



**Submission of International Aerospace Law & Policy Group
(IALPG) to the Senate Rural and Regional Affairs and
Transport References Committee Inquiry on
Regulatory requirements that impact on the safe use of Remotely
Piloted Aircraft Systems, Unmanned Aerial Systems and
associated systems**

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Contents

Contents	2
Who are IALPG?	3
Executive Summary	5
Recommendations.....	7
A. Current and future regulatory requirements that impact on the safe commercial and recreational use of Remotely Piloted Aircraft Systems (RPAS), Unmanned Aerial Systems (UAS) and associated systems.....	10
ICAO and foreign regulator considerations	11
B. The existing industry and likely future social and economic impact of RPAS technology	16
C. The international regulatory/governance environment for RPAS technology and its comparison to Australian regulation	17
D. Current and future options for improving regulatory compliance, public safety and national security through education, professional standards, training, insurance and enforcement	17
E. The relationship between aviation safety and other regulation of RPAS for example, regulation by state and local government agencies on public safety, security and privacy grounds	19
F. The potential recreational and commercial uses of RPAS, including agriculture, mining, infrastructure assessment, search and rescue, fire and policing operations, aerial mapping and scientific research.....	20
G. Insurance requirements of both private and commercial users/operators, including consideration of the suitability of existing data protection, liability and insurance regimes, and whether these are sufficient to meet growing use of RPAS.....	21
H. The use of current and emerging RPAS and other aviation technologies to enhance aviation safety	22
I. Any other related matters	22
Conclusions.....	22
Appendix A.....	24

Who are IALPG?

International Aerospace Law & Policy Group (IALPG) is a specialist aviation legal practice based in Queensland, comprising Australian Founding Principal Joseph Wheeler, 3 foreign aviation legal experts who consult to the practice, including one local aviation safety and technical consultant who is both a qualified solicitor and full time international airline pilot.

Joseph Wheeler is one of the few post graduate alumni of the McGill University Institute of Air and Space Law in Montreal, Canada, who practices in the field of law predominantly for pilots and passengers. He is an elected Member of the Royal Aeronautical Society, and:

- Aviation Legal Counsel to the Australian Federation of Air Pilots providing individual, association and government affairs advice (AFAP is Australia's largest pilot professional association by member numbers);
- National Head of Aviation Law at Maurice Blackburn Lawyers, providing advice and representation on air disaster and injury cases to Australian and overseas clients;
- Aviation Spokesperson of the Australian Lawyers Alliance, the leading social justice legal professional association in Australia;
- a member of the Legal Committee of the International Federation of Airline Pilots' Associations (IFALPA) in Montreal, representing AusALPA (Australia's member association to IFALPA, which is made up of AFAP and the Australian and International Pilots Association, AIPA). IFALPA represents over 100,000 pilots and flight engineers worldwide and has observer status at ICAO;
- a member of the Professional & Government Affairs Committee of IFALPA;
- appointed to the Management Committees of organisations which advocate for aviation safety through specialist technical, professional, or pilot health and wellbeing programs through member representation and other initiatives, including Australian Certified UAV Operators Inc (ACUO) and HIMS Australia Advisory Group Inc; and
- a regular commentator on aero legal and aero political affairs for *The Australian*.

Joseph has worked as a regulator for the Australian Government and was responsible for airport economic regulation policy oversight, and planning and development, as an Assistant Director in the Airports Branch, Canberra, from 2011 – 2013. He has published more than 100 articles in total in peer reviewed journals, newspapers, magazines, legal websites, and on topics as broad as air safety policy, international law, aviation conventions, RPAS regulation, and topical policy development in Australia and at the International Civil Aviation

Organisation (ICAO). He also speaks regularly at international conferences on aviation legal and policy topics, most recently on the most notable air crash disasters this decade (MH17 and MH370), RPAS regulation and policy, and the legal approach in Australia to pilot fatigue risk management regulation.

This submission follows the Terms of Reference (TOR) in the order they have been presented.

Executive Summary

The Civil Aviation Safety Authority (CASA) amendment to Part 101 of the *Civil Aviation Safety Regulations 1998* (CASR) and other regulations (ie, CALA, which was registered on 29 March 2016, tabled in both Houses on 18 April 2016, but took effect from 29 September 2016) features:

- relaxation of existing impediments of training and certification to be able to commercially operate remotely piloted aircraft of certain sizes up to 2kg in weight;
- relaxation of the ability of certain property owners to use such aircraft, including aircraft up to 25 kg in weight, without training and certification for private purposes; and
- relaxation of the requirement for all drone operators to avoid *all* aerodromes, replacing it with a requirement that such aircraft must keep away from only *controlled* aerodromes.

While relying on the mitigation of risk through the imposition of standard operating conditions, the legislative amendment does not introduce necessary and sensible risk mitigation and enforcement measures uniformly recognised around the world to be necessary for the prevention of harm. Such harm includes injury to people on the ground, and mid-air strike with passenger airliners. Enforcement measures include, for example, a means of identifying and prosecuting the malicious, or untrained and reckless misusers of such aircraft, whether they be recreational, commercial, or otherwise.

As the Explanatory Memorandum to the CALA confirms, consultation was principally completed in 2014, some two years ago. Leaps and bounds have been made in the understanding of risks associated with all sizes of drone since that time. Furthermore, the legislative sophistication of countries around the world in this space has grown.

Given the growth of the market and industry, it is unclear why Australia is unique in not having introduced common-sense measures to prevent the misuse of such aircraft in the way other modes of transportation rely on similar provisions by, for example, restricting the age of remote pilots, introducing a suitable register to assist with the surveillance and supervision of drone operators of all types, and requiring that drone pilots simply inspect their aircraft for serviceability and airworthiness before each flight.

