

SORA workshop

9 – 10 February 2023





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LBA – Team leader UAS operations

Established
2002

800+

aviation experts
& administrators

Headquarters in
Cologne
Office in
Brussels

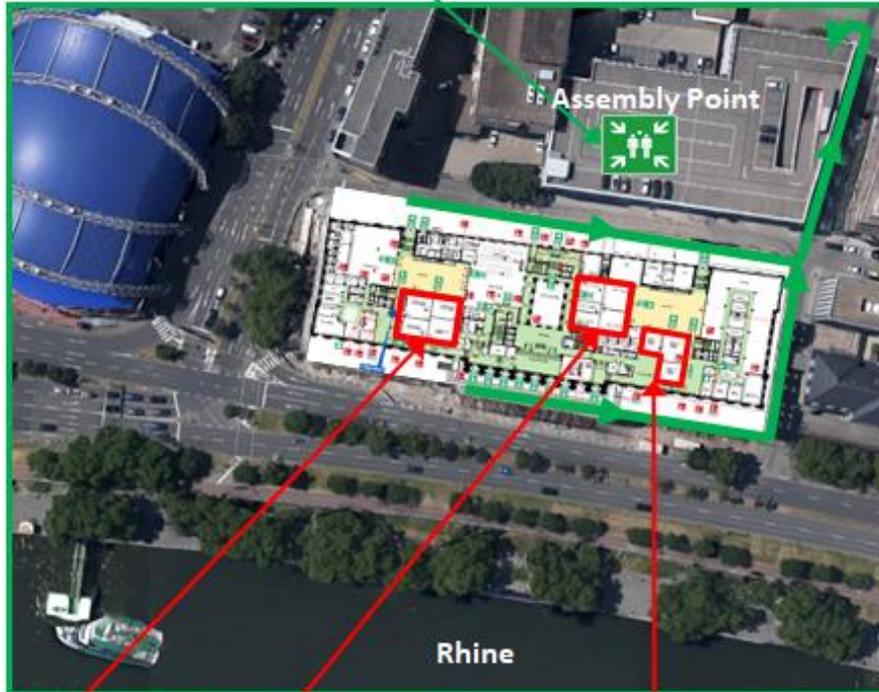
31 EASA member states
= **27** + **4**
EU + Switzerland, Norway
Iceland, Liechtenstein



Evacuation instructions: conference rooms

Escape route

Assembly Point: EASA Parking: Parkhaus Rhein Triadem, 3rd & 4th floor



Boeing

Airbus

Caravelle, Comet, Constellation

EASA Emergency Number: 1111

In case of emergency call: **1111**

The desk phones have a emergency speed dial button.



1. when to Evacuate

- a) Following acoustic signal
- b) Following instructions by emergency team

2. Evacuation signal and route

Signal: Continuous siren and/or voice message over loudspeaker

Routes: Nearest fire exit

3. Evacuation procedure

- a) Warn other people, help handicapped or injured persons
- b) Only use stairs and marked escape routes
- c) Do not use lifts
- d) Do not return to collect personal belongings
- e) Go directly to the assembly point
- f) Do not return to the building until instructed to do so



EMERGENCY
PROCEDURE CARD

European Aviation Safety Agency
Konrad-Adenauer-Ufer 3,
D-50668 Cologne, Germany

Find more information at your
EASA Emergency Procedure Card
on your visitor lanyard!

EASA Direktion house rules



→ Respect

- For phone calls kindly use the phone booths or the lobby
- Do not disturb colleagues in the office spaces

→ Hospitality

- EASA Bistro welcomes visitors but does not accept bank card payments
- You can pay cash or loan a canteen badge at the cash loading station
- 5€ deposit (at the end of the day refund of deposit and remaining credit)

→ Health and Safety

- The whole building is a non-smoking zone
- Smoking is allowed in front of the building to your right
- For evacuation purposes, re-arranging the seating configuration of the room is forbidden

SORA workshop - Agenda

9 February 2023

- 10:30 – 10:40: Welcome and introduction
- 10:40 – 11:30: Introduction to the UAS regulation and to the specific category
- 11:30 – 12:30: Specific category – STS and PDRAs and LUC
- 12:30 – 13:30** **Lunch break**
- 13:30 – 15:00: Specific operation risk assessment (SORA)
- 15:00 – 15:30** **Break**
- 15:30 – 17:30: Specific operation risk assessment (SORA)

10 February 2023

- 09:00 – 10:30: Writing an operator's manual
- 10:30 – 11:00** **Break**
- 11:00 – 13:00: Summary of changes in SORA 2.5

SORA workshop – 9 -10 February 2023

Purpose

- Explain how to apply SORA 2.0
- Identify known challenges related to SORA 2.0 and how these are solved with SORA 2.5
- Provide an overview of SORA 2.5

Method

- Use some examples and carry out a complete risk assessment

Rules of play

- After each presentation we will have a question and answer session
- Use **sli.do** #SORA2023 passcode: bwwlNb
- We are unable to monitor chats of Webex or Youtube
- Please refrain to ask questions related to open category (if needed we may organize a dedicated meeting)

SLI.DO



passcode: bwwlNb



Introduction to the UAS regulation and to the specific category

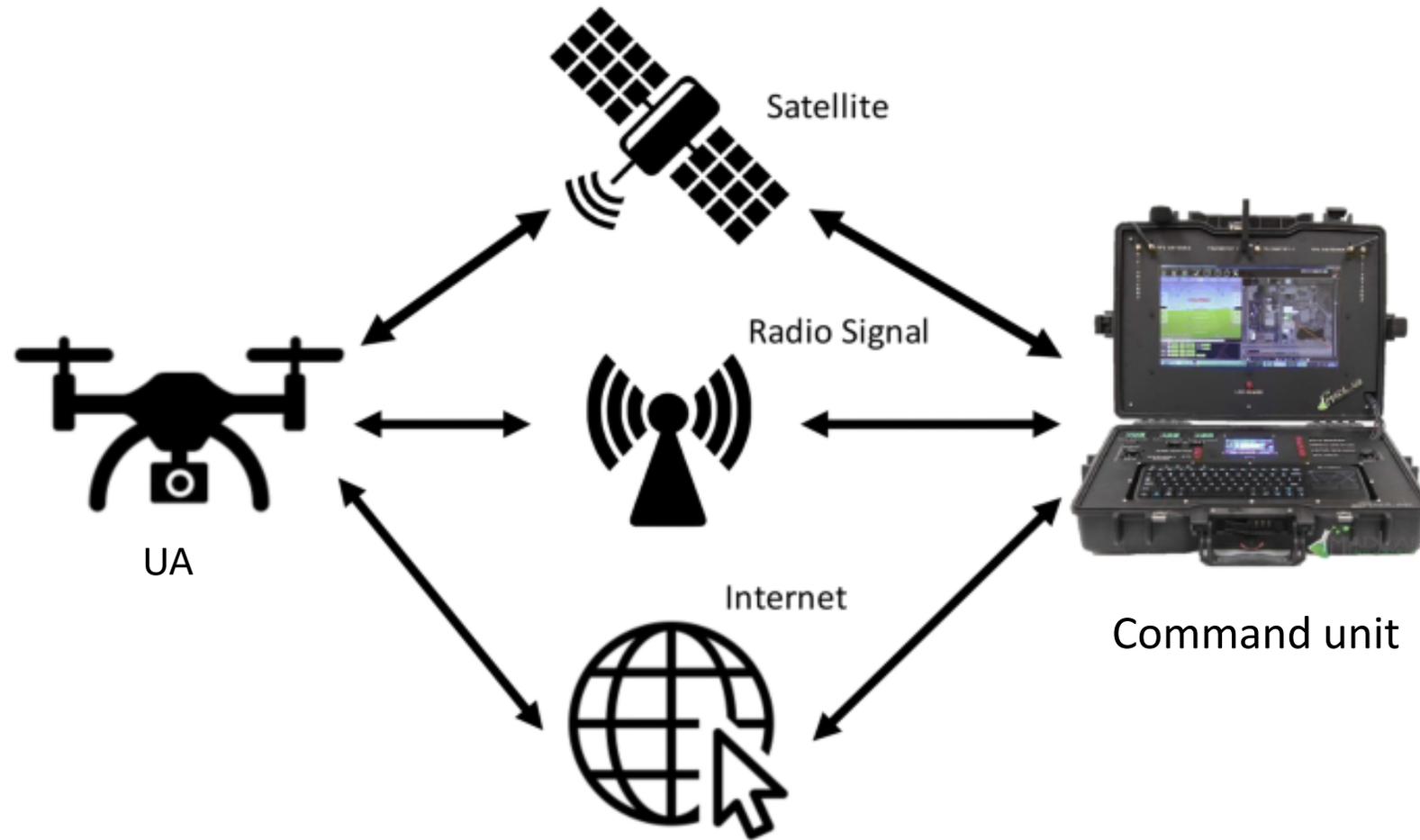
Who developed SORA?

