign Intelligence Service of Ukraine;
- Ministry of Defense of Ukraine;
- Ministry of Internal Affairs of Ukraine;
- air navigation service providers.

References:

Law of Ukraine "On the State Civil Aviation Security Program" dated February 20, 2003 No 545-IV;

Regulation on Use of Airspace of Ukraine, approved by the decree of the Cabinet of Ministers of Ukraine, dated 29.03.2002 No 401;

Order of the Ministry of Transport and Communications of Ukraine "On Approval of the Guidance to Assess the Level of Threat to Civil Aviation Security of Ukraine" dated 11.05.2007 No 390 (restricted), registered by the Ministry of Justice of Ukraine on May 25, 2007, registration No 542/13809 (as amended).

These documents are developed in accordance with relevant ICAO provisions, in particular Annexes 11 and 17, Doc 8973, Doc 9554, Doc 9433, Cir 330

Process and timeline:

In accordance with the legislation, the State Aviation Administration of Ukraine constantly conducts a general assessment of threats to civil aviation security on the basis of information received from the Security Service of Ukraine; Foreign Intelligence Service of Ukraine; Ministry of Defense of Ukraine; Ministry of Internal Affairs of Ukraine, air navigation service providers, and make a decision on establishing restrictions, prohibitions and terms on the use of airspace. The information mentioned above is specified in the final report on the investigation of the air crash of Malaysia Airlines' Boeing-777-200, https://www.onderzoeksraa d.nl/en/page/3546/crash-mh17-17-july-2014.

Actual implementation:

Describe what were the impact analysis results, if any — how civil aviation can be affected based on threat information — what airspace, what altitudes or type of aircraft.

According to the established procedures, the detailed information is specified in the final report on the investigation of the air crash of Malaysia Airlines' Boeing-777-200, https://www.onderzoeksraa d.nl/en/page/3546/crash-mh17-17-july-2014.

Changes after 17 July 2014:

National regulations and procedures regarding risk assessment in relation to threats to civil aviation security have been improved in line with updated ICAO Standards and Recommended Practices, Annexes 11, 17 to the Chicago Convention on International Civil Aviation, Doc 10084, and current legislation. In particular, the following have been adopted:

- Laws of Ukraine "On Combating Terrorism," "On the Security Service of Ukraine," "On Operational and Investigative Activities," "On Counterintelligence activities."

Ukraine has adopted the following legislative documents:

- Law of Ukraine "On the specifics of state policy to ensure the state sovereignty of Ukraine in the temporarily occupied territories in Donetsk and Luhansk regions" dated January 18, 2018 No 2268-VIII;
- State Civil Aviation Security Program, approved by the Law of Ukraine, dated March 21, 2017 No. 1965-VIII;
- Order of the Ministry of Infrastructure of Ukraine "On Approval of the Guidance to Assess the Level of Threat to Civil Aviation Security of Ukraine," 17.06.2020 No356 registered by the Ministry of Justice of Ukraine on 01.10.2020, registration No 960/35243;
- New edition of the Regulations on Use of Airspace of Ukraine, approved by the decree of the Cabinet of Ministers of Ukraine, dated 06.12.2017 No 954.
- "Rules of the Use of Airspace of Ukraine," approved by the Order of the State Aviation Administration of Ukraine and the Ministry of Defense of Ukraine, dated 11.05.2018 No 430/210, registered by the Ministry of Justice of Ukraine on 14.09.2018, registration No 1056/32508;
- Aviation Regulations of Ukraine "Air Traffic Service," approved by the Order of the State Aviation Administration of Ukraine, dated 16.04.2019 No 475, registered by the Ministry of Justice of Ukraine on 04.07.2019, registration No 727/33698.

Q9. What analysis methodology or risk matrix is used to assess the likelihood of a threat presenting itself and the potential consequences for civil aircraft flying over the conflict zone?

Answer:

An analysis methodology or risk matrix used to assess the likelihood of a threat and potential consequences for civil aircraft has been developed and approved in accordance with relevant regulatory documents. (Along with this, attention ought to be paid to the fact that at the time the air crash occurred, there was no concept or definition for a "conflict zone").

Responsible:

- State Aviation Administration of Ukraine;
- Security Service of Ukraine;
- Foreign Intelligence
- Service of Ukraine;
- Ministry of Defense of Ukraine;
- Ministry of Internal Affairs of Ukraine.

