



SAFE SKIES.
**SUSTAINABLE
FUTURE.**



| ICAO



ICAO ESAF/WACAF Regional Office UAS/RPAS Workshop

Nairobi, Kenya
June, 2025

ICAO UAS/RPAS Overview

Objectives

4

- **Understand ICAO Developing Works On Unmanned Aviation**
 - **RPAS Panel;**
 - **Advanced Air Mobility Study Group;**
 - **ICAO Resources.**



SCOPE OF ICAO WORK ON UNMANNED AVIATION

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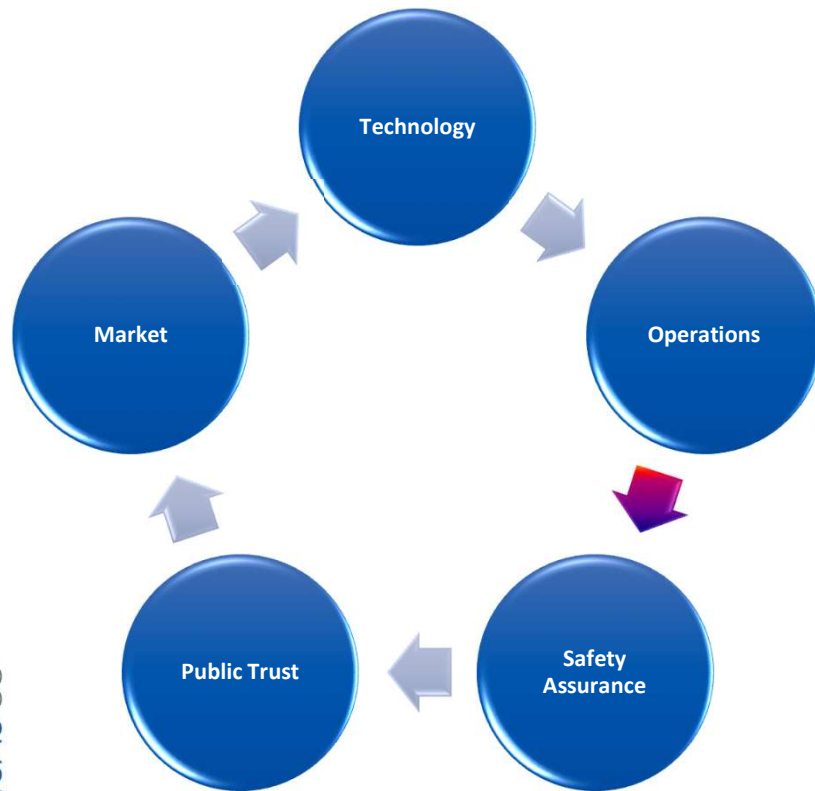
FEATURES

- Multiple Frameworks;
- Global Multiple Applications;
- Beneficial Outcomes;
- Manned Aviation Risks...
 - RPA to operate alongside manned aircraft, as a predictable, cooperative airspace user: All **19 Annexes** affected
 - RPASP - Priority given to **fundamentals** for **international** operations

SCOPE OF ICAO WORK ON UNMANNED AVIATION

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Accelerating pace of technology development



The Innovation Cycle:

1. **Technology** enables new operations (use cases)
2. **Operations** feed regulatory development (**data-driven, evidence-based**)
3. **Safety assurance** (regulatory framework) creates public confidence (**trust**)
4. **Public confidence** allows market expansion (**investments**)
5. **Investments** support technology advancements (**R&D**)

SCOPE OF ICAO WORK ON UNMANNED AVIATION

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The challenge of integrating **unmanned aircraft** into the aviation system requires:

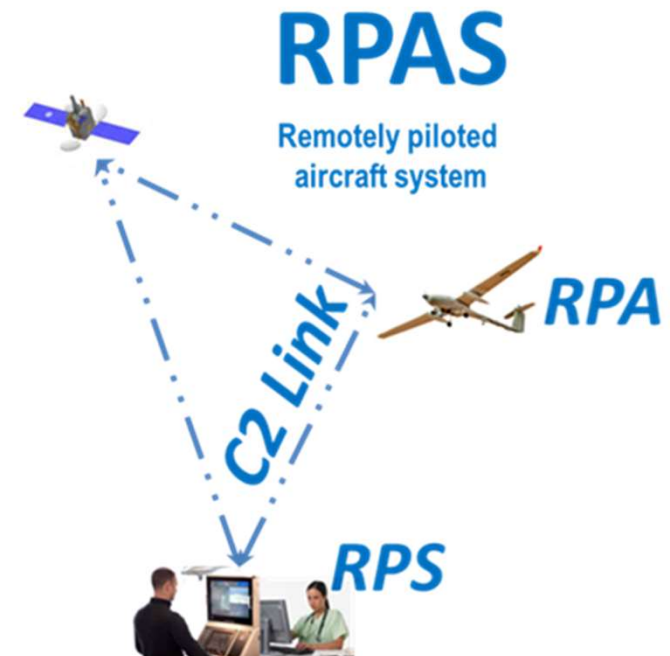
- **technical** expertise
- **intergovernmental** framework
- **global** geographic coverage
- **regulators & industry** cooperation

