Approval of UA operations in Singapore

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9 & 10 May 2023

CAAS
Civil Aviation Authority of Singapore

Agenda

- Overview of unmanned aircraft (UA) regulations in Singapore
  - Pilot Competency
  - Operator Permit
  - Activity Permit
- Learning from Experience

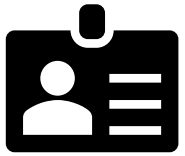
Overview of UA regulations in Singapore

STEP BY STEP REGULATORY PROCESS

1

Registration

- UA with mass exceeding **250g**



2

Pilot Competency

- Define drone **operator/pilot competency required** for certain weight and type of drone operations

3

Operator Permit

- Assessment on the **organization level capabilities** and **airworthiness** of the UA

4

Activity Permit

- Address **air and ground risk** for a particular operations, in a particular area and time.

Pilot Competency

COMPETENCY COMMENSURATE WITH THE RISK OF OPERATIONS (1/2)

Basic competency (UABTC) required to operate a UA weighing >1.5kg to <7kg for **non commercial** operations

Civil Aviation Authority of Singapore

1 CAAS approve a UABTO and its the course & exam materials

4 CAAS conduct inspections to ascertain that the pilots have the necessary qualifications

UA Basic Training Organisation (UABTO)

2 Provides online training, conducts an exam thereafter to test the applicant's knowledge, prior to UA Basic Training Certificate issuance

Provides service for a fee

UA Basic Training Certificate (UABTC)

3 Student can do the training at their convenience online. After passing the exam, the UABTC would be issued electronically and can be kept in the student's mobile device

Pilot Competency

COMPETENCY COMMENSURATE WITH THE RISK OF OPERATIONS (2/2)

Professional competency (UAPL) required to operate a UA >7kg or when operating for **commercial** purposes (regardless of UA weight)

Civil Aviation Authority of Singapore

1 CAAS audits the UATO, approve the course & exam materials & assesses the flight examiner *(5 stage approval process)*

5 CAAS conducts inspection to ascertain that pilots have the necessary qualifications

4 CAAS conducts theory exam & issue the UA pilot licence

UA Training and Assessment Organisation (UATO)

2 Provides theory and practical training. Carry out practical assessment to ascertain the student's piloting skills

Provides training & assessment for a fee

UA Pilot Licence (UAPL)

3 Students may choose to attend the classroom training first, or do the theory exam without the training. However, the practical assessment needs to be conducted by the UATO

Operator Permit

COMMERCIAL AND OTHER HIGHER RISK UA OPERATIONS

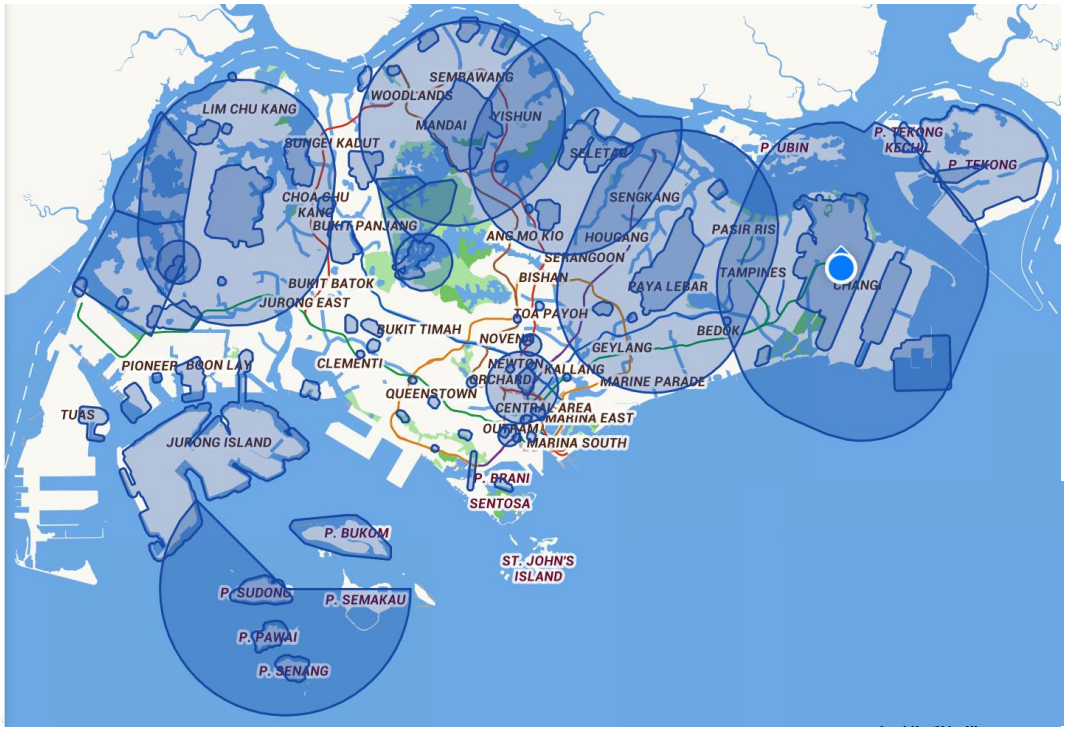
Assessment on an organisation capability and airworthiness of UA

