
Remotely Piloted Aircraft Systems & Journalism

Opportunities and Challenges of Drones in News Gathering

David Goldberg, Mark Corcoran,
and Robert G. Picard

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List of Abbreviations

ANO	Air Navigation Order (UK)
AUVSI	Association for Unmanned Vehicle Systems International
CAA	Civil Aviation Authority (UK)
CASA	Civil Aviation Safety Authority (AU)
EASA	European Aviation Safety Agency (EU)
FAA	Federal Aviation Administration (US)
FPV	first person view
IACP	International Association of Chiefs of Police
ICAO	International Civil Aviation Organisation
MA	model aircraft
MAV	micro air vehicle
MTOM	maximum take-off mass
PIC	person in charge
RC	radio controlled
RPA	remotely piloted aircraft
RPAS	remotely piloted aircraft system(s)
UAS	unmanned aerial system
UAV	unmanned aerial vehicle

Executive Summary

Interest in the potential for using remotely piloted aircraft (RPA) for journalism is growing because of the opportunities they pose as a tool for news gathering. Deployment of these aircraft by militaries worldwide has risen in the past decade and prospective civilian uses are leading aviation regulators to develop and adapt policies that will govern and facilitate expansion of their uses.

Such aerial platforms raise technical, policy, and journalistic issues that need to be comprehended before they are used for news gathering. In late 2012, the Reuters Institute for the Study of Journalism and the Programme in Comparative Media Law and Policy at the University of Oxford brought together a high-level group of journalists, policy and legal specialists, and aerospace technology experts to address challenges posed by the use of unmanned aircraft in news gathering. This report summarises the issues raised in those discussions and adds additional research to help news organisations evaluate the potential for use of these tools, to understand the broader context and issues surrounding their use, to consider how they might be used, and to assess the desirability of their use.

Technology and capability considerations that need to be taken into account include:

- The complexity and capabilities of remotely piloted aircraft vary widely.
- Acquisition costs for RPAS most likely to be employed by news organisations range from a few hundred pounds to a few hundred thousand pounds.
- The size and range of unmanned aerial vehicles (UAVs) vary widely and many manufacturers are offering systems for commercial users.
- What news organisations plan to do with UAVs will influence the choice of drone(s). As size and capabilities of drones increase, more personnel are required to operate and maintain the systems.
- UAVs have cost advantages compared to helicopters and fixed-wing aircraft and are less likely to cost human lives in the event of accident.

Policy, regulatory, and legal considerations are central to the operation of remotely piloted aircraft and must be understood before their operation:

- Remotely piloted aerial systems are legally categorised as ‘aircraft’ and thus come under the jurisdiction of aviation regulators.
- The fundamental regulations of aircraft airworthiness, pilot competency, and flight and radio operations apply to remotely piloted vehicles.
- Regulators are currently developing additional sets of regulation and conduct requirements for RPAS.
- Air law is poised to become the new area of expertise for media lawyers and they will need to become adept at dealing with a new set of aviation regulators, nationally, regionally, and globally.
- The principal aviation regulatory goal is *safety* and this will be balanced against the goal of RPAS deployment for media purposes.
- The size and weight of the unmanned aircraft will determine which regulatory regimes apply.
- Media use of RPAS will be considered ‘aerial work purposes’, therefore regulatory permission to fly will be legally required for media users in many countries.
- Some operation of an RPAS may become an ‘in-house’ activity, raising the question of who is the ‘person in charge’ or ‘a person under the control of a person in charge’ from a liability perspective.

- RPAS use will raise issues of privacy and data protection, overflight of persons and property, and insurance.

Journalistic operational issues will require thought about what they offer, how they will be used and under what circumstances, and ethical and other issues arising from their use:

- Unmanned aerial vehicles provide new and advantageous ways to provide news coverage.
- The journalistic use planned will influence the size and capabilities of RPAS selected.
- Some systems can be operated by a journalist or photographer; others may require three or more persons to handle different functions.
- Uses of aerial vehicles will create conflicts with law enforcement and emergency services. These are not new conflicts as they have previously existed for media helicopters and live broadcasts, but they are likely to produce new challenges that will require additional police–news media coordination.
- Use of RPAS will extend existing and create additional privacy issues for journalists that will require careful consideration of their uses lest they produce loss of journalistic credibility amongst the public.
- Civil liberty issues—particularly related to the use of RPAS by authorities—may produce public opposition that might affect the ability of journalists to use unmanned aerial vehicles.
- Even if news organisations do not operate their own vehicles, they will increasingly be offered images from second parties and will need to consider ethical implications related to the conditions under which they were obtained by those parties.
- Use of RPAS raises some issues of journalistic safety, especially when deployed in war zones.

Remotely piloted aircraft will become increasingly available to journalism in the future and news executives and journalists will need to attend to the developments and issues surrounding their use. New organisations will need to make decisions whether it is feasible and desirable to employ them, how they might be effectively used, the ethics of their use in news reporting, and how their use might affect journalistic credibility amongst the public.

1. Introduction

Remotely piloted aircraft systems (RPAS), sometimes called unmanned aerial vehicles (UAVs) or drones, are rapidly becoming available for non-military uses. Producers are now offering systems for use in surveying and mapping, police applications, agriculture tasks such as tracking herds and flocks of livestock, and environmental and wildlife observation. A number of media organisations are now exploring their application and some have begun test uses for news and other production activities.

The use of such aerial platforms raises technical, policy, and journalistic issues that need to be comprehended in considering their application to news gathering. Although basic policy is in place regarding RPAS in some countries, many policy issues regarding uses of more advanced systems are still being determined by regulators and will be decided in the near future.

This report introduces the issues that news executives, particularly broadcasters and photo editors, will need to reflect upon if considering the use of unmanned aerial vehicles for news gathering. Its primary intention is to explain what is happening in terms of the development of drones and public policy and what they will need to know and consider before pursuing their use.

Use of aerial platforms is not new to journalism, of course. Journalists and photographers ascended in hot air balloons during the 19th century to cover battles and other events. During the 20th century many media used fixed-wing aircraft and, later, helicopters to cover events from above. Over the years they have been used to cover protests, fires, police activities, disasters, traffic and a range of news topics.

What is new about RPAS, however, is that they allow aircraft to be much smaller, lower the costs of acquisition and operation, make aerial coverage much more widely available to print and broadcast news organisations, and produce some safety benefits. Consequently, interest in the potential for using remotely piloted aircraft for journalism is growing because of the opportunities they offer as a tool in news gathering. Deployment of these aircraft by militaries worldwide has risen in the past decade and prospective civilian uses are leading aviation regulators to develop and adapt policies that will govern and facilitate this expansion.

Technical and policy aspects of remotely piloted aerial vehicles are important for news organisations because they must make decisions about acquiring tech and many will operate drones internally. This is different from news organisations' use of helicopters and other aircraft, which are almost always contracted from aviation companies and provided with licensed pilots. News organisations did not need to pay much attention to the technology because this was the province of aviation service providers. If news organisations become the owners and operators of drones themselves, they will have to understand and deal with a new set of concerns at the organisational level.

The development of this report began in late 2012 when the Reuters Institute for the Study of Journalism and the Programme in Comparative Media Law and Policy at the University of Oxford brought together a high-level group of journalists, policy and legal specialists, and aerospace technology experts to address challenges posed by the use of RPAs in news gathering. The issues raised in those discussions led to future research and interviews. This report seeks to help news organisations evaluate the potential and desirability of these new tools.

The drone or unmanned aerial vehicle (UAV) industry now chants the mantra of the three Ds: 'If the job is too dull, dirty, or dangerous – get a UAV to do it'. There are potentially hundreds of civil applications. Drones are also being launched by park rangers, mine surveyors and scientists. Police and surf life savers are lining up

to launch their own 'eyes in the sky'. And one of the most obvious, yet contentious, applications is news gathering.

For major media organisations, faced with increased budgetary pressures, the appeal is immediate; why operate a fleet of multi-million-dollar news helicopters when many of the dull, dirty, and dangerous tasks could potentially be done by a £20,000 or even a £500 drone?

Drone technology is almost as old as aviation itself. The Hewitt-Sperry 'automatic airplane' first lurched skywards on a short, but successful pilotless flight in 1918. What is new is the convergence of two key elements now driving the civilian drone boom: the emergence of cheap high-end consumer technology and market forces.

The United States is winding down its ground-based interventions in Afghanistan and Iraq and its Global War on Terror and the troops are going home, replaced by an ever increasing number of controversial drone strikes. Yet the Pentagon has actually cut spending on military drones from £3.2 billion (€3.7 billion/\$4.8 billion) in 2012 down to £2.5 billion (€2.9 billion/\$3.8 billion) in FY2013, with further reductions forecast. American aerospace manufacturers, who exclusively supplied drones to the US military, responded to these cutbacks by working to create a lucrative, new civilian market.¹

The leading drone industry lobby group, the Association for Unmanned Vehicle Systems International (AUVSI) lobbied hard, via a 60-member Congressional Unmanned Systems Caucus, to overturn the longstanding domestic ban on civil and commercial drones. In February 2012, Congress relented, directing the Federal Aviation Administration to integrate civilian drones in domestic airspace by 2015. The FAA estimated 30,000 civil and commercial UAVs could be flying by 2030.² Aerospace analysts, the Teal Group, forecast a lucrative future, with a combined military/civil global market estimated to exceed £43.1 billion (€63.4 billion/\$89.1 billion) over the next decade. Other groups such as UAS Internationally are equally optimistic.³

AUVSI's March 2013 market estimate is much higher, forecasting a global market of £92 billion (€109 billion/\$140 billion) generated over 10 years.⁴ Domestically in the US, AUVSI estimates the UAV industry will cumulatively generate 103,000 new jobs and £54 billion (€64 billion/\$82.1 billion) in economic activity by 2025.⁵

How the United States manages its domestic drone roll out is highly relevant to the rest of the world as the US aerospace industry dominates the sector, generating two-thirds of global production and development. Manufacturers in Europe, China, and many other countries have introduced remotely piloted aircraft of their own to compete for shares of the civilian market. This classic market-driven policy has now converged with another factor, the rise of cheap, highly capable consumer electronics championed by those now seeking to 'democratise technology'.

The suits of corporate America now find themselves sharing airspace with the jeans and t-shirts of the 'personal drone movement'. Chris Anderson is a self-declared 'drone evangelist'. A physicist-turned-journalist, Anderson was Hong Kong and New York correspondent for *The Economist*, then (2001–12), editor-in-chief of influential technology magazine *Wired*.

¹ J. R. Chiles, 'Drones for Hire', *Air and Space Smithsonian* (Jan. 2013).

² FAA, *FAA Aerospace Forecast Fiscal Years 2010–2030*, http://www.faa.gov/data_research/aviation/aerospace_forecasts/2010-2030/media/2010%20Forecast%20Doc.pdf.

³ 'Teal Group Predicts Worldwide UAV Market Will Total \$89 Billion in its 2012 UAV Market Profile and Forecast', 11 Apr. 2012, <<http://tealgroup.com/index.php/about-teal-group-corporation/press-releases/66-teal-group-predicts-worldwide-uav-market-will-total-89-billion-in-its-2012-uav-market-profile-and-forecast>>. <www.uvs-international.org>.

