



## **Senate Inquiry**

into Regulatory Requirements that Impact on the  
Safe Use of Remotely Piloted Aircraft Systems

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Submission by

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The Asia-Pacific RPAS Consortium (ARC) welcomes and is fully supportive of this Inquiry. By way of background the ARC is a group of like-minded member organisations that have been individually selected based on their experience, reputation and professionalism to ‘cover the field’ of expertise across the entire RPAS sector. As world leaders and innovators in their respective and unique area of RPAS expertise, ARC member organisations provide *Drone Powered Solutions* for government and industry across all industry sectors including medical, infrastructure, transport, media and entertainment, telecommunication, agriculture, resource and mining.

ARC’s vision is “To provide benefits to society through innovation and drone technology with like-minded business working together”. The objective of the Consortium is "To provide the most comprehensive Drone Powered Solution to industry and government worldwide and to lead these entities to a safe and effective adoption of drone technology”.

By way of example in promoting the Consortium’s vision and objectives the ARC has launched the Angel Drone project. This project is managed by the Asia-Pacific RPAS Consortium and represents a series of ongoing medi-drone trials. Because of the almost limitless applications of drone technology each Angel Drone trial will draw upon the specialist expertise of the various consortium members and from an audited and approved panel of professional and responsible RPAS operators to ensure that the respective trial objectives are achieved.

Finally, and most important, the Asia-Pacific RPAS Consortium retains the services of only the most professionally responsible and safety-conscious RPAS operators. ARC use only operators that have been audited and approved under the RPAS International Standard (UIS) – *the world’s first international RPAS standard*. This ensures that *all* ARC clients have the highest level of safety and risk assurance that their Drone Powered Solutions are performed by approved operators that are compliant with not only all the CASA regulatory requirements but operate responsibly, in terms of privacy and security considerations, and in accordance with the UIS *Code of Conduct*.

On behalf of the ARC I am pleased to present this submission to the Inquiry.

**Ronald I C Bartsch**  
President, Asia-Pacific RPAS Consortium



## **SENATE INQUIRY: Regulatory requirements that impact on the safe use of Remotely Piloted Aircraft Systems, Unmanned Aerial Systems and associated systems**

### **Background**

The rapid uptake of unmanned aircraft applications for commercial purposes represents the most significant development in civil aviation since the introduction of the commercial jet aircraft. According to a leading international drone consultancy firm, UAS International, in 2016 in the U.S. alone, nearly 100 companies manufactured approximately 250 different types of drones. Worldwide expenditure on drones was in excess of US\$8 bn. In a major report released in May 2016 by PwC, the world's largest professional services firm, the estimated market value of drone-powered solutions is in excess of US\$127bn.

However, unlike all previous forms of aircraft, Remotely Piloted Aircraft Systems (RPAS) face a unique and highly restrictive challenge – there exists no international certification standards against which to regulate their usage. It has been incumbent upon individual states to develop their own regulations in respect to the domestic civil applications of drones. And then for individual operators to seek exemptions from what is generally very restrictive operating conditions. To date less than one third of the contracting states to the Chicago Convention have developed any such regulations. It is expected that international standards promulgated by the International Civil Aviation Organization (ICAO) in the form of Standards and Recommended Practices (SARPs) are still many years away.

Unless and until local aviation regulatory authorities pass civil aviation regulations permitting their use, the commercial application of RPAS is not permitted, and in some countries, specifically prohibited. Therefore, the certification and approval of drones by the relevant regulatory agencies is without doubt the most significant impediment to their usage and indeed to the growth of this sector of the aviation industry. Irrespective of the capabilities or application of drones – which are as diverse as they are unique – their commercial potential cannot be realized without the relevant operating approvals to permit such operations. In short, the ability to gain the requisite individual operating approvals for drone operations is without doubt the most important prerequisite for any significant commercial drone application.

The Asia-Pacific RPAS Consortium believe Australia is uniquely placed as a world leader in the civilian and commercial application and certification of unmanned aircraft systems (RPAS). In fact, Australia's Civil Aviation Safety Authority (CASA) was the first aviation safety regulator in the world to certify commercial Remotely Piloted Aircraft System (RPAS) operators back in 2002. The United States has only recently passed similar such legislation in 2015. Australia therefore is a world-leader in the civilian and commercial regulation and usage of drones with some of the most experienced civilian RPAS operators, manufacturers, trainers, researchers, lawyers and insurers.

Due to the wide cross-section of expertise and depth of knowledge on unmanned systems across the consortium members we have provided in the following sections those areas within the terms of reference of this Inquiry that the ARC has specific comments. To assist in referencing this submission we have adopted the numbering system provided in the documentation provided on the Government website.

**A. The current and future regulatory requirements that impact on the safe commercial and recreational use of Remotely Piloted Aircraft Systems (RPAS), Unmanned Aerial Systems (RPAS) and associated systems, including consideration of:**

**i. Civil Aviation Safety Regulation 1988 Part 101**

*ARC Comment:* The ARC support the objective, content and style of these regulations. They have been developed in accordance with sound and objective risk-based methodology. This position is supported by ARC Member Mr. Jim Coyne of UAS International who drafted much of the current Part 101 regulations and is generally recognised as one of the world leading authorities on RPAS regulation and certification together with the ARC President who is considered one of the leading aviation lawyers specialising in RPAS operations, Mr. Ron Bartsch, who in his thesis on the regulatory aspects of RPAS integration into society provides a more detailed account of the contents and assessment of the current CASR Part 101.<sup>1</sup>

In terms of civilian RPAS regulatory requirements, Australia has been a world leader with the introduction of the first certification standards in 2002. As a pioneer in UAS regulation, the CASA promulgated, in 2002, Part 101 of the *Civil Aviation Safety Regulations 1988* (Cth) (CASR) and *Advisory Circular AC-101-1 (0) Unmanned Aircraft and Rockets*. Under the Australian framework, CASA only permits commercial UAS (including unmanned aircraft of more than 150 kg) to fly in Australian airspace if the operator first obtains an Operator Certificate (OC).<sup>2</sup>

In contrast to CASA's approach some national regulators, initially took an entirely different approach and in some instances, for example the United States, in respect to aircraft less than 150 kg were considered to be 'model aircraft' and as they operated in controlled situations (or segregated airspace) in relatively small numbers, considered that comprehensive regulation was unnecessary.<sup>3</sup> With the introduction in 2015 of the *ICAO RPAS Manual*, detailed guidance material for contracting states to the ICAO is now available on how to develop RPAS regulations. It is envisaged that a more internationally harmonised approach to domestic drone regulation will now be adopted.

