

Drones and Safety



Drones and Privacy



Managing Drones' Safety and Privacy Impacts

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<http://www.rogerclarke.com/SOS/Drones-SPI> { .html, .pdf }

Commercial UAVs Conference

Brisbane – 28 October 2015

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2013-15



Game-Changing Factors

- Substantial increase in capabilities
 - Payloads
 - Capacity to carry cameras
- Much more useful to business and government
- Much more attractive to consumers
- Much lower entry-points
 - Costs, Expertise, Effort

Game-Changing Factors

- Substantial increase in capabilities
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 - Costs, Expertise, Effort
- Model Aircraft Clubs are no longer the venue
- Street Mentality (cf. remote-controlled model cars)



WA Triathlon 8 April 2014

Unlicensed pilot, Warren Abrams, New Era Photography and Film
Crashed into a competitor, requiring treatment, stitches
The operator unconvincingly claimed interference or hijack
DPP declined to prosecute; CASA levied an AUD 1700 fine

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http://atsb.gov.au/media/5680302/ao-2015-035_final_report.pdf
<http://www.abc.net.au/news/2014-11-13/drone-operator-at-geraldton-marathon-fined/5887196>



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<http://www.dailymail.co.uk/news/article-2905158/The-Sydney-Opera-House-Aussie-landmarks-like-NEVER-seen-One-man-drone-offer-completely-different-perspective-world-s-photographed-places.html#ixzz3oWGK6Vlh>

Challenges – The Operational Environment

- **Physical Congestion**
 - Indoors, Forests, Buildings, Pole-Strung Cables, Airport, Emergency Scene (ghoul factor), Celebs/Notorieties (fan/parapazzi factor)
- **Electronic Congestion**
- **Contention**
 - Scheduled Aircraft, Emergency Ops (Search, Fire, Accident, Hostage, Stake-Out)
- **Criminal Uses**
 - Delivery, Diversion, Weaponisation, Jamming
- **Sociopathic Uses**
 - Interference, Weapon-Carriage, Kamikaze

Challenges – Control Modes

- **VLOS (Visual Line of Sight)**
- **FPV (First Person View)**
 - As an Aid
 - Exclusive (Goggles)
- **Instrument-Based Ops (IBO)**

- **Single-Device**
- **Team / Squadron**
- **Swarm / Flock**

Challenges – The Pilots and Facilities Operators

- Education ==>> Understanding
- Training ==>> Expertise
- Concentration ==>> Performance
- Task Design ==>> Avoidance of
Cognitive Overload

- Risks of Error
Mis-Judgement
Dehumanisation

Some Failures

- **First UK law enforcement use**
Lost in the Mersey River off Liverpool (BBC 2011)
- **First media use in Australia**
Lost off Christmas Island (Corcoran 2012)
- **First US police-owned drone, in Texas**
Crashed into a police vehicle (Biddle 2012)
- **In South Korea, a drone crashed into its control truck, killing 1, and injuring 2 'remote' pilots (Marks 2012)**
- **Significant micro-drone crashes in Australasia**
Auckland (2012), Sydney (2013), Geraldton (2014), Melbourne (2015), plus some near-misses at airports

'Failure Modes'

Artefact Failure

- Mechanical
- Electrical
- Power
- Programming
- 'Fail-Secure' Misdesign

Pilot Failure

- Education / Understanding
- Training / Skill
- Concentration / Timing
- Contextual Appreciation

Environmental Factors

- Physical Congestion
- Turbulence
- Lightning
- Communications
 - Interruption
 - Data Corruption

'Fail-Secure'?