⁴ One of the authors attended briefing/presentation by AUVSI on this issue at the Avalon International Air Show, 26 Feb. 2013.

⁵ <www.auvsi.org/Resources/EconomicReport>.

He says:

*Thanks to Smartphones, and Wii controllers and other consumer electronics, we have all the necessary elements to create a Drone. Sensors, wireless, GPS, processors, cameras, everything that's the Smartphone revolution has basically made the technologies cheap and available and this has just happened over the past four or five years.*⁶

This technological emergence has led to the creation of online 'personal drone' communities, dedicated to open-source drone research and development. Many of these hobby forums have evolved into commercial businesses, as crowd sourcing accelerates the already dynamic pace of innovation.

In 2007, Anderson founded the online group DIY Drones which now boasts more than 36,000 members worldwide. Volunteering their expertise online are IT experts from Google, Apple, IBM, bankers in Japan, advertising agents in Brazil, hobbyists from Australia, grocery store managers in the US.

*I was blown away by what people in our community were doing with sensors from mobile phones and chips that cost less than a cup of coffee. Feature by feature, they were matching – or besting – aerospace electronics that had cost tens or hundreds of thousands of dollars just a decade earlier. It felt like the future of aviation. . . . Autopilot electronics look just like smartphone electronics, simply running different software. The technical and economic advantages of coat-tailing on the economies of scale of the trillion-dollar mobile-phone industry are astounding.*⁷

Anderson claims to have accidentally kick-started the domestic drone boom in the United States and, while some dispute his assertion, Anderson is a highly influential figure in the emerging 'personal drone' movement. In late 2012, Anderson resigned from *Wired* to focus on his drone manufacturing start-up, 3D Robotics. The company has expanded from building £115 (€135/\$175) open source drone autopilots to manufacturing more than 1,000 small multi-rotor and fixed-wing drones and autopilots a month, of which half are sold in the United States. He says: 'Today there're more drones out there being flown by hobbyists than there are by the military'.⁸ Anderson aims to sell his drones for £330 (€385/\$500) each: 'Military-grade technology at toy prices'.

And it is this global 'Generation Drone' or 'Personal Drone' movement, rather than the established defence aerospace industry that may initially offer the most affordable and immediate options for many news gathering applications.

This report is divided in three portions that address technical and engineering issues, policy and legal issues, and journalistic issues surrounding the use of remotely piloted aircraft systems. This report is not designed for aviation and policy specialists, but rather for media company personnel. Consequently, it does not delve deeply into engineering and technical aspects or precise legal and policy provisions and mechanisms. Rather, it raises the implications of those elements in assessing the use of these aircraft and points readers to more specialised and technical materials on those elements should they be required.

⁶ M. Corcoran, 'Drone Journalism Takes Off', *ABC News Online - Foreign Correspondent Special Report*, <www.abc.net.au/news/2012-02-21/drone-journalism-takes-off/3840616>.

⁷ C. Anderson, 'How I Accidentally Kickstarted the Domestic Drone Boom', *Wired*, 22 June 2012, <www.wired.com/dangerroom/2012/06/ff_drones>.

⁸ Corcoran, 'Drone Journalism'.

Unsettled Terminology

Because the new aerial platforms involve evolving systems, the terminology surrounding them is also evolving. Debates are occurring among manufacturers, regulators, users, and the public over the terminology for these aerial vehicles and related systems.

In news stories and popular parlance they are usually called ‘drones’, reflecting journalistic needs for brevity and adoption of a term widely used among military personnel. Decades ago, the term originally indicated a pilotless, radio-controlled military target towing aircraft.⁹ Today, ‘drone’ is the popular description for any unmanned craft in the sky, whether it is flown directly by an operator on the ground or is capable of fully autonomous flight with no direct human intervention.

Aviation professionals, manufacturers, and government regulators prefer a complex array of more technically precise terminology for a number of different reasons.

Because the term ‘drone’ is widely associated with military surveillance and attack systems that have become politically contentious, manufacturers promoting civilian sales of their equipment have sought more neutral term such as ‘unmanned aerial vehicle’ (UAV) or remotely piloted aircraft (RPA). These terms, however, refer only to the flight object and not the related control and communication elements required.

Many military forces, including those of the UK, US, and Australia, insist on using the terms ‘remotely piloted aircraft’ (RPA) and ‘remotely piloted aircraft system’ (RPAS). Military pilots hate the drone word because they feel it diminishes their expertise and direct involvement in controlling the craft in the air. As a Royal Australian Air Force RPA unit commander reassured an aviation industry gathering, ‘people like to see the word “pilot” in there’.

International and national civil aviation regulators also can’t quite settle on a label, but are wrestling with the terminology as a way of clarifying and give specificity to policy, law, and regulation and standardising uses of the terms. The UK’s Civil Aviation Authority, for example, has produced a glossary and admits ‘the terminology related to UAS operations continues to evolve and therefore . . . [t]he terms listed . . . are a combination of the emerging International Civil Aviation Organisation definitions, other “common use” terms which are considered to be acceptable alternatives, and a number of “legacy” terms.’¹⁰ Many regulators are now adopting the ‘remotely piloted aircraft’ and ‘remotely piloted aircraft systems’ terms as generic descriptors.

Then there are a few subcategory definitions that are useful for our discussion: ‘first person view’ (FPV) for aircraft are flown via an on-board camera that is live-streamed to an operator on the ground; ‘micro air vehicle’ (MAV) denotes the growing swarm of insect-like craft now being perfected in technology labs; and ‘model aircraft’ (MA) indicates those used by hobbyists. The latter are often flying high-performance craft identical to the big boys, but are prohibited from calling them RPAs in some jurisdictions because regulators have reserved that label for commercial and professional operators.

We are ambivalent about the terms, but have adopted ‘remotely piloted aircraft’ and ‘remotely piloted aircraft systems’, and ‘drones’ for informal use. We occasionally even use ‘unmanned aerial vehicle’, merely to reduce repetition of the use of the terms in the text. We do, however, make clear distinctions between the aircraft component and the control and communication system components that are necessary for operation and use as platforms for imagery—the primary function proposed for their journalistic use.

⁹ In 1931 the British developed the Fairey ‘Queen’ radio-controlled target from the Fairey III floatplane and in 1935 produced another radio-controlled target, the ‘DH.82B Queen Bee’, derived from the de Havilland *Tiger Moth* biplane trainer. Through some convoluted path, the name of ‘Queen Bee’ is said to have led to the use of the term ‘drone’ for remote-controlled aircraft: Greg Goebel, ‘Unmanned Aerial Vehicles’, <www.vectorsite.net/twuav_01.html#m1>.

¹⁰ <www.caa.co.uk/docs/33/CAP722.pdf> (accessed Nov. 2012).

2. The Technology and Capabilities of UAVs

Drones are now being launched in such a vast, proliferating swarm of differing shapes, sizes, and capabilities that the only limitations are budget and imagination. They vary in size, weight, range, and flight duration, the complexity of their control systems and up/downlink capabilities, and technical qualifications required for their operations. Factors such as the distances to be covered, height necessary, amount of time in the air, weight of the camera and communication payload, and energy consumption, endurance, and reliability affect the types of technology necessary and, ultimately, the prices for acquisition and costs of operation.

It is likely that most news organisations will most often use smaller, lighter UAVs that cost under £1,000 (€1,200/\$1,500), but some uses may require spending tens of thousands pounds for heavier, longer-range vehicles or contracting with aviation service firms for those with the greatest capacity and flexibility. This section is designed to help news executives understand the array of choices – from extremely large to miniature UAVs that can be used for different purposes. There are underlying technological reasons for the differences, related to capabilities, range, payload requirements, overall weight, and uses and these produce differences in operational requirements.

Some RPAS are hovering vehicles that can be launched anywhere and employ single or multiple rotors; whereas others are fixed-wing aircraft that require take-off and landing strips and have larger turning radiuses. The aircraft can use propeller or jet propulsion and most are powered by electricity or fuel.

The largest remotely piloted aircraft flying today is the £132 million (€154 million/\$200 million) US Air Force Northrop Grumman RQ-4 Global Hawk. With the wingspan of an airliner, this unarmed intelligence gatherer soars to 65,000 feet as it crosses the globe on non-stop 35-hour missions. The ‘unmanned’ mantle is also a misnomer, as a 45-member ground crew is needed to service and maintain what is dubbed a low-flying satellite.¹¹ Global Hawk is the ultimate camera platform. While the exact capabilities are a closely guarded secret we do know it can obliquely film targets from a distance of 140 kilometres.¹²

Global Hawk has also been pressed into humanitarian service. Several were diverted to provide imagery over the California wildfires in 2008 and the 2010 Haiti earthquake. In 2011 20 missions were flown over Japan’s post-tsunami nuclear disaster. But the vast cost and complexity of the aircraft means it will remain a capability that editors and news directors can only dream of. As Global Hawk tracked high over Japan’s nuclear disaster, emergency services had dispatched another much smaller drone, an 8kg Honeywell T- Hawk, to duck and weave around Fukushima to assess the damage,¹³ a type of drone more likely to be employed by news organisations. In selecting a small drone for this critical low-level mission, the Fukushima crisis managers were spoilt for choice.

Now taking to the skies are hundreds of different types of small, cheap multi-rotor and fixed-wing UAVs that resemble radio-controlled model aircraft. But the toylike appearances are deceptive. These craft conceal some impressive capabilities: autonomous flight, live video streaming cameras, GPS guidance, all sold in a neat compact flying package, available online or from the local hobby shop for the price of a smart phone.

¹¹ In 2011, a US Air Force general told an AUVSI briefing that keeping a single *Predator* on circuit 24/7 over Afghanistan takes 159 people, including operators, maintainers, general staff, and 57 image analysts to convert the information into actionable data. (Author interview with Peter Smith, military UAV manufacturer, AUVSI Board member, Melbourne, 26 Feb. 2013.)

¹² M. Corcoran, ‘Revealed: US Flew Spy Drone Missions from Australia’, www.abc.net.au/news/2012-09-03/revealed-us-flew-drone-missions-from-australia/4236306. G. D. Warwick, ‘Cooling Down’, *Aviation Week and Space Technology* (31 Dec. 2012).

¹³ S. Fontaine, ‘Global Hawk Served New Role in Japan Aftermath’, *Air Force Times* (14 Aug. 2011). M. Smith, *Flying Drone Peers into Japan’s Damaged Reactors*, CNN, 10 Apr. 2011.

News organisations considering adding drones to their array of technologies will be confronted by a bewildering array of options. In North America alone, there are now 146 small UAV models weighing less than 11.2kg, being produced by 69 companies.¹⁴

ABC-TV Australia's *Foreign Correspondent* programme recently explored the international drone bazaar and defined four categories of UAV suitable for different news-gathering tasks. These groupings broadly reflect a new category system for commercial drone operations, proposed by Australia's Civil Aviation Safety Authority.¹⁵

Model Aircraft or Drone?

