

DRONING THE STORY

by

ALEXANDRA SUZANNE GIBB

B.A. (Hons.), Simon Fraser University, 2011

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF JOURNALISM

in

The Faculty of Graduate Studies

THE UNIVERSITY OF BRITISH COLUMBIA

(Vancouver)

April 2013

© Alexandra Suzanne Gibb, 2013

Abstract

Drones, or unmanned aerial vehicles, have dominated headlines over the past decade for their controversial role in hunting and killing suspected militants in the Middle East and northern Africa. Increasingly, they are also making headlines for their rapid appropriation by civil society. Among the earliest adopters of drone technology are journalists who are striving to be cutting edge in a floundering industry. This essay provides a comprehensive exploration of drone journalism: its technological evolution, its potential domestic and international applications, and the foreseeable ethical challenges it presents to journalists and audiences. It consists of five distinct, yet interrelated parts: The first section defines what is meant by the term “drone” and the current legal status of civilian drone operations in the United States. The second section outlines the historical evolution of drone technology, beginning with the invention of the world’s first model aircraft in ancient Greece and ending with the development of Lockheed Martin’s semi-secret stealth reconnaissance drone. The third section briefly describes the role of backyard “tinkerers” in the development of drone technology. The fourth section explores the various uses of news drones and provides examples of each. And the fifth section delves into the ethical challenges facing drone journalists.

Such an examination is necessary because new technologies are often developed, embraced, and employed long before the adequate formulation of ethical standards and practices. Ultimately, this essay finds that journalists can use drones to enhance breaking and daily news coverage, investigative reporting, conflict and disaster reporting, and photojournalism. Doing so, however, presents a number of ethical challenges related to individual privacy, “Little Brother” surveillance and journalistic independence, the gamification of news, and psychological harm, thereby necessitating a reimagining of traditional journalism ethics codes.

Preface

David Beers, adjunct professor at the University of British Columbia's Graduate School of Journalism, and Taylor Owen, research director at Columbia University's Tow Center for Digital Journalism, approved this project on April 12, 2013.

Table of Contents

Abstract.....	ii
Preface.....	iii
Table of Contents.....	iv
1. Droning the story.....	1
1.1 A drone by any other name.....	2
1.2 The evolution of (un)manned flight.....	7
1.3 The “Making” of a revolution.....	16
1.4 Drone journalism redefines storytelling.....	23
1.5 Breaking and daily news.....	23
1.6 Investigative reporting.....	27
1.7 Conflict and disaster reporting.....	30
1.8 Photojournalism.....	34
1.9 “Little Brother” is (not) watching you.....	36
1.10 Drones and privacy.....	38
1.11 Drones and surveillance.....	45
1.12 Drones and gamification.....	48
1.13 Drones and psychological harm.....	55
1.14 Conclusion.....	58
References.....	60

1. Droning the story

Greek mythology's Daedalus of Athens—the master craftsman who constructed the deceptive Cretan labyrinth that caged the monstrous Minotaur—is looking for a means to escape the Greek island when he invents flight. With his beloved son Icarus by his side, Daedalus crafts two sets of wings out of feathers and wax. He attaches one set to Icarus' shoulders and the other to himself. He then instructs his son to “Stay in the middle. ... If you go lower, the water will weigh down the feathers; higher, the sun's heat will scorch them” (Ovid, 2010, p. 212). With that, the two embark on their long journey home. Initially, Icarus is fearful of flying and follows closely in his father's path. Soon, however, he is drawn to the sky and soars higher. “Proximity to the blazing sun softens the scented wax that bound the feathers and the wax melts” (Ovid, 2010, p. 212). Icarus “beats his naked arms,” but cannot catch the wind (Ovid, 2010, p. 212). He falls to the sea and drowns.

Enterprising journalists are equipping themselves with a new set of wings that will take their storytelling abilities to new heights. Like Icarus, however, those who are seduced by the thrill of flight and dismissive of the potential (ethical) dangers may find themselves plummeting to their professional deaths. This essay provides a comprehensive exploration of drone journalism: its technological evolution, its potential domestic and international applications, and the foreseeable ethical challenges it presents to journalists and audiences. Ultimately, it finds that journalists and news organizations can use drones to enhance breaking and daily news coverage, investigative reporting, conflict and disaster reporting, and photojournalism. Doing so, however, presents a number of ethical challenges related to individual privacy, “Little Brother” surveillance and journalistic independence, the gamification of news, and psychological harm, thus necessitating a reimagination of traditional journalism ethics codes.

The following consists of five distinct, yet interrelated parts: The first section defines what is meant by the term “drone” and the current legal status of civilian drone operations in the United States. The second section outlines the historical evolution of drone technology, beginning with the invention of the world’s first model aircraft in ancient Greece and ending with the development of Lockheed Martin’s semi-secret stealth reconnaissance drone. The third section briefly describes the role of backyard “tinkerers” in the development of drone technology. The fourth section explores the abovementioned uses of news drones, providing several examples of each. And the fifth section delves into the abovementioned ethical challenges facing drone journalists. Such an examination is necessary because new technologies are often developed, embraced, and employed long before the adequate formulation of ethical standards and practices.

1.1 A drone by any other name

Flying machines with no human in the cockpit manning the yoke have been called many names: drones, pilotless aircraft, remotely piloted aircraft, remotely piloted vehicles, robot planes, unmanned aerial vehicles, unmanned aerial systems, unmanned aircraft, and even zenanas—a term “which both sounds like the aircraft’s distinctive buzz and is Arabic slang for a nagging wife” (Morely, 2012, para. 5; Wilson, 2011).

But, as demonstrated in the following section, determining what exactly constitutes a drone proves challenging given such a diversity of design and function. Here is how some government regulators define them:

U.S. Department of Defense (2007):

A powered vehicle that does not carry a human operator, can be operated autonomously or remotely, can be expendable or recoverable, and can carry a lethal or nonlethal payload. Ballistic or semi-ballistic vehicles, cruise missiles, artillery projectiles, torpedoes, mines,

satellites, and unattended sensors (with no form of propulsion) are not considered unmanned vehicles. Unmanned vehicles are the primary component of unmanned systems. (Office of the Secretary of Defense, 2007)

U.S. Federal Aviation Administration (2010):

[A] device used or intended to be used for flight in the air that has no onboard pilot. This includes all classes of airplanes, helicopters, airships, and translational lift aircraft that have no onboard pilot. Unmanned aircraft are understood to include only those aircraft controllable in three dimensions and therefore exclude traditional balloons and unpowered gliders. (Federal Aviation Administration, 2010a)

European Aviation Safety Agency (2009):

Individual system elements consisting of an “unmanned aircraft,” the “control station,” and any other system elements necessary to enable flight, i.e. “command and control link” and “launch and recovery elements.” There may be multiple control stations, command and control links, and launch and recovery elements within a UAS. (European Aviation Safety Agency, 2009)

Transport Canada (2010):

A power-driven aircraft, other than a model aircraft, that is operated without a flight crewmember on board. ... Unmanned air vehicles may take the form of airships, aeroplanes, or rotorcraft. Basically, they could be considered to be any unmanned aircraft that performs a useful mission and can be remotely controlled or has autonomous flight capability. (Transport Canada, 2010)

North Atlantic Treaty Organization (2010):

An aircraft that does not carry a human operator and is capable of flight under remote control or autonomous programming. A UA is designed to be recoverable, but can be

expendable and can carry a lethal or nonlethal payload. UA are rotary or fixed-wing aircraft or lighter-than-air vehicles capable of flight without an onboard crew. (North Atlantic Treaty Organization, 2010)

These definitions are tremendously broad, but do share a few general characteristics: That is, a drone is an autonomous or remotely piloted powered aircraft capable of flying without an onboard operator or passengers. This generally excludes balloons, gliders, and kites.

How regulators define what constitutes a drone is extremely important because it dictates who is able to fly them, what they are able to fly, and for what purposes. The Federal Aviation Administration (FAA) currently restricts the operation of non-recreational civilian drones in U.S. airspace (Bennett, 2012). Any public entity interested in flying a drone higher than 400 feet and/or for non-recreational purposes in the U.S. must apply for and obtain a Certificate of Waiver or Authorization (COA) from the FAA's Air Traffic Organization (Federal Aviation Administration, 2011; Lynch, 2012). Meanwhile, private entities interested in flying drones for experimental or research purposes must apply for and obtain a Special Airworthiness Certificate (SAC) (Federal Aviation Administration, 2011; Lynch, 2012). Commercial drone operations remain prohibited. According to the Electronic Frontier Foundation, a nonprofit dedicated to digital rights, some 700 to 750 COAs and SACs were granted between 2006 and April 2012, approximately 300 of which remain active (Lynch, 2012). Those with authorization include (un)manned aircraft manufacturers, state and local governments, U.S. Customs and Border Protection, U.S. Defense Advanced Research Projects Agency, the U.S. military, and universities (Lynch, 2012).

The recreational operation of civilian drones (55-pounds and under), meanwhile, is loosely regulated by a set of voluntary guidelines put forth by the FAA in June 1981 (Federal Aviation Administration, 1981). An Advisory Circular notes that "model aircraft can at times

pose a hazard to full-scale aircraft in flight and to persons and property on the surface” (Federal Aviation Administration, 1981, para. 2). Therefore the FAA recommends, among other things, 1) operating unmanned aircraft away from populated or “noise sensitive” areas; 2) ensuring the unmanned aircraft is airworthy before flying near spectators; and 3) flying the unmanned aircraft under 400 feet, in the operator’s line-of-vision, and away from airports and commercial air traffic (Federal Aviation Administration, 1981). These guidelines are reinforced in the *FAA Reauthorization and Modernization Act of 2012* discussed below.

As unmanned technology becomes less expensive to acquire, operate, and maintain, however, more drones will likely be flying overhead in the not-too-distant future. Teal Group Corporation, a team of aerospace and defense analysts, estimates that worldwide spending on drone technology will increase from \$6.6 billion in 2012 to \$11.4 billion over the next decade (Finnegan, 2012). As a result, the FAA predicts there will be as many as 30,000 drones buzzing through American airspace by 2030 (Federal Aviation Administration, 2010b).

The rapid appropriation of drone technology by civilians has the FAA concerned about potential safety implications (U.S. Government Accountability Office, 2008). Drones pose a collision risk because they still lack the technology to detect, or “sense,” and avoid other aircraft. Likewise, drones are challenging to fly and prone to crashing (U.S. Government Accountability Office, 2008). For example, a \$200 million Global Hawk—a high-altitude, long-endurance surveillance drone owned and operated by the U.S. Navy—crashed during a routine training operation near Salisbury, Maryland in June 2011 when its pilot lost control (Lawrence, 2012). Similarly, law enforcement officers in Montgomery County, Texas crashed a \$300,000 ShadowHawk—a 50-pound unmanned helicopter—into their own armoured SWAT vehicle in March 2012 when the drone lost contact with the operator’s controls (Kell, 2012; Vanguard Defense, n.d.). And drones designed and built by do-it-yourself enthusiasts often fall out of the

sky due to pilot and technical errors or simply a gust of wind (Gustin, 2012). “These things crash,” said Aaron Brodie, a freelance photojournalist and producer for CNN, in an interview last October (personal communication, October 12, 2012). Brodie is a radio-controlled aircraft hobbyist and one of the first journalists to use a camera-equipped drone to film the aftermath of a violent EF4 tornado that ripped through Tuscaloosa, Ala. in April 2011. “These things are not commercial aircraft. Batteries can run out, motors can fail, propellers can break and, most importantly, you’re flying at a low level. I mean, I’ve crashed into trees” (personal communication, October 12, 2012).