The CASA RPAS operator certificate granted under CASR part 101 includes restrictions to the operator in relation to the operation of unmanned aircraft. Despite the availability of exemptions, CASA's regulatory framework for UAS remains underpinned by the idea that, in order for UAS to fly within a class of airspace, they must be able to guarantee – through compliance with equipment and Air Traffic Control standards – the same (or equivalent) level of safety prescribed for manned aircraft.<sup>4</sup> As RPAS will increasingly be operating in built up areas and eventually in non-segregated airspace, there is a need to introduce regulation to ensure they do not pose an unacceptable risk to piloted aircraft and individuals on the ground.

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<sup>1</sup> See published thesis at: <https://ses.library.usyd.edu.au/handle/2123/14844?mode=full>

<sup>2</sup> Civil Aviation Safety Authority, *Unmanned Aircraft and Rocket*, AC 101-1(0), July 2002, s 12.2.2.

<sup>3</sup> Ibid. International Civil Aviation Organization, *Unmanned Aircraft Systems* (2011) Circular 328 AN/190, 3; Kapnik, Benjamin 'Unmanned But Accelerating: Navigating the Regulatory and Privacy Challenges of Introducing Unmanned Aircraft Into the National Airspace System' (2012) 77 *Journal of Air Law and Commerce* 439, 441.

<sup>4</sup> Peterson, Mark 'The UAV and the Current and Future Regulatory Construction for Integration into the National Airspace System' (2006) 71 *Journal of Air Law and Commerce* 521, at p. 584.

CASR Part 101 was first drafted over 10 years ago in anticipation of civil operations of RPAS. At the time there was little civil operational experience to draw on from other countries and as a consequence there was limited detail included in the Regulations or Advisory Circulars relating to pilot qualifications, risk management, and airworthiness operational approval processes. Effectively, the regulation only provided a basis for CASA oversight with minimal guidance to industry. Consequently, CASA must treat every application for RPAS operation as a standalone exercise, requiring significant education of applicants and a high risk of inconsistent responses that may create safety issue.

The rapid increase in activity levels and demand for CASA approvals for a range of operations from humanitarian, law enforcement, security and commercial activities increases the possibility that, without adequate guidance to industry and CASA staff, inconsistent decisions with possible adverse outcomes may result. Even in 2009 with the release of the *National Aviation Policy White Paper* there was an expectation by government that CASA would support the use of RPAS through safe and consistent regulation and oversight.<sup>5</sup> For this reason, as was explained above,<sup>6</sup> an outcome-based regulatory approach provides a more efficient approach to safely accommodate the myriad of types of RPAS and their increasingly diverse applications.

Aviation is an open and dynamic environment – domestically and internationally – and with RPAS operations there are increasing challenges for both CASA and the RPAS sector. While the needs and objectives of the stakeholders may vary, they both need to ensure that safety related considerations are at the forefront. This is one of the key challenges with the rapid growth of the RPAS sector.

Integration of RPAS into contemporary society presents unprecedented challenges at various levels: into modern society generally; into our legal system; into existing civil aviation regulatory framework; and into unsegregated civilian airspace. Those aspects of integration that are at present creating the greatest challenges derive from the differences between RPAS and any previous type or variety of aircraft design and technology. Therefore, from a legal and regulatory perspective, the real integration difficulties stem from the inherent differences and diversities of this new form of aircraft combined with the fact, obviously, that RPAS are piloted remotely and at some time in the future, fully autonomous. And perhaps the most sobering aspect of all is that the rate of advancement of RPAS technology is showing absolutely no signs of abating and indeed is continuing to increase at an increasing rate.

It should also be remembered that drones – as they were traditionally referred – were conceived and developed within a military milieu. RPAs are, as with many previous aviation innovations – including the jet engine – a child of war. It is only a matter of time before we begin to experience their full potential within the civilian and commercial aviation sector. Unlike military RPAS activities, civilian operations, particularly commercial usage, cannot rely on specially designated and restricted military airspace. Therefore, one of the key issues for operating RPAS for civilian purposes will be their integration into non-segregated common airspace.

Civilian UAVs are intended to operate in a different environment than military UAVs, namely in the common, non-segregated civilian airspace, together with all other air traffic. What is acceptable in

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<sup>5</sup> Commonwealth of Australia, 'National Aviation Policy White Paper' Policy Paper, Australian Government, December 2009, 1-238.

<sup>6</sup> See section 1.4.

military operations and in segregated airspace does not apply to civilian applications. At the moment, RPAS lack formal airworthiness certification by civilian aviation authorities. There are no airworthiness standards and acceptable means of compliance for those technical features of UAV technology, which go beyond traditional manned aircraft. The main obstacle for civilian UAVs to fly in non-segregated airspace is safety.<sup>7</sup>

As civilian usage of RPAS become more common and their commercial and operational superiority more demonstrable, the pressure imposed upon governments and regulators for access to unsegregated and ultimately unrestricted civilian airspace will intensify. Of course there will be public outcry from certain sectors of society and individuals but cost benefit methodology will most likely prevail. Such is the nature of democratic societies. Ultimately RPAS will be flying, with the same degree of freedom as manned aircraft, in non-segregated airspace. Therefore, a solid legal framework on the international, regional (for example, the European Union and the EASA) and national level laying down all technical, safety and operational requirements will need to be implemented. CASR Part 102 will be Australia's attempt to achieve this goal.

The diversity of application of RPAS usage that differs from that of manned aircraft is what places the adequacy of existing law and regulatory framework under so much pressure. We therefore need to consider the scope of RPAS activities and applications to ensure that any changes to the regulatory regime will be sufficient to accommodate and harness RPAS technology now and well into the future. Australian ABC journalist Mr Mark Corcoran, who is an expert on RPAS technology, stated: "I think that the problem is that the technology is now progressing at such a rate that regulators and legislators risk being buffeted in the slipstream in the slipstream".<sup>8</sup>

The enormity of the task of integrating RPAS into unsegregated civil airspace cannot be overstated, however, the legal issues associated with RPAS activities are not restricted to safety and technical regulation. While the advantages to society in general of increased usage of RPAS is undeniable, because of the uniqueness of this new type of aircraft technology, its increased civilian usage also raises a number of important legal, social and ethical issues.

Most RPAS activities, where regulators have permitted operations, are currently constrained to segregated airspace such as test sights, designated danger areas or within temporary restricted areas. On some occasions, RPAS operations are permitted in an extremely limited environment outside segregated airspace. To exploit fully the unique operational capabilities of current and future RPAS and thus realise the potential commercial benefits of RPAS, there is a desire to be able to access all classes of airspace and operate across national borders and airspace boundaries. Such operations must achieve an acceptable level of safe but regulation should not become so inflexible or burdensome that commercial benefits are lost.

