



# THE DRONE REGULATORY ENVIRONMENT

3

# SPECIFIC FLIGHT CATEGORY





# New EU legislation as from January 1st

Including **automated** flights

## OPEN

- Low risk
- No operational authorisation or declaration required by operator before start of flight
- VLOS, 25kg MTOM, 120m AGL

Including **BVLOS** & **autonomous** flights

## SPECIFIC

- Increased risk
- Operational authorisation required by CA based on SORA
  - or Declaration suffices if Standard Scenario (STS-x)
  - or LUC self-authorisation

Think of Air Taxi's or Cargo over dense urban area

## CERTIFIED

- Risk as manned aviation
- Certified operator
- Certified UAS with CoA
- Licensed pilot

Whatever the category:  
there are minimum pilot competencies !

# EU legislation flight category details

Including automated flights

## OPEN

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  - or** LUC with self-authorisation

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# SPECIFIC category



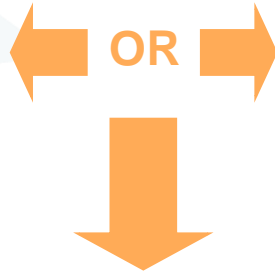
**SPECIFIC**  
**NEW :**  
Including **BVLOS** &  
**autonomous** flights

- Increased risk
- Operational Declaration suffices if you fly a Standard Scenario (STS-x)  
**or** SORA-based Operational Authorisation required by CA  
**or** LUC needed

# SPECIFIC category



**Authorisation  
required before  
flight, granted by  
CA based on  
assessment of  
Specific  
Operational Risk  
Assesment  
(SORA)**



**Declaration  
suffices if  
standard  
scenario is  
followed,  
confirmation of  
receipt by CA  
required before  
flight**

**Self-authorisation for  
operators with an  
LUC**

## **UAS:**

Any UAS (as from 1/1/2024: with Direct Remote ID)

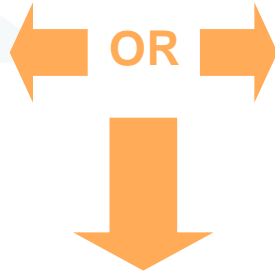
## **FLIGHT:**

- Any operation which is not 'Open' nor 'Certified'
- Registration of operator
- Operational conditions defined in either the authorisation or the standard scenario
- Rules of the air apply
- Logbook keeping and operational handbook is required

# SPECIFIC category



Authorisation  
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(SORA)



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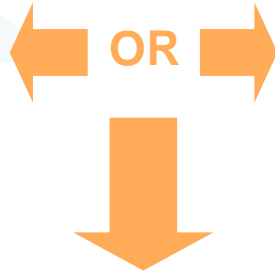
## PILOT COMPETENCY:

- Minimum age 16 (possibility by MS to lower to 14)
- Defined in either the standard scenario or in the authorisation

# SPECIFIC category: STS



Authorisation required before flight, granted by CA based on assessment of Specific Operational Risk Assessment (SORA)



Declaration suffices if standard scenario is followed, confirmation of receipt by CA required before flight

Self-authorisation for operators with an LUC

## STANDARD SCENARIO:

- Declaration to CA suffices, confirmation of receipt required
- Two versions will be available **but only as from 1/1/2024**:
  - STS-01 – VLOS over a controlled ground area in a populated environment
  - STS-02 – BVLOS with Airspace Observers over a controlled ground area in a sparsely populated environment
- Temporary **Belgian BE-STS-01** already available as from 1/1/2021 (declaration possible up to 31/12/2023, such declarations remain valid maximum up to 31/12/2025)

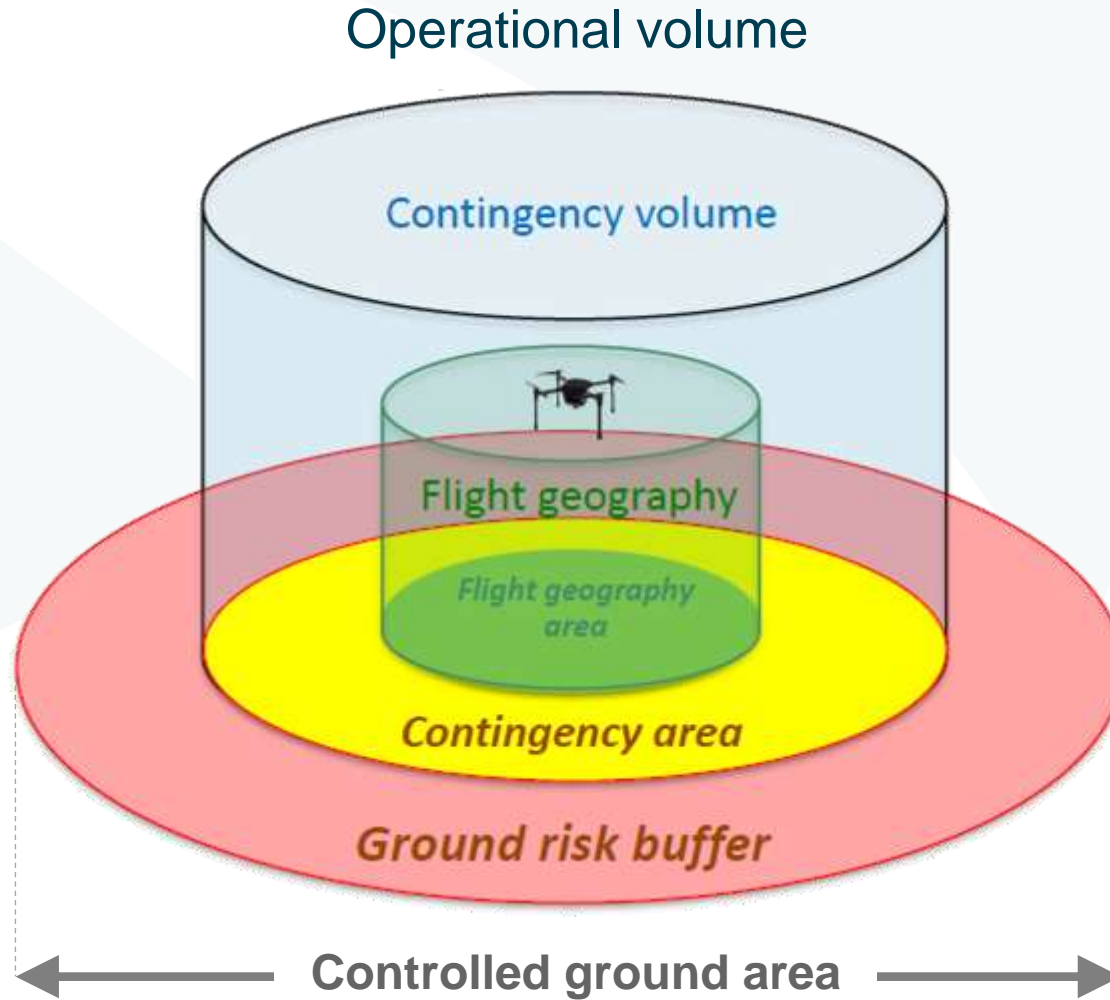


# Delegated Act C-classes of drones for Standard Scenario's

UAS		
Class	MTOM / Joule	Main technical requirements
<b>STS-01</b> C5 For STS-01	< 25kg < 3m in size	<del>Max height above the take-off point of 120m or selectable and visualised height limitation</del> , mechanical strength, lost-link management, <u>optional</u> geo-awareness pilot warning, battery warning, max sound power level, be equipped with green lights, protected C2 link, <u>no fixed wing, height info to pilot, low speed mode 5m/s, independent flight termination system (incl. impact dynamics reduction), C2 link quality info</u>
<b>STS-02</b> C6 For STS-02	< 25kg < 3m in size	<del>Max height above the take-off point of 120m or selectable and visualised height limitation</del> , mechanical strength, lost-link management, <u>optional</u> geo-awareness pilot warning, battery warning, max sound power level, be equipped with green lights, protected C2 link, <u>max. speed 50m/s, height info to pilot, geo-caging, independent flight termination system (not incl. impact dynamics reduction), trajectory programming, C2 link quality info</u>

- C5 drone can also be based on C3 drone + **Class C5 accessories kit**, such kit then needs to be compliant with all C5 requirements except height info to pilot
- Technical requirement exemptions do exist for tethered C5 drones

# SPECIFIC category

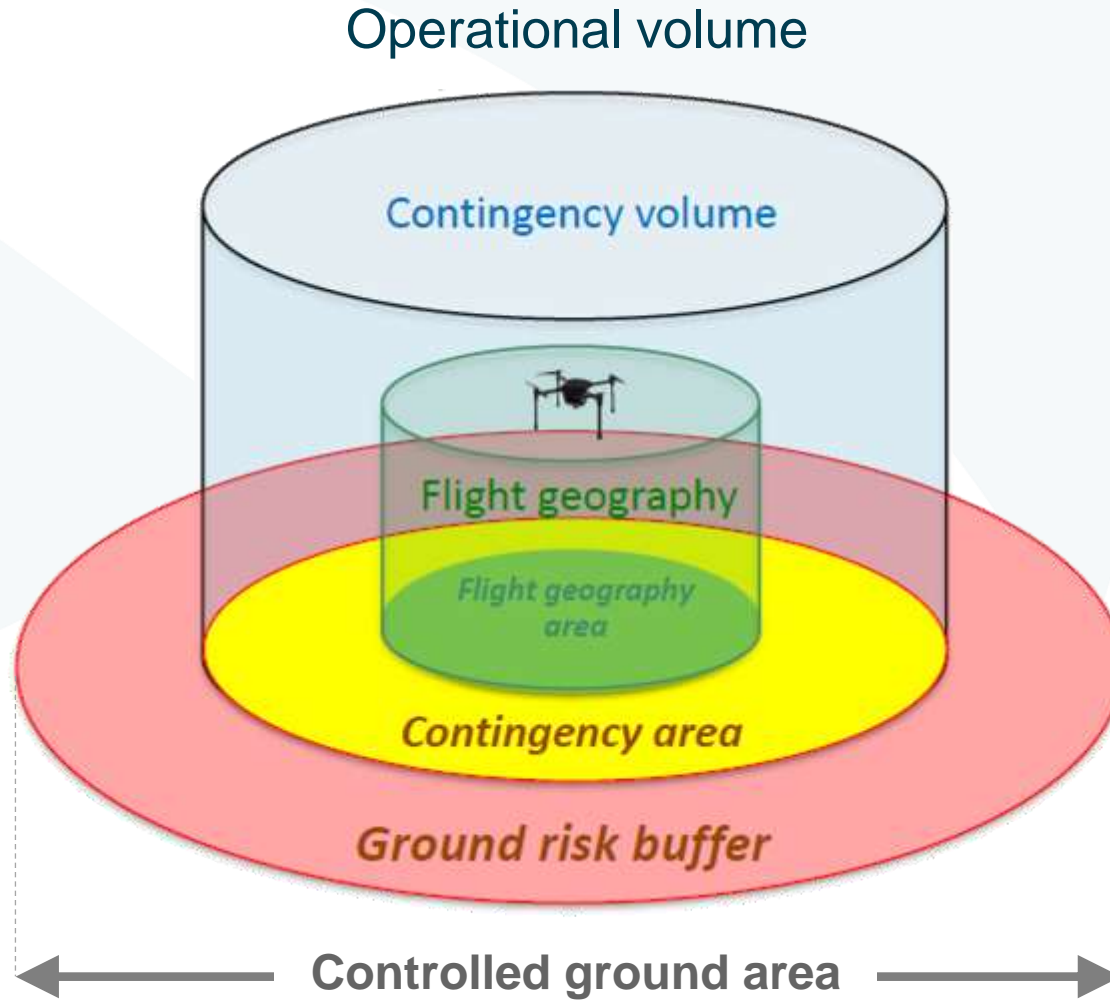


The '**flight geography**' is the spatially and temporally defined volume of airspace in which the UAS operator plans to conduct the operation under normal procedures.