→ Joerg

Where SORA is used in the world?

→ Joerg

What is a drone?



Unmanned aircraft system

Command Units and level of automation



Is this the end of pilots role?

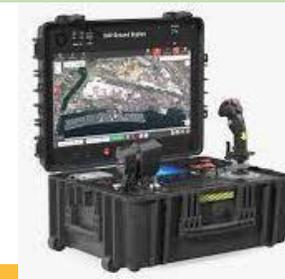


**No!
Persons with
skills of pilots
will be always
needed**

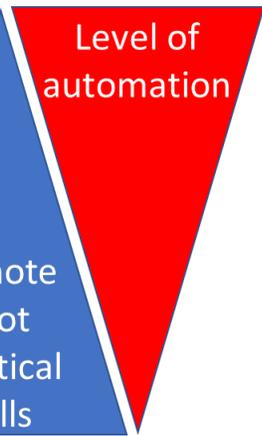
Automatic mode
'Fly by mouse'



Manual mode
Direct control of the flight surfaces



Fully autonomous
Automatic flight
Direct control



Responsibility on the operator and manufacturer

Remote pilot responsibility

Automatic flight: The flight path and contingency/emergency procedures are pre-loaded before flight. At anytime the remote pilot monitors the flight and intervenes in case the drone is not heaving as programmed or in case of an unplanned situation

Which UAS operations are we addressing?



Aerial work



Even if SORA may be potentially used, the UAS regulation provides other simplifications for leisure flights

