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To catch a drone: Security and privacy challenges in a high-tech age

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A brief intro . . . Ron Bartsch BA (Syd) BSc (Syd) LLB (NSW) LLM (UTS) Dip Ed (Syd)

- Managing Director, UAS International Pty Ltd
- Managing Director, AvLaw Pty Ltd
- Chairman, AvLaw International Pty Ltd
- Independent Director, Regional Express Holdings Limited
- Director. Australian Associations of Unmanned Systems
- Director, OneSAFE Integrated Risk Management
- Former Head of Safety for Qantas Airways Limited
- Former Senior Airline Manager, CASA
- Aviation specialist part-time member and aviation specialist of the Administrative Appeals Tribunal (AAT)
- Senior Lecturer and Senior Visiting Fellow in aviation law at University NSW and the ANU
- Admitted as a Barrister to the High Court of Australia and Supreme Court of New South Wales
- Air Transport Pilot License (ATPL) holder with over 7,000 flying experience and command endorsements on over 30 aircraft including Boeing 717 and Beechjet
- Author of six publications on aviation law including *International Aviation Law (2012)*
- *Aviation Law in Australia (4thed)* contributing author to *Halsbury's Laws of Australia*
- 35 years aviation industry experience, pilot, safety regulator, airline executive, consultant
- Worked with PASO, Port Vila, Vanuatu for 6 months (2006-2007) and Dili 2009-10
- Undertaking PhD research studies at University of Sydney (in spare time)
- Consulted widely throughout the Asia-Pacific region including Kingdom of Tonga, Solomon Islands, Samoa, Vanuatu, Fiji, Kiribati, Papua New Guinea, Timor-Leste, Indonesia, Malaysia, Singapore, South Korea, Middle East, Jordan, Hong Kong, South Africa, New Zealand, India, Myanmar and Turkey

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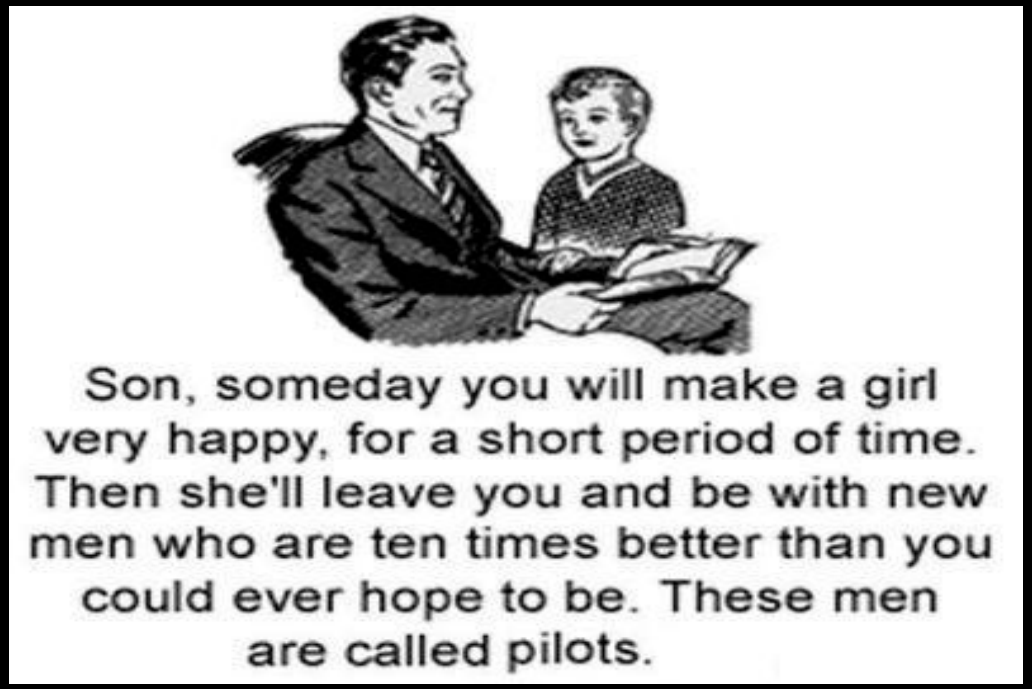
So who am I today?



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The Industry Leader

DRONE | RPA | UAV

CONSULTING | SALES | LEGAL | INSURANCE | CERTIFICATION

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Topics . . .

1. Drones ????	• Terminology • Certification • Some statistics
2. The four A's	• Accessibility • Affordability • Adaptability • Anonymity
3. The good, bad & ugly	• Benefits to society • Risks – security • Privacy issues
4. Industry update	• CASA regulations • International & ICAO • Industry associations
5. Where to from here?	• Eyes in the Sky • Recommendations • 'Unmanned and Uncontrolled?'
6. Questions . . .	• Without notice

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Welcome to planet Earth AD

After Drones

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1. Drones ???

- Terminology
- Certification
- Some sobering statistics

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1.1 Terminology

The Australian regulator – CASA – and the European Aviation Safety Agency (EASA) use the term *Remote Piloted Aircraft (RPA)* in respect to civilian usage. The *Unmanned Aerial Vehicle (UAV)* or RPA together with the datalink and ground control units are collectively referred to as *Unmanned Aircraft Systems* or UAS. This is also the term used by the Federal Aviation Administration (FAA) and Congress in the United States.

