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Federal Department of the Environment, Transport, Energy and Communications DETEC

Federal Office of Civil Aviation FOCA
UAS Authorization and Oversight

New Drone Regulation

Webinar on the Specific Category

2023-05-02

Agenda

- **Introduction**
- **Overview & intent of the specific category**
- **Approval Types:** STS, PDRA, SORA, (LUC)
- **Use-Cases**
  - PDRA S-01
  - SORA: SAIL II
- **Outlook**
- **Other questions from the survey**

How the webinar was build & expectations

- Broad overview on the possible authorization types for your operations
- **Assumption**: Operations cannot take place in the conditions of the OPEN category (due to distances, height, BVLOS, UA without class marking, etc.)
- **Use-cases**: Real applications might be different, and details might make a substantial difference. Slides simplified for exemplification.
- **No "one-size fits all"**: Need to discuss your specific operation in detail within the formal application process for Operational Authorization
- **Risk-based approach** == "it depends"

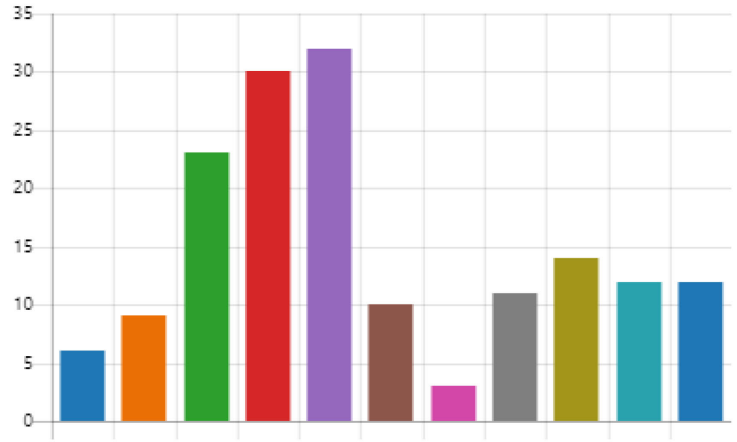
This icon ➔  shows a link to Guidance Material (help) from FOCA or other authorities

Introduction: Closed Loop

- Survey results:

A) Which field(s) of drone industry?

Manufacturing	6
Research	9
Surveying operations	23
Photography / Filming	30
Inspections	32
Agriculture	10
Logistics/Delivery	3
Public Services	11
Consulting	14
Construction	12
Other	12



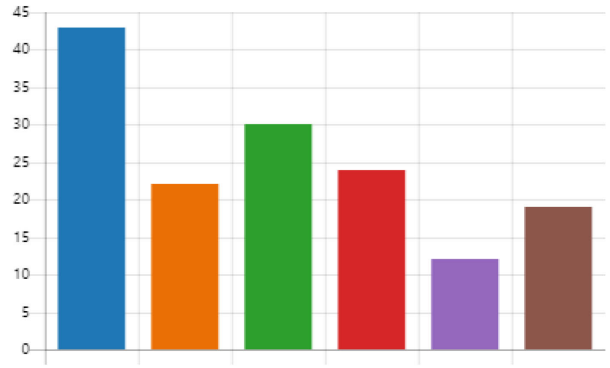
B) Which type of approval are you interested in

More Details

STS: Standard Scenarios (CH ...	60
PDRA: Pre-defined Risk Assess...	44
SORA: Specific Operations Ris...	45
LUC: Light UAS Operator Certi...	32

C) What reason(s) do you need an approval for?

I cannot respect the distance t...	43
I need to fly over crowds	22
I need to fly BVLOS	30
I need to fly higher than 120m...	24
I need to fly a drone > 25kg	12
Other	19



- Cameras and microphones are disabled during presentation
- Slides will be made available after the webinar
- Condensed questions from the survey at the end
- Several answers are already integrated in the core presentation

Categories of Operation

OPEN

VLOS
< 25kg
< 120m AGL
Not over crowds

No authorization needed

SPECIFIC

Cannot respect conditions from OPEN category

e.g. BVLOS

FOCA approval needed

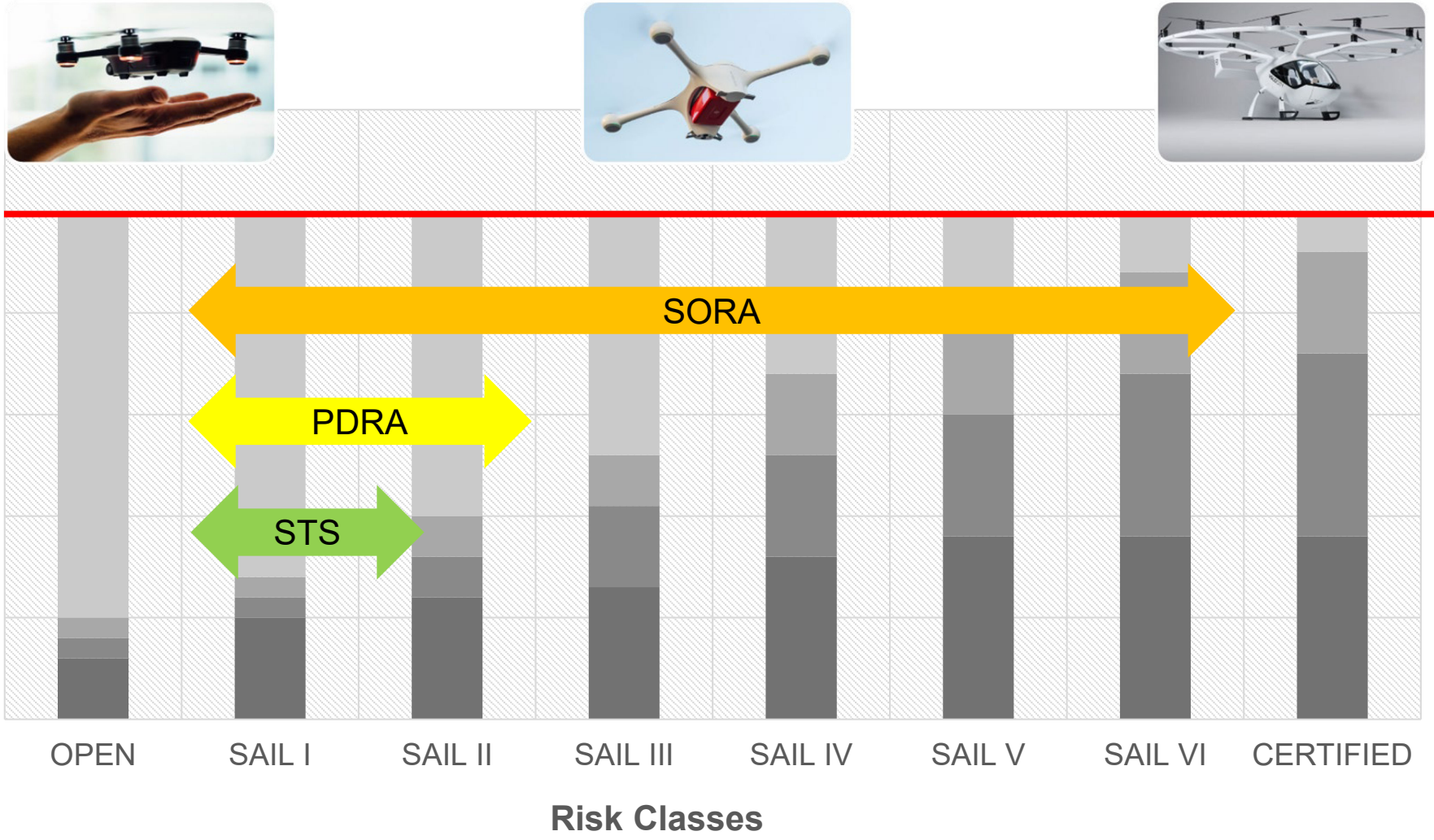
CERTIFIED

Air-taxi
Freight transport

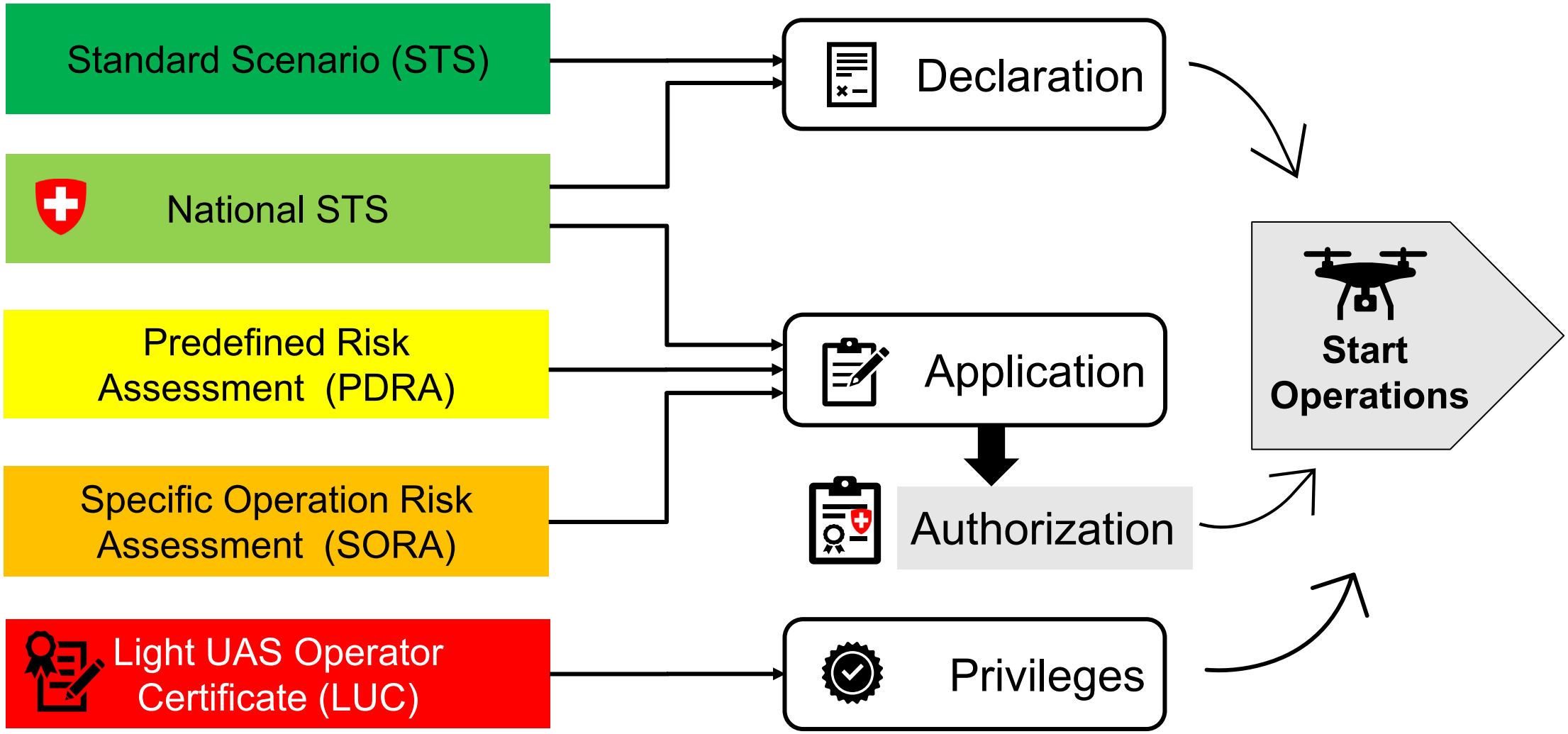
e.g. > 1m & over crowds

Licensed crew & certified UAS

Philosophy: Risk-based Approach



Types of approvals/declarations



Which approval procedure for my operation(s)

Concept of Operations (ConOps)

Drone characteristics
- C-Marking
- Size /Weight
- Speed

Operating Mode
- VLOS
- BVLOS
- EVLOS

Area overflown
- Controlled Ground Area
- Sparsely Populated
- Populated
- Gatherings of people

Environment
- Rural area
- Urban area
- Assemblies of people

Flight limits
- Height
- Route

Airspace
- Class of airspace
- Type of airspace

CHECK
ConOps
vs.
requirements

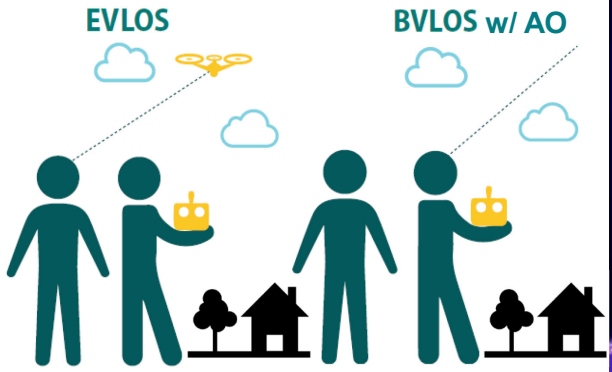
STS ?
1. Declare

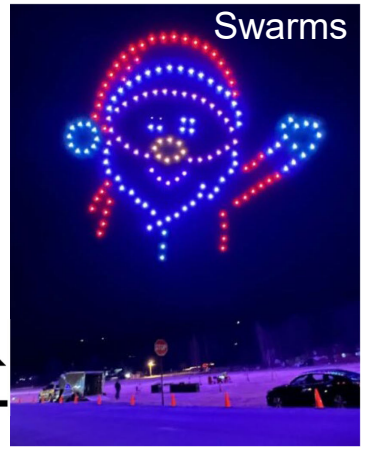
PDRA ?
1. OM
2. Apply

SORA
1. Assess risks
2. Create docs
3. Apply

CH-STS (National)

- Approvable until 12/2023
- Valid until 12/2025
- Drone: No C-label required
- Mostly based on declarations

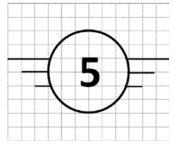




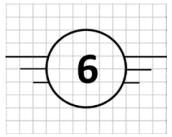
EU-STS (European)