There has also been no clear consideration of non-aviation policy measures which would improve the safety situation, including:

- import controls on high powered vehicles and their components;

- categorisation of certain sized vehicles as weapons, given the damage may result in the hands of wrongdoers when used as such (eg, this is the case for other easily obtained devices such as laser pointers, which present a safety hazard to passenger flights when misused by individuals);
- security/background vetting for recreational users of high powered and large drones, whose lack of training may unintentionally or maliciously cause serious threats to safety; and
- making suitable insurance compulsory for all commercial operators.

This submission comments on the above together with the need to have regulations and policies which permit:

- identification of drone users from their vehicles using technological means, by CASA, for enforcement;
- development of a professional standard of operation for commercial operators rather than sending a message that they can operate professionally “straight out of the box”; and
- better enforcement of existing laws against those who misuse drones.

Such simple policy solutions are features of a diverse variety of nations’ recent drone laws.

In particular, the US Federal Aviation Administration (FAA) has developed rules which very simply and effectively address the burgeoning industry (recreational and commercial). The European Union is moving much the same way and aims to create its drone “ecosystem” or “U space” by 2019 notwithstanding the challenges of unifying many nations under one set of rules.

This Senate Committee has an opportunity to lead a positive and long-lasting change in such regulation. The Recommendations set out below are respectfully submitted as suggested key lines of policy thought to guide such a change and the writer would be pleased to attend with the Committee as a witness to further discuss them.

Recommendations

Recommendation 1: Future iterations of this legislation, which seek to better regulate both recreational operations of very small drones, are jeopardised by the policy position embodied within CALA to remove essentially all the restrictions which preserved safety for very small drone *commercial* operators. It would seem next to impossible to regulate those flying drones for fun if those who must be held to account when flying for reward are barely restricted in their activities at all (including not needing aeronautical training).

Accordingly, it is necessary to repeal CALA before any consideration of better or more stringent recreational drone use regulation.

Recommendation 2: An evaluation within the policy scope of the Department of Immigration and Border Protection of whether these items or vehicles (which are often treated as toys by the uninitiated and uneducated) should be performed to determine if they should be classed as a form of weapon (or some new relevantly similar class) to vet those who seek to obtain them.

This may be able to be achieved with a, for example, point of sale certification by purchasers to record their intended use and identity.

Recommendation 3: It would not be particularly onerous to require manufacturers, by way of appropriate Australian Standards, to implement a technological tracking system, in each drone which can, with appropriate civil aviation legislation, empower CASA to receive and remotely visualise the activities of the foreign manufactured but locally operated drone. This is akin to something which EASA Prototype Rules published in August 2016 recommend (ie, geographical limitations using geo-fencing technology to inhibit drone use in prohibited or restricted areas).¹

Such technologies must be accompanied by appropriate airworthiness standards to guarantee reliability in such systems. These methods can be leveraged to ensure swift enforcement of remote pilot compliance with the “standard operating conditions”, and ensure compliance with flight around or near prohibited, restricted or danger zones.

Recommendation 4: The foreign regulators’ safety cases and methodologies to appraise risk of injury and death should be closely examined to update the policy basis for scaling back the rules imposing barriers for entry to commercial drone operation (for very small drones) in Australia.

¹ See <https://www.easa.europa.eu/system/files/dfu/UAS%20Prototype%20Regulation%20final.pdf>.

It is not until we understand why nations with the experience of seeing the Australian history of drone regulation develop have gone down a separate and more cautious path, that we will be able to craft appropriate rules for Australia, to ensure safety.

Recommendation 5: CASA should wait for the outcome of the ICAO RPAS survey as will be presented to the ICAO Legal Committee in late 2017 to determine what is considered to be working or not in domestic regulation of RPAS; and to compare its regulations with those of other States. In the meantime it would be prudent to repeal CALA or amend it further to add prophylactic mechanisms to better separate this kind of flying activity from manned aviation until more experience is available from overseas to support what we would suggest is the preferred mode of regulation (eg US FAA; European prototype rules).

Recommendation 6: As set out above, technological safeguards must be explored and mandated (as will be the case in Europe), as well as ensuring *aeronautical education* remains in Part 101 of CASR as a key part of a licensing regime for very small drones.

Recommendation 7: Many lessons can be learned from the model aircraft sector of aviation, and it is vital that the relevant associations' views be carefully examined for the betterment of establishing drone operators, particularly in the very small category, given that this group has proven to be, under similar challenges, a risk-averse and mature set of operators.

Recommendation 8: CASA must be required to act on appropriate public information and legislate to receive greater access to information from RPAS themselves (using a variety of technologies). This would contribute strongly to better enforcement outcomes, and thereby better public education and reinforcement of the importance of regulatory compliance with, for example, standard operating conditions.

Recommendation 9: It is only by ensuring that mandatory technologies in the aircraft themselves prevent access to sensitive sites (by geo-fencing or other emerging technologies) and putting in place appropriate criminal sanctions explicitly targeted at denouncing the use of RPAS against the interests of national security, that we will be able to adequately address the likelihood of a terror attack either being planned, carried out, or attempted on Australian soil.

Recommendation 10: Local councils can and must be part of the conversation to properly educate those in the community about what is acceptable, and what is not, in terms of safeguarding those who use public spaces for recreation and their daily business.

Leaving aside issues of the effectiveness or enforceability of some of the laws which have been already been passed by councils, the regulation of drone activity at a local level sends a powerful message to users about potential dangers of misuse, the level of responsibility such users would have to those they accidentally injure, and help train community members to understand the power of and maturity required to safely and responsibly operate when the possibility exists to come into accidental contact with people, vehicles, wildlife, or infrastructure.

Recommendation 11: A latent danger is that by removing one aspect of a task which was done previously by manned aviation or some other manual way, and replacing it with an RPAS, the operator or client behind such an operation will focus on the fact of the *outcome of the application*, rather than appreciating that by using an RPAS for such a task *demand*s an applied appreciation for the world of aviation and a sense of “airmanship” (responsibility) that only comes from rigorous training and experience.