Many regulatory authorities throughout the world have adopted the above approach as they transition to a more 'safety systems' and less prescriptive approach to safety regulation. The emphasis is placed more on the operator to demonstrate to the regulator, usually through the development of an exposition, that they have established robust safety systems and procedures that

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<sup>7</sup> Kaiser, S 'UAVs and Their Integration into Non-segregated Airspace', 2011, p. 162.

<sup>8</sup> O'Sullivan, Emma 'Eyes in the Sky: New Technologies Present New Challenges for Law Makers' August (2014) *About the House* p. 46.

ensure they can carry out their operations safely. The following extract of the Australian Civil Aviation Safety Authority clearly describes the commercial advantages of such an approach:

“Apart from the safety benefits that will be derived from this new regulatory regime clearly articulating the safety outcomes that are required, the new regulations will allow greater operational flexibility for airlines in achieving these safety outcomes. I am certain that this legislative flexibility will provide significant opportunities for your organisation in terms of integrating safety into your business planning processes.”<sup>9</sup>

The ARC supports the approach of the Australian Government with a safety outcome based approach to the regulation of RPAS – particularly considering the rate of technological development and their diversity of application. During the transition to CASA’s new regulations, CASA is encouraging operators to develop safety cases to support applications, where required, for exemptions against existing regulations. This approach also applies to the restrictions imposed upon RPAS operating certificates. The safety case does not need to follow any particular format but must clearly identify all risks associated with the proposed change and comprehensively articulate how they are to be managed and mitigated to an “equivalent or improved level of safety”.

The above approach has been adopted by CASA in respect to RPAS Operating Certificates issued under the Civil Aviation Safety Regulations (1998) Part 101. Due to the vast diversity and uniqueness of RPAS operations, a highly prescriptive regulatory framework is simply not practical or feasible to encompass the scope of applications. If the legislation is structured in such a way that it prescribes the desired safety outcomes, the operator has the flexibility to structure their procedures so that they are both safe and commercially sustainable.

The viability of the commercial market for RPAS, especially in the civil market, is heavily dependent on unfettered access to the same airspace as manned civilian operations to enable sustainable commercial operations. Whilst it is essential that RPAS demonstrate an equivalent level of safety compared to manned operations, the current regulatory framework has evolved around the concept of an on-board pilot or pilots. There is a need to develop RPAS solutions that assure an equivalent level of safety for RPAS operations, which in turn will require adaptation or transition of the current regulatory framework to allow for the concept of the remote pilot without compromising the safety of other airspace users.

One of the major issues facing RPAS operations is the demonstration of equivalence (in particular for detect and avoid systems) in the context of an evolving air traffic management (ATM) environment. It is very important to understand that the current ATM environment is not static. Achieving equivalence with manned operations is not a fixed target as there are many significant changes proposed that aim to improve operational efficiency and performance or enhance safety. On the whole proposed changes to the ATM environment could be seen as advantageous to RPAS operations as more and more functions within the environment are automated<sup>10</sup> thus there is a significant opportunity for the RPAS industry to influence the shape of the future ATM environment to support wider RPAS operations.

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<sup>9</sup> From a letter to the CEOs of all major airlines from CASA's head of Air Transport Operations Group (ATOG) in June 2007.

<sup>10</sup> For instance the ongoing mandating for aircraft operating in controlled airspace to be fitted with ADS-B satellite based systems.

In summary the technical standards that RPAS will need to meet to be integrated into non-segregated airspace has been widely discussed<sup>11</sup> and it is expected that new technology will resolve many of the issues associated with RPAS, including maintaining separation, establishing airworthiness, maintaining contact with air traffic control, loss of link or sight of RPAS procedures, and ensuring the security of the link and base station. As these technical challenges are overcome, authorities will need to be aware of the implications for other stakeholders with aviation responsibilities.<sup>12</sup> For example, it has been suggested that air traffic controllers are best placed to provide separation advice for RPAS operators,<sup>13</sup> which arguably effects a de facto transfer of responsibility for separation from the pilot of the RPAS to air traffic control.

CASA and other regulatory authorities throughout the world will also need to ensure that new technologies have demonstrated efficacy, but also that evidentiary requirements are met. For example, the RPAS command and control link must be secure and able to detect and monitor when deliberate interference has been attempted. Equally, larger RPAS may require on-board tamper proof instruments to record the actions of the pilot. In imposing these additional requirements, Authorities must balance the need for safety against the cost according to their individual charters.<sup>14</sup>

In considering the various alternatives in search of the most appropriate legislative approach to RPAS regulation is whether other aspects of aviation regulation such as the introduction of safety management systems (SMS) and the move towards a more 'outcomes' based legislation are appropriate for RPAS operators.<sup>15</sup> As previously stated the introduction of these measures is a result of the aviation industry moving beyond a prescriptive legislative model to a form of regulation that recognises that the safety of aircraft operations is affected by a wide range of factors such as the safety culture of operators, and that the aviation industry is mature enough for operators to choose how to meet safety requirements without limited oversight of an Authority.<sup>16</sup> It may be argued that while this approach is possible with a mature industry with a long history of safe operations, this approach may not be suited to new RPAS operators, particularly those without operational or even *aviation* experience.<sup>17</sup>

On the other hand regulatory authorities could continue with a prescriptive legislative model until the industry has matured. This would reflect the reality that while widespread RPAS operations might be new, the complex framework that is in place for safe operations in non-segregated airspace is the result of decades of experience which RPAS operators may be unfamiliar with, and that the safety standards required today are far more important than in the early days of aviation when 'experimental' aircraft were common. A prescriptive legislative model may also assist in ensuring RPAS operations are standardised at the outset, and reduce the likelihood of RPAS operators

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<sup>11</sup> See for examples Ravich, Timothy 'The Integration of Unmanned Aerial Vehicles into the National Airspace' (2009) 85 *North Dakota Law Review* 597; Stefan Kaiser, 'UAVs and Their Integration into Non-segregated Airspace' (2011) 36(2) *Air and Space Law* 161.

<sup>12</sup> Kaiser, Stefan 'Third Party Liability of Unmanned Aerial vehicles' (2008) 57 *Zeitschrift für Luft Weltraumrecht* 229, 233.

<sup>13</sup> Kaiser, S 'Legal Aspects of Unmanned Aerial vehicles' (2006) 55 *Zeitschrift für Luft Weltraumrecht* 344, 352.