References:

Law of Ukraine "On the State Civil Aviation Security Program" dated February 20, 2003 No 545-IV;

Regulation on Use of Airspace of Ukraine, approved by the decree of the Cabinet of Ministers of Ukraine, dated 29.03.2002 No 401;

Order of the Ministry of Transport and Communications of Ukraine "On Approval of the Guidance to Assess the Level of Threat to Civil Aviation Security of Ukraine" dated 11.05.2007 No 390 (restricted), registered by the Ministry of Justice of Ukraine on May 25, 2007, registration No 542/13809 (as amended).

These documents are developed in accordance with relevant ICAO provisions, in particular Annex 17 and ICAO Doc 8973.

Process and timeline:

In accordance with the legislation, the State Aviation Administration of Ukraine constantly conducts a general assessment of threats to civil aviation security on the basis of information received from the Security Service of Ukraine; Foreign Intelligence Service of Ukraine; Ministry of Defense of Ukraine; Ministry of Internal Affairs of Ukraine, air navigation service providers, and make a decision on establishing restrictions, prohibitions and terms on the use of airspace. The information mentioned above is specified in the final report on the investigation of the air crash of Malaysia Airlines' Boeing-777-200. https://www.onderzoeksraa d.nl/en/page/3546/crash-mh17-17-july-2014.

Actual implementation:

Describe if and how risk was assessed and what levels of security risk were determined for what airspace, what altitudes or what type of aircraft.

According to the established procedures, the detailed information is specified in the final report on the investigation of the air crash of Malaysia Airlines' Boeing-777-200. https://www.onderzoeksraa d.nl/en/page/3546/crash-mh17-17-july-2014.

Changes after 17 July 2014:

National regulations and procedures regarding risk assessment in relation to threats to civil aviation security have been improved in line with updated ICAO Standards and Recommended Practices, Annexes 11, 17 to the Chicago Convention on International Civil Aviation, Doc 10084, and current legislation. In particular, the following have been adopted:

- Laws of Ukraine "On Combating Terrorism," "On the Security Service of Ukraine," "On Operational and Investigative Activities," "On Counterintelligence activities."

Ukraine has adopted the following legislative documents:

- Law of Ukraine "On the specifics of state policy to ensure the state sovereignty of Ukraine in the temporarily occupied territories in Donetsk and Luhansk regions" dated January 18, 2018 No 2268-VIII;
- State Civil Aviation Security Program, approved by the Law of Ukraine, dated March 21, 2017 No. 1965-VIII;
- Order of the Ministry of Infrastructure of Ukraine "On Approval of the Guidance to Assess the Level of Threat to Civil Aviation Security of Ukraine," 17.06.2020 No356 registered by the Ministry of Justice of Ukraine on 01.10.2020, registration No 960/35243;
- New edition of the Regulations on Use of Airspace of Ukraine, approved by the decree of the Cabinet of Ministers of Ukraine, dated 06.12.2017 No 954;
- "Rules of the Use of Airspace of Ukraine," approved by the Order of the State Aviation Administration of Ukraine and the Ministry of Defense of Ukraine, dated 11.05.2018 No 430/210, registered by the Ministry of Justice of Ukraine on 14.09.2018, registration No 1056/32508.

Q10. What is the process to determine security mitigations that would permit civil aviation to overfly a conflict zone?

Answer:

The process to determine security risk mitigations has been established on the basis of the analysis of identified threats in accordance with relevant regulatory documents. (To answer this question, the phrase "Security risk mitigations" has been used instead of the phrase "security mitigations"). (Additional information is provided in Appendix 3). (Along with this, attention ought to be paid to the fact that at the time the air crash occurred, there was no concept or definition for a "conflict zone").

Responsible:

- State Aviation Administration of Ukraine;
- Security Service of Ukraine;
- Foreign Intelligence Service of Ukraine;
- Ministry of Defense of Ukraine;
- Ministry of Internal Affairs of Ukraine;
- air navigation service providers.

References:

Law of Ukraine "On the State Civil Aviation Security Program" dated February 20, 2003 No 545-IV;

Regulation on Use of Airspace of Ukraine, approved by the decree of the Cabinet of Ministers of Ukraine, dated 29.03.2002 No 401;

Order of the Ministry of Transport and Communications of Ukraine "On Approval of the Guidance to Assess the Level of Threat to Civil Aviation Security of Ukraine" dated 11.05.2007 No 390 (restricted), registered by the Ministry of Justice of Ukraine on May 25, 2007, registration No 542/13809 (as amended).

These documents are developed in accordance with relevant ICAO provisions, in particular Annexes 11 and 17, Doc 8973, Doc 9554, Doc 9433, Cir 330

Process and timeline:

In accordance with the legislation, the State Aviation Administration of Ukraine constantly conducts a general assessment of threats to civil aviation security on the basis of information received from the Security Service of Ukraine; Foreign Intelligence Service of Ukraine; Ministry of Defense of Ukraine; Ministry of Internal Affairs of Ukraine, air navigation service providers, and make a decision on establishing restrictions, prohibitions and terms on the use of airspace. The information mentioned above is specified in the final report on the investigation of the air crash of Malaysia Airlines' Boeing-777-200. https://www.onderzoeksraa d.nl/en/page/3546/crash-mh17-17-july-2014.