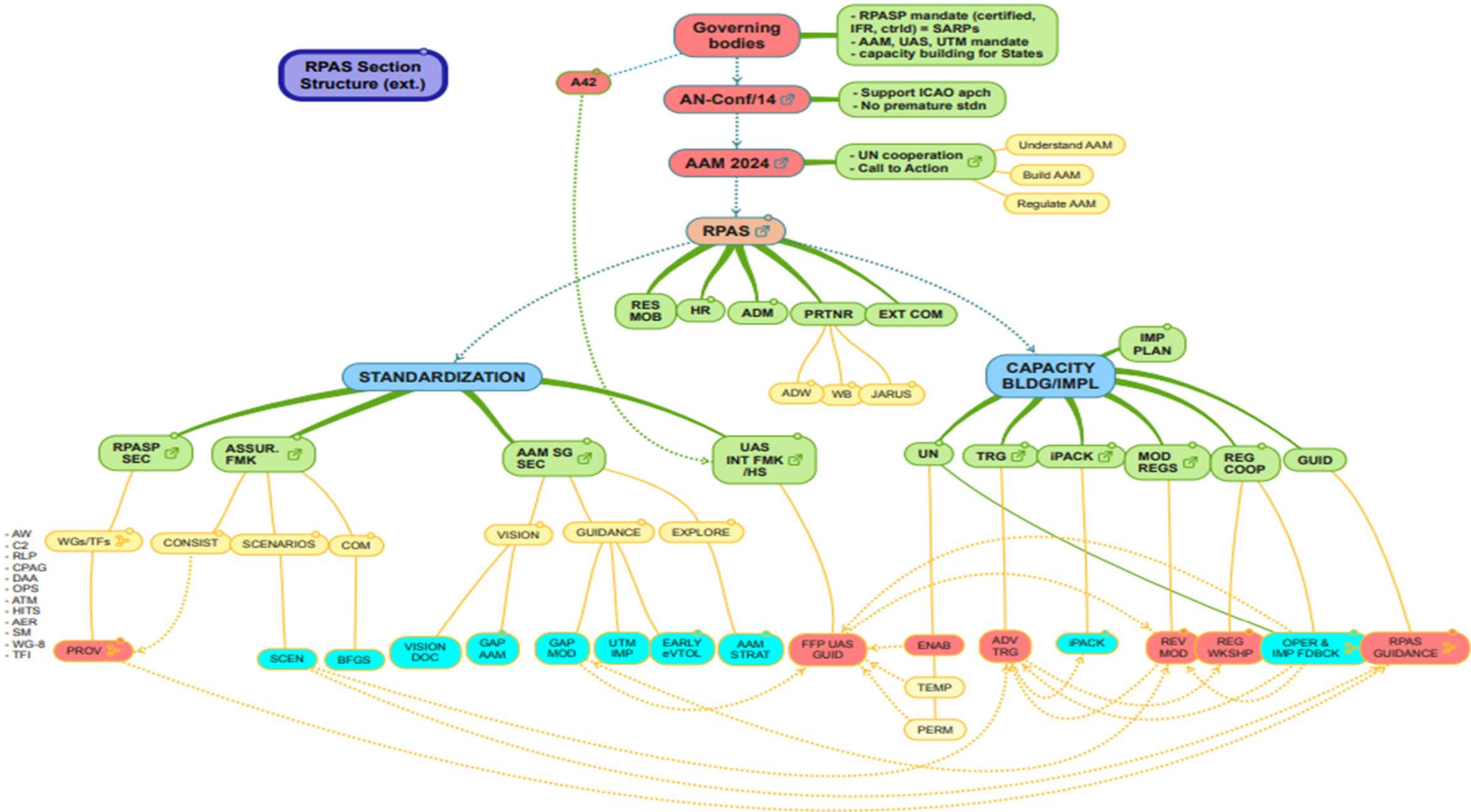
SCOPE OF ICAO WORK ON UNMANNED AVIATION

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An **RPAS** consists of:

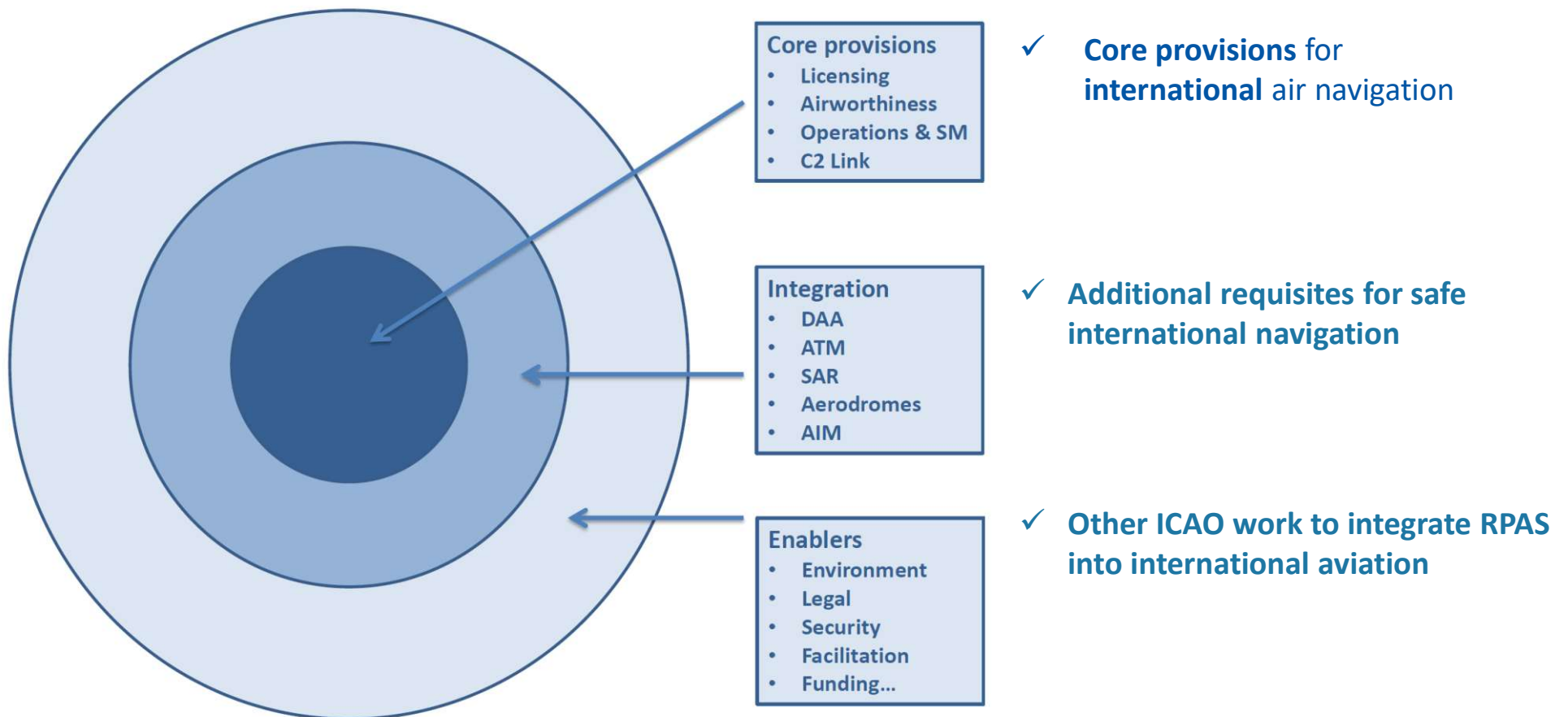
- One (1) **RPA**
- One (1) **or more RPS**
- **RPA and RPS** connected by **C2 Link** (in direct radio line-of-sight or BRLOS, such as via satellite)
- **other components** essential for flight, like manned aircraft, including:
 - ATC communications and surveillance equipment (radio coms; CPDLC; ADS-B; SSR transponder)
 - navigation equipment
 - launch and recovery equipment (e.g. catapult, winch, rocket, net, parachute, airbag)
 - flight control computer (FCC), FMS and autopilot
 - system health monitoring
 - flight termination system