1st Stage Pre-Application	To ensure that the operator understand the regulatory requirements.
2nd Stage Formal Application	The applicant demonstrates understanding of the regulatory requirements and how it complies with it through documentation such as how it manages it operations, continuing airworthiness of the UA, crew competencies.
3rd Stage Document Evaluation	CAAS to assess the applicant's ability to comply and operate the UA in accordance with the regulatory requirement
4th Stage Demonstration & Validation	Applicant to demonstrate the operational control stipulated in its submitted documents include demonstration of a UA a flight.
5th Stage Certification & issuance of approval	Approvals are valid for up to a year

Activity Permit

COORDINATION WITHIN AGENCIES TO ADDRESS AIR AND GROUND RISK

CAAS is the lead agency to coordinate with multiple stakeholders. Clearance for operations in controlled airspace, security sensitive areas and areas of interest to public agencies



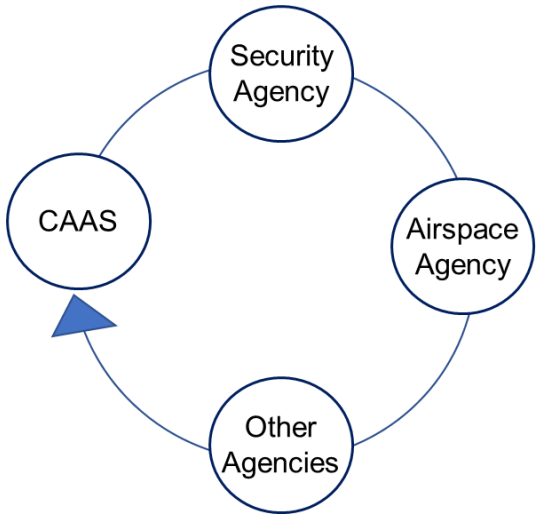
- 5 Aerodromes (2 civilian and 3 military) and related No Fly Zones
- Security sensitive areas
- Protected parks and agency installations

Activity Permit

ENHANCING INTER-AGENCY PROCESSES

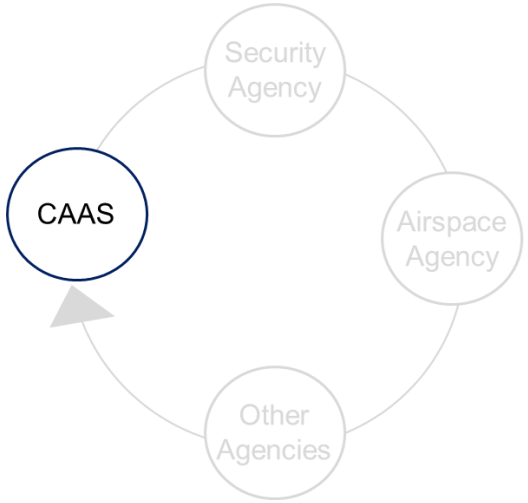
- Multiple inter-agency coordination leads to long lead time in clearing of the activity permit, which led to the need for a streamlined clearance process