<sup>14</sup> McCormick, John 'Development of RPAS in Civil airspace and challenges for CASA' (Speech delivered at the Association for Unmanned Vehicle Systems Australia, Melbourne, 25 February 2013) < <http://www.casa.gov.au>.

<sup>15</sup> Bartsch, R *International Aviation Law* (Ashgate Publishing, 2012), p. 287.

<sup>16</sup> Bartsch, R *Aviation Law in Australia* (4<sup>th</sup> ed) op. cit. 77, 577 and 607-8; *International Aviation Law* Op. cit. p. 287.

<sup>17</sup> Bartsch, R *International Aviation Law* Op. cit. p. 26.

developing individual practices with catastrophic results, a lesson that has been learnt well by existing operators.<sup>18</sup>

As a concluding comment to this question, irrespective of which path either CASA or other agencies adopt in regulating RPAS activities the problem of effective oversight remains bewildering. The regulatory focus must remain on the safety of commercial air transport operations and of the fare-paying passenger. As some stage more attention must be directed toward promoting a greater role of the RPAS sector itself and of reputable industry associations and organisations such as ARC. It is acknowledged that CASA has delegated certain aspects of review of RPAS applications to industry but the ARC consider that apart from delegating certain entry control tasks there are other opportunities for CASA to work with industry.

Consideration of at least some degree of self-administered (as with other industry sectors)<sup>19</sup> may well be the outcome. It is important that self-administered is not confused with deregulation. CASA continue to provide safety oversight over bodies and organisations that have been granted various levels of delegated responsibilities. In the meantime, the RPAS industry continues to expand at exponential rates. The area of most growth – the small RPAS operated by individuals in populous areas at low levels – remains mostly uncontrolled from an effective surveillance perspective.

The Asia-Pacific RPAS Consortium consider that delegating certain responsibility to organisations such as ARC – **that do not operate RPAS** – and are independent, in the area of surveillance and oversight by way of auditing of RPAS operators is one area that can have almost immediate advantages in terms of safety to the air travelling sector and privacy (and safety) to the general public. This is also consistent with the recommendation in the Government's *Aviation Safety Regulation Review* and that has been endorsed by CASA, in respect to utilising the benefits of industry surveillance and audit programs.

Only those certified RPAS operators that have been audited and approved under the UAS International Standard (UIS) are permitted to offer their services through the Consortium. In the absence of international drone regulatory standards the UIS provides a high level of safety assurance to all ARC clients. Apart from being audited against an international RPAS audit standard (derived from guidelines in the ICAO RPAS Manual) all operators approved under the UIS are also required to comply with the UIS Code of Conduct. This ensures that not only will the Approved UAS Operator (AUO) comply with relevant regulatory requirements they will also operate drones responsibly – that is in accordance with privacy and security considerations.

## ii. Local design and manufacture of RPAS and associated systems

*ARC Comment:* The ARC the 'Phoenix' jet drone) and Carbonix and consider both these companies exemplify the level of advancement in the design and capability of local manufactures of RPAS.

## iii. Importation of RPAS and associated systems *ARC Comment:* Nil.

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<sup>18</sup> A DC10 crash was the result of deviation from the usual process for removing the engine and pylon. Bartsch, Ronald, R *International Aviation Law* op. cit. p. 26.

<sup>19</sup> For instance, in Australia the Gliding Federation and the Parachute Association are both self-administrating bodies that provide for high safety standards and strict compliance to their operational standards and code of conduct.

#### iv. State and local government regulation

*ARC Comment:* The ARC consider that the most significant area, and indeed deficiency, in State and local government regulation, is in respect to privacy and security issues relating to commercial and recreational usage of RPAS.

Dealing with matters related to privacy is not part of CASA's role. The right to privacy in Australia is governed federally by the *Privacy Act 1988*<sup>20</sup> and is regulated by the Australian Privacy Commissioner. Recently the Privacy Commissioner raised the issue of privacy with the Attorney General to highlight the threats to citizens' privacy from RPAS, and suggested a review of the current privacy regulatory framework.<sup>21</sup> The Commissioner conceded that whilst the *Privacy Act* governs how a government agency or commercial entity employing RPAS is to collect, store, use, disseminate and protect a citizen's personal information, that legislation does not extend to protect citizens from private individuals who collect personal information using RPAS.<sup>22</sup>

The various States and territories have laws relating to privacy<sup>23</sup> but most of these are limited in much the same way as the federal *Privacy Act 1988*. The laws generally apply to the activities of State and territory government agencies and tend to be limited to those entities. There is also a range of additional laws that may protect against invasive or inappropriate use of RPAS. For example, each State and territory has legislation that may make it illegal in certain circumstances to use a surveillance device to record or monitor private activities or conversations via listening devices, cameras, data surveillance devices or tracking devices.

#### 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

Protection of an individual's privacy is the most contentious issue related to non-segregated RPAS operations throughout the world. As unmanned aircraft can house high-powered, digital cameras that operate in the visual, infrared, and low-light spectra<sup>24</sup> privacy concerns seem to be well founded. In the U.S. concerns over privacy has caused delays to a number of the U.S. Government mandated deadlines set by *FAA Modernization and Reform Act of 2012*.<sup>25</sup>

Although invasion of privacy is just one of many areas in which existing laws are challenged it is the area that ARC considers should be the focus of attention. The reason for a concentration on this area of the law is because— at least in Australia – that the RPAS activities that can cause most invasion to privacy are those operated in populous areas, at low levels (for example, below 400 feet AGL) and

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<sup>20</sup> *Privacy Act 1988* (Cth)

<sup>21</sup> Australian Privacy Commissioner, Correspondence: Attorney General: *Regulation of drone technology September 2012* (September 2012) Office of the Australian Information Commissioner <<http://www.oaic.gov.au/news-and-events/statements/privacy-statements/regulation-of-drone-technology/correspondence-attorney-general-regulation-of-drone-technology-september-2012>>.

<sup>22</sup> Ibid.

<sup>23</sup> *Listening Devices Act 1992* (ACT); *Surveillance Devices Act 2007* (NSW); *Surveillance Devices Act* (NT); *Invasion of Privacy Act 1971* (Qld); *Listening and Surveillance Devices Act 1972* (SA); *Listening Devices Act 1991* (Tas); *Surveillance Devices Act 1999* (Vic); *Surveillance Devices Act 1998* (WA).

<sup>24</sup> UTC Aerospace Systems, TASE400 and 400D Cloud Cap Technology <<http://www.cloudcaptech.com/gimbal>>.

