Unmanned Aircraft Systems

Opportunities and Challenges

ICAO APAC RO Workshop on UAS Operations Over High Seas

November 2025

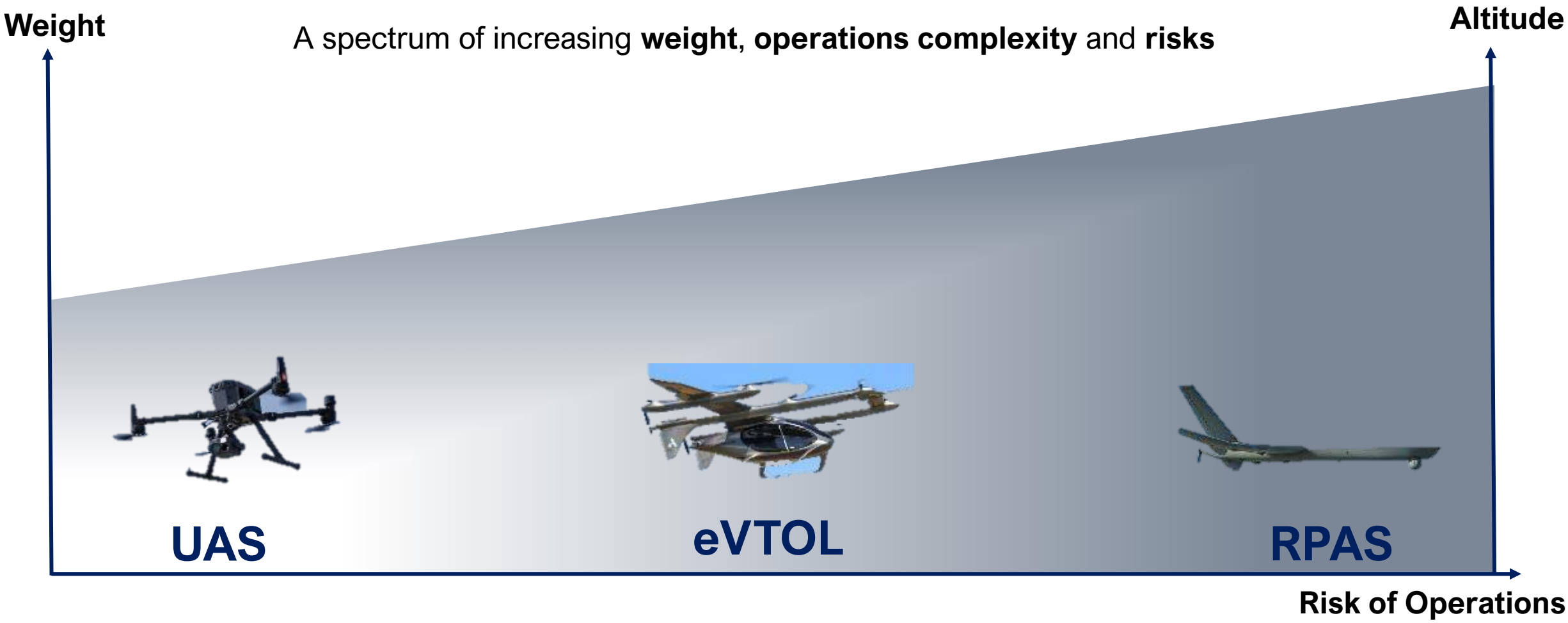
CAAS
Civil Aviation Authority of Singapore

Agenda

- Opportunities
  - Categories of Operations
  - States' Approach to facilitate UAS
- Challenges
  - Factors Inhibiting Access to Benefits
  - Unpacking the Inhibiting Factors
- Examples to resolve challenges

What is UAS?

"An aircraft which is intended to be operated with no pilot on board is classified as unmanned."



