



**Federal Aviation  
Administration**



## ASTM Standards – Spring 2021 Meeting

Jay Merkle, Executive Director  
FAA Unmanned Aircraft Systems Integration Office

May 27, 2021

# Agenda

- Recent UAS Rules
- Standards Supporting Recent Rules
- FAA Participation/Acceptance
- RID Compatibility Issues
- Questions

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# Recent UAS Rules

- Operations Over People/Night Operations
- Remote Identification of UAS



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# Operations Over People Overview

- Small UAS Operations Over People (OOP) Notice of Proposed Rulemaking (NPRM) published 2/13/2019
  - Approximately 933 comments received at close of comment period, 4/15/19
- Final rule published 1/15/21, effective 4/21/21:
  - Creates categories of operations that permit small Unmanned Aircraft (UA) to operate over people
  - Allows small UA operations over moving vehicles
  - Allows routine night operations
  - Updates initial testing and recurrent training requirements



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# Operations Over People Rule Schedule

<b>Final Rule posted on FAA.gov</b>	<b>December 28, 2020</b>
Final Rule published in Federal Register	January 15, 2021
Night Testing & Training	April 6, 2021 (15 days prior to effective date)
Portal operational to accept Declaration of Compliance	April 11, 2021 (10 days prior to effective date)
Effective Date – including the beginning of night operations without a waiver	April 21, 2021



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# Remote Identification (ID) Rule Overview

- Remote Identification of UAS (RID) Notice of Proposed Rulemaking (NPRM) published 12/31/2019
  - Over 53,000 comments received at close of comment period, 3/2/20
- Final rule published 1/15/21, effective 4/21/21:
  - RID can be described as a “Digital License Plate” for UA
  - It is the next step toward further integration of UA into the National Airspace System (NAS)
  - RID is necessary to address aviation safety and security issues regarding UA operations in the NAS and is an essential building block toward safely allowing more complex UA operations.



# Remote ID Rule Schedule

<b>Final Rule posting on FAA.gov</b>	<b>December 28, 2020</b>
Final Rule published in Federal Register	January 15, 2021
Final Rule Effective Date	April 21, 2021
UAS Manufacturing/Production Compliance Date	September 16, 2022
FAA begins accepting FRIA applications	September 16, 2022 (Subpart C effective 20 months after publication date)
Operational Compliance Date	September 16, 2023



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# ASTM Standards Supporting Recent Rules

- Remote ID – F3411-19
  - Published and in Revision to align with final rule
- Operations Over People Test Methods – F3389-20
  - Published and in Revision to align with final rule



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# FAA Participation/Acceptance

- FAA's UAS Integration Office (AUS) working with FAA's Aircraft Certification Service (AIR) and the Office of the Chief Counsel (AGC) to clarify and standardize FAA participation in Standards Development Organization (SDO) activity.
- FAA must prioritize resources and may not be able to participate in every development effort
- FAA acceptance of standards is separate process from FAA participation in standards development process
- FAA is expecting industry consensus standards to be presented as means of compliance for Remote ID & Operations Over People rules
- Acceptable means of compliance will be published via Notice of Availability (NOA) in the Federal Register and listed on the FAA website



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# RID Compatibility Issues

- The Federal Government, including the FAA, is committed to publishing performance based rules
- Performance based rules allow greater innovation and flexibility for industry through use of industry consensus standards
- It is critical that rules, standards, and equipment maintain flexibility to allow for modernization and maintain backward compatibility to accommodate:
  - Bluetooth Versions (4/5)
  - WiFi Versions (NAN/Beacon)
  - Hardware/Operating Systems, i.e.
    - Apple/iOS
    - Samsung/Android

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# A Canadian Perspective: Creating an RPAS Regulatory Framework



ASTM F38 – Spring 2021



Transport  
Canada

Transports  
Canada

Canada



# Overview

- The Canadian Approach to Drone Regulation
- The International Approach to the Drone Industry
- Regulatory Cooperation
- Implementation & Harmonization



# How does Canada regulate RPAS?



Transport  
Canada

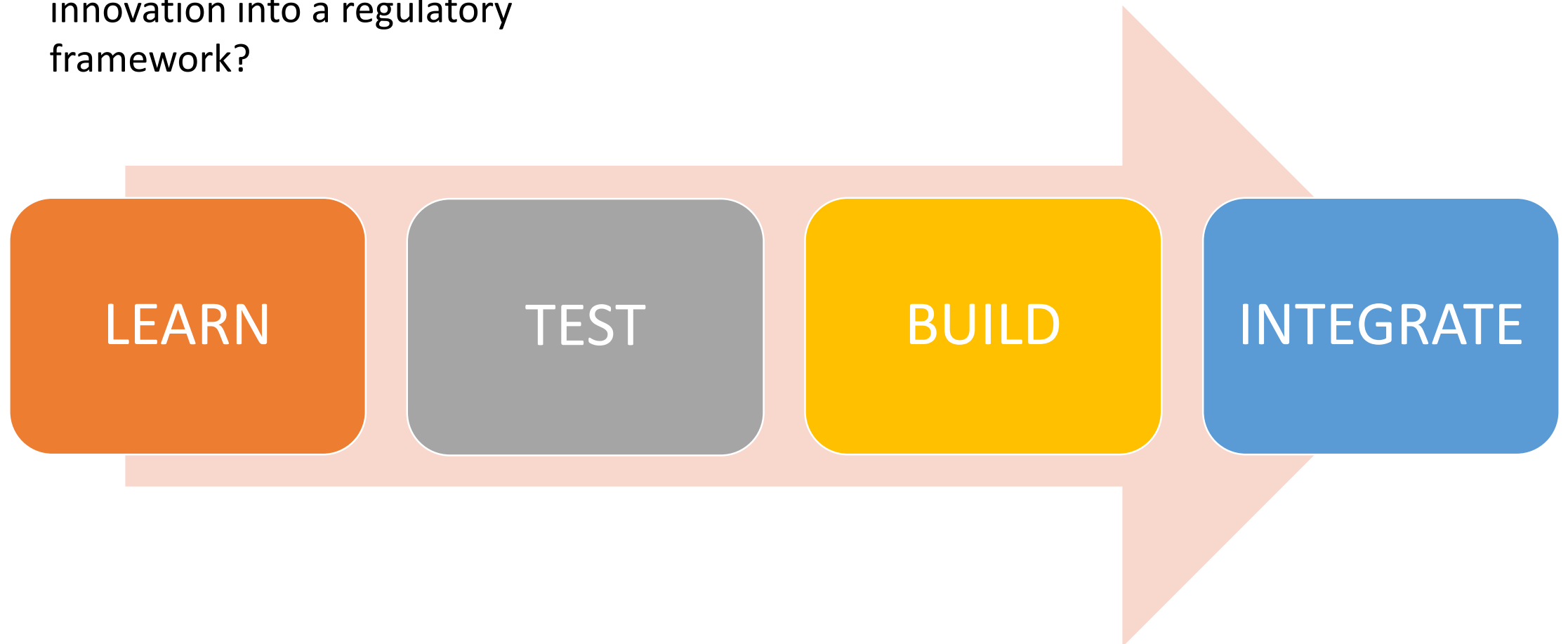
Transports  
Canada

Canada



# Canadian Regulatory Approach

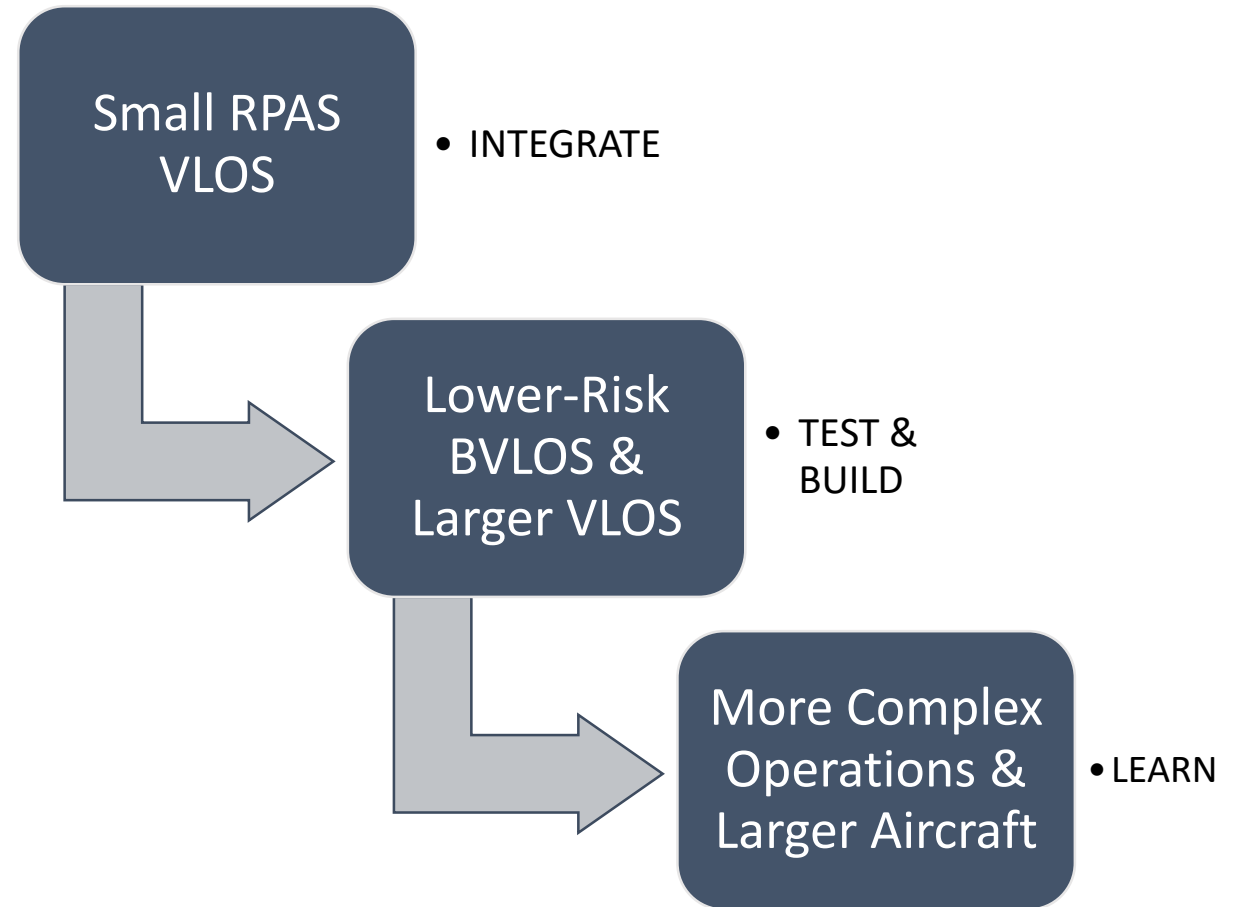
- Challenge: How do we integrate innovation into a regulatory framework?