This is, in part, what prompted U.S. President Barack Obama to sign the abovementioned *FAA Reauthorization and Modernization Reform Act of 2012*, which tasks the aviation authority with safely integrating “civil unmanned aircraft systems into the national airspace system” by September 30, 2015. Among other requirements, the bill dictates that the FAA determine which drones—according to their “size, weight, speed, operational capability, proximity to airports and populated areas, and operation within visual line of sight”—do not pose a (safety) threat to other users of domestic airspace, the public, or national security, and whether or not authorization should be required to operate them.

The FAA’s definition of what constitutes an unmanned aircraft will thus have an enormous impact on the ability of individuals, groups, and organizations to utilize drone technology for civilian purposes—including, but not limited to, precision agriculture, firefighting, resource exploration and extraction, power and pipeline inspection, search and rescue operations, photography and videography, atmospheric research and (extreme) weather reconnaissance, geophysical mapping and research, and wildlife research and tracking (“How drones will revolutionize farming,” 2013; Wall, 2011; Gahrn, 2012; Morris, 2012; Ungerleider, 2012; Duffy, 2012; “Drones fly over Calgary,” 2013; Dillow, 2012; Beckhusen, 2012; “Ecology drones,”

2012; “Google cash,” 2012; Platt, 2012; Di Napilo, 2012). It will also determine whether or not enterprising journalists will be able to deploy drones to gather and report the news.

1.2 The evolution of (un)manned flight

Before delving into the use of drones for journalistic newsgathering, it is important to understand the origins of drone technology. (Un)manned flight is nothing new. In fact, ancient Greek philosopher and mathematician Archytas of Tarentum is credited with inventing the world’s first model aircraft, known as “the Pigeon,” between 428 and 347 B.C. (Dalamagkidis & Valavanis & Piegle, 2012, p. 12). The mechanical bird, which was made of wood and powered by steam enclosed in its stomach, flew more than 600 feet before crashing and needing to be reset (Dalamagkidis & Valavanis & Piegle, 2012, p. 12). During the same period, halfway around the world, the Chinese were experimenting with hot air balloons, kites, and spinning tops capable of vertical flight (Dalamagkidis & Valavanis & Piegle, 2012, p. 12; Yinke, 2011).

Contemporary unmanned aerial vehicles, however, trace their beginnings to the early 20th century when the beating drums of World War I awakened the innovative spirit of industrialism. In 1915—twelve years after Orville and Wilbur Wright invented and successfully flew the world’s first “power-driven, heavier-than-air” airplane in 1903—Serbian-American inventor Nikola Tesla published a dissertation predicting the future of war:

The art of telautomatics, or wireless control of automatic machines at a distance, will play a very important role in future wars and, possibly, in the later phases of the present one. Such contrivances, which act as if endowed with intelligence, may take the shape of aeroplanes, balloons, automobiles, surface, or underwater boats, or any other form according to the requirement in each special case. They will have far greater ranges and

will be much more destructive than the implements now employed. (Tesla, 1915, para. 34)

Tesla believed the unmanned aerial torpedo, in particular, would render fortress-penetrating siege guns like the “Big Bertha” howitzer “obsolete” (Tesla, 1915, para. 34).

Tesla never translated his ruminations into reality. However, his ideas came to fruition the following year with the advent of the guided missile. For two years, Britain’s conventional weapons proved no match for Germany’s sophisticated fleet of (un)manned aerial vehicles, including explosive-laden super zeppelins, which “slipped over the British coast silently and at great height” and “dropped their bombs on utterly unsuspecting targets” before melting away (Cruickshank, 2011, para. 16). In search of new defenses, the British military promoted English engineer and inventor Archibald Low from a volunteer service member in the Royal Flying Corps to head of the clandestine RFC Experimental Works program in hopes that his civilian research on radio guidance systems would lead to new weapons delivery platforms (Smithson, 2012; Wolfgang, 2012; Thompson, 2012; Kennedy, 2012). Low worked with a handpicked team of 30 men—including jewelers, carpenters, and engineers—to develop an “Aerial Target,” a radio-controlled flying bomb that could easily penetrate the outer skeleton of German zeppelins and/or strike ground targets (Warne, 2012). The team successfully completed its first trials in 1917, but the project was dropped soon after the war ended.

Across the pond, similar unmanned aerial technology was being developed by the U.S. Navy to combat the German U-boat threat (Pearson, n.d.). Elmer Sperry, inventor of the gyroscope, had been designing and developing automatic stabilization technology for maritime vessels since 1896 and for aircraft since 1909. Inventor and electrical engineer Peter Cooper Hewitt, meanwhile, had been advancing wireless telegraphy and telephony since 1898 (B, 1921). The two teamed up in 1915 to co-develop a pilotless flying bomb that would “act as a flying

torpedo, carrying onboard intelligence to sustain flight over long periods of time without human intervention” (Feron & Johnson, 2008, p. 1010). Supported by the U.S. Naval Consulting Board, of which both inventors were members, Hewitt and Sperry equipped a handful of Navy-furnished Curtiss N-9 seaplanes with Sperry’s automatic control and stabilization gear (Pearson, n.d.). The first test flight of the “Hewitt-Sperry Automatic Airplane” was completed in September 1917 with an onboard pilot to control take-off and landing. The automated controls reportedly flew “the plane to the designated target and [dropped] a bag of sand on command” (Pearson, n.d., para. 16). Two months later, an onboard pilot was no longer needed and “30-mile test flights were being made regularly with an error in range of about two miles” (Pearson, n.d., para. 16).

After several successful demonstrations, Sperry decided to experiment with a more efficient airframe—one uniquely designed for remote control mechanisms. He obtained six modified N-9s, later known as the Curtiss-Sperry Flying Bomb, “with an empty weight of 500 pounds, a top speed of 90 miles-per-hour, a range of 50 miles and the capability of carrying an explosive load of 1,000 pounds” (Pearson, n.d.). Sperry insisted the flying bomb would become “the gun of the future” and would “make war so extremely hazardous and expensive no nation [would] dare go into it” (Pearson, n.d.). However, a year’s worth of disappointing test flights and the end of World War I led to the program’s cancellation in 1918.

Interest in unmanned aerial technology waned in the years following World War I, but was reinvigorated as German Fuhrer Adolf Hitler threatened Europe with his genocidal expansion of the Third Reich in the mid-1930s. In 1934, World War I British flyer turned stunt pilot turned movie star Reginald Denny formed “Reginald Denny Industries” (later the “Radioplane Company”) and opened a hobby shop for model aircraft enthusiasts on Hollywood Boulevard (Singer, 2011). For the next several years, Denny and his business partners designed, built, and popularized radio-controlled model aircraft, which they sold as do-it-yourself kits for

between \$10 and \$25 (Bennett, 2001, para. 3). Toward the end of the decade, as U.S. involvement in World War II became inevitable, “Denny got the idea that cheap radio-controlled planes would make perfect targets to give more realistic training to antiaircraft gunners” (Singer, 2009, p. 49). He purchased the rights to a lightweight engine designed by engineer and fellow radio control hobbyist Walter Righter and installed it on one of his more sophisticated radioplanes, or “Dennyplanes.” He pitched the system to the U.S. Army Air Corps and won a contract for 53 units in 1940 (Singer, 2009, p. 49; Newcome, 2004, p. 57-61). In the years immediately following, the Army purchased an additional 15,000 units, making it the “first mass produced unmanned plane in history” (Singer, 2009, p. 49; Singer, 2011, para. 2). Denny moved his manufacturing operations to a factory in California where, coincidentally, army photographer Private David Conover spotted a “buxom” female assembly worker spraying Dennyplanes with fire retardant (Singer, 2009, p. 50). Conover “thought this woman had potential as a model and sent his photos to a friend at a model agency” (Singer, 2009, p. 50). Soon thereafter, she left her job at the factory, “dyed her mousy brown hair to platinum blond,” and changed her name from Norma Jeane Dougherty to Marilyn Monroe (Singer, 2009, p. 50). Denny’s Radioplane Company was purchased by Northrop Corporation, which later merged with Grumman Aerospace to form today’s defense giant Northrop Grumman, in 1952 (Singer, 2009, p. 50; Northrop Grumman, n.d.).

World War II witnessed several other ambitious projects that contributed to the development of unmanned aerial technology, including top-secret U.S. military operations Aphrodite and Anvil. According to *Wired for War* author Peter W. Singer, director of the 21st Century Defense Initiative and senior fellow in foreign policy at the Brookings Institution, by 1944 Germany had produced and deployed the world’s first operational cruise missile (the V-1), ballistic missile (V-2), jet fighter (Me-262), and drone (FX-1400, or “Fritz”) (Singer, 2009, p. 47-

48). The latter was “a 2,300-pound bomb with four small wings, tail controls, and a rocket motor” that “would drop from a German plane flying at high altitude. The controller in the plane would then guide it into the target using a joystick that steered by radio” (Singer, 2009, p. 48).

Germany’s sophisticated arsenal of both manned and unmanned aerial vehicles contributed to the deaths of some 33,000 Britons—more than 8,000 of which were killed by V-1s and V-2s—by war’s end (Weeks, 2000, para. 3).

In response to Germany’s aggressive aerial campaign, the Allied forces carried out bombing raids against Hitler’s vulnerable rocket facilities on the Baltic Coast (Weeks, 2000). However, hundreds of German rocket launchers were secured in seemingly impenetrable concrete bunkers and subterranean factories that were too difficult for manned bombers to strike (Weeks, 2000, para. 2). Therefore, the U.S. Army Air Forces launched Operation Aphrodite and the U.S. Navy launched Operation Anvil wherein distressed or obsolete manned bombers, like Boeing’s B-17 “Flying Fortress” and Consolidated Aircraft’s B-24 “Liberator,” were converted into explosive-laden drones that could be flown into Germany’s V-1 and V-2 launch sites by remote control (Singer, 2009, p. 48; Weeks, 2000; Spark, 2004). A two-man crew “would fly the plane during takeoff, arm the explosives in midair, and bail out. A mothership flying nearby would then take control of the bomber remotely and, using two television cameras mounted in the drone’s cockpit, steer the plane into Nazi targets” (Singer, 2009, p. 48).

Early tests flights—flown without explosives—in Florida and later Great Britain were executed safely, but “proved inconclusive” (Weeks, 2000, para. 9). Even so, the U.S. Army Air Forces authorized the first of 15 Aphrodite missions on August 4, 1944. That same day, four modified B-17s, reclassified as a BQ-7 Aphrodites, loaded with 22,000 pounds of Torpex explosive were deployed toward German V-1 and V-2 launch sites. All of them crashed before reaching their intended targets, killing one crewmember (Miller, 2006, p. 301-302). Subsequent

missions by both the U.S. Army Air Force and the U.S. Navy resulted in similar failures, the most infamous of which occurred on August 12, 1944 when a modified B-24, reclassified as a BQ-8, exploded minutes into the flight (Miller, 2006, p. 302; Parsch, 2003). Both pilots—35-year-old father of three Wilford J. Willy and 29-year-old Joseph Kennedy Jr., the older brother of future U.S. President John Fitzgerald Kennedy—were killed instantly (Miller, 2006, p. 302). Their remains were never recovered (Miller, 2006, p. 302; Singer, 2009, p. 48; Spinetta, 2011; Yenne, 2004, p. 20).