Leisure flights, including with model aircraft



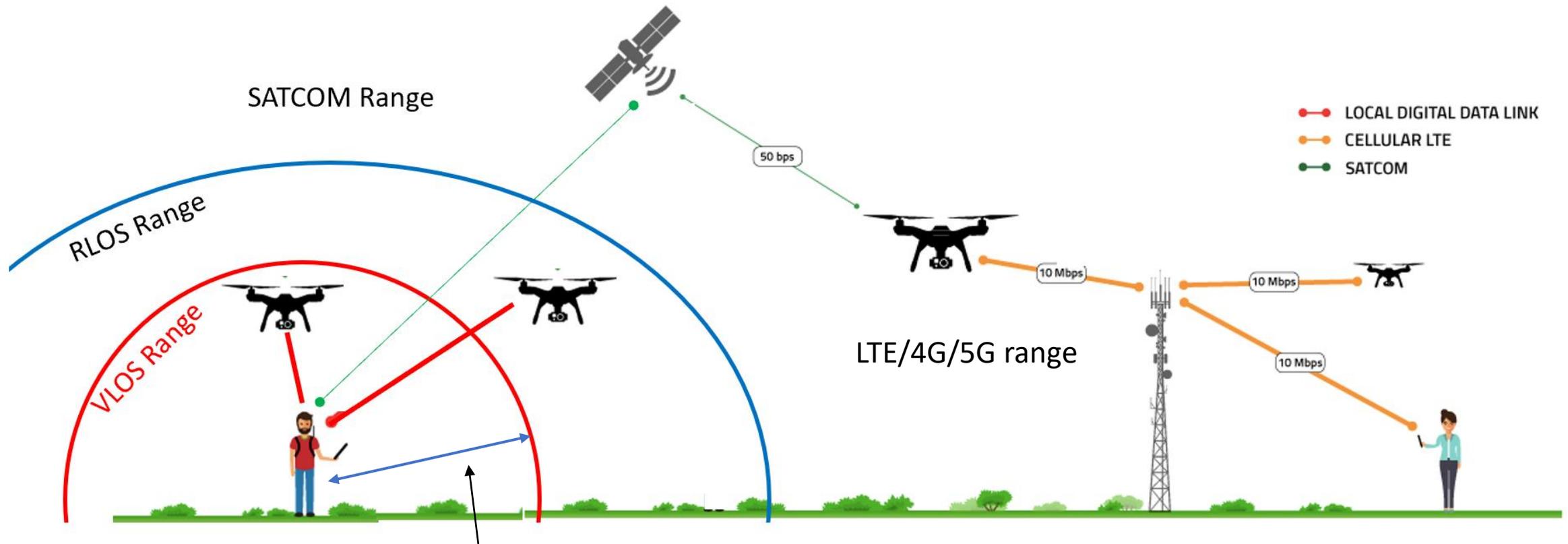
Urban

**Certified category
SORA cannot be used**



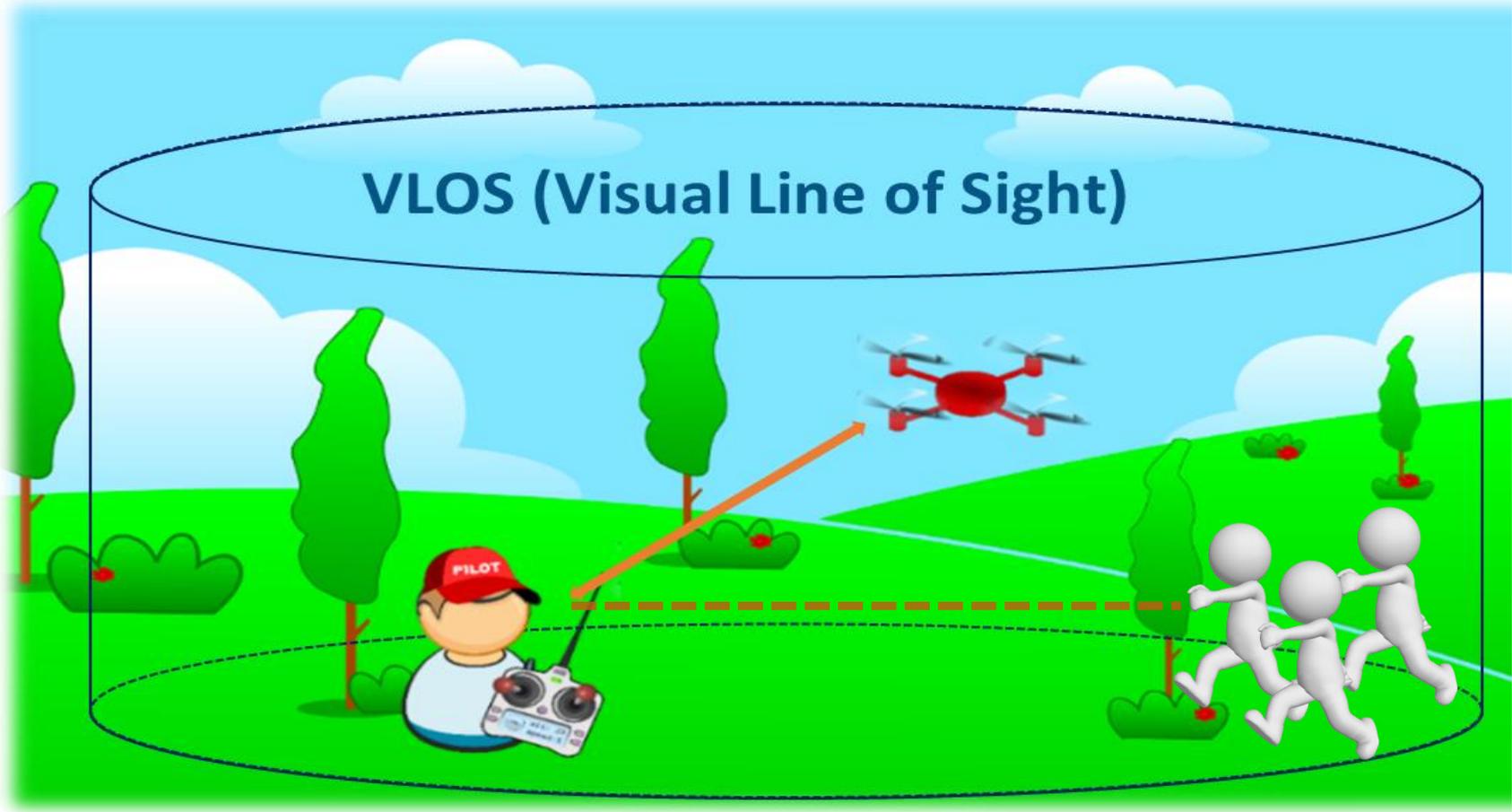
International IFR flights

Definitions



It depends on the size of the drone and characteristics of the area

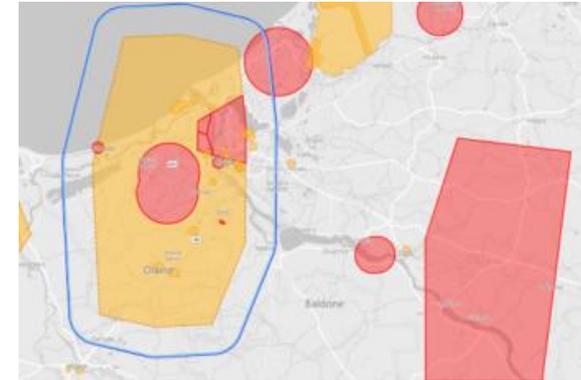
Definitions





Operational authorisation

UAS geographical zone



Flight authorisation

UAS operation vs UAS flight

A **UAS operation** is made of **one or multiple flights** conducted under the same conditions defined by **one operational authorisation**.

Operation centric, risk-based, performance based regulation

- No distinction among professional or leisure operations
- Requirements are not prescriptive: they identify the minimum performance to make the operation safe, not how to reach it (performance based)

UAS categories

<p>Open Regulation 2019/947 – Art. 4</p>	<p>Specific Regulation 2019/947 – Art. 5</p>	<p>Certified Regulation 2019/947 – Art. 6</p>
<p>No authorisation required before starting the operation</p>  <p>PRESCRIPTIVE APPROACH</p>	  <p>SORA</p>	   

[Regulation \(EU\) 2019/945](#) (technical requirements and third country operations)



[Regulation \(EU\) 2019/947](#) (registration and operational requirements)

Drone regulation

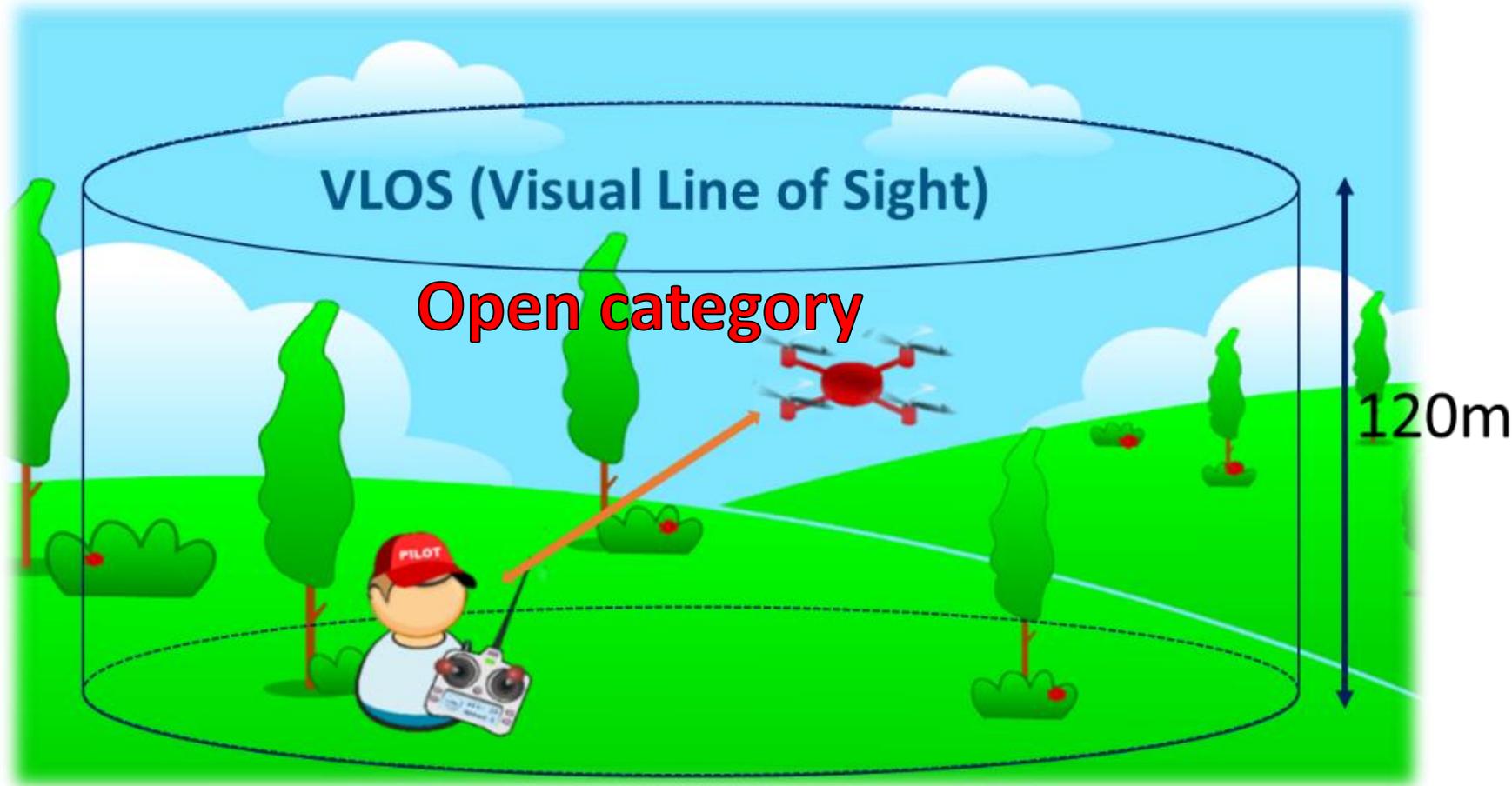
- Applicable to EASA states: EU + Switzerland, Iceland, Lichtenstein and Norway
- Operator registration valid in all EASA states
- Operational authorisation issued by the state of registration is valid in all other states (cross border procedures applies)
- Remote pilots may train and get a certificate in any EASA states
- Only for civil drones but possibility to opt in for state and military drones