<sup>25</sup> Dillingham, Gerald 'Unmanned Aircraft Systems: Continued Coordination, Operational Data, and Performance Standards Needed to Guide Research and Development' 2013, <http://www.hq.nasa.gov/leg> (viewed 3 May 2014).

with small or micro RPAS. And this is the precise type of RPAS activities that may be outside of the scope of current RPAS regulations because of Constitutional limitations.<sup>26</sup>

It is worthwhile to note that the Privacy Commissioner did acknowledge that there was State and territory legislation, although possibly insufficient and seemingly inconsistent,<sup>27</sup> relating to 'unlawful surveillance, stalking and harassment that may apply to the use of . . . [RPAS] by individuals.'<sup>28</sup> The Privacy Commissioner recommended that all levels of government "to review their privacy and surveillance legislation to ensure it covers the use of . . . [RPAS] technology".<sup>29</sup> This initiative led to the Commonwealth tasking the House of Representatives Standing Committee on Social Policy and Legal Affairs to undertake an inquiry into the regulation of Unmanned Aerial Vehicles. This inquiry and its report are detailed later in this section.<sup>30</sup>

CASA has repeatedly stated that "matters related to privacy is not part of its role; it is a matter for the Australian Privacy Commissioner".<sup>31</sup> However, CASA believes that the RPAS community can play a critical role in educating the broader public and engaging in meaningful dialogue with them to demonstrate the positive aspects of RPAS technology and the benefits that can be provided to society.<sup>32</sup> It remains to be seen how CASA will improve regulation over the 'operation of unmanned aerial vehicles'<sup>33</sup> without duly considering the impact of privacy concerns on RPAS aviation-safety regulations, especially given the delays being experienced by the FAA to achieve its government's corresponding mandate have arisen primarily due to privacy concerns.

The key consideration in respect of privacy protection is foremost to protect citizens' rights to privacy by reviewing and aligning relevant legislation. Nominating the interrelationship that must exist between CASA, the Office of the Australian Information Commissioner, and other key stakeholders would facilitate that review and alignment, and subsequent development of RPAS aviation-safety regulations.

While ICAO provides a forum to coordinate air safety issues, member States must consider domestic implications from use of RPAS, including the privacy of its citizens. Generally, the international norm for privacy flows from Article 12 of the *Universal Declaration of Human Rights 1948*, which provides that '[n]o one shall be subjected to arbitrary interference with his privacy. The issue that arises is whether RPAS are permitted to operate in national airspace over public places (such as parks and beaches) and if so, will there be a requirement for RPAS to avert its 'eyes' from the ground?

In the United States, commentators have argued that interference with privacy would contravene the U.S. Constitution's Fourth Amendment, in that it protects U.S. citizens against unreasonable searches and seizures.<sup>34</sup> In this context, the FAA held public consultations in April 2013 to seek

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<sup>26</sup> Op. Cit. 'Unmanned and Uncontrolled' Bartsch, R at: <https://ses.library.usyd.edu.au/handle/2123/14844?mode=full>

<sup>27</sup> See Australian Privacy Commissioner, above, for reference to 'possibly insufficient' legislation. See ABC Online, *Drones fly through privacy law loophole* (14 September 2012) ABC News <<http://www.abc.net.au/news/2012-09-13/drone-technology-prompts-privacy-law-review-call/4260526>> for reference to 'seemingly inconsistent' legislation.

<sup>28</sup> Australian Privacy Commissioner, Mr Timothy Pilgrim.

<sup>29</sup> ABC Online, Op. cit.

<sup>30</sup> House of Representatives Standing Committee on Social Policy and Legal Affairs 'Eyes in the sky: Inquiry into drones and the regulation of air safety' The Parliament of the Commonwealth of Australia, Canberra, July 2014. See section 1.5.4.

<sup>31</sup> CASA Deputy Director of Aviation Safety, Mr Terry Farquharson.

<sup>32</sup> ABC Op. cit.

<sup>33</sup> *National Aviation Policy White Paper*, p. 115.

<sup>34</sup> Roberts, Troy 'On the Radar: Government Unmanned Aerial Vehicles and their Effect on Public Privacy Interests from Fourth Amendment Jurisprudence and Legislative Policy Perspectives' (2009) 49 *Jurimetrics* 491, pp 499-508; Travis, D

comment on draft privacy provisions for its RPAS test site. While the FAA does not intend for the privacy provisions to apply more generally across non-segregated airspace, it may inform future discussions on how law, policy and industry practice should respond in the longer term.<sup>35</sup>

Unfortunately, in Australia, the issue remains unaddressed, even in the aftermath of the recommendations of the 'Eyes in the sky' inquiry into RPAS and the regulation of air safety. The Australian Privacy Commissioner recently commented that the *Privacy Act 1988* (Cth) does not contain provisions dealing with invasion of privacy from individuals operating RPAS. CASA similarly acknowledges the regulatory gap between CASA's focus on air safety and the wider Commonwealth's legislative responsibility to ensure privacy of its citizens.<sup>36</sup> However, there are possibly other provisions<sup>37</sup> that CASA can use to enforce privacy, which prohibits the operation of a RPAS over a populous area unless the RPAS can clear the area in the event of a component failure. As will be highlighted later in this submission, the area of most concern is in situations where the operation of RPAS is outside of navigable airspace, and by the aircraft design, is incapable of operating in navigable airspace.

Notably, the Australian Law Reform Commission is undertaking an Inquiry into 'Serious Invasions of Privacy in the Digital Era' and will review, among other things, the growth in capabilities to use surveillance and communication technologies and community perceptions of privacy.<sup>38</sup> As privacy considerations using RPAS gather momentum in other jurisdictions, hopefully this will generate a similar impetus in Australia to review the *Privacy Act* in the near future.

The Commonwealth *Surveillance Devices Act 2004* regulates the lawful use of surveillance devices by federal law enforcement agencies but does not contain prohibitions on the use of surveillance devices, as is the case with some of the laws of the States and territories. Moreover, each States and territory government take varying approaches to their surveillance devices prohibition laws.<sup>39</sup> Four of the jurisdictions have surveillance devices laws and four have listening devices statutes that are simply not appropriate for modern communication technology let alone rampaging RPAS technology.

The Asia-Pacific RPAS Consortium consider that the major area of concern in respect to State and local government regulations relating to commercial and recreational use of RPAS is the fact that there is no comprehensive regulatory framework to address the privacy and securities issues facing the public and businesses. It is suggested that by adopting an industry code of conduct, (such as the UIS RPAS Code of Conduct) that is also subject to industry surveillance, then this can effectively 'fill

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'We've Got Our Eyes on You: When Surveillance by Unmanned Aircraft Systems Constitutes a Fourth Amendment Search' (2009) 51 *South Texas Law Review* 173, pp. 197-204.