To cope with abnormal situations (e.g. navigation errors, UA drifting due to wind/gusts, etc.), the UAS operator should define the '**contingency volume**' as an airspace volume where contingency procedures are applied in order to bring the UA back to a normal situation within the 'flight geography'

The '**ground risk buffer**' is the area on the surface of the Earth surrounding the operational volume, which is defined by the UAS operator to minimise the risk to third parties on the surface in case the UA leaves the operational volume

# SPECIFIC category



## Operational volume

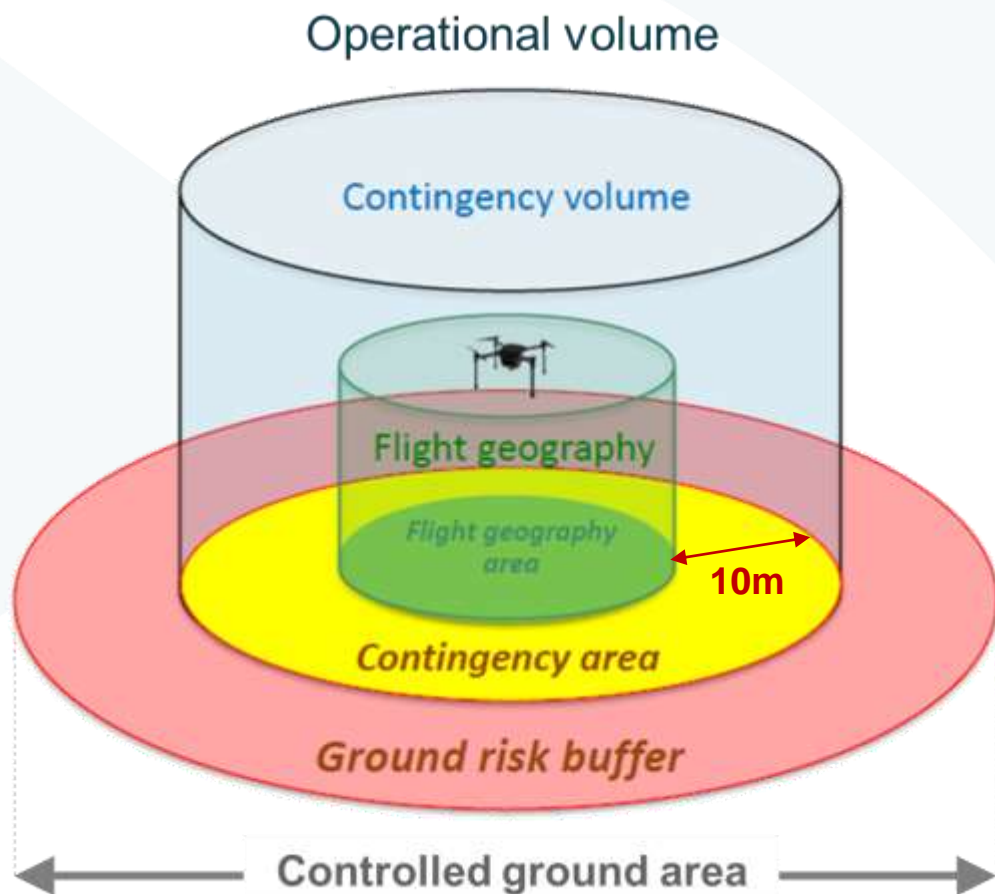
= flight geography + contingency volume

## Controlled ground area

= flight geography area + contingency area + ground risk buffer

= area where the UAS operator is able to ensure that ***only involved people are present***, by means of fencing or using other methods, as appropriate, considering the population density.

# SPECIFIC category



## STANDARD SCENARIO STS-01 as from 1/1/2024

VLOS operations at a maximum height<sup>(1)</sup> of 120m,  
over controlled ground areas<sup>(2)</sup>  
that can be in populated (e.g. urban) environments,  
using UAS with MTOMs of up to 25 kg, <3m in size  
Tethered or untethered C5 drone operated at less  
than 5m/s ground speed

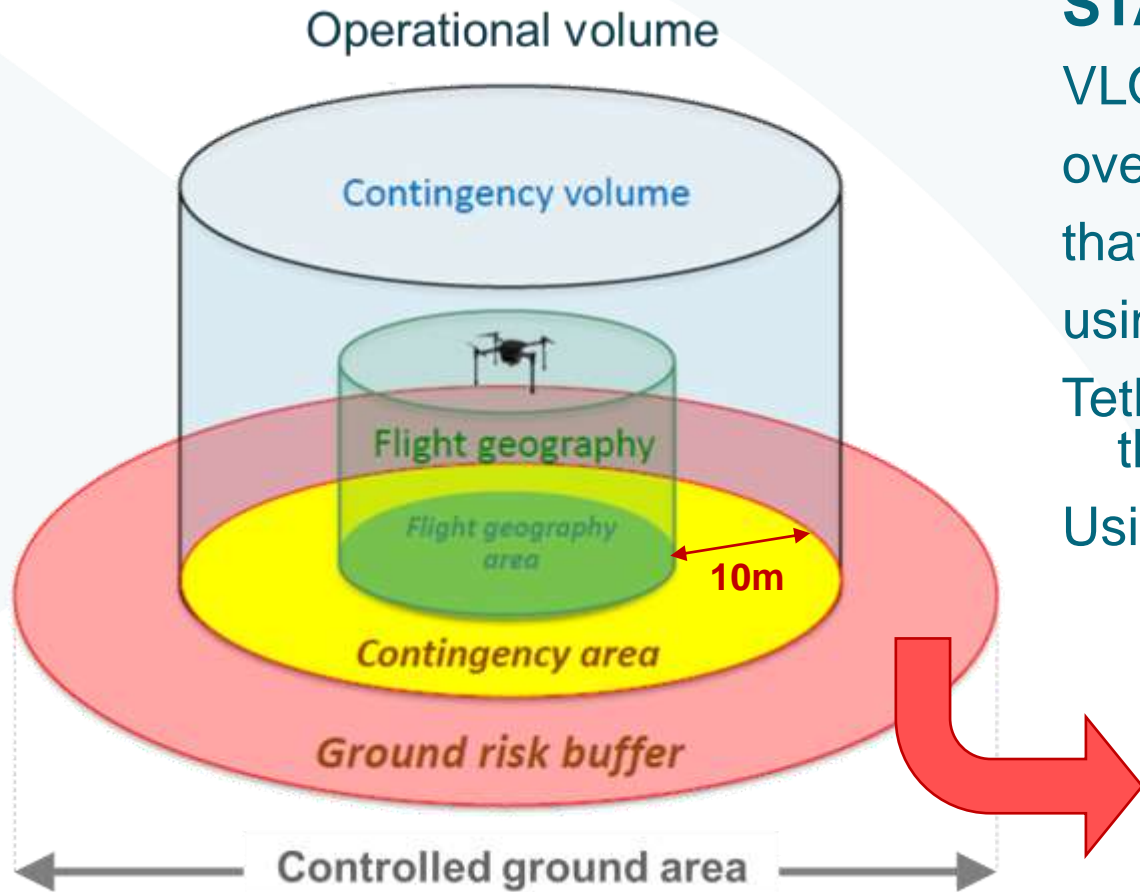
Using pre-defined Ops Manual

<sup>(1)</sup> 120m above GND or 15m above obstacle

<sup>(2)</sup> Ground Buffer dependent on flight height



# SPECIFIC category



## STANDARD SCENARIO STS-01

VLOS operations at a maximum height<sup>(1)</sup> of 120m, over controlled ground areas<sup>(2)</sup> **➔** *Only involved people present!* that can be in populated (e.g. urban) environments, using UAS with MTOMs of up to 25 kg, <3m in size  
Tethered or untethered C5 drone operated at less than 5m/s ground speed

Using pre-defined Ops Manual

Flight height	MTOM < 10kg	MTOM > 10kg
30m	10m	20m
60m	15m	30m
90m	20m	45m
120m	25m	60m

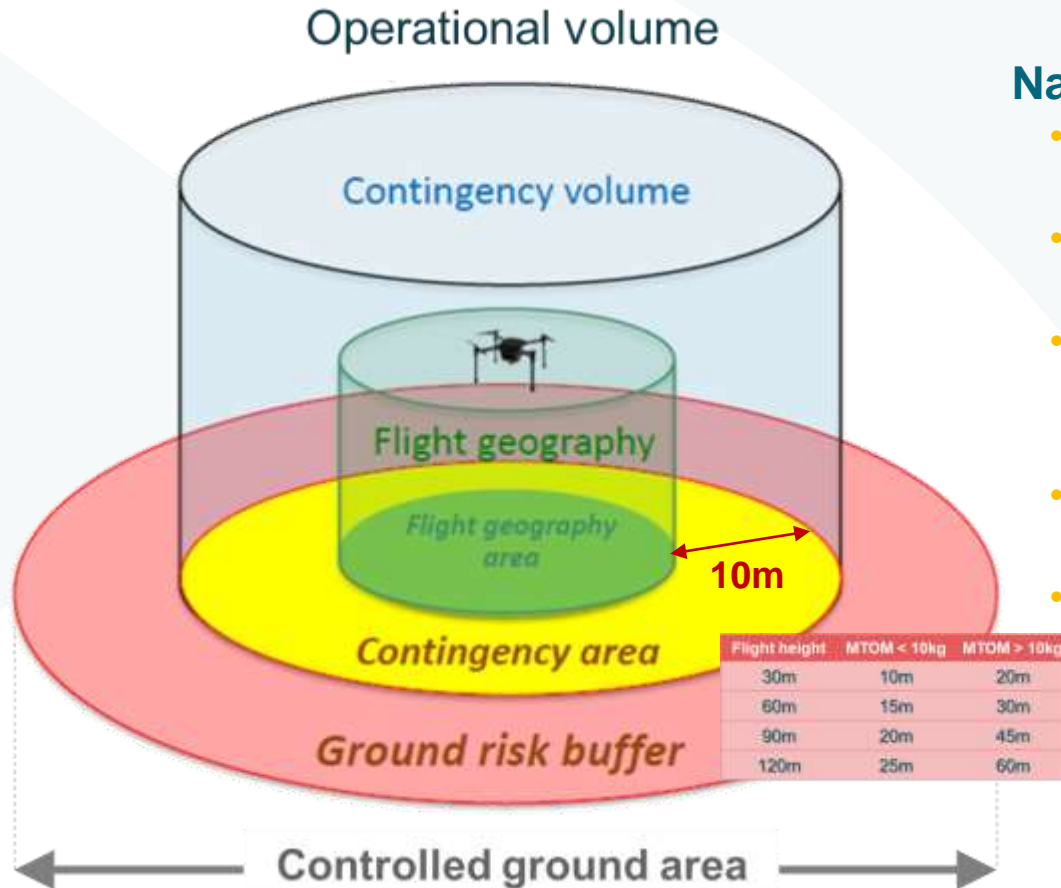
<sup>(1)</sup> 120m above GND or 15m above obstacle