Characteristics of the specific category

A drone may crash when flying in an area with an acceptable (low) risk to injury a person or jeopardise a manned aircraft

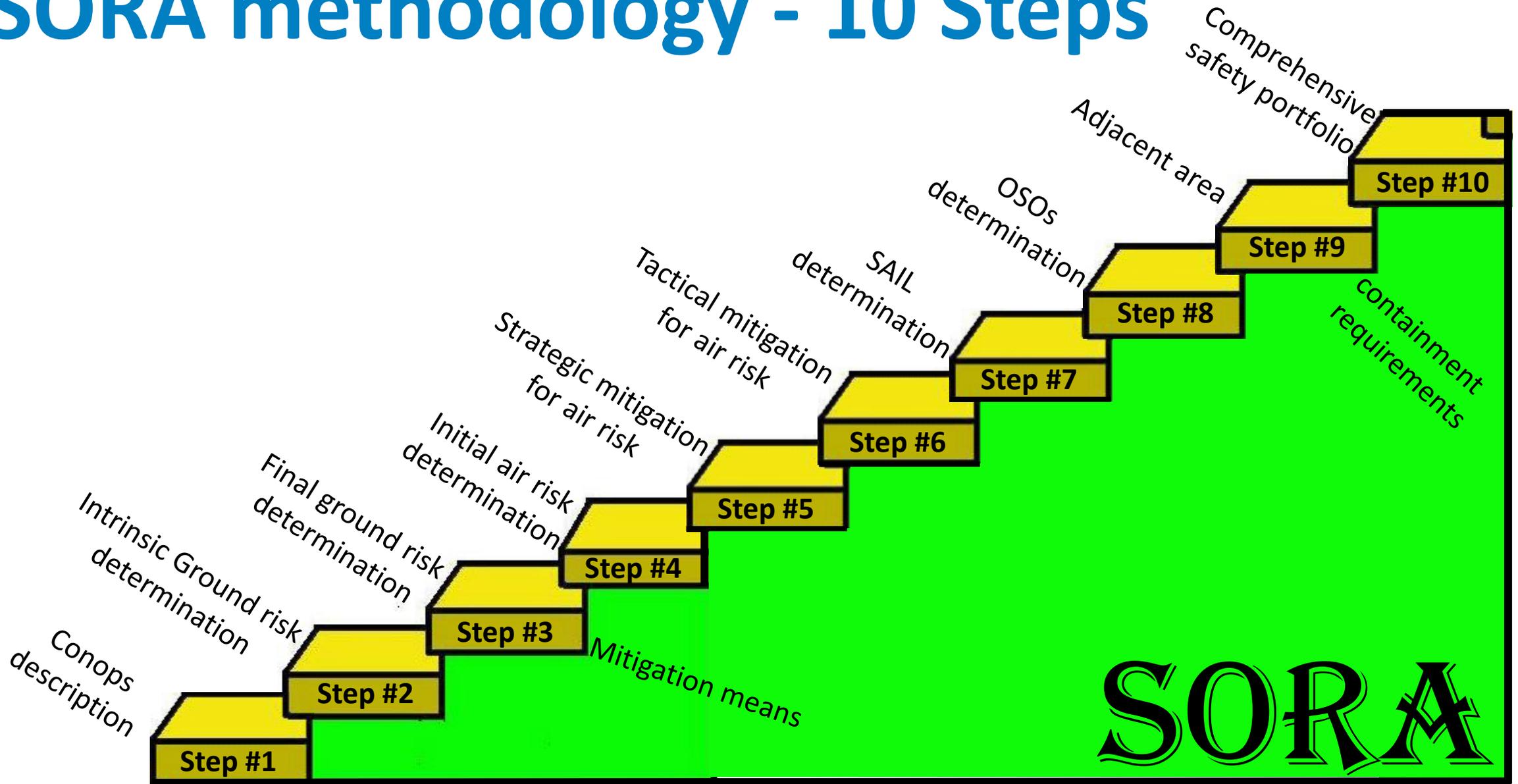


When the specific category starts?



When one or more of the limitations of the open category are exceeded

SORA methodology - 10 Steps



**Is SORA complex and difficult
to understand?**

How to address a so large variety of potential operations?



AQUILA

To help bring internet connectivity to more people, Facebook is designing solar-powered airplanes that will beam internet signal to people in remote, underserved regions within a 60-mile diameter. Each aircraft is designed to be in the air for up to 90 days at a time.

FLIGHT ALTITUDE
Aquila is designed to fly at altitudes between 40,000 and 90,000 feet.

60-MILE COMMUNICATION DIAMETER

WINGSPAN
Aquila has a wingspan bigger than a Boeing 737 airplane.

WEIGHT
Aquila weighs a third as much as an electric car. About half the mass of the airplane is devoted to batteries.

POWER USAGE
At 90,000 feet, Aquila can fly using just 3,000 W of power — about as much as three hair dryers.

WHY SOLAR
Solar airplanes are a less expensive way to deliver internet than fiber or microwave links. They require less maintenance, and don't need to land as often as traditional aircraft.

SPEED
Because it's very large, Aquila is very slow. It flies at less than 60 miles per hour. That's the best endurance speed, or being able to stay aloft for months at a time.