Considerations about the myriad uses for drones or RPAS must actually be, to some degree, put aside in consideration of the regulatory context they must be operated within. Failing to do so risks the skewing of laws which facilitate activity and industry at the expense of the primary consideration behind all of CASA’s (mandated by legislation) activity, particularly its primary regard as to performing its functions: *the safety of air navigation*.²

Recommendation 12: In the way CASA administers the requirements of Australian air operators to hold suitable carriers’ liability insurance within the *Civil Aviation (Carriers’ Liability) Act 1959* (Cth), CASA should mandate appropriate insurance for commercial drone operators, thus ensuring the confidence of the public in the professionalism and risk management abilities of those operators, while cautiously being prepared for the event of accident or incident.

² The *Civil Aviation Act 1988* (Cth) at s 9A provides:

- (1) In exercising its powers and performing its functions, CASA must regard the safety of air navigation as the most important consideration.
- (2) Subject to subsection (1), CASA must exercise its powers and perform its functions in a manner that ensures that, as far as is practicable, the environment is protected from:
 - (a) the effects of the operation and use of aircraft; and
 - (b) the effects associated with the operation and use of aircraft.

In addition s 11 provides:

CASA shall perform its functions in a manner consistent with the obligations of Australia under the Chicago Convention and any other agreement between Australia and any other country or countries relating to the safety of air navigation.

Taken together, these provisions indicate strongly that safety and uniformity of aviation laws across States should (and must) be the prime drivers in performing CASA’s delegated legislative functions. The reduction of “red tape” cannot and should not be equated with CASA functions, particularly where those functions are legislated to be directed towards the preservation of safe skies.

A. Current and future regulatory requirements that impact on the safe commercial and recreational use of Remotely Piloted Aircraft Systems (RPAS), Unmanned Aerial Systems (UAS) and associated systems

- 1 Civil Aviation Safety Regulation Part 101;
- 2 local design and manufacture of RPAS and associated systems;
- 3 importation of RPAS and associated systems;
- 4 state and local government regulation; and
- 5 overseas developments, including work by the International Civil Aviation Organization (ICAO) and overseas aviation regulatory jurisdictions

Part 101 of the *Civil Aviation Safety Regulations 1998* (CASR) sets out the rules in Australia applicable to the use of remotely piloted vehicles (“drones”). The features of the original (ie, pre-29 September 2016, or “unamended”) legislation included suitable licensing and education requirements for those wishing to pursue commercial operation of drones. This was the first drone legislation in the world and has resulted in accident/injury-free commercial drone operations in Australia for over a decade. Many elements remain in Part 101, but the controversial elements of the amendment which applied since 29 September 2016 actually represent the scaling back of safeguards which have to date contributed to the progressive maturing and safety record of commercial drone operation, particularly training.

This situation would be akin to attempting to regulate recreational flyers when professional pilots were free to fly as they wished, with no training or aeronautical knowledge, as long as they only flew within areas they themselves had the discretion to measure and stay within. And yet the almost 2,000 new commercial operators in Australia have this same situation, and share the skies with professionals with aeronautical knowledge (and their passengers), with equipment that can traverse controlled airspace, and do so without any (*regulator evaluated*) appreciation of the organisation and importance of aviation.

Recommendation 1: we suggest that future iterations of this legislation which seek to better regulate both recreational operations of very small drones, are jeopardised by the policy position taken to remove essentially all the restrictions which preserved safety for very small drone *commercial* operators. It would seem next to impossible to regulate those flying drones for fun if those who must be held to account when flying for reward are barely restricted in their activities at all. Accordingly, it is necessary to repeal this part of the CALA before any consideration of better or more stringent recreational drone use regulation.

TOR A(iii) mentions importation of RPAS and associated systems and it is a point well raised by the Senate Committee. Unlike laser pointers, which are known to be used in many cases of pilot incapacitation, and which are restricted imports and classed as weapons at certain (high) powers, RPAS which can be used maliciously and have significant power are available without restriction in Australia and can be imported within normal passenger baggage and by mail or cargo services.

With the exception of hobbyist-created drones, most RPAS used recreationally in Australia and for commercial operations in the “very small” category, are foreign imports.

Recommendation 2: an evaluation within the policy scope of the Department of Immigration and Border Protection, of whether these items or vehicles (which are often treated as toys by the uninitiated and uneducated who use them) should be performed to determine if they should be classed as a form of weapon (or some new relevantly similar class) to ensure that only those with genuine intent to use the drone safely and within the rules obtain them.

This may even be able to achieved with some point of sale certification by purchasers to record their intended use and identity.

Recommendation 3: it would not be particularly onerous to require manufacturers, by way of appropriate Australian Standards, to implement a technological tracking system, in each drone which can, with appropriate civil aviation legislation, empower CASA to receive and remotely visualise the activities of the foreign manufactured but locally operated drone. This is akin to something which EASA Prototype Rules published in August 2016 recommend (ie, geographical limitations using geo-fencing technology to inhibit drone use in prohibited or restricted areas).³

Such technologies must be accompanied by appropriate airworthiness standards to guarantee reliability in such systems. These methods can be leveraged to ensure swift enforcement of remote pilot compliance with the “standard operating conditions”, and ensure compliance with flight around or near prohibited, restricted or danger zones.

ICAO and foreign regulator considerations

I am a member of both the IFALPA Professional & Government Affairs Committee, and IFALPA Legal Committee. One of the roles of the latter is to monitor efforts at ICAO level which affect professional airline pilots. IFALPA has observer status at ICAO.

