Hobbyist Drones
Payload and Mission Capabilities

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What Does 'Hobbyist' Mean?

- 'Private / Personal / Sport / Recreational'
  - Not 'Air Work / Commercial tasks (hire and reward)'
  - incl. demos, training, R&D, company-internal purposes

- But where are the boundaries?
  - Rental for private or personal use?
  - Vicarious Joy-Rides (for the view)?
  - Competitions / Professional Sport?
  - Journalism / Voyeurism, if unpaid?
  - Uninc'd / Inc'd Enterprises / Associations?
    - e.g. Human and Animal Search, Mustering, Hunting, Anti-Hunting, Trespass Surveillance
Hobbyist Drones Payload and Mission Capabilities

- Introductory Presentation
  - Scope of the Session
- Use Contexts
  - Public Safety
  - Surveillance and Privacy
  - Regulatory Framework
- Regulatory Options
  - Public Safety
  - Surveillance and Privacy

Types of Hobbyist 'Missions'

- Observation
  - Location
  - Pursuit
- Recording
- Search (person, article, animal, wreckage)
- Comms Relay (bushwalking, on-property)
- Survey (vegetation)
- Goods Delivery (water)

Observation and Recording Motivations

- Scenic Appreciation
- Sousveillance ('police watch')
- Voyeurism / Peeping Toms
- Voyeurnalism / Paparazzi Aloft
- Journalism
- Community Policing / Vigilantism
- Moral Minority Policing

Modes of Use

- VLOS (Visual Line of Sight)
- FPV (First Person View)
  - As an Aid
    - Exclusive (Goggles)
- Instrument-Based Ops (IBO)
- Single-Device
- Team / Squadron
- Swarm / Flock
Use-Related Challenges

- **Physical Congestion**
  - Indoors, Forests, Buildings, Pole-Strung Cables, Airport, Emergency Scene (ghoul factor), Celebs/Notorieties (fan/parapazzi factor)

- **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, as a Weapon, Jamming

- **Sociopathic Uses**
  - Interference, Weapon-Carriage, Kamikaze

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The Prescott Case – Sydney, 2 Oct 2013


[Link to video](http://www.liveleak.com/view?f=dccca42c2905&ajax=1&player_width=512&player_height=384&iframe=true&width=550&height=420)
Sydney, 2 Oct 2013

- Rihanna video-tech, Edward Prescott, flies his drone from a wharf West of Circular Quay
- The drone control malfunctions
- It auto-redirects back to its point-of-origin
- It hits two Sydney Harbour Bridge girders, lurches across 6 lanes, a few metres above traffic, hits another girder, crashes on a railway line
- The next train-driver stops and picks it up
- A Naval event is in progress
- Prince Harry is in town
- International coverage follows (London, Milan)

http://www.liveleak.com/view?i=661_1385456831

The Prescott Case – Sydney, 2 Oct 2013

- The Police gave him back his damaged drone
- He posted the video it had captured on the Web

CASA provided some quotes to the media:
- "There are regulations and fines attached ... hundreds of dollars"
- "[Drone pilots] must keep them at least 30m away from any people, buildings or structures"
- "Airspace around the Harbour Bridge is restricted"
- "Check with local council where they can be used"

Long after Prescott left, CASA levied an $800 fine


Some Failures

- First UK law enforcement use
  Lost in the Mersey River off Liverpool (BBC 2011)
- First Australian media use
  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)
- Micro-drone crashes in CBDs
  Auckland (Mortimer 2012), Sydney (Kontominas 2013)

'Failure Modes'

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

Pilot Failure
- Education / U'stding
- 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
Harm to Public Safety

Impact Factors
- Aircraft Velocity
- Propellor Velocity
- Mass
- The Object that’s hit

Consequential Harm
- Explosion / Fire
- Surprise / Diversion

Physical Interference
- Air Ops
- Ground Ops

Comms Interference
- Congestion
- Jamming

Deliberate Harm
Motivations
- Thrill-Seeking
- Revenge
- Aid to Crime
- Terrorism

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Hobbyist 'Micro-Drones'
Surveillance
The Privacy of Personal Behaviour

- The interest that individuals have to behave as they wish, without undue observation and interference by others
- Behaviour encompasses activities, movements, associations and preferences
- Sexual, Religious, Political ...
- Private places, Public places
- Surveillance – Visual, Electronic, Transactional, ...

“Kate Middleton and many other people besides can rest assured that their bare breasts are fair game, anywhere, any time,” the Australian Privacy Foundation’s Roger Clarke warned, in a week when snaps of the pregnant Duchess in a bikini made international headlines.

Last year a New South Wales resident filed a complaint after spotting a drone hovering outside their bedroom window, Australian Privacy Commissioner Timothy Pilgrim said.

THE civilian drone revolution in Australia has triggered calls from the Privacy Commissioner for a public debate about the "intrusive" technology as police investigate the potential of drones for crime fighting.