- Applicable from 01/2024
- Drones: C5 or C6 label
- Only declarations

STS-01



STS-02



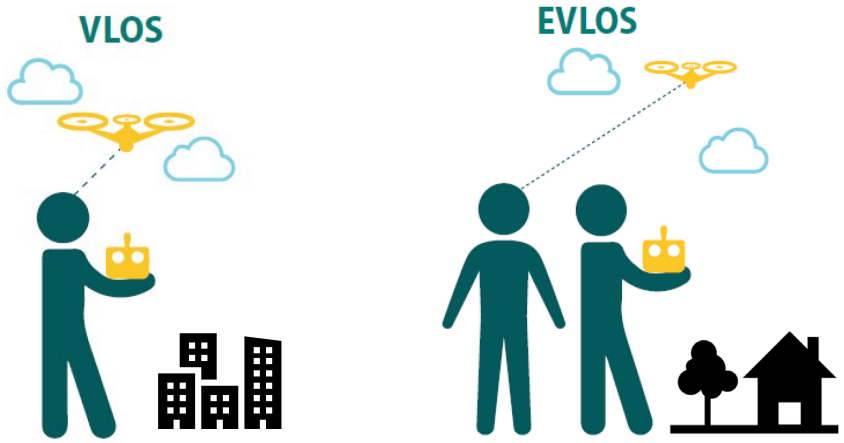
PDRA: Pre-defined Risk Assessment

PDRA

- For drones **without** class marking
- Declaration plus evidence (OM)

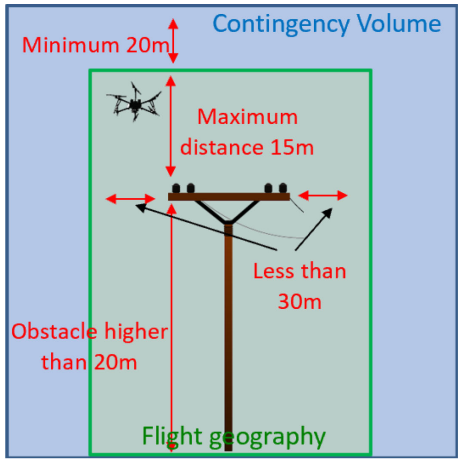
- PDRA S-01: “Mirror” of EU STS-01
  - VLOS
  - urban area
- PDRA S-02: “Mirror” of EU STS-02
  - EVLOS
  - rural area

➢ **Requirement: Controlled ground area!**



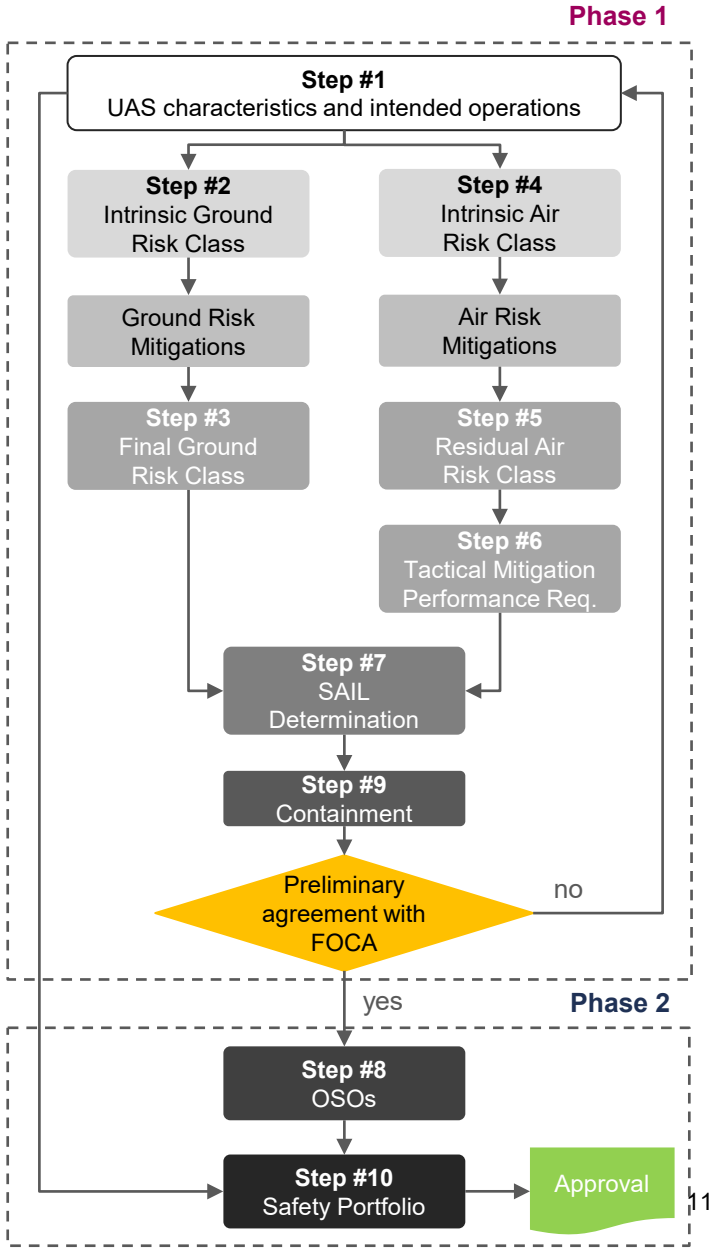
PDRA G-0x: BVLOS flights

- G-01: rural area with Airspace Observers (AO)
- G-02: reserved/restricted airspace
- G-03: close to infrastructure – inspection



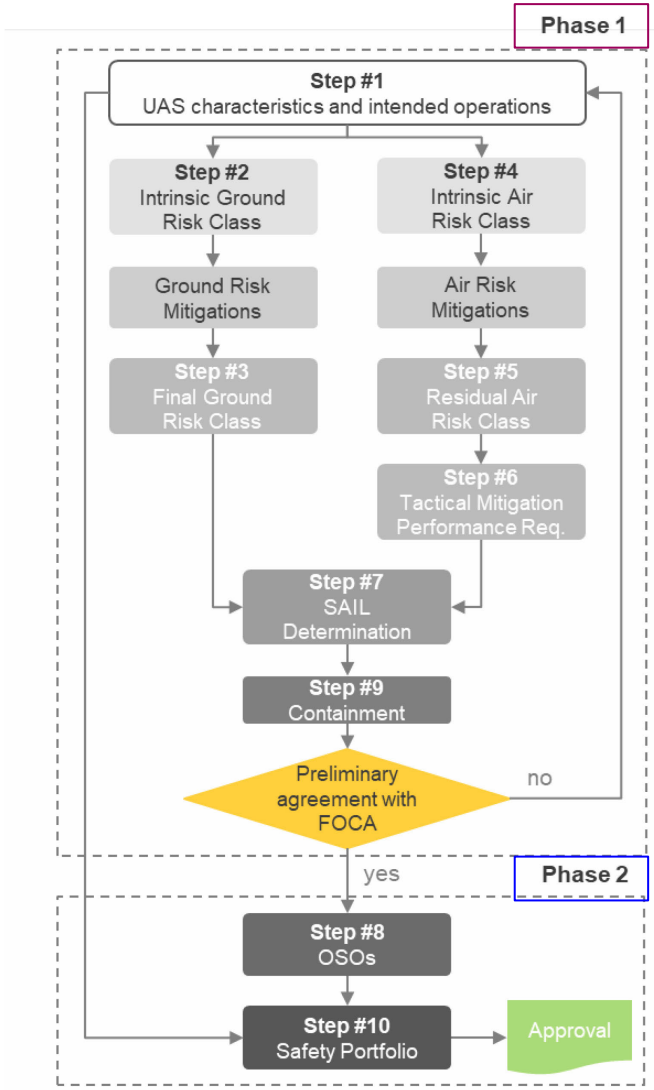
SORA: "Swiss cheese" & Bird's-eye View

UAS: Unmitigated risk

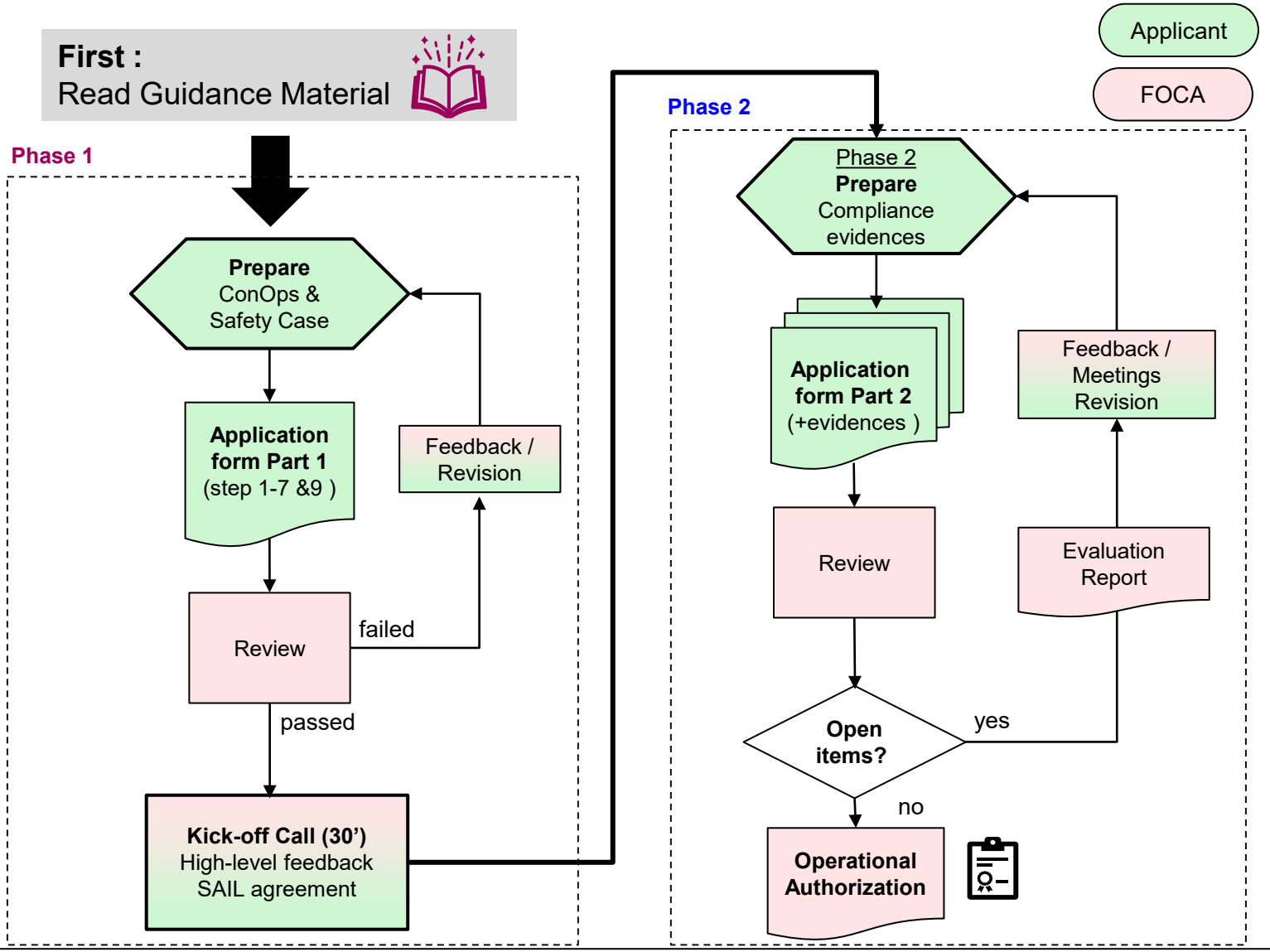


SORA application process @FOCA

SORA



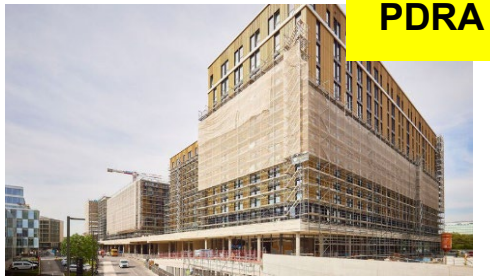
First :
Read Guidance Material



Use-case #1: PDRA S-01 ➔ Usable

CONSTRUCTION-MONITORING, Rte de Meyrin, Geneva

PDRA



High-level ConOps:

Parameter	Value
Range limit	VLOS
Type UA	Multicopter
Max CD/Size	0.7 m
MTOW	4.5 kg
V0	15 m/s
Hmax	60 m AGL

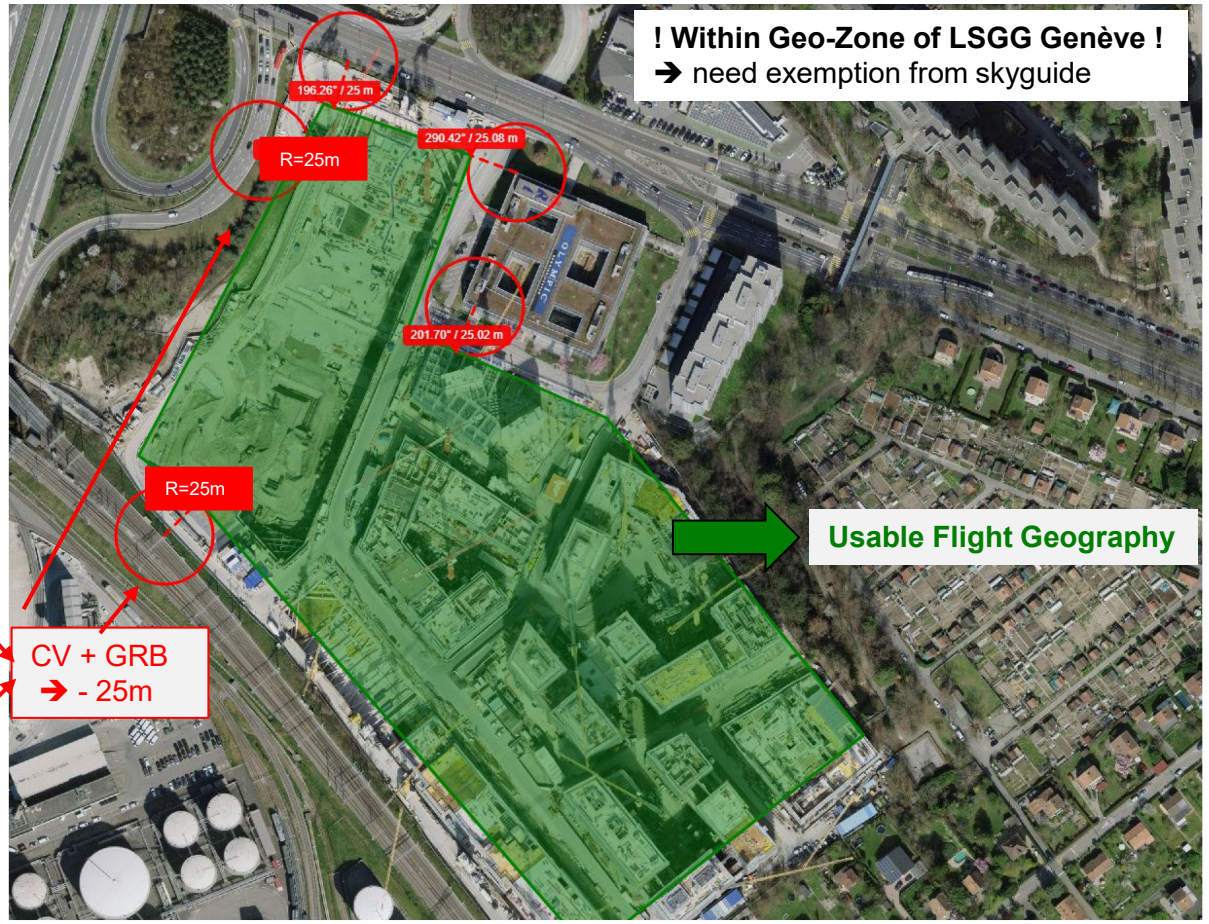
Sub-urban / Populated

PDRA characterization*:

REQ #	Condition
1.6	UAS operations should be conducted over a **controlled ground area (CGA)**.
3.1.2	…**contingency volume (CV)** => at least **10 m**
3.5	…establish a **ground risk buffer (GRB)** to protect 3rd parties on ground
3.6	Ground risk buffer (Max height <60 m AGL, MTOM <10kg) => **15 m**
4.1.10	ensure that before starting the operation, the **controlled ground area is in place**, effective, and compliant with the minimum distance that is defined in points 3.1 and 3.5

Definition of CGA ?

*AMC4 to Article 11 of (EU) 2019/947



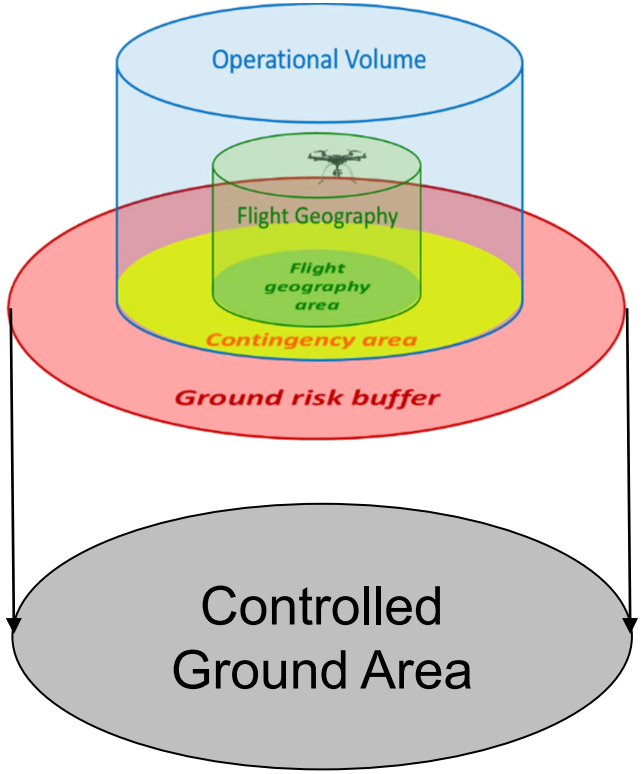
Controlled Ground Area (CGA)

PDRA S-01 , condition # 4.1.11
4.1.11 ensure that before starting the operation, all persons that are present in the controlled ground area:
(a) have been informed of the risks of the operation;
(b) have been briefed on or trained in, as appropriate, the safety precautions and measures that the UAS operator has established for their protection; and
(c) have explicitly agreed to participate in the operation.

Interpretation:
Establish diligent procedure to strategically (before the flight) mitigate the risk on ground, down to practically zero.

Solutions/options:
- Can be fenced, with cordon procedures / security perimeter (e.g., involving police)
- If not fenced,
  - Area must be clearly marked with signs; and
  - Area must be monitored fully by the operator for any people entering area; and
  - In addition, a procedure must be established to cope with uninvolved persons entering the controlled ground area take appropriate measures to maintain safety.

Caution !
In case a controlled ground area is used in a populated area, it triggers enhanced containment as per AMC1 to Article 11 and FOCA AltMoC.



Further info ➔ FOCA Guidance Material (FOCA-UAS-GM-Part 1)

Use-case #2a: PDRA S-01 ➔ Limited use

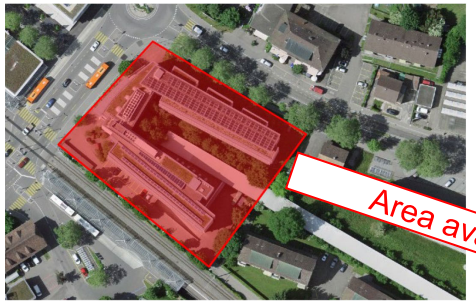
PDRA

MAPPING / INSPECTION, BAZL Facilities, Ittigen

High-level ConOps:

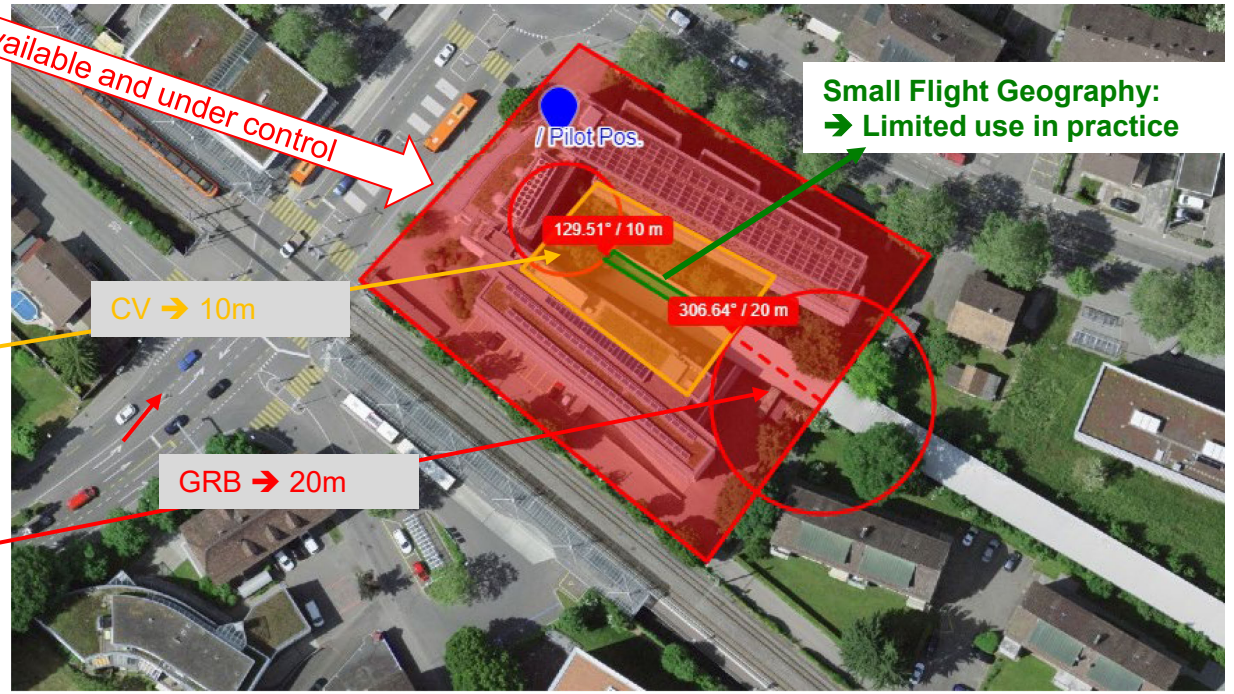
Parameter	Value
Range limit	VLOS
Type UA	Multicopter
Max CD/Size	0.7m
MTOW	4.5 kg
V0	15 m/s
Hmax	80m AGL

Urban / Populated



PDRA characterization:

REQ #	Condition
1.6	UAS operations should be conducted over a **controlled ground area (CGA)**.
3.1.2	…**contingency volume (CV)** => at least **10 m**
3.5	…establish a **ground risk buffer (GRB)** to protect 3rd parties on ground
3.6	Ground risk buffer (Max height <90 m AGL, MTOM<10kg) => **20m**



*AMC4 to Article 11 of (EU) 2019/947

Use-case #2b: PDRA S-01 ➔ Limited use

PDRA

MAPPING / INSPECTION, BAZL Facilities, Ittigen

➔ **Forward Planning**

Start from the needed flight geography, suitable for the mission

Apply required contingency volume and ground risk buffer

OUTCOME

The UAS operator need to have control over **area that are not easily manageable** (here: the whole neighborhood)

Solution

SORA

- Offers **flexibility**
- Demands **effort and resources**

Use-case #3: SORA – Step #1

SORA

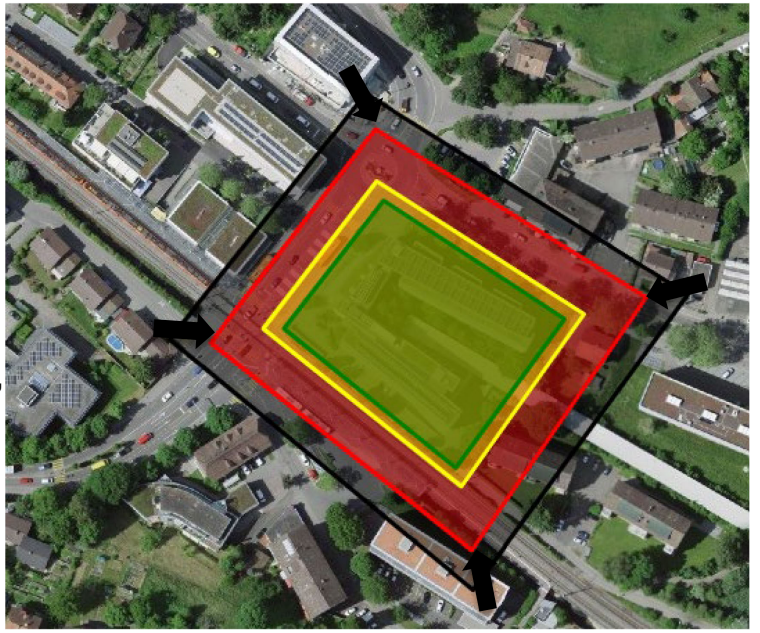
Step #1 – Concept of Operations :

Parameter	Value
Mission	Thermal Mapping
Range limit	VLOS
Type UA	Multicopter
Max CD/Size	0.7m
MTOW	4.5 kg
V0	15 m/s
Hmax	80m AGL
Area overflown	Populated

Operating Volumes/Area

Defined according to:

- Mission needs (FG)
- Actual UA characteristics & performance (CV)
- Realistic dynamics in case of termination, e.g., ballistic approach (GRB)



Reduction of GRC footprint in comparison to PDRA

Ref. FOCA Guidance Material (FOCA-UAS-GM-Part 1)

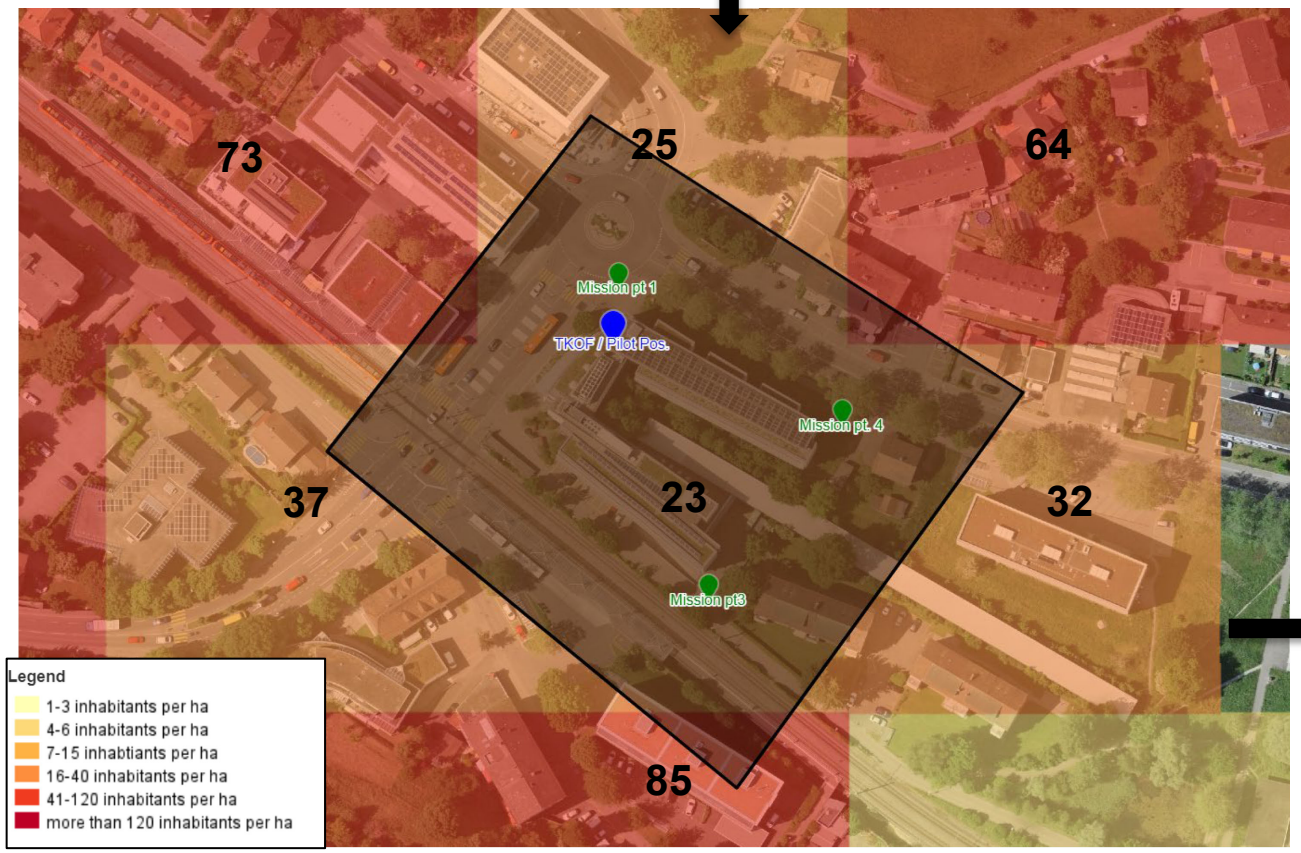
GRB Lateral - S_{GRB}	
S_{GRB} – Method 1 Generic approach - 1:1 Rule	$S_{GRB} = H_{CV} + \frac{1}{2} \cdot CD\ [m]$
S_{GRB} – Method 2 Ballistic approach[6] Note: This approach is **applicable only to rotary wing UA** (Helicopter, Multicopter)	$S_{GRB} = V_0 \sqrt{\frac{2H_{CV}}{g}} + \frac{1}{2} \cdot CD\ [m]$

