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FOR THE SAFETY OF AIR NAVIGATION

EUROCONTROL

Generic OHA for CBA

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Abstract

This document is a Generic deliverable for an Operational Hazard Assessment for Cross Border Area operations. It was developed from an actual OHA. Since the hazards are generic to any CBA it is felt that this document provides for a sound basis for any future OHA for airspace projects.

Keywords

OHA CONOPS

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Draft	☐	EATMP Stakeholders	☐	Extranet	☐
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1. INTRODUCTION

1.1 Important Preliminary Note

The approach described below diverges from a classical approach and might not fully satisfy a Regulator. Therefore this proposed approach should be discussed and approved by the Regulator preferably prior to commencing any work.

This applies most particularly to Tables 1, 2 and 3.

1.2 Background

This document was developed from an actual OHA. Since the hazards are generic to any CBA it is felt that this document provides for a sound basis for any future OHA.

1.3 CONOPS/Environment of Operations

It is paramount that participants to the OHA are fully briefed about the CONOPS and actual experts of the area as the environment of operations is a key element contributing to the results of the OHA.

2. METHODOLOGY

In this OHA Safety Objectives are not used as would be in a classical FHA as many organisations do not use Safety Objectives for changes such like CBA which involve airspace, procedures, equipment and human elements of the ATM system.

Instead and in order to provide the decisions makers with a meaningful assessment of the risks associated with a CBA, it was proposed to deliver the best evaluation of risks based on experts judgement.

This means that the results are provided in the following form: e.g. "it can be expected that an incident of a severity 2 will occur every 2 years" as opposed to "this risk (severity 2, probability of occurrence x is acceptable as it falls within the Safety Objective".

To establish the risk presented by a hazard it was therefore proceeded as follows:

- From identified hazard, identify possible causes, for each cause(s) assess the possible rate of occurrence of these causes which give **Rh** the probability of the hazard to exist.

  The hazard will happen 10 times per year (expert opinion)

- **Re** the ratio between hazard occurrence and hazard actual effect on aircraft and their occupants. Re is mainly a function of traffic density in the environment of operations (either in the CBA for incursions into it or outside the CBA for excursions out of the CBA)

  Out of the 10 times the hazard will occur there will be X situations where another aircraft is at a location that would lead to the hazard producing effects on aircraft and occupants.

- Identify internal/external mitigations that could apply and assess their efficiency in lowering the effect consequences of the hazard i.e. lowering the **severity** of the event.

  You may screen all severities to select the most appropriate one having regards mitigations.

  Note: in some instances, mitigations may also influence Re i.e. totally suppress any effect of the hazard. Hence the calculation of R is made at the next step

- The rate of of the hazard to actually result in a loss of separation of the severity of the worst credible consequence is therefore **R = Rh x Re**

As there is no such scheme today as an accident/incident causation model, the severity classification shall rely on a specific argument demonstrating the most probable effect of hazards, under the worst case scenario. The severity of the effects of hazards in that environment of operations shall be determined using the classification scheme shown in figure below.

Figure 1: Severity classification scheme

Participants to the OHA are asked to express their expert judgement about Rh and Re in qualitative terms e.g. rare, occasional (see table below) as it not possible for experts to come up with frequency of occurrence expressed in numerical terms.

Qualitative definition	frequency	Quantitative definition	Quantitative equivalent
Has never occurred yet throughout the total lifetime of the system.	Extremely rare	Less than once a year	10^{-5}
Only very few similar incidents on record when considering a large traffic volume or no records on a small traffic volume.	Rare	Once a year	10^{-4}
Several similar occurrences on record – Has occurred more than once at the same location.	Occasional	Once a month	10^{-3}
A significant number of similar occurrences already on record – Has occurred a significant number of times at the same location.	Frequent	Once a week	5×10^{-3}
A very high number of similar occurrences already on record – Has occurred a very high number of times at the same location.	Very frequent	More than once a week	3×10^{-2}

Table 1. Conversion Qualitative – Quantitative

To allow the **R = Rh x Re** calculations the experts qualitative evaluations were transposed in to quantitative figures in terms of occurrence rate per operational hours as shown below:

10^{-5} strictly means an occurrence every ten years' however it should be interpreted as a rate of occurrence lower than once a year.

- 10^{-4} means one occurrence per 10 thousand hours i.e. per year
- 10^{-3} means one occurrence per month
- $5x10^{-3}$ means one occurrence per week
- $3x10^{-2}$ means one occurrence per day

Then **R** is translated back into qualitative terms using the same table.

Once **R** and **Severity** were established the risk classification table shown below was used to determine **Risks** (estimated rate of occurrence per severity class) associated with hazards.

	Frequency (Number of occurrences)				
Severity	Very Frequent	Frequent	Occasional	Rare	Extremely rare
SC1					
SC2					
SC3					
SC4					
SC5					

Table 2. Risk acceptability levels

The following table is proposed as acceptability criteria for decision makers. However the last word remains with the persons concerned with the final decision.

