

Civil Remotely Piloted Aircraft System (RPAS) Regulations in Australia

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Introduction

- UAS growth: recreational and commercial use
- History of UAS Regulations in Australia
- Regulations 2002 - 2016
- Regulations 2016 – present
- UAS in Controlled Airspace
- Future developments
 - Small UAS Potential Harm Analysis
 - UAS Risk Assessment Framework

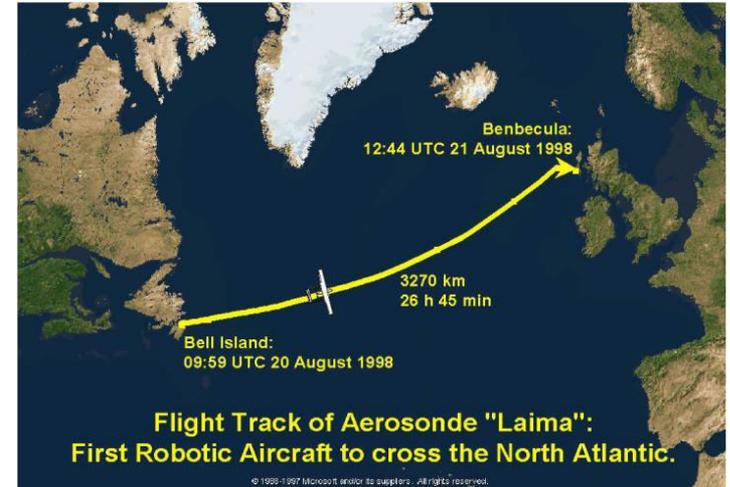


Acknowledgement

Some material used with permission from Jim Coyne, former Civil Aviation Safety Authority airworthiness engineer and manager Future Technologies. Jim was also Chair of the International Civil Aviation Organisation Unmanned Aircraft Systems Study Group, since February 2010.

UAV Early Highlights

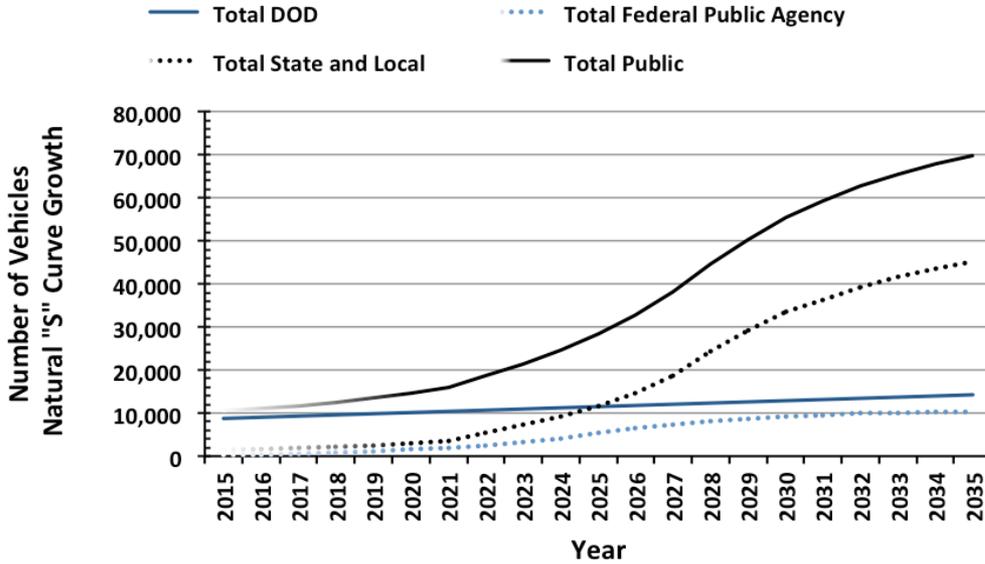
- In 1998, a partly Australian developed Aerosonde UAV completed an autonomous Atlantic crossing using 4 kg of fuel (2,000 nm in 27 hrs). The vehicle was originally developed for meteorological measurements.
- In 2001, a Global Hawk made international aviation history when it completed the first non-stop flight across the Pacific Ocean by an autonomous aircraft, flying from Edwards Air Force Base to RAAF Base Edinburgh, SA (7,500 nm in 22 hrs).