Actual implementation:

Describe if and what security mitigations were determined that would permit civil aviation to overfly the conflict zone.

According to the established procedures, the detailed information is specified in the final report on the investigation of the air crash of Malaysia Airlines' Boeing-777-200. https://www.onderzoeksr aad.nl/en/page/3546/crash-mh17-17-july-2014.

Changes after 17 July 2014:

National regulations and procedures regarding security risk mitigations based on identified threats to civil aviation have been improved in line with updated ICAO Standards and Recommended Practices, Annexes 11, 17 to the Chicago Convention on International Civil Aviation, Doc 10084, and current legislation. In particular, the following have been amended:

- Laws of Ukraine "On Combating Terrorism," "On the Security Service of Ukraine," "On Operational and Investigative Activities," "On Counterintelligence activities."

Ukraine has adopted the following legislative documents:

- Law of Ukraine "On the specifics of state policy to ensure the state sovereignty of Ukraine in the temporarily occupied territories in Donetsk and Luhansk regions" dated January 18, 2018 No 2268-VIII;
- State Civil Aviation Security Program, approved by the Law of Ukraine, dated March 21, 2017 No. 1965-VIII;
- Order of the Ministry of Infrastructure of Ukraine "On Approval of the Guidance to Assess the Level of Threat to Civil Aviation Security of Ukraine," dated 17.06.2020 No356 registered by the Ministry of Justice of Ukraine on 01.10.2020, registration No 960/35243;
- New edition of the Regulations on Use of Airspace of Ukraine, approved by the decree of the Cabinet of Ministers of Ukraine, dated 06.12.2017 No 954.
- "Rules of the Use of Airspace of Ukraine," approved by the Order of the State Aviation Administration of Ukraine and the Ministry of Defense of Ukraine, dated 11.05.2018 No 430/210, registered by the Ministry of Justice of Ukraine on 14.09.2018, registration No 1056/32508;
- Aviation Regulations of Ukraine "Air Traffic Service," approved by the Order of the State Aviation Administration of Ukraine, dated 16.04.2019 No 475, registered by the Ministry of Justice of Ukraine on 04.07.2019, registration No 727/33698.

Q11. What are your normal (not during conflict) criteria for establishing restriction or segregation of airspace and what are the coordination procedures both internally and externally?

Answer:

Criteria for the implementation of appropriate restrictions and reservations of airspace and coordination procedures have been established in accordance with relevant regulatory documents.

Responsible:

- State Aviation Administration of Ukraine;
- Security Service of Ukraine;
- Ministry of Defense of Ukraine;
- Ministry of Internal Affairs of Ukraine;
- air navigation service providers;
- air space users.

References:

Regulation on Use of Airspace of Ukraine, approved by the decree of the Cabinet of Ministers of Ukraine, dated 29.03.2002 No 401

Rules of aeronautical information service provision (Order of the Ministry of Transport and Communications of Ukraine (dated 01.07.2004 No564).

Instruction on planning and usage of temporarily reserved airspace and conditional ATS routes, approved by decree of the State Aviation Administration of Ukraine 22.05.2006 No 354

These documents are developed in accordance with relevant ICAO provisions, in particular Annexes 2, 11 and 15, Doc 9426, Doc 9554, Doc 9433, Cir 330, documents of EUROCONTROL, and EU legislation.

Process and timeline:

Prohibitions or restrictions on the use of airspace are established by the State Aviation Administration of Ukraine or the authorities involved in the Joint Civil-Military System at the request of the competent authorities and users of airspace.

The detailed information is specified in the final report on the investigation of the air crash of Malaysia Airlines' Boeing-777-200. https://www.onderzoeksr aad.nl/en/page/3546/crash-mh17-17-july-2014.

Actual implementation:

Not applicable—no answer required.

According to the established procedures, the detailed information is specified in the final report on the investigation of the air crash of Malaysia Airlines' Boeing-777-200. https://www.onderzoeksr aad.nl/en/page/3546/crash-mh17-17-july-2014.