Previously
Non Streamlined Clearance

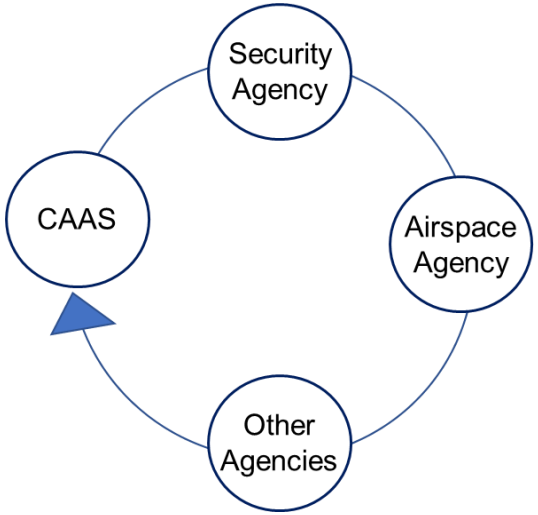


Currently
Streamlined Clearance

Simple Request

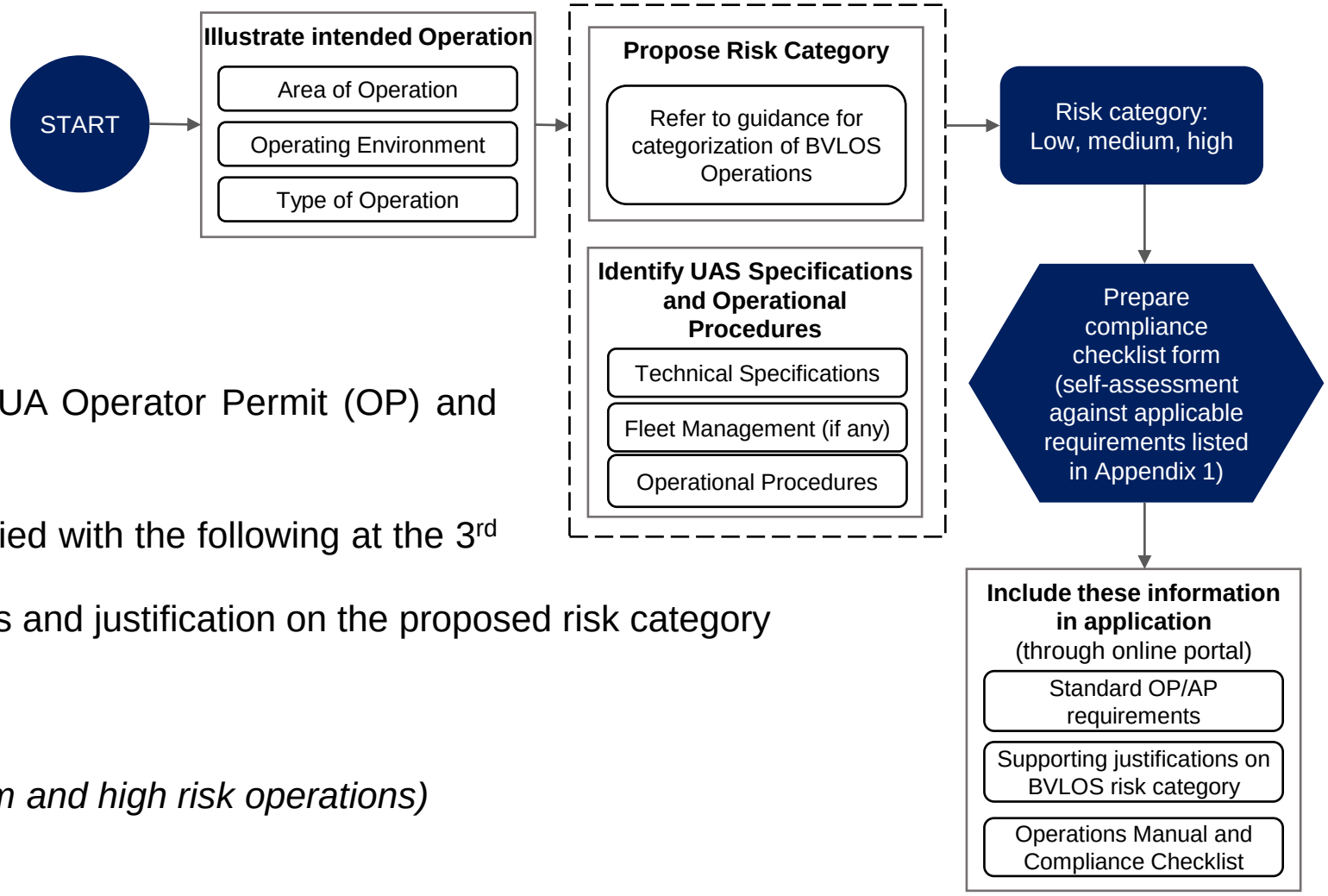


Complex Request



Beyond Visual Line of Sight Operations

APPROACH TO FACILITATE OPERATIONS AND MANAGING RISK



An BVLOS application is made through UA Operator Permit (OP) and thereafter, a Class 1 Activity Permit (AP).

The application will have to be accompanied with the following at the 3rd phase of OP assessment:

(1) Illustration of the intended operations and justification on the proposed risk category
(2) Design specification of the UA
(3) Compliance Checklist
(4) System Safety Assessment
(5) Reliability demonstration *(for medium and high risk operations)*

Operator Permit

BEYOND VISUAL LINE OF SIGHT OPERATIONS (2/2)