<sup>(2)</sup> Ground Buffer dependent on flight height

# SPECIFIC category



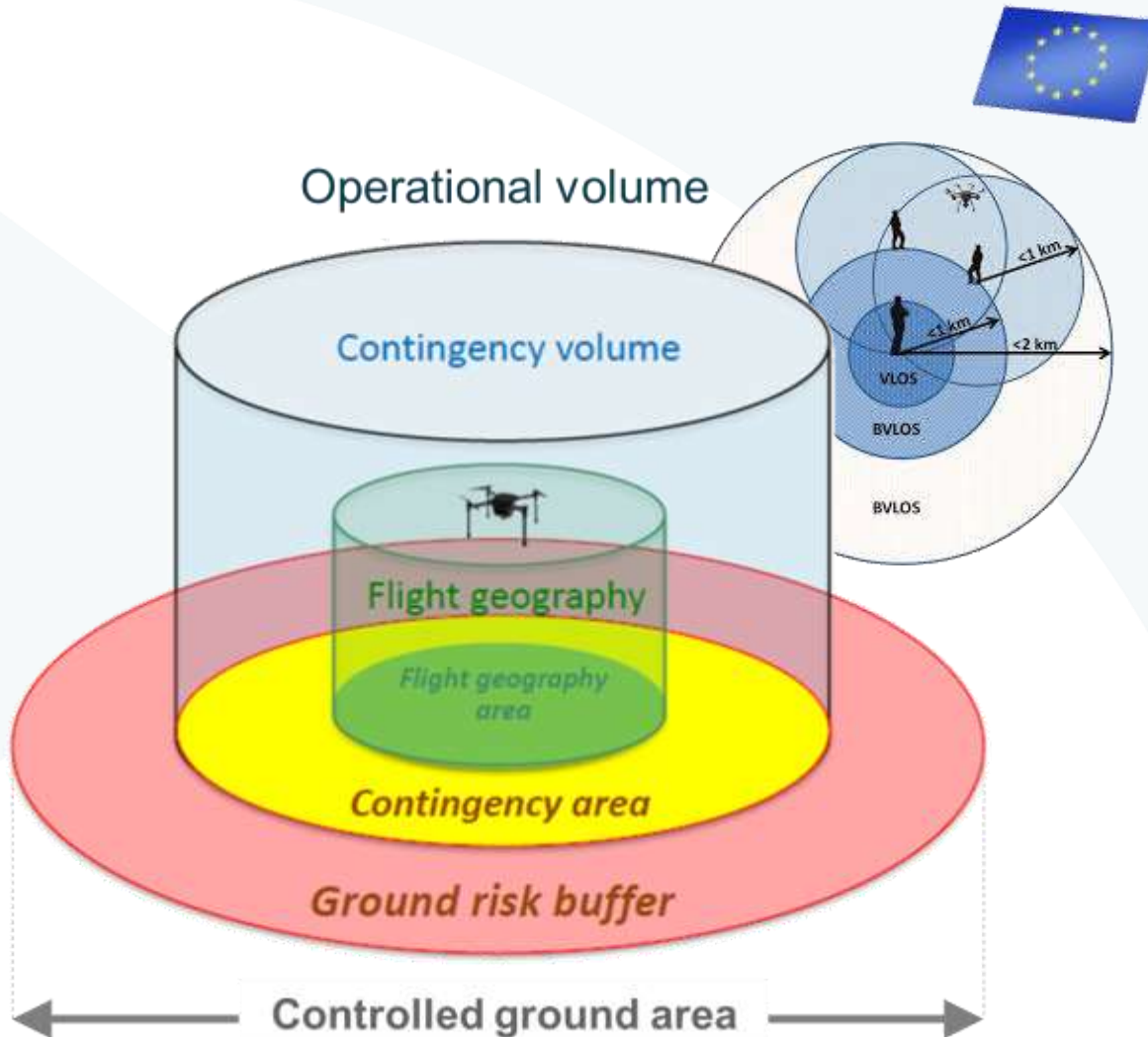
## STANDARD SCENARIO BE-STS-01 (MD publicised in 'Staatsblad/Moniteur 31/12/2020)



**National Belgian STS-01** is very similar to the EU version, except:

- Instead of C5 drone: rotary drone certified ('homologated') according to 2016 KB, can be tethered, no fixed wing
- Max. characteristics 2m instead of 3m, max. MTOM 22kg instead of 25kg
- Some additional mandatory technical specs found in Cx drones such as e.g.: speed and height indication, low speed mode (<5m/s), protected C2 link, low battery warning a.o. (*Appendix 3*)
- Mandatory content template for Ops Manual (*Appendix 2*) (your OM needs to be compliant when audited, but no pre-approval required by BCAA)
- Pilot competencies (*Appendix 1*):
  - Having a former Class1 pilot license converted in to Open A2 'Certificate of remote pilot competency' + declaration of being knowledgeable about the Specific category and associated risk assessment or
  - Having 'Certificate of remote pilot theor. knowledge for operations in the national BE-STS01' issued by the BCAA or Designated Entity + 'Accreditation of completion of BE-STS01 practical skill training' issued by Recognized Entity

# SPECIFIC category

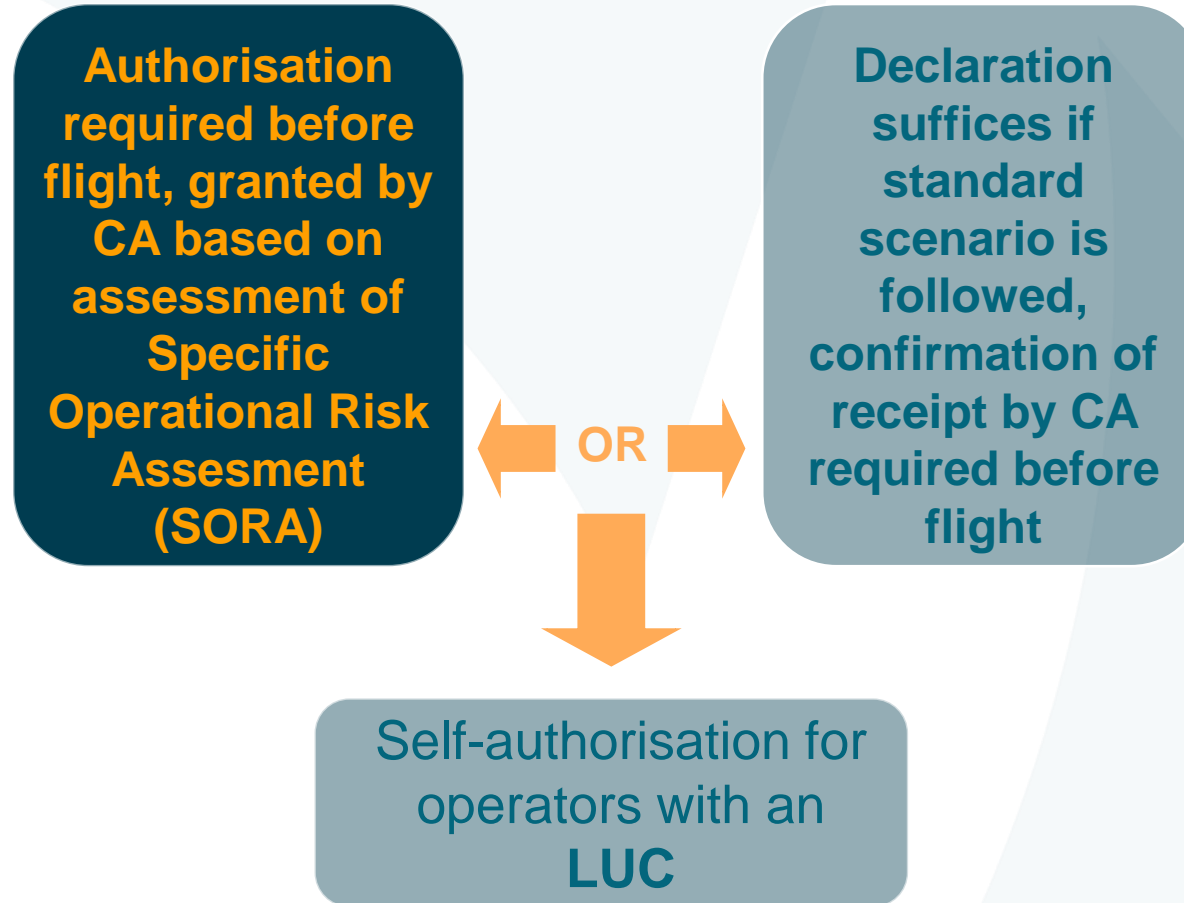


## STANDARD SCENARIO STS-02

as from 1/1/2024

- BVLOS operations
- with the UA at not more than 2 km from the remote pilot, if visual observers are used
- at a maximum height of 120 m
- over controlled ground area
- in sparsely populated environments
- using C6 UAS with MTOMs of up to 25 kg
- using pre-defined Ops Manual

# SPECIFIC category





# SPECIFIC category

## OPERATIONAL AUTHORISATION =

- authorisation to execute certain type of flights, at places with certain characteristics (**‘generic’ authorisation**) OR at a certain known locations identified by geographical coordinates (**‘precise’ authorisation**)
- Request to be SORA-based (Specific Operational Risk Analysis)