RPAS is a serious and high priority matter still being scoped for study and response by the ICAO Legal Committee, where the policy area has been elevated from previous committees

³ See <https://www.easa.europa.eu/system/files/dfu/UAS%20Prototype%20Regulation%20final.pdf>.

such as the RPAS Panel. The publication of ICAO's *Manual on Remotely Piloted Aircraft Systems* (RPAS) in 2015 was the first attempt at a global set of guidance material on the large range of technical and operational issues raised by the peculiarities of pilotless aircraft. This document largely focusses on international aspects but impacts on the consideration of domestic regulation of civil drones as it pertains to the ambitious but still potential seamless integration of drones into the airspace with instrument flight rules (IFR) air traffic.

The main goal of ICAO through providing such guidance is to reiterate the prime importance of facilitating RPAS usage but not at the expense of manned aviation.

Regrettably the present, concerning, regulatory amendment in Australia not only facilitates a greater range of risks to manned aviation by encouraging a larger take up of unqualified operators to legitimise flights in airspace they may know nothing about, but at the same time rolls back licensing and training, which jeopardises the continuing safety of aviation in Australia. This is not consistent with Australia's commitment as an ICAO state to seek uniformity in its aviation regulation.

Other technical experts will no doubt raise the issue of safety cases for the new regulation amendment, and note the fact that newer studies which emerged during 2016 support the introduction of US FAA and European policies and legislation to regulate drones of even lighter weight than 2kg on safety grounds. It is not my intention to traverse that technical material.

Recommendation 4: it is a recommendation that those foreign regulators' safety cases and methodologies to appraise risk of injury and death, be closely examined to update the policy basis for scaling back the rules imposing barriers for entry to commercial drone operation (for very small drones) in Australia.

It is not until we understand why nations with the experience of seeing the Australian history of drone regulation develop have gone down a separate and more cautious path, that we will be able to craft appropriate rules for Australia, to ensure safety.

Foreign regulators with these newer stricter approaches to control of drones have had significantly less drone-related incidents than our own nation (per year, especially 2015-16). So it is alarming that for a nation which has managed to keep its operators safe primarily using pre-29 September laws, it has sought a roll back of those very protections.

Communications with the ATSB in October 2016 reveal there have been many reported sightings of drones by manned aviation and close calls:

Over the past 12 months, 151 RPAS-related occurrences have been reported to the ATSB. Of these, 118 involved manned aircraft crews reporting sightings/encounters

with RPAS, with the majority of incidents relating to unknown RPAS where the operator could not be identified/determined. It is often the case that pilots sight an RPA for only a few seconds before it disappears from sight. It is considered likely that the majority of these RPAS were privately/recreationally operated.

These encounters are often difficult for aircraft crews/pilots to accurately estimate the distance and height of the RPAS relative to their aircraft—some are believed to be at a reasonable distance, up to 1km away, and some are estimated to be closer.

The remaining 33 occurrences relate to RPAS specific accidents and incidents. These almost exclusively relate to CASA-approved commercial RPAS operators self-reporting incidents to us involving their own RPAS.

The ATSB has not received any notifications of an RPA or model aircraft colliding with an airborne manned aircraft.⁴

With statistics like that (which both demonstrate the vagaries of reporting and the responsibility of properly trained and certified drone operators) the likelihood is that Australia will have the first *major* drone-related accident.

Australia's very wide and clear skies are a temptation for all untrained, and amateur operators – the problem with the deregulation of commercial operation is simply that it makes the problematic malicious, uncaring, or untrained recreational operator, a *legitimate* operator, and thus one who can make money through their exploits.

Drones operated in dangerous ways invite questions about liability for injury and death. At the request of the ICAO Legal Committee the ICAO Legal and External Relations Bureau prepared a study on liability issues for RPAS which was completed in 2015.⁵ Given ICAO's primary mandate, the liability issues considered were international (ie, cross border operations of RPAS and how [and if] existing liability laws would apply to such pilotless flights). Pilotless flight in itself is not new and was anticipated in precursors to the *Chicago Convention 1944*. Accordingly, the conclusion of ICAO LEB was that depending on the way carriage was effected (ie, by commercial operators for reward) existing laws on liability would apply in the case of pilotless international passenger or cargo operations, with the latter expected to become the most prevalent first within forthcoming decades.

The situation is not so clear for purely *domestic* operations and the relevant liability law would depend on the law of the state. In Australia we have a liability regime for damage by

⁴ Email from ATSB Communications Officer to Joe Urli, President of ACUO Inc, on 4 October 2016.

⁵ See <http://www.icao.int/Meetings/LC36/Working%20Papers/LC%2036%20-%20WP%202-4.en.pdf> at Appendix 2.

aircraft to people and property on the ground which RPAS most likely fits within.⁶ As I stated in an article in September this year published by the Australian Lawyers Alliance:

Liability for drone injuries applies to operators or controllers pursuant to the Damage by Aircraft Act 1999 (Cth) which sets up a domestic strict liability regime for compensation for those injured on the ground by aircraft, mirroring international provisions which accomplish the same purpose.

However, the technical and regulatory landscape in Australia is such that the owner of a drone or its operator are notoriously difficult to identify, and thus pursue, after an incident. There is no federal requirement on the owner or operator to be insured for liability for damages. No legislation presently requires registration of non-commercial operators and their equipment. This is problematic because the drones themselves are fairly unreliable. There are no international or local airworthiness standards in place for hobbyist operators, nor any import controls on the more powerful machines which are brought into the country daily in droves. Research released by RMIT⁷ in Victoria on 24 August 2016 confirms that technical problems are the primary cause for accidents with drones – usually a breakdown in communication between the drone and its controller. They accounted for 64 per cent of worldwide incidents between 2006 and 2016.

The relevance of ICAO's position is that, more recently, it has taken an interest in how states are themselves regulating RPAS – in order to better understand what specific tasks/roles ICAO needs to focus on going forward.