Radio-controlled (RC) model aircraft and the hobby groups that fly them have existed for decades. Current civil aviation regulations in the UK and Australia (and in other countries, as well) make a clear distinction between RC models and commercial unmanned aircraft.¹⁶ In Australia, recreational drones are defined as model aircraft. Hobbyists are required to stay below 400 feet, and operate only in daylight, keep the drone in sight at all times, and stay well away from airports and areas of high population density. These recreational flyers are not required to undertake training or register their craft.

Rapid technological advances have blurred the distinction between the hobbyist and professional UAV. Hobbyists fly UAVs that often match and sometimes exceed the capabilities of commercially approved craft.

As the capabilities of smaller platforms increase, UAVs move from the realm of most hobbyists towards commercial operations that involve greater deployment of technology and personnel and gain increased scrutiny and regulation from aviation regulators.

Micro and Small Multi-Rotor (Less than 2kg Take-Off Weight)

The craft in this category are predominately of helicopter-style or multi-rotor configuration, with a limited flight duration and camera payload.

At the entry level is the ubiquitous AR Drone 2.0, manufactured by French company Parrot.¹⁷ This small four-rotor craft, or quad-copter, is marketed as a £230 (€270/\$350) toy. Two cameras (one of which records HD quality imagery) stream video back to a tablet or smartphone control, which operates via a Wi-Fi network generated by the drone. Out of the box, the Parrot has partial automation, with push button take-off, landing and hover modes. It boasts a 50 metre range and 12 minutes of flight time. Global sales of all AR Drone models have reportedly exceeded 500,000 since it was first launched in 2010.¹⁸ Optional extras now include a plug-in GPS, and tests on new control systems have pushed the range out to one kilometre, batteries permitting.¹⁹

The AR Drone 2.0 is easy to fly, however its small size and light weight (380–700 grams²⁰) make the craft unstable even in light winds and this adversely affects

¹⁴ According to a briefing by the AUVSI chairman at the Avalon International Air Show, 26 Feb. 2013, attended by one of the authors.

¹⁵ M. Corcoran, 'Drones Set for Large-Scale commercial Take-Off', 1 Mar. 2013, <www.abc.net.au/news/2013-03-01/drones-set-for-large-scale-commercial-take-off/4546556>.

¹⁶ CASA, *Differences between Unmanned Aircraft Systems (UAS) and Model Aircraft*, 2013, <www.casa.gov.au/scripts/nc.dll?WCMS:STANDARD::pc=PC_100375>

¹⁷ <<http://ardrone2.parrot.com/usa>>.

¹⁸ S. Hargreaves, 'Drones Go Mainstream', *CNN Money*, 9 Jan. 2013, <<http://money.cnn.com/2013/01/09/technology/drones/>>. G. Mortimer, 'QGroundControl and Flight Recorder Bring Autonomous Flight to AR.Drone', *SUAS News*, 19 Jan. 2013, <www.suasnews.com/2013/01/20637/qgroundcontrol-and-flight-recorder-bring-autonomous-flight-to-ar-drone/>.

¹⁹ A. Méchaly, 'Bell Labs + Parrot R&D plug 4G/LTE dongle, AR.Drone 2 fly 1000m/3280ft', *SUAS News*, 30 Oct. 2012, <www.suasnews.com/2012/10/19449/bell-labs-parrot-rd-plug-4glte-dongle-ar-drone-2-fly-1000m3280ft>. Mortimer, 'QGroundControl'.

²⁰ The lower figure is only possible if you fly without the protective hull.

image stability. Despite these limitations, the AR Drone 2.0 may be suitable for short-range news gathering in inner-city areas, or on the periphery of street protests, where agility and immediacy take priority over picture quality. The lightweight construction makes it highly susceptible to damage, but equally, it is less likely to cause injury if colliding with people. The low cost and live video capability of the AR Drone 2.0 also makes it suitable for the 'disposable drone' concept, where there is an accepted risk the craft may be seized or destroyed. Another benefit of the 'disposable drone' is that, if it is to be sacrificed, the range of the craft can be effectively doubled.

By comparison, most micro air vehicles and nano drones such as the highly publicised Hummingbird, and the growing swarm of insect-sized nano-bots, remain creatures of the science lab. The world's first operational nano-system has already been deployed for military use. The Norwegian-developed Black Hornet, operated by the British Army in Afghanistan, is a 10 centimetre long nano drone weighing just 16 grams. Equipped with three overlapping video cameras, and guided by an autopilot weighing half a gram, it has an operational radius of more than one kilometre and 25 minute endurance. Other capabilities remain a closely guarded secret. The nano-system would make an exceptionally effective news-gathering platform, if it wasn't for the prohibitive cost. A UK company has been contracted to supply and maintain 160 of the craft for the British Army. The total cost including research and development for 160 Black Hornets is £20 million (€23.5 million/\$30.4 million). The Black Hornet's developer says the British Army demanded 'a system that was so small it would be exempt from all regulations. It would be up to the individual soldier to decide when and where to launch.'²¹

Nano drones will eventually be commercially available and affordable. But will they be so small as to 'be exempt from all regulations'? Possibly. For example, Australia's aviation regulator CASA currently has no regulations for any UAV/drone weighing less than 100 grams.

Larger Multi-Rotor and Helicopter (2+ kg)

Larger multi-rotor craft, with a take-off weight of 2–7kg, offer a more stable, manoeuvrable filming platform and the ability to lift heavier, more sophisticated cameras, gimbals, and stabilisation systems. This class is best suited for low-level filming, offering flexibility when deployed as 'a four hundred foot camera boom'. Most multi-rotors are powered by brushless electric motors running on lithium polymer batteries. All configurations involve a weight/performance trade off; a larger camera results in a shorter flight time.

In January 2013, the US Smithsonian Institution's *Air and Space Magazine* gave multi-rotors a mixed review:

They're inefficient in cruise, short on payload, and unable to auto-rotate to a safe landing if a motor fails. But for simplicity, durability, and ease of modification, they are hard to beat.

An important feature of these small drones is their portability; because their range is relatively short, operators need to pack up and move to reach greater distances.

Aside from the mounted camera, the quad-copter has only 12 moving parts: four motors and two bearings per motor.²²

²¹ BlackHornet developer ProxDynamics briefing attended by one of the authors, AUVS-A Conference Melbourne, 24 Feb. 2013.

²² Chiles, 'Drones for Hire'.

The American small UAV industry will face some tough international competition for the potential media market. The German-built MikroKopter range is increasingly popular with professional photographers. MikroKopter requires a highly skilled operator to fly, and at least one additional team member to safely operate the camera. Depending on camera configuration, a complete MikroKopter system costs approximately £12,800–£13,200 (€15,100–€15,600/\$19,800–\$20,500), fly-away.

While the Europeans offer a highly engineered product, it is China, with its vast manufacturing base, cheap labour and economies of scale that has the potential to dominate this sector. Many small Chinese UAVs already sell for about 25–50% of the price of European and North American competitors, although there is intense debate over the quality of the Chinese-made product.

The Chinese multi-rotor, the X650 V8, manufactured by X Aircraft is claimed to be selling about 350 units a week. The 2.2kg drone boasted a 2 kilometre range, 2 kilometre maximum altitude, and a top speed of 70 kilometres an hour. With a smaller GoPro-type camera, maximum flight duration was about 20 minutes. Extras included a GPS-guided autonomous mode, enabling the X650 to take off and fly to a predetermined location, record images, and return to base, without direct human intervention. If the radio control link to the X650 was lost, the drone was programmed to land immediately or return to the launch point. The X650 V8 is configured with eight rotors, theoretically giving greater stability in flight, and enabling safe return of the aircraft should one rotor fail.

With a skilled operator at the controls, the X650 displayed impressive manoeuvrability and the ability to provide stable close-up imagery while moving between trees and other obstacles. It recorded quality vision, operating at the maximum legal altitude of about 120 metres, well short of the claimed ceiling of 2,000 metres. The X650 is equipped with a First Person View (FPV) capability. FPV enables the operator to control the drone when the aircraft flies beyond the visual line of sight, by means of a live video feed from the drone to a ground station monitor. Other basic flight data, such as height, speed, compass heading, and battery life, were also displayed on the X650 FPV system. The complete unit was priced at £2,500 (€2,900/\$3,000).

The X650 requires a team of two: pilot and camera operator. Due to its relatively small size, the X650 was unstable in moderate winds. Aeronautical engineers say this is potentially a major problem for all small multi-rotors operating in high-density inner-city locations, where lighter craft are highly susceptible to the ‘canyoning’ effect of unpredictable winds, generated by close proximity of office blocks and apartment buildings. There are other potential safety hazards for all small UAVs flying in First Person View FPV mode; the operator controlling the craft by FPV is reliant on the extremely narrow field of vision provided by the on-board camera to prevent collisions and seek filming opportunities.

This has also proved to be a major issue with large military drones. One former US Air Force UAV pilot, who has flown Predators over Afghanistan, described the experience as attempting to operate an aircraft while ‘looking through the soda straw’. This restrictive flight control method could potentially increase risk of a collision if a large number of media drones swarmed over a major news event while sharing congested airspace with police, emergency service UAVs, and piloted helicopters.

The X650 and nearly all other UAV types lack any effective anti-collision system, relying instead on the conventional ‘see and avoid’ method. This is potentially the greatest safety risk for all civil and commercial UAV operations, a problem magnified in congested domestic airspace of the United States, which averages 100,000 domestic flights each day. The Federal Aviation Administration forecasts that 30,000 civil and commercial drones will be added to this mix by 2030.

'Sense and avoid' anti-collision transponders are routinely fitted to piloted aircraft but developers still face challenges in attempting to miniaturise the systems for UAV technology. Recently the US Government Accountability Office, looking at the progress of the FAA's integration of Unmanned Aerial Systems (UAS) into the domestic airspace, made a sombre assessment. In submission, the GAO's Gerald Dillingham told a Congressional panel:

To date, no suitable technology has been deployed that would provide UAS with the capability to sense and avoid other aircraft and airborne objects and to comply completely with FAA regulatory requirements of the national airspace.²³

The GAO was also concerned over the potential for jamming of the drone's controls signals: 'According to one industry expert, GPS jamming would become a larger problem if GPS is the only method for navigating a UAS.' Dillingham testified that small drones are also vulnerable to spoofing, where a third party takes control of the craft's navigational signal.

This type of scenario was recently demonstrated by researchers at the University of Texas at Austin . . . During the demonstration at the White Sands Missile Range, researchers spoofed one element of the unencrypted GPS signal of a fairly sophisticated small UAS (mini-helicopter) and induced it to plummet toward the desert floor. The research team found that it was straightforward to mount an intermediate-level spoofing attack, such as controlling the altitude of the UAS, but difficult and expensive to mount a more sophisticated attack.²⁴

Military drones have demonstrated a surprising vulnerability to electronic attack. Militants in Iraq reportedly used a £17 (€20/\$26) off the shelf programme to intercept unencrypted live video feeds from Predator drones.²⁵ In 2011, a stealthy RQ-170 Sentinel reconnaissance drone dubbed 'The Beast of Kandahar' came down in Iran. Tehran claims it spoofed the RQ-170's sensors into believing the craft was landing at the US base at Kandahar, Afghanistan, but many Western experts doubted Iran's capability to mount such a sophisticated attack on the RQ-170's heavily encrypted controls. Regardless of the cause, the captured Sentinel was soon displayed for the world to see.