### Air risk

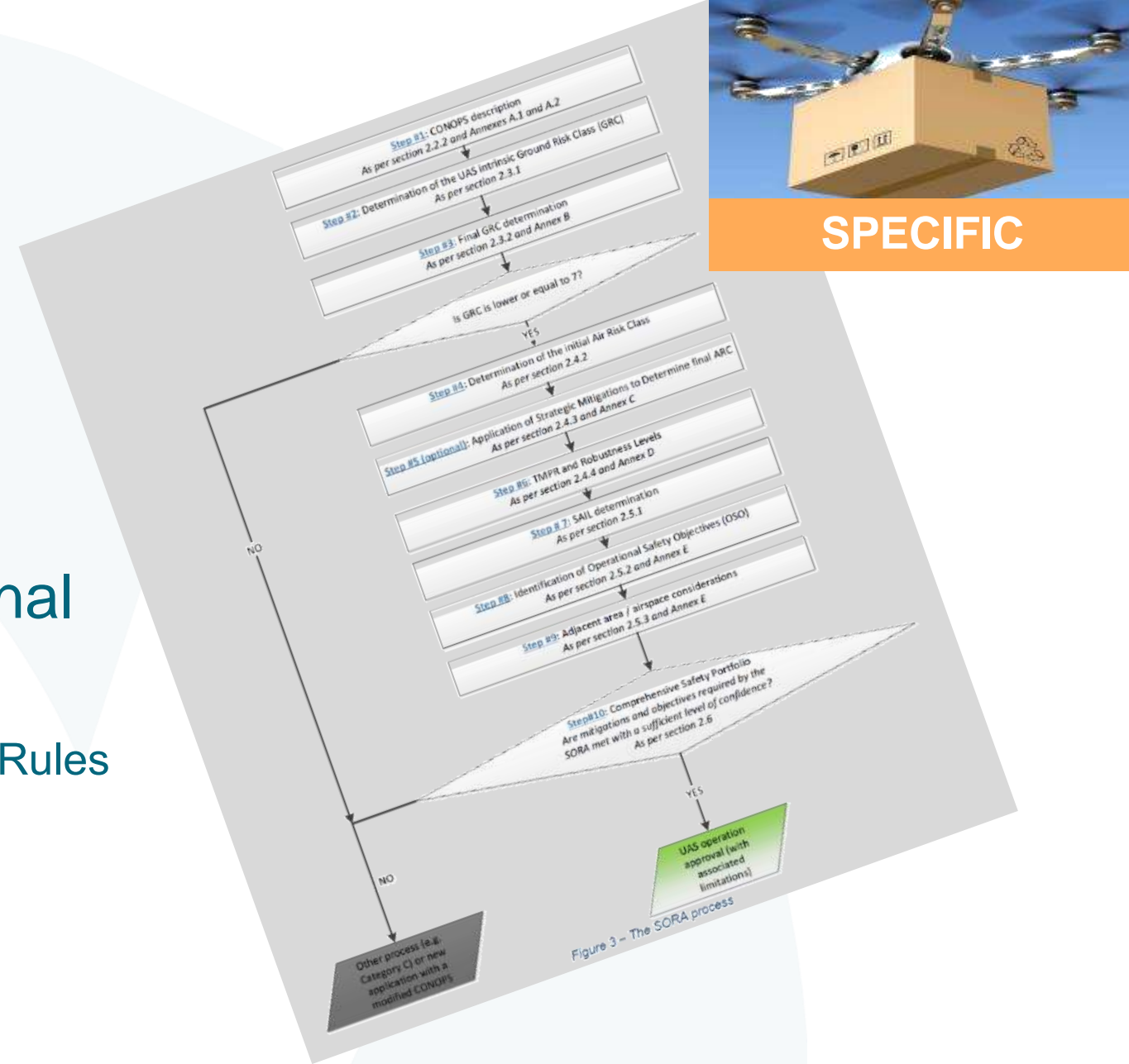


### Ground risk

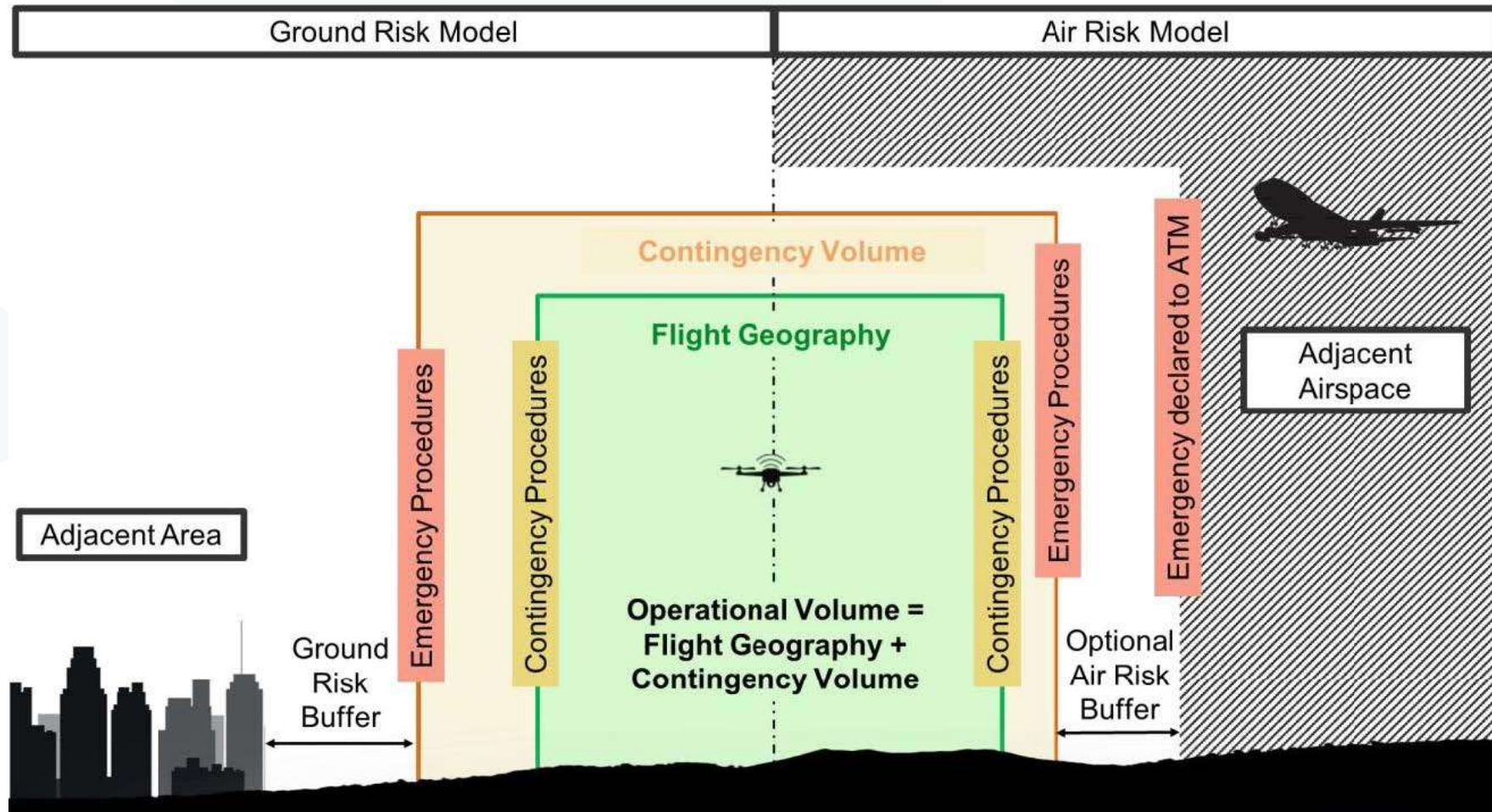


# SPECIFIC category

There is a step-by-step Methodology helping you to write your own SORA as backbone of your Operational Authorisation request  
(details provided in EASA's "Easy Access Rules for Unmanned Aircraft Systems")



# Risk cross section (semantic model)



# Robustness of a risk mitigation

Level of integrity (= safety gain) provided by a mitigation

- Example: if drone crashes, it remains within 1:1 rule

Level of assurance (= method of proof) that a mitigation has been achieved

- Low: by own declaration
- Medium: by supporting evidence (technical: test report, human; by proof of experience)
- High: integrity has been found to be acceptable by a competent third party.

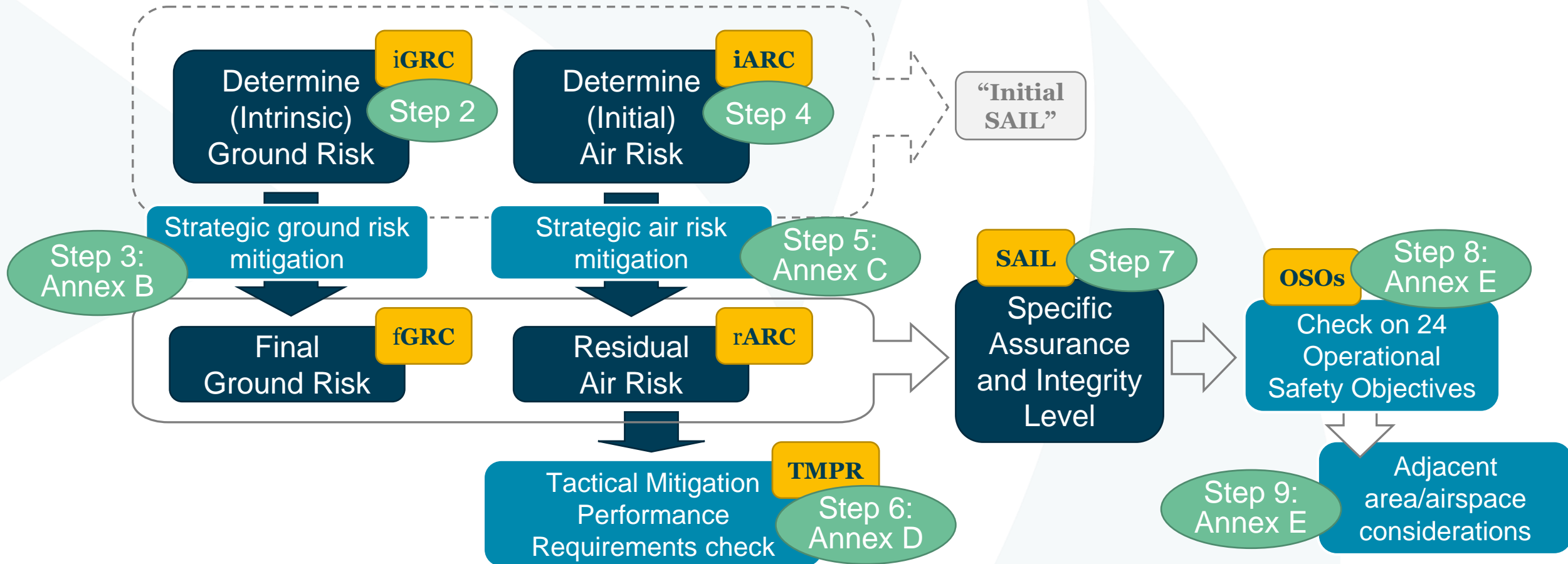
	Low assurance	Medium assurance	High assurance
Low integrity	Low robustness	Low robustness	Low robustness
Medium integrity	Low robustness	Medium robustness	Medium robustness
High integrity	Low robustness	Medium robustness	High robustness

Robustness level is determined by the **lowest** level of either integrity or assurance

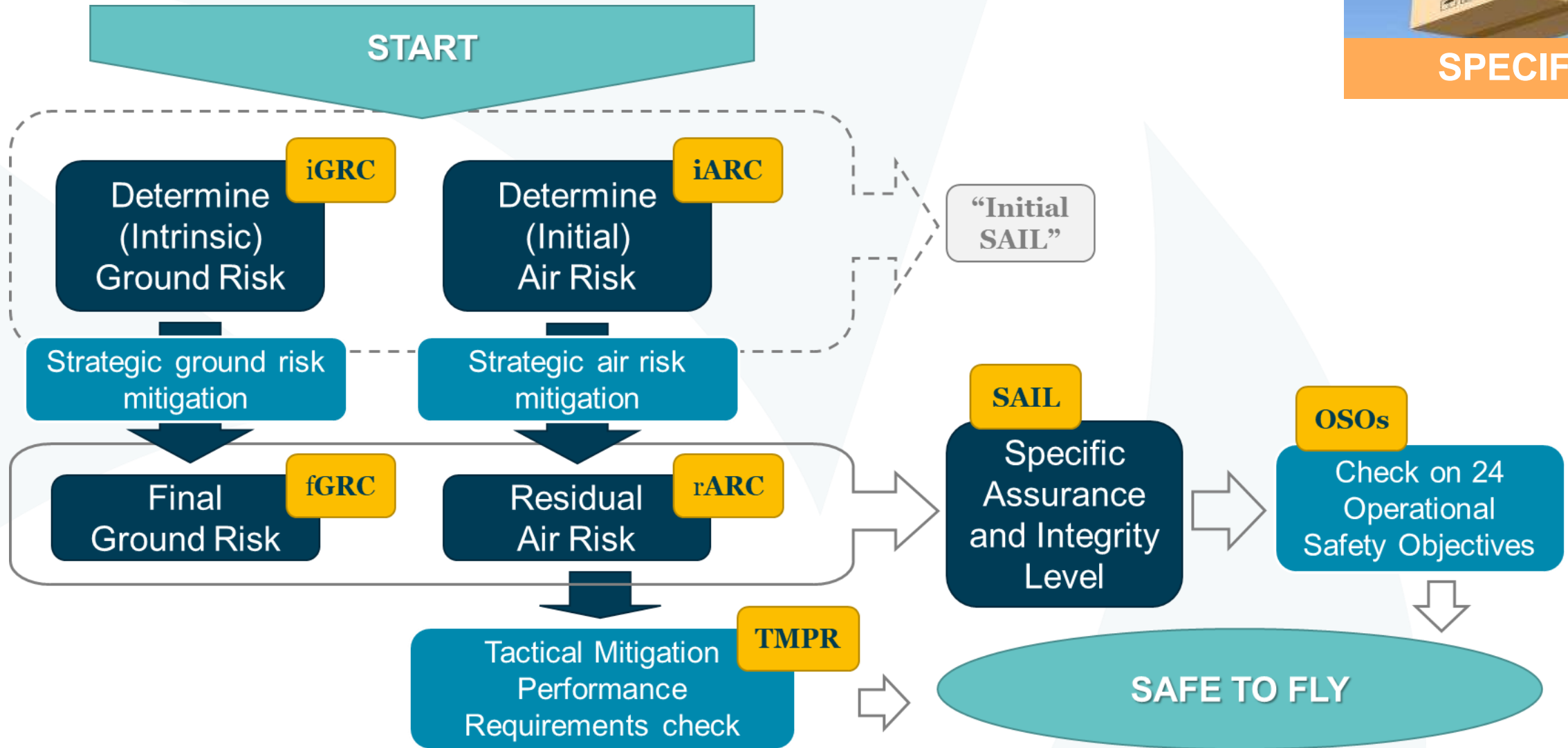


# SORA process: outline

- Step 1: drafting a Conops (see AMC Annex A for content)
- Then go through step-by-step assesment:



# SORA process: outline



# SORA process: step 2

## Determine iGRC



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 <sup>3</sup>	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			

**‘populated area’** is used in the context of ground risk and should be understood as ‘congested area’, as defined in Regulation (EU) No 965/2012 (the ‘Air Operations Regulation’): ‘in relation to a city, town or settlement, any area which is substantially used for residential, commercial or recreational purposes’

# SORA process: step 3 mitigate down to fGRC

## Final GRC after mitigation measures



Criterion #1: Definition of the ground risk buffer

Criterion #2: Evaluation of people at risk

Mitigation Sequence	Mitigations for ground risk	Robustness		
		Low/None	Medium	High
1	M1 — Strategic mitigations for ground risk <sup>10</sup>	0: None -1: Low	-2	-4
2	M2 — Effects of ground impact are reduced <sup>11</sup>	0	-1	-2
3	M3 — An emergency response plan (ERP) is in place, the UAS operator is validated and effective	1	0	-1

Criterion #1: Technical design, e.g. parachute

Criterion #2: Procedures, e.g. maintenance

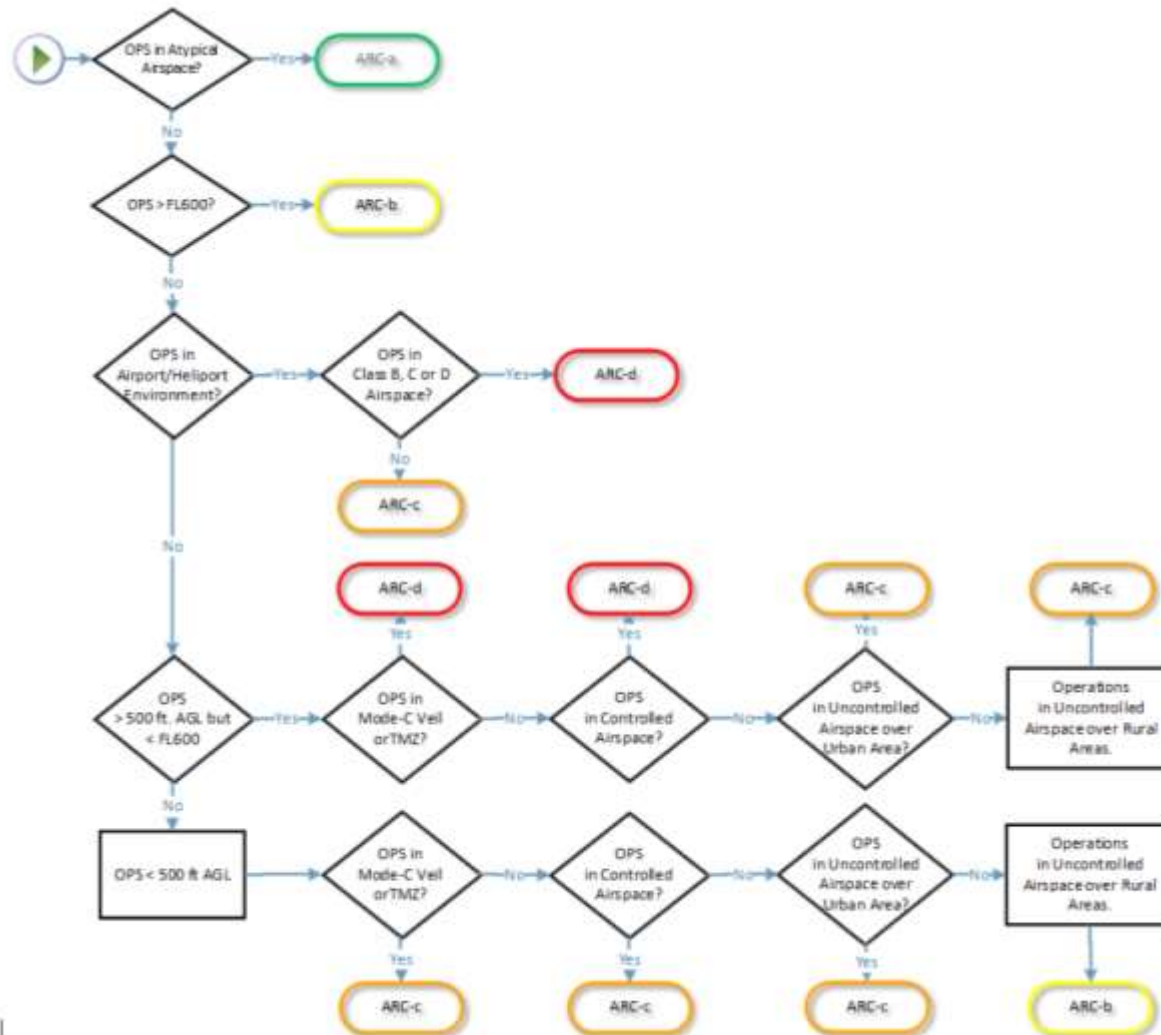
Criterion #3: Training

(10): Definition of the ground risk buffer; Evaluation of people at risk

(11): Technical design (e.g. parachute); Procedures (e.g. maintenance); Training

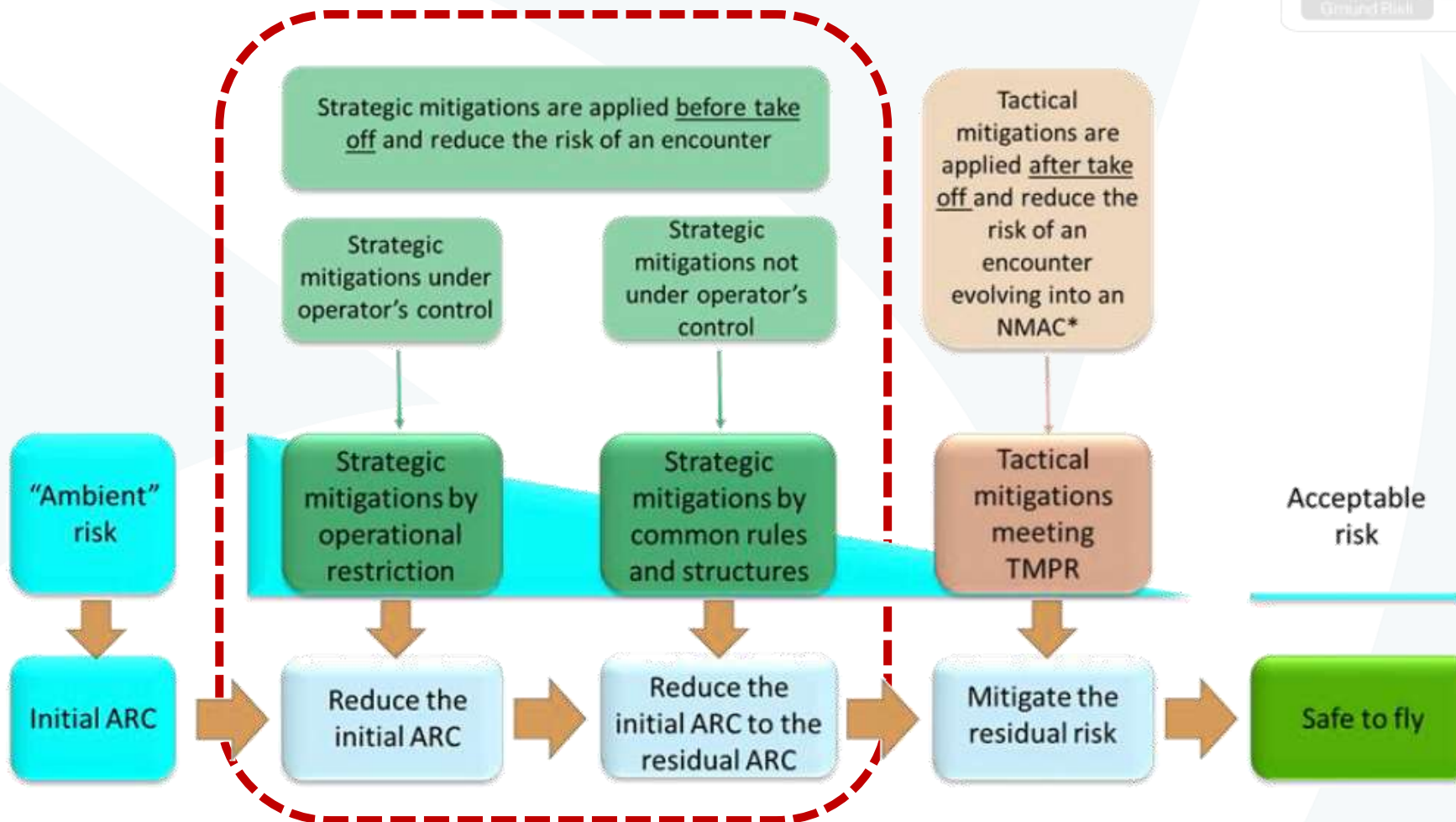


# SORA process: step 4 Determine iARC

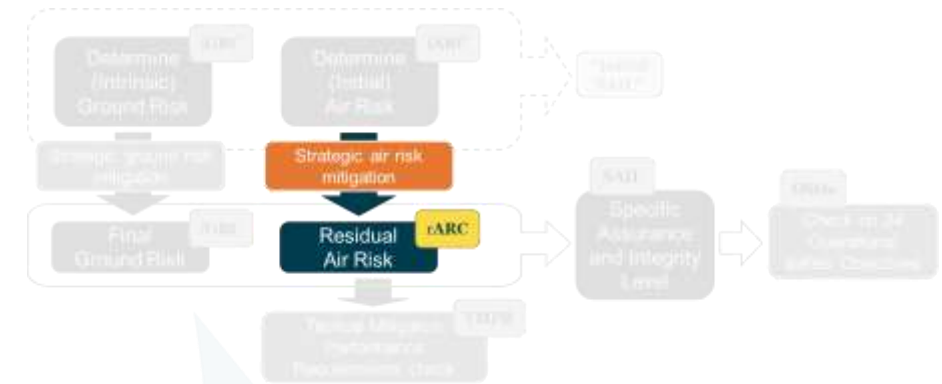


**‘rural area’** is used in the context of the air risk and it means the volume outside a populated area and not within the aerodrome traffic zone (ATZ) of an aerodrome.