Changes after 17 July 2014:

National regulations and procedures regarding the implementation of appropriate restrictions and reservations of airspace, with ensuring appropriate coordination procedures, have been improved in line with updated ICAO Standards and Recommended Practices Annexes 2, 11, 15 to the Chicago Convention on International Civil Aviation, Doc 10084, Doc 10066 documents of EUROCONTROL, and with current national and EU legislation considered. In particular, the following have been adopted:

- New edition of the Regulations on Use of Airspace of Ukraine, approved by the decree of the Cabinet of Ministers of Ukraine, dated 06.12.2017 No 954.
- "Rules of the Use of Airspace of Ukraine," approved by the Order of the State Aviation Administration of Ukraine and the Ministry of Defense of Ukraine, dated 11.05.2018 No 430/210, registered by the Ministry of Justice of Ukraine on 14.09.2018, registration No 1056/32508;
- Aviation Regulations of Ukraine "Air Traffic Service," approved by the Order of the State Aviation Administration of Ukraine, dated 16.04.2019 No 475, registered by the Ministry of Justice of Ukraine on 04.07.2019, registration No 727/33698.

Q12. What are the decision processes for security of airspace, including establishing restriction or segregation of airspace in a conflict zone? What are the ANSP and military coordination procedures for active civil flights and their safety?

Answer:

Procedures for decision-making and civil- military coordination in the introduction of bans, restrictions and terms on the use of airspace are established in accordance with relevant regulatory documents. (Additional information is provided in Appendix 3). (Along with this, attention ought to be paid to the fact that at the time the air crash occurred, there was no concept or definition for a "conflict zone").

Responsible:

- State Aviation Administration of Ukraine;
- Security Service of Ukraine;
- Ministry of Defense of Ukraine;
- Ministry of Internal Affairs of Ukraine;
- air navigation service providers;
- air space users.

References:

Regulation on Use of Airspace of Ukraine, approved by the decree of the Cabinet of Ministers of Ukraine, dated 29.03.2002 No 401

Rules of aeronautical information service provision (Order of the Ministry of Transport and Communications of Ukraine (dated 01.07.2004 No564).

Instruction on planning and usage of temporarily reserved airspace and conditional ATS routes, approved by decree of the State Aviation Administration of Ukraine 22.05.2006 No 354

"Instructions on the organization of interaction between the bodies of the joint civil-military air traffic management system of Ukraine and the governing bodies of the Air Force of the Armed Forces of Ukraine" dated 29.02.2012;

These documents are developed in accordance with relevant ICAO provisions, in particular Annexes 2, 11 and 15, Doc 9426, Doc 9554, Doc 9433, Cir 330, documents of EUROCONTROL, and EU legislation.

Process and timeline:

Prohibitions or restrictions on the use of airspace are established by the State Aviation Administration of Ukraine or the authorities involved in the Joint Civil-Military System at the request of the competent authorities and users of airspace.

The detailed information is specified in the final report on the investigation of the air crash of Malaysia Airlines' Boeing-777-200. https://www.onderzoeksr aad.nl/en/page/3546/crash-mh17-17-july-2014.

Actual implementation:

Describe who took what decisions for security of airspace, including establishing restriction or segregation of airspace. Describe what coordination took place between the ANSP and military regarding the security threats.

According to the established procedures, the detailed information is specified in the final report on the investigation of the air crash of Malaysia Airlines' Boeing-777-200. https://www.onderzoeksr aad.nl/en/page/3546/crash-mh17-17-july-2014.

Changes after 17 July 2014:

National regulations and procedures regarding the implementation of appropriate restrictions and terms on the use of airspace, with ensuring civil-military coordination, have been improved in line with updated ICAO Standards and Recommended Practices Annexes 2, 11, 15 to the Chicago Convention on International Civil Aviation, Doc 10084, Doc 10066 documents of EUROCONTROL, and with current national and EU legislation considered. In particular, the following have been adopted:

- New edition of the Regulations on Use of Airspace of Ukraine, approved by the decree of the Cabinet of Ministers of Ukraine, dated 06.12.2017 No 954.
- "Rules of the Use of Airspace of Ukraine," approved by the Order of the State Aviation Administration of Ukraine and the Ministry of Defense of Ukraine, dated 11.05.2018 No 430/210, registered by the Ministry of Justice of Ukraine on 14.09.2018, registration No 1056/32508;
- Aviation Regulations of Ukraine "Air Traffic Service," approved by the Order of the State Aviation Administration of Ukraine, dated 16.04.2019 No 475, registered by the Ministry of Justice of Ukraine on 04.07.2019, registration No 727/33698;
- New edition of "Instructions on the organization of interaction between the bodies of the joint civil-military air traffic management system of Ukraine and the governing bodies of the Air Force of the Armed Forces of Ukraine" dated 29.02.2012.

Q13. What organisations are involved and what are the procedures for coordinating airspace restrictions in the conflict zone among adjacent FIRs?