UAS Forecast 2015 - 2035



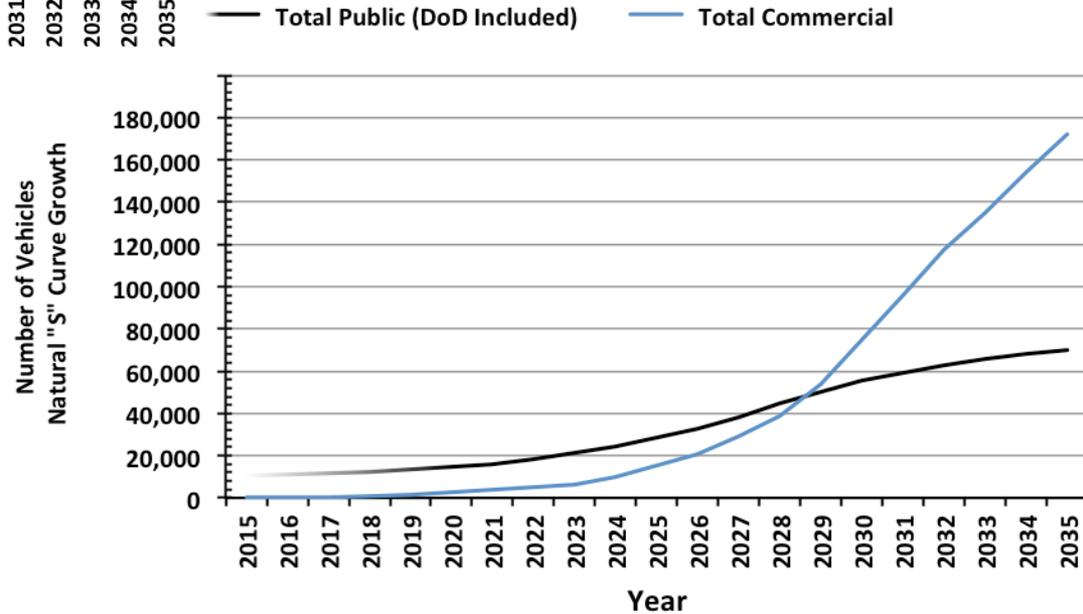
DoD and Public Agency Unmanned Aircraft Systems



“Australia Post is trialling the use of remotely piloted drones internally, with the backing of the CASA.”

“Currently \$2,000 typically buys you a small, high performance multi-rotor the size of a wheelie bin lid, equipped with HD live stream video cameras, GPS, autopilot, top speed of 70 km/hr, with a range of 2 to 3 km and a 15-20 minute flight time.”

Unmanned Aircraft Systems



History UAV Regulations in Australia

- UAV operations in Australia are governed by the Civil Aviation Safety Authority (CASA) contained in CASR Part 101.
- Promulgate an operational body of legislations for UAVs in 2002.
- In 2013 new amendments were announced to more accurately align the requirements and controls applied to UAVs with the safety risk that each particular aircraft and designated activity presents.
- In 2015, the first drone-related fine issued (A\$850 = US\$685 = CHF650).
- After an extensive consultation period the new amendments were approved and came into effect on 29 September 2016.



CASR Part 101 before 2002

- Prior to 2002, model aircraft as defined by CASA Part 101 are those that are *flown for sport, recreation, and education*.
- Model aircraft cannot be flown for commercial gain.
- There are no requirements for formal piloting qualifications to operate these vehicles, but they must only be operated with visual line-of-sight in day visual meteorological conditions (VMC).
- These rules are not compatible with the trend of UAV development and operations. Model Aircraft \neq Unmanned Air Vehicle (UAV)
- In 2002, CASR Part 101 introduced a new category Subpart 101F: UAVs.
- The rules that apply under this legislation were centred around one important distinction: whether the aircraft in question is defined as a model aircraft or an unmanned aircraft.