The use of the term ‘drone’ is usually applied to their military application.

1.2 Certification

- Australia's CASA in 2002 became the first aviation safety regulator in the world to certify UAS operations and to permit commercial usage
- CASA issued *Civil Aviation Safety Regulation* Part 101 which is about to be amended and updated before the end of 2014
- One of the proposed amendments is to remove the requirement for UAS to be certified if they are less than 2kg and are operated within the 'segregated airspace' restrictions that apply to these operations

1.3 Some sobering statistics . . .

- It is estimated that there are in excess of 750 manufacturers of UAS worldwide – this figure is continuing to increase on an almost daily basis
- There are expected to be in excess of 30,000 UAS operating in the United States alone by 2020*
- The UAS industry is expected to create 70,000 new jobs in the first three years of integration into the national airspace and over 100,000 jobs by 2025
- It is predicted that by 2020, $11.4 billion each year will be spent on UAV sales

* The Future of Drones in America: Law Enforcement and Privacy Considerations, Hearing Before the S. Comm. on the Judiciary, 113th Cong. 2 (2013) (statement of Sen. Patrick J. Leahy, Chairman, S. Comm. on the Judiciary).

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2. The four A's

- Accessibility
- Affordability
- Adaptability
- Anonymity

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2.1 Accessibility

- UAS are readily available from the Internet, retailers and E-Bay
- If they are not operated commercially (within restrictions) there is no requirement to attain an Operator Certificate (OC) under CASR Part 101
- CASA has issued more than 120 operating certificates
- No restrictions on purchase of UAS

2.2 Affordability

- UAS can be purchased from as little as $50
- Costs are reduced by operating them through smart phones and tablets
- As technology improves – GPS units, cameras, power plants and batteries – their price continues to reduce
- Example – Chinese manufactured UAS quad with electronic (geo) fences, anti collision systems and fully autonomous available for less that $4000

2.2 Affordability

Chinese manufacturer programs Phantom drones with no-fly zones to protect Australian airports

- One of the world's leading manufacturers of small commercial and hobbyist drones is introducing technology to prevent its unmanned aircraft from flying near 10 major Australian airports.
- In announcing what it calls "No Fly Zones" safety modifications, China-based DJI Innovations will modify software that provides satellite GPS guidance for its highly popular 'Phantom' series unmanned aerial vehicles (UAVs).
- The drones will be blocked from operating near 350 airports around the world by creating an electronic 'geo-fence' around airports to reduce the risk of collision between drones and manned aircraft
- An eight-kilometre exclusion zone will be established around 10 major Australian airports

PHOTO: DJI's Phantom 2 Vision drone. (Supplied: DJI)
MAP: Australia

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2.2 Affordability

Parrot AR.Drone 2.0 RC Quadcopter, Elite Edition, Jungle Version

- Comes with a frontal 720p HD camera with 30fps and a 91 degree angle
- You can record and share your videos through the FreeFlight 2.0 app and the online AR.Drone Academy
- Equipped with sensors for improved control
- HD video can be streamed live to your smartphone or tablet computer during flight
- Absolute Control mode for beginners offers intuitive piloting functionality
- Acrobatic flip mode allows you to perform barrel rolls as you are flying

You Save $70.00

Buy now

Only

$379.99

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2.3 Adaptability

- UAS can do the dull, dirty and dangerous

Current usage includes law enforcement, search and rescue, forensic photography, monitoring or fighting forest fires, border security, weather research, scientific data collection, pipeline, shark patrolss, utility and farm fence inspections, vehicular traffic monitoring; real-estate and construction-site photography, relaying telecommunications signals; fishery protection and monitoring and crop dusting

2.4 Anonymity

- Satellite data links can allow UAS to be controlled and operated from a remote location or even internationally

- UAS can be operated without licenses or certificates and there is no register or tracking of operators or purchasers
- Most small fixed wing UAS and all rotorcraft UAS can be launched and retrieved from virtually any location – effective surveillance is virtually impossible

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3. The good, the bad and the ugly

- Benefits to society
- Risks: security, terrorism and corporate crime
- Privacy issues

3.1 The good: Benefits to society

- Can conduct operations that can save lives – search and rescue (SAR)
- Can conduct important operations that are not currently achievable – adverse weather conditions or operations in hostile terrain
- Can reduce impact upon the environment as compared with traditional aircraft operations – electric motors or low emission engines

Scenario: Supersonic UAS to deliver human organs, blood or medicines

- Two hour medivac flight from Singapore to Canberra . . .

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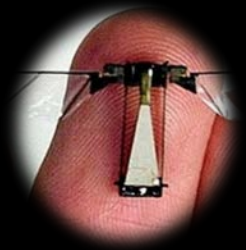
3.2 The bad: Security, terrorism and crimes

- UAS can be used as a threat to both national and international security
- Existing air defense systems are ineffective against terrorist mini UAS since they were developed to face different kinds of threats
- Micro UAS can be used for corporate espionage – traditional security surveillance and detections systems are not designed to detect their presence

Scenario: Micro UAS monitoring meetings of the Reserve Bank or Board meetings



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3.2 The bad: Security, terrorism and crimes

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An alarming scenario . . .