ICAO sought information from member states in August 2016, and the results will be presented to the ICAO Legal Committee in November/December 2017 at its next meeting. A detailed questionnaire was sent to States, and a comprehensive survey will be undertaken by the ICAO LEB, to serve as the basis of the report to be submitted in late 2017 so that Member States will be in a position to consider the next steps to be taken with respect to this issue.

Recommendation 5: it is recommended that CASA should wait for the outcome of the survey as presented to the ICAO Legal Committee to determine what is considered to be working or not; and to compare its regulations with those of other States. In the meantime it would be prudent to repeal the amendment or amend it further to add prophylactic mechanisms to safeguard this kind of flying activity from manned aviation until better experience is available from overseas to support what we would suggest is the preferred mode of regulation (eg US FAA; European prototype rules).

⁶ *Damage by Aircraft Act 1999 (Cth)*.

⁷ Dr Graham Wild and Dr Glenn Baxter from RMIT University's School of Engineering, performed the study together with John Murray from Edith Cowan University.

Australia's commercial pilots, from the Australian Federation of Air Pilots, and air traffic controllers, from Civil Air Australia, have bolstered the views of commercial drone operators from the Australian Certified UAV Operators association, to apprise us of the risks.

But Australia is not alone. International organisations, including *all of those which represent manned aviation globally* signed a Joint Statement in September 2016, the month the CALA came into effect, in a similar vein to the recommendations set out in this submission. It is reproduced at Appendix A. The organisations which signed the statement jointly called for a harmonised cross-EU integration of drones into the airspace, and raised mandatory training, registration as a means of identification and enforcement, and increased enforcement as keys to good regulation in this space. The list of signees includes:

International Air Transport Association (IATA)
International Federation of Air Line Pilots' Associations (IFALPA)
International Air Carrier Association (IACA)
International Council of Aircraft Owner and Pilot Associations (IAOPA)
International Federation of Air Traffic Controllers' Associations (IFATCA)
International Federation of Air Traffic Safety Electronics Associations (IFATSEA)

plus,

Airlines for Europe (A4E)
Airports Council International Europe (ACI EUROPE)
Air Traffic Controllers European Unions Coordination (ATCEUC)
Civil Air Navigation Services Organisation (CANSO)
European Business Aviation Association (EBAA)
European Cockpit Association (ECA)
European Helicopter Association (EHA)
European HEMS and Air Ambulance Committee (EHAC)
European Regions Airline Association (ERAA)
European Transport Workers' Federation (ETF).

We must regard the views of these experts as they have a genuine interest in keeping the skies safe, and in turn have a joint responsibility to actively and pragmatically keep the skies safe for regular consumers of air travel. Good laws can safeguard people on the ground and passengers while allowing drones to accomplish the many effective tasks they are capable of. The CALA legislative amendment does not provide such a law.

Where the rest of the world's air safety regulators and the organisations set out above, have concluded that only very small (micro, or under-250g drones) pose little risk and can be operated under more relaxed rules, Australia's Part 101 now permits drones up to **2kg** to be

used commercially by people of any age, background, or skill level as long as they adhere to a set of standard operating conditions (SOCs) which include, in part, flying no higher than 400 feet above ground level, no closer than 30 m from people and not in a prohibited or restricted area, nor within 5.5 km of a controlled aerodrome.

The legislation purports to preserve safety purely by having such SOCs, but in reality sends a message that the skies are free to 2kg and under drone operators, and encourages rogue flights, because such drones are so powerful and there is no requirement that people take up the kind of aeronautical education that would skill them to even comply with the SOCs.

Two kilogram drones are potentially lethal devices powered by lithium polymer batteries that do not just smoulder like lithium ion batteries in smartphones when crushed. They explode when struck. The potential for disaster if they strike aircraft skins, or are ingested into jet engines is high, and catastrophic losses would result for turboprop (regional) aircraft and helicopters struck on their propellers or rotor blades. Some legal protections need to be in place to prevent this dangerous exposure to airline flights in controlled airspace because the easily broken SOCs are not going to be enough.

Recommendation 6: As set out above, technological safeguards must be explored and mandated (as will be the case in Europe), as well as ensuring *aeronautical education* remains in Part 101 of CASR as a key part of a licensing regime for this size of drone.

B. The existing industry and likely future social and economic impact of RPAS technology

It is clear that RPAS have boundless scientific, practical, and commercial potential. The present industry (in terms of manufacturing drones, as well as use of them for a variety of applications) is and will continue to boom in the way new uses for accessible technology always do: compare the proliferation of conveniences “apps” now bring to users’ smartphones. So of course the economic impact will be significant to these sectors if drones are regulated in a way which does not facilitate expanded scopes of operation and freedoms.

That being said, the social cost of getting the regulatory scheme wrong to facilitate the evolution and application of such technologies is high. Requiring operators to be trained to operate is uncontroversial and would not detract from the evolution of drone technology nor its applications. Requiring operators to use an internal technological mechanism to register/identify and locate their drones in the event of a mishap is also uncontroversial and would not impede research and development – it would only impact manufacturers.

Requiring operators to insure themselves against liability for third party damage and prove they possess sufficient aviation knowledge before they operate commercially or otherwise

also, should be uncontroversial, and the insurance market (as it always has) can and will adapt to spreading such risks.

However, the impact of an air disaster precipitated by the lack of training, lack of mandated technology to track and separate drones from manned aviation, and lack of insurance in the event of a disaster, would inevitably detract from the economic wonders that drones present. To be clear while there is insurance available to passengers in an air disaster, there is no comparative insurance available for subrogated claims by the air carrier against the wrongdoer/drone operator, which would have ramifications for the price of insurance to airlines.

The tendency in aviation law has always been reactive to loss of life and equipment – laws restricting risks to safety always emerge in the aftermath of accidents when narrow causes are isolated. However, drone technology presents an effective clean slate and obvious risks to the aviation industry in a way which has not quite been seen before. It is the case that professional pilots, air traffic controllers, and remote pilots with experience in the industry all agree that more stringent regulation be put in place to separate drone traffic from manned aviation. The consequences of their intersection when the aviation community have warned of such impending disasters, do not bear mentioning.