Risk level	Category	Meaning
A	Unacceptable	The risk can not under any circumstances be accepted. It has to be reduced to a level which may be tolerable and preferably accepted.
B	Not desirable	Not desirable, but could in certain cases be tolerable after confirmation of *C ANS* (provided that the risks has been reduces as low as reasonable practicable). The risk shall also be guarded so that it not increases over time and ends up on a higher level.
C	Acceptable	*No other means are necessary to reduce the risk*. The risk shall be overlooked so that it not increases over time and ends up on a higher level.

Table 3. Risk acceptability

3. OHA SESSION

3.1 Hazard Identification

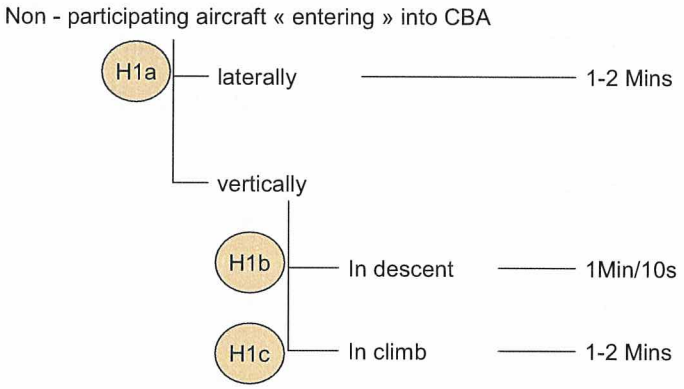
Two main categories of hazards were identified with regards to the feared event which is the loss of separation between participating and non-participating aircraft:

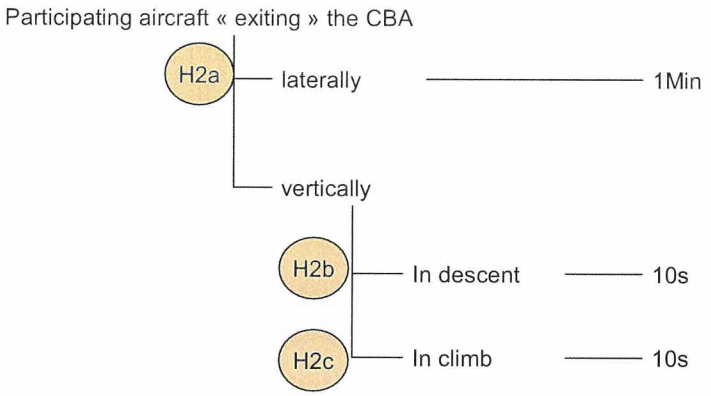
- Non - participating aircraft incursion into a CBA; and
- Participating aircraft excursion from the CBA.

In both hazards the incursion respectively excursion can take place through the sides of the CBA, the top or the bottom.

Having regards aircraft performances and typical trajectories the two main hazards differ slightly for what concerns the time from start of hazard developing to possible feared event i.e the actual loss of separation.

This is reflected in the two slides below.





Note: Cases where and excursion/incursion takes place through the side of the CBA and the aircraft is levelled, in climb or descent are considered equivalent.

Note: Term "GAT aircraft" is used for any non participating aircraft whether it is civil or military.

Hazard Identification System

H1a1			
H1	GAT aircraft		
	a	Lateral incursion	
		1 to x	Numbering based on causes

3.1.1 Hazards List

Hazards identified as shown below.

Note: It is to be noted that more (sub) hazards could be identified depending on the environment of operations within and out of the CBA.

3.2 Hazard Classification

3.2.1 Frequency of Occurrence

For each hazard experts have used their experience in terms of:

- Recalling events that lead to the hazard (to assess Ph); and
- Professional judgement of the efficiency for available mitigations (to assess Pe)

The quantitative value used for "extremely rare" conversion was 10^{-5}. From straight calculation this equates to once occurrence in 10 years. However in many instances the expert judgement was expressed in terms of "this does not happen once a year but less than that".

Example is "emergency descent by civil aircraft" which was reported to occur 5 times in ten years i.e. once every 2 years.

As a conservative measure it therefore advised to extend this understanding to all hazards i.e. "Extremely rare" to be interpreted as less than once a year i.e. every two years (or even more).

3.2.2 Severity

For each hazard experts have assessed and come to a consensus as to the severity (worst credible effect) to be allocated to each hazard.

The main parameter taken into consideration was the time for hazard detection and reaction i.e. use of mitigations available and time for mitigations to take effect.

Whenever required this was done by elimination i.e. scrutinising severity in decreasing order.

3.2.3 Incursion into CBA by Non-Participating Aircraft

Hazards in the yellow area:

- H1a5 Lateral deviation by non - participating aircraft into CBA due to lack of CBA status awareness"
- H1b5 Vertical deviation (descent) into CBA by non - participating aircraft due to lack of CBA status awareness
- H1b7 Vertical deviation (descent) into CBA by non - participating aircraft due to emergency
- H1c2 Vertical deviation (climb) by non - participating aircraft due to pilot leading to CBA incursion due to Pilot mistake (e.g. misdialling of cleared flight level)
- H1c5 Vertical deviation (climb) into CBA by non - participating aircraft due to lack of CBA status awareness

Hazards at the margin yellow/green areas

- H1c2 Vertical deviation (climb) by non - participating aircraft into CBA due to pilot error or loss of situational awareness
- H1c3 Vertical deviation (climb) by non - participating aircraft into CBA due to technical failure (Radar) due to technical failure leading to ATCO mistake

These hazards were classified as marginally yellow due to the fact that detection of deviation may not be effected within the time required to allow for mitigations to fully apply.