Answer:

According to relevant regulatory documents, procedures for informing about the establishment of restrictions on the use of airspace in FIRs, including ones that belong to adjacent are states, introduced in appropriate written agreements between area control centers, as well as between authorities responsible for air traffic management in adjacent states. (Along with this, attention ought to be paid to the fact that at the time the air crash occurred, there was no concept or definition for a "conflict zone").

Responsible:

- State Aviation Administration of Ukraine;
- Ministry of Defense of Ukraine;
- air navigation service providers.

References:

The Air Code of Ukraine.

Regulation on Use of Airspace of Ukraine, approved by the decree of the Cabinet of Ministers of Ukraine, dated 29.03.2002 No 401

Rules of aeronautical information service provision (Order of the Ministry of Transport and Communications of Ukraine (dated 01.07.2004 No564).

Rules of flights and air traffic service in the classified airspace of Ukraine, approved by the order of the Ministry of Transport and Communications of Ukraine 16.04.2003 No293.

These documents are developed in accordance with relevant ICAO provisions, in particular Annexes 11 and 15, Doc 9426, documents of EUROCONTROL.

Process and timeline:

Information pertaining to restrictions on the use of airspace is published in aeronautical information documents and provided to the competent authorities of adjacent states.

Actual implementation:

Describe if and how the airspace restrictions were coordinated with the adjacent FIRs and what organisations were involved in the coordination.

According to the established procedures, the detailed information is specified in the final report on the investigation of the air crash of Malaysia Airlines' Boeing-777-200. https://www.onderzoeksr aad.nl/en/page/3546/crash-mh17-17-july-2014.

Changes introduced after 17 July 2014:

National regulations and procedures regarding the dissemination of information about implementation of appropriate restrictions and reservations of airspace, with ensuring appropriate coordination procedures, have been improved in line with updated ICAO Standards and Recommended Practices, Annexes 11, 15 to the Chicago Convention on International Civil Aviation, Doc 10084, Doc 10066 documents of EUROCONTROL. In particular, the following have been adopted:

- New edition of the Regulations on Use of Airspace of Ukraine, approved by the decree of the Cabinet of Ministers of Ukraine, dated 06.12.2017 No 954.
- "Rules of the Use of Airspace of Ukraine," approved by the Order of the State Aviation Administration of Ukraine and the Ministry of Defense of Ukraine, dated 11.05.2018 No 430/210, registered by the Ministry of Justice of Ukraine on 14.09.2018, registration No 1056/32508;
- Aviation Regulations of Ukraine "Air Traffic Service," approved by the Order of the State Aviation Administration of Ukraine, dated 16.04.2019 No 475, registered by the Ministry of Justice of Ukraine on 04.07.2019, registration No 727/33698.
- Aviation Regulations of Ukraine "Aeronautical Information Service Provision," approved by the Order of the State Aviation Administration of Ukraine dated on 13.05.2019 No 582, registered by the Ministry of Justice of Ukraine on 09.07.2019, registration No 760/33731.

Q14. What is the process to decide if there is a need for aeronautical information publication and to choose the communication tool for it (e.g. NOTAMs, AIC)?

Response:

The decision-making process on the need to publish aeronautical information and the procedure for its publication has been established in accordance with relevant regulatory documents.

Responsible:

- State Aviation Administration of Ukraine;
- Ministry of Defense of Ukraine;
- air navigation service providers.

References:

The Air Code of Ukraine.

Regulation on Use of Airspace of Ukraine, approved by the decree of the Cabinet of Ministers of Ukraine, dated 29.03.2002 No 401

Rules of aeronautical information service provision (Order of the Ministry of Transport and Communications of Ukraine (dated 01.07.2004 No564).

These documents are developed in accordance with relevant ICAO provisions, in particular Annexes 11 and 15, Doc 9554, Doc 8126, documents of EUROCONTROL.

Process and timeline:

Aeronautical information is published by the decision of the State Aviation Administration of Ukraine in coordination with the state authorities concerned.

Actual implementation:

Describe how it was decided if there is a need for aeronautical information publication and how it was chosen what communication tool for it (e.g. NOTAMs AIC).

According to the established procedures, the detailed information is specified in the final report on the investigation of the air crash of Malaysia Airlines' Boeing-777-200. https://www.onderzoeksr aad.nl/en/page/3546/crash-mh17-17-july-2014.