“Incidents are expected to become more common as sales continue to skyrocket. There are already more than 50,000 drones believed to be in operation in Australia that would continue to skyrocket as drones became more affordable and accessible through retail stores.”



CASR Part 101 from 2002 and 2016

- In 2002, CASR Part 101 introduced a new category Subpart 101.F: UAVs.
- The new rules were centred around one important distinction: whether the aircraft is defined as a model aircraft or an unmanned aircraft.
- Unmanned Air Vehicles:
 - Large UAV > 150 kg (330 lbs)
 - Micro UAV \leq 100 gr (0.22 lbs)
 - 100 gr < Small UAV \leq 150 kg

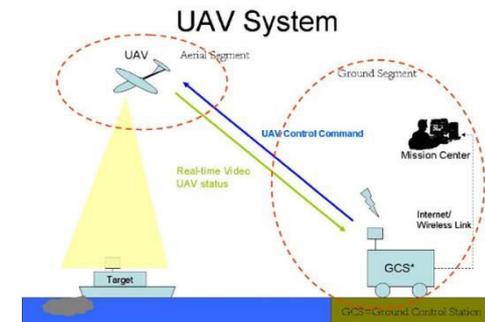


Excluded:

- Tethered model aircraft
- Model aircraft indoors
- Unmanned airship indoors
- Small balloon within 100 m (328 ft) of a structure and not above the top of the structure.
- Unmanned tethered balloon below 400 ft AGL.
- Fireworks rocket not capable of rising above 400 ft AGL.

CASR Part 101 from 2002 and 2016

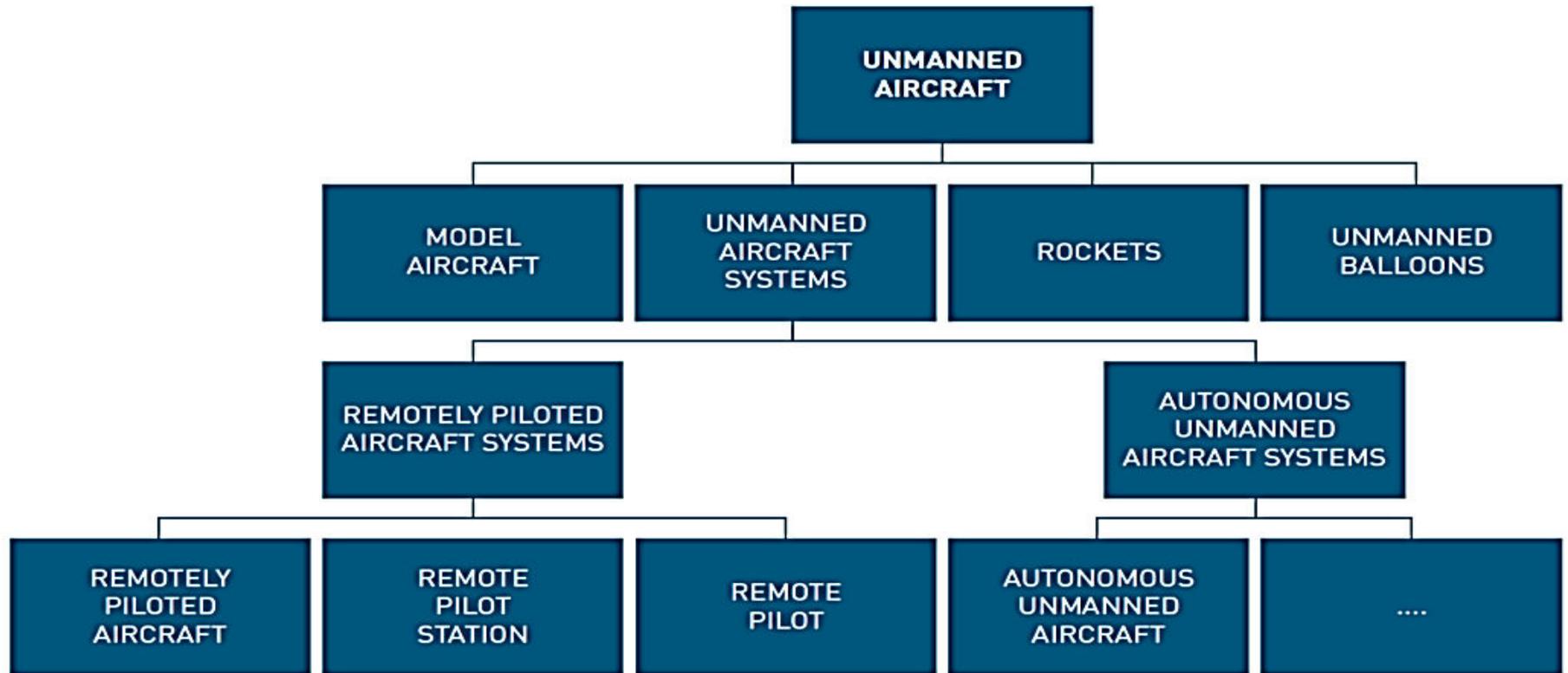
- UAV > 150 kg (*large UAV*) must have:
 - Special Certificate of Airworthiness (cf. Airworthiness Requirements for Light Sport Aircraft)
 - Certificate of Registration
 - Maintenance Program
 - Operator's Certificate for Hire or Reward operations
 - Operations require CASA approval
- UAV < 150 kg (*small UAV*):
 - = model aircraft, if operated for sport or recreation (Subpart 101.G)
 - No airworthiness requirements
 - Operational requirements:
 - Must stay clear of populous areas
 - Must stay in line of sight
 - For take-off mass > 25 kg (*giant model aircraft*) CASA approval required