UAS opened up new opportunities

Provided new capabilities, enhanced efficiency, improved productivity

Expand cargo and logistics capability

Improve efficiency & safety in operations

Enhance public service offerings

Create economic opportunities

eVTOL promised to revolutionalise mobility

Opens up new possibilities

- Improve connectivity and accessibility for underserved urban and regional areas
- Enable multi-model transport integration with aviation and ground systems
- Enhance emergency and public service operations
- Drive economic growth through new industry value chains and job creation.

Different categories of operations

As guided by ICAO in Annex 6 Part IV

Categories of Operations

Open

Low risk flights within defined limitations like visual line-of-sight, no authorisation required.

Specific

Medium risk operations requiring operational authorisation, safety risk assessment and appropriate mitigations before flight.

Certified

High risk operations requiring full certification, licensing and airworthiness standards equivalent to manned aviation.

States' approach to facilitate UAS operations

As guided by ICAO in Annex 6 Part IV

Category of Operations	Remarks
Open *Low risk flights within defined limitations like visual line-of-sight, no authorisation required.*	***Majority of States** have promulgated regulations to allow VLOS operations outside of no-fly zones. There remain some States where UAS operations are under military authorisations.*
Specific *Medium risk operations requiring operational authorisation, safety risk assessment and appropriate mitigations before flight.*	***Many States** have established regulations to address pilot competency, operations risk, airspace issues but as complexity increases, many lack resources to fully address the industry needs.*
Certified *High risk operations requiring full certification, licensing and airworthiness standards equivalent to manned aviation.*	***Only a handful of States** have carried out certification. The lack of standards hold back others in developing regulations for high risk operations. Some States facilitate through waivers.*

Challenges

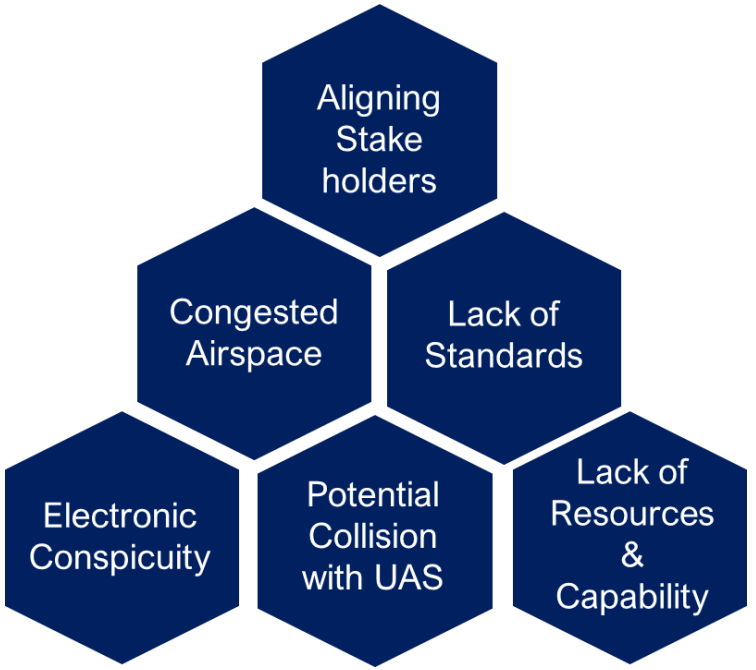
Factors Hindering Access to Benefits

Challenges

Unpacking the Inhibiting Factors

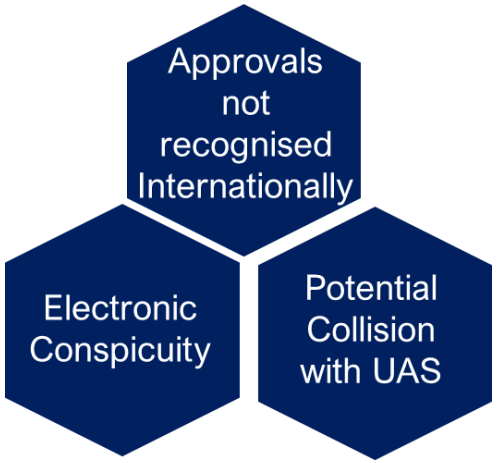
States ***can leave it*** to Original Equipment Manufacturer & Research Institutes