- If 900 grams of weapons-grade anthrax was dropped from a UAS at a height of 100 m just upwind of an large city of 1.5 million people all inhabitants would become infected

- Even with the most aggressive medical measures that can realistically be taken during an epidemic a study estimates that approximately 123,000 people would die*
  - 40 times the fatalities from the 2001 World Trade Centre terrorists attacks

- Similar scenarios can be applied to metropolitan water catchment areas

Threat of Terrorism Using Unmanned Aerial Vehicles: Technical Aspects

Eugene Miasnikov

Center for Arms Control, Energy and Environmental Studies Moscow Institute of Physics and Technology

Lawrence M. Wein, D. L. Craft and E. H. Kaplan, "Emergency Response to Anthrax Attack," Proceedings of the National Academy of Sciences, Vol. 100, No. 7, pp. 4346–4351, April 1, 2003

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3.3 The ugly: Privacy issues

- UAS can be readily purchased from the Internet, stores and E-Bay
- If they are not to be operated commercially there is no requirement to attain and Operations Certificate (OC) under CARS Part 101
- Most small fixed wing UAS and all rotorcraft UAS can be launched and

4. Industry update

- CASA new regulations
- International developments and the International Civil Aviation Organization (ICAO)
- Industry UAS associations

5. Where to from here?

- ‘Eyes in the Sky’ Report
- Recommendations
- Unmanned and uncontrolled: Gaps in our laws

5.1 Eyes in the Sky – July 2014

Inquiry into drones and the regulation of air safety and privacy

House of Representatives, Standing Committee on Social Policy and Legal Affairs

Terms of reference

- On 12 December 2013, the House of Representatives Standing Committee on Social Policy and Legal Affairs resolved in accordance with Standing Order 215 (c) to conduct the following inquiry:
- Inquiry into a matter arising from the 2012-13 Annual Report of the Office of the Australian Information Commissioner, namely the regulation of Unmanned Aerial Vehicles.

5.1 Eyes in the Sky – Findings

Extract from Foreword

"Like any new technology, drones can be misused. They can pose a safety risk to other aircraft or to people and property on the ground, and the cameras and sensors they carry can be used to invade Australians' privacy. The challenge we face is to realise the potential of this innovative technology while protecting against its risks."

The technology is now progressing at such a rate that regulators and legislators risk being buffeted in the slipstream"

- "The lack of uniformity means that there is insufficient protection of people's privacy"

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5.2 Eyes in the Sky – Recommendations

Safety in the air

Recommendation 1

- increased consultation by CASA with industry and peak bodies

Drones and Privacy

Recommendation 2

- CASA provide more information to users and manufacturers re privacy issues

Recommendation 3

- Australian Government consider introducing legislation by July 2015 which provide protection against privacy-invasive technologies and consider Australian Law Reform Commission's proposal for the creation of a tort of serious invasion of privacy

Recommendation 4

- At the 2014 COAG's Law, Crime and Community Safety Council, the Australian Government initiate action to simplify Australia's privacy regime by introducing harmonised Australia-wide surveillance laws

Recommendation 5

- Consider the measures operating to regulate the use or potential use of RPAs by Commonwealth law enforcement agencies for surveillance purposes in circumstances where that use may give rise to issues regarding a person's seclusion or private affairs. introducing harmonised Australia-wide surveillance laws

Recommendation 6

- The Australian Government coordinate with the Civil Aviation Safety Authority and the Australian Privacy Commissioner to review the adequacy of the privacy and air safety regimes in relation to remotely piloted aircraft, highlighting any regulatory issues and future areas of action. This review should be publicly released by June 2016.

5.3 Gaps in the law

Constitutional issues

The Commonwealth has limits to which it can legislate in respect to aviation

- First High Court challenge in *R v Burgess: ex parte Henry (1936)*
  - *HCA rejected the application of the "Commingling doctrine"*
- Next challenge in *Airlines of NSW v NSW (1965)*
  - *HCA accepted application of the "Commingling doctrine"*

This High Court decision still represents the current law

The legal issue: The commingling doctrine does not apply to non-navigable airspace. What then of private (ie outside corporations power) usage of UAS that *cannot* affect the safety of air navigation operated within a State (ie intrastate)?

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Modern society has proved remarkably adept at integrating and normalising technological developments, especially once any moral panic relating to their introduction subsides. On the other hand, the negative impacts of some technological advancements have only become clear subsequent to their introduction and integration into society; which makes them much harder to regulate and control. Ensuring that such risks are managed in a balanced manner which permits us to benefit from the advances requires prospective consideration, deliberation and regulation. That can be particularly challenging when such advances are so 'speed[y]' and 'relentless'.

However, if we do not at least make an attempt we might find ourselves overrun by the technology before we can translate the discussion into effective action.

Thank You!

Thank you for the opportunity to meet with you today

We welcome any questions you may have

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LAX September 2015 . . .