Changes introduced after 17 July 2014:

National regulations and procedures regarding the publication of aeronautical information have been improved in line with updated ICAO Standards and Recommended Practices Annexes 11, 15 to the Chicago Convention on International Civil Aviation, Doc 10084, Doc 10066, documents of EUROCONTROL, and current legislation. In particular, the following have been adopted:

- New edition of the Regulations on Use of Airspace of Ukraine, approved by the decree of the Cabinet of Ministers of Ukraine, dated 06.12.2017 No 954.
- "Rules of the Use of Airspace of Ukraine," approved by the Order of the State Aviation Administration of Ukraine and the Ministry of Defense of Ukraine, dated 11.05.2018 No 430/210, registered by the Ministry of Justice of Ukraine on 14.09.2018, registration No 1056/32508;
- Aviation Regulations of Ukraine "Air Traffic Service," approved by the Order of the State Aviation Administration of Ukraine, dated 16.04.2019 No 475, registered by the Ministry of Justice of Ukraine on 04.07.2019, registration No 727/33698.
- Aviation Regulations of Ukraine "Aeronautical Information Service Provision," approved by the Order of the State Aviation Administration of Ukraine dated on 13.05.2019 No 582, registered by the Ministry of Justice of Ukraine on 09.07.2019, registration No 760/33731.

Q15. What organisations are involved in and what are the processes to prepare, verify if ICAO AIS procedures and terminology are used, validate for correctness and transmit aeronautical information to the users of it (e.g. airlines and ANSPs)?

Response:

The processes of preparation, verification and application of ICAO procedures and terminology, confirmation of correctness and transfer of aeronautical information to its users have been established in accordance with relevant regulatory documents.

Responsible entity:

- State Aviation Administration of Ukraine;
- Ministry of Defense of Ukraine;
- air navigation service providers;
- EUROCONTROL;
- ICAO.

References:

The Air Code of Ukraine.

Regulation on Use of Airspace of Ukraine, approved by the decree of the Cabinet of Ministers of Ukraine, dated 29.03.2002 No 401

Rules of aeronautical information service provision (Order of the Ministry of Transport and Communications of Ukraine (dated 01.07.2004 No564).

These documents are developed in accordance with relevant ICAO provisions, in particular Annex 15, Doc 8126, and EU legislation.

Process and timeline:

The State Aviation Administration of Ukraine, the Ministry of Defense of Ukraine, and air navigation service providers in accordance with their competence, check draft documents of aeronautical information published by the Aeronautical Information Service (AIS) according to the decision of the State Aviation Administration of Ukraine and provided to airspace users.

The State Aviation Administration of Ukraine supervises the established procedures.

Actual implementation:

Please describe the organizations involved in the preparation of aeronautical information, verification of the use of the ICAO AIS procedures and terminology, and validation of the correctness and transmission of the aeronautical information to its users.

According to the established procedures, the detailed information is specified in the final report on the investigation of the air crash of Malaysia Airlines' Boeing-777-200. https://www.onderzoeksraa d.nl/en/page/3546/crash-mh17-17-july-2014.

Changes introduced after 17 July 2014:

National regulations and procedures regarding the publication of aeronautical information and dissemination of information among users have been improved in line with updated ICAO Standards and Recommended Practices Annexes 11, 15 to the Chicago Convention on International Civil Aviation, Doc 10084, Doc 10066, documents of EUROCONTROL, and current legislation. In particular, the following have been adopted:

- New edition of the Regulations on Use of Airspace of Ukraine, approved by the decree of the Cabinet of Ministers of Ukraine, dated 06.12.2017 No 954.
- "Rules of the Use of Airspace of Ukraine," approved by the Order of the State Aviation Administration of Ukraine and the Ministry of Defense of Ukraine, dated 11.05.2018 No 430/210, registered by the Ministry of Justice of Ukraine on 14.09.2018, registration No 1056/32508;
- Aviation Regulations of Ukraine "Air Traffic Service," approved by the Order of the State Aviation Administration of Ukraine, dated 16.04.2019 No 475, registered by the Ministry of Justice of Ukraine on 04.07.2019, registration No 727/33698.
- Aviation Regulations of Ukraine "Aeronautical Information Service Provision," approved by the Order of the State Aviation Administration of Ukraine dated on 13.05.2019 No 582, registered by the Ministry of Justice of Ukraine on 09.07.2019, registration No 760/33731.

Q16. What are the procedures for disseminating civil aviation security threat information to operators within and outside the conflict zone FIR?

Response:

The procedure for disseminating information about threats to the civil aviation security has been established in accordance with relevant regulatory documents. (Along with this, attention ought to be paid to the fact that at the time the air crash occurred, there was no concept or definition for a "conflict zone").

Responsible:

- State Aviation Administration of Ukraine;
- Ministry of Defense of Ukraine;
- air navigation service providers.