# SORA process: step 5 mitigate down to fARC

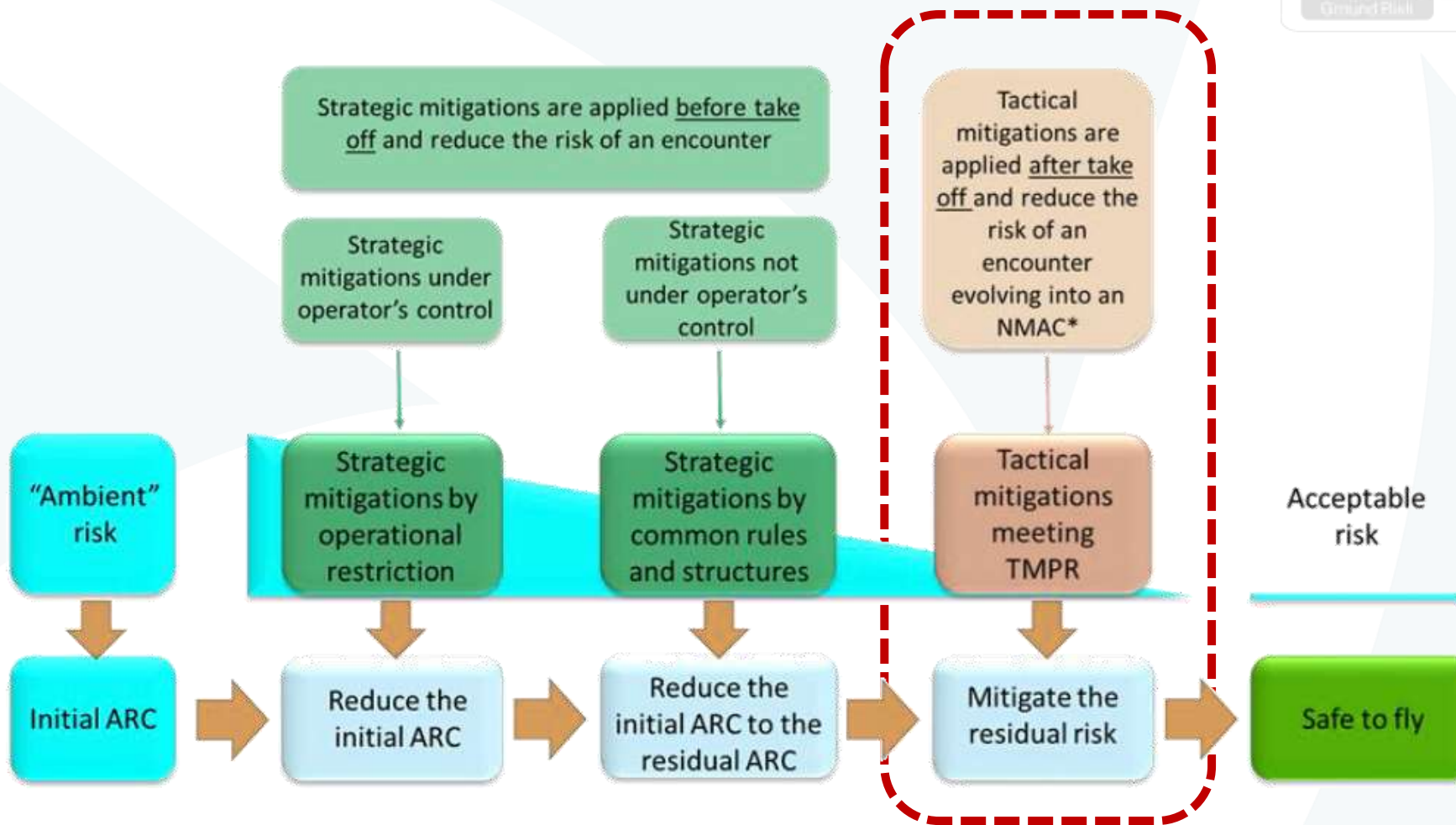


\* NMAC: near mid-air collision

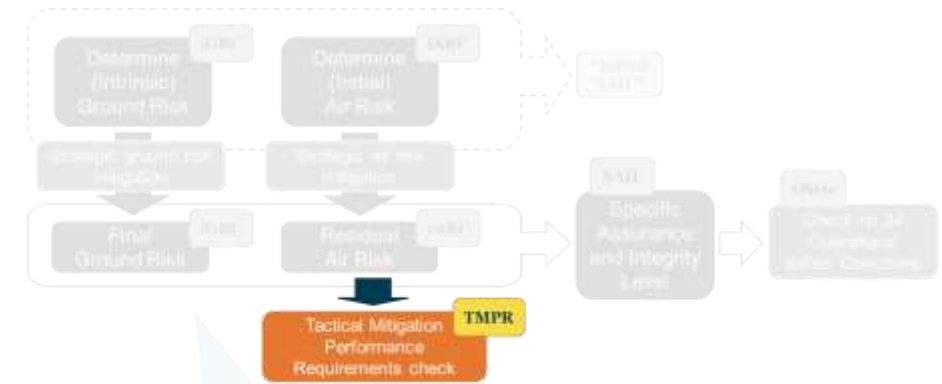


Pre-flight  
'Strategic'  
Air Risk  
Mitigation

# SORA process: step 6 check in-flight TMPRs



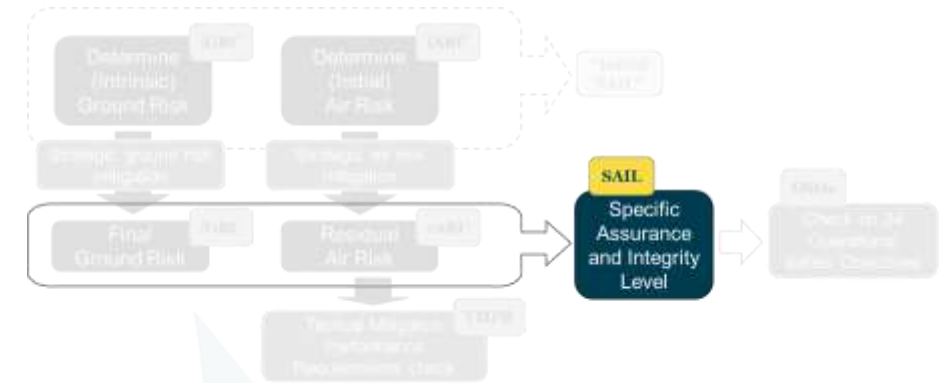
\* NMAC: near mid-air collision



**In-flight  
'Tactical'  
Air Risk  
Mitigation**

by complying with  
the right level of  
performance  
requirements

# SORA process: step 7 determine SAIL

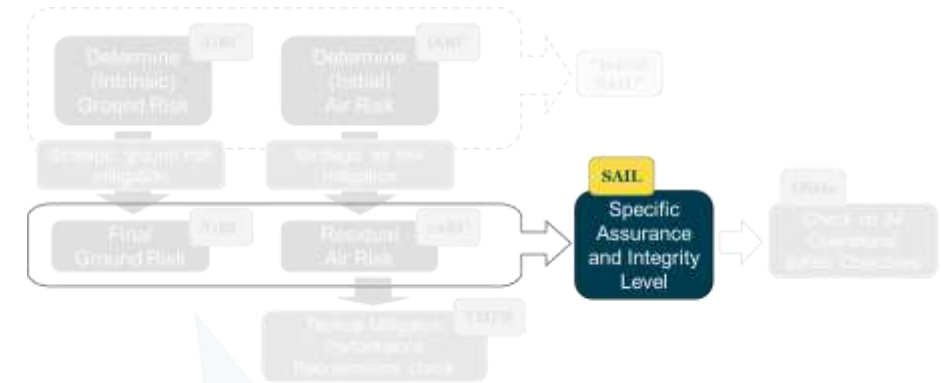


SAIL determination				
	Residual ARC			
Final GRC	a	b	c	d
≤2	I	II	IV	VI
3	II	II	IV	VI
4	III	III	IV	VI
5	IV	IV	IV	VI
6	V	V	V	VI
7	VI	VI	VI	VI
>7	Category C operation			

**SAIL level =  
consolidation  
of final ground  
and residual  
air risk**



# SORA process: step 7 determine SAIL



## EXAMPLE

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			

## EXAMPLE:

iGRC was GRC-4 and got mitigated to fGRC = GRC-3

iARC was ARC-c and got mitigated to fARC = ARC-b

(be aware: SAIL higher than II requires design verification of the UAS by EASA!)

# SORA process: step 8

## Check all OSOs

- Motivation and demonstration of SAIL
- Determination of level of required robustness of mitigations (for all 24 OSO's)
- Example of first 3 OSO's:

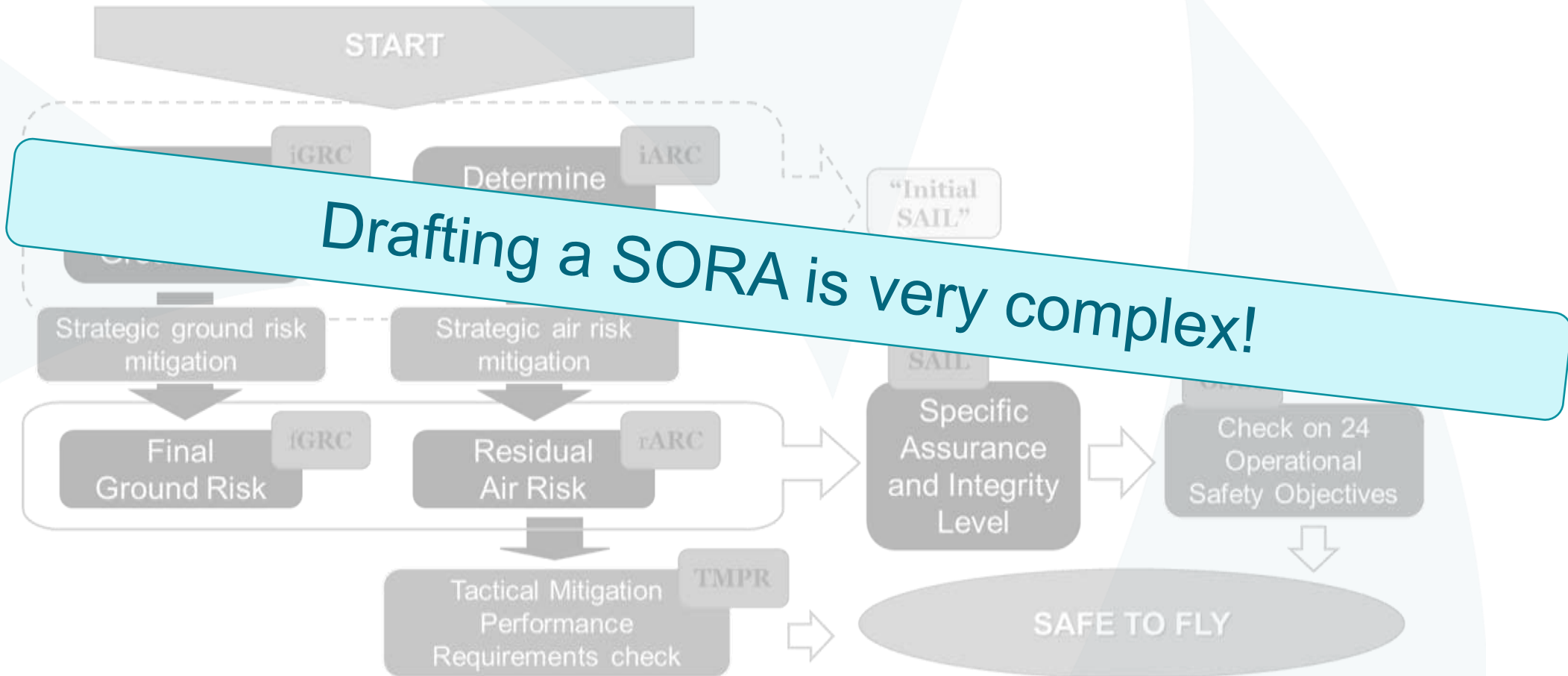


OSO number (in line with Annex E)		SAIL					
		I	II	III	IV	V	VI
	<b>Technical issue with the UAS</b>						
OSO#01	Ensure the UAS operator is competent and/or proven	O	L	M	H	H	H
OSO#02	UAS manufactured by competent and/or proven entity	O	O	L	M	H	H
OSO#03	UAS maintained by competent and/or proven entity	L	L	M	M	H	H

O: optional  
 L: low robustness  
 M: medium robustness  
 H: high robustness

# SORA process: conclusion

- Start with Step 1: drafting a Conops (see AMC for content)
- Go through step-by-step assesment:



# SORA process: conclusion

- Start with Step 1: drafting a Conops (see AMC for content)
- G... by step assesment:

To help you out EASA made several **pre-defined risk assessments (PDRAs)**, which you can simply refer to and prove compliance so it allows the CA to speed up the Operational Authorisation process.

You can find more details in the 'EASA Easy Access Rules' for drones





# Intrinsic Ground Risk Class vs PDRAs

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
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BVLOS over an assembly of people	8			

## Published PDRAs

### PDRA-S01

VLOS – 150m height – Class D&G

### PDRA-S02

BVLOS – 2km range – 150m height – Class D&G

### PDRA-G01

BVLOS – 1km range – 150m height – Class G airspace only

### PDRA-G02

BVLOS – TSA

### PDRA-G03

BVLOS – 50m height or TSA – Class D&G

### PDRA-05

BVLOS – 110m height - direct C2 link – Class G airspace only

## PDRAs under development

### PDRA-06

VLOS – 120m height – Prototype testing

### PDRA-07

BVLOS – Airport Env. – Airport/RWY Ins.