C. The international regulatory/governance environment for RPAS technology and its comparison to Australian regulation

Discussion under this TOR is subsumed under A, in respect of ICAO and other regulators' approach to drone regulation as compared to the latest iteration of Part 101, CASR.

D. Current and future options for improving regulatory compliance, public safety and national security through education, professional standards, training, insurance and enforcement

Model aircraft enthusiasts are the quiet success story in Australian aviation, and no conversation about drones would be complete without looking at how and why model aircraft users have succeeded to evade the spotlight with safety concerns in respect of causing dangers for people and manned aviation.

The reason why such operations have remained largely off the radar can be captured in one word, in our view: “maturity”. Maturity of aviation knowledge, maturity of appreciation for risk, and maturity of operation such that care and attention to both aircraft, surroundings, and operators feature strongly in model aircraft clubs around Australia.

Recommendation 7: many lessons can be learned from this sector of aviation, and it is vital that the relevant associations' views be carefully examined for the betterment of establishing drone operators, particularly in the very small category, as risk-averse mature operators.

Options for improving regulatory compliance also necessitate a closer look at resources and styles of enforcement by CASA. It is clear that the community has no faith in the enforcement options now available, and which is, anecdotally, under-utilised. However, this is no criticism of CASA, whose role and resources cannot allow officers to be everywhere.

Recommendation 8: promptly acting on appropriate public information and legislating to receive greater access to information from RPAS themselves (using a variety of technologies) would contribute strongly to better enforcement outcomes, and thereby better public education and reinforcement of the importance of regulatory compliance with, for example, standard operating conditions.

As mentioned above, if RPAS were required to capture their own flight maps and relay that so as to allow CASA to monitor locations of flights and other coordinates, the temptation to fly dangerously would be lowered, and public confidence in drones and their use would be increased.

National security is a matter which has evoked little substantive consideration - to the detriment to the conversation on what exactly makes appropriate laws for technology of this kind. The US FAA imposes background checking of drone operators above 250g in weight, but the Australian CALA fails to engage with the real risk of terrorist activity being facilitated with drones by anyone with the money to buy one and masquerade as a commercial operator.

The fact that RPAS can be used to film (and that is a primary objective of many military RPAS) makes them a vital tool for legitimate military purposes, but also for malicious or terrorist uses.

Recommendation 9: it is only by ensuring that mandatory technologies in the aircraft themselves prevent access to sensitive sites (by geo-fencing or other emerging technologies) and putting in place appropriate criminal sanctions explicitly targeted at denouncing the use of RPAS against the interests of national security, that we will be able to adequately address the likelihood of a terror attack either being planned, carried out, or attempted on Australian soil.

In respect of security risks, terrorism is not the only candidate for improper or unauthorised drone use. The French experience has been that drones are becoming problematic in their use over sensitive zones including nuclear power stations, foreign embassies, and military bases.

The fact is if a regulatory solution is not developed another unregulated industry, the “antidrone” industry will flourish and commercially dictate the prevention and response to drone incursions over private property and sensitive sites. The Wall St Journal indicated the breadth of the problem in an article in July 2016.⁸

The fact is that if appropriate preventive technologies (for misuse) for all drones are mandated and in place, and penalties for their removal or evasion made effective, we can at least take a small step forward in guarding against the improper use of drones, as well as ensure the dangers associated with methods of “bringing them down” do not also create a reactive, though potentially well-intentioned, parallel set of safety risks for people on the ground and air passengers.

E. The relationship between aviation safety and other regulation of RPAS for example, regulation by state and local government agencies on public safety, security and privacy grounds

Already, local councils are trying to modify the behaviour of (mis) users of drones, and protect those who may be injured by recreational RPAS. Chicago city council approved a ban of drones in November 2015, followed in December 2015 by Leichhardt council in Sydney, which bans RPAS use in public spaces such as parks and beaches, mostly to protect children’s privacy. In February 2016, Transport Canada mooted “no drone” signs around Victoria Harbour to remind operators that the harbour was also a busy airport. At the same time, there were reports the Town of Cambridge council in Western Australia, prompted by residents’ complaints, was seeking to prevent flights without a permit. Such controls are hard to enforce but make people think twice.

At the RPAS CivOps conference in Brussels, Belgium from 6-7 December 2016, representatives from Denmark remarked that the regulatory style there is based around the creation of a proud culture of aviation with respect to drones. Thus, efforts are encouraged for the public to report errant drone behaviour and responsibility is trained into all operators.

While commercial RPAS operators may argue this creates a burden on them, this is really not about them or genuine hobbyists. Properly made rules ensure that. This is about the errant or malicious user, and encouraging a consistent level of responsibility in this group.

Recommendation 10: local councils can and must be part of the conversation to properly educate those in the community about what is acceptable, and what is not, in terms of safeguarding those who use public spaces for recreation and their daily business.

⁸ See <http://www.wsj.com/articles/next-step-for-drones-defending-against-them-1437645600>.

Leaving aside issues of the effectiveness or enforceability of some of the laws which have been passed, the regulation of drone activity at a local level sends a powerful message to users about potential dangers of misuse, the level of responsibility such users would have to those they accidentally injure, and help train community members to understand the power of and maturity required to safely and responsibly operate when the possibility exists to come into accidental contact with people, vehicles, wildlife, or infrastructure.

F. The potential recreational and commercial uses of RPAS, including agriculture, mining, infrastructure assessment, search and rescue, fire and policing operations, aerial mapping and scientific research

The potential uses are more than we can imagine at this time, which is why ensuring the regulatory balance is correct is so important. The most important thing to note on this point is that no matter what the application of RPAS, the common denominator is that RPAS operate in the world of **aviation** and within a complex array of airspace demarcations with their own attendant issues, risks, and legal framework.