Use-case #3: SORA – Step #2

SORA

Step #2 – Determination of intrinsic Ground Risk (iGRC)

- Assessment based on population density layer of map.geo.admin.ch
- 3 persons/ha → Populated area



Parameter	Value
Type UA	Multicopter
Max CD/Size	0.7m
MTOW	4.5 kg
V_0	15 m/s
Hmax	80m AGL
$V_{terminal}$	30 m/s* (Ekin ~ 2kJ)

Intrinsic UAS ground risk class				
Max UAS characteristics dimension	1 m / approx. 3 ft	3 m / approx. 10 ft	8 m / approx. 25 ft	>8 m / approx. 25 ft
Typical kinetic energy expected	< 700 J (approx. 529 ft lb)	< 34 kJ (approx. 25 000 ft lb)	< 1 084 kJ (approx. 800 000 ft lb)	> 1 084 kJ (approx. 800 000 ft lb)
Operational scenarios				
VLOS/BVLOS over a controlled ground area[3]	1	2	3	4
VLOS over a sparsely populated area	2	3	4	5
BVLOS over a sparsely populated area	3	4	5	6
VLOS over a populated area	4	5	6	8
BVLOS over a populated area	5	6	8	10
VLOS over an assembly of people	7			
BVLOS over an assembly of people	8			

Table 2 — Determination of the intrinsic GRC

iGRC: 4

*By applying §2.3.1 (d) et (l) of AMC1 Article 11 (SORA 2.0), one can claim that the iGRC is in the first column based on CD = 70% of 1m and Ekin = <6% of 34kJ. Further guidance will be published by FOCA and EASA in Q2-Q3/2023

Use-case #3: SORA – Step #3

Step #3 – Ground Risk Mitigations ➔ Final Ground Risk class

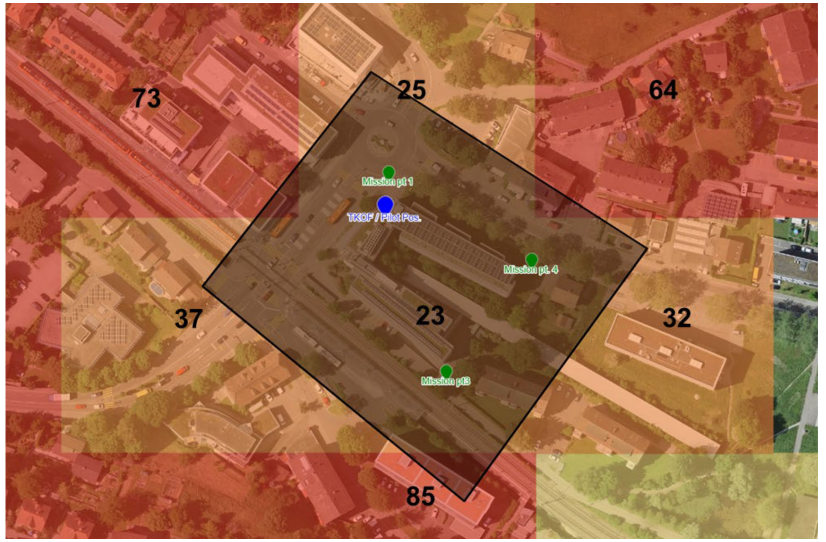
iGRC: 4 (VLOS in pop, 1m-class / <700J)

Mitigation Sequence:

- **M1 – Strategic ➔ Reduction of people at risk**
  Quantitative criteria : Demonstration that the risk is reduced by a factor of approximately 10 (i.e. a 90 % reduction) compared to the risk assessed before the mitigation (= population density map)
  - time of exposure, time of the day, …
  - warning signs, on-site inspection (procedure for site assessment)
  - people initially “at risk” are sheltered (protected by roofs, in cars ,…)

- **M2 – Tactical ➔ Reduction of impact**
  - e.g. use of parachute, frangibility
    - M2 Medium ⟶ developed and tested according to standards
    - M2 High ⟶ verified by EASA
  - *Here: none, not claimed*

- **M3 – Organizational ➔ Emergency Response Plan (ERP)**
  - An ERP is in place, operator validated and effective
  - ERP is compliant with (EU) AMCs, follows best-practices, evidence is available for review

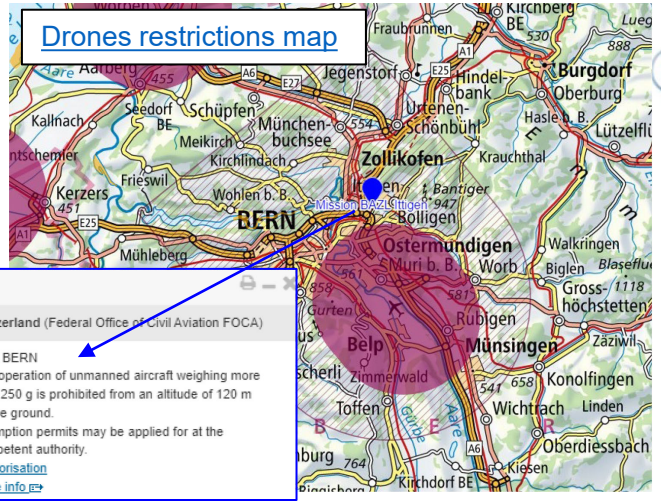


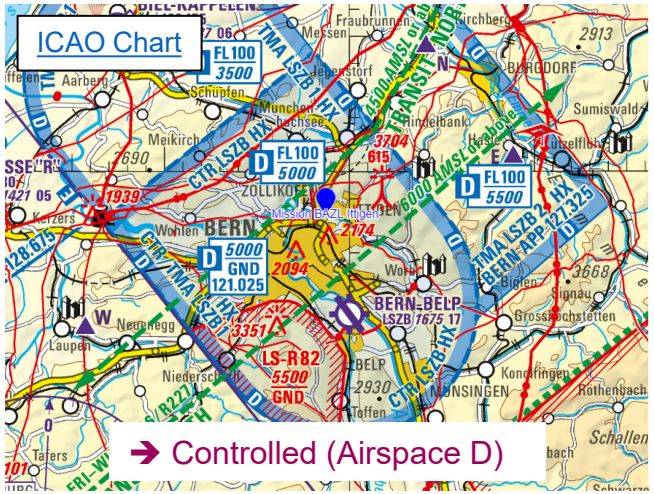
Mitigation Sequence	Robustness		
	Low/None	Medium	High
M1	0: None -1: Low	-2	-4
M2	0	-1	-2
M3	1	0	-1

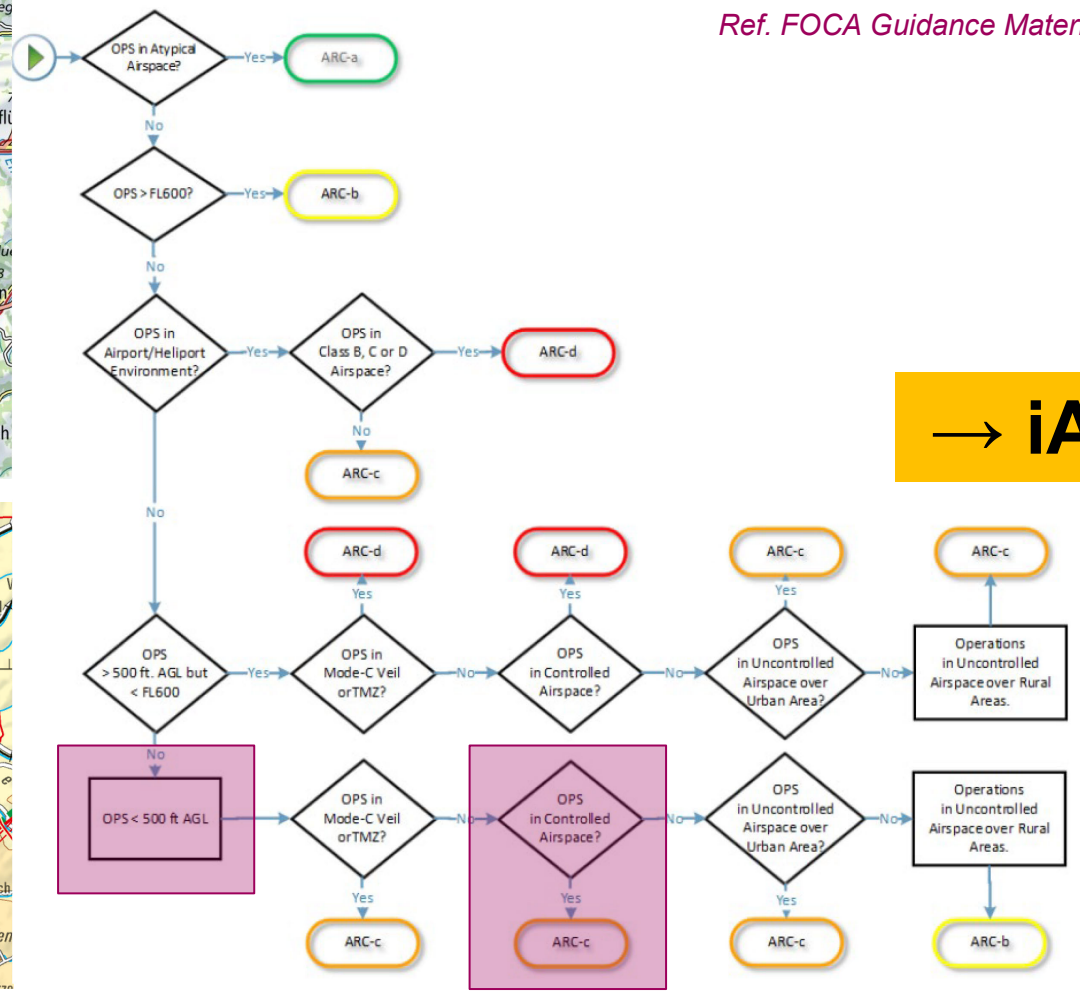
fGRC: 3

Use-case #3: SORA – Step #4

Step #4 – Air Risk Assessment







Ref. FOCA Guidance Material (FOCA-UAS-GM-STEP4)

→ iARC: ARC-c

Use-case #3: SORA – Step #5

Step #5 – Air Risk Strategic Mitigations

Demonstration of risk reduction → density similar to ARC-b?

- **Operational restrictions / type of operation**:
  → Max. height, VLOS, visual inspection, close to infrastructure…
- **Common structures and rules:**
  → Procedures in place: e.g. coordination with air navigation service provider (skyguide)
- **Considerations wrt. the OPEN category**
  → Here no exemption needed < 120m + VLOS rules of the air
- **General assessment** of airspace users
  - e.g., min. height for VFR, type of traffic expected, cooperative/uncooperative aircraft...
  - Hazard identification matrix
    - Hot air balloons ?
    - Hang gliders, paragliders, … ?
    - Gliders / Sailplanes?
    - General Aviation, recreational aviation under VFR ?
    - Helicopters: Medical, Aerial Work, Military, State aircraft, … ?