SCOPE OF ICAO WORK ON UNMANNED AVIATION

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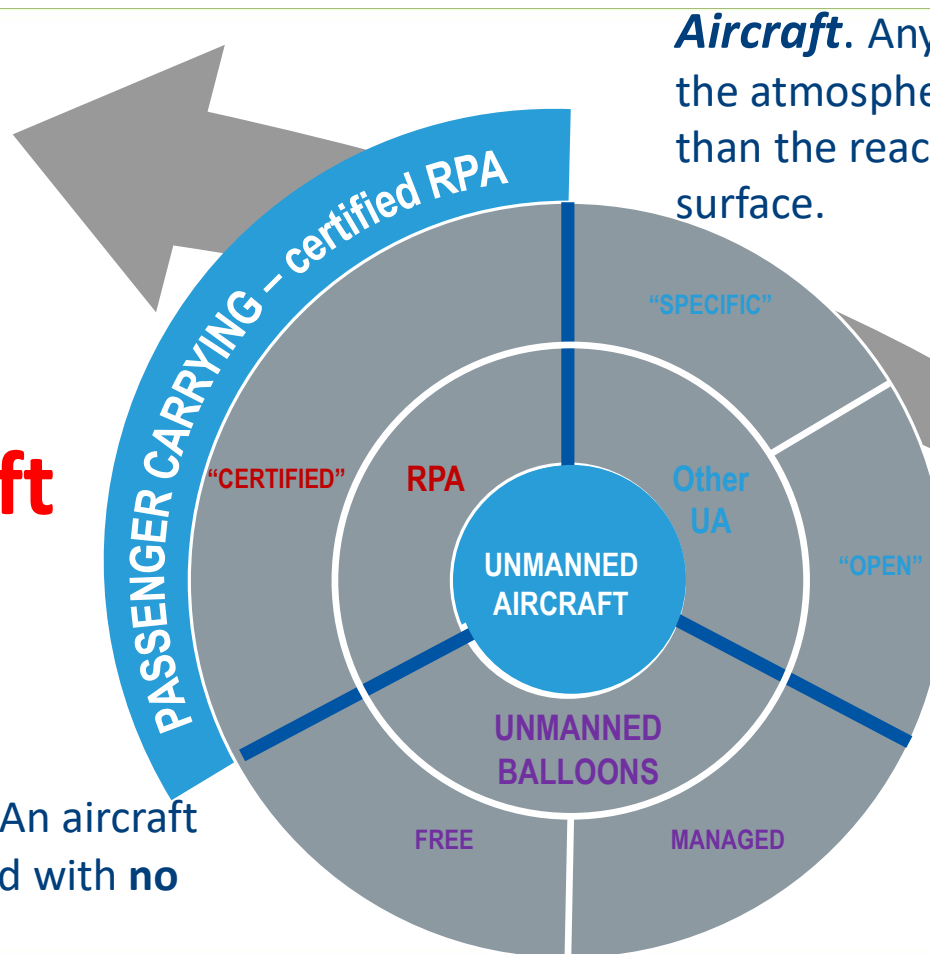
SCOPE OF ICAO WORK ON UNMANNED AVIATION

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UA=Aircraft

Unmanned aircraft. An aircraft intended to be operated with **no pilot on board**



Aircraft. Any machine that can derive support in the atmosphere from the **reactions of the air** other than the reactions of the air against the earth's surface.



SCOPE OF ICAO WORK ON UNMANNED AVIATION

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	2020	2021	2022	2023	2024	2025	2026
Licensing			Applicable				
Airworthiness		Effective					Applicable
C2 Link (gen.)		Effective					Applicable
Operations					Effective		Applicable
SM					Effective		Applicable
C2 Link (techn.)						Effective	Applicable (2028)
DAA						Effective	Applicable (2028)
ATM						Effective	Applicable (2028)
Aerodromes							Effective & Applicable (2028)
Other	Meteorology, Facilitation, Accident investigation, AIM, Environment, Security, Dangerous Goods, Infrastructure funding/financing, Legal issues...						