Time for Review

- Regulations date from 2002, but UAV technology has moved on ...
- Based on little operational experience.
- Provided limited detail in Regulations or Advisory Circulars on qualifications, risk management, airworthiness, or operational approvals.
- Regulation only provided a basis for oversight.
- Minimal guidance to Industry.
- CASA treats every application for UAS operation as a stand alone exercise.
- Rapid increase in activity levels and requests for approvals.
- Increases the probability for unsafe decisions.
- ICAO reshaping the regulatory framework for unmanned aircraft globally, replacing the term UAV with Unmanned Aircraft System (UAS), Remotely Piloted Aircraft Systems (RPAS) and Remotely Piloted Aircraft (RPA).
- Aviation White Paper requires CASA to support UAS operations.

Hierarchy of Terminology



- RPAS is a subset of UAS. It includes, but is not necessarily limited to, the RPA, a remote pilot station (RPS) and are piloted by a remote pilot (RP).
- When considering requests for RPAS related functions, CASA considers the total system, not just the aircraft.

CASR Subpart 101.F – Remotely Piloted Aircraft (RPA) – Sept. 2016

- RPA are divided into the following categories:

- $100\text{ g} < \text{Very small RPA} \leq 2\text{ kg}$
- $2\text{ kg} < \text{Small RPA} \leq 25\text{ kg}$
- $25\text{ kg} < \text{Medium RPA} \leq 150\text{ kg}$
- $\text{Large RPA} > 150\text{ kg}$



- *Excluded* RPA, representing RPA operations considered to be lower risk based on mass and type of operation.
- RPA operator's certificate (ReOC) and the remote pilot licence (RePL).
- Commercial operators flying very small RPAs do not require a ReOC or an RePL, but have to notify CASA and operate by the standard operating conditions.