# Rinse and Repeat

- Regulating innovation requires an iterative approach
- RPAS is not one thing and will require multiple waves of regulations
- To be timely in regulatory development, we need to be learning and testing on the next phase while the previous phase is moving towards integration





# How do we get there from here?

How do we deal with the middle?





# How are Civil Aviation Authorities and Industry responding?



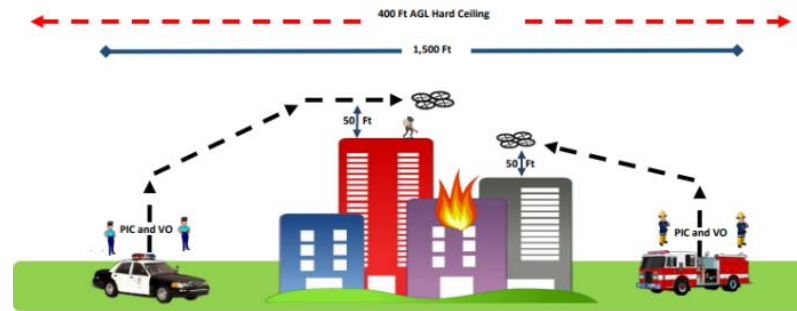
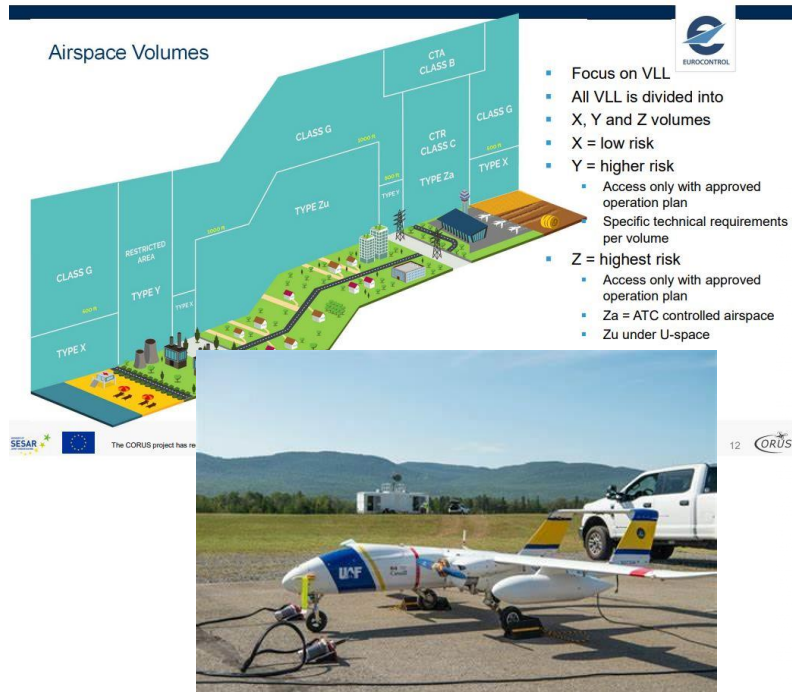
Transport  
Canada

Transports  
Canada

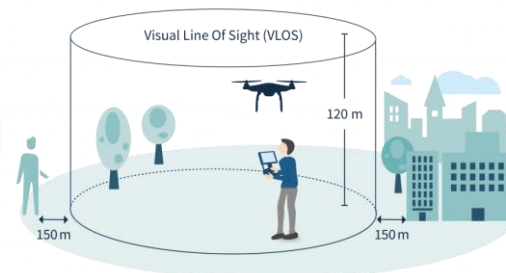
Canada

# International - Diversity in Operations

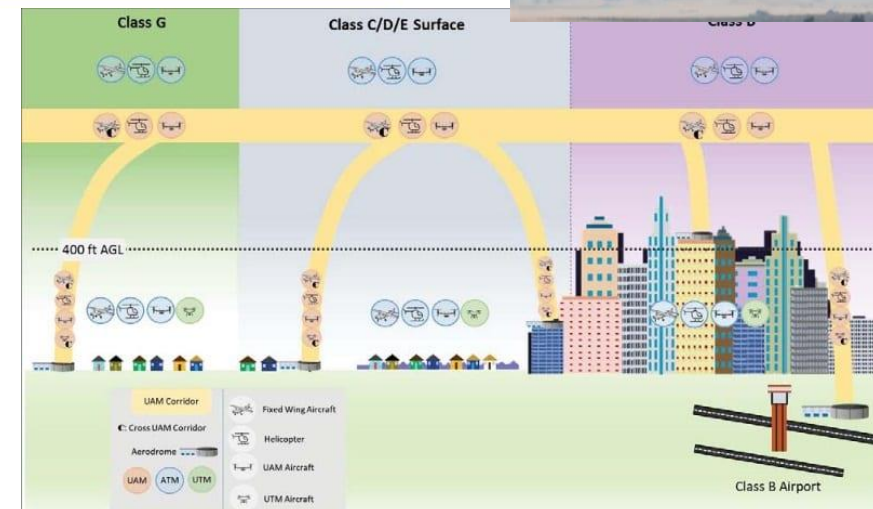
- General alignment in operational categories internationally.
- A multitude of ConOps and regulatory tools being researched & trialed.



## OPEN CATEGORY SUBCATEGORY A3



**No fly over uninvolved people**  
Conducted in an area where the remote pilot reasonably expects that no uninvolved person will be endangered within the range where the unmanned aircraft is flown during the entire time of the UAS operation.





# International - Personnel

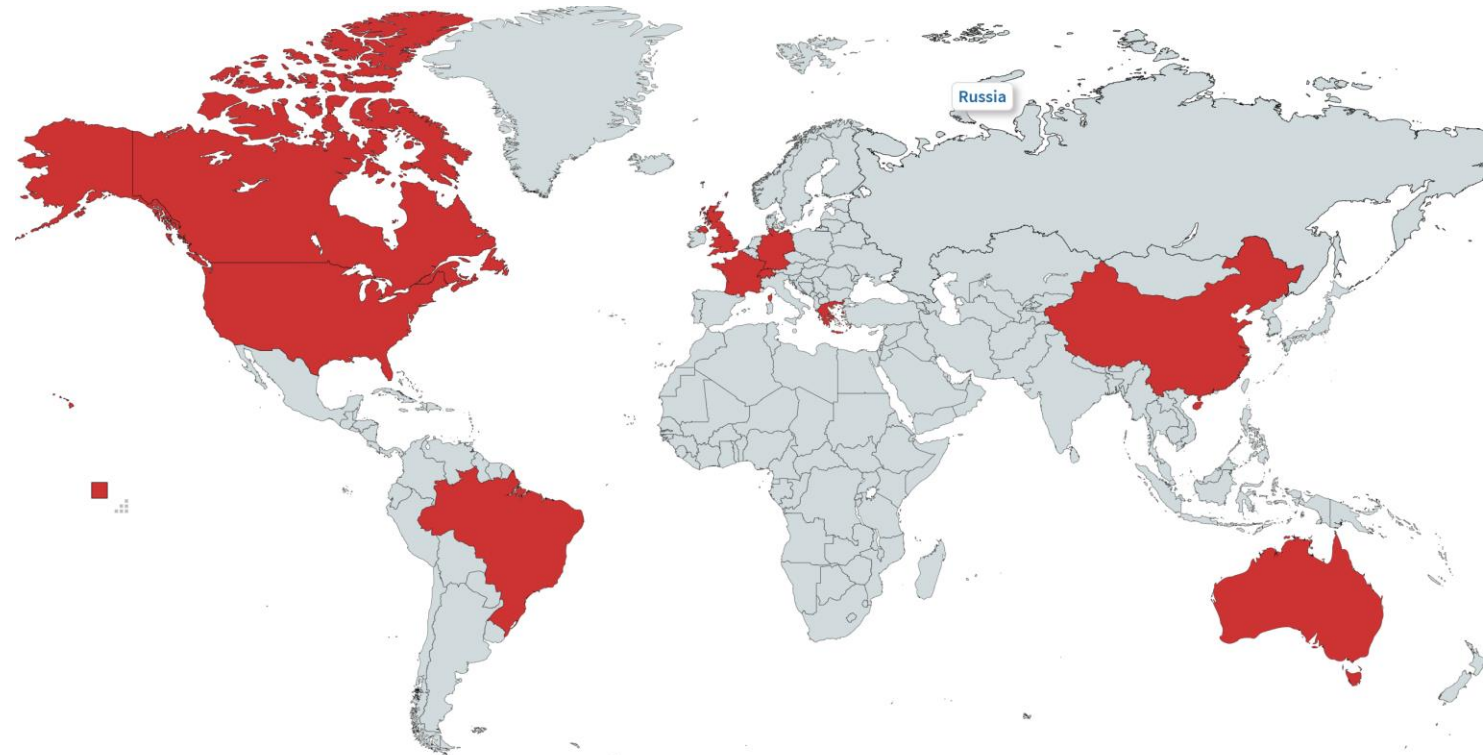
- Most jurisdictions require pilot training as well as competencies for ground crew.
- Expectations vary depending on operation and relative risk.
- RPAS operate beyond borders!





# International - Products

- A recent TCCA survey of sRPAS designers identified nearly a dozen different countries of origin for “Advanced” operations since 2019.
- Expect the industry to continue to grow and diversify.





# How do regulators work together?



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Canada

Transports  
Canada

Canada



# How have we done so far?

- Common regulatory frameworks provide a basis for “analogous” approvals:
  - Have identified particular challenges in recognizing approvals from other jurisdictions.
  - Risk evaluation frameworks are not always aligned.
  - Not all domestic authorities have the same regulatory tools.
- Strengthening multi-lateral and bi-lateral partnerships.
- Acknowledge the work the standards community has done to support safe operations and integration (e.g. AC 922-001, AC 903-001, CE markings, AW Drones, Ops Over People DoC process):
  - Still work to be done between regulators to understand the “analogues”: processes, limitations, and applicability of standards.



# Still work to do!

- Regulators recognize the need for a common approach to managing aviation safety and regularly meet to address the issues (ICAO, JARUS, Bilaterals):
  - The flexibility of domestic regulatory approaches needs to be balanced against international expectations.
  - Develop bases to support reciprocity of approvals.
- Industry has also recognized the need for a harmonized approach to routine operational approval:
  - **SDOs – ASTM, RTCA, EUROCAE, ISO, SAE and others!**





Thank you!