- Remain in Place
- Land Immediately
- Auto-Return to Origin



MCG
ICC
World Cup Final
29 March 2015
93000 People

Unidentified but licensed company, 3 operators
Multiple control modes, 200m-450m distance
All control was lost – Crashed onto a nearby median strip
Cause unknown – assumed radio frequency interference

Sources of Harm

Impact Factors

- Aircraft Velocity
- Propellor Velocity
- Mass
- The Object that's hit

Consequences

- Explosion / Fire
- Surprise / Diversion
- **Violence**

Physical Interference

- Air Ops
- Ground Ops

Comms Interference

- Congestion
- Jamming



**Euro 2016
Serbia v. Albania
Belgrade
13 Oct 2014**

A drone was used to fly a flag over the ground
The flag depicted so-called Greater Albania,
challenging Serbia's sovereignty over Kosovo
Serbian players pulled the flag to the ground

Crowd violence erupted
The players were pelted
The game was abandoned
The result went to court
Both sides were fined EUR 100,000

Deliberate Harm Motivations

- Thrill-Seeking
- **Incitement**
- Revenge
- Aid to Crime
- Terrorism

The Public Policy Need

1 Technology Assessment (TA)

- publication of background and issues papers
- public hearings
- published outcomes
- commitments to action arising from the outcomes

2 Regulatory responsibilities, authority and resources

3 Enhanced laws protecting the public:

- against use for physical and electronic interference
- against use of drones for aggression and violence
- against use of military functions in civilian contexts

The Regulatory Response

- **International**
ICAO, JARUS – Glacial, wait until 2018
- **USA**
FAA – Late, Proposed Rules of Feb 2015
- **EU**
EASA – A bit slow, docs of May, Sep 2015
- **UK**
CAA – A 'future requirement' of Jul 2014
- **Australia**
CASA, ATSB – Slow, maybe late 2015?

The Current Regulatory Framework in Australia

- Air Navigation Act
Air Navigation Regulations
- Civil Aviation Safety Authority (CASA)
- Civil Aviation Safety Regulations (CASR)
- CASR 101-1 (UAVs), since 1998 / 2002
- CASR-101-3 (Model Aircraft), ditto

The CASA Regulatory Regimes

DETERMINATIVE FACTORS						
Controlled Airspace	√	–	X	X	X	X
> 150kg Fixed-Wing / 100kg Rotorcraft	–	√	X	X	X	X
< 150kg Fixed-Wing / 100kg Rotorcraft	–	X	√	√	√	√
Commercial Use	–	–	√	X	X	X
2-7 kg	–	X	X	X	√	X
< 2kg	–	X	X	X	X	√
APPLICABLE REGULATORY REGIME						
Full Regulatory Framework (CASR)	√	√	–	–	–	–
Limited Regulatory Framework (CASR 101-1)	–	–	√	–	–	–
Model Aircraft Framework (CASR-101-3)	–	–	–	√	√	√
(Emergent light regulatory scheme)	–	–	–	–	(√)	–
(Emergent even-lighter regulatory scheme)	–	–	–	–	–	(√)
Damage by Aircraft Act	√	√	√	–	–	–

The CASA Regulatory Regimes for 'Commercial' Operations

- **Big Drones** are subject to Aircraft Rules:
 - Fixed-wing aircraft – >150kg
 - Rotorcraft – >100kg
- **'Non-Big' Drones** – light-handed regime – 101-1
Only outside controlled airspace, < 400ft AGL,
>3nm from aerodromes, > 30m from people
'Non-Big' = 0 / 2 / 7 / 20kg to 100/150kg [?!]
- **'Model Aircraft' (hobby/entertainment)**
A very light-handed regime – CASR-101-3

Enforcement

- CASA issued 15 infringement notices in 2014, across most if not all States and Territories
- Penalties range from \$900 to \$9600
- But CASA declares that **a lot of breaches** of Regulations and licensing conditions **are unenforceable**, because it's often difficult to determine who was responsible

Unregulated Category

< 2 Kilograms

1. Design approval - not required.
2. Production approval - not required.
3. Product approval - not required.
4. Operational restrictions based on:
 - Speed limit - 30KCAS (15 m/s)
 - VLOS only
 - Daylight only
 - Flight ceiling - 400ft AGL
 - Operations over people allowed
 - Remote Pilot to self-certify
 - Only frangible materials accepted