Encryption of military UAV control systems and video feeds has been progressively strengthened, but civilian drones, the majority of which rely on unencrypted signals from GPS satellites for navigation, remain vulnerable.

Another potential hazard for nearly all small and medium UAVs is the volatility of the lithium-polymer batteries that power the brushless electric motors. Several experienced small UAV operators have told ABC-TV Australia that the batteries have a history of exploding or catching fire upon heavy impact.

Small Fixed Wing (30–90 Minute Flight Duration)

Not much larger than their multi-rotor cousins, small fixed-wing drones offer a far greater aerodynamic efficiency that translates into longer flights and greater range. The compromise is an inability to manoeuvre closely within an urban environment, or hover in a fixed camera position.

This category could be effectively deployed on news gathering in regional or rural locations, where the operator is unable to launch from the immediate proximity of the news story. Ideal applications include coverage of natural disasters

²³ GAO, *Measuring Progress and Addressing Potential Privacy Concerns would Facilitate Integration into the National Airspace System*, GAO-12-981, 2012, <<http://www.gao.gov/assets/650/648348.pdf>>.

²⁴ GAO, *Measuring Progress*.

²⁵ 'Insurgents Hack US Drone', *Wall Street Journal* (17 Dec. 2009), <<http://online.wsj.com/article/SB126102247889095011.html>>.

such as floods or gaining access to stories in coastal regions, such as water sports, oil spills, and shipping incidents. This class of drone could also be suitable for use as a safety or reconnaissance tool by news teams operating in high-threat environments such as Afghanistan, in much the same way as soldiers use small drones to scout ahead for insurgents planting improvised explosive devices.

In 2010, ABC-TV Australia's *Foreign Correspondent* programme, on assignment in Afghanistan filming a report on US Army combat medevac helicopter operations, was given access to military drone imagery as a 'second unit' camera to supplement vision conventionally recorded from on board the helicopters. The drone's primary task was surveillance: to provide early warning of possible Taliban attacks on the operations being filmed by the ABC. While the drone images were average from a production point of view, the exercise was successful as a 'proof of concept' in validating the idea of the media using this technology in war zones.²⁶

One of the many innovators in this class is the Switzerland-based Team Blacksheep. Led by Raphael Pirker, Team Black Sheep (TBS) has evolved from a hobby group to small UAV business, developing and selling multi-rotors and small fixed-wing drones. The latest system is the customised TBS Zephyr, with a 1.37 wingspan, 30–50 minute flight time and a 30–45 kilometre range, priced at £1,300 (€1,500/\$2,000).²⁷ Controlled by FPV video goggles, the TBS fixed-wing drone is hand-launched and recovered by belly landing, ideally on a grass field. The video control link from drone to goggles is lower-grade analogue, while a second on-board camera records and stores HD vision, which is recovered after landing.

TBS has also achieved media prominence as 'drone activists', recording spectacular vision on unapproved flights over major US cities including New York, and more recently, central London. Pirker told ABC-TV Australia's *Foreign Correspondent* programme that 'part of what we do is try to stir up controversy, just to show what can be done with these drones. You have to cross certain boundaries to actually do that, to show people the technology is here.'²⁸ Pirker insists he follows his own strict safety protocols, but the barnstorming flights over prominent landmarks such as the Statue of Liberty and the UK Houses of Parliament have deeply divided the industry. Supporters claim TBS flights help promote the technology and destigmatise drones. Critics fear a draconian backlash that could result in a ban on small UAV commercial and recreational activities.²⁹

US military drone manufacturers are also now moving rapidly to exploit the emerging civilian market they helped create, through their successful lobbying of Congress. California-based Aerovironment Inc. currently builds about 85% of the US military's small UAV fleet, primarily unarmed, hand-launched, fixed-wing surveillance craft. These UAVs are compact enough to be carried in back-packs, then assembled and launched within five minutes. Aerovironment has already received numerous queries from media organisations interested in acquiring its products.³⁰

One of the most popular Aerovironment systems, with 19,000 built, is the 1.9kg, fixed-wing Raven. With a 1.4 m wingspan, the electric-powered, hand-launched Raven has a duration of 90 minutes, a 10 kilometre operational radius, and a maximum ceiling of 14,000 feet.³¹ Raven can be flown manually or in full autonomous mode, with GPS-guided way-points pre-programmed on a tablet device. It is equipped with a sophisticated gimbal-mounted camera system, with night-time infra-red capability. A single Raven costs about £23,000 (€27,000/\$35,000),

²⁶ M. Corcoran, *Afghanistan: The Golden Hour*, ABC-TV, 16 Feb. 2010.

²⁷ <<http://team-blacksheep.com/products/prod:tbszephyr>>.

²⁸ M. Corcoran, *USA: Rise of the Machines*, ABC-TV, 4 Sept. 2012.

²⁹ *Team Blacksheep in Wired*, Openpilot.org, 2012, <<http://forums.openpilot.org/topic/14527-team-blacksheep-in-wired>>. *Team BlackSheep's TEATIME in London*, YouTube, 14 Nov. 2012.

³⁰ Corcoran, *USA*.

³¹ <www.avinc.com/uas/small_uas/raven>.

but the complete system, when configured for the military, comprising three drones, ground control station, and remote video terminal, now costs US customers £65,900–£132,000 (€77,000–€154,000/\$100,000–\$200,000), depending on the volume of the sale.

An Australian company has established an approved UAV controllers course that can give a journalist or photographer with no flying skills competency in operating multi-rotor and small fixed-wing UAVs in an intensive two-week programme costing about \$5,000.³²

Larger Fixed Wing (20+ Hours Flight Duration)

Larger drones are widely assumed to be the exclusive preserve of the military, but some UAVs flying battlefield surveillance missions today evolved out of designs intended for long-range scientific research and fisheries surveying. A decade ago, scientists and tuna fishermen demanded UAVs with exceptional endurance that were capable of being launched and recovered without a runway, and most importantly were affordable. Two such craft that emerged to meet this capability are the Boeing-Insitu ScanEagle and the AAI Aerosonde.³³ Both UAV types are currently in military service as intelligence, surveillance, and reconnaissance (ISR) platforms, and are also available commercially, with civil sensor and camera systems capabilities lagging about two to three years behind cutting-edge technology available to military operators.

With a 3.6 metre wingspan the 25kg Aerosonde is slightly larger. Both launch from a large catapult and are recovered by being ‘captured’ in a large net or skyhook. The Aerosonde may offer more practicality for media use as it can also launch from a cradle fitted to the roof of a moving car and, upon return, use skids to land on a grassed football field.

These UAVs are purpose-built to carry sophisticated camera payloads of up to 6kg in gimbal mounts. They require highly skilled pilots and systems operators, but with complexity comes exceptional endurance; 20+ hours flight time for the Aerosonde and ScanEagle. Both types are powered by petrol engines that use insignificant amounts of fuel compared to manned helicopters or fixed-wing aircraft.

This capability may appeal to major media organisations seeking performance beyond that provided by conventional news helicopters. In Australia, for example, most media helicopters only have approval for daylight operations and a flight endurance of just a few hours. ScanEagle and Aerosonde face no such limitations, and can fly on through the night, maintaining coverage by switching to thermal imaging/infra-red systems.

Working against large fixed-wing media UAVs is the expense. A basic ScanEagle or Aerosonde platform costs about £65,000(€77,000/\$100,000). A high-resolution day/night camera system with thermal imager can add another £65,000–£165,000 (€77,000–€193,000/\$100,000–\$250,000).³⁴

Availability is another issue. To guarantee that one UAV is always ready to launch, the US Air Force has deployed ‘systems’ of four aircraft each. Combined with a launcher and ground control station, the total cost of the complete system is about £2.1 million (€2.5 million/\$3.2 million).

Large drones are ‘unmanned’ but they still require highly skilled teams of people on the ground to keep them flying. Sending media staff off on lengthy training courses may be one option. Another more immediate practical solution is outsourcing the operation to expert contractors. Both options add up to a costly labour-intensive operation.

³² <www.ausacademy.org/FTF_Marburg>.

³³ R. Conniff, ‘Drones are Ready for Take Off’, *Smithsonian Air and Space Magazine* (June 2011).

³⁴ DefenseIndustryDaily (2013) ‘From Dolphins to Destroyers: The ScanEagle UAV’, <www.defenseindustrydaily.com/from-dolphins-to-destroyers-the-scaneagle-uav-04933/>.

A ScanEagle or Aerosonde would require a team of three to four people to operate in a media environment. Launching this type of UAV on a major rolling story would demand long periods of intense concentration by the crew. A second or even a third team may be required to work in shifts to keep the UAV operational.

UAVs in this class have become over-engineered to meet the demands of punishing military operating environments. Aerosonde is now developing a special civil variant with a smaller engine and lighter airframe that will have 20% greater endurance, but only 60% of the price of the military version. The commercial variant will have fully autonomous take off, landing and flight systems enabling a reduction in crew size from four to two.³⁵

Current UAV technology still lacks that human element, what pilots call the 'Eyeball Mark 1'. This is the ability of a news helicopter pilot and media crew to observe and instantly react to a safety threat, or to anticipate a breaking development on a story that is unfolding beyond the narrow field of view of the camera. Helicopters also have an additional logistical capability lacking in UAVs: the ability to land in inaccessible locations and drop off equipment and news teams, or to immediately rescue individuals in distress.

Selecting the right RPAS for news operations will require clear thinking about how the news organisation plans to use the vehicle, who it expects to operate the aircraft, and under what conditions it will be employed. Some may chose only one type of UAV, whilst others many chose to acquire several different types. A few large organisations may obtain larger vehicles, but it is likely that most will contract services for larger UAVs from aviation service companies.

³⁵ Author interview with Peter Smith, Aerosonde board member, and AUVSI Board member, Melbourne, 26 Feb. 2013.

3. Policy, Regulatory, and Legal Considerations

The existing regulatory framework is limited and permits UAS [unmanned aerial systems] to fly in segregated airspace only. To unlock this market it is necessary to design a new regulatory framework allowing UAS to fly in the common airspace.³⁶

All of our crashes are caused by human error. As a rule, our errors involve miscalculating flight time – the battery goes dead and the device crashes.³⁷

Understanding the policy and regulatory environment for unmanned aerial vehicles is crucial for news executives, because much of that policy is currently being made in parliaments and administrative agencies. If news organisations want to use drones, they will need to become involved in the policy-making for civil users because existing and new policy will determine the extent to which and how they can be used in journalism and other civilian activities. Similarly, the regulatory aspects of civil aviation are central because those operating RPAS will have to comply with air regulations. If unmanned aerial vehicles are operated by journalists or others in news organisations they will need to be familiar with primary regulations to ensure safe and legal operation.

Oversight of remotely piloted aircraft systems involves interconnected policy and regulation at the national, regional (as in the case of the European Union), and international levels. This complexity is increased if cross-border operations are involved. A wide variety of aviation and communication policy issues are involved, including radio spectrum assignment and uses, certification of airworthiness of the vehicles, responsibility for flight operations, and pilot competency.