According to Singer, the military cancelled the drone program shortly after Kennedy's death "for fear of angering the powerful Joe Sr." (Singer, 2009, p. 49). As a result, the U.S. fell behind other western military powers, including Great Britain and Israel, in the design, development, and use of remote control systems (Singer, 2009, p. 49). For the next two decades, advancements in imagery technology and guidance systems led only to small developments in unmanned reconnaissance aircraft. Shortly after the start of the Vietnam War, for example, Ryan Aeronautical Company's widely used target drone, the Firebee, was transformed into a long-range unmanned spycraft capable of autonomous navigation along a predetermined flight path. Known as the Ryan Model 147, and later the AQM-34 Lightning Bug and Firefly series, the drone flew over enemy territory "performing electronic signal-gathering intelligence, camera reconnaissance, and various decoy radar signal transmissions" (Jarnot, 2011, p. 11). Upon completion of the mission, the intelligence payload, which was attached to a parachute, was ejected from the drone and recovered in midair by a nearby helicopter (Spinetta, 2011). Between 1965 and 1975, Lightning Bugs flew thousands of reconnaissance sorties over China and Southeast Asia (Spinetta, 2011). Despite so much success, however, the program was cancelled after the Vietnam War in favour of more reliable and less costly "manned aircraft projects and other technologies" (Spinetta, 2011, para. 27).

A similar reconnaissance drone, known as the D-21 Tagboard, was also developed during this time by Lockheed Martin's clandestine Skunk Works program (Spinetta, 2011). Like the Lightning Bug, the D-21 Tagboard was an autonomous long-range unmanned spycraft capable of flying "at speeds in excess of Mach 4" with a range of 3,450 miles (Spinetta, 2011, para. 23). Several failed missions over China, however, led to the cancellation of the program in 1969 (Spinetta, 2011).

While the U.S. "largely ignored" drone technology in the decades following Joseph Kennedy Jr.'s death, other Western nations did not (Spinetta, 2011, para. 28). During the 1973 Yom Kippur War, the Israeli Air Force purchased two types of American-made reconnaissance drones—Ryan Aeronautical's Firebee 1241 and Northrop Grumman's BQM-74 Chukar—for use against Arab coalition forces (Zaloga, 2008). According to Maj. Ronald McGonigle,

The UAVs fooled radar operators and defense systems. The ruse caused Arab defenses to expend their surface-to-air missiles (SAMs) and [anti-aircraft artillery (AAA)] against the UAVs, giving the second wave of manned aircraft a chance to penetrate the SAM and AAA defenses during a period of reloading. (McGonigle, 1992, p. 6)

This allowed Israel to successfully attack enemy defenses with minimal risk to manned systems (McGonigle, 1992).

The proven value of pilotless aircraft during the Yom Kippur War motivated the Israeli government to invest more resources in the research and development of drones. The result was Israeli Aircraft Industries' (IAI) Scout and Tadiran Electronic Systems' Mastiff, small remotely-piloted vehicles "the size of a large model airplane with inexpensive new lightweight video cameras to provide real-time surveillance" of the battlefield (Zaloga, 2008, p. 22). In the year leading up to the 1982 Lebanon War, Israel used the Scout and Mastiff as tactical reconnaissance platforms to gather photographs and electronic intelligence data on Syrian SAM facilities and

launch locations. This provided the Israeli Air Force “with a highly accurate threat picture, time for extensive planning, and time to tailor a force ideal for the upcoming battle” (McGonigle, 1992, p. 7). When the battle actually began, the drones “provided continuous video coverage for the IAF strike commander, collected [electronic warfare] information, lased targets for aircraft employing laser-guided munitions, precisely directed artillery fire onto the threat locations, jammed [enemy] communication frequencies, and provided real-time [bomb damage assessment]” (McGonigle, 1992, p. 9). Many thus recognize Israel as having developed the first modern drones. Both models remained in service until the 1990s.

The success of Israel’s unmanned systems in the 1970s and 1980s reinvigorated U.S. interest in drones. And, in fact, America’s most infamous drone has Israeli roots. In 1980, former Israeli Air Force engineer Abraham Karem founded Leading Systems and “retreated into his three-car garage in Hacienda Heights outside Los Angeles and, to the bemusement of his tolerant wife, began to build an aircraft” (Finn, 2011, para. 1). More than a year later, he transported a “cigar-shaped” aircraft, known as the “Albatross,” to Utah’s Dugway Proving Ground where he demonstrated its “ability to stay aloft safely for up to 56 hours” (Finn, 2011, para. 3). This sparked the interest of the U.S. Defense Advanced Research Projects Agency, which funded Karem’s company to develop more capable iterations of the drone. The Albatross became the Amber, which, in turn, became the today’s Predator (“The dronfather,” 2012). U.S. defense giant General Atomics was awarded a contract to further develop the Predator in 1994. That same year, the long-endurance, medium-altitude drone made its battlefield debut as an intelligence, surveillance, and reconnaissance platform over the Balkans.

While America has deployed Predators in every conflict since, their role has dramatically changed (Finn, 2011; “The dronfather,” 2012). Prior to the September 11 terrorist attacks, drones were not weaponized. In 2000, during two separate spy missions over Afghanistan,

Predators flown by the U.S. Central Intelligence Agency (C.I.A.) spotted wanted al-Qaeda leader Osama bin Laden. In the first instance, intelligence officials failed to properly identify him until it was too late to act. In the second instance, a Predator spotted “a tall man dressed in white robes with a physical and operational signature fitting bin Laden. A group of 10 people gathered around him were apparently paying their respects for a minute or two” (Tenet, 2004, p. 15). Predators tracked him until poor weather conditions forced their return to the U.S. Almost immediately, however, the U.S. Air Force and C.I.A. began discussing the possibility of weaponizing the Predator “by adapting it to carry and fire Hellfire missiles” (Tenet, 2004, p. 15). They reasoned that armed Predators would allow them to “accurately and promptly respond to future sightings of high-value targets” (Tenet, 2004, p. 15). In other words, an armed Predator could kill America’s most wanted within minutes of finding him (Gellman, 2002).

The first missile launched from a weaponized Predator took place on February 16, 2001 in Nevada (Baker, 2001). While initial tests proved inconclusive and several technical problems remained unsolved, the September 11 attacks on the Pentagon and World Trade Centre fast-tracked the deployment of armed Predators for use against terrorism suspects (McKelvey, 2011). The hunter-killers began flying over Afghanistan in October and carried out the first targeted killing four months later (Sifton, 2012). On November 3, 2002, six suspected militants were killed by a C.I.A. Predator strike in Yemen, marking “the first use of an armed Predator as an attack aircraft outside a theatre of war” (Pike, 2002, para. 1). Today, the Predator (and its bigger, more powerful variant, the Reaper) is America’s weapon of choice in the War on Terror.

U.S. spending on dozens of drone-related projects increased from \$350 million in 2001 to \$4.1 billion in 2011 (Priest & Arkin, 2011). As a result, more than one-third—or 7,500— aircraft operated by the U.S. Armed Forces are now unmanned (Gertler, 2012). Unlike the drones of yesteryear, however, today’s drones come in a variety of shapes and sizes with vastly different

capabilities: For example, AeroVironment’s bio-inspired Hummingbird weighs less than six pennies and is agile enough to fly through open windows. Northrop Grumman’s “lighter-than-air” helium-filled airship (known as the Long Endurance Multi-Intelligence Vehicle, or LEMV) is as long as a football field, as high as a seven-storey building, and powerful enough to provide 21 days of unblinking surveillance. QinetiQ’s solar-powered Zephyr is a high-altitude, long-endurance surveillance drone that weighs 100 pounds, has a wingspan of 75 feet, and can soar up to 60,000 feet for more than 14 days without refueling. Lockheed Martin’s Falcon (HTV-2) is a hypersonic drone that can travel at 20 times the speed of sound and will soon be capable of striking targets anywhere in the world within one hour. The 4.2-pound Raven and the 3.5-pound Draganflyer X6 are drones used by the U.S. military and domestic law enforcement agencies, respectively, for tactical surveillance and reconnaissance missions. And Lockheed Martin’s stealth Sentinel—which is reportedly equipped with electronic eavesdroppers, a microwave weapon that can zap enemy electronics systems, atmospheric sampling technology that can detect underground nuclear facilities, and jamming systems that can infect enemy communications with malicious malware—carries out clandestine spy missions over enemy territory (Gibb, 2012a; Gibb, 2012b).

1.3 The “Making” of a revolution

As delineated above, the development of drone technology is intimately tied to the military-industrial complex of Western nations. Over the past few years, however, developments in drone technology have also been born of an age-old “tinkering” tradition. Chris Anderson, former editor-in-chief of *Wired* magazine, published an article last June on the magazine’s *Danger Room* blog explaining how he “accidentally kickstarted the domestic drone boom” (Anderson, 2012a).

One sunny Friday afternoon in March 2007, I started planning what I'd hoped would be a deliciously geeky weekend with the kids. In the usual stack of products that had come into the *Wired* offices that day to be reviewed, there were two that seemed especially promising: a robotics kit and a ready-to-fly radio control airplane. I settled on a schedule: We would build robots on Saturday and fly planes on Sunday. Awesomeness would surely ensue. (Anderson, 2012a, para. 14)

Perhaps unsurprisingly, Anderson's children lost interest when the robotic three-wheeled rover they built from a Lego Mindstorm kit fell short of the "laser-armed humanoid" transformers they watch on television (Anderson, 2012a, para. 15). Anderson was frustrated with the apparent failure of his "geekdad weekend" until he realized that many of the sensors included in the Mindstorm kits are the same sensors required to build an autopilot: "accelerometers ('tilt sensors'), electronic gyroscopes, a compass, and a Bluetooth link that could connect to a wireless GPS sensor" (Anderson, 2012a, para. 17). He tinkered with hardware and software at his dining room table for a few weeks and eventually "developed a Lego autopilot that had most of the functionality of a professional device, if not the performance" (Anderson, 2012a, para. 18).

In need of a lightweight and inexpensive platform on which to install his autopilot, Anderson established DIYDrones.com as a forum for fellow drone enthusiasts to share their ideas, research, and projects and to help each other troubleshoot (Anderson, 2012a).

Initially, members would just post code and design files for their own projects, showing off for each other in a form of nerd braggadocio. But over time, we set up more organized systems of collaboration, including version control systems and file repositories, wikis, mailing lists, and formal team assignments. 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. (Anderson, 2012a, para. 20)

Today, DIYDrones.com claims to be the largest community of drone enthusiasts on the web with over 26,000 registered members (Anderson, 2012a, para. 5). And, according to Anderson's estimates, "around 1,000 new personal drones ... take to the sky every month" (Anderson, 2012a, para. 5). He has since left his position at *Wired* and co-founded 3D Robotics, a company that sells the hardware and software necessary to build drones at home.