Canada 



Transport  
Canada





# European Union UAS Regulatory Framework

ASTM F38 Committee Meeting

May 27, 2021

*Nicolas Eertmans*  
*European Commission, Aviation Safety Unit*



# UAS regulatory framework - 3 categories



open



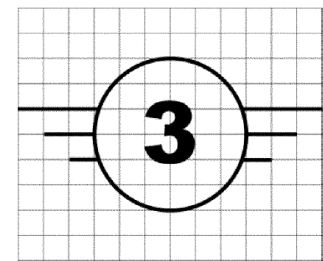
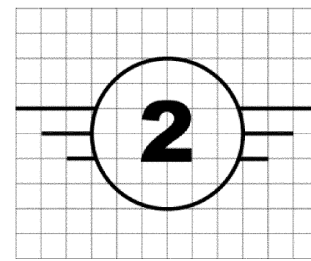
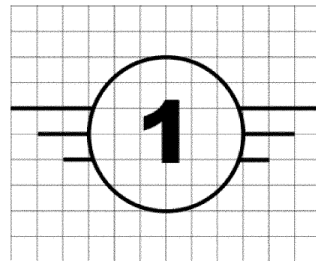
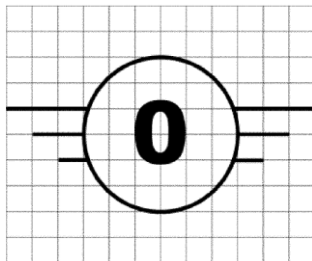
specific



certified



# Classes of unmanned aircraft in the 'open' category of operations



# UAS regulatory framework foundations



## UAS operators registration

Mandatory for operators of UAS > 250g

National registration systems, interoperable through EASA repository

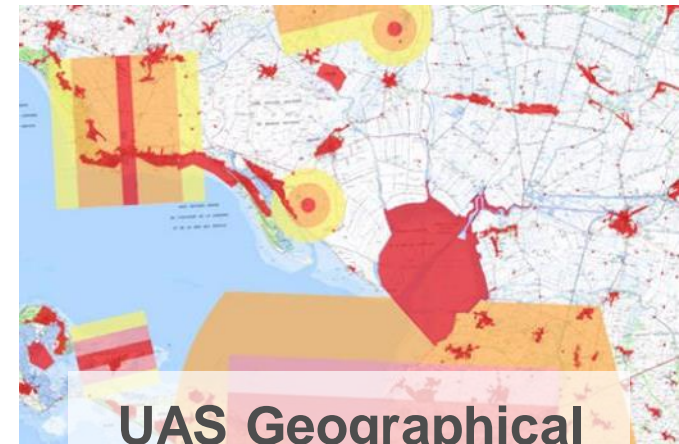
Applicable from **31/12/2020**



## Electronic Identification

Mandatory for new drones complying with CE classes C1-C3, C5, C6

Gradual operational limitations for non-compliant drones



## UAS Geographical zones and geo-awareness

UAS geographical zones restricting/relaxing UAS operations

Mandatory for new drones complying with CE classes C1-C3, C5, C6

# U-space

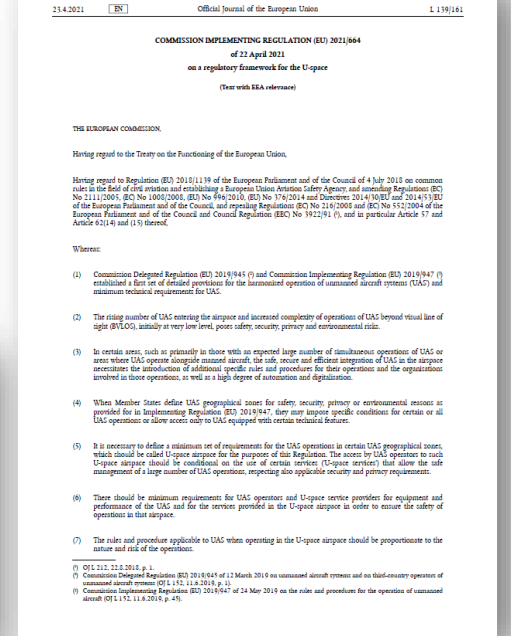
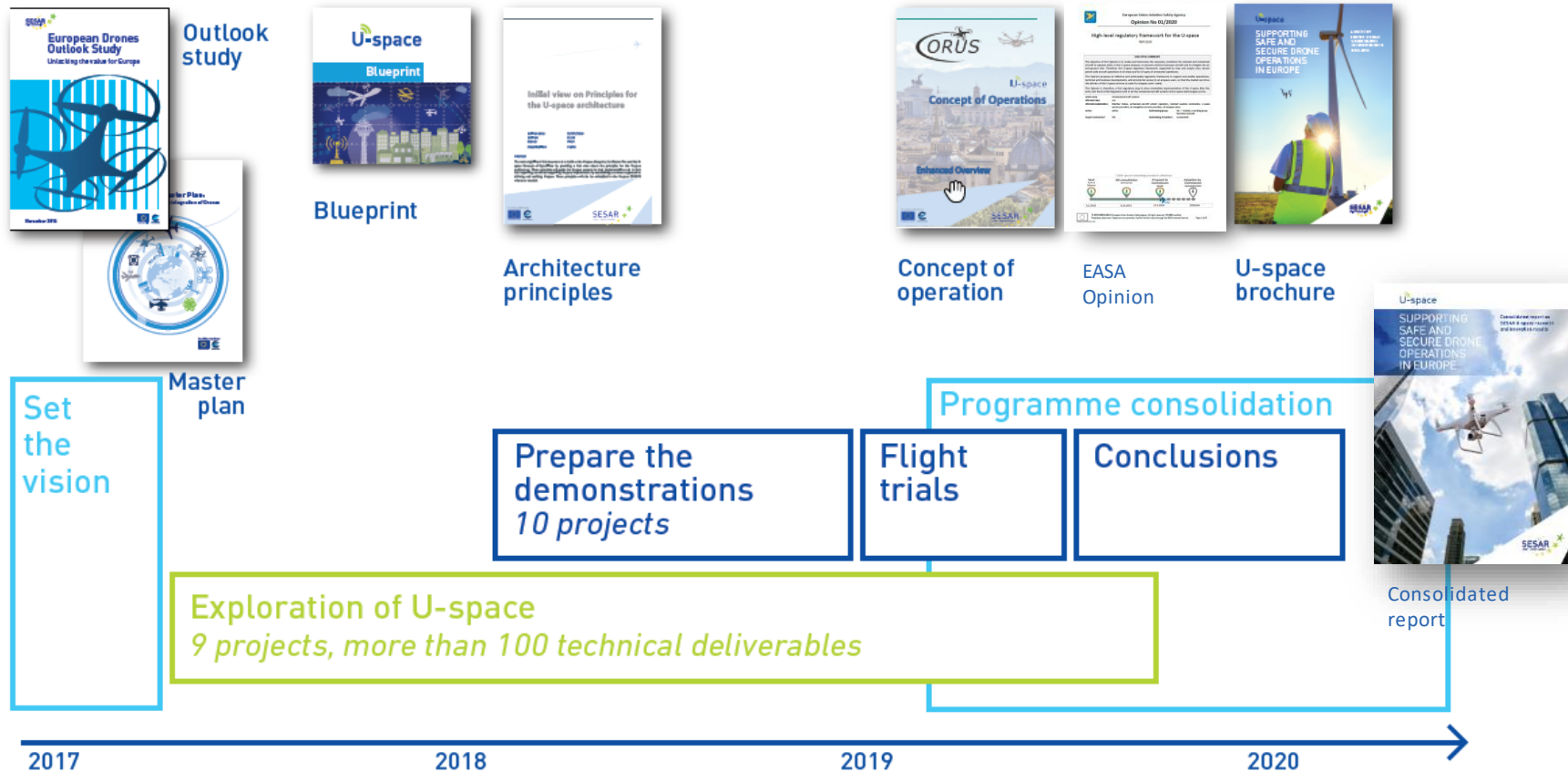


A traffic management system for UAS operations in designated airspace

Fundamental prerequisite for fully automated BVLOS operations and the development of UAM