Policy and legal issues at the operational level involve issues of liability (responsible parties, insurance requirements, and overflight of people and property), privacy and data protection, and application of aviation policy to news-gathering processes.

Fundamental questions to be considered include how media deployment of RPAS should be framed. Is news use primarily an aviation matter? Is media use technically for the purposes of 'aerial work'? Should using RPAS for media purposes weigh in the balance with aviation regulators to mitigate the implementation of the regulations and rules? And what specific regulatory and/or legal rules must media legal teams take into account in order for such use to be legal? Many of these are contentious issues that do not lend themselves to easy solutions and the processes of answering the questions involve multiple levels of government, competing regulatory agencies, political power plays, and differing values.

Media lawyers, media companies, and journalists will have to learn about and pay attention to technical regulations issued by authorities charged with ordering the use of airspace. This is because, first, an RPAS is regarded and defined as an 'aircraft' and, second, since the RPAS is being flown for the purpose of journalism and/or media production, it would not be considered a 'model' and/or 'toy' aircraft, flown for recreational/non-commercial purposes in a number of countries.

The UK Civil Aviation Authority glossary defines an RPAS as 'A set of configurable elements consisting of a remotely-piloted aircraft, its associated remote pilot station(s), the required command and control links and any other system elements as may be required, at any point during flight operation . . .' Whether called a 'drone' or an 'unmanned aerial vehicle' or an 'RPAS', from a legal perspective, any such vehicle is an *aircraft*, defined by the CAA glossary (using the

³⁶ ESPI, *A Regulatory Framework to introduce Unmanned Aircraft Systems into Civilian Airspace*, 2011, <www.espi.or.at/images/stories/dokumente/studies/ESPI_Report_31.pdf>, 4.6.

³⁷ <<http://ijnet.org/stories/story-behind-those-russian-drone-protest-images>>.

International Civil Aviation Authority formal definition) as ‘Any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth’s surface.’

A significant issue concerns the nature of the activity being undertaken when RPAS are deployed by media organisations or individuals for news gathering. Many media users believe that deploying such RPAS is akin to flying model aircraft; hence, no permission to fly or certification is needed. However, there is a regulatory category distinction between using such vehicles for recreational purposes or other purposes. From a regulatory perspective, the key question is, does such activity constitute ‘aerial work’? In the UK, the Air Navigation Order, 2009 (article 259) states that ‘aerial work means any purpose, other than commercial air transport or public transport, for which an aircraft is flown if valuable consideration is given or promised for the flight or the purpose of the flight’.³⁸ Further, ‘If the only payment involved is the payment of the pilot, the flight is deemed to be private for airworthiness purposes (although it will still be aerial work for other purposes, e.g. flight crew licensing).’

Media usage of RPAS would thus seem to fall within that category and hence brings it within the provisions of the UK Air Navigation Order. This is similar to the situation in Australia, where a hobbyist can legally fly a Parrot AR Drone around the local suburban park, but if the same craft is launched to record vision for the TV news, the suburban flyer is engaged in an illegal activity.³⁹

In broad terms, UK permits private use of RPAS under 20kg to be flown within line of sight to avoid collisions and the operator must maintain constant visual contact with the aircraft. Flights less than 100 feet above the ground are nearly free of regulation and those between 100 and 400 feet are somewhat free for non-commercial uses, although all must comply with the basic rules of air. Traditional flight regulations apply to all aircraft over 20kg.

Regulation

Awareness about the applicability of aviation regulations to media uses of RPAS and knowledge about the aviation regulators is critical. This constitutes a game-changer. Lawyers, when confronted with the topic of RPAS use, routinely see privacy as the number one legal concern. However, from the regulatory point of view, the number one issue is safety – not merely because the vehicle is ‘unmanned’ but because its use must fit within the broader perspective of overall aviation safety.⁴⁰

Most media lawyers have been blissfully unaware of the field of aviation law: it has not impinged on their clients’ activities. Their normal use of aerial vehicles, e.g. helicopters, has been mainly contracted out to third parties who are assumed to be cognisant of the relevant regulations. But, as RPAS will become owned and deployed *directly* by media companies, news-gatherers, and media production enterprises, not least because they are (relatively) inexpensive and small, this field of regulation will become a new area of expertise for media lawyers.

European news organisations considering RPAS need to be aware not only of regulation in their own countries but of the emerging European-level standards currently evolving to regulate, control, and also to facilitate RPAS operations.

A European Commission Staff Working Document was published on 4 September 2012: *Towards a European Strategy for the Development of Civil Applications of Remotely Piloted Aircraft Systems (RPAS)*.⁴¹ There are sections on the safe integration

³⁸ The CAA has published a ‘Summary of the Meaning of . . . Aerial Work’, <<http://www.caa.co.uk/docs/1428/SummaryOfCATPTAWANO2009May2010.pdf>> (accessed Dec. 2012); it states that the term ‘valuable’ ‘has a very wide meaning, including the provision of goods and services’.

³⁹ CASA, *Differences*.

⁴⁰ See CAA, *Unmanned Aircraft Operations in the National Airspace System*, see <<http://www.caa.co.uk/default.aspx?CATID=1995>>.

⁴¹ SWD (2012) 259 final, <<http://register.consilium.europa.eu/pdf/en/12/st13/st13438.en12.pdf>> (accessed Nov. 2012).

of RPAS into European airspace (EASA to certify vehicle above 150kg); radio spectrum; and the 'societal dimension' – responsibility, liability, insurance, privacy, and data protection.

Global work on the issue has been ongoing within the International Civil Aviation Organisation (ICAO) since 2005. ICAO's 2011 publication, *Unmanned Aircraft Systems (UAS)*,⁴² states that:

Unmanned aircraft systems (UAS) are a new component of the aviation system, one which ICAO, States and the aerospace industry are working to understand, define and ultimately integrate . . . The goal of ICAO in addressing unmanned aviation is . . . to underpin routine operation of UAS throughout the world in a safe, harmonised and seamless manner comparable to that of manned operations.

In March 2012, the Council of ICAO unanimously adopted amendments to the Chicago Convention⁴³ which constitute 'a very important milestone for the insertion of Unmanned Aircraft Systems (UAS) in the total aviation system (i.e. not only the airspace, but the body of safety rules which apply to aviation to protect third parties on the ground and other airspace users)'.⁴⁴ The ICAO's governing premise is that specific rights and obligations agreed by the contracting states will apply equally to both manned and unmanned civil aircraft.

Article 8 of the Convention provides that no aircraft capable of being flown without a pilot shall be flown over the territory of a contracting state without special authorisation by that state and requires that 'each contracting State undertakes to ensure that the flight of such aircraft without a pilot in regions open to civil aircraft shall be so controlled as to obviate danger to civil aircraft'.⁴⁵

The applicable regulations in the UK are contained in the Air Navigation Order (2009) made under the Civil Aviation Act (2006).⁴⁶ The principal regulator is the Civil Aviation Authority. The two articles of the Air Navigation Order ('Part 22 – Aircraft in Flight') are 166 and 167; they address 'small unmanned aircraft' and 'Small unmanned surveillance aircraft'. The articles apply to the 'person in charge' of the RPAS and a 'person under the control' of the 'person in charge'. Hence, media companies and users for journalistic/media production purposes will have to interpret the applicability to their circumstances of the notions of the 'person in charge' of an RPAS and 'a person under the control of a person in charge'.

Key issues involve securing the vehicle so that no articles or animals are dropped from an RPAS which could endanger persons or property, that the 'person in charge' may only fly the RPAS if 'reasonably satisfied' the flight can be done 'safely', and that the PIC must maintain 'direct, unaided visual contact' with the RPAS for collision avoidance. It also stipulates that, for RPAS over 7kg (only excluding fuel), the PIC must not fly them without appropriate ATC clearance in 'Class A, C, D or E airspace', an aerodrome traffic zone during the notified hours of watch of the air traffic control unit (if any) at that aerodrome, or at a height of more than 400 feet above the surface unless it is flying in specific airspace(s). Finally, the PIC must not fly the aircraft 'for the purposes of aerial work' except in accordance with a permission granted by the CAA.

⁴² ICAO (2011), Cir. 328 AN/190.

⁴³ The Convention on International Civil Aviation (signed at Chicago, 7 Dec. 1944) as amended by the ICAO Assembly (known universally as the 'Chicago Convention').

⁴⁴ <www.uasvision.com/2012/03/12/icao-adopts-uas-related-amendments> (accessed 24 Nov 2012).

⁴⁵ Quoted from CAA, *Unmanned Aircraft System Operations in UK Airspace – Guidance*, section 1, chapter 2, 1.1.3 and 1.1.4, <www.caa.co.uk/docs/33/CAP722.pdf> (accessed 24 Nov. 2012).

⁴⁶ UK Statutory Instrument (SI) 3015/2009, <www.legislation.gov.uk/ukxi/2009/3015/contents/made>; note also there is a substantial 'Impact Assessment [No 7] of a proposal to amend the Air Navigation Order to address the regulation of Unmanned Aircraft Systems' contained in the Explanatory Memorandum, <www.legislation.gov.uk/ukxi/2009/3015/pdfs/ukxiem_20093015_en.pdf> (accessed 24 Nov. 2012).

Other key issues specify that persons in charge of small unmanned surveillance aircraft equipped to undertake any form of surveillance or data acquisition must not fly without CAA approval over or within 150 metres of any congested area, over or within 150 metres of an organised open-air assembly of more than 1,000 persons, within 50 metres of any vessel, vehicle, or structure which is not under the control of the person in charge, and subject to the following within 50 metres of any person during take-off or landing or within 30 metres of any person other than the person in charge or a person under the control of the person in charge of the aircraft. These regulations would affect many potential journalistic uses of RPAS.

The UK's aviation regulator is the Civil Aviation Authority⁴⁷ and it recently issued the 5th edition of *Unmanned Aircraft System Operations in UK Airspace – Guidance*.⁴⁸ It sets out legal considerations under the Chicago Convention, EU-level regulations that created the European Aviation Safety Agency to establish and implement rules for aviation safety,⁴⁹ and the UK Air Navigation Order 2009 and the Rules of the Air Regulations 2007.

Specific Legal Topics and 'Soft Law'

In general, all RPAS require a certificate of airworthiness, i.e. a permit to fly. An EASA air-worthiness certificate is required if the vehicle is more than 150kg, is neither experimental nor used for state purposes (military, customs, police, search and rescue, fire-fighting, coastguard, or similar activities or services). Otherwise, the vehicle is subject to national regulation.

In the UK there are only two categories of aircraft: military (any aircraft which the Secretary of State for Defence certifies should be treated as a military aircraft) and non-military (see CAP 722). There is no special provision for other types of non-military state aircraft (such as those carrying out police, search and rescue, fire-fighting, coastguard, or similar activities or services). To operate an RPAS which weighs 20kg or less for aerial work purposes, a CAA Permission is also required as described in ANO 2009, article 166(5).