< 25 Kilograms

1. Design approval - not required.
2. Production approval - not required.
3. Product approval - not required.
4. Operational restrictions based on:
 - Speed limit - 87KCAS (45 m/s)
 - VLOS only
 - Daylight only
 - Flight ceiling - 400ft AGL
 - Operations over people not allowed
 - Qualified controller
 - Non-frangible materials accepted

CIVIL AVIATION SAFETY AUTHORITY

Partially Regulated Category

Limited Certificate of Airworthiness

1. Design approval – not required.
2. Production approval – not required.
3. Product approval based on the aircraft being in a condition for safe operation.
4. Operational restrictions based on:
 - limitations specified in the regulations
 - limitations specified by the manufacturer
 - limitations specified on the CofA
 - the operational equipment installed on the aircraft.

Specific Certificate of Airworthiness

1. Design approval – self-certification.
2. Production approval – self-certification.
3. Product approval based on the aircraft being in a condition for safe operation.
4. Operational restrictions based on:
 - limitations specified in the regulations
 - limitations specified by the manufacturer
 - limitations specified on the CofA
 - the operational equipment installed on the aircraft.

C I V I L A V I A T I O N S A F E T Y A U T H O R I T Y

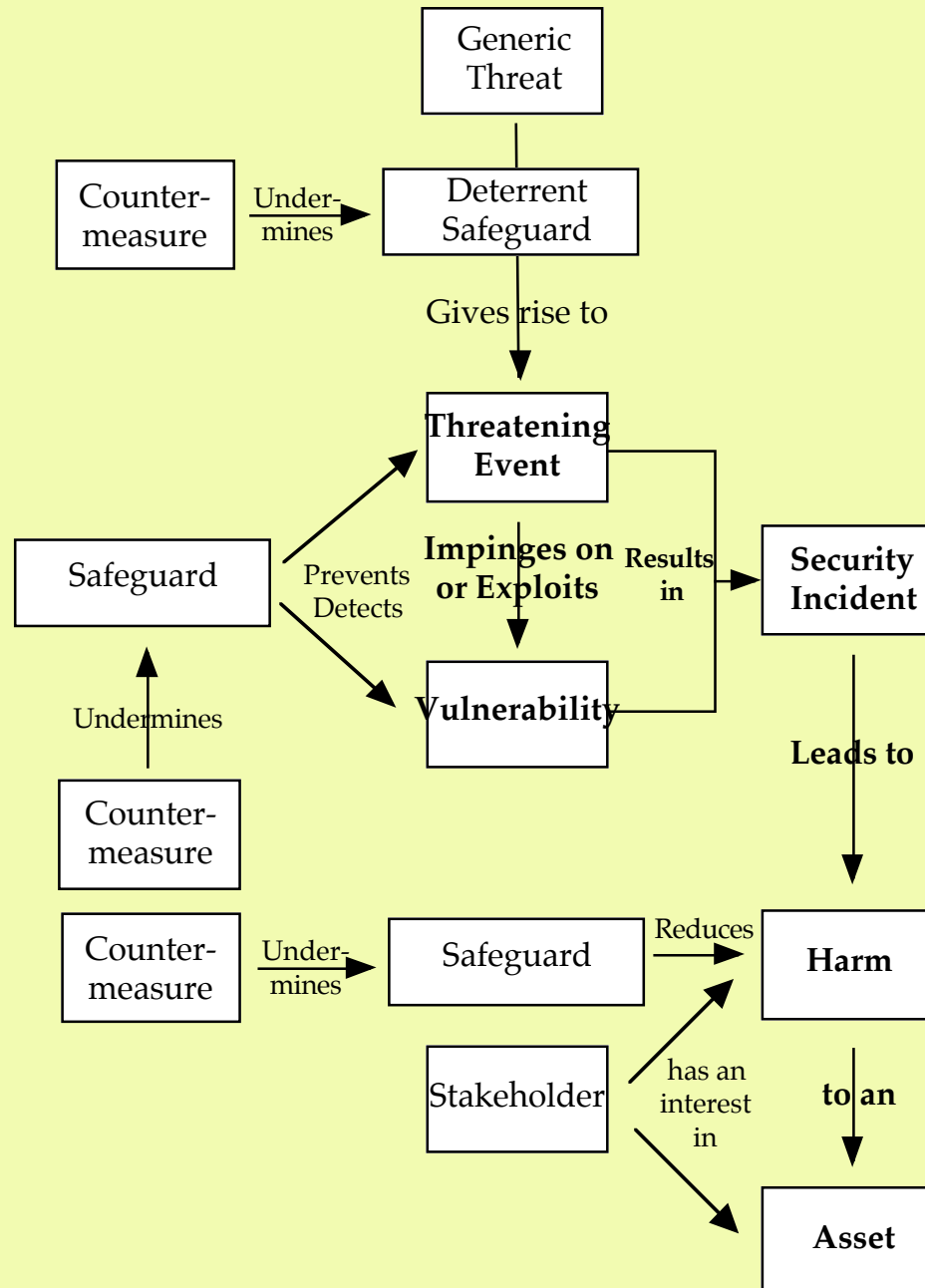
The Corporate Response

- Compliance Plan
- Risk Assessment
- Risk Management

ISO 31000/10 – Risk Management Process Standards

NIST SP 800-30 – Risk Management Guide for IT Systems

Conventional Security Model



<http://www.rogerclarke.com/EC/PBAR.html#App1>

Generic Risk Management Strategies

- **Proactive Strategies**

- Avoidance
- Deterrence
- Prevention

- **Reactive Strategies**

- Isolation
- Recovery
- Transference

- **Non-Reactive Strategies**

- Tolerance
- Abandonment
- Dignified Demise
- Graceless Degradation

Generic Risk Management Strategies