Based on connectivity and Internet services

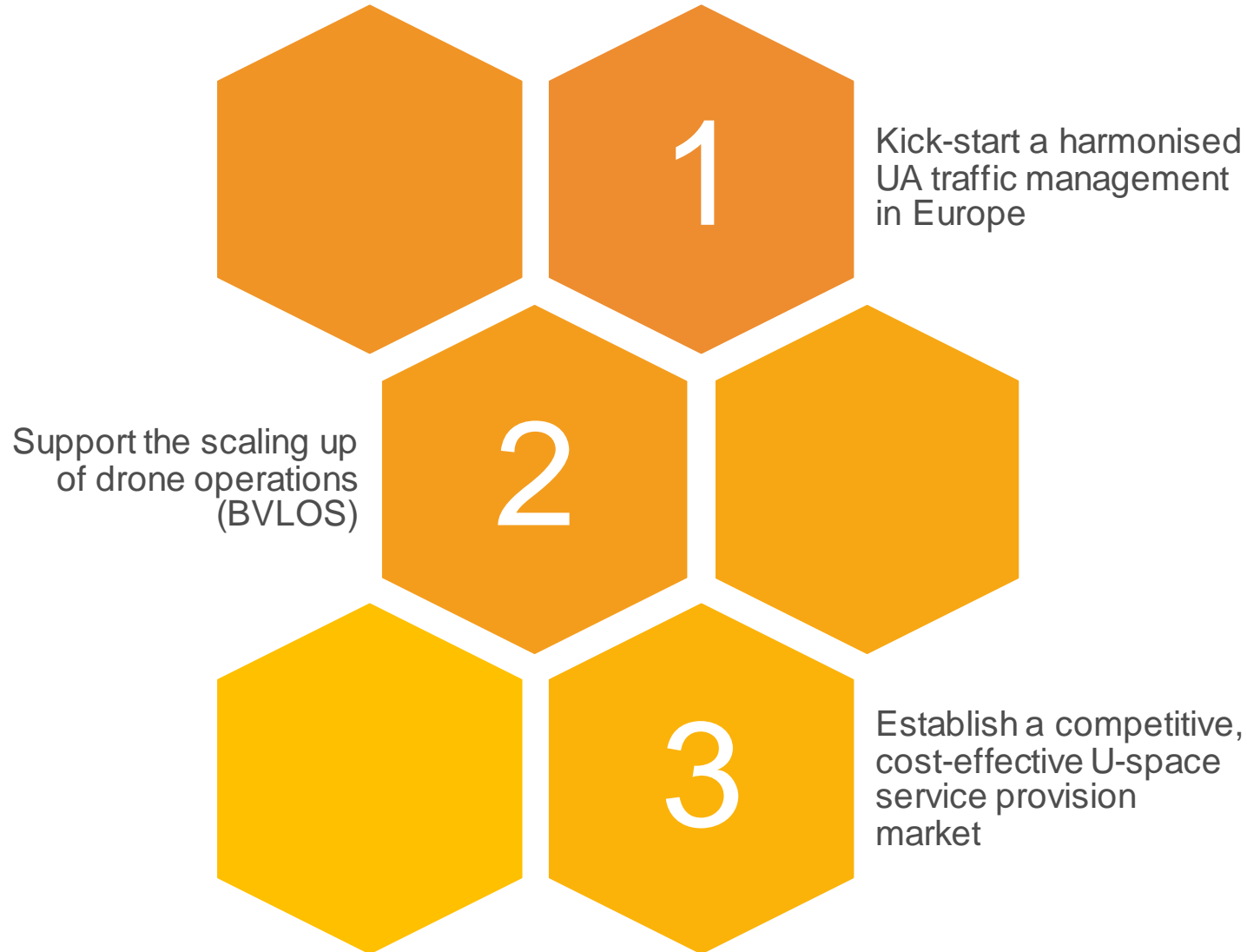
# A short & complex timeline to 2021



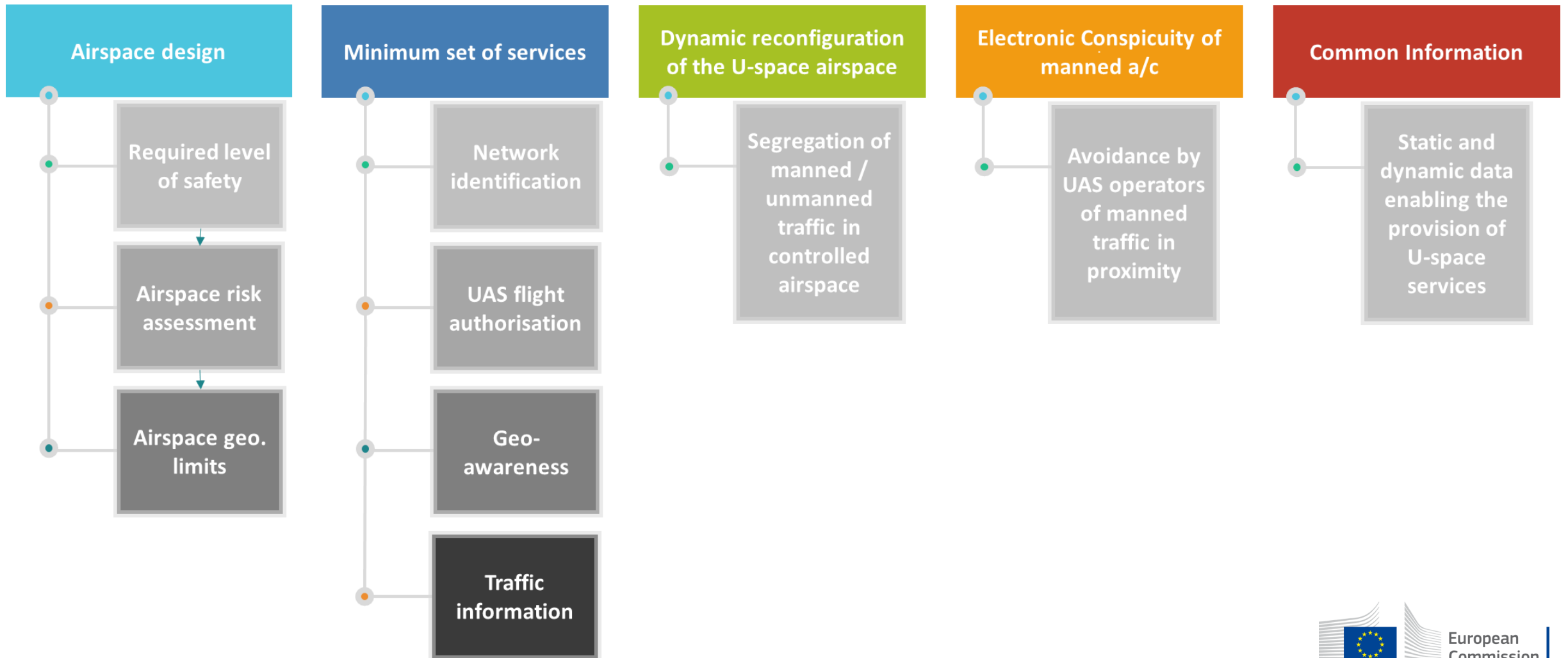
(EU) 2021/664

2021

# U-space regulatory framework, what do we want to achieve?



# Initial U-space regulatory framework

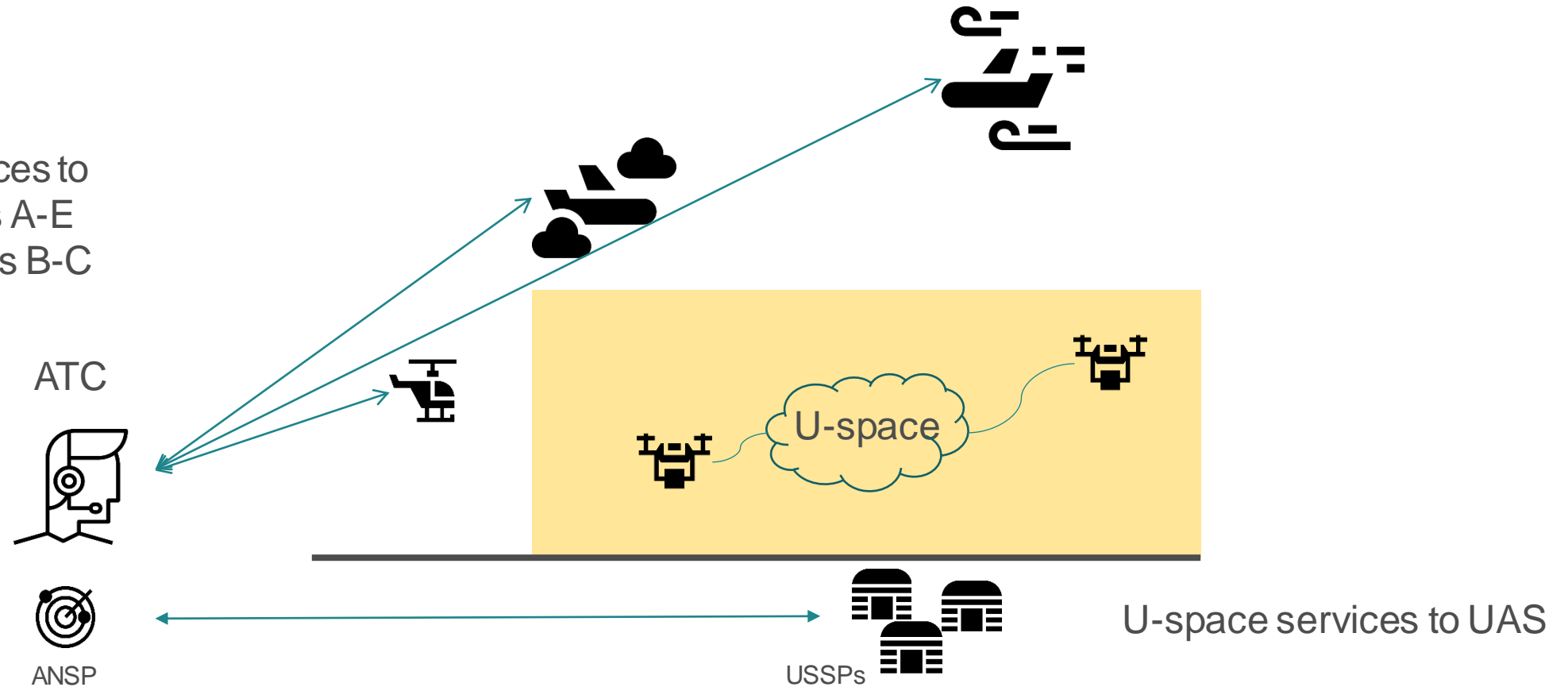




# Segregation of manned / unmanned traffic in controlled airspace

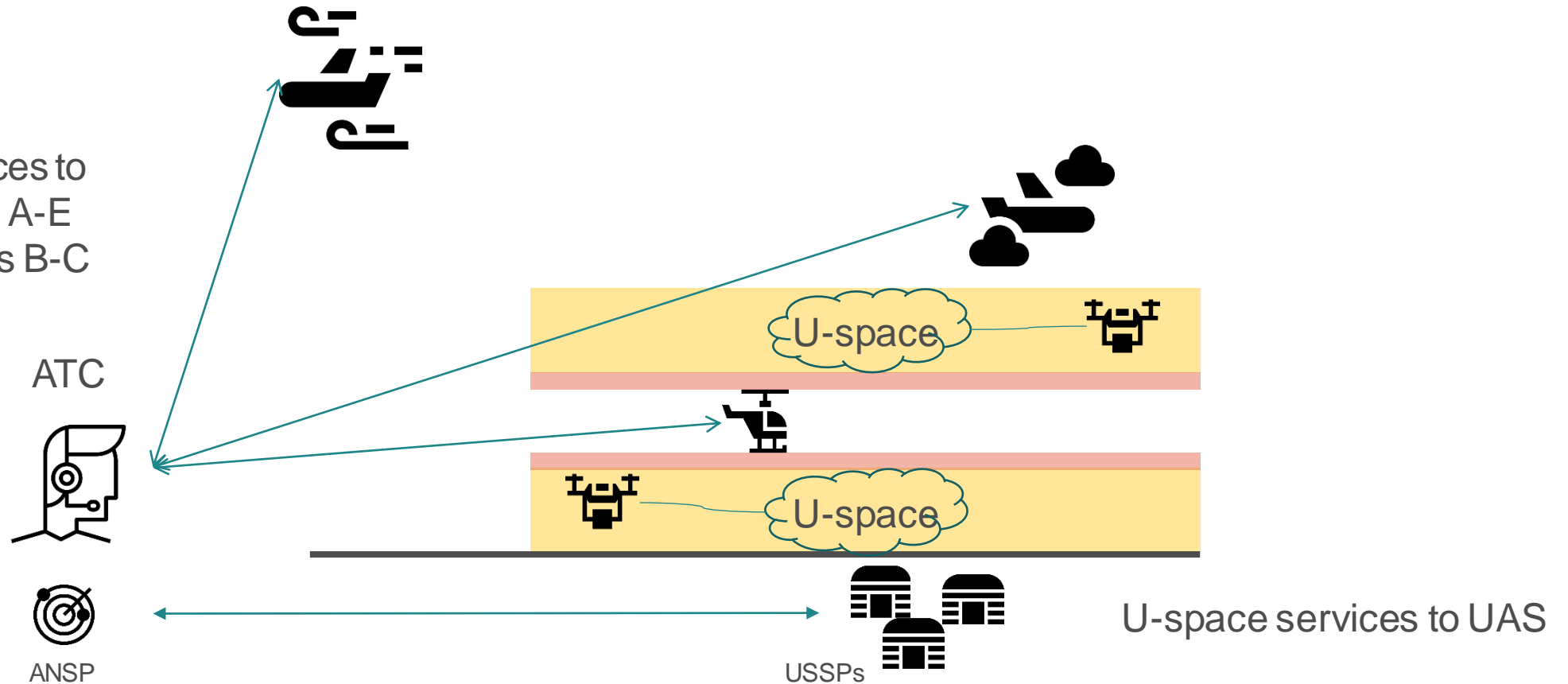
Air traffic services to

- IFR in Class A-E
- VFR in Class B-C

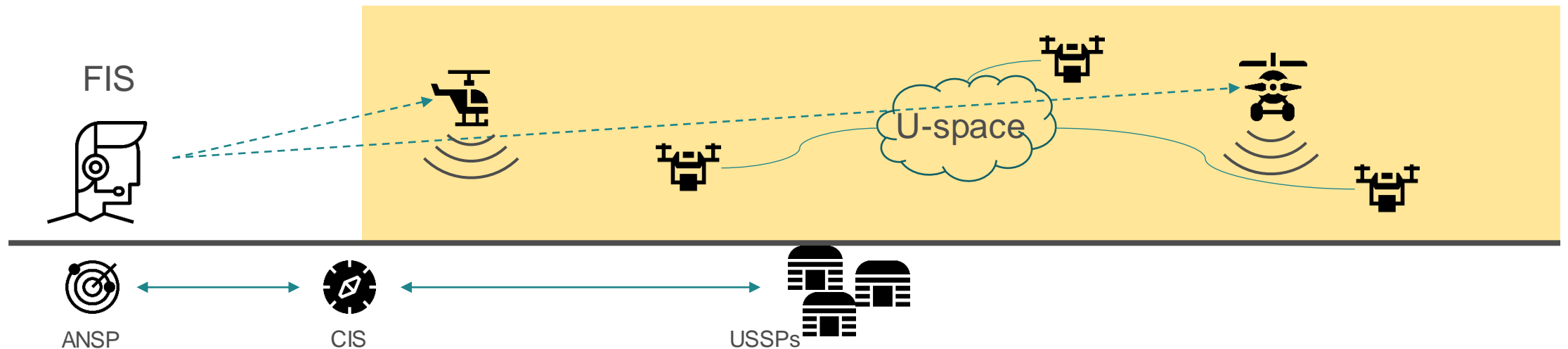
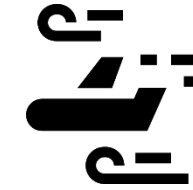


# Dynamic reconfiguration in controlled airspace

- Air traffic services to
- IFR in Class A-E
  - VFR in Class B-C



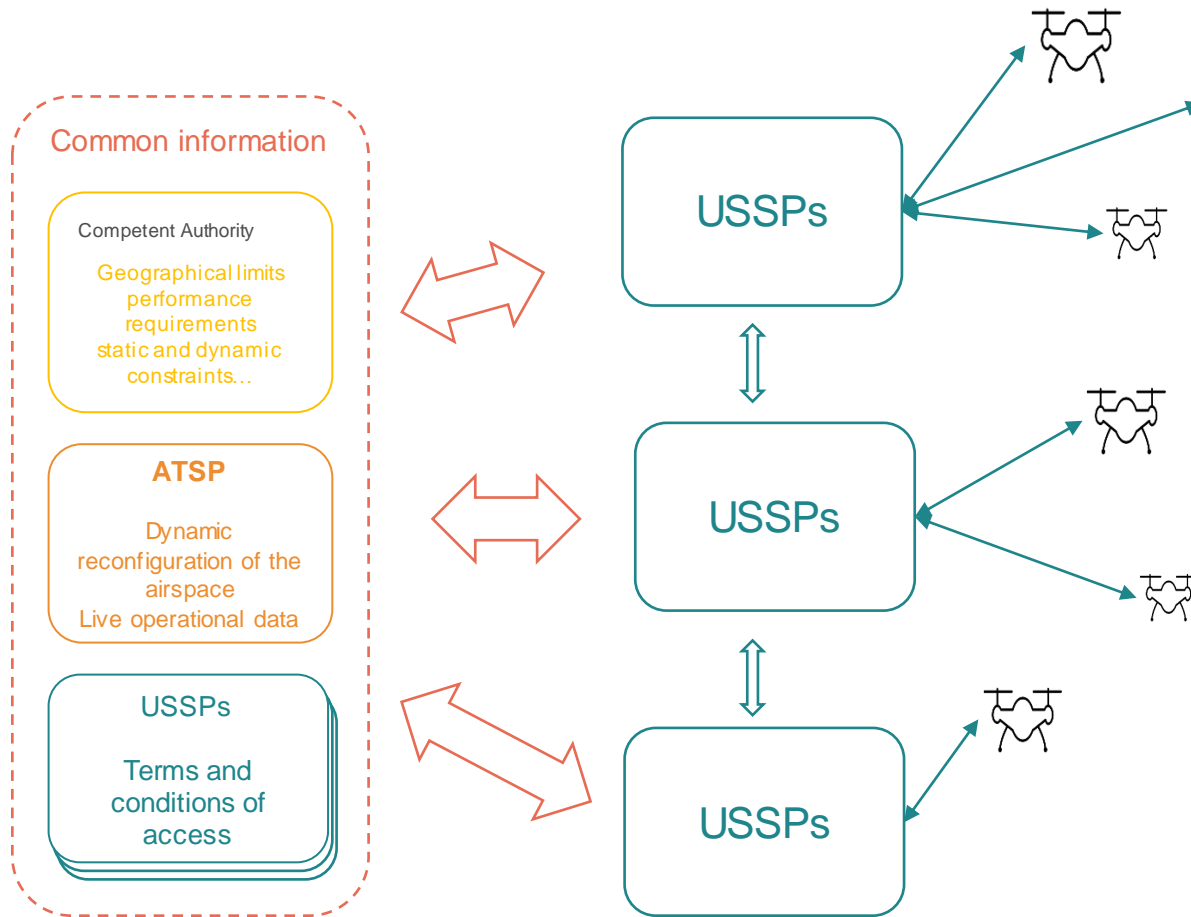
# U-space in uncontrolled airspace



# Electronic Conspicuity in U-space airspace

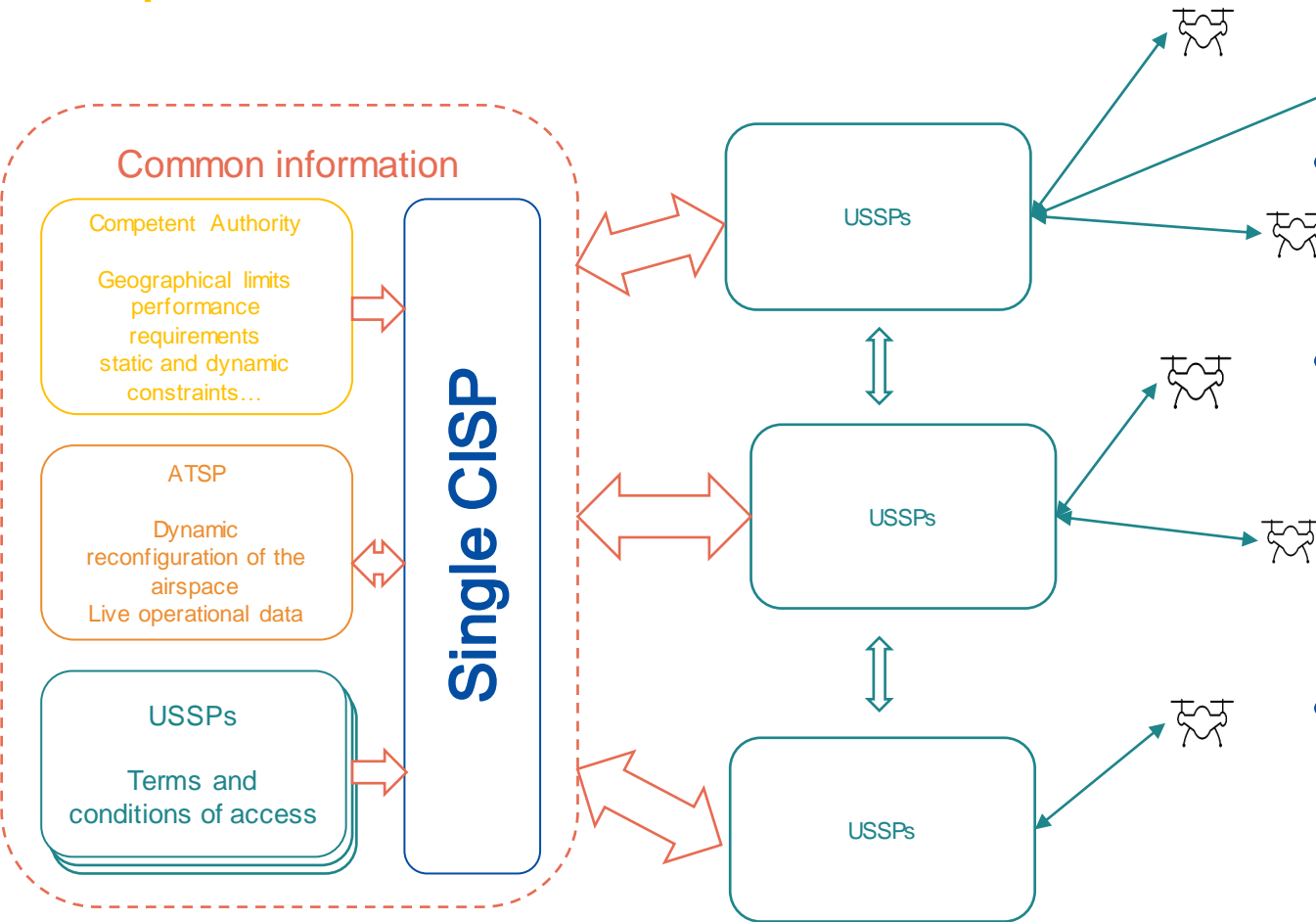
- Assumption is that it would be unsafe for manned aircraft to fly in U-space without being seen by USSPs (unless the aircraft remains under the control of ATC)
- Type and density of existing and anticipated manned traffic must be assessed before considering the designation of U-space airspace
- U-space is expected to be first designated in areas of high density of existing and anticipated commercial UAS traffic and in (sub)urban environments
- Requirement for electronic conspicuity would be limited to U-space airspace but, depending on the solution, it may bring safety benefits to manned aircraft outside of U-space airspace as well
- Requirement limited to 'being seen' – no requirement for traffic display, detect and avoid...
- Objective of AMC/GM group is to identify a number of AMCs, affordability for the target airspace users being a key assessment criteria
- Building on EASA's work on Airborne Collision Risk
  - EPAS RMT.0376 “Anti-collision and traffic awareness systems for aircraft with MTOM less than 5 700 kg or less than 19 passengers”
  - Research study EASA2011.07 on “Scoping improvements to see and avoid for General Aviation”
  - Safety Issue Analysis “Deconfliction with IFR/VFR traffic”

# Common Information – Distributed Model



- Each element of the common information is unique and comes from a given source – no duplication or competition in CI provision
- Each provider of CI elements make them available to other operational stakeholders
- ATSPs and USSPs are certified, including for the provision of CI

# Common Information – Centralised Model



- Member States *may* designate a single CISP
- Single CISP collects CI elements from CA, ATSP and USSPs, and make them available to all operational stakeholders
- Single CISP is certified (in addition to ATSP and USSPs)