### PDRA-08

VLOS – TSA - Swarming

# SPECIFIC category PDRA

**‘populated area’** should be understood as ‘congested area’, as defined in Regulation (EU) No 965/2012 (the ‘Air Operations Regulation’): *‘in relation to a city, town or settlement, any area which is substantially used for residential, commercial or recreational purposes’*

PDRA #	UAS characteristics	BVLOS / VLOS	Overflown area	range remote pilot			11
PDRA-S01	Maximum characteristic dimension of up to 3 m and take-off mass of up to 25 kg	VLOS	Controlled ground area that might be located in a populated area	VLOS	150m	Controlled or uncontrolled, with low risk of encounter with manned aircraft	AMC4
PDRA-S02	Maximum characteristic dimension of up to 3 m and take-off mass of up to 25 kg	BVLOS	Controlled ground area that is entirely located in a sparsely populated area	2 km with AO(s) 1 km, if no AO	150m	Controlled or uncontrolled, with low risk of encounter with manned aircraft	AMC5
PDRA-G01	Maximum characteristic dimension of up to 3 m and typical kinetic energy of up to 34 kJ	BVLOS	Sparsely populated areas	If no AO, up to 1 km	150 m (operational volume)	Uncontrolled, with low risk of encounter with manned aircraft	AMC2
PDRA-G02	Maximum characteristic dimension of up to 3 m and typical kinetic energy of up to 34 kJ	BVLOS	Sparsely populated areas	n/a (direct C2 link)	As established for the reserved or segregated airspace	Reserved or segregated for the UAS operation	AMC3
PDRA-G03	Maximum characteristic dimension of up to 3 m and typical kinetic energy of up to 34 kJ	BVLOS	Sparsely populated areas	n/a (direct C2 link)	50 m from ground unless in reserved or segregated airspace	Controlled or uncontrolled airspace if height is below 50 m, otherwise reserved or segregated airspace	AMC6

**NEW!**

**NEW!**

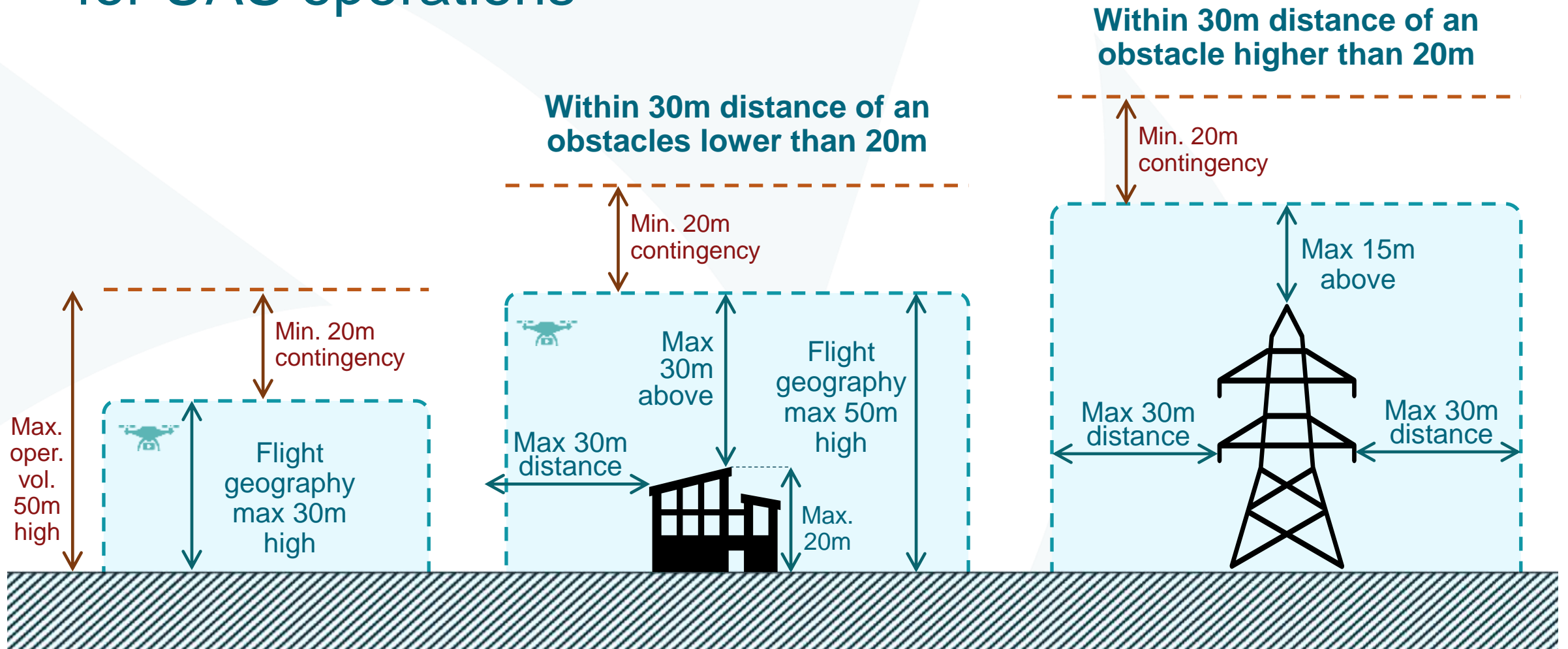
# PDRA G-03 for BVLOS flights

- Made to facilitate operational authorisations for UAS operations for routine and automated surveillance and inspection of facilities and infrastructures, with the UA flying very close to such facilities and infrastructures.
- Flight geography
  - limited in height (max 30m AGL or above obstacle)
  - Limited in its lateral boundaries by the range of the DIRECT C2 link (no network-based C2 link allowed)

## Ground risk

- Ground risk: in addition to the conditions included in previous PDRAs, the UAS operator should ensure that the person or the entity responsible for the facility or infrastructure over which the operation takes place, has taken the necessary measures to protect the uninvolved persons present within its limits during the entire UAS operation.

# **NEW!** PDRA G-03 MAXIMUM flight height when in airspace not reserved nor segregated for UAS operations





**NEW!**

# PDRA G-03 for BVLOS flights

- Drone characteristics: maximum characteristic dimensions up to 3 m and typical kinetic energy up to 34 kJ;
- over sparsely populated areas;
- at very low level, see previous slide;
- operated in BVLOS within the range of a direct C2 link;
- the operation should be limited to pre-programmed or pre-planned flexible routes, which decrease the risk of collision with obstacles (given the short distance to those), allowing for a better protection of third parties on the ground, also due to prior knowledge of the routes (thus avoiding overflight above people)

# SPECIFIC: Cross-border operations or operations outside the State of registration

Authorisation granted by CA of registration based on assessment of SORA

OR

Declaration with conf. of receipt by CA of registration based on standard scenario

Cross border operations or operation outside state of registration

- Operator revises mitigation measures for e.g.: local airspace, terrain, population and climate
  - Revision sent by operator to CA of operation using application form for a cross-border UAS operation
  - Other CA assesses the update and issues statement of acceptance to operator and CA of registration
  - After receiving the confirmation of acceptability, the UAS operator may start its operation.
  - The CA of the MS of registration issues a revision of the operational authorisation listing the additional new location(s), and provide a copy of the revised operational authorisation to the MS of authorisation and to the UAS operator
- Operator forwards declaration and confirmation of receipt (sent by CA of registration) to the CA of operation

# SPECIFIC: Cross-border operations or operations outside the State of registration

**UAS operator holds a LUC**

Cross border operations or operation outside state of registration

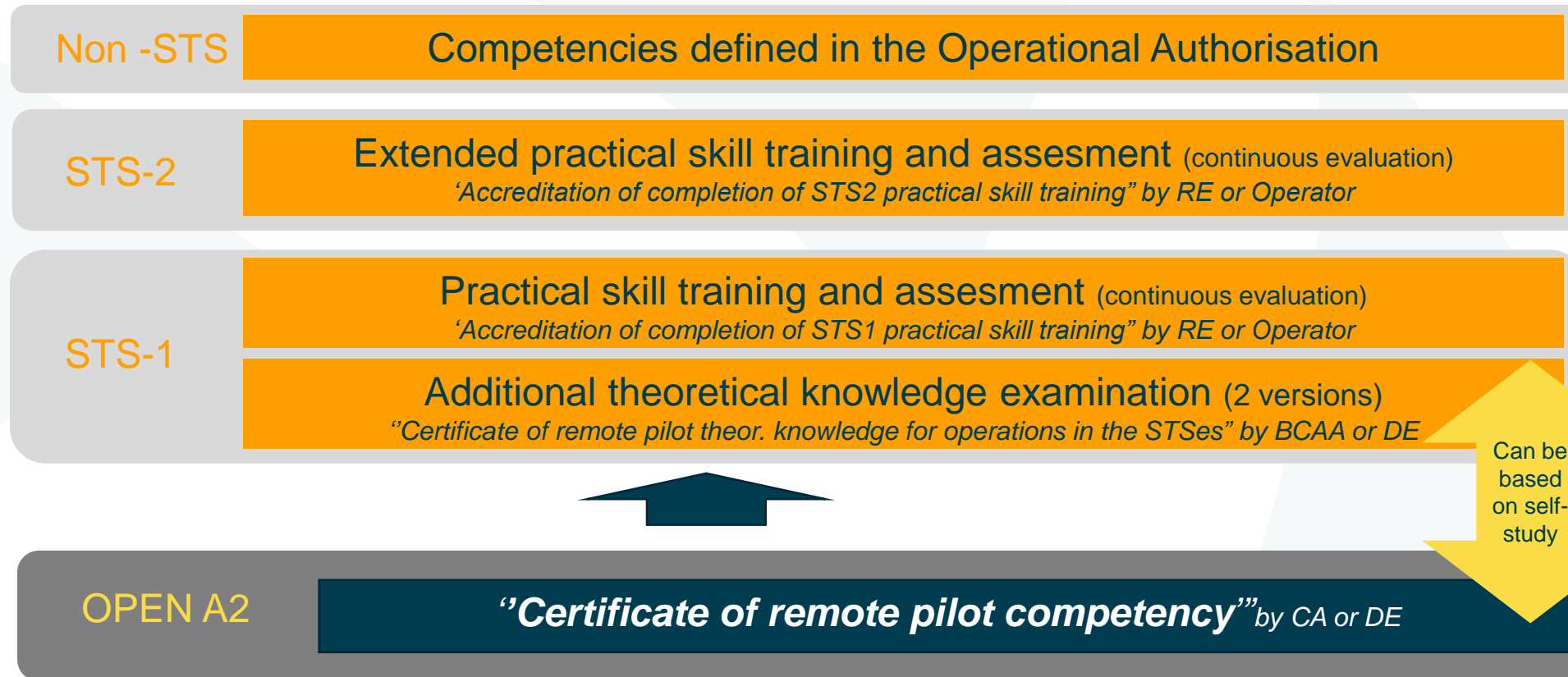
Operator must provide to the CA of operation:

1. the location(s) of the intended operation
2. a copy of the terms of approval received by the CA of registration

If the LUC terms of reference include the privileges to assess the local conditions and to apply the mitigation measures in other locations, than the UAS operator may start the operation as soon as it has received confirmation of receipt and completeness of the application.

If the LUC terms of reference do not include the privileges to assess the local conditions and/or apply the mitigation measures in other locations, than the UAS operator may start the operation only after it has received the confirmation of acceptability that the updated mitigation measures and procedures are satisfactory for the intended location(s).