Anderson may be giving himself a little too much credit by claiming to have "kickstarted the domestic drone boom" (Anderson, 2012a). After all, industrious tinkerers like Archytas, Reginald Denny, and Abraham Karem have, for centuries, taken to their backyards, basements, and garages to develop the tools and toys of tomorrow. There is, however, little doubt that Anderson has become the iconic visage of a resurging trend: "making."

In his new book, *Makers: The New Industrial Revolution* (2012), Anderson situates the domestic drone boom in the maker movement, which describes "a wide variety of activities, from traditional crafting to high-tech electronics" (Anderson, 2012b, p. 20). Unlike do-it-yourself enthusiasts in the past, makers use 21st century digital tools—like computer-assisted design software—to blueprint their inventions "onscreen" and upload files to a commercial manufacturing service for small-scale or mass production (Anderson, 2012b, p. 18). Alternatively, makers with 3-D printers can simply hit "print" and have their invention prototyped within minutes. According to Anderson,

The beauty of the web is that it democratized the tools both of invention and of production. Anyone with an idea for a service can turn it into a product with some software code ... no patent required. Then, with a keystroke, you can 'ship it' to a global market of billions of people. (Anderson, 2012b, p. 7-8)

Makers today are also more likely to “share their creations online” since they are part of the open-source web generation that values grassroots collaboration (Anderson, 2012b, p. 21).

This is important because many of today’s drone journalism pioneers can be located within the maker movement. Matthew Schroyer is a data and drone journalist at the University of Illinois Urbana-Champaign (UIUC) with a “gearhead background” (personal communication, October 24, 2012). Schroyer, whose father was a mechanic and grandfather was a machinist for a coal-mining company, grew up building and flying radio-controlled airplanes. “The machinery was very much in my blood,” said Schroyer in an interview last October (personal communication, October 24, 2012). Because he grew up around a lot of machining equipment, he said it was a “no brainer” to study mechanical engineering at university (personal communication, October 24, 2012). But as Schroyer progressed in his degree, he realized his “head really just wasn’t in it” and he soon became distracted by journalism (personal communication, October 24, 2012). He switched his major to mass communications, graduated in 2008 with a specialization in print and electronic journalism, and began “earning his wings” at a twice-weekly newspaper in the “middle of nowhere” Missouri (personal communication, October 24, 2012). Economic and political setbacks led to layoffs at the newspaper, prompting a “disenfranchised” Schroyer to pursue a Master in Journalism at UIUC (personal communication, October 24, 2012).

In 2010, Schroyer discovered that his childhood hobby has grown “exponentially in a very interesting direction” (personal communication, October 24, 2012). Radio control enthusiasts are combining sensors—such as accelerometers, gyroscopes, and GPS—with microcontrollers to make autopilots. “When you put an autopilot together with an RC airplane, you end up with a drone,” explained Schroyer. “I thought, ‘Wow, that’s pretty cool” (personal communication, October 24, 2012). Realizing drone technology can be used to collect aerial images and data for journalism, Schroyer began building and experimenting with drones in his

basement: “A lot of this stuff coincides, interestingly, with this sort of maker revolution that’s going on. There [are] a lot of people doing very interesting things out of their own basements that before [required] very advanced, very expensive machinery,” said Schroyer (personal communication, October 24, 2012).

A year later, in November 2011, Schroyer founded the Professional Society of Drone Journalists (DroneJournalism.org), a website where members can share their approaches to building drone platforms, publish their works of or research on drone journalism and, most importantly, collaboratively construct a drone journalism code of ethics. Also included on the site is a blog chronicling Schroyer’s designing, constructing, testing, and tweaking of drones for journalists. “What we’re trying to accomplish at DroneJournalism.org is a happy medium between the \$50,000 commercial drone with all the bells and whistles and the \$500 toy. We don’t need it to have all the capabilities and sensors of a warzone-ready drone. At the same time, it has to be able to take some abuse,” writes Schroyer on the blog (Schroyer, 2012a, para. 1). Schroyer is currently developing the “JournoDrone 3.”

Another early pioneer of drone journalism with roots in the maker movement is Aaron Brodie, a freelance photojournalist and producer for CNN who has had an interest in radio-controlled aircraft since he was a child. As the former producer/news manager for multimedia and interactive storytelling at CNN.com, Brodie traveled to Tuscaloosa, Ala. in April 2011 to photograph the aftermath of the violent EF4 tornado that had recently devastated the region. Days earlier, Rupert Murdoch’s now defunct tablet newspaper *The Daily* published an aerial video of the destruction reportedly shot using an off-the-shelf \$300 smartphone- or tablet-controlled Parrot AR.Drone (“Daily drone is loose,” 2011). Brodie said in an interview last October that his boss thought *The Daily*’s footage was “cool” and wanted to do something similar “because not as many people are going to see it on *The Daily* as on CNN.com” (personal communication,

October 12, 2012). Brodie borrowed a Parrot AR.Drone from a coworker, rigged a GoPro camera to it, and drove from Atlanta, Ga. to Tuscaloosa where he flew it over demolished homes, through tangled power lines, and across debris-strewn roads. The captured video—which was grainy and shaky—was edited and posted on CNN’s *This Just In* blog (Roegiers, 2011).

A couple weeks later, Brodie learned that *The Daily*’s footage was actually gathered by a third party media company (Mortimer, 2011). “When I saw that, I was like palm to face,” said Brodie. “No wonder theirs looks so good. . . . They had something that was way more suited for that task. You watch theirs and it went really high up and really smooth” (personal communication, October 12, 2012). Brodie said he learned an important lesson that day: “If I’m going to get into this drone thing, then I have got to have something a lot better than a Parrot” (personal communication, October 12, 2012). He said the Parrot is “amazing” for those just starting out in drone journalism because it allows one to learn the basics of drone operations and to discover what possibilities and challenges drones create for newsgathering. It is also accessible, inexpensive, and easy to operate. Even so, Brodie said he wanted to come up with something better.

The Discovery Channel’s *Storm Chasers* (now cancelled) was a documentary television series that followed teams of adventurers, filmmakers, and scientists as they intercepted tornadoes in the central and southeastern U.S. One team, led by meteorologist Reed Timmer, drove an armoured chase vehicle into the eyes of storms to gathering data and video footage. Brodie was working with Timmer at the time and decided to pitch him the idea of flying custom-made “drone probes” into tornadoes to gather data. “We’d get close enough and launch this thing full speed, right into a tornado, with a weather probe right on it because [Timmer’s] whole thing, just like the movie *Twister*, [is] to get these weather probes up inside the tornado,” said Brodie. “It’s frustrating to do from a vehicle because you have to stay on the road and . . . tornados just

don't always agree. You can't plan it that much" (personal communication, October 12, 2012). Brodie said Timmer "loved" the idea and welcomed him to the team. Brodie helped design and build a "super durable" aluminum drone that is easy to fly and can be quickly repaired in the field. "This thing was bulletproof," said Brodie. "There's no glue. Everything is either welded or ... it's screws and nuts and bolts" (personal communication, October 12, 2012). The first time he took it on a tornado chase, it was still in prototype stage and had two wires crossed. Every time it took off, the motors were reversed and it would spin uncontrollably into the concrete at high speeds. "I crashed this thing into the pavement like ten times," said Brodie. "I finally realized I had the wires crossed, put the wires back, took off, flew no problem" (personal communication, October 12, 2012).

During the design process, Brodie thought about how his drone could also be used by journalists, believing that unmanned technology could open up a "whole other world" for the news industry: "It could be balloons. It could be ground-based remote-controlled vehicles—they all use the same batteries, the same radio controls, the same motors, the same everything," he said. "There are radio-controlled trucks that will go 60 miles-per-hour and pull a 90-pound boy across a carpeted floor and can climb rocks. What if we put a live-camera on that and sent it down the streets in Benghazi?" (personal communication, October 12, 2012).

Schroyer and Brodie are just two examples of journalists who are designing and building drones in their backyards, basements, and garages. "This isn't Woodward and Bernstein here," said Schroyer. "This is something more grassroots that's happening" (personal communication, October 24, 2012). But not for long. In an attempt to remain competitive and cutting edge in a floundering industry, major news organizations are quickly adding drone technology to their newsgathering arsenals. National Public Radio affiliate KBIA recently received a \$25,000 grant from the University of Missouri-Columbia, where the station is based, to design and build news

drones (Byers, 2012a; Sefton, 2012). Others—like FOX5-Vegas morning meteorologist Ted Pretty—are purchasing do-it-yourself drone kits online. And the world’s first Drone Journalism Lab at the University of Nebraska-Lincoln is using a \$50,000 grant from the Knight Foundation to purchase a handful of off-the-shelf drone models that they are testing and modifying for journalists. Al Jazeera English, BBC, and CBS, among others, have also expressed interest in or are actively using drones for storytelling (“Domestic drones on the rise,” 2011; LizMartinezG, 2011; Postgate, 2012; Pfeiffer, 2013; Stahl & Bonin, 2012; Jefferies, 2012).

1.4 Drone journalism redefines storytelling

There are at least four primary uses for news drones envisioned by the pioneers of drone journalism: breaking and daily news, investigative reporting, conflict and disaster reporting, and photojournalism. While the FAA’s current legal restrictions keep most non-recreational drones grounded, there are already a few examples of journalists using drones in each of these categories.

1.5 Breaking and daily news

Drones, first and foremost, can be used to augment traditional breaking and daily news coverage. Activist and journalist Tim Pool used an off-the-shelf drone, nicknamed the “Occuicopter,” to live-stream coverage of the 2011 Occupy Wall Street protests and police response (Captain, 2012). Occupy Wall Street began in September 2011 when a group of activists gathered in New York’s Zuccotti Park to protest, among other things, corporate greed and the growing socioeconomic divide between the privileged “one-percent” and everyone else. Within weeks, the movement spread across the U.S. and around the world.

By this time, according to *Wired*, Pool had already developed an international reputation for live-streaming broadcasts of the Occupy protests from his smartphone (Captain, 2012; Fields & Duff, 2011). So when police began arresting journalists and restricting access to Occupy

spaces, he knew he needed a backup plan. He started experimenting with two modified Parrot AR.Drones to document police and protestor activity. “It’s going to be monitoring everybody” at the demonstrations, said Pool in an interview with *The Atlantic*’s Adam Martin (Martin, 2011, para. 3). “If there’s a black bloc, they’re going to get caught too. It’s going to show people the truth, whether that’s wrongdoing by protestors, by police, or by anybody else in the area” (Martin, 2011, para. 3). Video shot by Pool on his smartphone and posted on his UStream channel shows his friend setting up a drone near 60 Wall Street, N.Y (Pool, 2011). “When the news happens, we now have access to aerial videography and photography,” Pool is heard explaining to his online audience (Pool, 2011). He later told several media outlets that he plans to develop an unmanned zeppelin, dubbed the “Occu-Eye,” capable of live-streaming video from onboard cameras while it hovers dozens of feet above the ground. He wants it to be Internet-controlled, so if police arrest one operator, another can takeover (Captain, 2012).

A recent CBS *60 Minutes* story on the salvaging of the half-submerged Costa Concordia luxury cruise liner serves as another example of how drones can be used for daily newsgathering. On the evening of January 13, 2012, the \$563 million Italian ship ran aground near Tuscany’s Isola del Giglio soon after embarking on a weeklong Mediterranean journey (Erlanger, 2012). Of the 4,229 passengers and crewmembers on board, 32 died and dozens more were injured (Pianigiani, 2012). One year later, salvage companies continue to remove the overturned ship from “the pristine waters of marine sanctuary” (Pianigiani, 2013, para. 1).