By overly focusing on RPAS applications in commercial or any use, we lose sight of the overarching consideration that RPAS are systems used within the existing world of aviation and aviation knowledge is of prime importance for any applied use of RPAS.

Aviation is the most heavily regulated industry in the world, with good reason, and uniformity across countries' laws is sought precisely because of the dangers which arise if compliance is approached in a haphazard manner. RPAS used in all commercial settings should fare no differently just because of the commercial or intellectual appeal of using an aerial medium to streamline or make safer an otherwise dull or monotonous task (or indeed, create new applications hitherto not performed at all).

Recommendation 11: a latent danger is that by removing one aspect of a task which was done previously by manned aviation or in another manual way, and replacing it with an RPAS, the operator or client behind such an operation will focus on the fact of the *outcome of the application*, rather than appreciating that by using an RPAS for such a task involves a better appreciation for the world of aviation and a sense of “airmanship” (responsibility) that only comes from rigorous training and experience.

Considerations about the myriad uses for drones or RPAS must actually be, to some degree, put aside in consideration of the regulatory environment they must be operated within. Failing to do so risks laws which facilitate activity and industry at the expense of the primary consideration behind all of CASA's (mandated by legislation) activity, including its delegated legislative function: *the safety of air navigation*.⁹

⁹ The *Civil Aviation Act 1988* (Cth) at s 9A provides:

G. Insurance requirements of both private and commercial users/operators, including consideration of the suitability of existing data protection, liability and insurance regimes, and whether these are sufficient to meet growing use of RPAS

It is unclear why Australia's CASA is unique in not having introduced common-sense measures to prevent the misuse of such aircraft by, for example, restricting the age of drone pilots, and requiring that drone pilots simply inspect their aircraft for serviceability and airworthiness before each flight. Future rules must mandate measures to identify owners/operators of drones when crashes happen through registration, identifying marks and insurance.

Without this, persons injured or killed on the ground cannot pursue strict liability compensation under the *Damage by Aircraft Act 1999* (Cth) because identifying the aircraft owner is nearly impossible to enforce the liability. The legal regime which could act to provide the injured with remedies against drone operators thus has little ability to operate as intended if the relevant aircraft operator is unable to be found.

Recommendation 12: in the way CASA administers the requirements of Australian air operators to hold suitable carriers' liability insurance within the *Civil Aviation (Carriers' Liability) Act 1959* (Cth), CASA should mandate appropriate insurance for commercial drone operators, thus ensuring the confidence of the public in the professionalism and risk management abilities of those operators, while cautiously being prepared for the event of accident or incident.

There is much work to do to ensure safety with drone technology through proper regulation, and the present legislative amendment must be significantly reworked or removed, in order to make way for that work and facilitate a better regulatory landscape.

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- (1) In exercising its powers and performing its functions, CASA must regard the safety of air navigation as the most important consideration.
 - (2) Subject to subsection (1), CASA must exercise its powers and perform its functions in a manner that ensures that, as far as is practicable, the environment is protected from:
 - (a) the effects of the operation and use of aircraft; and
 - (b) the effects associated with the operation and use of aircraft.

In addition at s 11 the Act provides:

CASA shall perform its functions in a manner consistent with the obligations of Australia under the Chicago Convention and any other agreement between Australia and any other country or countries relating to the safety of air navigation.

Taken together, these provisions indicate strongly that safety and uniformity of aviation laws across States should (and must) be the prime drivers in performing CASA's delegated legislative functions. The reduction of "red tape" cannot and should not be equated with CASA functions, particularly where those functions are legislated to be directed towards the preservation of safe skies.

H. The use of current and emerging RPAS and other aviation technologies to enhance aviation safety

As discussed above with respect to the myriad applications of RPAS, aviation itself can and does benefit from ways of using RPAS to streamline or make more effective existing tasks necessary for the safe operation of aircraft. As long ago as 2014 (when consultation for the CALA was under consultation) British carrier Easyjet was reportedly researching using drones for preflight tasks.¹⁰

Recommendation 13: as also mentioned above, further investigation must be done to determine if existing and emerging onboard RPAS technologies which can map and prevent travel into dangerous or prohibited areas can be made reliable enough to be mandated in either or both of commercial and recreational drones.

It is the reliability as well as the accessibility or cost of such technology which is at issue, rather than any mandate on CASA to use such methods to ensure drones do not fly where they are (presently) only subject to restrictions in SOCs and geographical boundaries that must be determined by operators who may actually have no aeronautical knowledge, nor desire to acquire it, and yet *need* such knowledge to legally remain within such bounds.

I. Any other related matters

Conclusions

In Australia, one needs a license to drive a car, fly a light aircraft, or manoeuvre a boat. We do not need licenses to skate, fly paper planes, or play basketball. The difference between these groups of activity revolve around the capacity for death or significant harm to be done to those around you, or the likelihood it will be caused to others if simple rules are not followed. There is also a common thread in that a mode of transport is being controlled (albeit in the case of RPAS not yet carrying passengers).

It is prudence and government intervention which permits activities in the former group to happen recreationally and for commercial purposes, with a suitable standard of safety, while engendering responsibility in drivers/users that are cornerstones of our everyday use of modern modes of transport that, should they fail, could precipitate significant harm to others.

It seems inconceivable then that there are, from 29 September 2016, no age, training, experience, security, or licensing restrictions on commercial drone operators whose high powered less than 2kg vehicles can fly to 19,000 feet high (FL190) and accomplish speeds of

¹⁰ See <http://www.bbc.com/news/business-27308232>.

up to 72 km/hour, putting them clearly within the path of high capacity air transport operations.¹¹

Such drones could cause the crash deaths of fare paying Australian domestic and international airline passengers.