<sup>35</sup> FAA, 'Online Session on UAS Test Site Privacy Policy', (online transcript), 3 April 2013, <<http://www.faa.gov/about/initiatives/uas/media/UAStranscription.pdf>>.

<sup>36</sup> Griffith, C 'Drones a safety and privacy headache', *The Australian* (online), 18 July 2013, <<http://www.theaustralian.com.au/australian-it/personal-tech/drones-a-safety-and-privacy-headache/story-e6frgafz-1226681074927>>; Background Briefing, 'Drones fly through privacy loophole', *ABC News* (online), 14 September 2012, <<http://www.abc.net.au/news/2012-09-13/drone-technology-prompts-privacy-law-review-call/4260526>>.

<sup>37</sup> See CASR 1998 sub-regulation 101.280.

<sup>38</sup> Australian Law Reform Commission, 'New Commissioner appointed to the ALRC for Serious Invasions of Privacy Inquiry', (online media release), 30 July 2013, <<http://www.alrc.gov.au/news-media/media-release/new-commissioner-appointed-alrc-serious-invasions-privacy-inquiry>>.

<sup>39</sup> For a comprehensive account of the various State and Territory laws as they relate to UAS activities see: Butler, Des 'The Dawn of the Age of the Drones: An Australian Privacy Law Perspective', *UNSW Law Journal*, Volume 37(2), 2014.

the void' between CASA safety and technical regulations and the ineffective patchwork of State privacy laws – just as the helicopter industry effectively oversighted the 'fly neighbourly' program.

**v. Overseas developments, including work by the International Civil Aviation Organization (ICAO) and overseas aviation regulatory jurisdictions;**

*ARC Comment:* Admittedly with the establishment of the International Civil Aviation Organization (ICAO) in 1944<sup>40</sup> and with it the proliferation and universal acceptance of its technical, safety and operational standards, the mechanism exists to ensure RPAS – as with all other technological developments in civilian aviation – are effectively and safely accommodated. ICAO in the past has developed relevant SARPs to accommodate the introduction of new technologies within the international aviation sector.

In respect to the development of RPAS specific SARPs the ICAO has adopted an entirely different, and indeed novel approach, as to how these universal standards will be developed. In the context of gaining harmonised RPAS standards across all convening states to the Chicago Convention is important that the process that the ICAO has adopted is clearly understood. In the past, in respect to the development of any new technical standards relating to international air transportation, SARPs have always been developed in advance and these standards is the basis upon which international standards are promulgated. In respect to RPAS standards ICAO has developed guidance material<sup>41</sup> that will assist states develop their own regulations so they can be incorporated into their domestic civil aviation law.

In 2007 the ICAO established the Unmanned Aircraft Systems Study Group (UASSG) to consider, *inter alia*, how best to develop RPAS standards. The UASSG was established by the in response to the perceived urgent need for the harmonisation of terms, strategies and principles with respect to RPAS operations.

The terms of reference of the UASSG were described as follows:

In light of rapid technological advances, to assist the Secretariat in coordinating the development of ICAO Standards and Recommended Practices (SARPs), Procedures and Guidance material for civil unmanned aircraft systems (UAS), to support a safe, secure and efficient integration of UAS into non-segregated airspace and aerodromes.

Under the Chairmanship of the then CASA manager, Mr James Coyne,<sup>42</sup> the UASSG worked collaboratively with other expert groups within ICAO as well as external standards-making organisations. During the six years of its operation UASSG served as the high level focal point for global interoperability for the development of RPAS regulatory standards.

ARC Member organisation Technical Director Mr Jim Coyne, the then Chair of the UASSG, commented that the ultimate objective of ICAO was to “develop a regime that would allow for an

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<sup>40</sup> ICAO was initially established as the Provisional International Civil Aviation Organisations (PICAO) in 1944 immediately following the Chicago Convention. With the ratification of the Convention by the 26<sup>th</sup> signature state in 1947 the ICAO officially came into being.

<sup>41</sup> Full citation to ICAO RPA Guidance material and date March 2015 *Remotely Piloted Aircraft Systems Manual (RPASM)* ICAO Doc 10019. See later heading “Remotely Piloted Aircraft Systems Manual”.

<sup>42</sup> Mr Jim Coyne is the Technical Director of the international consultancy firm UAS International Pty Ltd that provides global UAS solutions across all facets of the sector.

RPAS operator or remote pilot to file a flight plan and conduct a safe and efficient flight from one part of the world to another as a routine user of the air navigation system without impacting the safety or cost for manned aviation". To that end the work of the UASSG has been critical in establishing the foundations upon which an international RPAS framework can be developed and for this vision to be realised.

The final three years of the work of the UASSG was dedicated almost exclusively to the development of the *Remotely Piloted Aircraft Systems Manual (RPASM)*.<sup>43</sup> The overall purpose of the RPASM is to provide guidance to contracting ICAO states<sup>44</sup> on technical and operational issues applicable to the integration of RPA in non-segregated airspace. This objective is clearly stated in the following extract:

The objective and purpose of the manual is to provide guidance on technical and operational issues applicable to the integration of RPA in non-segregated airspace.<sup>45</sup>

The RPASM contains material recommended for the benefit of the entire RPAS community, for example regulators, manufacturers, operators, pilots, air navigation service providers (ANSPs).<sup>46</sup> The scope of the RPASM is to recommend material for use by ICAO member states when establishing their regulatory framework for RPAS. The material should be used in conjunction with relevant SARPs contained in the respective Annexes. The following subjects are *not* within scope of this manual:

- a) State aircraft, without prejudice to the obligation for 'due regard' in Article 3(d) of the Chicago Convention;
- b) Autonomous unmanned aircraft and their operations including unmanned free balloons or other types of aircraft which cannot be managed on a real-time basis during flight; and
- c) Model aircraft, which many States identify as those used for recreational purposes only, and for which globally harmonized standards are not considered necessary.

Accordingly, the guidance provided in the RPASM applies to any RPAS used for other than recreational purposes. As previously noted the underlying premise upon which the manual was developed was to provide guidance materials that is consistent with the existing aviation regulatory framework and that will assist in the development of future RPAS specific SARPs.

The first edition of the RPASM was published in advance of the ICAO RPAS Symposium, held in Montreal from 23 to 25 March 2015. Subsequent editions will be developed to follow the evolution of the regulatory framework, as it is developed. In other words the manual will be updated and expanded as knowledge is gained and material becomes mature.