3.2.4 Excursion Out of the CBA by Participating Aircraft

Hazards in the yellow area:

- H2a1 Lateral deviation due to FC: wrong instruction/Lack of monitoring/Wrong focus/workload

  H2a2 Lateral deviation due to pilot: autonomous control/Loss of situational awareness/wrong area monitoring/CAP point position
- H2b5 Vertical deviation (through floor) by participating aircraft out of CBA emergency
- H2c1 Vertical deviation (climb) due to FC: misunderstanding of the vertical limitations/wrong clearance
- H2c2 Vertical deviation (climb) due to ACF due to misunderstanding of the vertical limitations/loss of situation awareness

Hazards at the margin between yellow/green areas:

- H2a7 Lateral deviation by mil ACF due to aircraft emergency
- H2b1 Vertical deviation (descent) due to FC misunderstanding of the vertical limitations/wrong clearance/issue with coordination with A/D TMA
- H2b2 Vertical deviation (descent) due to misunderstanding of the vertical limitations/Loss of situational awareness.
- H2c5 Vertical deviation (through ceiling) by participating aircraft out of CBA This may happen due to aircraft emergency or excessive manoeuvres, or loss of situational awareness. Pilot looking for height.

3.2.5 Overall Aggregation of Hazards

Severity 2	Severity 3
15×10^{-6} per operational hour	1.4×10^{-7} per operational hour
Equivalent to 1,5 incident every 10 years, actually to be interpreted 1,5 incident for periods of more than a year	Equivalent to 1 incident for periods of more than 5 years

Overall this can be interpreted in the way that the rate of occurrences will be low however their severity will be rather high.

4. OHA SESSION CONCLUSIONS

1. All hazards are in the "Extremely rare" with severities 2, 2/3 or 3. This means that rate of safety occurrences should be very low to low with however potentially high severity
2. Additional mitigations where possible could therefore be studied such like:
   - Depending on activity type and number of act involved a solution could be to book the whole CBA up to FL 660 taking into account the overall structure;
   - Centre of Gravity of the military activity to be located away from CBA borders; and
   - Ensure permanent lateral distance between mil activity and civil aircraft above or below CBA.

These mitigations are on the side of the MIL partners but that is inherent to the fact that the new element in the system is an area meant for military activity.

Annex 1: List of Involved Experts

Nber	Name	Organisation	Job position relevant to own role in the OHA and associated activities	Number of years in that job
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

Annex 2: Hazard Tables

Hazard id	Hazard description	Hazard causes/origin	Rh of hazard occurring qualitative	Rh of hazard occurring quantitative	Internal/external mitigations	Re hazard effect qualitative	Re hazard effect quantitative	Severity classification	Resulting R of hazard quantitative	Resulting R of hazard qualitative	Resulting risk classification	comments
H1a1	Lateral deviation by GAT aircraft into CBA due to Civil ATC lack of coordination leading to CBA incursion	The missing coordination may be either a required coordination to cross through an activated CBA or; A tactical coordination required due to air traffic situation circumstances e.g. aircraft forgotten on heading which brings the aircraft into the CBA ATS-route that has not been closed due to CBA operations and tactical re-routing is not provided by the ATC.			CBA areas are displayed at ATCO radar screens FC detection							

Hazard id	Hazard description	Hazard causes/origin	Rh of hazard occurring qualitative	Rh of hazard occurring quantitative	Internal/external mitigations	Re hazard effect qualitative	Re hazard effect quantitative	Severity classification	Resulting R of hazard quantitative	Resulting R of hazard qualitative	Resulting risk classification	comments
H1a2	Lateral deviation by GAT aircraft into CBA due to pilot error leading to CBA incursion	This could be (possibly) due to a wide range of reasons (absence of GAT/airline pilot at the OHA session did allow to be more precise). One example the group thought of is the misunderstanding by the pilot of the next reporting point. NAV error- BRNAV requirement is +/- 5NM 95 % of the flight time, non – BRNAV may be also allowed in controlled airspace if MIL or one-time permit...			Radar monitoring and detection by Civilian ATCO Route adherence monitoring tool (RAM) warning Flight leg at activation Flight Plan based Safety warnings							
		Due to FPL processing, it is allowed to fill routes as DCT. However this does not allow the Flight Plan absed Safety warnings to work			(Solution to be found by creating points)							