→ fARC: ARC-b

Use-case #3: SORA – Step #6

Step #6 – Tactical Mitigation Performance Requirements (TMPR) – during flight

Here → VLOS Operations

The operator should produce:

- VLOS de-confliction scheme
- methods applied for detection
- criteria used to avoid incoming traffic

- If the remote pilot relies on detection by observers, description of:
  - communication phraseology,
  - procedures; and
  - protocols

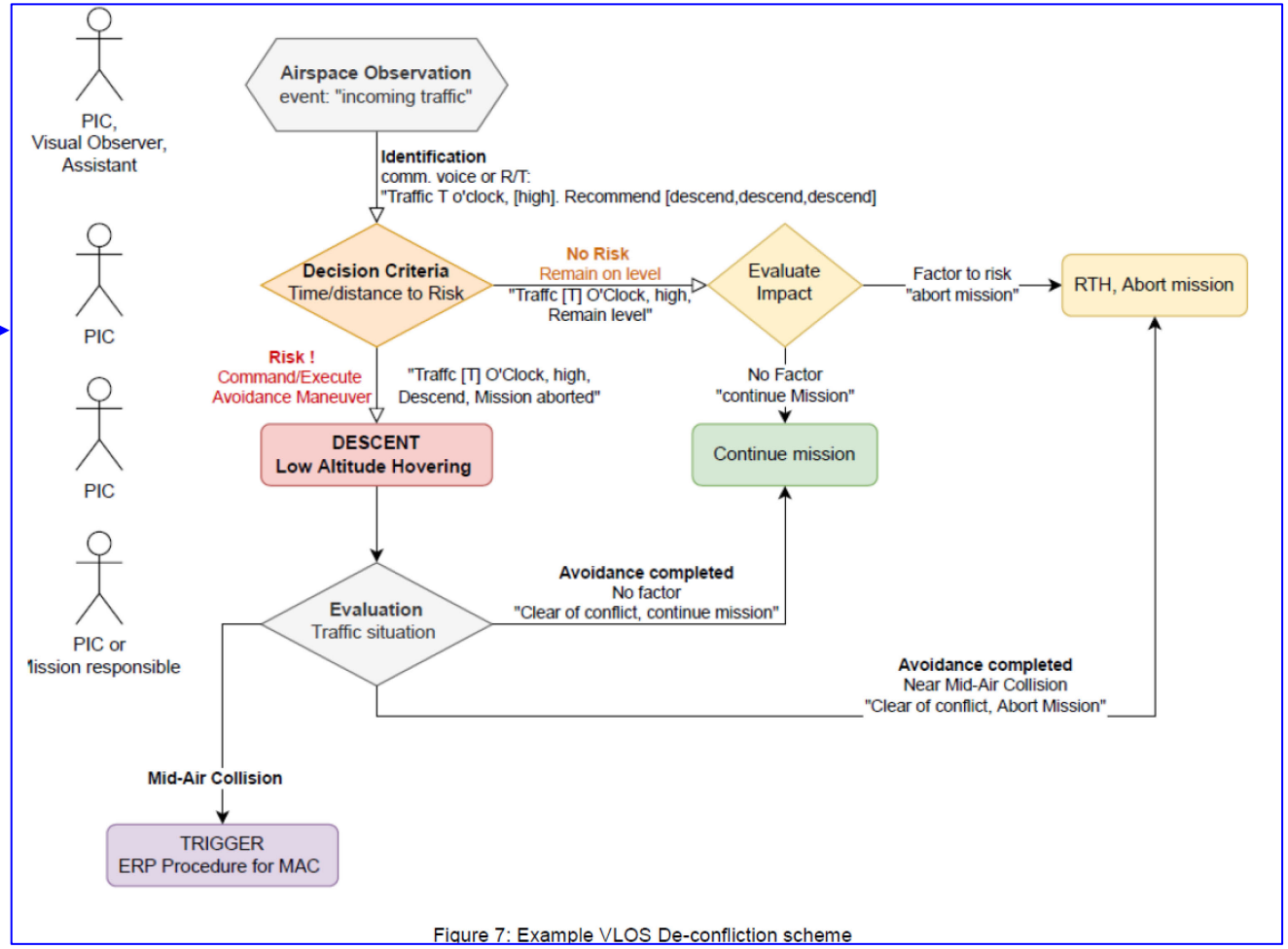


Figure 7: Example VLOS De-confliction scheme

Use-case #3: SORA – Step #7 & #8

Step #7 – Specific Assurance and Integrity Level (SAIL) → **Step #8 – Operational Safety Objectives**

Solid justification/evidence to claim final Ground Risk Class and Air Risk Class ?

➔Agreement on SAIL with the authority

SAIL determination				
	Residual ARC			
Final GRC	a	b	c	d
≤2	I	II	IV	VI
3	II	II	IV	VI
4	III	III	IV	VI
5	IV	IV	IV	VI
6	V	V	V	VI
7	VI	VI	VI	VI
>7	Category C operation			

Table 5 — SAIL determination

OSO number (in line with Annex E)		SAIL					
		I	II	III	IV	V	VI
	Technical issue with the UAS						
OSO#01	Ensure the UAS operator is competent and/or proven	O	L	M	H	H	H
OSO#02	UAS manufactured by competent and/or proven entity	O	O	L	M	H	H
OSO#03	UAS maintained by competent and/or proven entity	L	L	M	M	H	H
OSO#04	UAS developed to authority recognised design standards[1]	O	O	L	L	M	H
OSO#05	UAS is designed considering system safety and reliability	O	O	L	M	H	H
OSO#06	C3 link performance is appropriate for the operation	O	L	L	M	H	H
OSO#07	Inspection of the UAS (product inspection) to ensure consistency with the ConOps	L	L	M	M	H	H
OSO#08	Operational procedures are defined, validated and adhered to	L	M	H	H	H	H
OSO#09	Remote crew trained and current and able to control the abnormal situation	L	L	M	M	H	H
OSO#10	Safe recovery from a technical issue	L	L	M	M	H	H
	Deterioration of external systems supporting UAS operations						
OSO#11	Procedures are in-place to handle the deterioration of external systems supporting UAS operations	L	M	H	H	H	H
OSO#12	The UAS is designed to manage the deterioration of external systems supporting UAS operations	L	L	M	M	H	H

Evidence:
Operations Manual

Operations Manual (OM) – Guidance Material

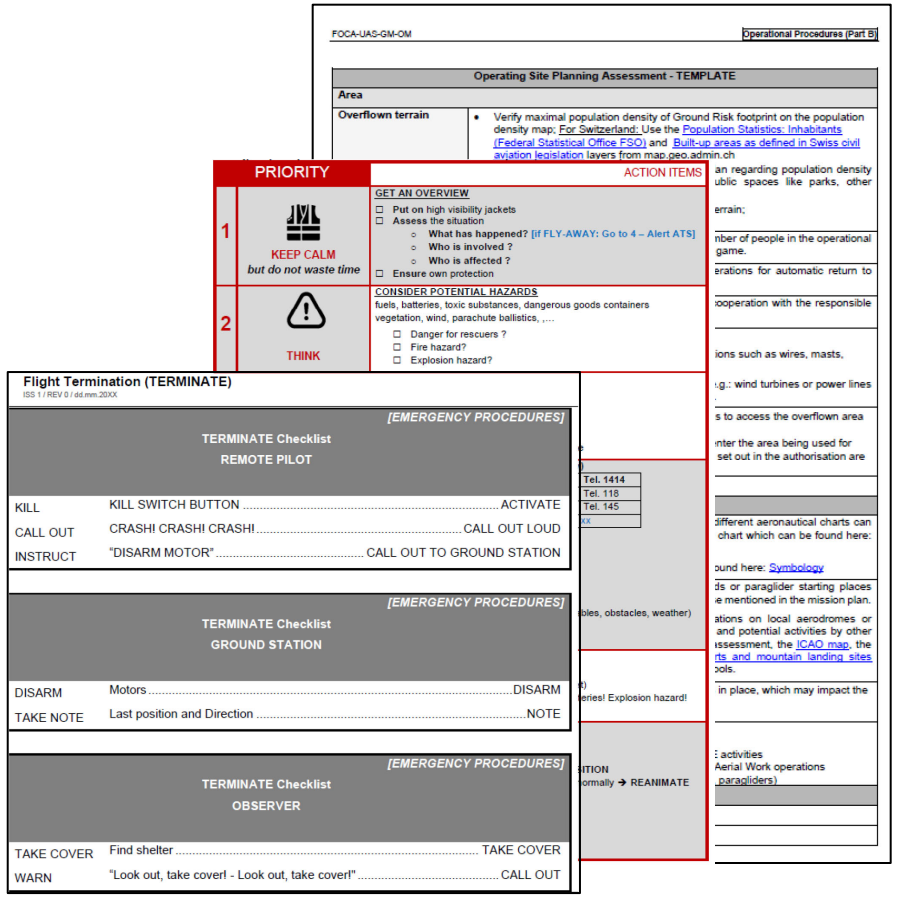
OM == ConOps (Annex A of SORA)

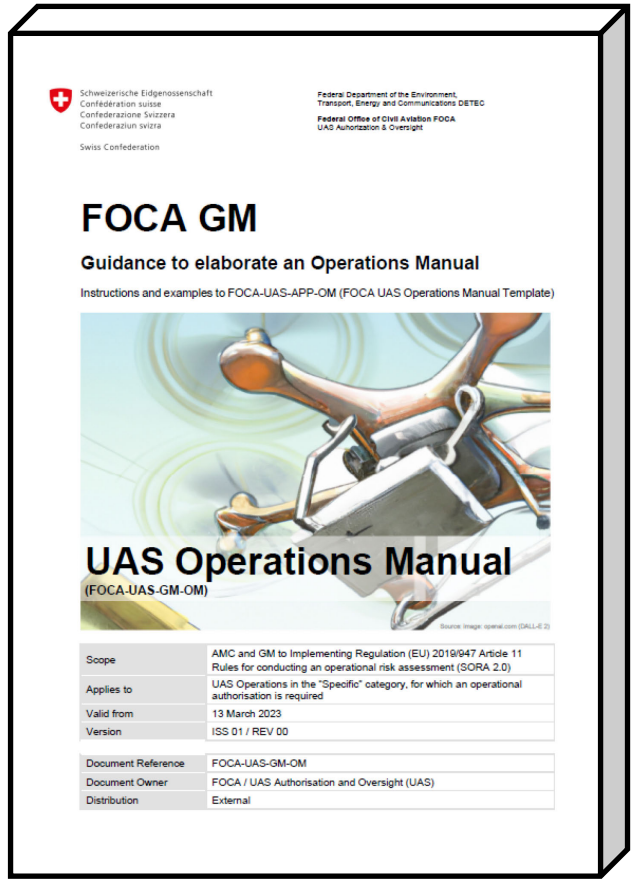
➔ **clear and comprehensive overview of the operator's organization and procedures**

OM must at least contain:

- Company Safety Policy
- Organizational structure & responsibilities
- Change Management Process
- Crew Composition & Qualifications
- **Operational Procedures**
  - **Standard Operating Procedures**
  - **Contingency Procedures**
  - **Emergency Procedures**
- **Checklists / Briefing**
- **Emergency Response Plan (ERP)**
- Occurrence Reporting
- Training Program
- Maintenance
- UAS Description & Specifications*

  *Reference to manufacturer's documentation OK

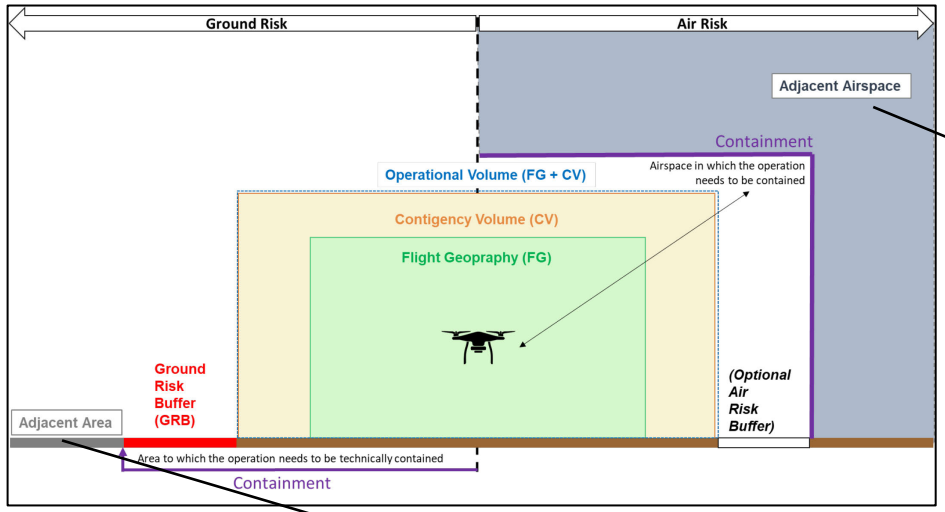




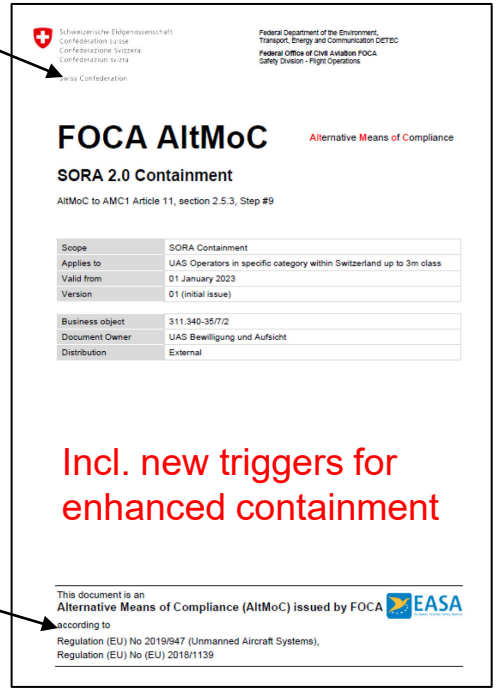
➔ Check FOCA Guidance Material (GM) and Template for Operations Manual (LINK)

Step #9 Containment

SORA



Assess adjacent area and airspace*



FOCA AltMoC

Alternative Means of Compliance

SORA 2.0 Containment

AltMoC to AMC1 Article 11, section 2.5.3, Step #9

Scope	SORA Containment
Applies to	UAS Operators in specific category within Switzerland up to 3m class
Valid from	01 January 2023
Version	01 (initial issue)
Business object	311.340-35/7/2
Document Owner	UAS Bewilligung und Aufsicht
Distribution	External

Incl. new triggers for enhanced containment

This document is an Alternative Means of Compliance (AltMoC) issued by FOCA according to Regulation (EU) No 2019/947 (Unmanned Aircraft Systems), Regulation (EU) No (EU) 2018/1139

LINK

BASIC CONTAINMENT

"No probable failure leading to a fly-away into the adjacent area/airspace"

- analysis of the UAS's probable failure types
- design and installation appraisal

ENHANCED CONTAINMENT

3 "fly-away" technical safety requirements:

- FTS → EASA MoC 2511-01
- Other designs (e.g., Tether)
  - Declaration based on evidence; or
  - EASA Design Verification Report (DVR)

* See slide 32 for further detail on Step #9 assessment


COMMON
QUESTIONS

Do we need an approval for each new location?

Generic vs Precise Operation Authorization*

***needs to be discussed in detail within formal application process!**

FOCA needs to gain trust in the competence of the operator, substantiated and documented with clear evidences that the requirements of the EU AMC are met.

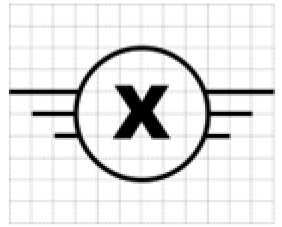
Best practice is to first issue one to a couple of location-specific approval before ‘generalizing’ it.

Generally, a **generic** approval under PDRA or SORA is possible and will require:

- generally applicable mitigations and/or restrictions (e.g. restricted airspace(s) granted, controlled ground area);
- clear and unambiguous operational conditions/limitations for a given UAS mission;
- the most diligent operational procedures to ensure that these conditions are always met; and
- sample of real and potential missions to assess the capacity of the applicant/UAS operator to conduct a risk assessment and/or apply the operational limitations

Further: see Annex to (EU)2019/947, GM2 UAS.SPEC.030(2)

Do I need a class label in the SPECIFIC?