Ensure safety: traditional approach



When a pilot is on board his/her safety needs to be ensured

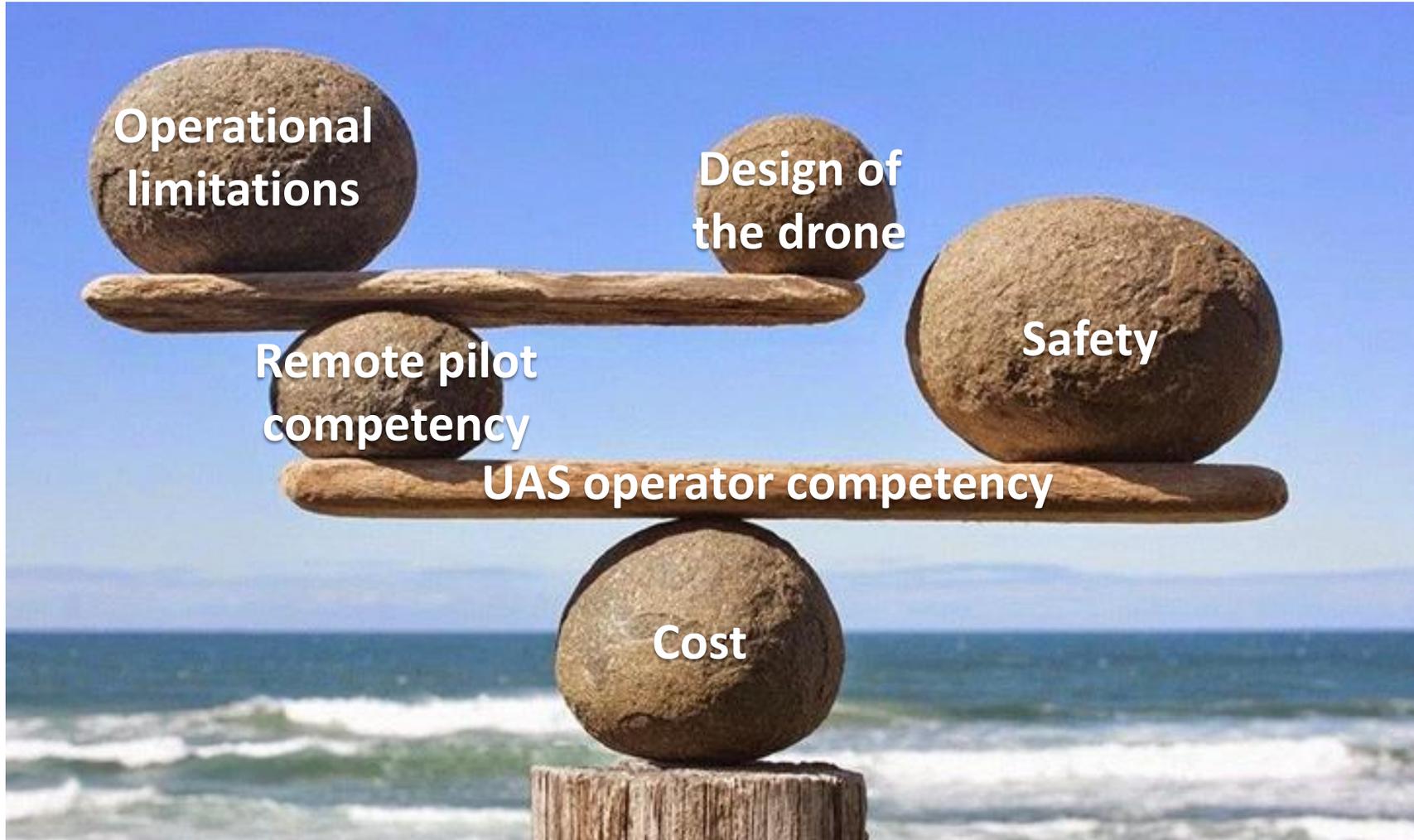


This approach is easy to understand

Is it appropriate for drones?

*Size of stones does not represent the ratio of costs

Ensure safety: a new approach



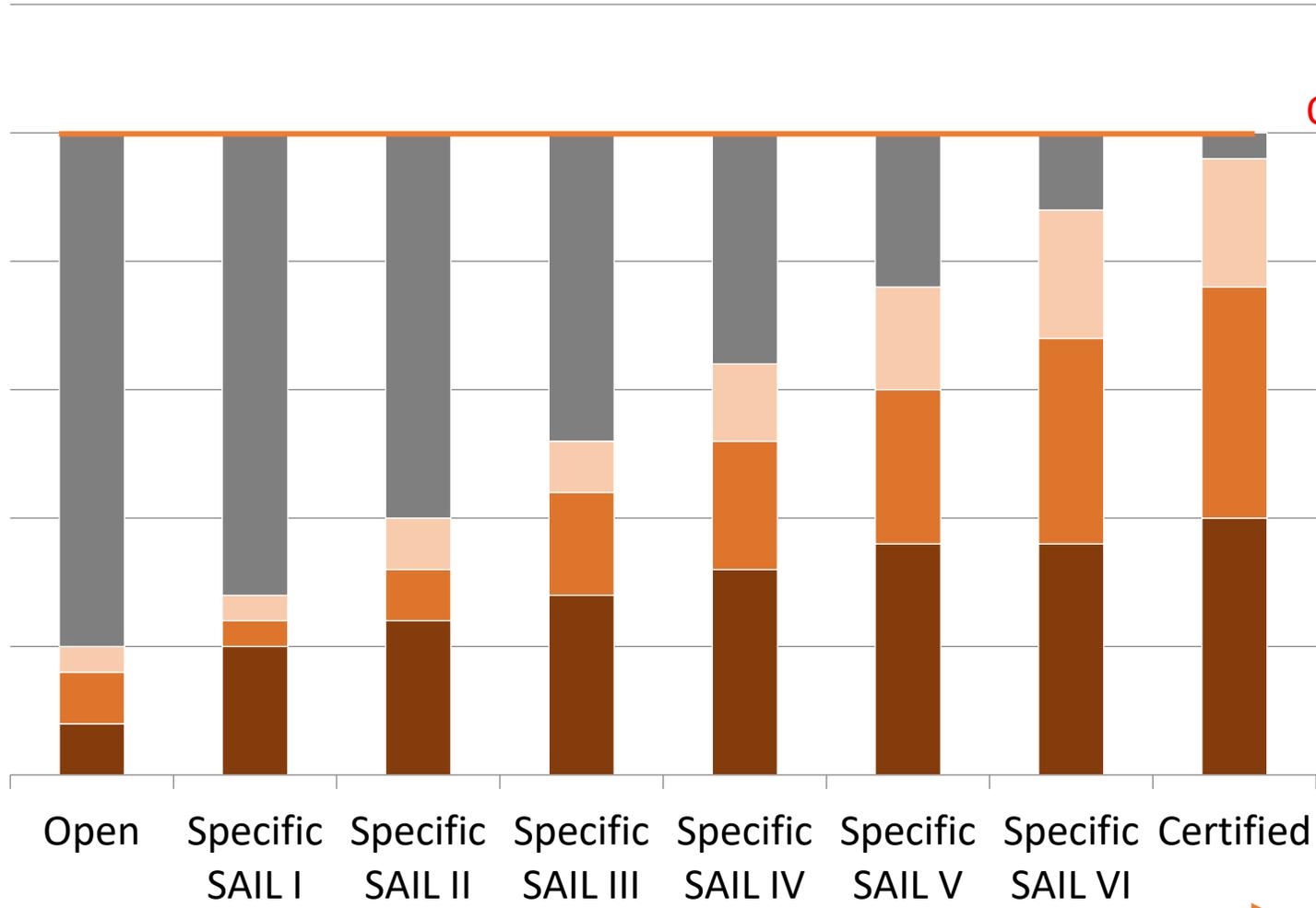
*Size of stones does not represent the ratio of costs

Ensuring safe operations

sli.doc



Safety Contribution



Operational safety target

- Operational limitations
- Remote pilot training
- UAS design
- Operator organisation

Intrinsic Risk of Operation



Please note: the chart is only illustrative of the simplified concept, the length of the bars does not represent the actual contribution

Is SORA complex and difficult to understand?