References:

Law of Ukraine "On the State Civil Aviation Security Program" dated February 20, 2003 No 545-IV;

Regulation on Use of Airspace of Ukraine, approved by the decree of the Cabinet of Ministers of Ukraine, dated 29.03.2002 No 401;

Order of the Ministry of Transport and Communications of Ukraine "On Approval of the Guidance to Assess the Level of Threat to Civil Aviation Security of Ukraine" dated 11.05.2007 No 390 (restricted), registered by the Ministry of Justice of Ukraine on May 25, 2007, registration No 542/13809 (as amended);

Rules of flights and air traffic service in the classified airspace of Ukraine, approved by the order of the Ministry of Transport and Communications of Ukraine 16.04.2003 No293.

Rules of aeronautical information service provision (Order of the Ministry of Transport and Communications of Ukraine (dated 01.07.2004 No564).

These documents are developed in accordance with relevant ICAO provisions, in particular Annexes 11, 15 and 17, ICAO Doc 8973, Doc 8126, Doc 9554, Doc 9433, and documents of EUROCONTROL.

Process and timeline:

The procedure for conveying information on threats to civil aviation security to airspace users is determined and carried out by the State Aviation Administration of Ukraine, the Ministry of Defense of Ukraine, including via air navigation service providers.

Actual implementation:

Please describe whether and, if so, how the civil aviation security threat information was disseminated to operators within and outside the conflict zone FIR?

According to the established procedures, the detailed information is specified in the final report on the investigation of the air crash of Malaysia Airlines' Boeing-777-200. https://www.onderzoeksraa d.nl/en/page/3546/crash-mh17-17-july-2014.

Changes introduced after 17 July 2014:

National regulations and procedures regarding dissemination of information about threats to civil aviation security have been improved in line with updated ICAO Standards and Recommended Practices Annexes 11, 15, 17 to the Chicago Convention on International Civil Aviation, Doc 10084, Doc 10066, the documents of EUROCONTROL, and current legislation. In particular, the following have been adopted:

- State Civil Aviation Security Program, approved by the Law of Ukraine, dated March 21, 2017 No. 1965-VIII;
- Order of the Ministry of Infrastructure of Ukraine "On Approval of the Guidance to Assess the Level of Threat to Civil Aviation Security of Ukraine," dated 17.06.2020 No356 registered by the Ministry of Justice of Ukraine on 01.10.2020, registration No 960/35243
- New edition of the Regulations on Use of Airspace of Ukraine, approved by the decree of the Cabinet of Ministers of Ukraine, dated 06.12.2017 No 954.
- "Rules of the Use of Airspace of Ukraine," approved by the Order of the State Aviation Administration of Ukraine and the Ministry of Defense of Ukraine, dated 11.05.2018 No 430/210, registered by the Ministry of Justice of Ukraine on 14.09.2018, registration No 1056/32508;
- Aviation Regulations of Ukraine "Air Traffic Service," approved by the Order of the State Aviation Administration of Ukraine, dated 16.04.2019 No 475, registered by the Ministry of Justice of Ukraine on 04.07.2019, registration No 727/33698.
- Aviation Regulations of Ukraine "Aeronautical Information Service Provision," approved by the Order of the State Aviation Administration of Ukraine dated on 13.05.2019 No 582, registered by the Ministry of Justice of Ukraine on 09.07.2019, registration No 760/33731.

Appendixes to the responses provided by Ukraine:

1) Ukrainian proposals based on recommendations made by DSB in the Final Report on the Crash of Malaysia Airlines, Flight MH17
2) Progress overview of ICAO conflict zone working programme 2017-2020.
3) General information on setting the Prohibited/Restricted Airspace over armed conflict zones.

The information from appendixes to the responses provided by Ukraine has been included in the discussion of the specific answers wherever the appendix was referred by Ukraine.

Appendix E
Clarifying Questions Responses from Ukraine

This appendix contains the responses received from Ukraine to clarifying questions. The responses are provided as received without additional editing or modification.

CQ1 — On 17 July 2014, before the downing of Flight MH17, a post from @ostro_v (as reported and translated into English during the Flight MH17 criminal prosecution court sessions at The Hague) said, "In Donetsk, at the Intersection of Ilyich Avenue at 9.15, there was a "Buk" on a tractor, surrounded by militiamen." Was that Twitter post known about prior to the downing of Flight MH17 and by which state authorities?

Answer:

At the time of the downing of MH17 flight, there were no means for real-time analysis of the content of all social networks.

CQ2 — Apart from what is referred to in CQ1, what other social media threat information about the presence in eastern Ukraine of air defence equipment that was not controlled by government forces and which could have reached the respective airspace in UKDV FIR above Flight Level 250 was identified, when and by which authority? This includes social media posts about a BUK missile system being seen.