An RPAS which is subject to national regulations and which weighs more than 20kg is not a 'small unmanned aircraft' for the purposes of the ANO, so that all the requirements, e.g. certificate of airworthiness or permit to fly, licensed flight crew, Rules of the Air must be complied with. If an aircraft cannot comply with all of these requirements the CAA may be prepared to issue an exemption under article 242 of the ANO 2009 for classes or individual aircraft or persons.

RADIO SPECTRUM

Given that no dedicated spectrum has so far been assigned to RPAS, civilian RPAS flying today for research or commercial purposes rely on ad-hoc frequency assignments. Radio spectrum availability is therefore an important element for the growth of RPAS services.⁵⁰

Spectrum is allocated under the auspices of the International Telecommunications Union and the World Radio Conference 2012 considered spectrum requirements and action supporting operations of unmanned aircraft systems. Concrete solutions will be further discussed and agreed at WRC 2015.⁵¹ The general approach currently being pursued is that non-military RPAs and RPAS using aeronautical spectrum will

⁴⁷ <www.caa.co.uk> (accessed 25 Nov. 2012).

⁴⁸ CAA, *Unmanned Aircraft System Operations in UK Airspace – Guidance*, CAP 722, <www.caa.co.uk/docs/33/CAP722.pdf> (accessed 30 Nov. 2012).

⁴⁹ <<https://www.easa.europa.eu/home.php>> (accessed 25 Nov. 2012).

⁵⁰ CAP 722, *Unmanned Aircraft System Operations in the UK Airspace – Guidance*, ch. 3.

⁵¹ Section 2.3, <<http://register.consilium.europa.eu/pdf/en/12/st13/st13438.en12.pdf>> (accessed 30 Nov. 2012).

require domestic licences from aeronautical regulators to use that spectrum, but that some spectrum will be set aside that does not require an aeronautical licence. Spectrum used for cameras, downlinks, and other payload uses will come under the appropriate domestic regulatory agencies for those uses. Discussions in WRC 2012 produced proposals on policy and specific spectrums for RPA/UAS command and control that will be taken up in 2015.

An important safety and security issue concerns the immunity of such wireless systems from being 'hacked into' and the purpose, direction, etc. of the flight being altered, perhaps for malign reasons.

RESPONSIBILITY Pilot competency requirements, i.e. certification to fly, will require media users and companies to provide evidence of pilot competency when making applications for permission to operate an unmanned aircraft, but there are currently no pilot licences required. The CAA has accepted the Basic National UAS Certificate (BNUCTM) and Basic National UAS Certificate – Small Unmanned Aircraft (BNUCSTM), as evidence of remote pilot competency (CAA 722, section 3, para. 7.1).

LIABILITY Media users need to address the issue of precisely who is liable (and for what) when an RPAS is deployed. Essentially, the rules for this kind of aircraft vehicle need to embrace a system in which the owner of the aircraft, the RPAS operator, and the pilot in command are differentiated. Practically, this entails that liability for damages caused by a UAV falling to the ground is placed on the operator who sets up the system.⁵²

OVERFLIGHT OF PEOPLE Many journalistic users of RPAS will want to fly their vehicles over crowds (demonstrations, riots, etc.). However they, and more importantly, their advisers, will have to become familiar with the safety issue of 'overflight of people'. The CAA Explanatory Memorandum states that 'As operations are very likely to involve flying Unmanned Aerial Vehicles (UAVs) in congested areas and above assemblies of persons, it is apparent that the safety of the public may be compromised unless steps are taken through government intervention to regulate the activity.'

The CAA Guidance (CAA 722, section 3, chapter 2) notes that separation distances in the Air Navigation Order apply to aircraft under 20kg (ANO 2009, articles 166 and 167) and that when unmanned aircraft over 20kg are involved, overflight of persons may be allowed depending upon the degree of airworthiness certification and appropriate operational procedures, such as ballistic recovery systems (parachutes), that would reduce risks to persons below.

Overflying people requires the understanding and inclusion of a safety case: this may have two components – an assessment of the 'Kinetic Energy Limits' and the method of flight termination (e.g. BRS). Two 'crash scenarios' are envisaged: (i) free-fall from 400 feet for all UA; and (ii), for a UA capable of high forward speed, a maximum impact speed (set as $1.4 \times$ maximum achievable steady speed in level flight).

INSURANCE EC Regulation 785/2004 came into force on 30 April 2005 requiring most operators of aircraft, irrespective of the purposes for which they fly, to hold adequate levels of insurance in order to meet their liabilities in the event of an accident. This EC Regulation specifies amongst other things the minimum levels of third-party accident and war risk insurance for aircraft operating into, over, or within the EU (including UAS), depending on their Maximum Take-Off Mass (MTOM). Details of the insurance requirements can be found on the CAA website

⁵² ESPI, *Regulatory Framework*, 2011.

under 'Mandatory Insurance Requirements'. UK legislation which details insurance requirements is set out in Civil Aviation (Insurance) Regulations 2005.⁵³

PRIVACY AND DATA PROTECTION Significant publicity has been given in various reports to the idea that RPAS constitute a new and significant threat to people's privacy, not least because the 'natural limit', namely, cost, on aerial surveillance is dramatically downsized when it comes to RPAs. For example, the American Civil Liberties Union, recently published a report stating that

*all the pieces appear to be lining up for the eventual introduction of routine aerial surveillance in American life – a development that would profoundly change the character of public life in the United States. . . . The prospect of cheap, small, portable flying video surveillance machines threatens to eradicate existing practical limits on aerial monitoring and allow for pervasive surveillance, police fishing expeditions, and abusive use of these tools in a way that could eventually eliminate the privacy Americans have traditionally enjoyed in their movements and activities.*⁵⁴

In September 2012, the Congressional Research Service published *Drones in Domestic Surveillance Operations: Fourth Amendment Implications and Legislative Responses* a reference to the US Constitution's protection of the 'right to be free from unreasonable searches and seizures'.⁵⁵

A reviewing court's determination of the reasonableness of drone surveillance would likely be informed by location of the search, the sophistication of the technology used, and society's conception of privacy in an age of rapid technological advancement. While individuals can expect substantial protections against warrantless government intrusions into their homes, the Fourth Amendment offers less robust restrictions upon government surveillance occurring in public places and perhaps even less in areas immediately outside the home, such as in driveways or backyards. Concomitantly, as technology advances, the contours of what is reasonable under the Fourth Amendment may adjust as people's expectations of privacy evolve.

The European Commission Staff Working Paper contains a section on privacy and data protection.⁵⁶ Its main points are that all actions related to RPAS must respect the right to respect for privacy as set out in the European Convention on Human Rights, that the draft EU General Data Protection Regulation will apply to data processing by private or commercial RPAS operators, that domestically public video surveillance using RPAS might be restricted by local laws and might need harmonising, that the draft Police and Criminal Justice Data Protection Directive will set minimum standards for state data processing, and that 'Privacy and Data Protection by Design' should be applied to payload development and automated deletion of data and could become a principle for civil RPAS operations.

Privacy concerns are noted and feature in two 'soft law' documents, including one adopted by the International Association of Chiefs of Police. In addition to regulations and law, the existence of 'soft-law' should be noted. So far, two main codes have been promulgated. In August 2012, the Aviation Committee of the International Association of Chiefs of Police (IACP) adopted its 'Recommended Guidelines for the use of Unmanned Aircraft'.⁵⁷ As noted in the section on Privacy and Data Protection, the Guidelines acknowledge that 'privacy concerns are an issue

⁵³ <<http://www.legislation.gov.uk/uksi/2005/1089/contents/made>> (accessed Nov. 2012); see also <<http://www.caa.co.uk/default.aspx?pageid=4510>> (accessed Nov. 2012).

⁵⁴ *Protecting Privacy From Aerial Surveillance*, <<http://www.aclu.org/files/assets/protectingprivacyfromaerialsurveillance.pdf>> (accessed Nov. 2012).

⁵⁵ <<http://www.fas.org/sgp/crs/natsec/R42701.pdf>> (accessed Nov. 2012).

⁵⁶ See n. 41.

⁵⁷ <www.theiacp.org/portals/0/pdfs/IACP_UAGuidelines.pdf> (accessed Dec. 2012).

that must be dealt with effectively if a law enforcement agency expects the public to support the use of UA by their police'. Thus, for example, it has provisions that agencies should not retain images unless part of an investigation, required as evidence, or required by law and that retained images should be open for public inspection unless exempted by law.

The Association for Unmanned Vehicle Systems International adopted the Unmanned Aircraft System Operations Industry 'Code of Conduct'. It is 'built on three specific themes: Safety, Professionalism, and Respect'.⁵⁸

AIR SAFETY Australia introduced the world's first civil UAV legislation in 2002. Acknowledging that technology advances have rendered these regulations obsolete, Australia's Civil Aviation Safety Authority (CASA) is now proposing a radical rewrite of the rules that could result in hundreds of small commercially operated UAVs taking to the skies, including those operated by media.⁵⁹

Currently there are just 33 CASA-approved commercial UAV operators in Australia, mainly deployed on scientific research, surveying, and aerial photography. The approvals process can take months and costs thousands of dollars, with applicants required to complete about 90% of a conventional private pilot's course.

Pending consultation with industry, the CASA is expected to recategorise all commercial UAVs in four weight classes, to be flown under the same rules as hobbyists until they receive specific exemptions. Operators of the smallest, Group A, weighing 2kg or less, will simply be able to fill out an online authorisation form, receive electronic approval, and start flying. Senior CASA officer Jim Coyne says the safety risk posed by this group is negligible, comparable to being hit by a cricket ball.

A cricket ball weights about 160 grams, but at 100 kilometres per hour, [with a] kinetic energy of about 62 joules . . . there's been no recorded incident of anyone being killed by a cricket ball in the stand.

The potential for harm and the consequence is very low.

We talk about a harmless UAS, causing minimal harm to a person. If it hits them on the head it will give them a headache. If it hits them in the back it will give them a bit of a bruise, but it is not going to kill you.

The larger the drone, the more stringent the controls. The 2–7kg class will require a risk assessment, and CASA will provide a half-dozen-page rule book. Jim Coyne notes: 'Potential for harm goes up, still it's not going to do a lot of damage . . . that's seven kilograms, about the weight of a six-month-old baby, at 14 knots, or 26 kilometres per hour.' He says operators proposing to launch the biggest drones in Group D will face greater scrutiny.

For example, the Scan Eagle weighs about 20kg, it can fly at about 15,000 feet, it can be on station for 20-plus hours, and flies about 120kph. It can fly to New Zealand, it can fly internationally . . . that person will be licensed, that person will have a full risk assessment, and it will be treated like a real aircraft.

CASA can expect resistance to this proposed restructure from sections of the piloted aviation community, which points out that drones carry no effective systems to avoid collisions.⁶⁰ It is not an unwarranted concern. Last year a commercial helicopter pilot reported he had already had one near miss with an unidentified

⁵⁸ <www.auvsi.org/conduct> (accessed Dec. 2012).

⁵⁹ Corcoran, 'Drones Set'.