CBS *60 Minutes* correspondent Leslie Stahl and senior producer Rich Bonin traveled to Italy in December 2012 for an update on the salvaging operations. Using a drone, they were able capture never-before-seen video of the ship’s interior since the wreckage. “We got these drones, which are almost like toy airplanes that you used to have when you were kids, and you attach a miniature camera to it and then some guy with a joystick steers it,” explained Bonin in a behind-

the-scenes video (Stahl & Bonin, 2012). “You could get within inches of the ship with this remote control drone” (Stahl & Bonin, 2012).¹ The footage was packaged into a [13-minute television segment](#) with animated graphics, contextual narrative, interviews, and traditional videography.

The Drone Journalism Lab’s coverage of the drought that scorched the Midwestern U.S. in summer 2012 serves as yet another example of how drones can be used for daily newsgathering. By October, Nebraska’s Platte River was reduced to a stream as searing temperatures evaporated one of the state’s major sources of water. With help from UNL’s Nebraska Intelligent MoBile Unmanned Systems (NIMBUS) lab—which is dedicated to developing more sophisticated drone technology—the team flew a \$25,000 Falcon 8 drone made by Ascending Technologies over the river to get an aerial view of the drought’s impact on water supplies (Waite, 2012). The drone footage was incorporated into a short online news story with expert interviews and contextual narrative (“Nebraska’s drought of 2012,” 2012).

According to Ben Kreimer, a Drone Journalism Lab student, the drone enabled the team to gain a perspective other news organizations could not. Kreimer said in an interview last October that a drone can perform the same tasks as news helicopters, but save newsrooms “ridiculous amounts of money, perhaps even human lives, because a human doesn’t have to leave the ground” (personal communication, October 19, 2012). He added that unlike helicopters, which have to fly at least 500 hundred feet above ground for safety reasons, drones can “operate

¹ This was not the first time CBS dabbled in drone journalism. In January 2013, a CBS affiliate in Florida used a Parrot AR.Drone to capture aerial footage of the Palm Beach Mall demolition. This story, which normally would not have aired outside of West Palm Beach, made national headlines when a swarm of bees attacked the drone and its operators. Approximately one minute into the video, which shows a backhoe tearing at the former walls of Sears, bees can be seen darting toward the drone’s camera lens. Later, the drone is maneuvered toward the news truck where the crew can be seen running for cover (Pfeiffer, 2013).

within that space, from ground-level up to 500 feet, and get into places a helicopter would not” (personal communication, October 19, 2012).

Another enterprising journalist using drones for daily news coverage is FOX5-Vegas morning meteorologist Ted Pretty. Pretty has worked for numerous television news stations throughout his career, not one of which owns a helicopter. “Aerial video was something competitors used for everyday traffic reports and breaking news,” writes Pretty on DroneJournalism.org (Pretty, 2012, para. 1). “My station(s) just didn’t have that option” (Pretty, 2012, para. 1). Last year, however, he read a news article about drone journalism and decided to build his own. He took a distance course through Unmanned Vehicle University to learn the basics and then purchased a do-it-yourself kit online: “I wanted to buy one I could build for troubleshooting purposes in case something [goes] wrong,” said Pretty in an interview last November. “I want to be able to fix it myself and tinker with it and adjust it. So that’s what I did” (personal communication, November 9, 2012).

Since then, Pretty’s wife Heidi Heyes has posted several drone-captured videos on her YouTube channel, including beauty shots of Black Mountain, Mission Hills Park, Sloan Canyon, a local toy drive, and the construction of a new Wet ‘n Wild theme park. A special holiday video of Pretty’s Blaven Drive neighbourhood decked out in Christmas lights—set, of course, to the theme song from *National Lampoon’s Christmas Vacation*—has also been posted (Heyes, 2012). “It’s perfect for a local meteorologist to get video of a nice day, to get people going about their lives in the park . . . some shots of the local mountains,” said Pretty. “There’s no way a station would spend the resources to get those shots if they have a helicopter, which is an exorbitant amount of money” (personal communication, November 9, 2012).

Indeed, in all of the abovementioned examples, drones allowed journalists to capture imagery they likely could not have obtained by any other means. News helicopters weigh several

tonnes and are not easily maneuverable. They also cost anywhere from a few hundred thousand to millions of dollars to purchase (depending on their size and equipment) and millions more to maintain and operate every year. News drones, meanwhile, typically weigh less than 10 pounds, can be piloted anywhere by anyone, require an initial investment of just a few hundred to a few thousand dollars, and cost pennies to maintain and operate. This makes them widely accessible to even the most financially strapped newsrooms. Drones are therefore democratizing the airways, giving journalists aerial access to news events as they unfold.

1.6 Investigative reporting

In addition to breaking and daily news, drones are powerful tools for investigative reporting. In January 2012, an unidentified radio control hobbyist in Dallas, Texas was flying his camera-equipped drone over Trinity River when he noticed something peculiar: “I was looking at images after the flight that showed a blood red creek and was thinking, ‘Could this really be what I think it is?’” the hobbyist told *sUAS News* (Mortimer, 2012, para. 3). As it turns out, a secondary pipe connected to Oak Cliff slaughterhouse—owned by Columbia Packing Company—was pumping pig blood into a creek that flows into Trinity River. The hobbyist reported his findings to the authorities and a lengthy investigation ensued.

According to a local CBS affiliate, the plant was shut down and indicted on 18 criminal charges in December (“Columbia packing owner,” 2012; Fink, 2012). The company faces up to \$250,000 in fines, while the former owner and his vice president “face water pollution and physical evidence charges,” potentially leading to jail time (“Columbia packing owner,” 2012, para. 8; Fink, 2012). Schroyer said this kind of investigation is going to be the “biggest selling point” of news drones, adding that what the hobbyist did “is something that a newspaper should have done had they had the technology” (personal communication, October 24, 2012).

Australia's *60 Minutes* program has also deployed a drone for investigative newsgathering. In May 2011, reporter Liam Bartlett and two producers investigated the onslaught of asylum seekers illegally arriving in Australia. Traditionally, these individuals are sent 2,000 kilometres across the Indian Ocean to a detention centre on Christmas Island (Bartlett & Sacre & Townsend, 2011). The *60 Minutes* crew decided to give its audience an inside look at the centre: "Tonight an insider breaks her silence and with the help of the latest spy technology, we will show you what is really happening behind the barbed wire," the show begins (Bartlett & Sacre & Townsend, 2011).

Bartlett explains that the visit has been pre-arranged by a refugee policy advocate and, in compliance with the rules, they supplied their names to the detention centre in advance. Even so, the journalists were denied entry upon arrival. After several attempts to have the visit (re)approved, Bartlett decides their best chance of showing "how and where asylum seekers are detained" is by flying over the centre with a drone: "It's unconventional, but I think it's the only chance we've got of being able to see inside. At least this way we could see over those high fences," he says (Bartlett & Sacre & Townsend, 2011). The team conveniently brought a hexacopter with them. They fly it over the detention centre, revealing the property's layout, design, and fire damage in high-definition.

These cases demonstrate how journalists can use drones to access otherwise restricted spaces for the purpose of investigating abusive or hazardous behaviour. It is important to note that in both of the abovementioned instances, no laws appear to have been broken. In 1946, the U.S. Supreme Court case ruled in *United States v. Causby* that the ancient doctrine extending ownership of land "to the periphery of the universe ... has no place in the modern world" (*United States v. Causby*, 1946). Rather, "the air is a public highway" and landowners own only "as much of the space above the ground as [they] can occupy or use in connection with the land" (*United*

States v. Causby, 1946). However, the Court also found that flights over private land that are “so low and so frequent as to be a direct and immediate interference with the enjoyment and use of the land” could be deemed unlawful (*United States v. Causby*, 1946). Similar court rulings have been made in Australia. Therefore, a onetime recreational flight over a meatpacking plant or a detention centre is unlikely considered interference.

Perhaps the biggest advantage of using drones as investigative tools is their ability to collect sensory data. Hurricane Andrew hit South Florida as a Category 5 storm on August 24, 1992, causing more than \$20 billion in damage (“Hurricane facts,” 1994). At the time, Miami was experiencing a housing boom: “Developers were buying up large, cheap tracts of land” and “suburbanizing” them with new houses, according to a blog post written by Schroyer (Schroyer, 2011, para. 19). Stephen Doig, then a research editor at *The Miami Herald*, quickly realized that many of the newer houses—including his own—did not survive the storm as well as older houses. Doig and his fellow *Herald* reporters overlaid damage data and property assessment records requested from the American Red Cross and Miami-Dade County on a wind contour map. In doing so, they were able to prove that “the county had allowed builders to use cost-saving shortcuts like using weaker strand board instead of plywood and staples instead of roofing nails” to speed up construction (Allen, 2012, para. 18). The result of their investigation was a 16-page Pulitzer Prize-winning report titled “What Went Wrong” (Schroyer, 2011, para. 31).

Doig’s investigation into post-Andrew property damage demonstrates the value of data journalism. However, relying on public bodies or third party organizations can often hinder investigations. First, receiving data can take months—sometimes years—depending on the nature of the request. Second, the requested data is often incomplete. According to Schroyer, the information Doig received from the American Red Cross was mostly unusable because it was “a collection of notes, and nothing neat and convenient like a spreadsheet that reporters could easily

search, index, and compare entries” (Schroyer, 2011, para. 22). Similarly, the information Doig received from Miami-Dade County only included data on some 8,000 homes, “which was about 10 percent of all the property damage” (Schroyer, 2011, para. 23). Doig told Schroyer that a drone would have been a useful means of gathering the desired data (Schroyer, 2013, para. 20).

Indeed, drones—particularly those built from scratch—can be equipped with a wide-array of sophisticated and increasingly accessible sensors that allow operators to gather vast amounts of information from the air. For example, gas sensors whiff the air for particles, electronic eavesdroppers listen to and record conversations on the ground, light detection and ranging (LIDAR) systems use lasers to create three-dimensional topographical maps, and infrared and hyperspectral sensors detect objects and materials invisible to the human eye (Weinberger, 2012). Most of these sensors can be purchased online for a few dollars to a few hundred dollars, installed on microcontrollers, and programmed to gather and display the desired data. Essentially, any kind of imagery or data that journalists desire can now be gathered by a custom-made news drone quickly and at very little cost, giving them immense freedom to gather information and launch investigations.

1.7 Conflict and disaster reporting

Government and military drones are increasingly being used to monitor disasters. For example, Global Hawks gave decision-makers and first responders a drone’s-eye view of the devastating wildfires that blazed through Southern California in 2007 (“Global Hawk, U-2 capture essential wildfire images,” 2007). They also provided an aerial perspective of the infrastructure damage caused by the 2010 earthquake in Haiti and the 2011 earthquake and tsunami in Japan (“Global Hawk collects reconnaissance data,” 2010; “Air Force officials use Global Hawk,” 2011; Capaccio, 2011). And the National Aeronautics and Space Administration

recently began flying Global Hawks over hurricanes and extreme weather events to collect data for scientific research (“NASA’s Global Hawk mission begins,” 2012).