Hazard id	Hazard description	Hazard causes/origin	Rh of hazard occurring qualitative	Rh of hazard occurring quantitative	Internal/external mitigations	Re hazard effect qualitative	Re hazard effect quantitative	Severity classification	Resulting R of hazard quantitative	Resulting R of hazard qualitative	Resulting risk classification	comments
H1a3	Lateral deviation by GAT aircraft into CBA due to linked failures/events	Failure of the civilian radars covering the CBA may lead to civilian ATCO loss of awareness and subsequently to an incursion into the CBA of a GAT aircraft under a erroneous instruction by civilian ATCO			number of radars covering the CBA Coverage ensured above lowest CBA level Additionally there is cross data exchange btn. ORG1 and ORG 2 Coordination with mil ("radar monitoring" by mil) Flight plan tracks If VMC VFR is possible							
		Displays failures			The Fallback systems are up and running Radar picture available in close vicinity							
		Case single radar coverage over CBA			Stop activity Coordination with mil ("radar monitoring" by mil) Flight plan tracks If VMC VFR is possible Hand over to other unit							

Hazard id	Hazard description	Hazard causes/origin	Rh of hazard occurring qualitative	Rh of hazard occurring quantitative	Internal/external mitigations	Re hazard effect qualitative	Re hazard effect quantitative	Severity classification	Resulting R of hazard quantitative	Resulting R of hazard qualitative	Resulting risk classification	comments
H1a4	Lateral deviation by GAT aircraft into CBA due to COM failure that has subsequently increased pilot workload and/or resulted in pilot loss of pilot situational awareness and/or pilot uncertainty about procedures/route to be followed	Any radio equipment failure or pilot mistake in radio equipment utilisation An aircraft following ICAO COM loss procedure could enter the CBA even if the procedure is properly followed			Emergency frequencies Monitoring the traffic Join up by MIL acft ACARS system depending on airlines (through airline) Relay acft Coordination with military							
		Total COM failure from ground			Duplication of systems							

Hazard id	Hazard description	Hazard causes/origin	Rh of hazard occurring qualitative	Rh of hazard occurring quantitative	Internal/external mitigations	Re hazard effect qualitative	Re hazard effect quantitative	Severity classification	Resulting R of hazard quantitative	Resulting R of hazard qualitative	Resulting risk classification	comments
H1a5	Lateral deviation by GAT aircraft into CBA due to lack of CBA status awareness	This may happen in cases when civil ATCO is not aware that CBA is active an instructs GAT aircraft to fly through CBA e.g. due to Communication breakdown between supervisor and ATCO position.			Civilian ATCOs would see participating aircraft in the CBA Conversely FC would see the airliner "aiming at " or entering into the CBA AMC Tool procedures for area activation							

Hazard id	Hazard description	Hazard causes/origin	Rh of hazard occurring qualitative	Rh of hazard occurring quantitative	Internal/external mitigations	Re hazard effect qualitative	Re hazard effect quantitative	Severity classification	Resulting R of hazard quantitative	Resulting R of hazard qualitative	Resulting risk classification	comments
H1a6	Lateral deviation by GAT aircraft due to external environment effects leading to CBA incursion	E.g. weather: CBs, Turbulences, Icing			Coordination with FC Weather (CBs) are not depicted on Civilian ATC screens directly however it is shown on separate screens at CWPs Tops of CBS are available at with a delay of 10 to 15 minutes							

Hazard id	Hazard description	Hazard causes/origin	Rh of hazard occurring qualitative	Rh of hazard occurring quantitative	Internal/external mitigations	Re hazard effect qualitative	Re hazard effect quantitative	Severity classification	Resulting R of hazard quantitative	Resulting R of hazard qualitative	Resulting risk classification	comments
H1a7	Lateral deviation into CBA by GAT aircraft due to emergency (e.g. pilot loss of situational awareness in the course of the emergency)	Any type of GAT aircraft emergency			Monitoring from civil military Coordination ATCO/FC detection Coordination with FC Restrict CBA OPS System tools (RAM, SAP)							

Hazard id	Hazard description	Hazard causes/origin	Rh of hazard occurring qualitative	Rh of hazard occurring quantitative	Internal/external mitigations	Re hazard effect qualitative	Re hazard effect quantitative	Severity classification	Resulting R of hazard quantitative	Resulting R of hazard qualitative	Resulting risk classification	comments
H1b1	Vertical deviation (descent) by GAT aircraft into CBA due to Civil ATC error leading a/c to CBA incursion	Due to Civilian ATCO mistake (e.g. slip of the tongue)			Own detection Colleague detection Flight Plan based Safety warnings triggers if CFL entered) SAP would not trigger only based on AFL change. ATCO/FC detection Coordination with FC Restrict CBA OPS Pilot readback of clearance							

Hazard id	Hazard description	Hazard causes/origin	Rh of hazard occurring qualitative	Rh of hazard occurring quantitative	Internal/external mitigations	Re hazard effect qualitative	Re hazard effect quantitative	Severity classification	Resulting R of hazard quantitative	Resulting R of hazard qualitative	Resulting risk classification	comments
H1b2	Vertical deviation (descent) by GAT aircraft into CBA due to Pilot error leading a/c to CBA incursion	Pilot mistake (e.g. misdialling of cleared flight level)			Civilian ATC radar monitoring FC radar monitoring							