Standard RPA Operating Conditions

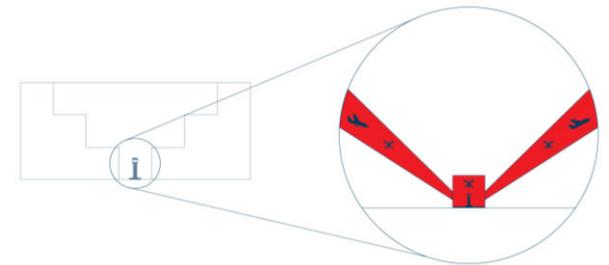
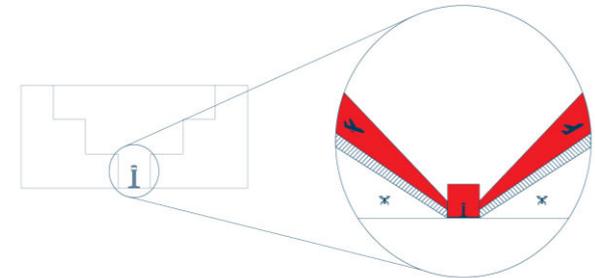
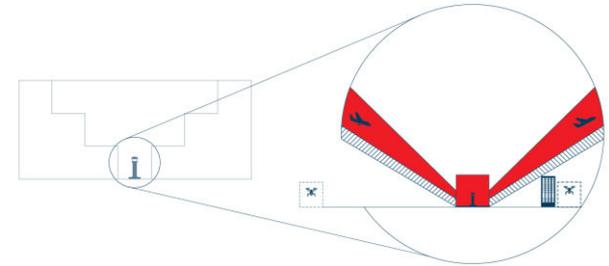
- Fly during the day and keep RPA within visual line-of sight.
- Not fly RPA higher than 120 m (400 ft) AGL.
- Keep RPA at least 30 m away from other people.
- Keep RPA at least 5.5 km away from airports.
- Not fly RPA over any populous areas.
- Not fly RPA near areas affecting public safety or where emergency operations are underway (without prior approval).
- Fly only one RPA at a time.
- Not fly RPA autonomously under the amendments. CASA is developing regulations for autonomous flight; however, there is scope for CASA to approve autonomous flight on a case-by-case basis.