Answer: It depends...

EU-STS: **Yes**

CH-STS, SORA: **No**

PDRA → tricky:

PDRA-S: "Similar" functionality to **C5/C6**

PDRA-G: **No**

Conformity table

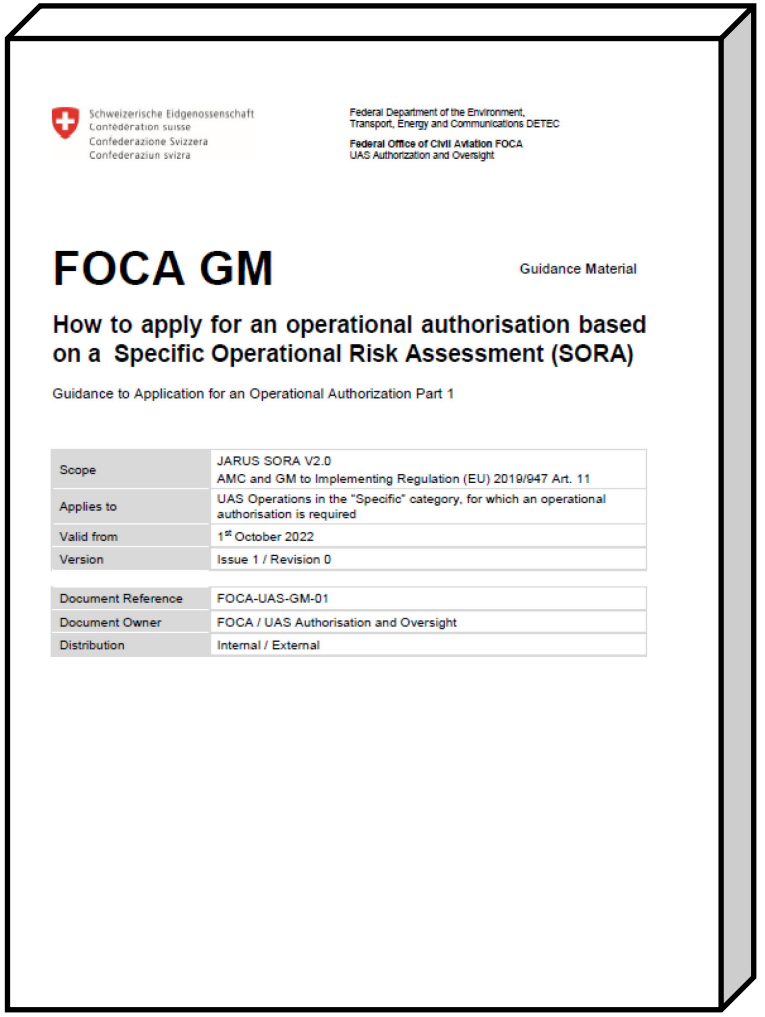
	C0	C1	C2	C3	C4	C5	C6
Internal production control (Part 7 of R945)	X				X	X	X
EU-type examination and conformity to type based on internal production control (Part 8 of R945)	X	X	X	X	X	X	X
Conformity based on full quality assurance (Part 9 of R945)	X	X	X	X	X	X	X

Functionality table

	C0	C1	C2	C3	C4	C5	C6
A maximum weight below 250 g	X						
A maximum weight below 900 g		X					
A maximum weight below 4 kg			X				
A maximum weight below 25 kg				X	X	X	X
A low speed mode (< 3 m/s), excepted for fixed-wing			X				
A low speed mode (< 5 m/s), unless tethered						X	
An indication of the noise emission		X	X	X		X	X
A direct remote identification function		X	X	X		X	X
A geo-awareness function		X	X	X			
A low-battery warning		X	X	X		X	X
A flight termination system, unless tethered						X	X
A geo-caging function							X
Information of drone position, speed and altitude						X	X

Where to get help?

- Specific Category Guide: Decision Tree
- FOCA GM on SORA Part 1 (all steps except. OSOs)
  - FOCA GM on ERP (Step #3: M3)
  - FOCA GM on Initial Air Risk Assessment (Step #4)
  - FOCA GM on Operational Procedures (Step #8/OSO8)
- FOCA GM on Operations Manual + Template
- LBA: OM Template and Guidelines on dimensioning
- EASA – Civil Drones page



Question from Webinar #1 :

How do you define the distance at which a drone is no longer considered to be in VLOS?

Appendix 1. Definition of VLOS / BVLOS Limits

Note: This section presents an approach developed and used by the German NAA – LBA in [4]

To determine whether an operation is conducted in VLOS condition, the main factor is to ensure that the remote pilot can truly operate the UAS within visual range. To check whether an intended UAS operation is in VLOS or BVLOS conditions, the following considerations shall be made:

Any operation beyond $VLOS_{Maximum\ Range}$, i.e. the maximum possible distance between the pilot location and the boundary between contingency volume and ground risk buffer is greater than $VLOS_{Maximum\ Range}$, is considered BVLOS.

$$VLOS_{Maximum\ Range} = \min(ALOS, DLOS)$$

Where

- **ALOS - Attitude Line Of Sight**:
  The Attitude Line Of Sight defines the maximum distance of attitude recognition. Up to this optical limit, the remote pilot is able to control the flight path of the UAS, i.e. to determine the attitude and position of the UAS. This can be determined by flight tests.
  - For Helicopter UAV and Multicopter : $ALOS_{max,rotorcraft} = 327 \cdot CD + 20\ [m]$
  - For Fixed-wing UAV : $ALOS_{max,fixedwing} = 490 \cdot CD + 30\ [m]$

- **DLOS - Detection Line of Sight**:
  The Detection Line Of Sight defines the distance up to which another aircraft can be detected in time and sufficient time is available for an avoidance manoeuvre. Ground visibility (GV) is a key factor to determine DLOS.

  $$DLOS_{max,} = 0.3 \cdot GV$$

  GV is dependent on the existing ground visibility at the location and time of operation (see below). However, $GV_{max} = 5km$ always applies.

- **GV - Ground Visibility**:
  The Ground visibility depends on the location and meteorological conditions and must be determined at the time of operation. The procedure for determining ground visibility must be described in the operational documentation. The use of landmarks or the use of a transmissometer are possible methods to determine GV.

  The maximum ground visibility that can be assumed is 5 kilometers, similar to the visibility according to the VFR visual ranges for airspace G.

VLOS & Controlled Ground Area (SORA 2.0)

- VLOS should be used only in relation to air risk,
- For ground risk : VLOS to ground = ‘visual ground observation’
- When the operation is in ‘visual ground observation’ no fence is needed to claim controlled ground area (only for VLOS)

Ref. FOCA Guidance Material (FOCA-UAS-GM-Part 1)

Question from Webinar #2 :

Do you have any statistics on past occurences/incidents with drones?

Main Data sources:

- Safety Annual Reports (admin.ch)
- Stay Safe by BAZL (admin.ch)
- Rapports d'événements aviation - Service suisse d'enquête de sécurité SESE (admin.ch)

- UAS - Air Accidents Investigation Branch reports - GOV.UK (www.gov.uk)
- Drones/UAS Archives – CHIRP

- EASA issues guidelines for management of drone incidents at airports | EASA (europa.eu)

- (PDF) Exploring Civil Drone Accidents and Incidents to Help Prevent Potential Air Disasters (researchgate.net)

Question from Webinar #3 :

How the define my containment requirements based on my adjacent areas/airspace

Ref. FOCA Guidance Material (FOCA-UAS-GM-Part 1)

9 Step #9 - Adjacent area / airspace considerations and containment requirements

9.1 Types of Containments

SORA V2.0 distinguishes between two different versions of containment:

- *"Basic"* containment: Point 2.5.3b applies to all operations regardless of what is included in adjacent areas.
- *"Enhanced"* containment: Point 2.5.3c applies to operations where one of the triggers in section 9.4 is true for the operation (higher risk involved).

To assess which type of containment applies, some considerations regarding adjacent (ground) areas and airspaces are required:

9.2 Adjacent (ground) area definition

Consider areas on the ground at most 1 km away from the operational volume (see §1.1 and Figure 2)

9.3 Adjacent airspace size definition

For the asessment of adjacent airspace, identify what type(s) of airspace is/are immediately touching the edge of the Operational Volume (I.e.normally touching the edge of Contingency Volume).

Refer mainly to the "No-Fly zone" (airport, heliport and aerodrome environment) and the "Limited no-fly zone" (CTR – Controlled Zone) depicted on the restrictions for drones layer of swisstopo maps. For awareness regarding all types of airspace (incluing e.g. TMAs, airspace C) please consult the ICAO Chart and the Glider Chart.

No-fly zone (5km from the runway or adapted zone)
Limited no-fly zone (150 m above the ground)

9.4 Assessment on triggers for Enhanced Containment

FOCA AltMOC on Containment (Step 9)

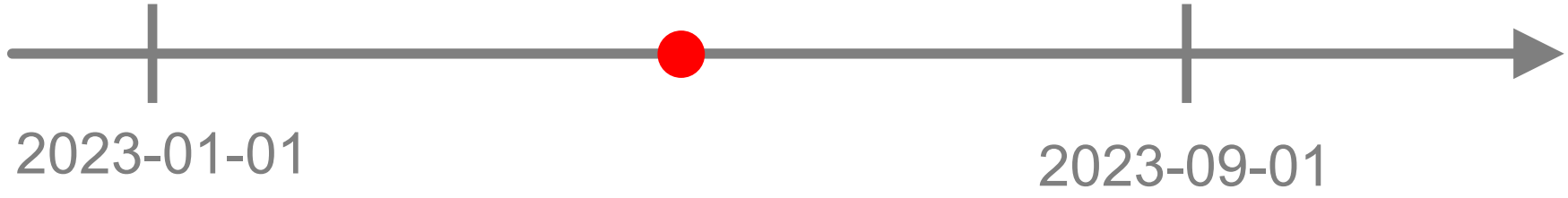
Enhanced containment triggers

(c) The following three safety requirements apply for operations:

- Where a large assembly of people (~20,000 ppl or more) is present within 1km distance from the operational volume, unless already approved for operations over assemblies of people. Applicant has a procedures in place to check this before each operation.
- Where adjacent areas are populated areas:
  - i. And a M1 mitigation of Medium or High robustness has been applied, unless the mitigation applies also to adjacent areas;
  - ii. Operation is conducted over a controlled ground area.
- Height of the operational volume is above 150m altitude AGL, where adjacent airspace is ARC-D. ATC or Competent authority permit is needed before the operation.
- With an UAS larger than the 3m class flown in airport environment.

1. The probability of leaving the operational volume shall be less than 10^{-4}/FH.
2. No single failure[k] of the UAS or any external system supporting the operation shall lead to operation outside of the ground risk buffer.
   Compliance with the requirements above shall be substantiated by analysis and/or test data with supporting evidence.
3. Software (SW) and Airborne Electronic Hardware (AEH) whose development error(s) could directly lead to operations outside of the ground risk buffer shall be developed to an industry standard or methodology recognized as adequate by the competent authority.

Transitional Period



8-months transitional period: From 01.01.2023 until 31.08.2023

Exemptions from the OPEN category

Aim: Allow operators to obtain an authorization

Attention !

Plan enough time, i.e. 3-4 months for a SORA

Apply ASAP

The End

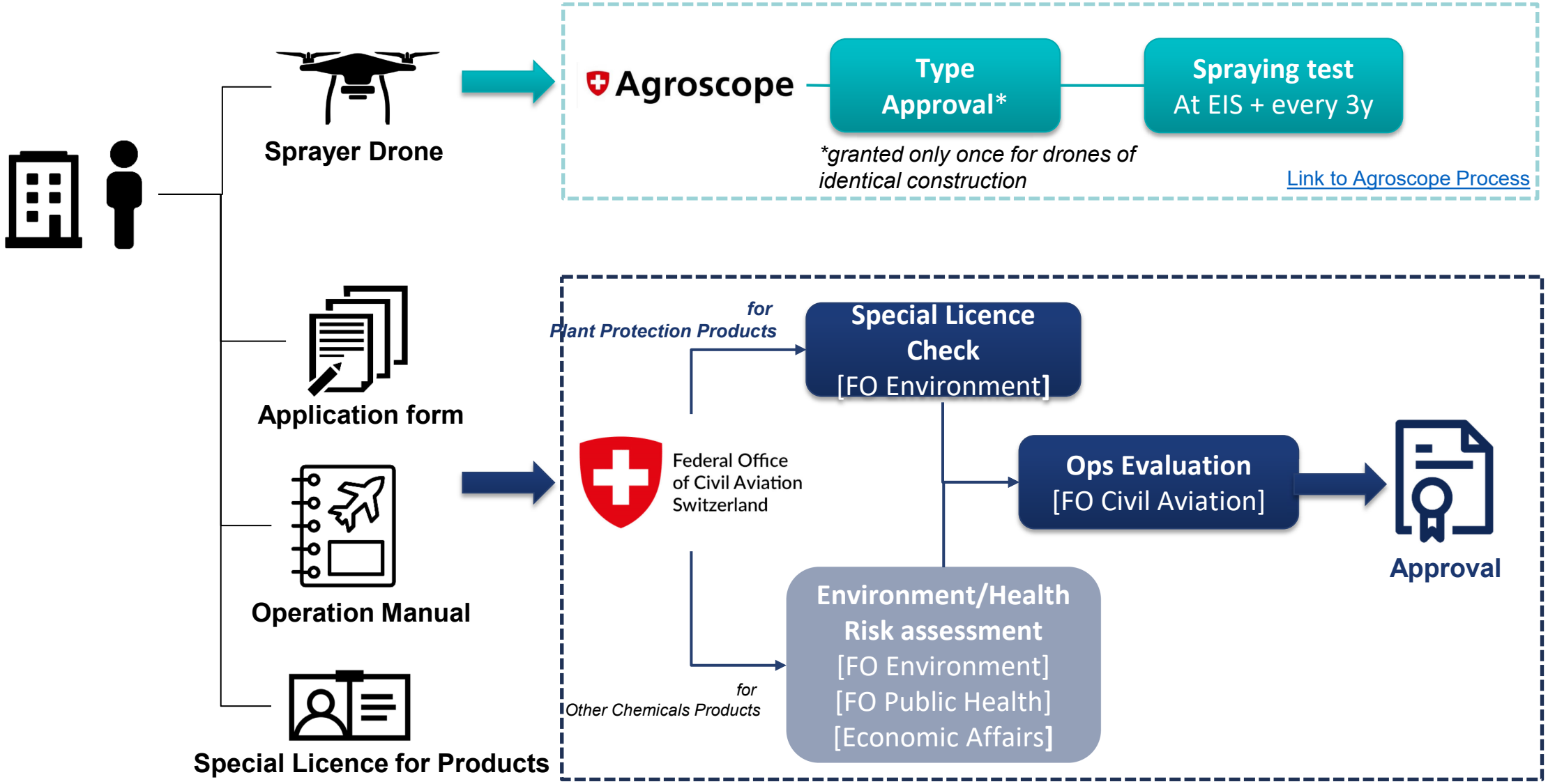
- Consult FOCA's website frequently for more information and guidance
- Check the drone map before each flight to be aware of the latest flight restrictions
- Subscribe to the "Innovation and Digitalization" newsletter