The work on the first package of SARPs to be developed by the RPASP was scheduled to be completed by early to mid-2016 to meet the timeline for review by the ANC and consultation with states. Recommendation to the ICAO Council for adoption of these SARPs is expected to occur in early 2018.

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<sup>43</sup> ICAO Doc 10019.

<sup>44</sup> ICAO Assembly Resolution A37-8: "Recognition that regional safety oversight organizations (RSOOs) have an important role in the USOAP CMA and that, wherever applicable, the word "States" should be read to include RSOOs".

<sup>45</sup> Section 1.4.1.

<sup>46</sup> Section 1.4.2

This submission by the Asia-Pacific RPAS Consortium contends that the adoption by contracting states of the ICAO guidance material contained in the RPAS Manual will significantly reduce both the time and cost associated with the RPAS integration process from a regulatory perspective. Embracing an internationally coordinated implementation strategy will thereby allow for the potential benefits of this emerging technology to be more quickly realised while at the same time ensuring society is protected from its harmful risks – at least from a safety perspective.

In summary, the Asia-Pacific RPAS Consortium consider that in the absence of any international RPAS technical standards (i.e. no RPAS SARPs) industry developed international RPAS standards (such as the *UAS International Standard*) would allow for conformance with the ICAO guidelines (as set out in the *ICAO RPAS Manual 92015*) even for countries and states that have no RPAS regulations (at present approximately two thirds of ICAO states have no form of RPAS regulations). If such an approach was adopted, this would allow for the more expedient uptake of RPAS technology – especially for life saving humanitarian proposes – an even in countries (like many of Australia's Pacific Island state neighbours) that have no RPAS legislation. By way of example, RPAS could be used for first relief medical support following natural disasters. Also, RPAS could be used (if they were subject to conformance with an accepted international RPAS standard), for search and rescue operations in international airspace. The search for the Malaysia MH370 is a case in point.

### **Related matters**

#### *(i) Improving safety and reducing the incidence of privacy violations from drone usage*

One of the main problems facing the government, regulators and the public is that there is no central repository or database to for the reporting of either regulatory infringements of RPAS activities or their invasion of individuals and corporate privacy rights or security considerations. The Asia-Pacific RPAS Consortium considers that more accurate information relating to such violations and infringements (whether intentional or otherwise) is the key to developing strategies that will more effectively address these most important safety and societal issues.

As such the ARC is in the process of developing a worldwide database based on information received from the RPAS operators, airlines, airport operators and the public. This Project – **Report-a-Drone** – will enable data to be entered online and information to be provided through a dedicated website. It is envisaged that if this project is supported by the government and industry stakeholders then better quality information will be available to stakeholders. For example, more accurate information of violations by RPAS in controlled airspace in the proximity of airports could be provided to the relevant authorities (for instance, to Air Services Australia for the issuing of NOTAMs to warn airlines of potential hazards). Also, information of privacy and security infringement, which may not be 'reportable events' at present could be reported. ARC believe that with more accurate information available the hazards and adverse impact of RPAS activities on society can be reduced.

ARC acknowledge than normal 'reportable incidents' relating to RPAS activities would continue to be reported to the Australian Transport Safety Bureau (ATSB) and that this proposal would involve the participation and co-operation of various government and industry stakeholders.

(ii) *Constitutional limitations of the Commonwealth over RPAS activities*

The Parliament of the Commonwealth of Australia has long since recognised the critical and forever increasing importance of aviation to its people and the economy. The federal government of the day has – through legislation and referendum – sought to gain greater control over aviation but with limited success. The High Court of Australia has, for the past five decades since the *Airlines of NSW (No 2) Case*, remained steadfast in its position regarding the constitutional limitations that prevail. This case remains the high-water mark in defining the limits to which the Parliament can control aviation. And the States and their constituents have likewise resisted attempts by the Commonwealth to gain greater control over the subject.

Since the introduction of powered flight aviation has changed enormously and developed at an unimaginable speed. But never before, even since the advent of the aeroplane, has the rate of technological advancement and diversity of application of aircraft design been so momentous, as has been the case with unmanned aircraft. And yet the Constitution has essentially remained static during this time. The Constitution *is* what it *is* and not what the Parliament wants it to be. And the Constitution *means* what the High Court says it *means* and not what the Parliament wants it to mean. What has changed is the world in which we live and not the Constitution.

With the unmanned aircraft era decisively upon us this industry sector now poses novel and unique challenges to society, particularly in the area of privacy and security. This research has shown that unlike any previous form of aircraft design, RPAS can operate – with unbounded agility – in regions that were not previously accessible to their manned counterpart. It is contended that the particular class of RPAS that, by design or purpose, are *incapable* of flying in navigable airspace, are not within the ambit of current RPAS regulatory control. The fact that these aircraft are therefore incapable of commingling with manned aircraft means that constitutionally the Commonwealth Parliament has no authority to regulate them.

In the past the State Governments have agreed, through legislative processes, to supplement those areas where the Commonwealth lacks authority, and thereby ensure that the full control over aviation activities and thereby benefiting society as a whole. But with the rate of development of RPAS technology it is highly unlikely that the States will be able to collectively and unanimously – as is required with ‘mirror’ legislation – agree upon such measures without subjecting society to intrusions of privacy and possibly unacceptable safety risks. Has the time finally arrived – after 70 years – that the question of constitutional reform should to be revisited?

The problem of constitutional limitations over the subject of aviation has plagued successive federal parliaments for almost a century – almost since the time of the first civil aviation law. But now this new breed of unmanned aircraft threatens to encroach upon the freedoms and privacy of everyday Australians. Whereas in the past, with the advancement of aircraft design and performance – and with it increasingly over-crowded skies – a balance had to be struck between the benefits the technology bestows upon the economy to the degradation of an individual’s freedom and enjoyment of life. The impact of the operations of large commercial airliners upon the environment in terms of noise and pollutants emissions is well known.

With the particular class of small RPAS, that this submission argues may be beyond the Commonwealth’s regulatory control, there are aspects of these operations – notably invasion of

privacy and security threats – which do not confer any accompanying commercial benefit to society. It is suggested that this is something that the voting population of Australia would surely concur and agree to expand the scope of the Commonwealth’s power. By simply adding the single word “aviation” to the section 51 of the Constitution by way of referendum the Commonwealth’s power would cover the field.