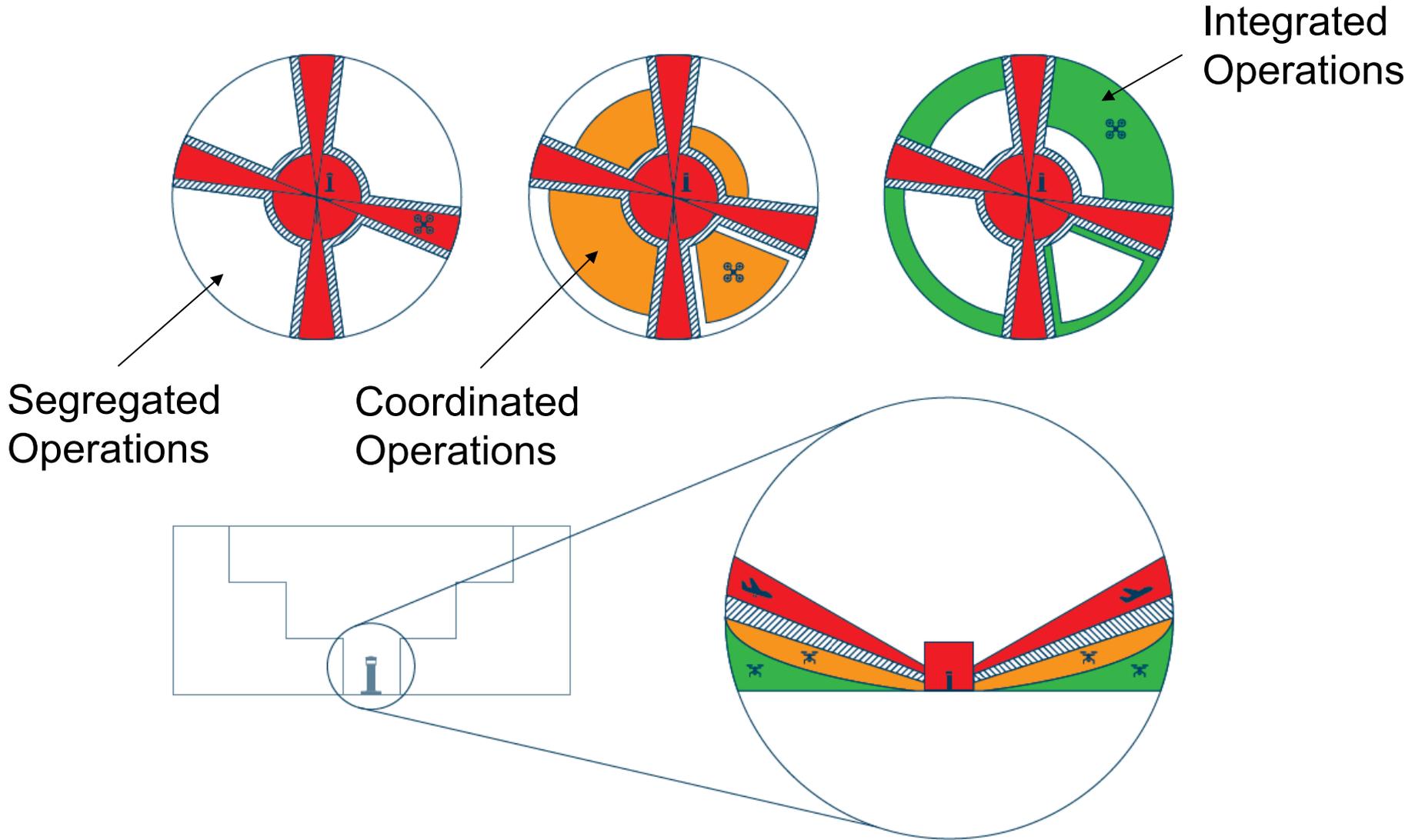
Excluded operation	RPA Pilot License	RPA Operator's Certificate
Very Small RPA	No	No
Small RPA - Private land	No	No
Medium RPA – Private land	Yes	No

RPAS Operations in ATM

- **Segregated Operations:** Operations which would normally impact on ATC but the characteristics of the requested location mean that direct interaction with ATC is not required and ATC can work independently around the RPAS operation.
- **Coordinated Operations:** Operations where interaction with ATC is required as determined through assessment of the characteristics of the location and equipment levels and capability of the RPAS. These operations may require extensive assessment or may have a standard “RPAS Buffer” applied.
- **Integrated Operations:** Operations where the equipment levels and capability of the RPAS are highly reflective of conventionally piloted aircraft and can be largely managed through pre-existent systems and processes.