"... there needs to be public debate about the use of this technology and whether current regulations are sufficient to deal with any misuse"
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Regulatory Framework

- **Natural Controls**
  Physical Danger, Economics, Reputation

- **Individual Self-Regulation**
  Self-Restraint, Social Responsibility

- **Industry / Social Self-Regulation**
  Declared Voluntary Codes

- **Co-Regulation**
  Negotiated Statutory Codes

- **Formal Regulation / Law**
  Imposed Statutory Codes, Enforcement

How to Recognise
An Effective Regulatory Scheme

<table>
<thead>
<tr>
<th>Process</th>
<th>Product</th>
<th>Outcomes</th>
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</thead>
<tbody>
<tr>
<td>Clarity of Aims, Requirements</td>
<td>Comprehensiveness</td>
<td>Oversight</td>
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<tr>
<td>Transparency</td>
<td>Parsimony</td>
<td>Enforceability</td>
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<td>Participation</td>
<td>Articulation</td>
<td>Enforcement</td>
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<td>Reflection of Stakeholder</td>
<td>Educative Value</td>
<td>Review</td>
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<td>Interests</td>
<td>Appropriate Generality and</td>
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<td>Specificity</td>
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http://investigatemidwest.org/2014/03/21/states-restrict-drone-use-because-of-privacy-concerns/
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Public Safety
The Realities

- Little Understanding
- Little Training
- Little Responsibility Taken
- Not Easily Identified and Located
- Not Easily Proven Responsible
- No Insurance
- No Assets

A Victim-Pays System

Public Safety
Social Controls

- Model Aircraft Clubs
  - Isolated Location
  - Constraints
  - Acculturation
  - Insurance

- No Powers, No Enforcement
- No Incentives to Drone Users to Join
The Current Regulatory Framework

International
- Small Drones are declared out-of-scope

National
- 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) since 1998/2002

The CASA Regulatory Regimes

<table>
<thead>
<tr>
<th>Controlled Airspace</th>
<th>&gt;150kg Fixed-Wing / 100kg Rotorcraft</th>
<th>&lt;150kg Fixed-Wing / 100kg Rotorcraft</th>
<th>Commercial Use</th>
<th>2-7 kg</th>
<th>&lt;2kg</th>
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APPLICATION REGULATORY REGIME

- Full Regulatory Framework (CASR)
- Limited Regulatory Framework (CASR 101-1)
- Model Aircraft Framework (CASR-101-3)
- (Emergency light regulatory scheme)
- (Emergency even-lighter regulatory scheme)
- Damage by Aircraft Act

Generic Risk Management Strategies

- Proactive Strategies
  - Avoidance
  - Deterrence
  - Prevention
- Reactive Strategies
  - Isolation
  - Recovery
  - Transference
- Non-Reactive Strategies
  - Tolerance
  - Abandonment
  - Dignified Demise
  - Graceless Degradation

"[Re] Small Unmanned Surveillance Aircraft (SUSA) within the weight category 7 - 20 kg ... there will be a future need for their aircraft to be assessed for airworthiness in relation to operating within 150 m of a congested area [competencies, tech specs, outcome mitigation; assessment fee Stg 134 p.hr.]"
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

Categories of Intervention

• Operator Professionalism
• Technical Features
• Extra Supplier Responsibilities
• Regulatory Mechanisms

Operator Professionalism
Can Military Norms be Scaled?

• Highly-Articulated Structures
• Highly-Articulated Processes
• Expensive / Pay-to-Play
• Rules of Engagement
• Monitoring
• Moral Suasion
• Threat of Licence Withdrawal
• Reviews

Technical Features

• Dual Control Channels
• Redundant Comms Channels
• Collision Detection
• Collision Avoidance
• Autoland
• 'Fail-Secure' [means what??]
• Design Audit and Certification
• Device Inspection after Manufacture
• Periodic Device Re-Inspection
Extra Supplier Responsibilities
Manufacturer? Distributor? Retailer?

- Information to Purchasers:
  - Risks
  - Procedures
  - Relevant Laws, Licensing
  - Public Liability Insurance
  - Club Directory
- Warranties
- Support and Maintenance Services

Regulatory Mechanisms

- Minimum Feature Set (Licensing of Artefact)
- Minimum Training (Licensing of Pilot, Operator)
- Documented Procedures
- Contexts of Use Permitted / Banned
  - Missions
  - Payloads
  - Locations
  - Circumstances
- Legal Liability
- Insurability dependent on Compliance

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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


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

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

The Policy Response

• Technology Assessment?
  • Only Europe has TA Agencies
  • Only Norway has published anything

• Risk Assessment?
  • Little sign of corporate RA
  • No sign of society-level RA

• Law Reform Commissions?
  • Mention in an ALRC Privacy Study

What Policy Response??

The Regulation of Surveillance
General Principles

1. Justification
2. Proportionality
3. Openness
4. Access Security
5. Controlled Use
6. Controlled Disclosure
7. Controlled Publication
8. Non-Retention and Rapid Destruction
9. Review
10. Withdrawal

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 ...
Privacy as a Strategic Factor

- Privacy is a potentially severe impediment
- 'Privacy doesn't matter until it does' means that media breakouts will be uncontrollable
- Privacy-Sensitivity in Design and Operation has the potential to be a Differentiator
- Privacy-Sensitivity doesn't just happen
- A Privacy Strategy involves a proactive stance, an express strategy, an articulated plan, resourcing, monitoring against the plan

http://www.rogerclarke.com/DV/PStrat.html

Forms of Privacy Project

- Privacy Strategy Formulation
- Privacy Issues Analysis
- Deeper Privacy Impact Evaluation Methods:
  - Privacy Law Compliance Assessment
  - Data Privacy Impact Assessment (PIA)
  - Internal Cost/Benefit Analysis
  - Internal Risk Assessment
  - Privacy Impact Statement
- Privacy Impact Assessment (PIA)
- Privacy Management Planning and Control
- Privacy Policy Statement (PPS) Prep, Review
- Privacy Audit


Privacy Impact Assessment
Key Considerations

1. Purpose
2. Responsibility
3. Timing
4. Scope (Dimensions, Stakeholders, Reference-Pts)
5. Stakeholder Engagement
6. Orientation (Process not Product; Solutions not Problems)
7. The PIA Process
8. Outcomes


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