SCOPE OF ICAO WORK ON UNMANNED AVIATION

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**Annex 2 – Rules of the Air - Appendix 4
Applicable 2012**

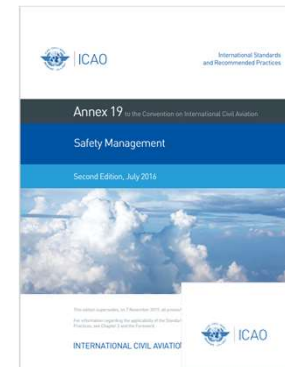
**Annex 7 – Aircraft Nationality and Registration Marks
Applicable 2012**

**Annex 1 – Personnel Licensing
Applicable 2022**

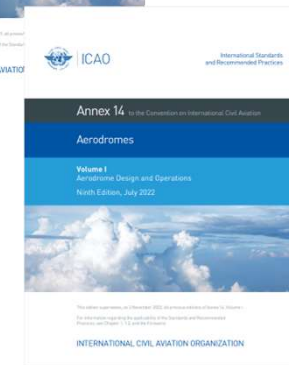
**Annex 8 – Airworthiness of Aircraft
Effective 2021/ Applicable 2026**

**Annex 10 – Aeronautical Telecommunications - Part VI
Effective 2021/ Applicable 2026**

**Annex 6 – Operation of Aircraft - Part IV
Effective 2024/ Applicable 2026**



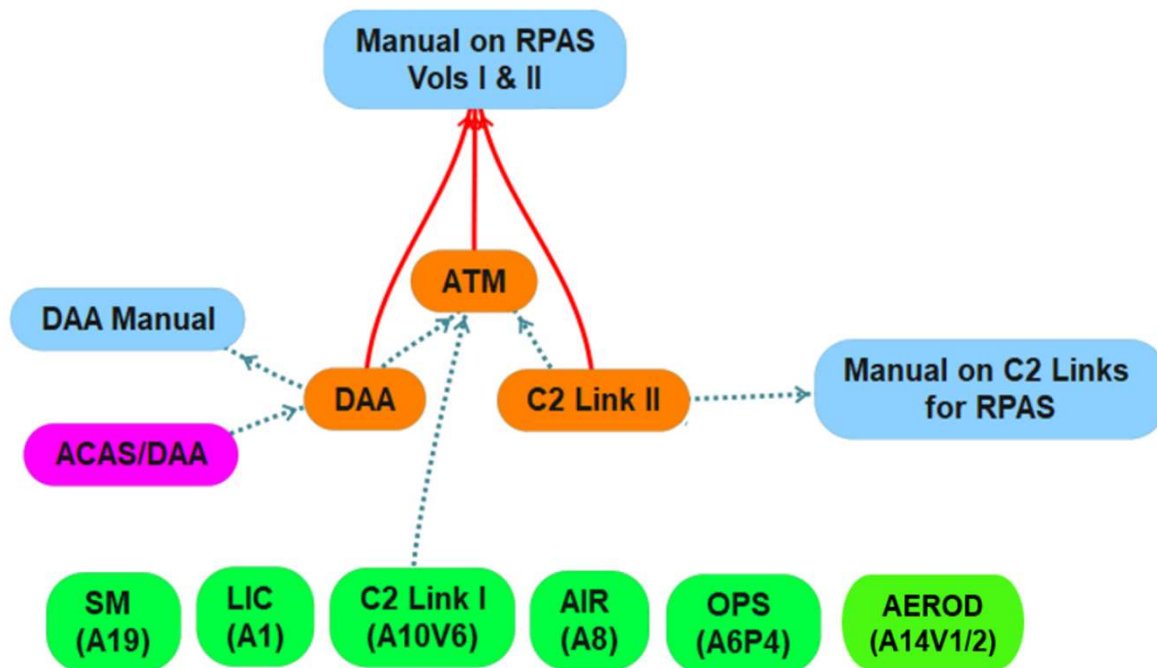
**Review Process
Annex 19 – Safety Management
Applicable 2026**



**In Progress
Annex 14 – Aerodromes
Applicable 2026**

Dependencies in the RPAS work

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Completed (adopted) packages

Packages under development

Dependencies are between:

1. Technical areas - SARPs/PANS
2. SARPs/PANS - other SARPs/PANS
3. SARPs/PANS - guidance

Request for authorization (Art. 8 CC) shall include C2 capabilities (A2App4, 3.2, l) and n))

Each state:
- to designate authority resp.
for documenting and implementing C2CSP
oversight process [A10V6, 2.3.2]

- RPAS operator to implement SMS in accord. A19 [A6P4, 3.3.1]
- SO to oversee C2 Link SP (A6P4, 3.6.3.1)
- SO to approve SLA [A6P4, 3.6.3.4]
- SO to verify authorized C2CSP [A6P4, 3.6.3.6 a)]
- SO to approve use of authorized C2CSP [A6P4, 3.6.3.6 d)]
- SO to accept safety, security, performance of RPS service (A6P4, 3.6.4.5.1)

State of RPS SP to:
- accept safety, security,
performance of RPS service (A6P4, 3.6.4.5.1)

**State of operation
State of C2CSP**

**State of the
operator**

**State of the
RPS SP**

SLA:
- QoS
- security
- outages/contingencies
- SM resp.
- arrangements for SP oversight
- C2CSP ERP [A6P4, 3.6.3.5]

SLA:
- safety and security [A6P4, 3.6.4.5.2]
- include cont'g airworthiness records
[A6P4, 3.6.4.5.3]

RPS SP

- RPS SP overseen by SO in conjunction with state of RPS SP [A6P4, 3.6.4.4]
- safety, security and perf. of RPS SP acceptable to SO and state of RPS SP [A6P4, 3.6.4.5.1]

C2CSP

**RPAS
operator**

RPS installer

- RPS installation by expert/competent personnel [A6P4, 3.6.4.2]
- verify airworthiness/op requirements and proper connection with RPA [A6P4, 3.6.4.3]