# Applicability timeline

- |                                |                 |
|--------------------------------|-----------------|
| • EASA Committee positive vote | February 2021   |
| • Commission adoption          | April 2021      |
| • Entry into force             | May 2021        |
| • Applicability                | 26 January 2023 |

# Future Research & Innovation (2021-2027)

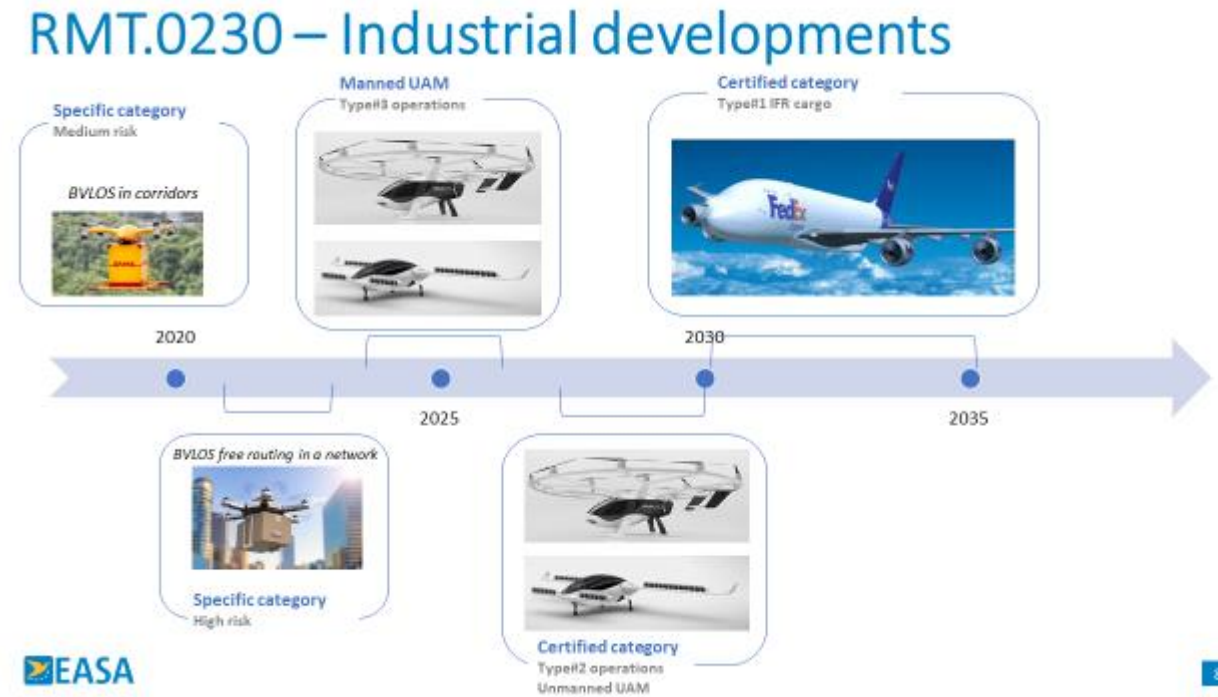
## Roadmaps:

- Connected and automated ATM
- Air-ground connectivity and autonomy
- Capacity on demand and dynamic airspace
- U-space and Urban Air Mobility
- Virtualisation and cyber-secure data sharing
- Multimodality and passenger experience
- Aviation green deal
- AI for aviation
- Civil/military interoperability and coordination

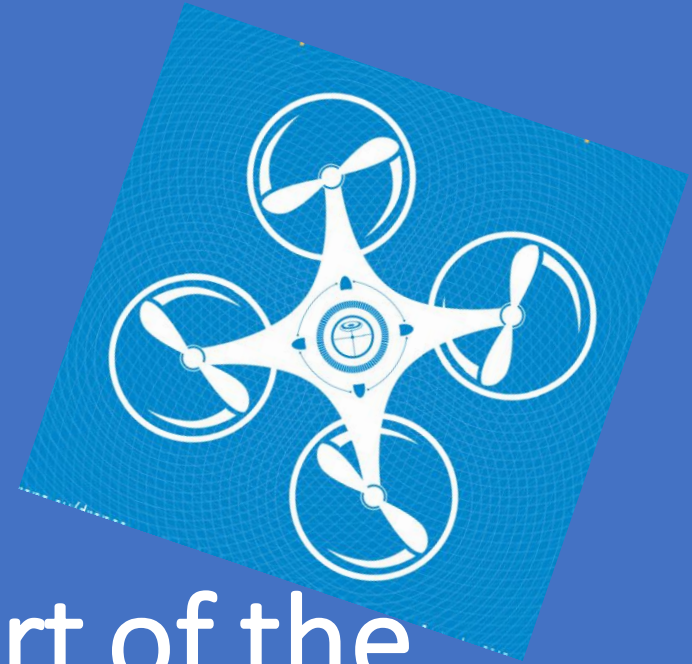


# Further work on the Certified Category

- Initial U-space framework not revisiting rules of the air – segregation of IFR/VFR traffic and UAS traffic (not flying IFR)
- SERA being reviewed as part of RMT.0230



# Thank you



# Development of standards in support of the drone regulation

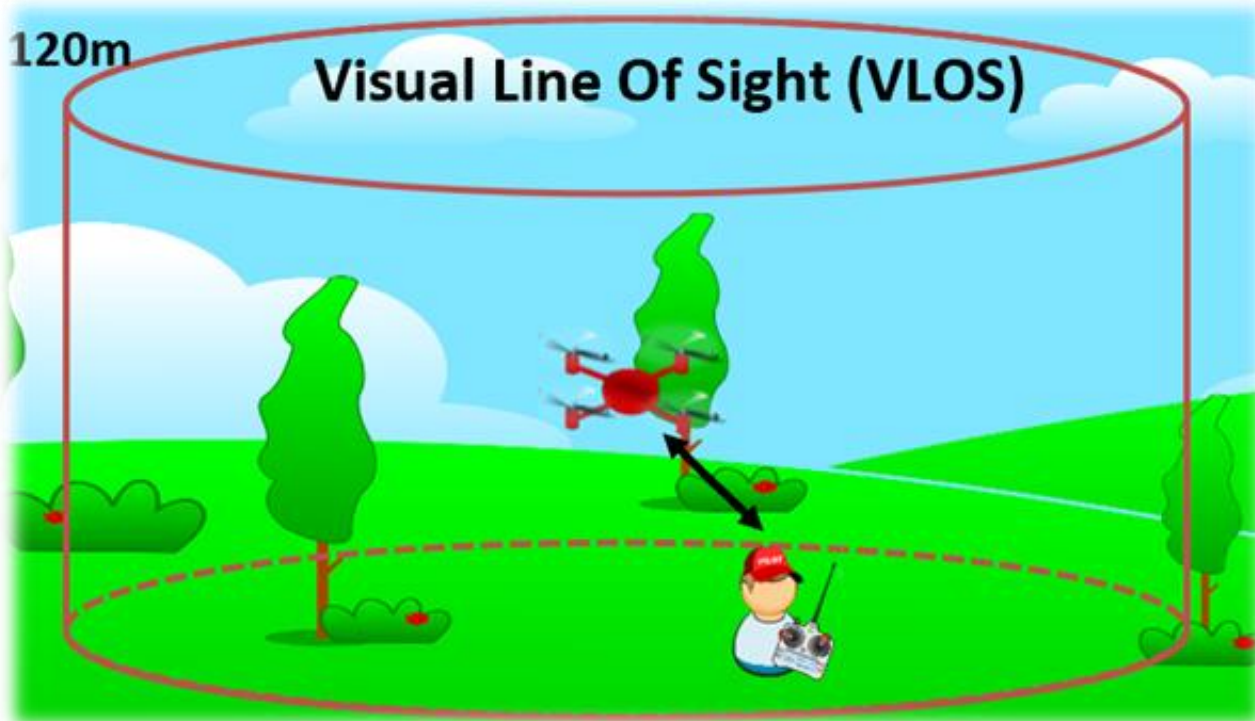
EASA Drones team

27 May 2021

**Your safety is our mission.**



# Open category



- A1 fly over people
- A2 fly close to people
- A3 fly far from people

Privately built  
with MTOM<250g



Privately built  
with MTOM<25kg



## Development of standards

Verification of design using the EU market regulation framework

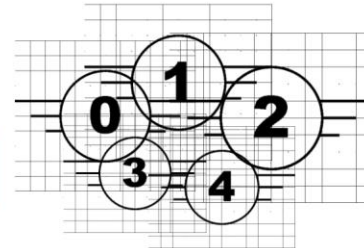
Manufacturers are allowed to claim presumption of compliance when they use EN (European norms)