States ***can collaborate*** to learn from each other



E.g. Meeting of APAC Regulators on AAM and UAS

States ***can work with*** ICAO AAM-SG or other ICAO groups to develop guidelines



E.g. UAS operations over high seas

Meeting of APAC Regulators on AAM and UAS

Working Collaboratively to Address Challenges

Raise **awareness** of new technologies and regulatory approaches and practices

Facilitate **alignment** on approaches and practices

Support **adoption** of policies and regulations

24 Asia-Pacific States and Administrations

8 eVTOL aircraft and UAS workstreams

1) Australia
2) Bhutan
3) Cambodia
4) China^
5) Cook Islands^
6) Fiji
7) Hong Kong, China
8) India
9) Indonesia^
10) Japan
11) Kiribati
12) Malaysia^
13) Maldives
14) Micronesia
15) Mongolia
16) Nepal
17) New Zealand
18) Papua New Guinea
19) Philippines^
20) Republic of Korea
21) Samoa
22) Singapore^
23) Sri Lanka
24) Thailand^

^ Indicates workstream leads

Asia Pacific Reference Materials for Regulators to Facilitate Advanced Air Mobility Operations

Aim:

- Reduce duplicative efforts by providing guidance on key considerations for developing regulations and policies to facilitate eVTOL aircraft and UAS operations
- Ease product transferability across markets and reduce regulatory uncertainty by streamlining compliance processes

Target Audience:

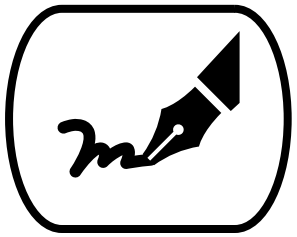
- Civil Aviation Authorities and National Agencies involved in facilitating AAM operations
- AAM Industry

Scan to Download

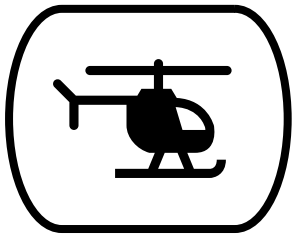
Reference Materials cover eight parts

Six on eVTOL aircraft and two on UAS

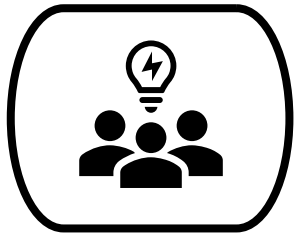
eVTOL Aircraft



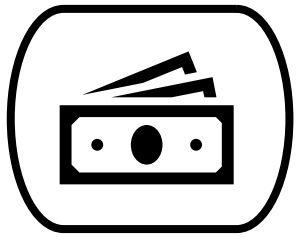
Part 01
Certification, Validation, and Acceptance of eVTOL Aircraft



Part 02
Regulations for eVTOL Aircraft Entry into Service



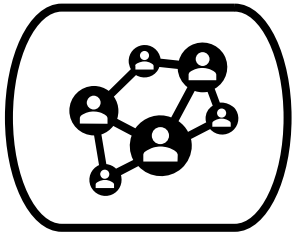
Part 03
Cooperation among National Agencies



Part 04
Economic Policies and Regulation

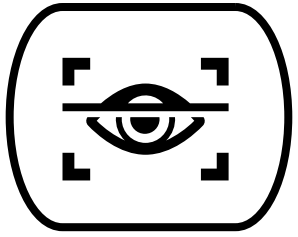
eVTOL Aircraft

Part 05
Capability Development



Part 06
Social Acceptance

Unmanned Aircraft Systems



Part 07
Technical Guidance for the Implementation of BVLOS UAS Operations

Part 08
Capability Building (UAS Personnel Training)