RPA

- C2CSP to:
- demonstrate compliance [A10V6P1, 2.3.10]
 - mitigate scheduled outages [A10V6P1, 2.3.8.1]
 - mitigate unscheduled degradations [A10V6P1, 2.3.8.2]
 - establish monitoring processes [A6P4, 3.6.3.7]
 - ensure QoS level [A10V6P2, 2.10.2]
 - monitor interference/plan solutions [A10V6P2, 2.10.2.1]
 - mitigate harmful interference [A10V6P2, 2.10.2.3]
 - have resources/documentation [A10V6P2, 2.10.2.4]

- RPAS operator to:
- ensure SP have structure, procedures, resources, personnel [A6P4, 3.6.1]
 - enter into SLA concerning C2 provision [A10V6P2, 2.10.1]
 - monitoring/reporting anomalies [A6P4, 3.6.3.8]
 - notify degradations [A6P4, 3.6.3.9]
 - ensure SO authorities have access to SP documents [A6P4, 4.2.2.2]
 - ensure State where contracted services are provided have access to premises, facilities, equipment and documents of contracted SP [A6P4, 4.2.2.3]

- TC of RPA to include RPS and C2 Link [A8P2, 1.4.3]
- limiting ranges established, incl. for C2 Link [A8P8, 1.2.2]
- sufficient information on any C2 Link config., operation, performance, emergency proc., and operating limitations [A8P8, 7.8]
- RPAS to complete integration tests with RPS, and ensure RPS operates with any C2 Link and C2CSP [A8P8, 10.2.2]
- RPS integrated to allow timely RPA control, incl. C2 Link state and perf. [A8P8, 10.3.1]
- RPA and RPS system architecture compatible any C2 Link [A8P8, 10.4.1]
- automatic taxi, t/o, ldg system not affected by C2 loss/degradation/interruption [A8P8, 11.6]
- C2 Link to perform under all anticipated op. conditions, incl: means maintain C2 Link; regain C2 Link; means ensure safe flight even lost C2 Link state; means monitor perf. /status C2 Link [A8P8, 11.7]

- RPAS operator resp. for safe operation of all RPS [A6P4, 3.6.4.1]
- enter into SLA with RPS SP (incl. cont'g airworthiness records) [A6P4, 3.6.4.5.2 & 3]
- ensure SO authorities have access to SP documents [A6P4, 4.2.2.2]
- ensure State where contracted services are provided have access to premises, facilities, equipment and documents of contracted SP [A6P4, 4.2.2.3]

- request for authorization (Art. 8 CC) shall include DAA capabilities (A2App4, 3.2, m))

State of operation

- SO to ensure established limitations/procedures/training for DAA equipment [A6P4, 6.20.1.1]
- SO may approve DAA w/o automated CA if equiv. level safety [6.20.2.2]

State of the operator

- DAA capability, under IFR, to enable avoid traffic [A6P4, 6.20.1.2]
- airborne DAA CA capab. to operate according to A10V4 [A6P4, 6.20.1.3]
- provide RP with capability of exercising vigilance detecting/avoiding collisions [A6P4, 6.20.1.4]
- provide RP with capability of taking action when hazards present at same time [A6P4, 6.20.1.5]
- ensure each remote flight crew member trained [A6P4, 9.3.1 j)]
- operators manual to cover policy, instructions, procedures and training requirements for avoidance of collisions and the use of DAA [A6P4App2, 2.1.29]

RPAS operator

- DAA to comply w/ Ch. 6 [A8P8, 11.8]
- ADS-B functionality to indicate LC2L state [A6P4, 4.5.8.5]
- single-engine RPA over popul. areas electrical supply to maintain DAA [A6P4App3, 2b)2)i)]
- recording of DAA failures [A6P4App8, 3e)]
- RPA flight manual shall cover DAA procedures [A8P8, 10.5.4]
- RPH flight manual shall cover DAA procedures [A8P9, 10.5.4]

RPA/H

C2 Link

RPS

- C2 Link order of priority; No. 2 DAA [A10V6, 2.4.3]

- RPS integrated to allow safe control by crew, incl. DAA [A8P8, 10.3.1]

1
INTERNATIONAL
HIGH RISK (CERTIFIED)

- a) Operations: international RPAS
- b) Regulation: full certification in accordance w/ Annexes 1, 6, 8

2
INTERNATIONAL
MEDIUM/LOW RISK (SPECIFIC/OPEN)

- a) Operations:
- cross-border UAS
 - high seas UAS
- b) Regulation:
- Annex 6, Part IV not applicable
 - future SARPs (Annexes 6 and 8)
 - future SARPs (Annex 2, new App.)
 - certificates scaled to fit

3
DOMESTIC
HIGH RISK (CERTIFIED)

- a) Operations: domestic certified RPAS
- b) Regulation:
- national regulations
 - States encouraged to use Annex 6, Part IV

4
DOMESTIC
MEDIUM/LOW RISK (SPECIFIC/OPEN)

- a) Operations: domestic UAS
- b) Regulation:
- national regulations
 - future ICAO guidance
 - impact from Quadrant 2

SCOPE OF ICAO WORK ON UNMANNED AVIATION

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“OPEN”

“SPECIFIC”

“CERTIFIED”

PART 101

Regulated low-risk
Visual Line-of-sight
Weight limits (<25kg)
Altitude (<500ft)

- Photography;
- Inspections;
- Recreational;...