- ASD STAN the standardisation body to develop EN

4  
7  
0  
9

**Product and verification requirements**  
for UAS in the open category

**Part 001**



**Direct Remote Identification requirements**  
for UAS in the open category

**Part 002**

**Geoawareness requirements**  
for UAS in the open category

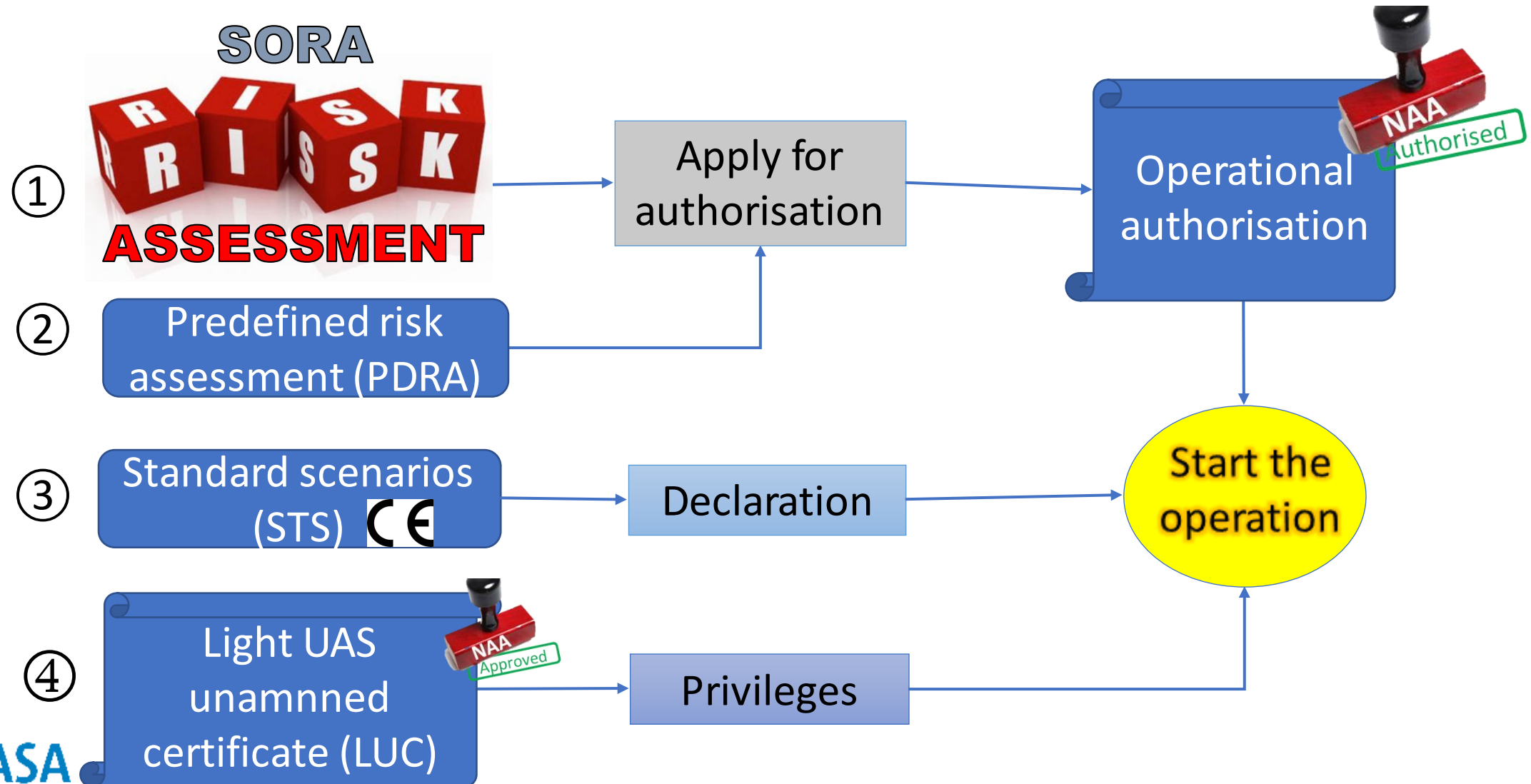
**Part 003**

**Lighting requirements**  
for UAS in the open category

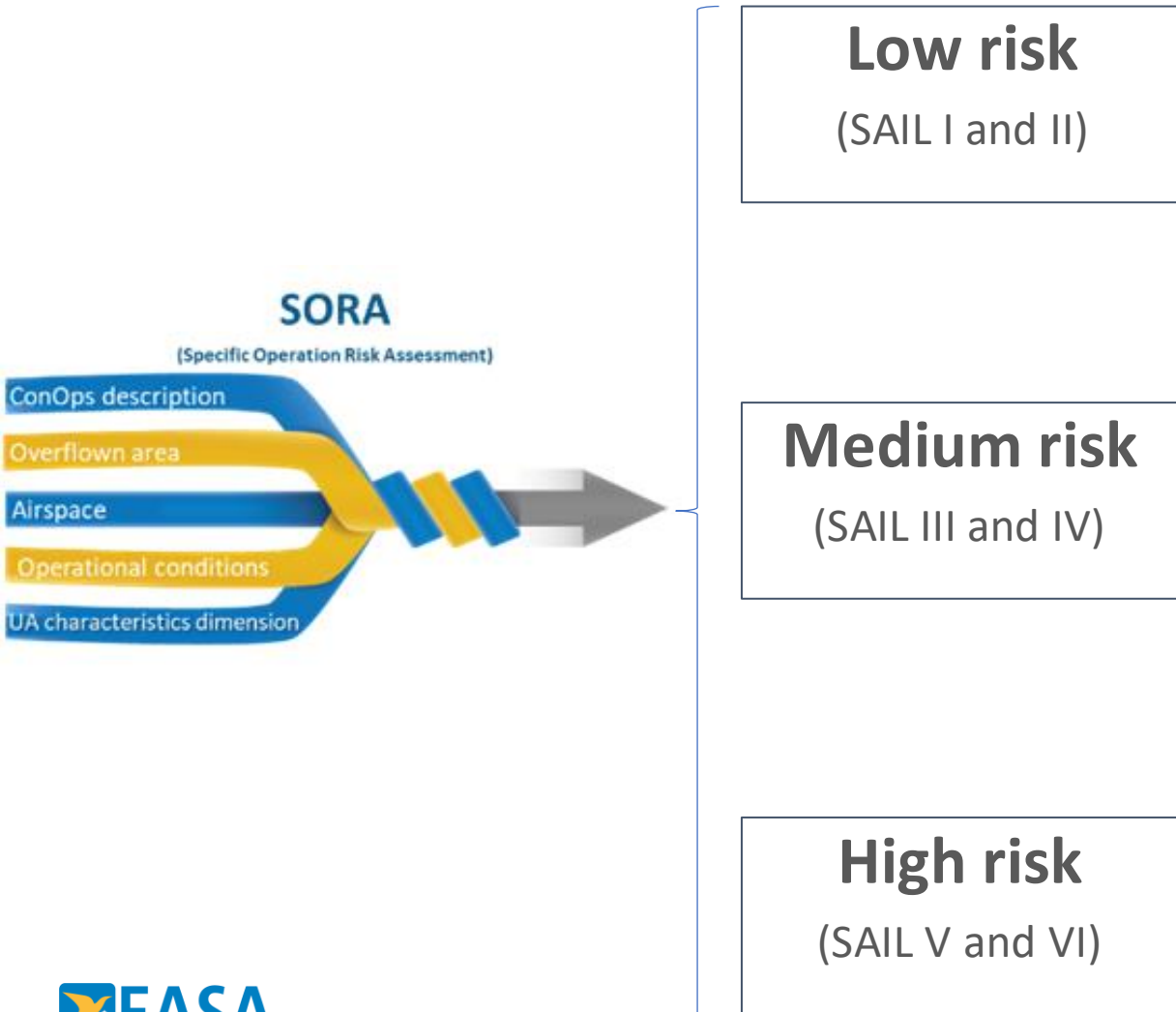
**Part 004**



# The 'specific' category



# Verification of the design of the UAS



- CE class mark for STS
- NAA may accept declaration of compliance or require operators to use UAS with design verification report issued by EASA (limited to containment or mitigation)
- Manufacturer may apply to EASA for a design verification report (limited to containment or mitigation)
- NAA may require operators to use UAS with design verification report issued by EASA
- Manufacturer may apply to EASA for a design verification report or a (R)TC, issued according to Part 21
- Mandatory (R)TC issued by EASA according to Part 21

# The design verification report

- Who can apply: Any natural or legal person capable to demonstrate design compliance of the UAS, mitigation means, containment (as applicable)
- May cover one or more of the following, requirement defined by SC-Light UAS:
  - mitigation means linked with the design;
  - enhanced containment function
  - full design of the UAS up to SAIL IV
- EASA will publish the list of design verification reports (with main data, similar to STC list)

Design Verification Report is not a type certificate – recognition only inside EASA MSs (at least for the initial phase)

# Need for standards

- SORA is a great methodology to support UAS operators and NAAs in conducting a risk assessment and identify the provisions making the operation safe, covering all domains (airworthiness, operation, personnel competence etc...):
  - Mitigations
  - Operational safety objectives
- Provisions are performance based and depending on the risk of the operation different level of robustness allowed

Need for standards for all SORA elements

# Certified category

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# Expected Industrial developments

**Specific category**  
Medium risk

*BVLOS in corridors*



2020

**Manned UAM**  
Type#3 operations



2025

**Certified category**  
Type#1 IFR cargo



2030

2035

*BVLOS free routing in a network*



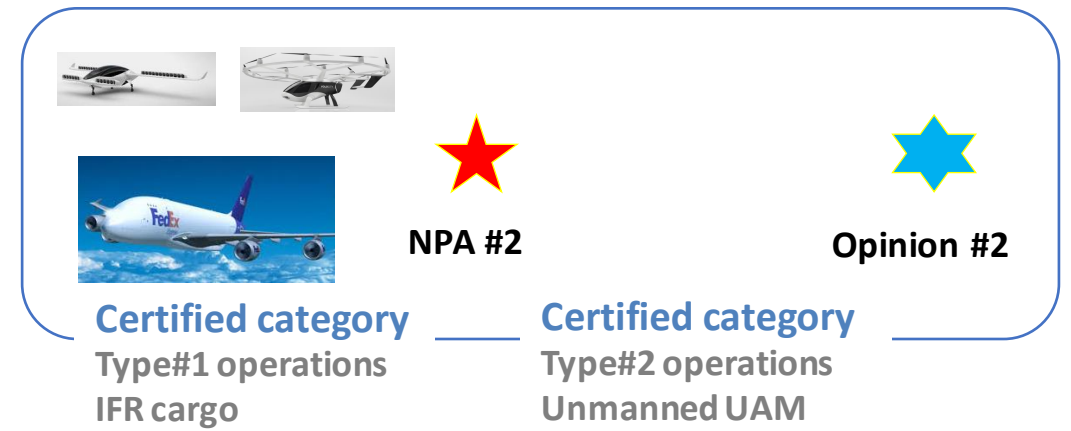
**Specific category**  
High risk



**Certified category**  
Type#2 operations  
Unmanned UAM

# RMT.0230 planning

2020		2021				2022				2023				2024
Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1



# Coordination of development of standards

## EUSCG

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# European UAS standards coordination group (EUSCG)

- **Goal:** coordinate the UAS-related standard development activities across Europe, essentially stemming from the EU regulations
- **Members:** EASA (chair), EU commission, EU and US standardisation bodies, other EU entities/agencies
- **Main product:** Rollout development plan – UAS (RDP-U)

# The AW Drones project

- Funded by the EU Commission
- 3 years project (will be completed by end of 2021)
- **Goal:** Collect information standards applicable to UAS developed mostly in EU and US and associate them with the EU regulatory requirements.
- AW-Drones portal

<https://www.aw-drones.eu/>

Time to fil the GAPS



A screenshot of the AW Drones Standards Info Portal website. The header includes the "AW DRONES" logo and navigation links for "Home" and "About". The main content area is titled "Drone Standards Info Portal" and includes a description: "The AW-Drones standards info portal is an online platform where users are able to easily identify relevant information from the AW-Drones database of standards and regulations." Below this, a light blue banner states: "You are viewing results based on previously selected filters." On the left, a "Filters" sidebar shows a dropdown menu set to "SORA OSO 03" and a "Choose a domain" section with several checkboxes and counts: "General" (0), "Initial Airworthiness (at UAS level)" (0), "Continuing Airworthiness" (3), "UAS Operations" (0), "Aerodromes" (0), "U-Space/ATM" (1), and "Emergency" (0). A search bar with the placeholder "Search standards" is located in the center. At the bottom, a "Keywords" section displays three tags: "Manuals (2)", "Instructions for continued airworthiness (1)", and "UAS-ATM (IFR above VLL and below FL 600) (1)".