⁶⁰ Corcoran, 'Drones Set'.

drone and in November 2011, a Royal Australian Navy target-towing jet encountered an unidentified drone while flying at 3,000 feet, 65 nautical miles east of Jervis Bay in NSW. The mystery drone was not operated by the Australian or US military or any of the certified civilian operators.⁶¹

Policy and regulation, then, are important factors that require attention of news organisations planning to employ RPAS. They will require knowledge of domestic requirements and those of other countries in which they plan to deploy the vehicles. These factors add complexity to the use of RPAS in journalism, but problems can be avoided through forethought and planning.

⁶¹ M. Corcoran, 'The Kill Chain: Australia's Drone War', *ABC News Online – Foreign Correspondent Special*, <www.abc.net.au/news/2012-06-08/australias-drone-war-in-afghanistan/4058058>.

4. Journalistic Operational Issues

Remotely piloted aerial vehicles have the potential to be effective platforms for images from above and to provide new ways of covering stories at ground level. From the journalistic standpoint, however, they create issues and concerns that news executives and journalists need to consider when deciding whether to acquire RPAS and how to employ them.

Aerial photographs and video adds context to story, provide rich illustrations of the scale of crowds, impact of natural disasters, flooding, or drought, and allow photography in locations where photographers cannot reach because of dangers or impediments to access. Audiences have grown to expect events to be portrayed and stories to be told from multiple viewpoints and RPAS make it possible for more news organisations to offer aerial vantages under more conditions.

Separate from the story-telling benefits, the aircraft also provide an effective means for news organisations to determine what is happening and gather information when they are not able to be within sight of events or the scale of events is too large to perceive from their ground locations.

Images obtained improve the range and quality of content available to news editors and producers and augment the use of helicopters or fixed-wing piloted aircraft that may not be available or appropriate for the use. RPAS do not answer all needs of journalists for aerial support. Helicopters, for example, can carry journalists, camera crews, and equipment to inaccessible locations or be diverted from news gathering to rescue persons in distress.

In most uses RPAS will be operated at lower cost than traditional manned aircraft. Their use does not replace traditional journalist image and information gathering, but supplements existing methods or provides more flexible ways for doing so. They also provide safety benefits by keeping journalists out of harm's way in covering violent or otherwise dangerous situations, do not endanger pilots and crew in case of accident, and are likely to do less damage to persons and property on the ground should they fall from the sky.

In addition to breaking news and investigative uses, RPAS can be used in sports coverage of bicycle races, marathons, and football matches where they can provide different visual perspectives than the cable- and track-based robotic cameras currently used.

Uses of RPAS in journalistic settings have already begun. Some have involved trial uses by news organisations, some by research organisations, and others by civic society organisations.

In Russia, Air Pano launched a remote-controlled Hexacopter to take pictures showing the scale of the crowd in Bolotnaya Square in Moscow during an election fraud protest 10 December 2011.⁶² An anonymous activist launched a small RoboKopter over riots in Warsaw, Poland, on 12 November 2011 then uploaded the panoramic vision to YouTube.⁶³ A group of citizen journalists flew a drone over the crowds to show the large scale of an anti-government rally in Argentina, protesting against rising inflation, violent crime, and corruption on 8 November 2012.⁶⁴

Interest in RPAS is growing. National Public Radio (NPR) in the US received a grant to develop drones for news-gathering purposes⁶⁵ and research in their use is

⁶² <www.airpano.com/360Degree-VirtualTour.php?3D=Moscow-Bolotnaya-Square-Rally&set_language=2> (accessed Nov. 2012); <<http://rt.com/news/duma-reelection-moscow-rally-467/>>.

⁶³ <<http://defensetech.org/2011/11/16/video-civilian-uav-films-polish-riots-from-above/#ixzz2DhTJQx2D>>; <<http://diydrones.com/profiles/blogs/uavs-can-be-used-to-watch-the-watchers-too>>; <www.robokopter.pl/en/aktualnosci/10-aktualno%C5%9Bci/92-11th-november-2011-warsaw-demonstration-during-the-independence-march.html>.

⁶⁴ <<http://stream.aljazeera.com/story/drone-camera-captures-argentinan-8n-protests>> (accessed Nov. 2012); <www.aljazeera.com/news/americas/2012/11/201211911150228531.html>.

⁶⁵ <www.politico.com/blogs/media/2012/11/npr-affiliate-launches-drone-program-150409.html?hp=r5> (accessed Nov. 2012).

being funded by media firms and foundations at the University of Missouri School of Journalism and the Drone Journalism Lab at University of Nebraska.

Australian journalists and producers are ahead of colleagues in most countries and media drones have already taken to Australian skies, both legally and in defiance of the rules. Australian drone journalism first hit the headlines in controversial style in 2011, when the Channel Nine *60 Minutes* programme defied authorities by flying a small multi-rotor drone over the Christmas Island immigration detention centre, where hundreds of asylum seekers were held. After being denied entry to the facility, the *60 Minutes* team launched a multi-rotor to record exclusive, if somewhat unremarkable, aerial images of the detention centre, before the craft crashed into the sea. Following complaints from the Immigration Department, the Australian Federal Police investigated the incident but no laws appeared to have been broken and Australian civil aviation authorities declined to pursue the matter.⁶⁶

In late 2012, Fox Sports launched FoxKopter, a small multi-rotor to cover several games of the Twenty20 Big Bash Cricket series. Flying 30 metres clear of the spectators, FoxKopter gave TV audiences an up-close-and-personal view of the match play. After a successful summer, the drone has already been deployed for the National Rugby League.⁶⁷ In early 2013, Australia's Seven Network TV current affairs programme *Sunday Night* deployed drones on two stories. Several small UAVs were sent aloft at various locations across the country, culminating on the Australia Day national holiday for a segment 'Great Southern Land – Australia by Drone'.⁶⁸ Seven also dispatched an approved UAV operator to accompany a *Sunday Night* team to Bangladesh, for a feature report 'Graveyard for Giants' on the perils of the beach shipbreaking industry. While the story has been periodically covered by international media, the airborne imagery provided a compelling new perspective, illustrating the scale and physical risks of the shipbreaking enterprise.⁶⁹

None of these examples qualifies as live news gathering and all were preceded by considerable planning, conducted in a clearly defined location, contracted out to flight operators with appropriate aviation approvals, but they reveal the range of settings in which RPAS can be used and improve the content provided.

Coverage Influences Technology Chosen

News organisations face a variety of consideration in decisions to acquire and operate RPAS. The first involves deciding how they will be used journalistically, because this has implications for the technologies employed.

In the simplest uses they can be employed merely to provide photographs or videos that give an aerial view of locations or events. If a limited duration flight is required and line of sight is maintained with the craft, HD-quality live video can be streamed back to the ground controller. However, if the small RPA flies beyond line of sight, and is operated by FPV, the craft is usually controlled by a lower resolution video link, while the HD video is stored and captured on memory cards until the RPA lands. Similarly, if sophisticated image stabilisation technologies are required and abilities to control focus and zoom camera lenses from the ground are required, larger aircraft will be required.

If the use will require longer flights or move out of the sight of the operator, larger scale RPAS with greater remote flying capabilities are needed and data downloads might require use of a satellite or a secondary aircraft.

⁶⁶ Corcoran, 'Drone Journalism'.

⁶⁷ Corcoran, 'Drones Set'.

⁶⁸ T. Noonan, Channel 7 Australia, 3 Feb. 2013.

⁶⁹ A. Russell, *Graveyard for Giants*, Channel 7 Australia, 17 Feb. 2013.

This may call for a layered approach to their use, acquiring small, hovering vehicles for urban work and covering natural disasters, nearly disposable UAVs for combat areas where recovering them after use may be impossible, and fixed-wing aircraft for larger, more lengthy uses.

Simple systems can be employed by a single operator – a journalist or photographer for example – as part of coverage activities, but more complex systems can require three personnel. This is because the aviation activity is complicated, needs training, and must adhere to flight safety regulations, so attention must be devoted to differing functions: a pilot is necessary to remotely fly the vehicle, ensure air safety and regulatory compliance, and make light repairs to air frame; a camera/payload controller operates the camera and audio (if any) and manages downlinks and video capture; and a flight director is responsible for overall management and supervision and handling direct dealings with journalists, producers, or directors who cannot be allowed to distract or interfere with the pilot and payload controller.

Use of RPAS will not merely create operational issues for news organisations, but will also raise journalistic issues and concerns regarding relations with officials and the public. Because RPAS are not yet in regular journalistic use it is not clear what new issues they will pose for journalism practice, but a few issues are apparent based on past experience; other issues will be expected to arise with use.

Relations with Emergency Services/Law Enforcement

The use of RPAS raises a number of issues involving emergency services and law enforcement. Two major issues require sensitivity and coordination, but are not new challenges to journalism.

The first involves avoiding and not interfering with emergency aircraft such as police helicopters, air ambulances, or fire-fighting aircraft. This issue will become increasingly important as these services adopt RPAS of their own and are likely to fly at heights similar to those of drones used by news organisations.

News organisations operating manned aircraft have typically coordinated with emergency services – and other media organisations – in cities where they regularly operate simultaneously to ensure safety, avoid interference with emergency operations, and permit best possible news gathering. These operations are also regulated by normal flight rules and it is the pilot who is regulated by law not journalists.

As RPAS come into play, similar coordination and regulation will be needed, but if small drones are deployed by journalists they will become the regulated operator and must be cognisant of their aviation as well as journalistic responsibilities.

The second issue involves police–journalist conflicts in cases where security concerns exist. Journalists are sometimes excluded from locations for safety reasons and live coverage can sometimes endanger police operations. RPAS will reduce exclusion for the former reason, but can still present problems in the latter case. It is also likely that the use of drones may lead to additional demands from police and prosecutors for access to video footage and still images obtained through their use. How the public will perceive this is uncertain.

A related problem occurs because police in some jurisdictions have detained or arrested journalists and photojournalists attempting to cover events. In the case of RPAS this could create a significant problem because of what happens to an RPAS in the air if the pilot or pilot-journalist is seized. Journalists and authorities may need to create special identifications or uniforms that essentially warn ‘If you arrest me, a flying lawnmower falls on someone’s head’.

Uses in Covert Journalism

RPAS have uses in situations where news organisations find it desirable to obtain images without being observed or in places where easy access for photography is not possible.

It has been suggested that RPAS have uses in investigative journalism and that they could be used to visually document illegal activities, such as revealing polluters operating on private land, smuggling activities, or unsanitary agricultural conditions. Such documentation might not otherwise be possible without the uses of aerial vehicles.

Some uses of RPAS in investigative activities, however, would move journalists' activities closer to those of private detectives. This raises significant ethical and legal issues that would need consideration within newsrooms and the profession and to inform uses that would be made of the technologies. Aerial platforms, for example, would make it possible to discretely follow public officials or others to clandestine meetings or to hover outside windows photographing or even listening in on meetings. With high-definition cameras, it might be possible even to photograph documents at a distance.

Like all tools, RPAS can be used in a variety of ways but the desirability and legality of doing so needs to be considered.