Hazard id	Hazard description	Hazard causes/origin	Rh of hazard occurring qualitative	Rh of hazard occurring quantitative	Internal/external mitigations	Re hazard effect qualitative	Re hazard effect quantitative	Severity classification	Resulting R of hazard quantitative	Resulting R of hazard qualitative	Resulting risk classification	comments
H1b3	Vertical deviation (descent) by GAT aircraft into CBA due to linked failures/events	Failure of the civilian radars covering the CBA may lead to civilian ATCO loss of awareness and subsequently to an incursion into the CBA of a GAT aircraft under a erroneous instruction by civilian ATCO			FC monitoring/support FLPN Tracks							

Hazard id	Hazard description	Hazard causes/origin	Rh of hazard occurring qualitative	Rh of hazard occurring quantitative	Internal/external mitigations	Re hazard effect qualitative	Re hazard effect quantitative	Severity classification	Resulting R of hazard quantitative	Resulting R of hazard qualitative	Resulting risk classification	comments
H1b4	Vertical deviation (descent) by GAT aircraft into CBA due to COM failure that has subsequently increased pilot workload and/or resulted in pilot loss of pilot situational awareness and/or pilot uncertainty about procedures/route to be followed	Any radio equipment failure or pilot mistake in radio equipment utilisation Also a pilot following the correct COM loss procedure may in some scenarios inadvertently, through no fault of his, deviate into an active CBA.			Emergency frequencies Monitoring the traffic Join up by MIL acft ACARS system depending on airlines (through airline) Relay acft Coordination with military							
		Total COM failure from ground			Duplication of systems Separate fall back systems Separate fallback VCS							

Hazard id	Hazard description	Hazard causes/origin	Rh of hazard occurring qualitative	Rh of hazard occurring quantitative	Internal/external mitigations	Re hazard effect qualitative	Re hazard effect quantitative	Severity classification	Resulting R of hazard quantitative	Resulting R of hazard qualitative	Resulting risk classification	comments
H1b4	Vertical deviation (descent) by GAT aircraft into CBA due to COM failure that has subsequently increased pilot workload and/or resulted in pilot loss of pilot situational awareness and/or pilot uncertainty about procedures/route to be followed	Any radio equipment failure or pilot mistake in radio equipment utilisation Also a pilot following the correct COM loss procedure may in some scenarios inadvertently, through no fault of his, deviate into an active CBA.			Emergency frequencies Monitoring the traffic Join up by MIL acft ACARS system depending on airlines (through airline) Relay acft Coordination with military							
		Total COM failure from ground			Duplication of systems Separate fall back systems Separate fallback VCS							

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H1b6	Vertical deviation (descent) by GAT aircraft due to external environment effects leading a/c to CBA incursion	E.g. weather: CBs, Turbulences, Icing			Coordination with FC Weather (CBs) are not depicted on Civilian ATC screens directly however it is shown on separate screens at CWPs Tops of CBS are available at with a delay of 10 to 15 minutes							

Hazard id	Hazard description	Hazard causes/origin	Rh of hazard occurring qualitative	Rh of hazard occurring quantitative	Internal/external mitigations	Re hazard effect qualitative	Re hazard effect quantitative	Severity classification	Resulting R of hazard quantitative	Resulting R of hazard qualitative	Resulting risk classification	comments
H1b7	Vertical deviation by GAT aircraft (from top) into CBA aircraft due to emergency descent	Any emergency type requiring immediate descent			Civilian ATCO radar monitoring FC radar monitoring Fighter pilot awareness of the surrounding traffic							

Hazard id	Hazard description	Hazard causes/origin	Rh of hazard occurring qualitative	Rh of hazard occurring quantitative	Internal/external mitigations	Re hazard effect qualitative	Re hazard effect quantitative	Severity classification	Resulting R of hazard quantitative	Resulting R of hazard qualitative	Resulting risk classification	comments
H1c1	Vertical deviation (climb) by GAT aircraft due to Civil ATC error leading a/c to CBA incursion	Due to Civilian ATCO mistake (e.g. slip of the tongue)			(seg area porbe) ATCO FC Coordination ATCO/FC detection Coordination with FC Restrict CBA OPS Pilot readback of clearance							

Hazard id	Hazard description	Hazard causes/origin	Rh of hazard occurring qualitative	Rh of hazard occurring quantitative	Internal/external mitigations	Re hazard effect qualitative	Re hazard effect quantitative	Severity classification	Resulting R of hazard quantitative	Resulting R of hazard qualitative	Resulting risk classification	comments
H1c2	Vertical deviation (climb) by GAT aircraft due to Pilot leading a/c to CBA incursion	Pilot mistake (e.g. misdialling of cleared flight level)			Civilian ATC radar monitoring FC radar monitoring							

Hazard id	Hazard description	Hazard causes/origin	Rh of hazard occurring qualitative	Rh of hazard occurring quantitative	Internal/external mitigations	Re hazard effect qualitative	Re hazard effect quantitative	Severity classification	Resulting R of hazard quantitative	Resulting R of hazard qualitative	Resulting risk classification	comments
H1c3	Vertical deviation (climb) by GAT aircraft due to linked failures/events	Failure of the civilian radars covering the CBA may lead to civilian ATCO loss of awareness and subsequently to an incursion into the CBA of a GAT aircraft under a erroneous instruction by civilian ATCO			FC monitoring/support							