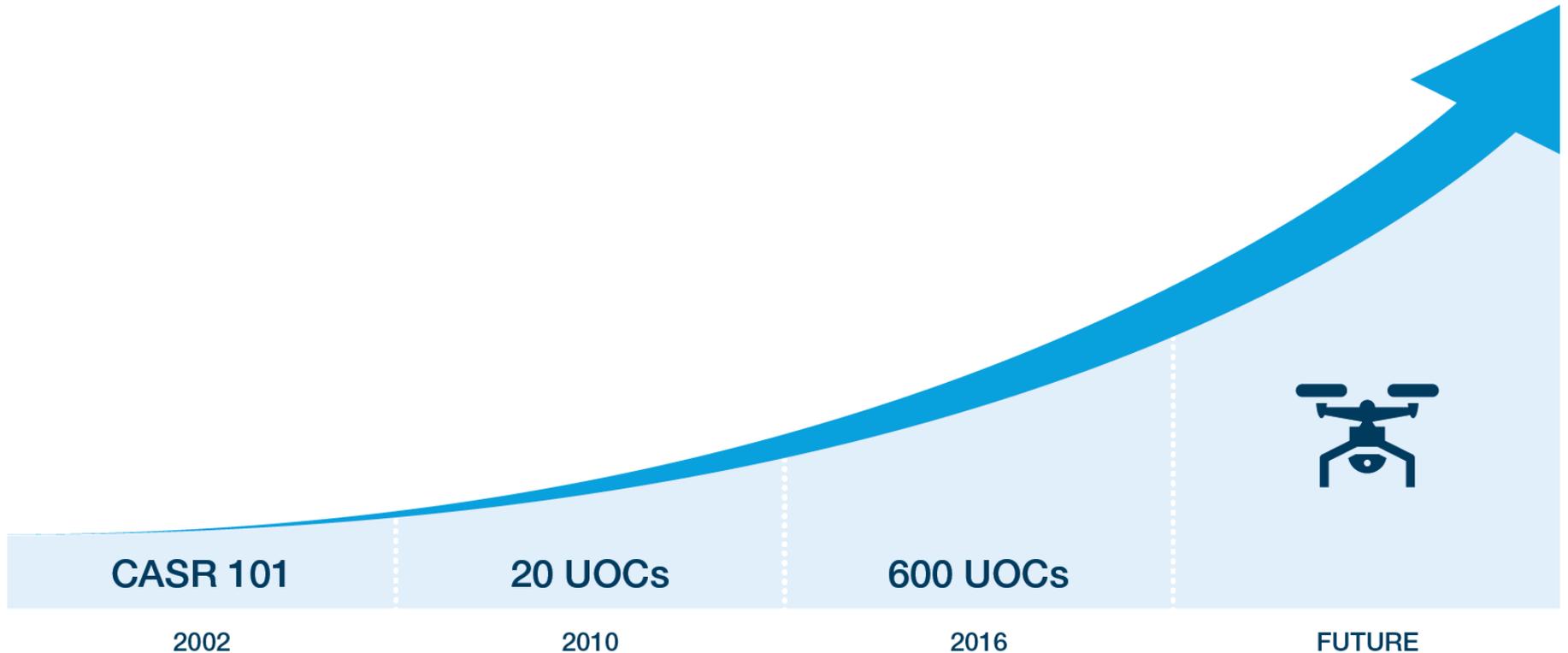


RPAS Fly Zones near Aerodromes



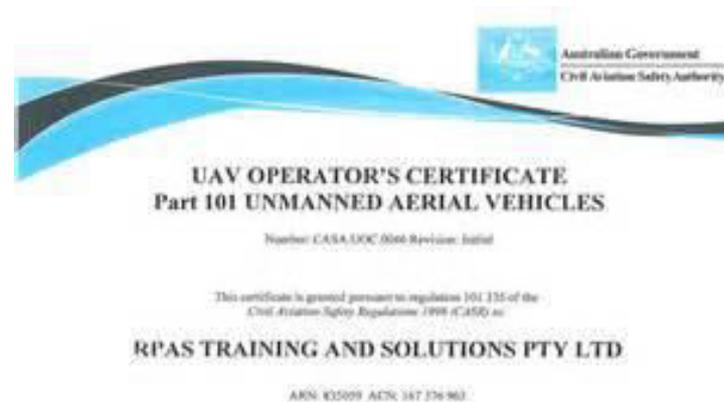
Australian RPAS UOC Growth

- RPAS is the fastest growing area of civil aviation.
- By mid 2016, there were approximately 600 commercial RPAS operators registered with the Australian Civil Aviation Safety Authority (CASA) through receipt of an Unmanned Operator Certificate (UOC).



Remote Pilot License (RePL)

- A Remote Pilot License (RePL) is required for operating a drone outside of the standard operating conditions applicable to the excluded category.
- The excluded RPA category allows low-risk RPA operations in certain circumstances without the need for a ReOC or RePL.
- This includes commercial operators with RPAs lighter than 2 kg and some private landowners operating RPAs up to 25 kg.
- Private landowners operating above 25 kg are required to hold a RePL.
- From 1 June 2017, RePL applicants will satisfy the training requirements by completing a RePL training course conducted by a person holding a RPA Operator's Certificate (ReOC) that authorised the training.