# SPECIFIC category, pilot competences



## SPECIFIC

There is **no** such thing as an overall official **"SPECIFIC Certificate of remote pilot competency"**





# Specific category “NEED TO KNOWS” BEFORE TAKE-OFF

# WHAT TO KEEP IN MIND

## Operational authorisation

(« Autorisation d'exploitation » – « Exploatievergunning »)



## Flight authorisation

(« Autorisation de vol » – « Vluchtvergunning »)

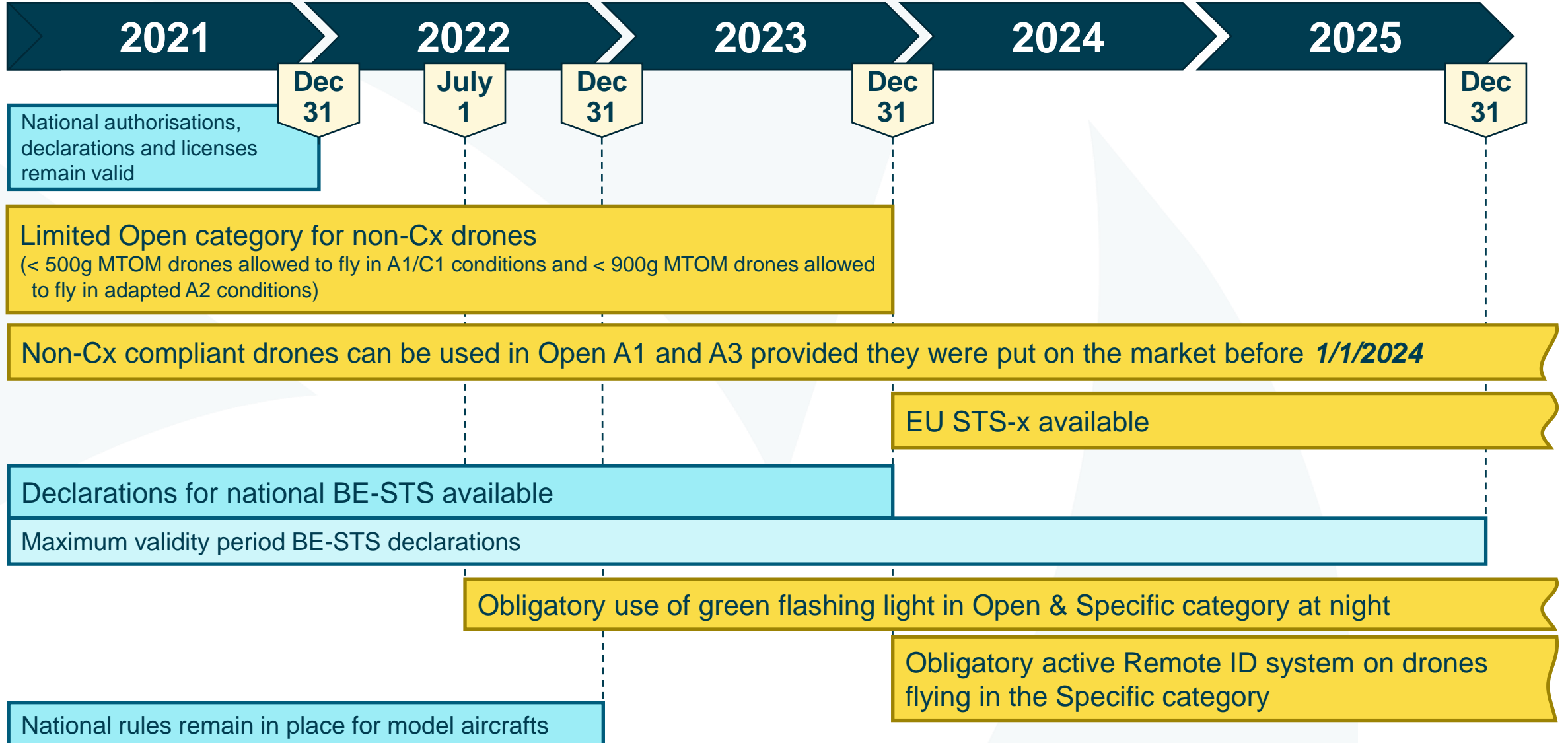


- Relevant for the Specific category only
- Tied to type of flight and characteristics of the location
- Always based on SORA
- NOT tied to actual GPS coordinates
- Remains valid for a long period of time
- **Granted by the BCAA**



- Only required in certain GeoZones (nationally defined)
- Can be relevant for all categories (Open, Specific and/or Certified)
- Valid for a short period of time
- Can be granted automatically (= notification)
- **Granted by a GeoZone Manager**

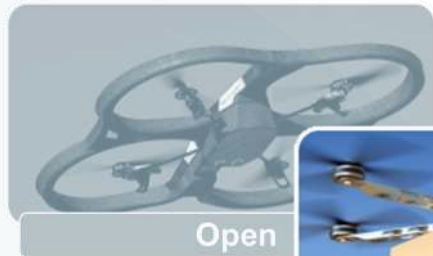
# Applicability overview



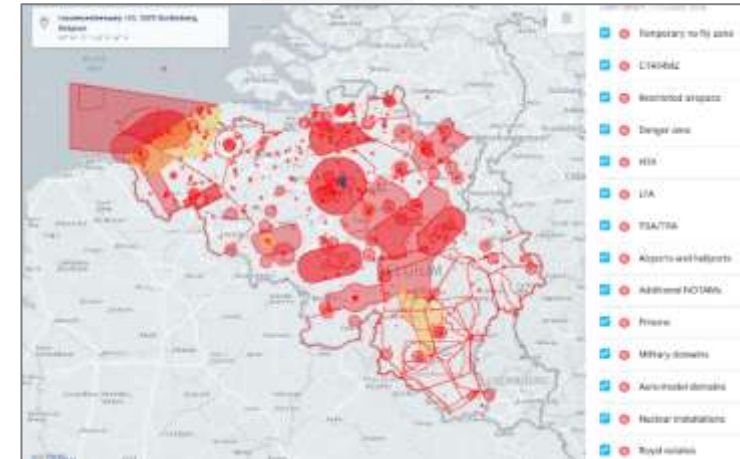
# SUMMARY OF WHAT TO KEEP IN MIND

## NEED TO RESPECT

Generic rules



National GeoZones



- Aerodrome zones (incl. heliports)
- P/D/R + Military zones
- CTRs
- Seaports
- UAS test-zones
- ....

# SUMMARY OF WHAT TO KEEP IN MIND

## NEED TO RESPECT

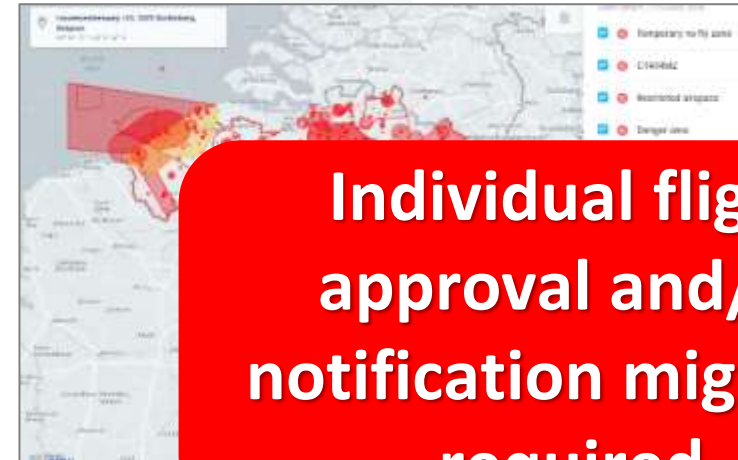
### Generic rules



**No individual flight approval nor notification required**



### National GeoZones

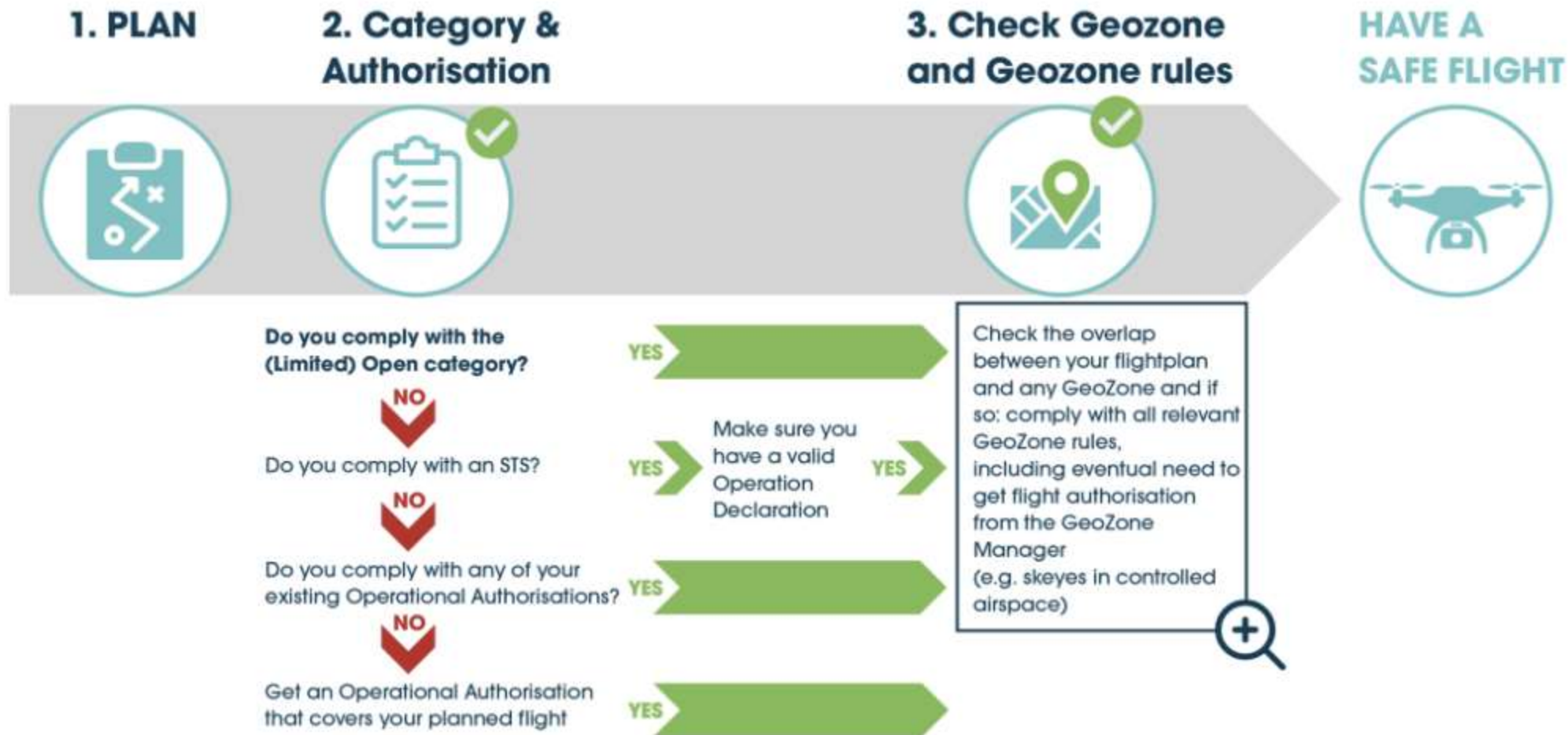


**Individual flight approval and/or notification might be required**

- Aerodromes (with temporary)
- P/D/R + Military zones
- CTRs
- Seaports
- UAS test-zones
- ....



# HAVE A SAFE FLIGHT



# HAVE A SAFE FLIGHT

**Check your position on :**



**map.droneguide.be**

Check on that map which GeoZones overlap with your flightplan and list all of them in YOUR LIST of relevant GeoZones.

**Check each relevant Geozone**



For each GeoZone on YOUR LIST you will have to go and see who the GeoZone Manager is and what extra rules he imposes

**Comply with EACH Geozone**



Make sure you comply with all additional conditions for each zone (e.g. max flight height, drone requirements, ...)

**GET ALL YOUR FLIGHT AUTHORISATIONS**



Get all your authorisations from the different Geozone managers (if required)