It is no surprise, then, that journalists are also using drones—albeit much smaller ones—to gain a drone’s-eye view of disasters. As briefly mentioned earlier, Rupert Murdoch’s defunct tablet newspaper *The Daily* was one of the first media organizations to use a drone for newsgathering. Like CNN’s Aaron Brodie, *The Daily* flew a camera-equipped drone over Tuscaloosa, Ala. days after a record-breaking tornado flattened entire neighbourhoods in spring 2011. “The extent of the damage is even more shocking when seen from the air,” says the video’s narrator as the drone ascends above piles of rubble (“Severe weather drone view,” 2011). Approximately two weeks later, *The Daily* flew a drone over Vicksburg, Miss. to film leaking floodwalls and colonial-era buildings submerged in the “seemingly endless waters” of the swelling Mississippi River (“Floodwaters carve deadly trail,” 2011; “Daily drone: Seemingly endless waters,” 2011). And in June 2011, *The Daily* once again used a drone to film the overflowing Souris River and subsequent flooding of Minot, N.D. “This video, shot by a drone-mounted camera, offers a unique perspective of the disaster. A wall of sandbags holds back the water at one house, while the neighbours are swamped,” says the film’s narrator as the drone hovers over devastated suburbs (“Misery in Minot,” 2011).

Thus, drones have enormous potential to provide journalists and audiences at home with a greater understanding of the scale and scope of devastation following disasters. PSDJ co-developer and former U.S. infantry soldier Acton Gorton said in an interview last October that disasters have “one perspective from the ground because you see through the horizon. But when you look at it from the sky—especially when you’re able to get closer than a helicopter [or airplane] can get—you get a very different idea of what things look like” (personal communication, October 26, 2012). He said the ability to gain an aerial perspective is “powerful”

for communicating to an audience the “swath of destruction” (personal communication, October 26, 2012). Schroyer agrees: “I can think of Hurricane Katrina and the damage that it did to New Orleans,” he said. “If you had the right kind of drone, you’d be able to understand a whole lot better where the levees failed, when they did, and how they did” (personal communication, October 24, 2012). Schroyer added that drones would have allowed journalists to quickly and easily determine what demographics and which parts of town were most affected by the “shortcomings [of] the system” (personal communication, October 24, 2012).

Another important use for news drones is for conflict reporting. On February 11, 2011, award-winning CBS *60 Minutes* correspondent Lara Logan was brutally raped and beaten by a riotous mob of men in Cairo’s Tahrir Square while she was covering the resignation of former Egyptian President Hosni Mubarak. For nearly 30 minutes, Logan fought for her life until she was saved by a group of Egyptian women and soldiers (“Lara Logan breaks silence,” 2011). According to ABC News, upwards of 100 journalists—including ABC’s Christiane Amanpour, CNN’s Anderson Cooper, and CBS’s Katie Couric—were also “assaulted, threatened, or detained during the uprising” (Moisse, 2011).

Every day, courageous journalists across the globe risk their lives to tell stories of conflict and disaster. In the future, however, media organizations may be tempted to send drones instead of journalists into dangerous situations. Brodie, who has experience reporting from disaster zones, said drones allow journalists “to get pictures we would never get without putting someone’s life in serious danger. Or that we might just never get, period. And that’s why we’re here—to tell those stories” (personal communication, October 12, 2012). Schroyer agrees: “If I had a million dollars right now and I was invincible, I would go over to Syria and I would build drones for not necessarily any side in that conflict, but for citizen journalists over there” (personal communication, October 24, 2012).

At the time of writing, there are no published examples of journalists using drones to cover international conflict. However, it is easy to imagine how drones could provide reporters and media organizations with aerial imagery and conflict data without putting human lives at risk. For example, Logan and her news crew could have situated themselves a safe distance away from Tahrir Square and flown a drone equipped with audio recorders and high-resolution cameras over the raucous crowd. This would have allowed them to *safely* capture broadcast-quality sights and sounds that could have been packaged into an evening news story with contextual narrative, explanatory detail, and witness interviews.

There are, of course, a few inevitable obstacles to deploying drones in conflict and disaster zones. First, even the most sophisticated drones can be removed from the sky. In February 2012, for example, Taliban militants claimed to have shot down a U.S. Predator drone flying low over North Waziristan (Ahmad, 2012). And recently, two Iranian warplanes fired at and missed a U.S. Predator drone on a “routine surveillance mission” over the Persian Gulf (Erdbrink & Gladstone, 2012, para. 2). Civilian drones—including those used by journalists—are even easier to shoot down. In November 2012, participants of a live pigeon shoot at Pennsylvania’s Wing Pointe hunting grounds allegedly shot down a drone used by the animal rights group SHowing Animals Respect and Kindness, or SHARK, to film what they claim is “illegal animal abuse” (Chang, 2012). Police investigated the incident to determine 1) whether SHARK was legally allowed to operate the drone over private property and without a license and 2) whether the shooters are guilty of vandalism (Cunningham, 2012). It is easy to imagine something similar happening to drones deployed by journalists in conflict zones, where hostilities and weapons abound.

Additionally, drones used by journalists in areas of conflict or disaster may pose a risk to government and military operations. Gorton said it is always beneficial to have journalists

embedded with the military because it helps communicate the mission to the public. However, he said he doubts the military will take kindly to journalists using drones in areas or situations where the military is involved. “The reality is they want situational control. They don’t want other people interfering with [operations]. They don’t want to have to deal with trying to figure out if something is friendly or foe,” said Gorton. “That just introduces too many uncontrolled elements inside something they are trying to control very tightly” (personal communication, October 26, 2012). Indeed, Fox News correspondent Geraldo Rivera was removed from Iraq in 2003 for drawing a map in the sand that revealed the location and movement of U.S. troops (Carr, 2003). The risk of reporting sensitive information about military operations may be even greater if journalists are able to deploy a drone capable of transmitting live, drone’s eye-views of battlefields. Gorton suspects the military would shoot drones deployed by journalists out of the sky or prevent them going up in the first place (personal communication, October 26, 2012).

1.8 Photojournalism

In addition to breaking and daily news, investigative, and conflict and disaster reporting, drones can be useful to photojournalists. Award-winning *National Geographic* photographer Michael Nichols used drones to document lions and other wildlife in the Serengeti (Braun, 2011). In a letter to his editor (published online), Nichols describes using a drone to fly more than 65 feet over migrating wildebeests:

This gives us an image that could be made no other way. Not by helicopter—too noisy and too costly. Not by balloon—too scary and balloons only go where the wind goes. Not by traditional airplane—too fast and too high and also too scary. ... The micro-copter is a big tsetse fly and so far the scariest thing for the wildebeests is the commotion we make preparing for the launch. We will figure this out. I think we are headed for groundbreaking aerial images. (Nichols, 2011, para. 1)

Nichols adds that the “best thing” about using a drone to photograph wildlife is its low-impact. He and his team can transport the drone on their four-by-four truck and deploy it at a moment’s notice (Nichols, 2011, para. 2).

National Geographic’s deputy director of photography Ken Geiger said in an interview on the magazine’s website that drones allow Nichols to hover over the lion pride while they are stationary to provide a unique and intimate perspective: “You’ll be able to hover 15 feet in the air and actually do that dream wide-angle shot of lions on top of the rocks with the plains in the background” (Braun, 2011, para. 4). Nichols’ photography will be published in the magazine in 2013.

There are already several examples of artists using drones to take stunning aerial images. AirPano, for example, is a group of Russian photographers that uses drones to take high-resolution panoramas of global landmarks, including Iguazu Falls on the border of Argentina and Brazil, the Egyptian pyramids, and the city of Moscow at night. Unfortunately, legal restrictions in the U.S. and elsewhere throughout the world are discouraging photojournalists from publicizing their drone-captured images. As the FAA loosens restrictions over the next few years, however, drone photojournalism will likely become extremely popular in newsrooms across the country.

As demonstrated, then, drones are perfect tools to augment breaking and daily news, investigative reporting, conflict and disaster reporting, and photojournalism because they 1) are accessible to even the most financially strapped newsrooms, 2) provide unique aerial perspectives of otherwise hard-to-reach places, 3) are capable of quickly collecting imagery and sensory data for investigation, and 4) remove reporters from danger without sacrificing stories.

1.9 “Little Brother” is (not) watching you

While many journalists are enamoured with drone technology and what it could mean for their craft, however, news drones are raising some serious ethical concerns: “Drones open up a ton of questions that we really have to ask as journalists,” said Waite in his presentation at the 2012 Online News Association conference in San Francisco, Calif. (Waite & Kreimer, 2012). “It’s not, ‘What happens to journalistic ethics and safety and legal questions when one person can put a drone in the air?’ but ‘What if we have 30 of them in the air? What happens if everybody can get in the air?’” (Waite & Kreimer, 2012).

Kreimer agrees and said educating the public about the value of drone journalism is key. His goal is to figure how drones can be used for good and for evil and to make people aware of both: “Drones are a great technology that can be easily abused in unfathomable ways,” said Kreimer. “Really it’s a balance between the good and bad and not to forget that even though there are a million good things you can do with a drone as a journalist, there are also a million detrimental things you can do as well” (personal communication, October 19, 2012).

Schroyer also expressed concern over the public’s potential response to drone journalism: “The way that people have been introduced to drones has been very negative, understandably. You read about weddings getting blown up in Afghanistan by Predator drones and when that’s all you hear about, you start to think that the technology is inherently evil and intrusive and scary,” said Schroyer. “But at the same time, it’s a tool. It’s all about how you use it and I think this is a tool that can be used for good” (personal communication, October 24, 2012).

To nullify these concerns, Schroyer drafted a “Drone Journalism Code of Ethics” and cross-posted it on his blog *Mental Munition* and on DroneJournalism.org (Schroyer, 2012b). This code, he writes, “should be viewed as a layer of additional ethical considerations atop the

traditional professional and ethical expectations of a journalist in the 21st century” (Schroyer, 2012b, para. 9). He suggests the following requirements be met—in order—before a journalist can ethically use a drone for newsgathering: 1) the information sought must be newsworthy and unobtainable by other means; 2) the drone must be operated safely, meaning the journalist knows how to use the equipment and it is in suitable working condition; 3) journalists must abide by laws and regulations and cause minimal public disruption; 4) journalists must respect the privacy of individuals; and 5) journalists must continue following traditional codes of ethics (Schroyer, 2012b).

Kathleen Bartzen Culver, a professor at the University of Wisconsin-Madison’s Centre for Journalism Ethics and adjunct faculty member at the Poynter Institute for Media Studies, recently published an article titled “Ethics aloft: The pros and cons of journalists using drones” on PBS’s *MediaShift* website. She briefly outlines the increasing popularity of news drones and their “tremendous promise” in journalism. However, she writes, news drones also “pose the threat of revenge effects”—or unintended consequences—that could prove disastrous. Culver says journalists’ “ethical reasoning about [drones] has to move well beyond worst-case paparazzi scenarios” (Culver, 2012, para. 3). Among the key ethical issues she identifies are conflicts of interest, accuracy and context, and privacy. Like many who have expressed similar concerns, however, she fails to provide any meaningful elaboration or solutions. The following section is an attempt to fill in these gaps.

1.10 Drones and privacy

A 2010 documentary about the creative methods used by paparazzi to capture money shots of Hollywood glitterati, titled *Paparazzi: The Sharks of the French Riviera*, shows French celebrity stalkers flying a drone over a private, star-studded beach party in Cannes, France. Unlike terrestrial paparazzi, who were denied access to the event and thus had a limited vantage

point, aerial paparazzi were able to capture every tequila shot and wardrobe malfunction by Paris Hilton and friends in high-definition (Lietar, 2010).