Traditional approach



Always possible:
Easy to understand but
it may be expensive

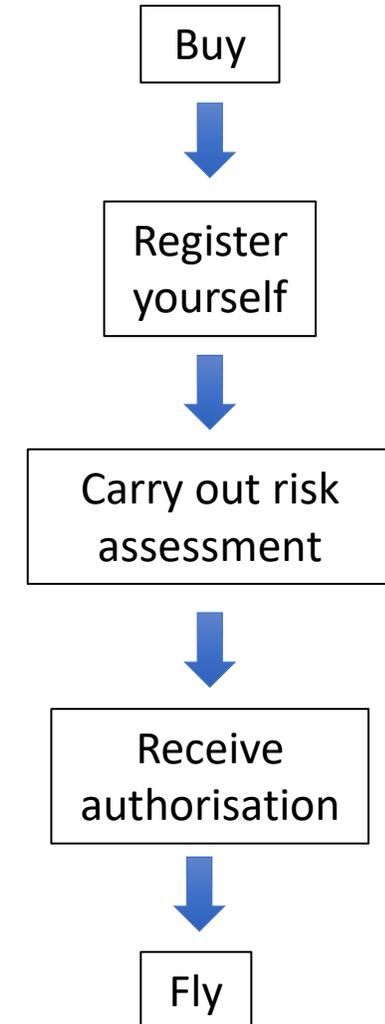
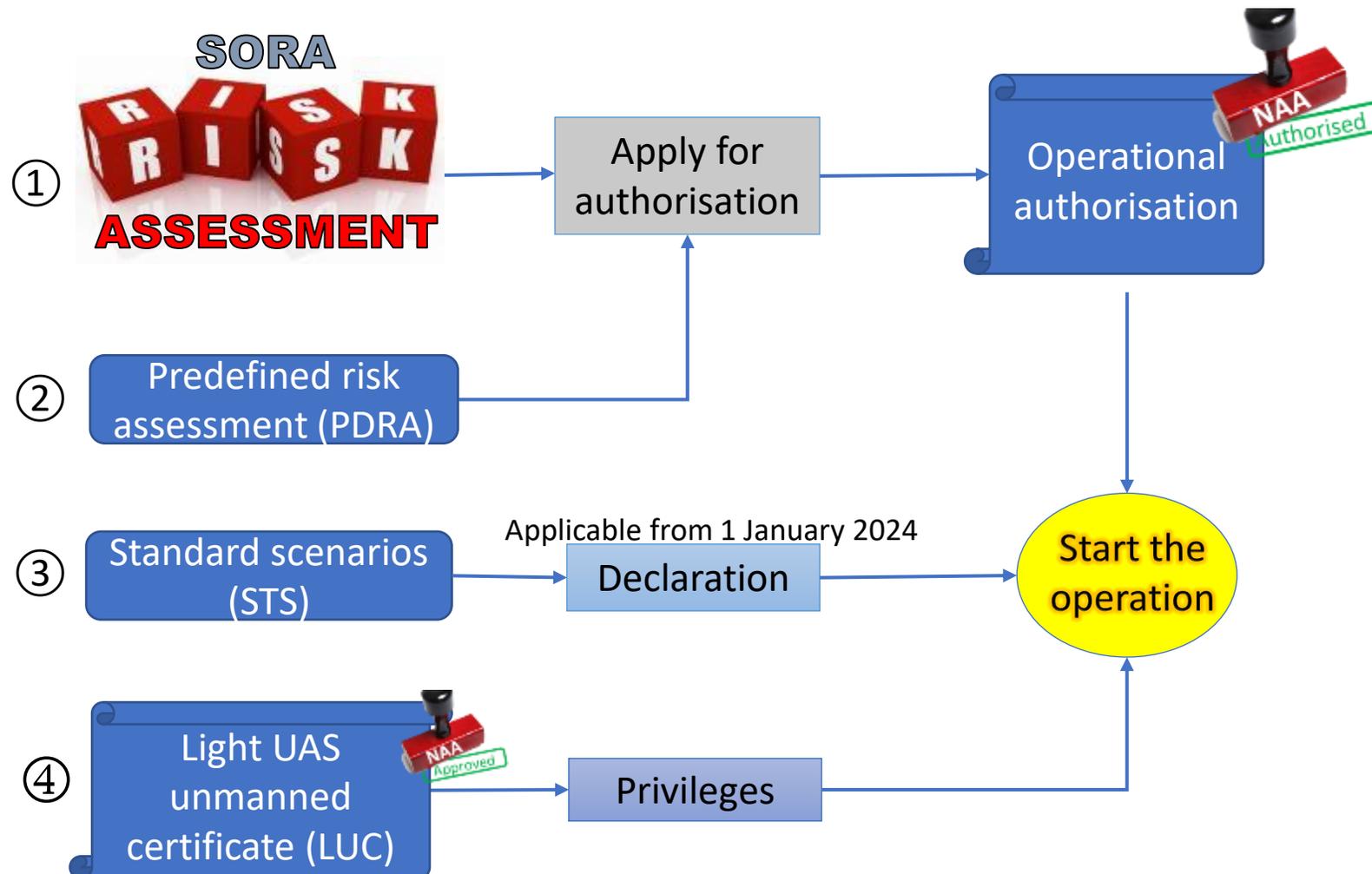
Risk based approach



More the applicant wants to
reduce the cost (identifying
mitigations/limitations),
higher the complexity

Specific category

Requirements based on the risk assessment performed by the UAS operator



Registration as UAS operator

Member State of residence or main place of business



A UAS operator always needs to be registered when operating in the specific category

A UAS operator cannot register twice.
If already registered for previous operation, that is enough