Caters to States beyond APAC

Each State is different with individual unique considerations

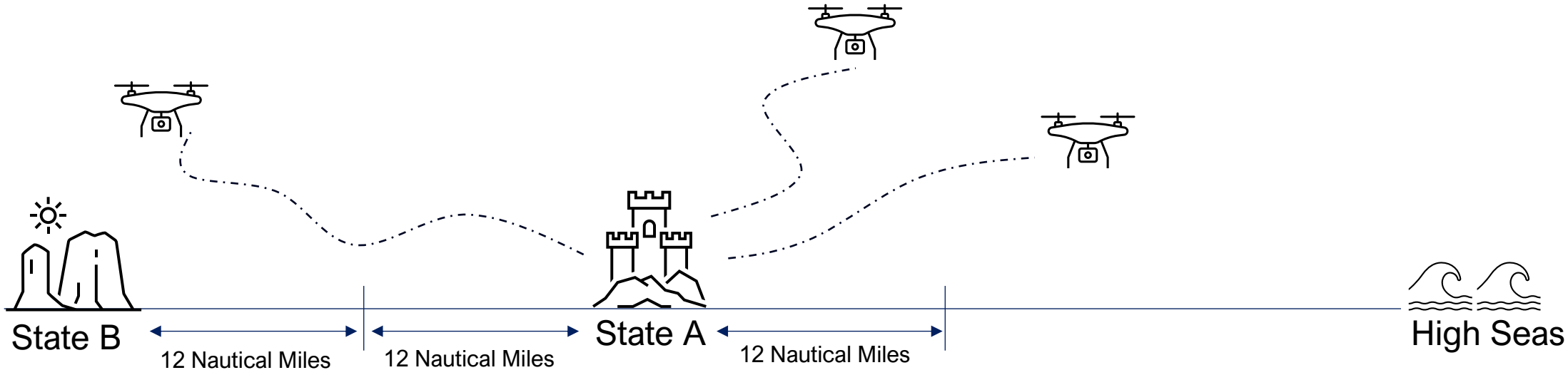
The reference materials are a descriptive resource for regulators to consider, adapt and use to prepare for and facilitate eVTOL aircraft and complex UAS operations.

Each of the *eight* parts contains:

- **Introduction** — a brief overview of the part's content
- **Background** — setting the context of the topic through historical precedents or current practices
- **Key Considerations** — insights related to the topic, compiled through literature reviews, surveys, workshops, or brainstorming
- **Action Plan** — guidance for regulators on potential steps to address and prepare for in the respective topic
- **References** — sources used in developing the content. Where applicable, annexes are included to guide the implementation of each part

UAS Operations

Domestic ➔ Cross-Border ➔ High Seas



- Cross-border operations may proceed with an agreement between the States involved in the operations.

- Authorisations issued by originating State and sometimes waivers for BVLOS, permitting said UAS operations.
- NOTAMs issued for operations of said UA to inform other airspace users.

- While State A's approval might be recognised by State B, operations in international waters is more complex and is governed by international framework.

UAS Operations

Challenges when Operating over High Seas

1

- **International Agreement**
  - Operations in international waters is more complex.

2

- **Chicago Convention**
  - Article 8 includes pilotless aircraft
  - Article 31, CoA is a must.
  - Article 32, Pilot license is a must
  - Some others not practical requirements i.e. Article 17 on Nationality of Aircraft, Article 20 on Display of Marks, Article 29 on Documents to Carry and Article 34 on Journey Log Books.

3

- **Airspace**
  - Cannot comply with seen & be-seen requirements
  - Electronic Conspicuity?

It's a complex issue and arising from A42, ICAO is being asking to look into an interim solution to allow UAS operations over high seas.

Summary

Collaboration is Key to unlocking Opportunities

- Meeting of APAC Regulators on AAM and UAS
- ICAO AAM-SG & Specific Task Groups
- Other working groups (i.e. JARUS)

Thank You