For any questions: **rpas@bazl.admin.ch**

BACK-UP SLIDES

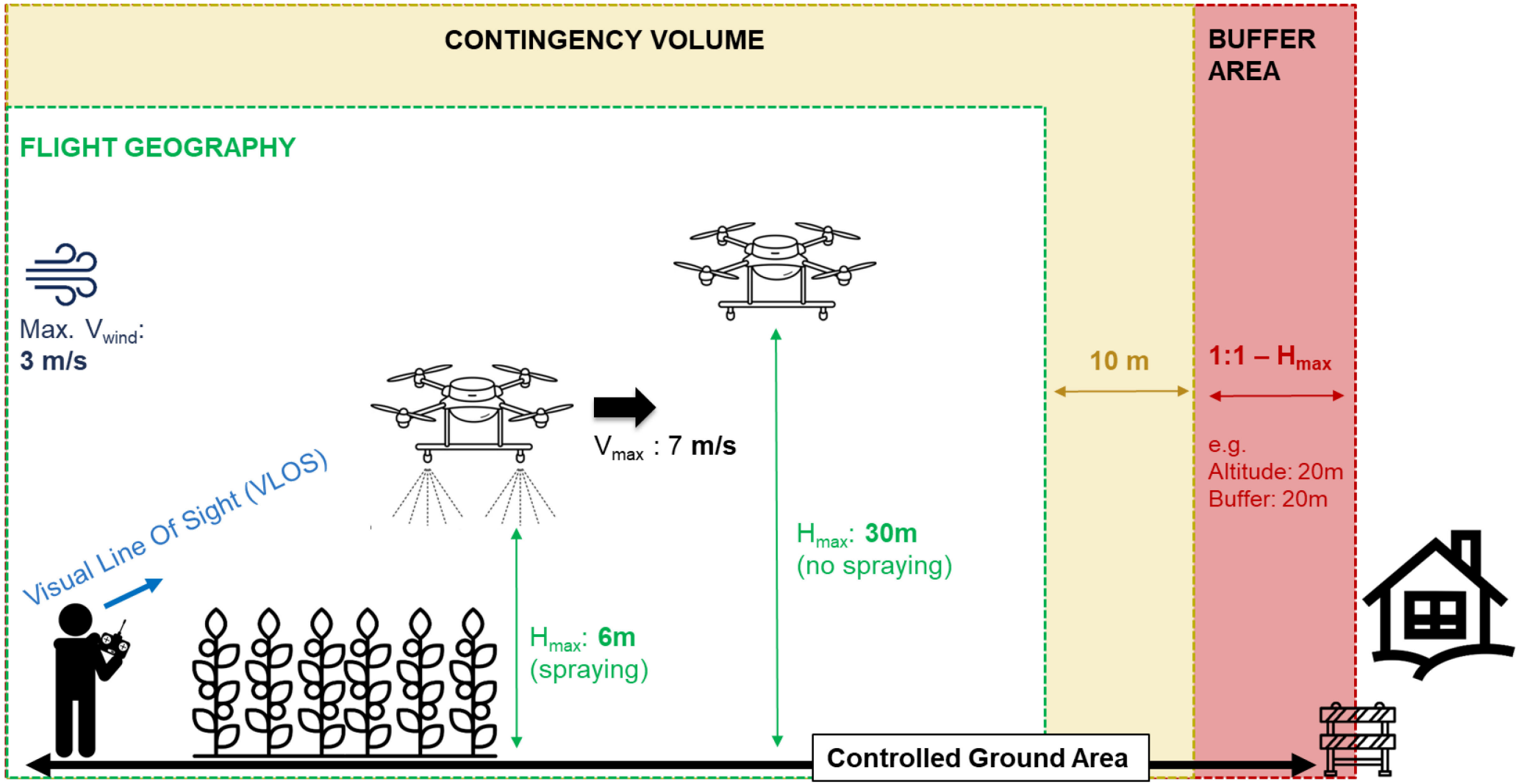
Further information

Spraying STS Application Process



CH-STS: Spraying / Agriculture applications

STS

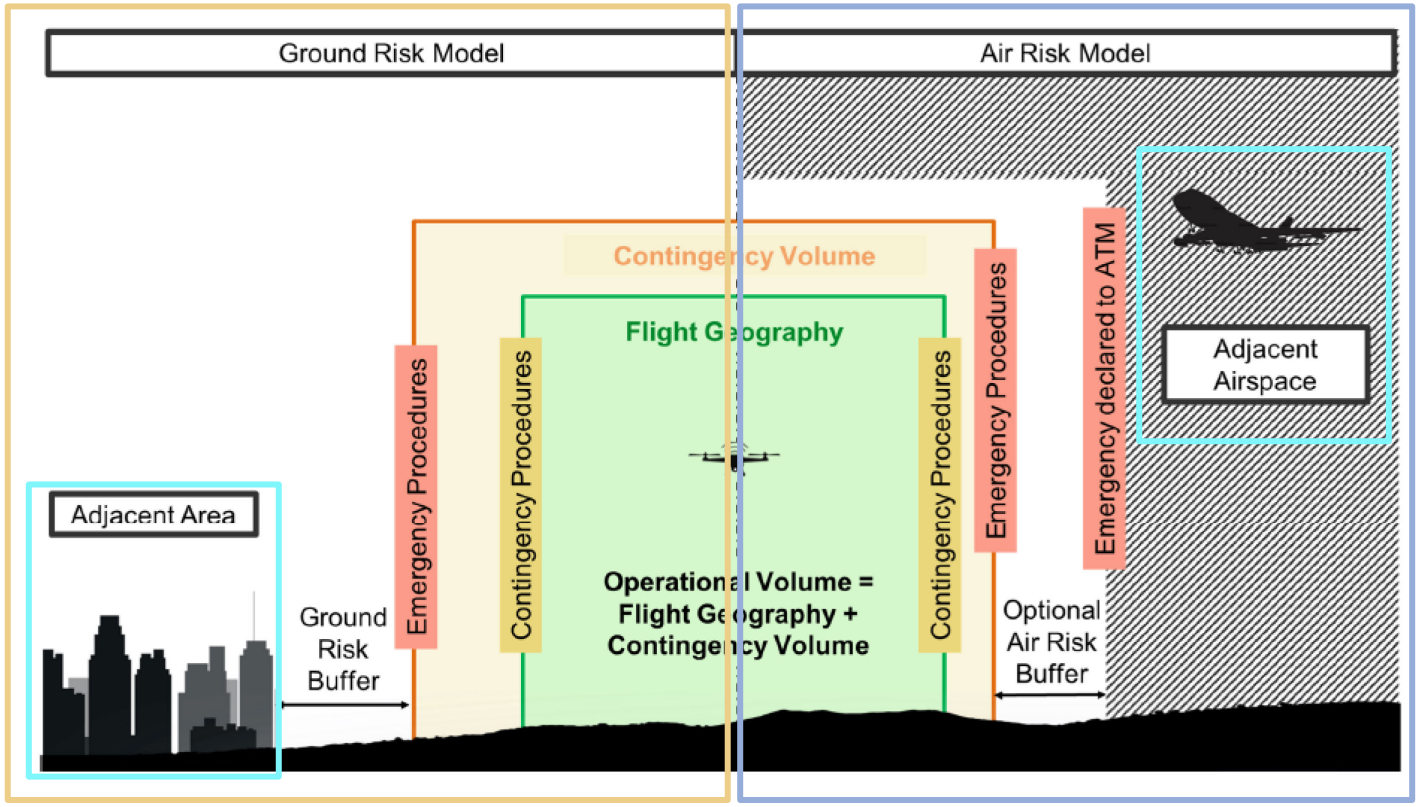


The safety assessment approach – SORA

SORA

- Step 1 – CONOPS Description
- Step 2 – Initial Ground Risk Class
- Step 3 – Final Ground Risk Class
- Step 4 – Initial Air Risk Class
- Step 5 – Final Air Risk Class
- Step 6 – TMPR[1] and Robustness Levels
- Step 7 – SAIL[2] Determination
- Step 8 – Operational Safety Objectives
- Step 9 – Adjacent area / airspace
- Step 10 – Safety Portfolio

[1]Tactical Mitigation Performance Requirements
[2] Specific Assurance and Integrity Levels



Operations Manual

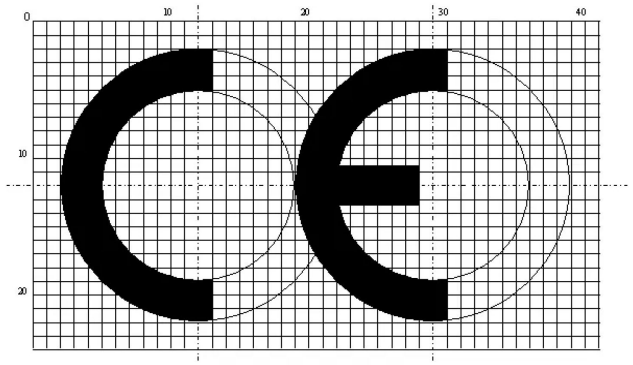
Test reports

Other evidences

CE Marking vs. Class Identification Label

CE marking

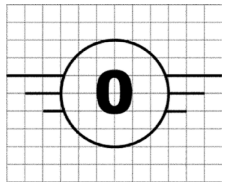
The manufacturer affirms the product's conformity with *all* the relevant European *health*, *safety* and *environmental protection* requirements.



Attention: It is forbidden to fly a drone without CE marking!

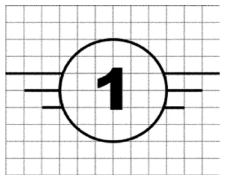
Exception: Self-built drones (no CE & C label required)

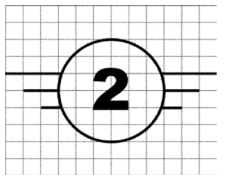
Class identification label ("C")