Registration of drones **only** when a certificate of airworthiness is mandated

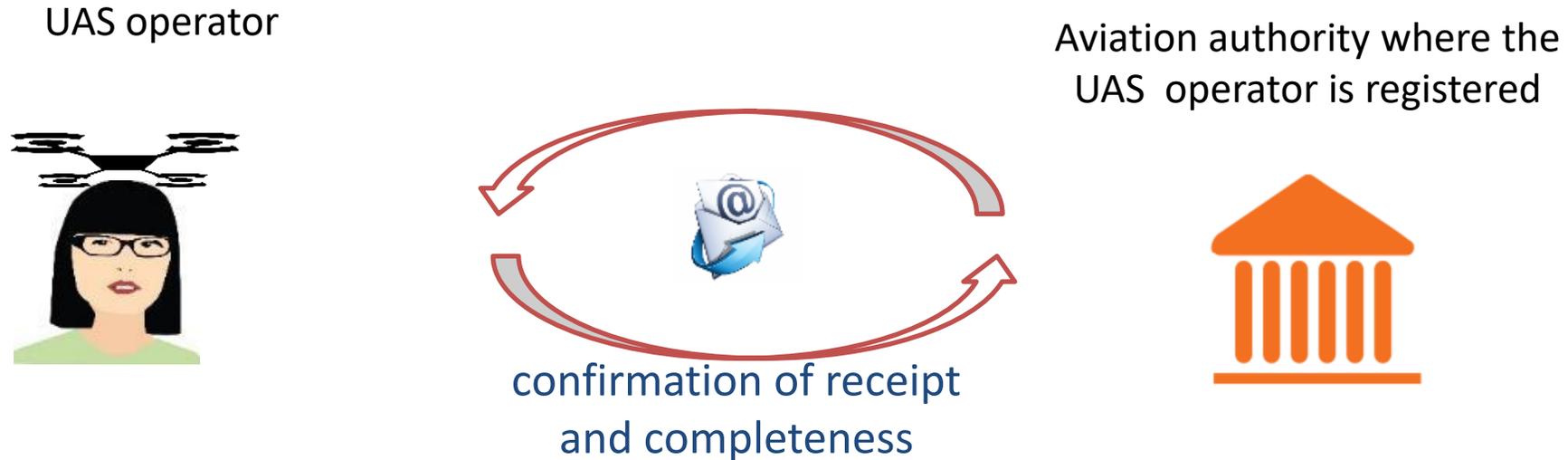




SORA workshop

Specific category – STS and PDRAs and LUC

Specific category – Standard scenario (STS)



2 EU STS published and becoming applicable from 1 January 2024

In some states national STS are available

Predefined risk assessment (PDRA)

Scenarios assessed by EASA applying SORA

Published as
AMC x to SORA

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ¹
1. Operational characterisation (scope and limitations)				
Level of human intervention	Self-declaration	1.1 No autonomous operations: the remote pilot should have the ability to maintain control of the UA, except in case of a loss of the command and control (C2) link.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		1.2 The remote pilot should operate only one UA at a time.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		1.3 The remote pilot should not operate the UA from a moving vehicle.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		1.4 The remote pilot should not hand the control of the UA over to another command unit.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
UA range limit	Self-declaration	1.5 <u>Launch/recovery</u> : at VLOS distance from the remote pilot, if not operating from a safe prepared area. <i>Note: 'safe prepared area' means a controlled ground area that is suitable for the safe launch/recovery of the UA.</i>	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		1.6 <u>In flight</u> :		
		1.6.1 <u>If no AOs are employed</u> : the UA is not operated further than 1 km (or other distance defined by the competent authority) from the remote pilot. <i>Note: The remote pilot's workload should allow them to continuously visually scan the airspace.</i>	<i>Please include a reference to the relevant chapter of the OM, otherwise indicate 'n/a'.</i>	'I declare compliance.' or 'n/a'
		1.6.2 <u>If AOs are employed</u> : the range is not limited as long as the UA is not operated further than 1 km (unless a different distance is defined by the	<i>Please include a reference to the relevant chapter of the OM, otherwise indicate 'n/a'.</i>	'I declare compliance.' or 'n/a'



List of published PDRAs

PDRA Ref	UAS Characteristics	Main Ops characteristics	Typical ops
PDRA-S01 <i>AMC4 Article 11</i> <i>Same scenario of STS-01</i>	MTOM=25 kg Max dimension 3m	<ul style="list-style-type: none"> ✓ VLOS; ✓ Controlled ground area also over populated area; ✓ Controlled or uncontrolled airspace less than 150m AGL; 	Agricultural works, short range cargo ops
PDRA-S02 <i>AMC5 Article 11</i> <i>Same scenario of STS-02</i>	MTOM=25 kg Max dim 3m	<ul style="list-style-type: none"> ✓ BVLOS up to 1km or 2km with AO; ✓ Controlled ground area over sparsely populated area; ✓ Controlled or uncontrolled airspace less than 150m AGL; 	Surveillance, agricultural works, short range cargo ops
PDRA-G01 <i>AMC2 Article 11</i>	Max dim 3m	<ul style="list-style-type: none"> ✓ BVLOS with Aerial Obs; ✓ over sparsely populated area; ✓ Uncontrolled airspace less than 150m AGL; 	Surveillance, long range cargo ops
PDRA-G02 <i>AMC3 Article 11</i>	Max dim 3m	<ul style="list-style-type: none"> ✓ BVLOS; ✓ over sparsely populated area; ✓ Segregated airspace (Height of segregated airspace). 	All range of ops
PDRA-G03 <i>AMC6 Article 11</i>	Max dim 3m	<ul style="list-style-type: none"> ✓ BVLOS; ✓ over sparsely populated area; ✓ Max height of 30m or within 15m from obstacles 	Linear inspections, agricultural works

List of PDRAs under development



JARUS Ref	UAS Charact.	Main Ops characteristics	Typical ops	Status
PDRA-05	Max dim 3m	<ul style="list-style-type: none"> ✓ BVLOS; ✓ over sparsely populated area; ✓ in airspace where at least 50% of manned a/c can be detected; ✓ Up to 120m AGL; 	All range of ops	Published by JARUS
PDRA-06	Max dim 8m	<ul style="list-style-type: none"> ✓ VLOS; ✓ Over controlled ground area; ✓ in airspace where at least 50% of manned a/c can be detected; ✓ Up to 120m AGL; 	Testing of prototype UAS	Under preparation
PDRA-07	Max dim 3m	<ul style="list-style-type: none"> ✓ VLOS/BVLOS; ✓ Over controlled ground area; ✓ Airport environment; ✓ Up to 50m AGL 	Airport/runway inspections, calibration, surveillance	Under preparation

List of PDRAs under development



JARUS Ref	UAS Charact.	Main Ops characteristics	Typical ops	Status
PDRA-08	Max dim 1m	<ul style="list-style-type: none"> ✓ VLOS with aerial observers; ✓ Over controlled ground area; ✓ Segregated airspace; ✓ Up to 120m AGL 	Drone light shows	Under preparation
PDRA-10	Max dim 3m	<ul style="list-style-type: none"> ✓ VLOS with arial observers; ✓ Over sparsely populated area; ✓ Uncontrolled airspace ✓ Up to 200m AGL; 	Surveillance	Under preparation
PDRA-0x	Max dim 3m	<ul style="list-style-type: none"> ✓ VLOS; ✓ Over sparsely populated area; ✓ Segregated airspace; ✓ Up to 40m AGL 	Agricultural work	Under preparation