Risk Level	Allowable Operations	Technical & Operational Requirements Code				Possible Use Cases
		Pre-requisites (Basic)	*Level 1 Requirement*	*Level 2 Requirement*	*Level 3 Requirement*	
LOW	• No overflying *uninvolved* people − Fly in an area where it is reasonably expected that no uninvolved person will be present.	• Emphasis on **containment** and **operational procedures**				• Ship to Shore Delivery • Premises Surveillance • Building Inspection • Facilitation of trials for medium and high risk operations
MEDIUM	• Flying in proximity to but at a safe distance from *uninvolved* people • Flying over *uninvolved* people − Limited to only temporary transiting over areas where the presence of people are reasonably expected	• Safety objective where probability of a catastrophic failure condition does not exceed 1 x 10^{-6} / FH • System redundancies • Software assessment • Ability to detect static and collaborative dynamic obstacles				• Ship to Shore Delivery • Parcel Delivery • Facilitation of trials for high risk operatons
HIGH	• Flying over *uninvolved* people • Higher risks operations such as: − Carriage and transporting of dangerous goods or people − Flying and operating in non-segregated airspace	• Safety objective where probability of a catastrophic failure condition does not exceed 1 x 10^{-7} / FH • To meet recognized standards • Ability to detect static and dynamic obstacles				• Parcel Delivery over masses • Media Coverage over masses

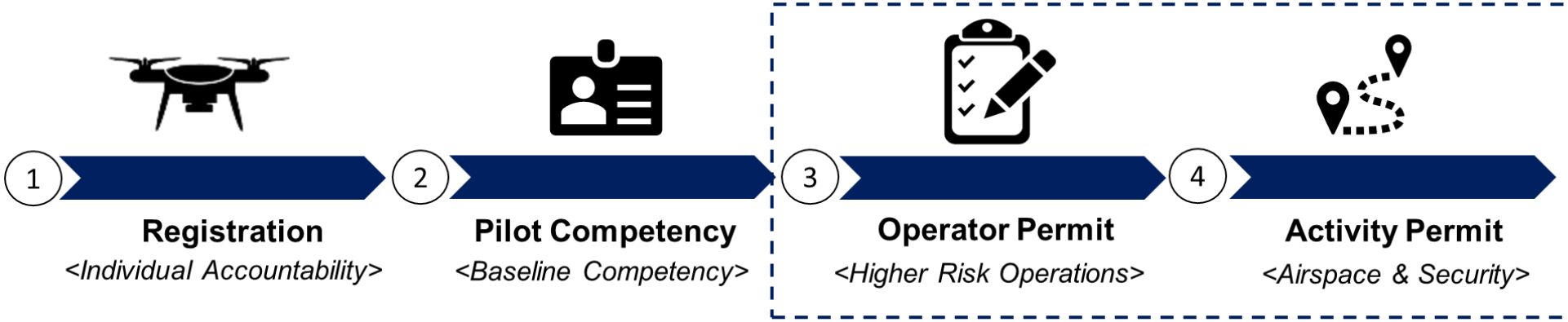
For Medium and High Risk level operations: A reliability demonstration is required, which is a challenge

Learning from Experience

NEED FOR AUTOMATED AND SCALABLE SYSTEM

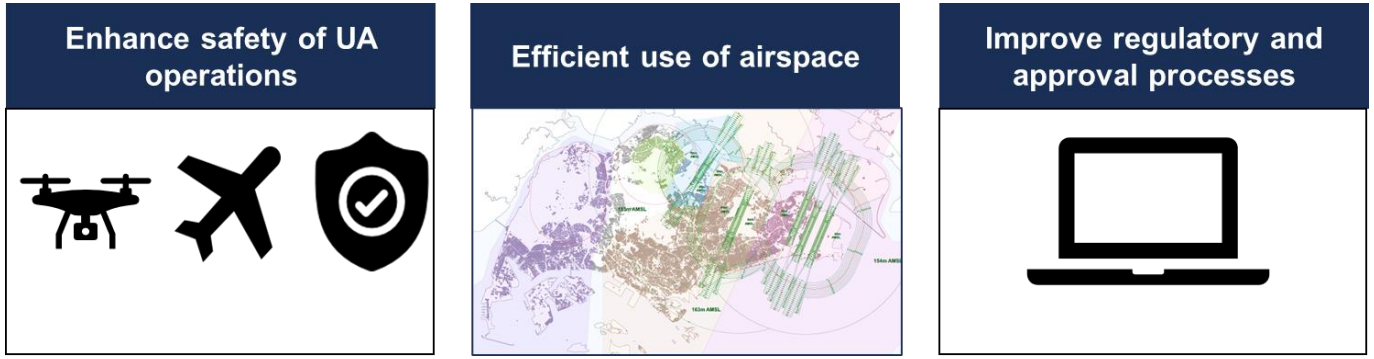
Current

While the current regulations mitigates risk, it is not fully efficient to address the anticipated scaling up of industry demand (i.e. ③ and ④)



Future

CAAS is working on the unmanned aircraft system traffic management (UTM) system to allow the efficient use of airspace, improve regulatory and approval process, and enhance the safety of UA operations



Thank you