PART 102

Operations centric-risk based
Visual Line-of-sight or
Beyond Visual Line-of-sight
Greater weights
Higher altitudes

- Long route inspections
- Deliveries



ICAO SARPs

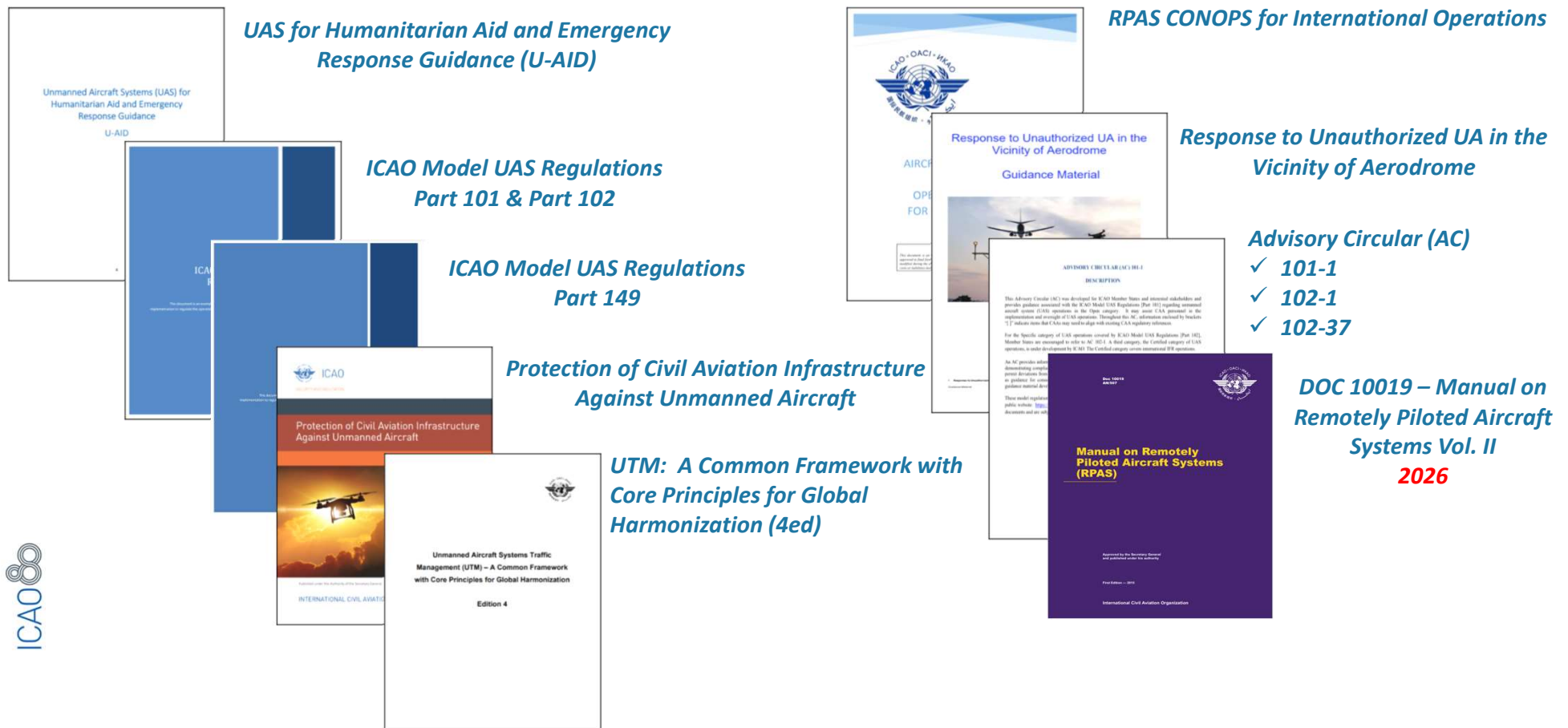
Traditional approach
Integrated operations
International/IFR
Certificated aircraft, pilots, and operators

- Similar to manned aviation



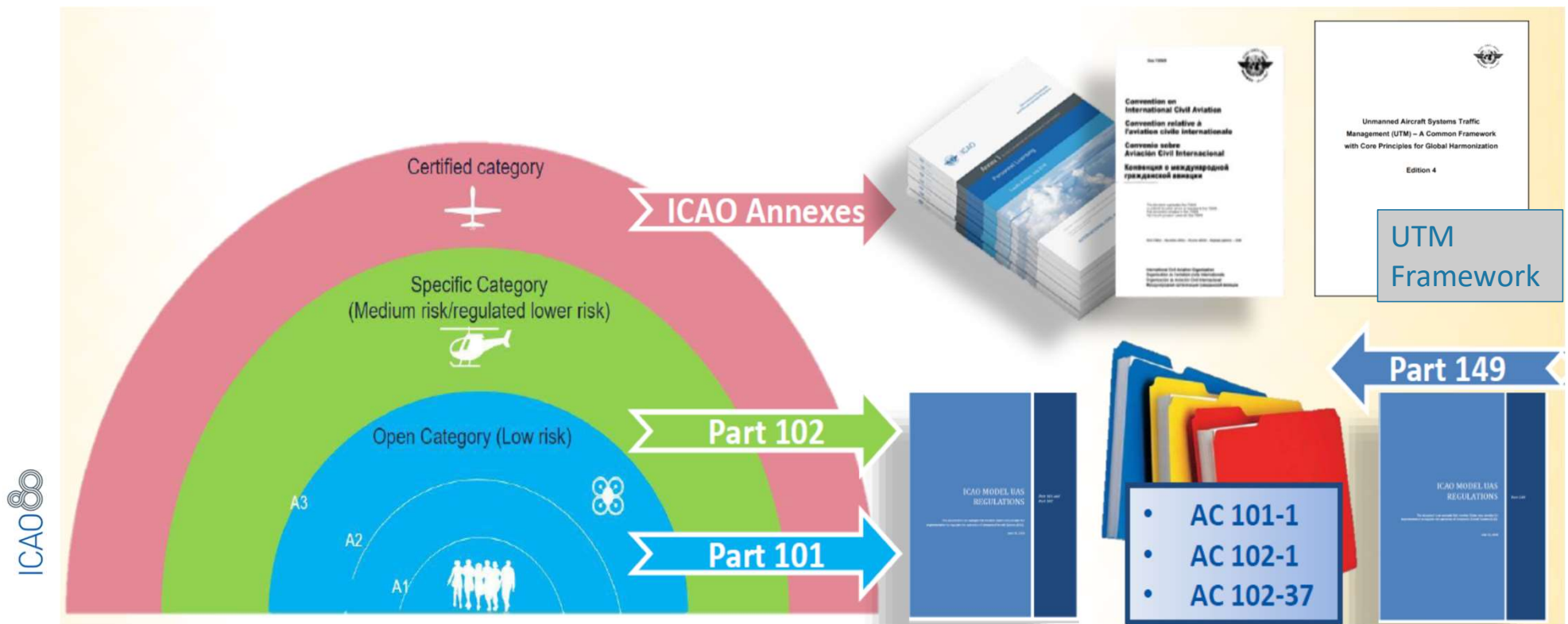
SCOPE OF ICAO WORK ON UNMANNED AVIATION

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SCOPE OF ICAO WORK ON UNMANNED AVIATION