Answer:

At the time of the downing of the flight MHl7 there were no technical means for real-time analysis of all social networks.

CQ3 — What weapon was used in the attack on a Ukraine An-26 military transport aircraft that occurred on 14 July? What knowledge of this weapon did the authorities responsible for security risk analysis have prior to the downing of the Flight MH17?

Answer:

An-2b aircraft flew along the state border and due to a missile hit, his crew was forced to land. Ukraine did not have access to the aircraft after it crashed in territory controlled by pro-Russian armed forces. Based on the available information, there was a belief that the plane was hit by an air-to-air missile.

CQ4 — What authority or authorities knew prior to the downing of Flight MH17 about the threat information contained in the 150,000 intercepted telephone conversations mentioned on 28 September 2016, during the Joint Investigative Team (JIT) presentation of the first results of the Flight MH17 criminal investigation, namely the exchange in the morning of 17 July 2014 between Dubinskiy, Semenov, Kharchenko and Pulatov about [the] presence in eastern Ukraine of Buk-M?

Answer:

The analysis of the specified telephone conversations was made after the event.

CQ5 — What authority or authorities knew prior to the downing of Flight MH17 about the threat information described by Vitaly Nayda, the head of counterintelligence for the Ukrainian State Security Service, on 19 July 2014 at a news conference in Kiev, that the first information "hinting" at a Buk launcher in the possession of the armed non-state forces was received on 14 July? Did State Aviation Administration of Ukraine know prior to the downing of Flight MH17 about this information?

Answer:

There was no confirmation of the mentioned information, therefore, the State Aviation Administration of Ukraine did not have information about the presence of the "Buk" missile system in the conflict zone.

CQ6 — Apart from what is referred to in CQ1, CQ3, CQ4 and CQ5, what other threat information about the presence in eastern Ukraine of air defence equipment that was not controlled by government forces and which could have reached the respective airspace in UKDV FIR above Flight Level 250 was identified, when and by which authority prior to the downing of Flight MH17?

Answer:

There was no such information.

CQ7 — What intent to attack aircraft in eastern Ukraine with air defence equipment that was not controlled by government forces and which could have reached the respective airspace in UKDV FIR above Flight Level 250 was identified, when and by which authority prior to the downing of Flight MH17?

Answer:

There was no such information.

CQ8 — What threat information about the presence of air defence equipment in eastern Ukraine that was not controlled by government forces and which could have reached the respective airspace in UKDV FIR above Flight Level 250 was known and how did it become known by the State Aviation Administration

of Ukraine prior to the downing of Flight MH17? How was the associated security risk assessed and what airspace management decision was taken?

Answer:

There was no information on the presence of air defense systems in pro-Russian armed formations with the possibility of defeat above the FL 250 echelon.

CQ9 — What risk factors for unintentional attack became known by the State Aviation Administration of Ukraine prior to the downing of Flight MH17 and how did this information affect their security risk assessment?

Answer:

Prior to the crash of MH17, the State Aviation Administration of Ukraine was unaware of the threat of an unintentional attack above the FL 250 echelon.

CQ10 — The Netherland DSB investigation report notes that, "After an emergency beacon was activated at around 1320, indicating that flight MH17 had crashed, UkSATSE made the decision at 1500, at the tactical level, to also restrict the airspace above FL 320." It could be deduced that UkSATSE was responsible for threat and risk analysis, but the responses received notes that "the State Aviation Administration of Ukraine constantly conducts a general assessment of threats to civil aviation security." In that respect, which authority was responsible prior to the downing of Flight MH17 for the threat and risk analysis and assessment?

Answer:

UkSATSE made a decision at the tactical level to limit the airspace above the FL320 echelon as an immediate response to the disappearance of the MH17 aircraft, as stated in paragraph 6.3 of Part B of the final report of the MH17 crash investigation issued by the Dutch Safety Board. This fact is fully consistent with the information set out in section 6.1 of the Final Report.

References

[1] ICAO, 2018, Doc 10084 "Risk Assessment Manual for Civil Aircraft Operations Over or Near Conflict Zones," Second Edition, INTERNATIONAL CIVIL AVIATION ORGANIZATION, Quebec, Canada

[2] Dutch Safety Board, 2015, "Crash of Malaysia Airlines flight MH17 Hrabove, Ukraine, 17 July 2014," The Hague, The Netherlands

[3] International Civil Aviation Organisation, Doc 10066 "Procedures for Air Navigation Services, Aeronautical Information Management," First Edition 2018, Montreal, Canada

[4] International Civil Aviation Organisation, Doc 8126 "Aeronautical Information Services Manual," Sixth Edition 2003, Montreal, Canada