The present amendment legislation (the *Civil Aviation Legislation Amendment (Part 101) Regulation 2016*) brings about a real deterioration of air safety. This is so notwithstanding that CASA's legislative functions *must* be performed with regard to "the safety of air navigation *as the most important consideration*" (section 9A(1), *Civil Aviation Act 1988* (Cth), emphasis added), and that CASA has described this rule set, in the words of its own press release on 28 September 2016, as "[n]ew drone rules cut red tape".¹²

With respect to any whole of government processes along such lines, CASA's functions and public safety cannot be downgraded in this way to save potential operators from having to educate themselves about aviation, or outlaying the modest impost of a \$1,400 application fee.

¹¹ Technical specifications for a commonly available drone available online or from department stores in Australia (dji Phantom 4).

¹² See <https://www.casa.gov.au/media-release/new-drone-rules-cut-red-tape>.

Appendix A



September 2016

Joint call to safely integrate Drones / UAS into Europe's Airspace

The Signatories of the Statement want to support the effort of the European regulator to produce a robust harmonized EU-wide regulatory safety framework for drones. At the same time, in this Joint Statement, the sector parties A4E, ACI EUROPE, ATCEUC, CANSO, EBAA, ECA, EHA, EHAC, ERAA, ETF, IACA, IAOPA, IATA, IFALPA, IFATCA, and IFATSEA express their serious concern about the safety of manned aircraft in controlled and uncontrolled airspace. As a result of growth in both commercial and recreational markets, drone manufacturers and operators are seeking greater access to airspace, including that in which commercial aircraft are operating. Recent incidents in the surroundings of European airports or close to low-level helicopter operations are an illustration of the threats we are facing. From a safety and efficiency perspective, the following Statement addresses the key areas of our concern.

Recent rapid technological advancements have resulted in a mass introduction of drones (or 'UAS' Unmanned Aircraft Systems) on the consumer market, and increasingly for commercial purposes.

To ensure safe drone operations – and in the absence of a European legal framework for drones below 150 kg – many European Member States introduced regulations for drones at national level. However, these national rules are not harmonized and some of them regulate commercial drone operators in no stricter manner than for recreational users.

The technological evolution does indeed offer many practical and efficient possibilities, especially for commercial applications. If operating within a clear robust legal framework, these technologies can be exploited in a manner that ensures high safety of operations and encourages responsible use of drones. To achieve this, the legal framework for such

The recreational use of drones is rapidly increasing and the related risk of incidents and accidents with manned aviation must be mitigated. In fact, irresponsible recreational and commercial drone use constitutes serious safety risks that are often under-estimated. To mitigate those risks, extra measures are required to address the following issues:

- lack of awareness and negligent behavior of some operators/consumers as to the technical possibilities of their drones versus legal restrictions
- lack of awareness about safety risks and in particular about the consequences of a collision between a drone and manned aircraft, be it an airplane or a helicopter.
- shortcomings in rule enforcement

The signatories emphasize the importance to ensure compatibility with the ongoing work at ICAO level.

commercial operations must include appropriate licensing of the drone pilot and authorization of commercial drone operations, as well as robust oversight by the national aviation authority.

1. Extensive public awareness campaign

The general public, recreational / occasional drone users as well as commercial clients have to be aware of the safety risks, duties, liabilities, insurance requirements, responsibilities and third party privacy issues associated with drone operations. This is essential as lack of awareness and negligence might result in the possibility to monitor third parties, or in case of malfunctions, to cause harm to them. Significantly more resources must therefore be dedicated to this aspect of drone integration into the airspace.

2. Registration of all drones

If the owner/pilot can be traced, it will encourage compliance with rules & regulations and could also serve as a motivation for training. Registration should occur compulsorily at the time of purchase or resale.

3. Mandatory training and certificate/license

The obligation to obtain a certificate or license – depending on the properties, performance and features of the drone – creates awareness and mandates knowledge of the applicable regulations and restrictions and helps to develop necessary skills. A solid knowledge base is a must, considering the complexity of the national and European airspaces and related aviation regulations. Moreover, a legally required certificate or license also enhances the ability to enforce rules. Operating a drone is thereby reserved for people who have acquired permission to do so. This requirement should be mandatory except for the harmless drones. This category of drones is understood to do no harm to people (e.g. be limited to a maximum weight of 250g and a radius of action of no more than 50 meters from the pilot).

4. Technical Performance Limitations

By means of built-in geo-fencing and altitude / distance restrictions the safety risks concerning critical airspace, terrain, and buildings can be significantly reduced. Anti-collision technologies should also be considered where available. Built-in limitations should compensate for the lack of competence of the drone pilot.

In order to preserve the high level of safety in European airspace we jointly ask for the introduction of the following measures for all types of drones in addition to the request of a clear, stricter and robust legal framework for commercial drone operations:

5. In-depth research into the impact of collisions between drones and manned aircraft

While the risks related to bird strikes are well known, it is presently unclear what damage smaller drones could cause to manned aviation. Also, there is little scientific insight and research into which drones would cause no or only limited harm to people on the ground. Hence, there is a need for scientific research and testing, on the basis of which further mitigating measures can be taken or regulation may be made more proportionate.

6. Integration of recreational drones into national Model Aircraft Flying Regulations

The current national Model Aircraft Flying Regulations are mostly inadequate for drone flyers. This is because the classic model aircraft flyers traditionally build in greater safety margins into operation than drone users presently do by operating usually only in areas that are specifically designated for that purpose and exercising a strict self-oversight. The same high safety standards should be applied when integrating the recreational drone users.

7. Increase in the effectiveness of enforcement.

The best rules for drones are useless if they cannot be enforced. To enable national authorities to guarantee the safety of manned aviation and third parties on the ground, enforcers must receive training and technical equipment to be able to monitor regulation compliance. Also, the registration of drones as well as the requirement for a drone pilot certificate/ license will facilitate such enforcement.