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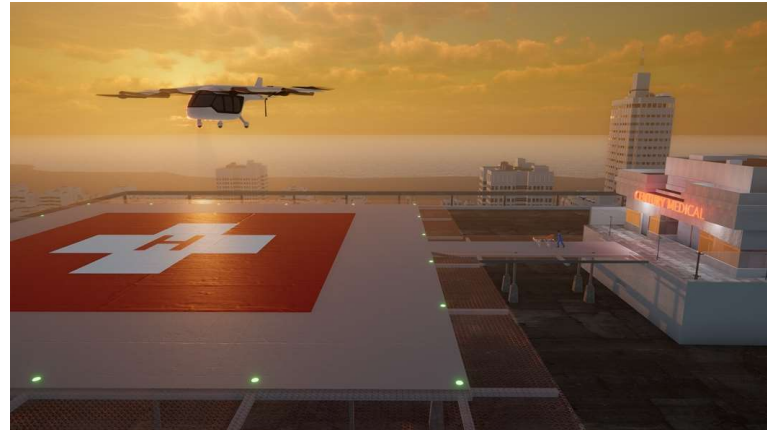
ADVANCED AIR MOBILITY (AAM)

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REGIONAL
CARGO AND
PASSENGER
TRANSPORT



PUBLIC
GOOD



CONSUMER/
ENTERPRISE
GOODS AND
SERVICES



LOCAL
PASSENGER
TRANSPORT



ADVANCED AIR MOBILITY (AAM)

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AAM Study Group (AAM SG) – Terms of Reference

The AAM SG will support the ICAO Secretariat to develop a holistic vision and framework related to AAM, and:

- a) **serve as a focal point** for ICAO AAM-related work with the aim of ensuring global interoperability and harmonization;
- b) perform an **assessment of the AAM ecosystem**, including, as deemed necessary, subsets, such as urban air mobility (UAM) and enablers, such as unmanned aircraft system (UAS) traffic management (UTM), automation and autonomy, information and data management, artificial intelligence (AI), etc.);
- c) based on the outcomes of the previous step, **perform a gap analysis between existing practices, ICAO provisions and what might be required from ICAO**;
- d) **develop initial guidance material** and the outline of a global framework, as deemed necessary; and
- e) develop **recommendations for an ICAO AAM strategy** and on future work.



ADVANCED AIR MOBILITY (AAM)

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Topics being currently considered by the AAM SG

- ✓ **Assessing the AAM Ecosystem (not only the aircraft)**
- ✓ **Holistic vision of the AAM ecosystem evolution report**
- ✓ **UAS regulatory framework gap analysis**
- ✓ **UTM implementation guidance material**
- ✓ **Early implementation Guidance on eVTOL operations in current ATM environment**
- ✓ **Exploring areas: autonomy and automation, new flight rules, the role of the pilot, information and data management, the link between AAM and the UN SDGs...**
- ✓ **Support ATMRPP on Global ATM Operational Concept (GATMOC) update for AAM related considerations**
- ✓ **Coordination with many ICAO expert groups: ADOP, RPASP, GANP SG, TFP, IMP, FLTOPSP, ATMOPSP...**



ADVANCED AIR MOBILITY (AAM) - *CALL TO ACTION*

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Calling for collaboration in key areas

- ✓ Understanding AAM
- ✓ Building AAM Infrastructure
- ✓ Supporting, Governing and Regulating AAM

Specific priorities

- ✓ Regulatory interoperability and adaptability, airspace integration, multilevel cooperation, and support for innovation