Hazard id	Hazard description	Hazard causes/origin	Rh of hazard occurring qualitative	Rh of hazard occurring quantitative	Internal/external mitigations	Re hazard effect qualitative	Re hazard effect quantitative	Severity classification	Resulting R of hazard quantitative	Resulting R of hazard qualitative	Resulting risk classification	comments
H1c4	Vertical deviation (climb) by GAT aircraft into CBA due to COM failure that has subsequently increased pilot workload and/or resulted in pilot loss of pilot situational awareness and/or pilot uncertainty about procedures/route to be followed	Any radio equipment failure or pilot mistake in radio equipment utilisation			Emergency frequencies Monitoring the traffic Join up by MIL acft ACARS system depending on airlines (through airline) Relay acft Coordination with military							
		Total COM failure from ground			Duplication of systems Separate fallback VCS							

Hazard id	Hazard description	Hazard causes/origin	Rh of hazard occurring qualitative	Rh of hazard occurring quantitative	Internal/external mitigations	Re hazard effect qualitative	Re hazard effect quantitative	Severity classification	Resulting R of hazard quantitative	Resulting R of hazard qualitative	Resulting risk classification	comments
H1c5	Vertical deviation (from below) by GAT aircraft into CBA due to lack of CBA status awareness	This may happen in cases when civil ATCO is not aware that CBA is active an instructs GAT aircraft to fly through CBA e.g. due to Communication breakdown between supervisor and ATCO position.			Civilian ATCOs would see participating aircraft in the CBA Conversely FC would see the airliner "aiming at " or entering into the CBA AMC Tool activation procedures							

Hazard id	Hazard description	Hazard causes/origin	Rh of hazard occurring qualitative	Rh of hazard occurring quantitative	Internal/external mitigations	Re hazard effect qualitative	Re hazard effect quantitative	Severity classification	Resulting R of hazard quantitative	Resulting R of hazard qualitative	Resulting risk classification	comments
H1c6	Vertical deviation (climb) by GAT aircraft due to external environment effects leading a/c to CBA incursion	E.g. weather: CBs, Turbulences, Icing			Coordination with FC Weather (CBs) are not depicted on Civilian ATC screens directly however it is shown on separate screens at CWPs Tops of CBS are available with a delay of 10 to 15 minutes							

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Hazard id	Hazard description	Hazard causes/origin	Rh of hazard occurring qualitative	Rh of hazard occurring quantitative	Internal/external mitigations	Re hazard effect qualitative	Re hazard effect quantitative	Severity classification	Resulting R of hazard quantitative	Resulting R of hazard qualitative	Resulting risk classification	comments
H1c7	Vertical deviation (from below) into CBA by GAT aircraft due to emergency climb (e.g. looking for altitude due to potential emergency development)	Any emergency type requiring immediate descent			Civilian ATCO radar monitoring FC radar monitoring Fighter pilot awareness of the surrounding traffic							

Hazard id	Hazard description	Hazard causes/origin	Rh of hazard occurring qualitative	Rh of hazard occurring quantitative	Internal/external mitigations	Re hazard effect qualitative	Re hazard effect quantitative	Severity classification	Resulting R of hazard quantitative	Resulting R of hazard qualitative	Resulting risk classification	comments
H2a1	Lateral deviation by participating aircraft (military aircraft in the CBA) due to FC error leading a/c to excursion out of the CBA	This may be due to the following from the part of the Fighter Controller: Wrong instruction, Lack of monitoring of aircraft progress, Wrong focus (distraction, looking elsewhere or workload) Wrong area data in FC systems			Military pilot monitoring of area Civilian ATCO radar monitoring FA monitoring							

Hazard id	Hazard description	Hazard causes/origin	Rh of hazard occurring qualitative	Rh of hazard occurring quantitative	Internal/external mitigations	Re hazard effect qualitative	Re hazard effect quantitative	Severity classification	Resulting R of hazard quantitative	Resulting R of hazard qualitative	Resulting risk classification	comments
H2a2	Lateral deviation by participating aircraft (military aircraft in the CBA) due to military pilot error leading a/c to excursion out of the CBA	This may be due to : autonomous control error, pilot loss of situational awareness, wrong area monitoring, CAP point position Wrong area data in aircraft systems			Call from the FC ATCO radar monitoring FA radar monitoring Airspace design- Military procedures OAT Harmonisation **CBA definition point**							

Hazard id	Hazard description	Hazard causes/origin	Rh of hazard occurring qualitative	Rh of hazard occurring quantitative	Internal/external mitigations	Re hazard effect qualitative	Re hazard effect quantitative	Severity classification	Resulting R of hazard quantitative	Resulting R of hazard qualitative	Resulting risk classification	comments
H2a3	Lateral deviation by participating aircraft due to linked failures/events	Failure of the military radars covering the CBA may lead to FC loss of awareness and subsequently to an excursion into the CBA of a participating aircraft under a erroneous instruction by FC MIL ACFT erroneous display of area data in ACFT systems			Pilot awareness Stop activity, civilian ATCO support to clear the area If VMC VFR is possible Hand over to aerodrome							