PERCEPTIONS OF COVERT MEDIA USE Because application of drones in journalism is only just emerging, it is unknown how the public will react to their use. In some parts of the world drones are associated with military targeting and it is uncertain how far will local people be willing or inclined to distinguish between a news organisation's drone and one used by an intelligence agency for surveillance or identifying targets. Even in locations where they are not being used for military purposes, it is uncertain how far people be willing to accept surveillance and other uses of RPAs.

Airborne Paparazzi

It is likely that non-journalists and non-journalistic photographers, such as paparazzi, will also adopt unmanned aircraft for their purposes and this may ultimately affect perceptions of their journalistic use.

Imagine a camera drone slowly climbing to a 30th-floor hotel window. Now visualise the face of the targeted celebrity, caught in an indiscrete moment: the million-dollar money shot.⁷⁰

The potential certainly exists because fines or confiscation of a drone would provide little disincentive when the rewards are potentially so large. To date there's very little evidence that paparazzi in Australia, the United States, or the UK have taken to this new technology with any great enthusiasm, but the potential exists.

Typical multi-rotors cannot efficiently lift the big heavy lenses that most paparazzi prefer for 'stand-off' shots, and if a drone can get close enough to a suitable target, the noise generated might remove the elements of discretion and surprise. The development of quieter drones and better digital photography may remove that element however.

Isolated paparazzo use of RPAS is occurring, however, and was featured in a 2010 documentary *Sharks of the French Riviera*, which recorded their exploits in tracking Paris Hilton and other American celebrities at the Cannes Film Festival and along the beach resorts of southern France.⁷¹ The 'Sharks' launched a €30,000

⁷⁰ Corcoran, 'Drone Journalism Takes Off', ABC News Online, 21 Feb. 2012.

⁷¹ <<http://www.youtube.com/watch?v=aMp50M1vs4M>>.

(£25,000/\$39,000) multi-rotor over a beach party, recording more than 100 still images on a memory card, before returning to the launch point. Despite being subsequently confronted by Paris Hilton's bodyguards, they managed to escape with their pictures.

Privacy Issues

The use of drones raises a number of privacy and civil liberty issues for journalists to consider that go beyond the legal issues of privacy invasion. These involve ethical concerns related to the building and maintenance of trust between the public and news organisations and the credibility of journalism.

Issues of privacy arise in cases where the public has expectations of privacy, such as persons in their backyards or on rooftops. Companies such as Google, which use land-based and satellite imagery in their mapping operations, have already encountered problems in this area and news organisations will soon experience them because of overflights.

News organisations will thus have to consider privacy in cases where images of individuals who are not in public spaces or engaged in news-worthy activities are obtained. Such uses have both ethical and legal implications. National laws regarding privacy vary significantly in different jurisdictions, especially with regard to images obtained outdoors, and these will be applied to images taken from UAVs or new laws may be put into place as a consequence of their use.

The use of drones also raises the question whether press intrusion on private individuals and celebrities will become much worse if they track an individual on and off private property in a way that a press photographer or paparazzo, even with a long lens, might not be able to do.

Some journalists are concerned that using RPAs may place them on the wrong side of the privacy/surveillance debate – especially if the state employs them and unethical journalists or photographers use them in ways to which the public objects. This, it is feared, could lead to the perception that journalists are part of the surveillance state and harm the credibility of journalism and news organisations.

Civil Liberty Issues

The use of unmanned aerial vehicles for surveillance activities in communities – whether by authorities or private parties (including journalists) – has raised civil liberty concerns, as has use of CCTV in public and private places.

In the United States, the pro-drone lobby (led by industry group the Association for Unmanned Vehicles International, AUVSI) is locked in a struggle with growing numbers of US privacy advocates, led by the American Civil Liberties Union, which is concerned by the mass surveillance capabilities of this technology and its potential misuse by police. A number of US state and regional governments have also begun banning civilian drone operations in their locales before the concept has even taken off.

These disputes may lead to restrictions that affect the use of drones not only by government agencies but news organisations as well. Some journalists are concerned that opponents of drones will be suspicious of news organisation uses of UAVs and promotion of facilitating policies, perceiving them as a powerful institution with the ability to observe others who are unable to avoid scrutiny or don't have access to the same technologies.

Third-Party Images

News organisations will increasingly be offered photographs and video from private sources, raising questions about the authenticity and context of materials provided

by other UAV operators, as well as the ethics of obtaining images in ways in which journalists might not otherwise participate. In Australia, if UAV images offered to the media are gathered illegally, CASA has indicated that the agency will investigate the drone operator, not the broadcaster or media outlet.

Many activists and activist groups – especially environmental and animal rights organisations – have already employed RPAS to document pollution, animal conditions, and illegal activities. These have been used in their documentaries and are now being offered to journalists. In the United States, state and Federal legislators have introduced ‘Ag Gag’ bills with anti-drone fly-over provisions to prevent activists and journalists from documenting illegalities in the agricultural sector.

The use of RPAS sometimes violates flight regulations, may constitute trespass, might be the result of privacy invasion, or conflict with other ethical concerns, so journalists need to be aware of and consider these in choices whether to use aerial images from other parties.

Safety Concerns

A fundamental concern over journalistic uses of RPAS is that major news events would produce a plethora of media drones, contesting for airspace with RPAS of emergency services and piloted aircraft. This would endanger not only the drones, but people in piloted aircraft and on the ground should collisions or other accidents occur.

Although similar issues of air safety exist today with piloted media aircraft, the scale and scope of the issue would be expanded through the use of drones by multiple news organisations, including those who have not traditionally used helicopters and fixed-wing aircraft.

Current first person view technologies for piloting civilian RPAs at a distance are not highly developed, and line-of-sight control from the ground will become even more difficult in a swarm of drones. As the number of drones used by authorities, media, and private individuals increases, the risks of aircraft crashing into each other or the locations of surveillance and on members the public will increase. It is unknown how far the public is willing to tolerate the risks inherent in increased uses of RPAs by media and private individual in such situations.

Journalist Safety

The use of RPAS by journalists creates some safety-specific journalist concerns, particularly in war zones. Although use of small drones has great potential for keeping journalists out of the line of fire in combat settings whilst still acting as a witness to events, it also make them vulnerable to parties who might target journalists.

The ability of combatants to track radio signals needed to control RPAS, operate on-board cameras, and download images provides the opportunity to locate journalists and make them vulnerable to attack. This is not an unrealistic scenario given the number of attacks and deaths of journalists in recent years by parties tracking their mobile and satellite phone signals. It will thus need to be taken into consideration when operating in combat zones.

Many journalists might also be concerned about mistrust generated amongst combatants, as well as the public, through the use of the same kinds of technologies that might be employed by government and other combatants. It might also be difficult for combatants to identify journalists operating RPAS as civilians and increase the likelihood of them being fired upon.

Journalistic uses of RPAS thus raise a variety of professional and legal concerns, and probably many not currently imaginable, which will influence how,

and the purposes for which, they are used. They do provide useful functions for news organisations, but can have public opinion and legal consequences so news executives will need to consider their uses carefully so as not to negate the benefits they provide.

The questions for journalists and news organisations are whether RPAS provide more advantages than disadvantages in terms of content acquisition, relations with authorities, and public responses to their civilian use.

5. Conclusions

Remotely piloted aircraft will be common in the skies of many nations in the near future because they offer distinct opportunities and advantages to journalism. The critical factor that remains to be addressed is the creation of balanced rules that facilitate media use of RPASs whilst maintaining the safe operations of air space.

As news organisations begin to integrate their use they will also need to overcome a degree of public ambivalence or resistance to the technologies because of concerns in some countries over their military uses, uses by police, and privacy concerns. Consequently, journalists will need some sensitivity to ethical concerns surrounding their use.

Due to the rapid global proliferation of small, highly capable camera-equipped RPAS in the last three to four years, aviation regulators are expressing concerns over their inability to enforce rules governing RPAS use. Responsible news organisations will need to work cooperatively with regulators to ensure air safety and conditions under which RPAS can be effectively used for news gathering.

The advantages of RPAS are significant: the costs of aerial photography will go down, allowing more media outlets to use it and the simplicity and size of some systems will allow a single journalist to operate them. This may lead to a 'drone journalist' arriving on the scene of a breaking story, removing a small multi-rotor from a backpack which is launched into a hovering drone swarm, mixing with drones, helicopters, and fixed-wing aircraft from larger media outlets, along with those of police, emergency services, and even bystanders.

Where the development of remotely piloted aircraft is taking us is unclear and it may even revive interest in the concepts of aerial trespass and nuisance that were recognised in some jurisdictions at the beginning of flight. In some countries there may be heavy resistance to their use, but in other countries restrictions may be levied only against certain uses or underline or extend privacy rights because of the widespread utility of RPAS.

Remotely piloted aircraft can be expected to become increasingly useful to journalism in the future. News executives and journalists will need to attend to the developments and issues surrounding their use in order to determine whether they will accept them and use them in effective, ethical, and safe news reporting.

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Workshop Participants

The following individuals were participants in the Reuters Institute for the Study of Journalism Programme on Comparative Media Law and Policy, University of Oxford, Workshop 'The Future of UAVs in News Gathering and Media Production', 22 October 2012. This report includes topics raised during the workshop discussions, but does not necessarily reflect the views and opinions of the participants. The authors of the report are solely responsible for its content.

Daniel Bennett
Kings College London

Ant Miller
BBC

Chris Blackford
Sky Futures

Robert G. Picard
University of Oxford

Gerry Corbett
UK Civil Aviation Authority

Mark Stephens CBE
Finers Stephens Innocent

David Goldberg
University of Oxford

Nabiha Syed
New York Times

Dominic Harrison
Channel 4

Judith Townsend
City University London

William Hayes
BBC

Amanda Trelfall
BAE Systems

Susan Jeffryes
Thales Group

Matt Waite
University of Nebraska

Gary Kebbel
University of Nebraska

Jonathan Webber
Callen Lenz

About the Authors

David Goldberg is an associate fellow, Centre for Socio-Legal Studies, University of Oxford. He directs the deeJgee Research/Consultancy and is a Lecturer for Glasgow Caledonian University's communications law course and Senior Visiting Fellow, Institute of Computer and Communications Law in the Centre for Commercial Law Studies, Queen Mary College, University of London. He was previously on the faculty of the School of Law, University of Glasgow, founded the *Journal of Media Law*, and he is a fellow of the Royal Society of the Arts.

Mark Corcoran is a senior reporter and producer for the Australian Broadcasting Corp. where he is directing a project examining news-gathering applications of drone technology. He is also a visiting fellow of the University of Technology, Sydney, researching privacy, regulatory, and safety implications of 'drone journalism'.

Professor Robert G. Picard is Director of Research at the Reuters Institute in the Department of Politics and International Relations at University of Oxford, a research fellow at Green Templeton College (Oxford), and a fellow of the Royal Society of Arts. A specialist in media economics and policy, he is the author and editor of 27 books. He received his Ph.D. from the University of Missouri, Columbia, and has been a fellow at the Shorenstein Center at the John F. Kennedy School of Government at Harvard University. He has consulted and carried out assignments for governments in North America, Europe, Africa, and Asia and for international organisations including the European Commission, UNESCO, and the World Intellectual Property Organisation. He has been a consultant for leading media companies in North America, Europe, Asia, Africa, and Latin America.

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