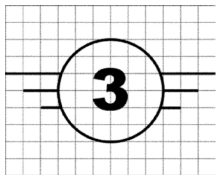


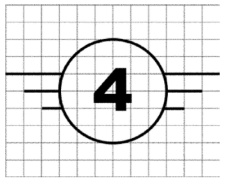
Lightweight, toys

OPEN

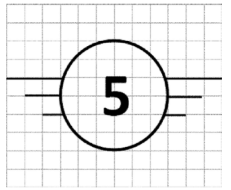




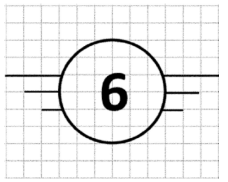




Model aircraft



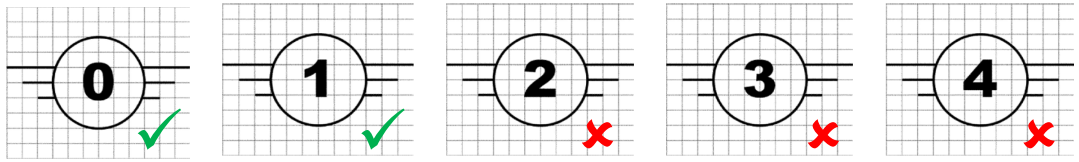
EU-STS-01



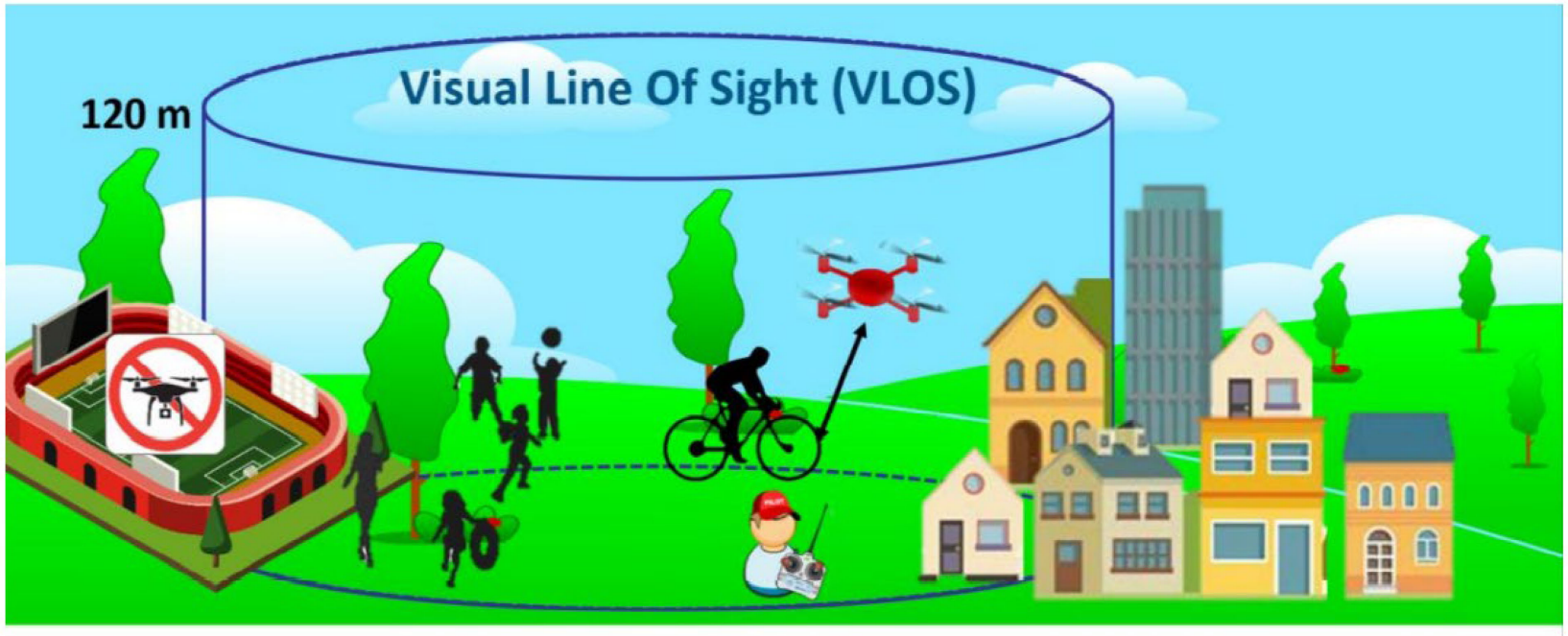
EU-STS-02

SPECIFIC

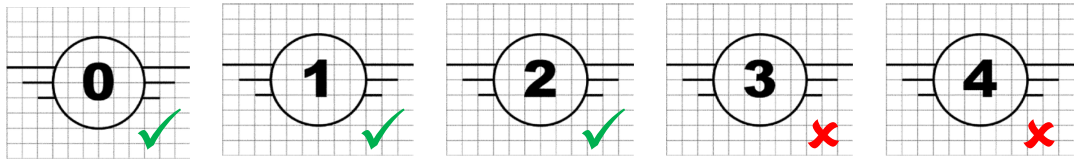
OPEN A1



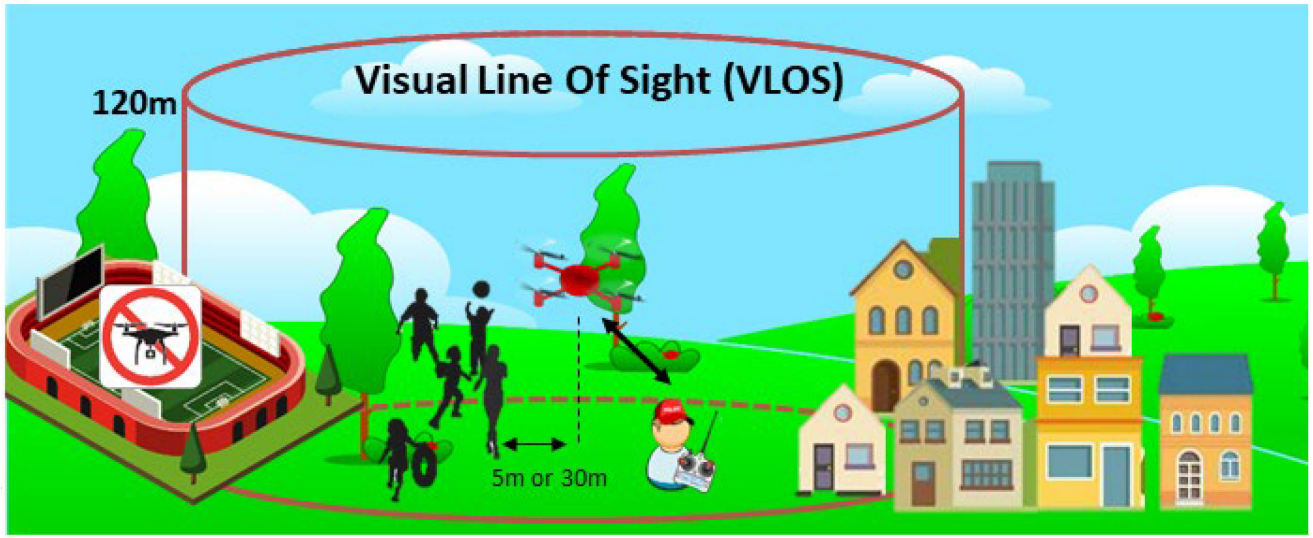
- Class labels: C0 and C1
- Forbidden to fly over crowds
- Reasonably expect not to fly over uninvolved people

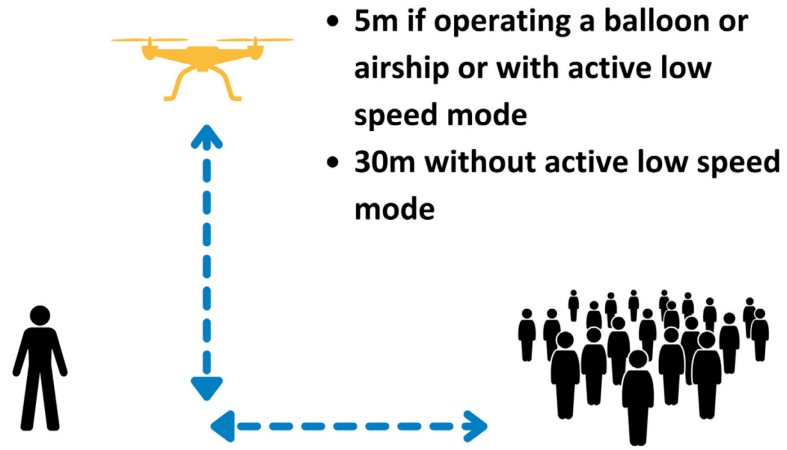


OPEN A2

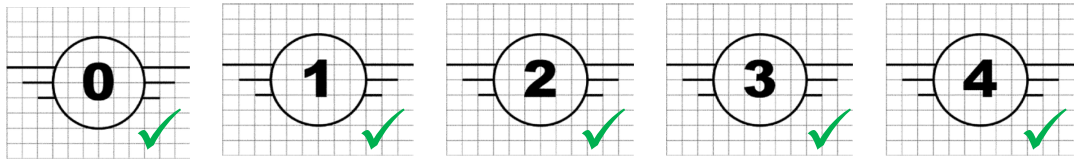


- Class labels: C0, C1, C2
- Horizontal distance to uninvolved persons:
  - According to the **1:1 rule** → safety distance ≥ height
  - Lower limit depending on low-speed mode (3m/s):
    - Without low-speed mode: **30m**
    - With activated low-speed mode: **5m**

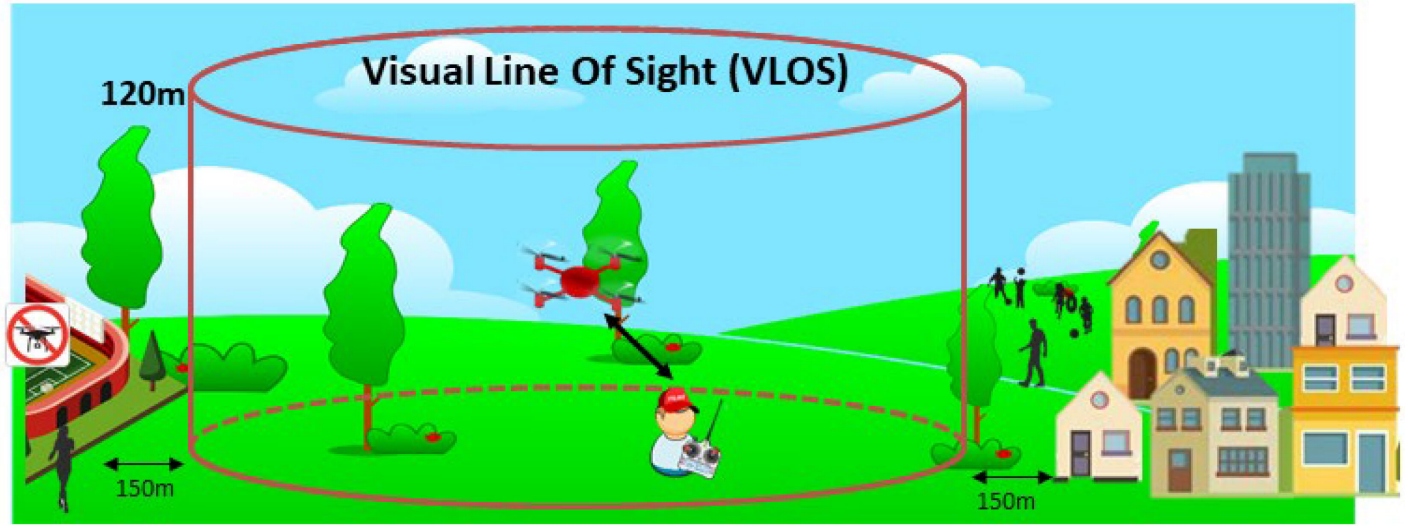




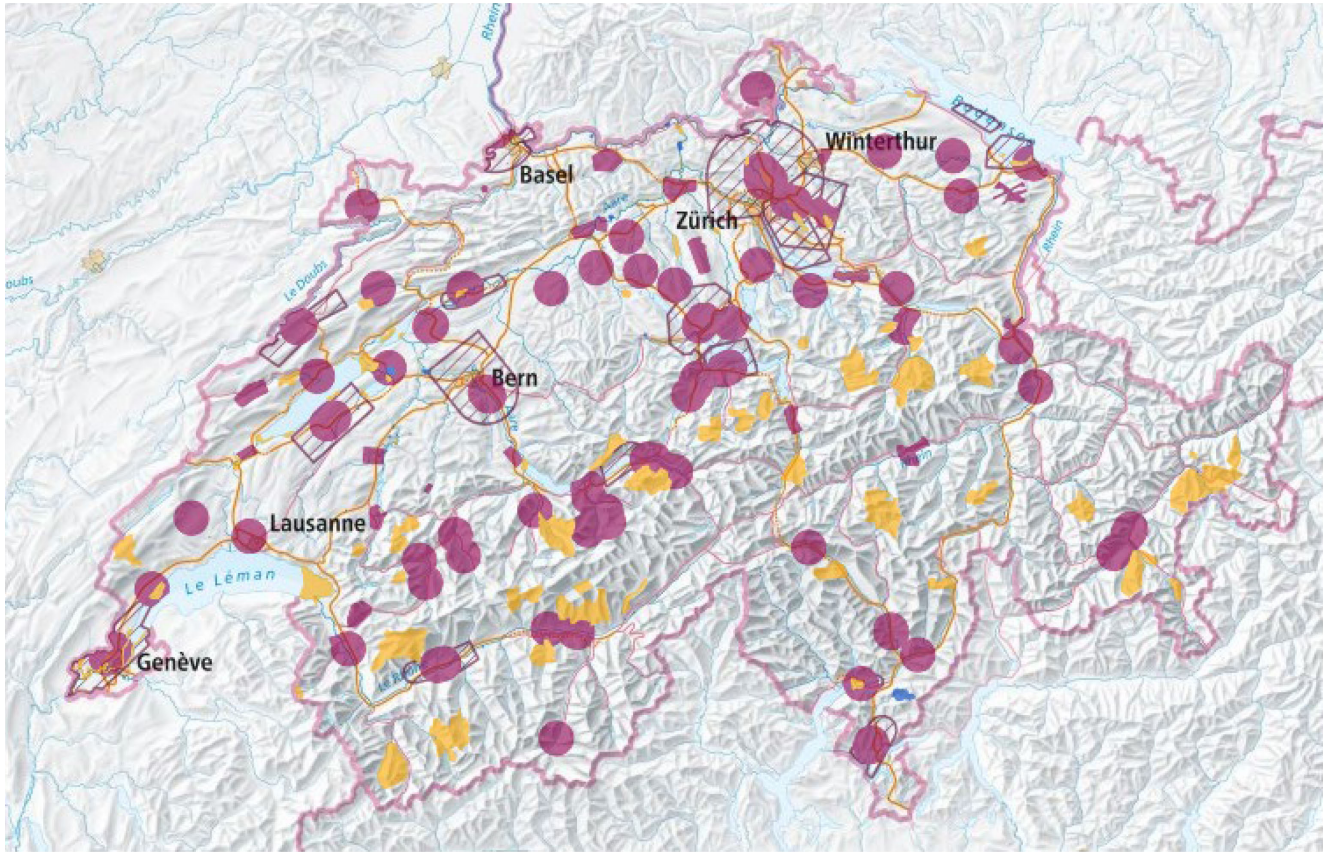
OPEN A3



- Class labels: C0, C1, C2, C3, C4
- Horizontal distance to uninvolved persons:
  - According to the **1:1 rule** and never lower than **30m**, or
  - Distance of **2s** with max speed (which ever is higher)
- At least **150m** away from residential, commercial or industrial areas



Drone Map: Geozones



https://map.geo.admin.ch/?layers=ch.bazl.einschraenkungen-drohnen

Existing ones:

- 5km around airports
- Control zone (CTR)
- Wildlife reserves

New:

- Military infrastructure
- Airport perimeter
- Nuclear power plants
- Certain energy infrastructure
- Prisons
- Cantonal geozones

Remote Pilots: Training / Certificates

OPEN

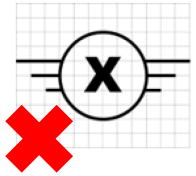
Category	Class	Certificate
A1	C0	None
A1	…, C1	A1/A3
A2	…, C2	A1/A3 + A2
A3	…, C3, C4	A1/A3

Exception: No certificate required for remote pilots flying model aircraft according to CoGP

SPECIFIC

Category	Class	Certificate
STS-CH	-	A1/A3 + A2
STS-EU	C5, C6	A1/A3 + STS
PDRA-S	-	A1/A3 + STS
PDRA-G	-	Case-specific
SORA	-	Case-specific

Transitional Category: Drones without C-Label



Until 2023-12-31

Weight	Certificate	Operation in	Additional operating restrictions
< 250g	Not required	A1	None
< 500g	A1/A3	A1	None
< 2kg	A1/A3 + A2	A2	Horizontal safety distance of at least **50m** to uninvolved persons
< 25kg	A1/A3	A3	None

WIP: Exemption to have same restrictions as in regular A2

From 2024-01-01

Weight	Certificate	Operation in	Additional operating restrictions
< 250g	Not required	A1	None
< 25kg	A1/A3	A3	None

Note:
< 2kg drones will fall into the < 25kg class