*(iii) Technology and the law*

It is impossible to accurately predict the true form of technological advances, or the impact they will have on aviation, society and our legal system. It is equally difficult to envisage the impact or risks they may impose upon our way of life. Contemporary society has proven to be remarkably adept at integrating and normalising technological developments, especially once any moral anxiety relating to their introduction subsides. On the other hand, the negative impacts of some technological advancements have only become apparent subsequent to their introduction and integration into society, which makes them much harder to regulate and control.

The challenge for governments throughout the world is to ensure that the risks associated with the introduction of this new technology are managed and balanced in such a manner that permits society to benefit as a whole. The technical standards that RPAS will need to meet to be integrated into non-segregated airspace will be considered in some detail in later chapters. It is expected that new technology will resolve many of the issues associated with RPAS, including maintaining separation, establishing airworthiness, maintaining contact with air traffic control, loss of link or sight of RPAS procedures, and ensuring the security of the link and base station. There epitomizes a touch of irony in that technology created the “drone” issue but may also prove to be the solution.

As these technical challenges are overcome, authorities will need to be aware of the implications for other stakeholders with aviation responsibilities. For example, it has been suggested that air traffic controllers are best placed to provide separation advice for RPAS operators, which arguably effects a de facto transfer of responsibility for separation from the pilot of the RPAS to air traffic control. Issues relating to situational awareness and other non-technical aspects of drone operations require special consideration. The human factors element of drone operations is another area that requires close consideration.

Authorities will also need to ensure that new technologies have demonstrated efficacy and that evidentiary requirements are met. For example, the RPAS command and control (C2) link must be secure and able to detect and monitor when deliberate interference has been attempted. Equally, larger drones may require on board tamper-proof instruments to record the actions of the pilot. In imposing these additional requirements, authorities will have to balance the need for safety against the cost—as per usual cost-benefit analysis.

## Summary and Conclusion

As a concluding comment the purpose of this submission by the Asia-Pacific RPAS Consortium is in no way to meant to stifle or impede the development and uptake of this technology within civil aviation – not that that would be either possible or desirable. As a new form of aircraft RPAS, as with for example the introduction of the helicopter, can provide enormous benefits for the aviation industry and indeed the wider community. The task ahead for regulators and governments is articulately described below:

It is vital that when achieving the milestone of the twenty-first century, RPAS are integrated into the non-segregated airspace without reducing existing capacity but maintaining safety levels currently imposed and minimizing potential dangers to other aircraft, passengers, and other persons and property on the ground. A further challenge faced by the aviation authorities internationally in relation to the upcoming full integration of RPASs is to deal not only with the vast legal ramification but also with the societal and ethical implications thereof. Whether this will be done through amendments of existing legislation or the enactment of a new international Convention dealing specifically with UAS remains to be seen. What is, however, clear is that this great technological advancement of aircraft is the future of aviation and that RPASs will inevitably reshape the conventional use of airspace as we now know it.<sup>47</sup>

It is hoped that this government Inquiry may assist in providing a wakeup call for throughout Australia and across the various levels of governments and in the Asia-Pacific region to more aggressively engage in collective and harmonised dialogue to develop effective implementation and integration strategies for civilian RPAS operations. Without exception this has been the situation with all previous rapid advancements in aircraft design and technology of this magnitude – indeed they have been the basis for international conventions – most notably the *Paris Convention 1919* and the *Chicago Convention 1944*.

The potential impact of civilian RPAS operations, perhaps by virtue of their inherent design, seemed to have thus far, slipped under the radar. This submission suggests that what is required to address the emerging RPAS issues is a ‘whole of government approach’ in respect to implementation strategies and due to the unique characteristics of aircraft operations, this needs to be initiated, coordinated and promulgated at the international level.

As a final word this extract from *Drones in Society*<sup>48</sup> provides some pertinent comment:

Since its very beginning, aviation was a pioneering and creative industry but, at least in its early years, at the expense of many accidents and the cost of many lives. Today, aviation is based on mature and robust safety systems and cultures. Traditionally it takes years, if not decades, to develop new aircraft type. Innovations are integrated slowly, through the application of strict regulatory controls in accordance with internationally accepted safety and technical standards. The result is a very good safety record.

It is highly attractive to merge the innovative power and competitive pricing of information technologies with aviation. Unmanned aircraft are a product of such a merger. But society continues to struggle to accommodate and integrate unmanned aircraft as governments and their legal

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<sup>47</sup> Michaelides-Mateou, S & Erotokritou, C ‘Flying into the Future with UAVs: The Jetstream 31 Flight’ at p. 129.

<sup>48</sup> Bartsch, Coyne & Gray, *Drones in Society: Exploring the strange new world of unmanned aircraft*, Routledge, UK, 2017, at p11.

systems are overwhelmed by the rate of technological advancement. It is contended that if these aircraft are to be integrated into common, unsegregated civil airspace, then under current laws relating to aircraft certification standards, and in accordance with international conventions, they necessarily must be subject to the same, or at least equivalent, technical and safety standards.

As previously stated [in this submission], any aircraft flying today is capable of being flown by a remotely located pilot. Therefore, if the current level of safety of our air transport system is to be maintained there must be at least an equivalent level of safety for all unmanned operations if they are to share the same airspace.

Public awareness of drones and the political and societal understandings of them are thought to be paramount if there is to be support and acceptance of the technology and its future development. The introduction of RPAS into domestic airspace raises never faced safety and integration issues. Of the many challenges facing governments throughout the world, and for RPAS manufacturers and operators seeking commercial opportunities in civilian markets, perhaps the most significant is the lack of airspace regulation that covers all existing and contemplated unmanned systems and operations.

Access to the common airspace is the key to everything regarding unleashing the full potential of drones and the benefit they can bestow upon society. To achieve this goal, the focus of new regulations must be to maintain the safety levels the aviation industry has achieved during the past century of piloted operations

The regulation of drones continues to develop and poses several legal and regulatory challenges. Different jurisdictions have approached such challenges ways depending on national objectives and priorities. Examples from the US, Europe and Australia show that the safety of air navigation is of paramount concern and has naturally attracted close attention. The current prohibition that remains in many countries on the commercial usage of RPAS may have inhibited research and development in this area and ultimately, for these nations, impacted upon the timeliness of their integration into society.

It is clear that the regulatory challenge for all countries is the assurance of at least an equivalent level of safety for all drones in common national airspace. There is a crying need for the development of harmonized international rules relating to RPAS operations, but the difficulties and challenges remain. This [submission] has attempted to provide an overview of the emergence of drone operations into the civil aviation industry and create an awareness of some of the main issues—technical, legal and ethical—that this transition has created in the broader community. RPAS are unique and therefore may require unique solutions to the problems and challenges of this strange yet exciting new technology.