RPA Operator's Certificate (ReOC)

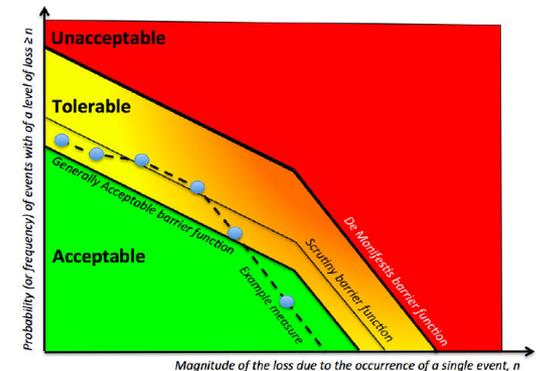
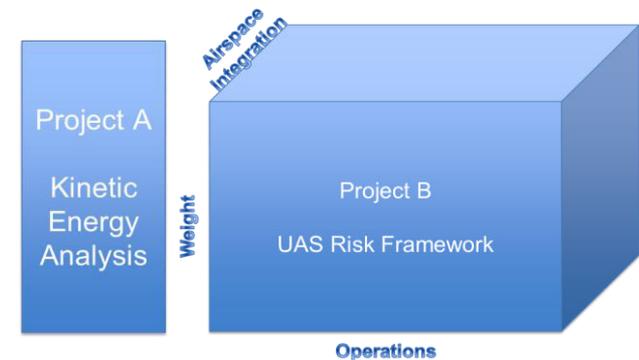
- CASA will issue the certificate upon successful completion of the assessment process to allow commercial operations.
- Previously, CASA authorised UAV operator's certificates in the RPA categories of **multi-rotor**, **fixed wing** and **helicopter** types across four different weights: < 2 kg, < 7 kg, < 20 kg and < 150 kg.
- From 29 September 2016, CASA is authorising RPA operator's certificates (ReOC) in the following weight categories:
 - very small (100 g - < 2 kg)
 - small (2 - < 25 kg) (where required with 7 kg restriction)
 - medium (25 - < 150 kg)
 - large (> 150 kg).



UAS Airworthiness Policies

UAS airworthiness policy to create a cost effective and risk based framework that scales with both size and operational capabilities, to create a holistic system encapsulating UAS of all sizes:

- Harmonisation with international standards: EASA and FAA.
- Outcome based: UAS operators prove compliance.
- Scaled risk-based categorisation: as the risk of the operation and aircraft increases, the requirements become more rigorous.
- Experimental UAS: UAS be eligible for experimental certificates.
- Model aircraft: Exempt from airworthiness regulations (Subpart 101.G).



UAS Airworthiness Categories

Category	Certified		Specific				Open	
	Standard	Restricted	Option 1	Option 2		Option 3	Small RPAS	Very small RPAS
type certificate (TC)	Yes	Yes (but with exemptions)	No	No	No	No	No	No
design approval	NAA	NAA	Industry	Industry	Industry	Industry	No	No
formalised design standards	Yes	Yes	No	Yes	No	No (optional)	No	No
production approval	NAA	NAA or Military type	No	Industry	No	No (optional)	No	No
CofA	Yes	Yes	No	Yes	Yes	No (optional)	No	No
operational restrictions	dependent on TC + installed equipment	operating conditions set according to TC and exempted standards + installed equipment	UOC + legislated operating conditions	standard operating conditions for small RPAS	standard operating conditions for very small RPAS			

Open category – i. sub-2 kg ii. 2-25 kg

Specific category – Option 1 – operational permission system, Option 2 – mandatory Certificate of Airworthiness system, Option 3 – an optional Certificate of Airworthiness system.

Certified category – UAS certification process would be similar to type certificated manned aircraft, to ensure an equivalent level of safety.



Thank You