Hazard id	Hazard description	Hazard causes/origin	Rh of hazard occurring qualitative	Rh of hazard occurring quantitative	Internal/external mitigations	Re hazard effect qualitative	Re hazard effect quantitative	Severity classification	Resulting R of hazard quantitative	Resulting R of hazard qualitative	Resulting risk classification	comments
H2a4	Lateral deviation by participating aircraft out of CBA due to COM failure that has subsequently increased military pilot workload and/or resulted in military pilot loss of pilot situational awareness and/or pilot uncertainty about procedures/route to be followed	Any radio communication failure cause or pilot mistake in radio equipment utilisation (PLOC) Radio com loss procedure badly designed Badly designed COM loss procedure design			Formation flights Escort acft Emergency frequencies (121,5) Common MIL/MIL procedures (when required)							

Hazard id	Hazard description	Hazard causes/origin	Rh of hazard occurring qualitative	Rh of hazard occurring quantitative	Internal/external mitigations	Re hazard effect qualitative	Re hazard effect quantitative	Severity classification	Resulting R of hazard quantitative	Resulting R of hazard qualitative	Resulting risk classification	comments
H2a5	Lateral deviation by participating aircraft in non active CBA due to lack of CBA status awareness	This may happen in cases when: A participating aircraft remains in an de-activated CBA, or A participating aircraft joins an inactivated CBA, or There was a lack of coordination between FA/FC and civil supervisor (no CBA activation extension request), or A participating is brought (directly by MIL control without military aircraft contacting civil ATC) into CBA by MIL and no coordination with civil supervisors counterpart has taken place			Civilian ATCO detection Supervisor intervention CBA activation/de-activation procedures AMC Tool procedures							

Hazard id	Hazard description	Hazard causes/origin	Rh of hazard occurring qualitative	Rh of hazard occurring quantitative	Internal/external mitigations	Re hazard effect qualitative	Re hazard effect quantitative	Severity classification	Resulting R of hazard quantitative	Resulting R of hazard qualitative	Resulting risk classification	comments
H2a6	Lateral deviation by participating aircraft out of CBA due to external environment effects leading to CBA excursion	E.g. weather: CBs, Turbulences, Icing										

Hazard id	Hazard description	Hazard causes/origin	Rh of hazard occurring qualitative	Rh of hazard occurring quantitative	Internal/external mitigations	Re hazard effect qualitative	Re hazard effect quantitative	Severity classification	Resulting R of hazard quantitative	Resulting R of hazard qualitative	Resulting risk classification	comments
H2a7	Lateral deviation by participating aircraft out of CBA due to emergency (e.g. pilot loss of situational awareness in the course of the emergency)	Due to any aircraft relevant failure or problems that can lead to an emergency situation			Intervention and coordination between FC, Civilian ATCOs and Supervisor IFF squawk to alert							

Hazard id	Hazard description	Hazard causes/origin	Rh of hazard occurring qualitative	Rh of hazard occurring quantitative	Internal/external mitigations	Re hazard effect qualitative	Re hazard effect quantitative	Severity classification	Resulting R of hazard quantitative	Resulting R of hazard qualitative	Resulting risk classification	comments
H2b1	Vertical deviation (descent) by participating aircraft out of CBA due to FC error leading to CBA excursion	This may be due to: Misunderstanding of the vertical limitations Wrong clearance Coordination with A/D TMA, (LOA to include restrictions) below CBA when is the case			Military pilot monitoring of CBA limits Civilian ATCO detection through monitoring (although mode C delay) FA radar monitoring Buffers Separation minima with traffic outside CBA							

Hazard id	Hazard description	Hazard causes/origin	Rh of hazard occurring qualitative	Rh of hazard occurring quantitative	Internal/external mitigations	Re hazard effect qualitative	Re hazard effect quantitative	Severity classification	Resulting R of hazard quantitative	Resulting R of hazard qualitative	Resulting risk classification	comments
H2b2	Vertical deviation (descent) by participating aircraft out of CBA due to Pilot leading to CBA excursion	Due to pilot mistake (e.g. loss of situational awareness, aircraft manoeuvres taking it beyond boundary) Vertical limit not understood This may be due to: Misunderstanding of the vertical limitations Wrong clearance Coordination with A/D TMA, (LOA to include restrictions) below CBA when is the case			Call from the FC ATCO/Supervisor (mode C delay) FA monitoring Altimeter warnings							

Hazard id	Hazard description	Hazard causes/origin	Rh of hazard occurring qualitative	Rh of hazard occurring quantitative	Internal/external mitigations	Re hazard effect qualitative	Re hazard effect quantitative	Severity classification	Resulting R of hazard quantitative	Resulting R of hazard qualitative	Resulting risk classification	comments
H2b3	Vertical deviation (descent) by participating aircraft out of CBA due to linked failures/events	Failure of the military radars covering the CBA may lead to FC loss of awareness and subsequently to an excursion into the CBA of a participating aircraft under an erroneous instruction by FC			Pilot awareness (Stop activity, civilian ATCO support to clear the area) If VMC VFR is possible Hand over to aerodrome							