Similarly, Gary Morgan, then CEO of the U.S. tabloid *Splash News*, told *The Wall Street Journal* in 2010 that he was developing a paparazzi drone, dubbed “C3Paparazzo,” to stalk and photograph celebrities (Gorman, 2010). The drone, he said, “would strike fear in the hearts of every celebrity having a birthday party” (Gorman, 2010, para. 3). Morgan became the tabloid’s senior vice president when Corbis Holdings took over in 2011. Jennifer Morgan, senior director of global communications at Corbis, clarified in an email that “*Splash News* has never worked to develop any type of drone device” and that the statement was made as a “joke” prior to Corbis’ acquisition (personal communication, October 9, 2012).

Most recently, *The San Francisco Chronicle* created Big Brother buzz when it reported that celebrity gossip website TMZ applied for authorization from the FAA to operate a drone:

The Federal Aviation Administration has been flooded with applications from police departments, universities, and private corporations and even the celebrity gossip site TMZ, all seeking to use drones that range from devices the size of a hummingbird to full-size aircraft like those used by the U.S. military to target al-Qaeda operatives in Pakistan and elsewhere. (Martin, 2012, para. 4; Byers, 2012c, para. 2)

The story was picked up by *The Drudge Report* and went viral. “It may seem ridiculous, but it’s not hard to imagine what TMZ could do with a couple of relatively inexpensive drones: hover over Lindsay Lohan’s car wreck as the police arrive, or outside the courtroom afterward, shooting video,” writes *Forbes*’ contributor John McQuaid (McQuaid, 2012, para. 4).

TMZ quickly denied the rumours in a statement titled, “We’re not keeping up with the droneses.” It read, “TMZ is not getting in the drone business. We don’t have a drone. We don’t want a drone. We never applied for a drone, despite a bogus report to the contrary. ... Truth is,

while drones are, in fact, awesome, it just ain't true" ("We're not keeping up," 2012, para. 1). FAA spokesperson Ian Gregor confirmed TMZ's claims, telling *Politico* that "TMZ does not have FAA authorization to fly an unmanned aircraft system (UAS)" nor does the aviation regulator have any record of such an inquiry or request (Byers, 2012b, para. 2). *The San Francisco Chronicle* has since issued a retraction (Martin, 2012).

The abovementioned examples demonstrate the enormous potential for abuse of drone technology, particularly in the realm of individual privacy. News organizations have long used helicopters for aerial photography and videography. But, as delineated earlier, helicopters are expensive to acquire, operate, and maintain, require trained pilots who are subject to human fatigue (meaning they cannot remain in the air for very long), and are difficult to maneuver in hard-to-reach places. Drones, meanwhile, have none of these restrictions. It is possible that a news organization or individual journalist could fly or hover a drone over an area or person of interest for hours, even days, at a time—passing the controls to a colleague when breaks are needed or pre-programming an automated flight path using integrated GPS technology.

As Schroyer pointed out, however, "It didn't take a drone to take the horrible paparazzi photos of the British royals. ... You can do that anyway with a telephoto lens" (personal communication, October 24, 2012). In September, Duchess of Cambridge Catherine "Kate" Middleton was photographed sunbathing topless on a terrace at a private chateau in Provence, France (Cowell & Burns, 2012). The images were published by the French edition of *Closer* magazine and republished by media organizations around the world. In an article on BBC's website, the couple referred to the photographs as a "grotesque and unjustifiable invasion of privacy" and is taking legal action against the magazine and the photographer ("Kate and William angered," 2012, para. 1; Sykes, 2012).

Despite fears over the panoptic power of drone technology, many drone journalists insist privacy laws will eventually catch up to the technology. “The question I often ask myself is this: Is this a new ethical problem or is this an old ethical problem involving new tools?” Waite told *The Guardian* in an interview in October 2012 (Jefferies, 2012, para. 15). “A lot of people beyond Buckingham Palace believe that was a pretty gross violation of privacy. So does the fact that a UAV could have been used change that at all? It doesn’t,” he said (Jefferies, 2012, para. 15).

Mickey Osterreicher, a veteran photojournalist and general counsel to the National Press Photographers Association, said in an interview last October that there will likely be people who feel improperly surveilled by news drones and will challenge the publication of drone-captured content as invasions of privacy (personal communication, October 10, 2012). However, he added, these concerns are nothing new and drones are just another technological advancement that the law will eventually accommodate: “There was a lot of handwringing about the advent of the handheld camera back in the 1800s and we all managed to survive,” he said. “Privacy as we knew it and as we know it now didn’t come to an end. People are used to having their pictures taken, especially nowadays when almost everybody has a cellphone that has a camera in it. ... We will adapt and survive and it will certainly make very interesting case law” (personal communication, October 10, 2012).

Ryan Calo, former director at Stanford Law School’s Centre for Internet and Society, wrote an article in December 2011 arguing that the “inevitable” rise of domestic drone use may actually be good for privacy. Echoing Osterreicher, Calo recalls the Big Brother concerns that accompanied the introduction of handheld cameras in the late 19th century: “yellow journalists armed with newly developed ‘instantaneous photographs’ splashing pictures of a respectable

wedding on the pages of every newspaper” (Calo, 2011, para. 2). But today, he writes, privacy violations are much less overt:

Maybe somewhere, in some distant server farm, the government correlates two pieces of disparate information. Maybe one online advertiser you have never heard of merges with another to share email lists. Perhaps a shopper’s purchase of an organic product increases the likelihood she is a Democrat just enough to cause her identity to be sold to a campaign. (Calo, 2011, para. 3)

Calo highlights the fact that the development of privacy law has traditionally failed to keep up with the rapid pace of technological change. Drones, however, may be “the visceral jolt society needs to drag privacy law into the 21st century” (Calo, 2011, para. 1). He says the privacy concerns raised by civil liberties groups “may gain serious traction among courts, regulators, and the general public” because drones “represent the cold, technological embodiment of observation. ... People would feel observed, regardless of how or whether the information was actually used. The resulting backlash could force us to reexamine not merely the use of drones to observe, but the doctrines that today permit this use” (Calo, 2011, para. 12 &17).

Current privacy law in the U.S. is primarily based on court precedent, through some privacy protections do exist at the state and local level. At the time of writing, there are no privacy or trespass laws specifically relating to non-recreational domestic drone operations. However, the following are a few Supreme Court rulings that may hint at what is to come:

- In *Katz v. United States* (1967), the Supreme Court ruled that individuals have a “constitutionally protected reasonable expectation of privacy” and that any intrusion—electronic or physical—may be considered a violation of the Fourth Amendment. In other words, individuals are legally protected against search and seizures if they have an expectation of privacy that society deems to be “reasonable” (*Katz v. United States*, 1967).

- In *California v. Ciraolo* (1986), the Supreme Court ruled that law enforcement officers can legally conduct aerial observation of an individual's property without a valid search warrant. The Syllabus reads, "The mere fact that an individual has taken measures to restrict some views of his activities does not preclude an officer's observation from a public vantage point where he has a right to be and which renders the activities clearly visible. The police observations here took place within public navigable airspace, in a physically nonintrusive manner. . . . Any member of the public flying in this airspace who cared to glance down could have seen everything that the officers observed" (*California v. Ciraolo*, 1986).
- In *Dow Chemical Co. v. United States* (1986), the Supreme Court ruled that photographing commercial properties from publically navigable airspace does not constitute a violation of the Fourth Amendment. The Syllabus reads, "For purposes of aerial surveillance, the open areas of an industrial complex are more comparable to an 'open field' in which an individual may not legitimately demand privacy. Here, the EPA was not employing some unique sensory device not available to the public, but rather was employing a conventional, albeit precise, commercial camera commonly used in mapmaking. The photographs were not so revealing of intimate details as to raise constitutional concerns. The mere fact that human vision is enhanced somewhat, at least to the degree here, does not give rise to constitutional problems" (*Dow Chemical Co. v. United States*, 1986).
- In *Florida v. Riley* (1989), the Supreme Court ruled that law enforcement officers do not need a valid search warrant to legally conduct a naked-eye inspection of an individual's property from publically navigable airways (in this case, 400 feet). The majority opinion concluded that, "Although an aerial inspection of a house's curtilage may not always pass

muster under the Fourth Amendment simply because the aircraft is within the navigable airspace specified by law, there is nothing in the record here to suggest that helicopters flying at 400 feet are sufficiently rare that [the] respondent could have reasonably anticipated that his greenhouse would not be observed from that altitude. Moreover, there is no evidence that the helicopter interfered with the respondent's normal use of his greenhouse or other parts of the curtilage, that intimate details connected with the use of the home or curtilage were observed, or that there was undue noise, wind, dust, or threat of injury" (*Florida v. Riley*, 1989).

These cases provide clues as to how the Supreme Court might rule if an individual feels they were wrongfully observed by a news drone. It is important to note, however, that the abovementioned cases involve government or law enforcement agencies observing private citizens. They may not necessarily apply to private citizens (journalists) observing other private citizens. Likewise, as mentioned in the previous section, *United States v. Causby* (1946) entitles private individuals to use publically navigable airspace as long as they do not interfere with property owners' enjoyment of the land. Therefore, aside from FAA restrictions, there seem to be no privacy or trespass laws guiding the appropriate use of news drones by journalists.

At least as far as journalists are concerned, however, the lack of a legal framework guiding non-recreational drone operations in U.S. airways should not be cause for panic. Journalists' behaviour remains restricted by public opinion and industry ethics codes. Journalism's reputation as a trusted information source has suffered lately in part, no doubt, to the *News International* phone hacking scandal in the United Kingdom, a slew of plagiarism allegations against established journalists in the U.S., and a widely held belief that the news media is inherently partisan (Farhi, 2012; Rieder, 2003; Robinson, 2011a). Indeed, a 2011 Pew Research Centre survey found that public approval of the news media is at an all-time low (Pew

Research Center, 2011). Only 38 percent of respondents said news organizations are moral and 69 percent of respondents said “news organizations invade people’s privacy” (Pew Research Center, 2011, p. 9). According to Culver, drones could damage “news media credibility at the precise moment journalism tries to assert its legitimacy and contribution to the public sphere. Citizens will not tolerate drone monitoring by a news media already suffering from historic low levels of public approval” (Culver, 2012, para. 25). Schroyer agrees: “If you are not using [drone technology] to the fullest extent, if you’re not using it for investigations, for instance, if you’re just using it as glorified tripod, you’re just getting all the risk ... and getting really none of the benefit” (personal communication, October 24, 2012). Therefore, the potential damage to one’s credibility will likely deter journalists from using drones unethically.