- **Proactive Strategies**

- Avoidance
- Deterrence
Reminders
Fines
Criminal Charges
- Prevention
Redundancy in
Power, Comms

- **Reactive Strategies**

- Isolation
- Recovery
- Transference
Express Liabilities
Compulsory Third-
Party Insurance

Technical Safeguards

- Dual Control Channels
- Redundant Comms Channels
- Collision Detection
- Collision Avoidance
- Autoland
- 'Fail-Secure' [means what??]

Process Safeguards

- Design Audit and Certification
- Device Inspection after Manufacture
- Periodic Device Re-Inspection

Privacy

The interest that individuals have in sustaining 'personal space', free from interference by other people and organisation

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Dimensions of Privacy

... of the Physical Person

Safety, biometrics, body organs, body tissue, body fluids, ...

... of Personal Behaviour

Your activities, movements, preferences, associations, ...

... of Personal Data

Data collection, storage, retention, use, disclosure, dataveillance, ...

... of Personal Communications

Voice, phone, email, chat, ...

... of Personal Experience

Your reading, viewing, interactions, social networks, ...



Drones' Impacts – Behavioural Privacy

- Surveillance is **more intrusive**:
 - A viewing-point in the air overcomes obstructions
 - The point-of-view can be moved, and moved quickly
- Surveillance is **more economic**, for organisations and individuals
- That enables **more intensive** surveillance (i.e. more of the time), and **more extensive** surveillance (i.e. in more places)
- Improved endurance enables **persistent** surveillance
- A much greater degree of **automated** monitoring is feasible
- Multiple sources and live feeds can be used at the same time
- **Pursuit** of a surveillance target becomes feasible
- The enforcement of surveillance laws becomes more difficult, because so many organisations and individuals breach them