# Questions

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# EUROCAE's role in international standardisation



Christian Schleifer, Director General

27 May 2021



# Who are we?

- Independent non-profit organisation
- Founded in 1963 in Lucerne by ECAC
- Dedicated 100% to aviation
- Long-standing successful record in standardisation
- A Governance and a Team dedicated to serve our members and the global aviation community





# Facts and figures

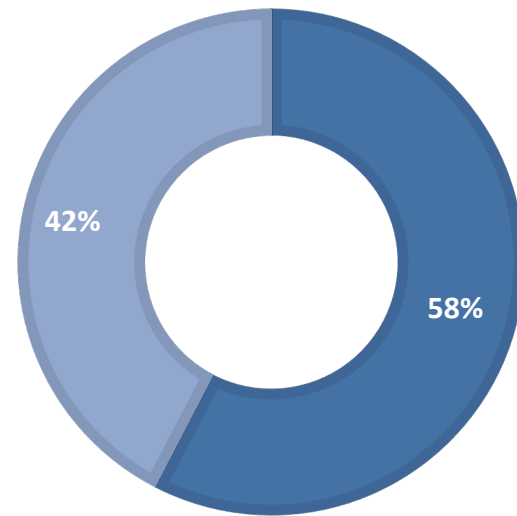
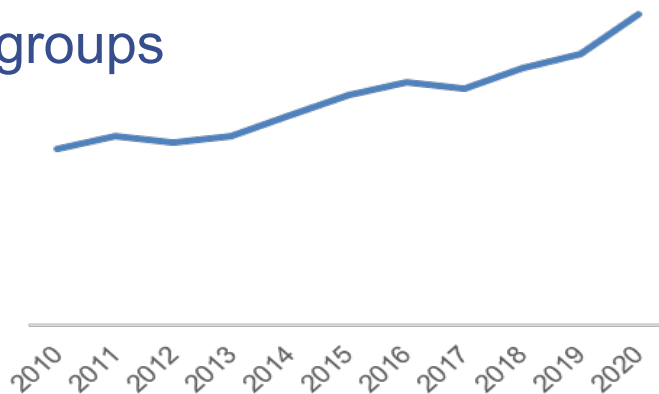
→ 350+ Members (+10% p.a.)

→ 146 in 2013

→ 48 active working groups

→ 26 in 2010

→ 3500+ experts



■ EU members

■ International members



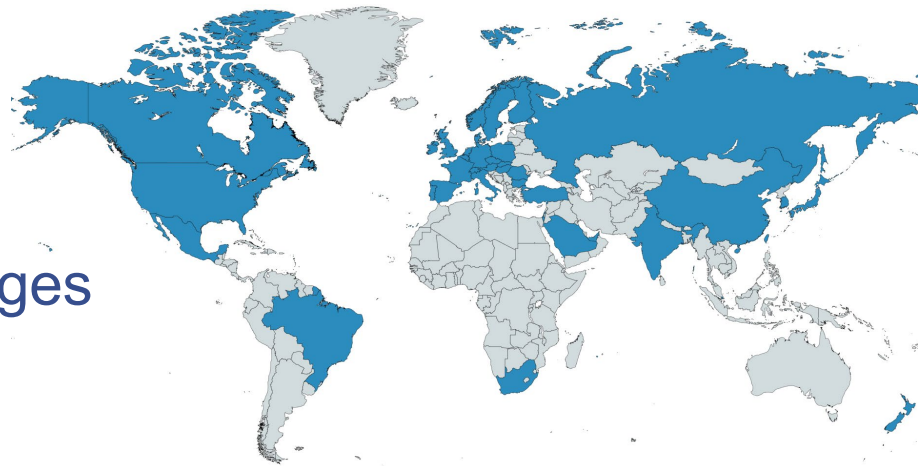
# Driving the Standard for Aviation





# Shaping global standards

- Worldwide interoperability needs international inputs to develop globally applicable standards
  - Developed by all interested parties
- To support global aviation targets & address global aviation challenges
  - GANP, ASBU, GASP
  - Regulations
  - Regional modernisation programmes





# Global coordination



WTO OMC



Intern. SDO  
SRT

Listed as SDO

50 % joint WGs

10 % joint WGs







# Partners



EUROCAE members & partners, ...



# Partners



**EUROCAE members & partners, ...**



# Partners



EUROCAE members & partners, ...



# Domains of activity

- **Avionics**
- **Communication**
- **Navigation**
- **Surveillance**
- **ATM Systems**
- **Airports**
- **SWIM**
- **Electric**
  - Lightning protection
  - High Voltage



- **Security**
- **AIS / MET**
- **RPAS, VTOL & GA**
- **Miscellaneous**
  - Fuel Cells
  - Hybrid propulsion
  - Space
  - Ice detection
  - C-UAS
  - NGAP
  - Covid response



# Inputs for EUROCAE activities

- ➔ **ICAO** – GANP, GASP, SRT, Safety Reports etc.
- ➔ **EASA, CAAs and other regulators** – Regulatory activities, Reports, Studies etc.
- ➔ **Investigation Authorities** – Accident /Incident Reports
- ➔ **EUROCAE Members and Partners** – Based on their needs



## Working Groups





# Process

- Transparent and open process
- Consensus driven development approach
- Standards validation
- Open consultation
- Worldwide recognition
- Worldwide application
- Open for worldwide participation
- By the industry – for the industry







# R&D – standardisation – deployment

## R&D



Next**GEN**

**SESAR**  
JOINT UNDERTAKING

**RESEARCH**

## Standardisation & Regulation



## Deployment

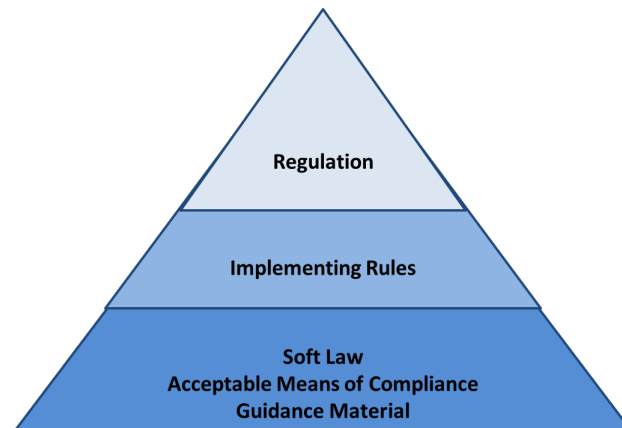


**SESAR**  
DEPLOYMENT MANAGER



# Regulation – Standard

- PB & RB regulations by EASA, FAA, ICAO; JCAB
  - Reference to industry standards
- Standards reaction to regulation
- Forward looking
  - In anticipation of regulatory requirements
- Referenced by the regulator
  - EASA, EU Leg, FAA, NAA, ICAO
- (E)TSO – MOPS, SW, Environment





# WG-105 UAS scope

## → WG-105 UAS

- Develop standards for the integration of all types of UAS into all types of airspace
- Activities cover areas as:
  - Detect and Avoid
  - C3 and Security
  - UTM / U-Space
  - Design & Airworthiness
  - Enhanced RPAS Automation
  - SORA





# WG-105 UAS activities

- **Detect and Avoid** addressing aspects on:
  - DAA under IFR (2 docs MASPS and MOPS)
  - DAA in Very Low-Level Operations
  - A comparison of DAA in VLL OSEDs: RTCA vs EUROCAE ED-267
- **C3 and Security** activity
  - UAS Communications by Cellular Networks (MOPS)



# WG-105 UAS activities

## ✈ UTM / U-Space

- ✈ Draft ED-282 Minimum Operational Performance Specification for UAS e-identification
- ✈ MOPS for Aeronautical Data Provision and Exchange
- ✈ MOPS for Network Identification Service of unmanned aerial vehicles for in A/UTM in U-Space
- ✈ MOPS for Flight Planning and Authorization Service for global awareness in A/UTM in U-Space
- ✈ MOPS for Traffic information / situation dissemination exchange format and service
- ✈ MOPS for Activities in support of U-Space Geo-awareness Service



# WG-105 UAS activities

## ✈ SORA

- ✈ Applicability of safe design standards for UAS in Specific Operations category
- ✈ ED-280A Guidelines for UAS safety analysis for the Specific category (low and medium levels of robustness)
- ✈ Guidelines for SAIL II application of SORA
- ✈ Guidelines on the use of multi-GNSS for UAS
- ✈ Guidelines on the Automatic protection of the flight envelope from human errors for UAS





# WG-105 UAS role

- Complementing the UAS regulatory framework with performance based standards
  - Participation in advisory groups, public consultations
- Link with R&D to support deployment of new technology
- Coordination with other SDOs to avoid duplication:
  - Draft MoU with ASTM – UAS, VTOL
  - Liaison status ISO – all activities
  - MoU GUTMA – for UTM/U-Space
  - Established and participation in EUSCG
  - Inputs to ANSI UASSC Roadmap







# EUROCAE UAS Standards

## → **Published since 2016:**

- ED-251 OSED for RPAS Automatic Taxiing
- ED-252 OSED for RPAS Automatic Take-off and Landing
- ED-253 OSED for Automation and Emergency Recovery.
- ED-258 OSED for Detect & Avoid [Traffic] in Class D-G airspaces under VFR/IFR
- ED-266 Guidance on spectrum access, use and management for UAS
- ED-267 OSED for DAA for VLL
- ED-269 MOPS for UAS geo-fencing
- ED-270 MOPS for UAS geo-caging
- ED-272 MASPS for RPS supporting IFR into non-segregated airspace
- ED-279 Generic Functional Hazard Assessment for UAS and RPAS
- ED-280 Guidelines for UAS safety analysis for the Specific category (low and medium levels of robustness)
- ED-281 MASPS for RPAS Automation and Emergency Recovery
- ED-283 MASPS for RPAS ATOL
- ED-284 MASPS for RPAS Automatic Taxiing
- ER-016 RPAS 5030-5091 MHz CNPC LOS and BLOS compatibility study
- ER-019 Inputs to RPAS AMC 1309



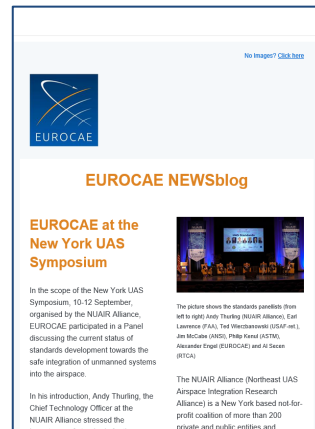
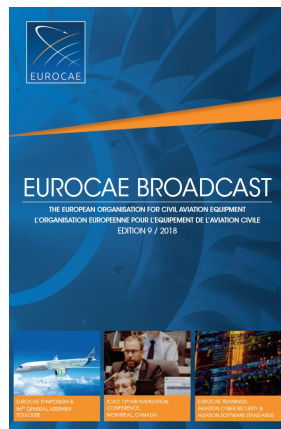
# future EUROCAE UAS activities

## ✈ Technical Work Programme

- ✈ EUSCG
- ✈ Rule making activities
  - ✈ Acceptable means of compliance
- ✈ Members/Industry needs
- ✈ Gap analysis
- ✈ Collaboration
  - ✈ Efficient use of resources
  - ✈ Complement and avoid overlaps



# For further information...



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