Hazard id	Hazard description	Hazard causes/origin	Rh of hazard occurring qualitative	Rh of hazard occurring quantitative	Internal/external mitigations	Re hazard effect qualitative	Re hazard effect quantitative	Severity classification	Resulting R of hazard quantitative	Resulting R of hazard qualitative	Resulting risk classification	comments
H2b4	Vertical deviation (descent) by participating aircraft out of the CBA due to COM failure that has subsequently increased military pilot workload and/or resulted in military pilot loss of pilot situational awareness and/or pilot uncertainty about procedures/route to be followed	Any radio communication failure cause or pilot mistake in radio equipment utilisation (PLOC) Badly designed COM loss procedure which is correctly followed by the pilot may lead to this if the vertical limits assigned to the exercise			Formation flights Escort acft Emergency frequencies (121,5) Common MIL/MIL procedures harmonisation							

Hazard id	Hazard description	Hazard causes/origin	Rh of hazard occurring qualitative	Rh of hazard occurring quantitative	Internal/external mitigations	Re hazard effect qualitative	Re hazard effect quantitative	Severity classification	Resulting R of hazard quantitative	Resulting R of hazard qualitative	Resulting risk classification	comments
H2b5	Vertical deviation (through floor) by participating aircraft out of CBA due to emergency	Full emergency			None							
		Other emergencies			None							

Hazard id	Hazard description	Hazard causes/origin	Rh of hazard occurring qualitative	Rh of hazard occurring quantitative	Internal/external mitigations	Re hazard effect qualitative	Re hazard effect quantitative	Severity classification	Resulting R of hazard quantitative	Resulting R of hazard qualitative	Resulting risk classification	comments
H2c1	Vertical deviation (climb) by participating aircraft out of CBA due to FC error leading a/c to CBA excursion	Due to FC error leading to CBA excursion This may be due to: Misunderstanding of the vertical limitations Wrong clearance Coordination with A/D TMA, (LOA to include restrictions) when is the case			**Military pilot monitoring of CBA limits would NOT happen. Pilot would follow instructions** Civilian ATCO detection through monitoring FA radar monitoring							

Hazard id	Hazard description	Hazard causes/origin	Rh of hazard occurring qualitative	Rh of hazard occurring quantitative	Internal/external mitigations	Re hazard effect qualitative	Re hazard effect quantitative	Severity classification	Resulting R of hazard quantitative	Resulting R of hazard qualitative	Resulting risk classification	comments
H2c2	Vertical deviation (climb) by participating aircraft out of CBA due to Pilot leading a/c to CBA excursion	Due to pilot mistake (e.g. loss of situational awareness, aircraft manoeuvres taking it beyond boundary) Vertical limit not understood This may be due to: Misunderstanding of the vertical limitations Wrong clearance Coordination with A/D TMA, (LOA to include restrictions) when is the case			Call from the FC ATCO/Supervisor FA monitoring Altimeter warnings (for some acft)							

Hazard id	Hazard description	Hazard causes/origin	Rh of hazard occurring qualitative	Rh of hazard occurring quantitative	Internal/external mitigations	Re hazard effect qualitative	Re hazard effect quantitative	Severity classification	Resulting R of hazard quantitative	Resulting R of hazard qualitative	Resulting risk classification	comments
H2c3	Vertical deviation (climb) by participating aircraft out of CBA due to linked failures/events	Failure of the military radars covering the CBAs may lead to FC loss of awareness and subsequently to an excursion into the CBA of a participating aircraft under a erroneous instruction by FC			Pilot awareness Stop activity, civilian ATCO support to clear the area If VMC VFR is possible Hand over to aerodrome							

Hazard id	Hazard description	Hazard causes/origin	Rh of hazard occurring qualitative	Rh of hazard occurring quantitative	Internal/external mitigations	Re hazard effect qualitative	Re hazard effect quantitative	Severity classification	Resulting R of hazard quantitative	Resulting R of hazard qualitative	Resulting risk classification	comments
H2c4	Vertical deviation (climb) by participating aircraft out of the CBA due to COM failure that has subsequently increased military pilot workload and/or resulted in military pilot loss of pilot situational awareness and/or pilot uncertainty about procedures/route to be followed	Any radio communication failure cause or pilot mistake in radio equipment utilisation (PLOC) Bad COM loss procedure design			Formation flights Escort acft Emergency frequencies (121,5) Common MIL/MIL procedures (when required)							

Hazard id	Hazard description	Hazard causes/origin	Rh of hazard occurring qualitative	Rh of hazard occurring quantitative	Internal/external mitigations	Re hazard effect qualitative	Re hazard effect quantitative	Severity classification	Resulting R of hazard quantitative	Resulting R of hazard qualitative	Resulting risk classification	comments
H2c5	Vertical deviation (through ceiling) by participating aircraft out of CBA	This may happen due to aircraft emergency or excessive manoeuvres, or loss of situational awareness. Looking for height			Call from the FC ATCO/Supervisor FA monitoring Altimeter warnings (for some acft)							

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