Contemporary Regulation of Surveillance

Tort

- Interference with Real Estate (Trespass, Nuisance)
- Interference with the Person (Trespass, Obstruction, False Imprisonment, Assault, AVOs / PSIOs)
- Interference with Emotional State (Stalking, Negligence)
- Deceitful Behaviour (Misrepresentation, Deceit, Passing-Off)

Surveillance Statutes

- Telecomms (postal, TIAA, computer offences)
- Aural / Visual Surv Devices (Clth, State, Territory)
- Pornography, Anti-Voyeurism

Other Statutes (Copyright, Trademarks, Media Law, Human Rights, Privacy)

Media Codes (APC, ACMA)

Direct Action (protecting the public, and the media)

State Surveillance and Listening Devices Acts

Vic, WA, NT (1998-2000)

& NSW (2007), Qld

Surveillance Devices Acts

Prohibition of surveillance only of a 'private activity', except:

- by someone who is a party to the activity
- if the activity is happening outside the building; or
- if the circumstances indicate that the parties do not care if they are seen

SA, Tas, ACT

1971, 1972, 1990

Prohibition of aural surveillance of a private activity, except ...

Workplace (NSW, ACT)

- Must be merely declared
- Covert only with a magistrate's approval

Anti-Voyeurism laws may put toilets, bathrooms, change-rooms off-limits

APF's Policy Statement on What's Needed

1. **Comprehensive laws regulating surveillance activities**, by all organisations and individuals
2. Provisions that relate to **private places**, but also provisions that relate to **private space in public places**
3. Provisions relating specifically to **visual surveillance**
4. Provisions relating to **aerial surveillance**, reflecting the additional vulnerabilities that arise from it
5. To the extent necessary, provisions relating to **surveillance by means of drones**
6. Provision of **responsibilities, authority and resources** to an appropriate agency ...

The Regulatory Response – Australia

** OAIC (Private sector, Clth public sector)

No mention since early 2014

Nothing substantive



• NSWIPC (NSW public sector)

No mention, ever



• VicPC / CPDP (Vic public sector)

No mention



• OICQ (Qld public sector)

Guidelines on Privacy and Drone Technology (data privacy only)



Office of the Information Commissioner
Queensland
Protecting your right to information and privacy

Guidelines Decisions Annotated legislation Publications Training and events Information for

Guidelines

- ▼ For government
 - ▶ Guidelines - Access and amendment
 - ▼ Guidelines - Privacy principles
 - ▶ Application of the IP Act

Home > Guidelines > For government > Guidelines - Privacy principles > Application of the IP Act > Drones - collection, storage and security of personal information

Drones - collection, storage and security of personal information

But Data Privacy only, not Behavioural Privacy

The Corporate Response

- Privacy Strategy
- Privacy Issues Analysis
- Privacy Impact Assessment (PIA)

Purposes of PIAs

- **Define:**
 - business needs
 - stakeholder groups
 - privacy impacts and implications
- **Understand**
 - the proposal
 - the rationale
 - stakeholder perspectives
- **Reflect**
stakeholder perspectives
- **Maximise**
 - positive impacts
 - stakeholder support
 - public confidence
- **Minimise / Avoid / Mitigate**
 - negative impacts
 - costly retro-fit of new features
 - negative publicity
 - misinformation impact
 - regulatory interference

Series of Papers in CLSR 30, 3 (Jun 2014)

- **Understanding the Drone Epidemic**
<http://www.rogerclarke.com/SOS/Drones-E.html>
- **What Drones Inherit from Their Ancestors**
<http://www.rogerclarke.com/SOS/Drones-I.html>
- **The Regulation of Civilian Drones' Impacts on Public Safety (with Lyria Bennett Moses)**
<http://www.rogerclarke.com/SOS/Drones-PS.html>
- **The Regulation of Civilian Drones' Applications to the Surveillance of People**
<http://www.rogerclarke.com/SOS/Drones-BP.html>
- **Drones' Challenges to Public Safety**
<http://www.rogerclarke.com/SOS/Drones-PSA.html>

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