Application process in case of PDRA

The UAS operator is not required to conduct the SORA risk assessment

Apply for authorisation

topic	Level of Assurance	PDRA provision	Compliance	Assurance
Level of human intervention	Low	1.1 No autonomous operations: the remote pilot should have the ability to maintain control of the UA, except in case of loss of the command and control (C2) link.	N/A	I declare that the UAS always allow the remote pilot to take control of the UA
	low	1.2 The remote pilot should operate only one UA at a time.	Operation manual at para xx indicates that remote pilot operates only one UA at a time	I declare....
	medium	1.3 The remote pilot should not operate from a moving vehicle.	Operation manual at para xx indicates that remote pilot cannot operate from a moving vehicle	I declare...., evidence can be found in appendix y to this document
	mow	1.4 The remote pilot should not hand over the control of the UA to another command unit.	...	I declare....
	Low	1.5 <u>Launch/recovery</u> : at VLOS distance from the remote pilot, if not operating from a safe prepared area. <i>Note: 'safe prepared area' means a controlled ground area that is suitable for the safe launch/recovery of the UA.</i>	I declare....
UA range limit	Low	1.6 <u>In flight</u> : 1.6.1 <u>If no AOs are employed</u> : the UA is not operated further than 1 km (or other distance defined by the competent authority) from the remote pilot. <i>Note: The remote pilot's workload should allow the remote pilot to continuously scan the airspace.</i>	N/A: AOs are employed	I declare....
	medium	1.6.2 <u>If AOs are employed</u> : the range is not limited as long as the UA is not operated further than 1 km (unless a different distance is defined by the competent authority) from the AO who is nearest to the UA.	Operation manual at para xx provides AO procedures	I declare that the procedures have been developed according to standards xx...., evidence can be found in appendix y to this document





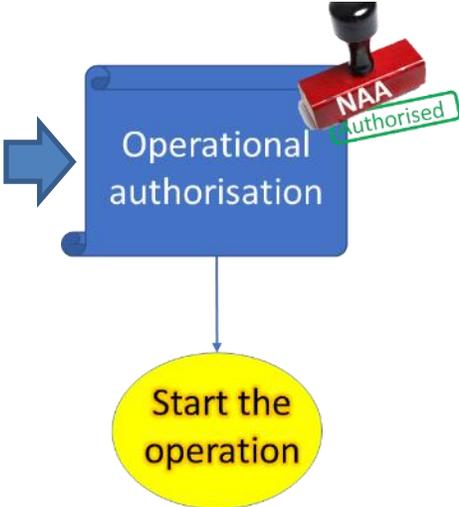
Application for an operational authorization

Data protection: Personal data included in this application is processed by the competent authority pursuant to [Regulation \(EU\) 2016/679](#) of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing [Directive 95/46/EC](#) (General Data Protection Regulation). It will be processed for

1. UAS operator data

1.1 UAS operator registration number	
1.2 Name of the UAS operator	
1.3 Name of the accountable manager	
1.4 Operational point of contact Name	





EASA plans to develop example of operation manual for each PDRA

Generic vs precise authorisations

- **Generic**: defined qualitatively (e.g. in a sparsely populated area, max 120m, in Arc b)
- **Precise**: defined by geographical coordinates

Precise authorisations if:

M1 mitigations are used

Residual ARC is 'c' or 'd'

Strategic mitigations are applied to lower the initial ARC (SORA Step #5), except when operating in a U-space airspace

The LUC

Light UAS unmanned certificate

Reg 2019/947 – Part C

LUC – Light UAS operator unmanned certificate



Applicable to all drones,
independently of their weight

Voluntary for operations in SAIL I-II-III

Mandatory for operations in SAIL IV-V-VI

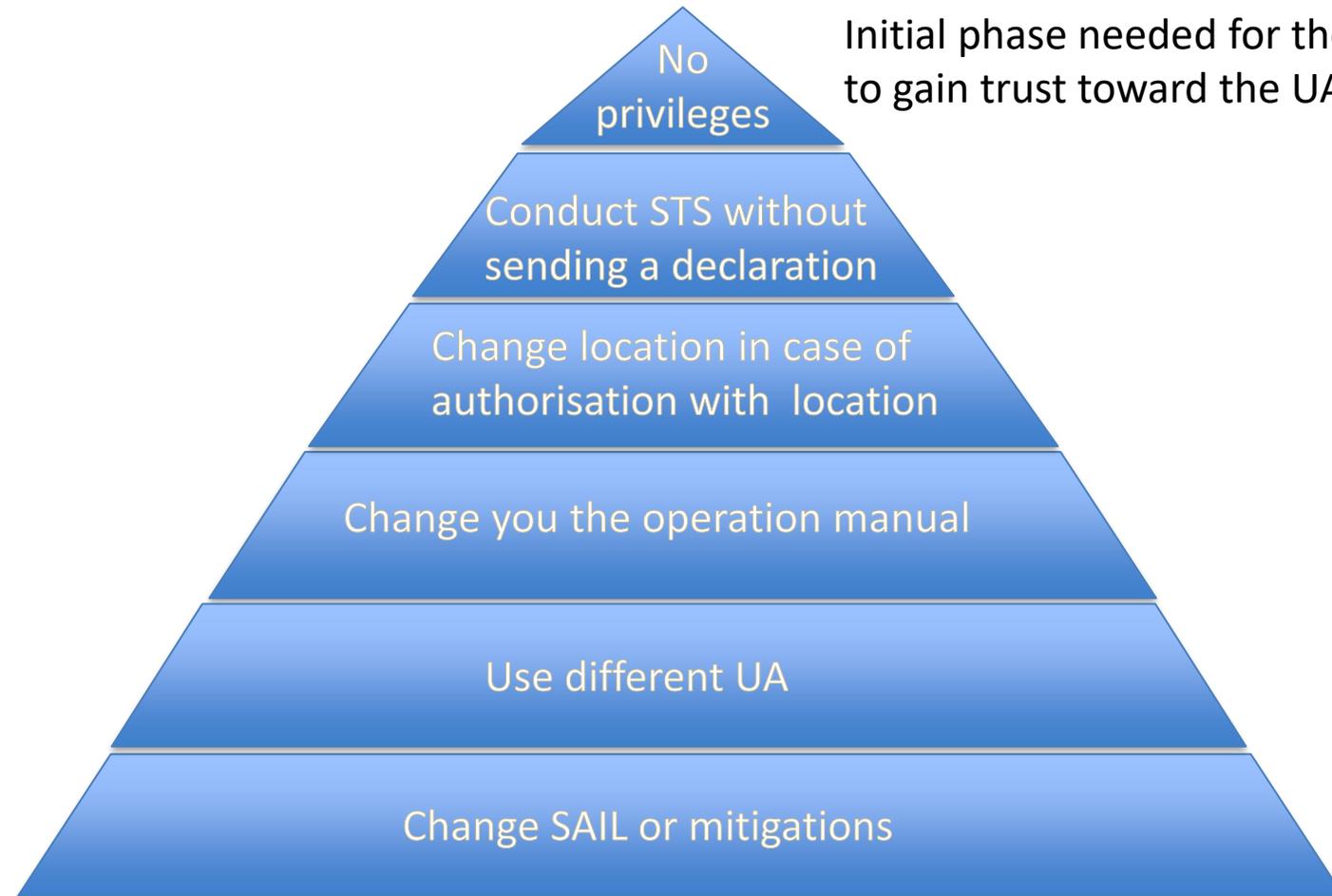
It requires a robust organisation (technically and financially) implementing some SMS requirement

It's a matter of TRUST of the authority toward the UAS operator

- ➔ It requires previous experience of SORA and risk mitigation
- ➔ It requires to demonstrate « how the operator thinks »

A LUC with privileges should be assigned to UAS operators only after a period in which the competent authority monitors the UAS operator through operational authorisation(s)

Privileges associated to LUC



Initial phase needed for the authority to gain trust toward the UAS operator



Your safety is our mission.