AAM 2024 ICAO'S FIRST ADVANCED
AIR MOBILITY SYMPOSIUM

AAM 2024 ICAO'S FIRST ADVANCED
AIR MOBILITY SYMPOSIUM



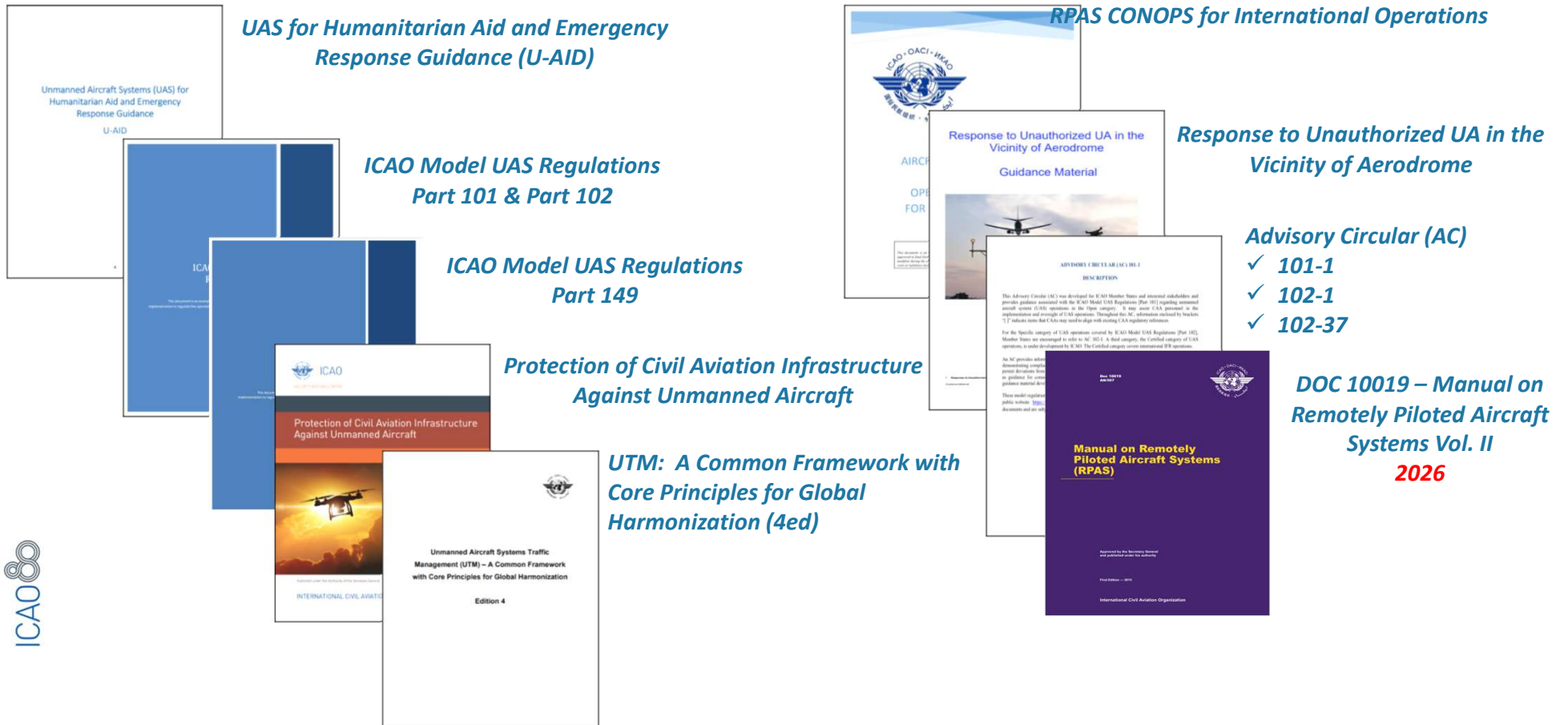
AAM International Call to Action

Paving the Way for the Future of Aviation with Advanced Air Mobility



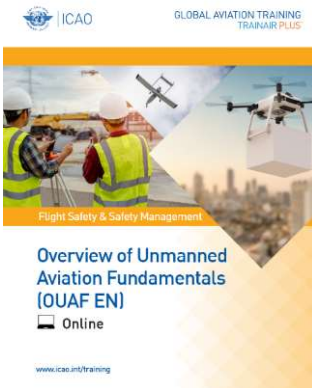
ICAO RESOURCES

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ICAO RESOURCES

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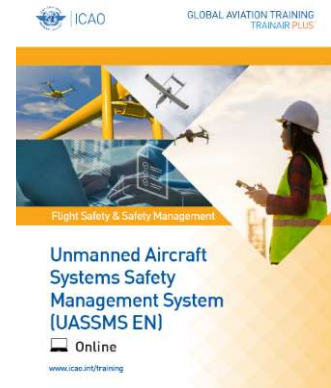
**Overview of
Unmanned Aviation
Fundamentals
(OUAF)**



**Unmanned Aircraft
Systems Operations
(UASO)**



**Unmanned Aircraft
Systems Regulations
(UASR)**



**Unmanned Aircraft
Systems Safety
Management System
(UASSMS)**

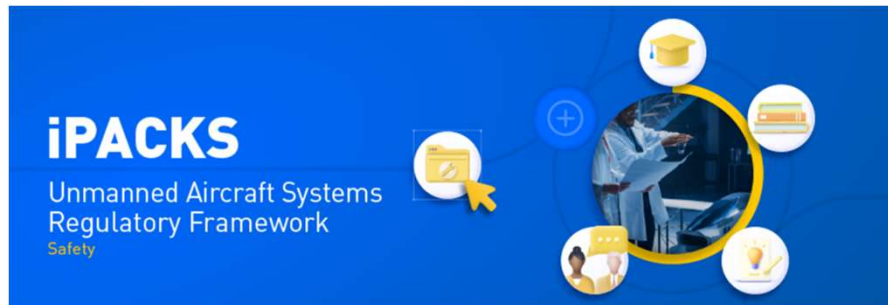


**Scan to view
the courses**



ICAO RESOURCES

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iPACK: This Implementation Package (iPack) is a self-contained package aimed at assisting and guiding ministries of transport, Civil Aviation Authorities (CAAs), and organizations that intend to operate UAS in multiple countries in the implementation of a UAS regulatory framework that remains outside of the Remotely Piloted Aircraft Systems (RPAS) framework.



ICAO RESOURCES

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AAM 2024
ICAO'S FIRST ADVANCED
AIR MOBILITY SYMPOSIUM

9 — 12 September 2024
ICAO Headquarters, Montréal, Canada

In collaboration with
CAAM

ICAO / Safety / Unmanned Aviation

- ICAO Model UAS Regulations
- U-AID or UAS for Humanitarian Aid and Emergency Response Guidance
- Additional Guidance ▶
- Expert Groups ▶
- Unmanned Aviation Bulletin
- Unmanned Aviation Training ▶

Unmanned Aviation and Advanced Air Mobility

The International Civil Aviation Organization (ICAO) is responsible for coordinating and developing global Standards and Recommended Practices (SARPs), Procedures, and Guidance material for unmanned aviation with the goal to facilitate a safe, secure, and efficient integration of unmanned aircraft into the global aviation system.

Unmanned aviation affords unique opportunities, including cargo transportation, delivery of life-saving materials, wildlife monitoring, disaster management support, infrastructure inspection, and much more. The rapid advancement of technologies supporting unmanned aviation presents



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SUSTAINABLE FUTURE.
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Helpful tools to assist States in realizing effective UAS operational guidance and safe domestic operations

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