Additionally, most journalists recognize and adhere to industry ethics codes put forth by the Society of Professional Journalists. Included in the SPJ Code of Ethics is a section on minimizing harm, which advises journalists to “recognize that private people have a greater right to control information about themselves than do public officials and others who seek power, influence or attention. Only an overriding public need can justify intrusion into anyone’s privacy” (Society of Professional Journalists, n.d.a). It also says that journalists should “show good taste” and “avoid pandering to lurid curiosity” (Society of Professional Journalists, n.d.a). Therefore, journalists may need to limit their use of drones to public spaces or seek permission from individuals or event organizers in order to minimize potential threats to individual privacy. When perceived intrusions do occur, the SPJ Code of Ethics requires journalists to 1) “Clarify and explain news coverage and invite dialogue with the public over journalistic conduct,” 2) “Encourage the public to voice grievances against the news media,” 3) “Admit mistakes and correct them promptly,” 4) “Expose unethical practices of journalists and the news media,” and 5) “Abide by the same high standards to which they hold others” (Society of Professional

Journalists, n.d.a). Therefore, journalists who use drones for newsgathering will be accountable not only to the public, but to other journalists, for their (un)ethical behaviour.

That being said, there is little doubt drones will challenge privacy law and journalism ethics codes in unforeseen ways, requiring a reimagination of both. Schroyer's Drone Journalism Code of Ethics is a great start, but with so much at stake it is vital that drone journalists devise specific rules guiding behaviour. For example, is it ever ethically responsible for journalists to fly drones over private property? If so, when and for what purpose(s)? Is it ever ethically responsible for journalists to use drones to collect data on or images of people or places without informed consent? If so, when and for what purpose(s)? Fortunately, there are at least two more years until the FAA allows journalists to fly drones legally, giving the industry time to reflect on its values and develop appropriate guidelines for drone journalism.

1.11 Drones and surveillance

The potential for drones to gather vast amounts of sensory information raises ethical concerns relating to “Little Brother” surveillance and journalistic independence. On May 1, 2012, vandalism and violence erupted in the streets of Downtown Seattle when peaceful demonstrations by labour rights activists turned into a riot. A group of about 75 anarchists, known as a “black bloc,” infiltrated the marches and began wreaking havoc (Carter & Bernton, 2012). That evening and into the next day, still and moving images of protestors disrupting traffic, throwing rocks, shattering windows, and attacking police officers flashed across television screens and occupied the front pages and homescreens of local newspapers.

The riot resulted in tens of thousands of dollars in damage and a lengthy police investigation (Pulkkinen, 2012). As part its evidence-gathering process, the Seattle Police Department reportedly subpoenaed several local media outlets—including KOMO 4, KING 5, KIRO 7, KCPQ 13, *The Seattle Times*, and *The Seattle Post Intelligencer*—for their unpublished

riot footage. The subpoena documents state that the raw media footage would assist officers in identifying and pursuing individuals responsible for committing state and federal crimes.

According to a 2008 study published in *The Minnesota Law Review*, police in the U.S. are increasingly subpoenaing news organizations for (un)published content to aid criminal investigations:

The 761 responding news organizations participating in the study reported that their ‘reporters, editors, or other news employees’ received a total of 3,062 ‘subpoenas seeking information or material relating to newsgathering’ in calendar year 2006. Weighting responses to estimate actual values for the entire population suggests that a total of 7,244 subpoenas were received by all daily newspapers and networked-affiliated television news operations in the United States that year. (Jones, 2008, p. 626)

The number of subpoenas issued in 2006 was significantly higher than it was five years prior (Jones, 2008, p. 628). The Poynter Institute’s Kelly McBride told *The Stranger*, a Seattle-based online newspaper, that capitulating to subpoenas jeopardizes journalists’ independence and puts them at risk of becoming, or being perceived as, another arm of law enforcement (Sanders, 2012). Indeed, one-third of the study’s respondents said the increasing commonality of police subpoenas has had a chilling effect on sources’ willingness to share information with reporters (Jones, 2008, p. 647-648).

Some U.S. states have shield laws—also referred to as reporters’ privilege—that are supposed to “protect journalists from having to reveal their sources and documents” to government and law enforcement agencies when ordered (Society of Professional Journalists, n.d.b). This protection is not always “total.” For example, journalists in some states may be protected from revealing information relating to civil, but not criminal, matters. Likewise, it is unclear as to whether journalists are protected under state shield laws when they are covering

national news. Currently, there is no federal shield law protecting journalists. However, the *Free Flow of Information Act* was introduced to the House of Commons in 2011 and is currently under review.

This is important because, as previously discussed, one of the biggest selling points of drones is their ability to serve as platforms for sensory data collection. Traditionally, news organizations and individual journalists have had to protect confidential sources, leaked documents, and camera footage. However, the ability of journalists to use drones to collect primary data may soon require them to protect databases as well. Imagine, for example, that a journalist flies a drone equipped with infrared sensors capable of picking up heat signatures of marijuana grow operations over neighbourhoods in Tallahassee, Fla. Without revealing the exact locations of grow-ops, the journalist can use the data to write a more comprehensive and informed story about the local drug trade. Publishing the story would certainly be in the public interest. Doing so, however, might prompt law enforcement officers to subpoena the data so they can make arrests. This would jeopardize the journalist's independence and, as Culver puts it, transform "reporting into surveillance" (Culver, 2012, para. 21).

Jennifer Lynch, a staff attorney with the abovementioned Electronic Frontier Foundation, echoes Culver's concerns. In an interview last October, she warned that "If third parties are collecting the data—whether it's journalists or whether it's any kind of commercial company that's flying drones—the government is going to want access to that data in one form or another" (personal communication, October 24, 2012).

Current industry ethics codes do not explicitly require journalists to protect their data from interested third parties. And, other than the requirement to act independently, they do not advise journalists how to behave when subpoenaed by police for information. Therefore, traditional media ethics codes must be reimagined to ensure journalists do not become "Little

Brothers” of the State. The following are just a few of the questions journalists should consider before launching a news drone: Can the sought-after data be obtained through other means? What is the likelihood that a drone will be capable of sufficiently obtaining the desired data? What are the potential consequences of obtaining and publishing the drone-collected data for citizens and for journalists? How can negative consequences be negated? How can the identities of those under the omniscient gaze of news drones be protected? Answering these questions will set the course for developing a new drone journalism code of ethics.

1.12 Drones and gamification

The potential gamification of news—or what Culver refers to as “accuracy and context”—is another ethical challenge raised by drone journalism, particularly when practiced internationally. Drones have become America’s weapon of choice in the War on Terror. Last year, the U.S. Air Force trained more drone pilots than fighter pilots (Bumiller, 2012). Every day, some 1,300 Air Force officers wake up in the comfort of their own beds, eat breakfast with their families, send their children to school, and commute to work in economy-class sedans and Japanese pickups (Bumiller, 2012; Martin & Sasser, 2010, p. 45). When they arrive at “the office”—which is typically located in a suburb of California, Nevada, or New Mexico—they pour themselves a cup of coffee and take a padded seat in tiny air-conditioned trailers with a handful of other officers dressed in murky-green or sandstorm brown jumpsuits (Martin & Sasser, 2010, p. 45). They put on their headsets, glance at nearly a dozen screens flickering in front of them, grab hold of a joystick, and begin flying hunter-killers tens of thousands of feet over Afghanistan (Zucchino, 2010). This is warfare in the new millennium.

In chapter four of his book *Predator: The remote-control air war over Iraq and Afghanistan: A pilot’s story*, Lt. Col. Matt J. Martin describes the first time he conducted a drone strike from a Predator:

Poor bastard. It looked like he was about to get into the Toyota and drive off to pick up his buddies and go shoot up some more marines. Or that might at least have been what he was thinking. Call him a bonus. Truck and driver. Blue light special. Kmart shoppers. Two for the price of one. My right index finger tightened on the control stick trigger, the ‘pickle.’ I was concentrating entirely on the shot and its technical aspects. Right range, right speed, locked in. The man wasn’t really a human being. He was so far away and only a high-tech image on a computer screen. (Martin & Sasser, 2010, p. 43-44)

As it turns out, a technical malfunction “robbed” the young pilot of his first shot (Martin & Sasser, 2010, p. 44). However, he goes on to explain the surreal experience of waging war with robots:

The ability to kill people from such great distances, playing God, widened the gap between the reality of war and our perception of it. It was almost like watching an NFL game on TV with its tiny figures on the screen compared to being down there on the field in the mud and the blood in the rain getting your socks knocked off. ... All the potential gains of war without the costs. It could even be mildly entertaining. Could it not also become too easy, too tempting, too much like simulated combat, like the computer game *Civilization*? (Martin & Sasser, 2010, p. 46-47)

Martin ends the chapter discussing the “psychological disconnect” of being at war all day and then driving home at night to eat steak with his wife Trish in a suburb of Las Vegas (Martin & Sasser, 2010, p. 47).

Martin’s experience illuminates how drones have “gamified” war. An entire generation of kids who grew up playing video games like *Call of Duty* and *Halo* are now real life remote-control killers. Further evidence of what former UN Special Rapporteur on Extrajudicial Killings Philip Alston calls a “PlayStation’ mentality to killing” can be found in the language used to

describe victims of drone strikes (United Nations Human Rights Council, 2010). U.S. military officials refer to humans killed by drone-launched Hellfires and smart bombs as bugsplats, “since viewing the body through a grainy-green video image gives the sense of an insect being crushed” (Hastings, 2012, para. 18). According to Jennifer Robinson, director of legal advocacy at the Bertha Foundation, the term is “deliberately employed as a psychological tactic to dehumanize targets so operatives overcome their inhibition to kill and so the public remains apathetic and unmoved to act” (Robinson, 2011b, para. 5). In other words, the name of the game is war and the only way to move to the next level is by squashing as many bugs as possible.

Just like drones have gamified war, so too may they gamify journalism. Today’s up-and-coming reporters belong to the same PlayStation generation that is now flying hunter-killers over Afghanistan. (Though the former were more likely playing *Oregon Trail* and *Treasure Math Storm* than *Call of Duty* and *Halo*). In fact, the abovementioned Parrot AR.Drone was originally developed and marketed as an augmented reality flying game that can be purchased at airport gift shops, Costcos, and Radio Shacks across North America. Users of the AR.Drone can download a gaming application from the Apple store titled *AR.Rescue*, which tasks players with helping “aliens return to their planet on board their rocket” (Parrot, n.d.). Simulated objects appear on the smartphone or tablet screen used to control the drone. Players then fly the drone to “recover the pieces of rocket scattered in the atmosphere, get rid of the nasty Crunchers, and try to beat the clock on every mission” (Parrot, n.d.). Another game, *AR.Race*, allows multiple players to race through simulated obstacle courses. As players accumulate points, they graduate to higher levels.

Given that radio-controlled devices are often developed with gamers and hobbyists in mind, journalists using them for newsgathering could easily experience a psychological disconnect between entertainment and reporting. As explained by Culver in “Ethics Aloft,”

Critics argue that soldiers far removed from the horrors of war make decisions to kill or destroy without context. Though far less lethal, the same danger applies to journalistic uses. By relying on a partially autonomous machine, reporters can distance themselves from the human toll of situations, potentially removing critical context. (Culver, 2012, para. 16)

In other words, drone journalists risk becoming so immersed in the technology and what appears on the screen in front of them that they forget why they are flying the drone in the first place: to tell stories of conflict and disaster that may be too dangerous for reporters to tell from the ground. The thrill of flight may seduce journalists into capturing the most extreme shot instead of that which best encapsulates the human experience. And the faceless figures that flash across the screen may become “sims” in a game rather than human beings deserving of respect. For drone journalists, then, the name of the game is news and the only way to move to the next level may be to forget all scruples.

Similarly, drone journalism may gamify audiences’ relationship with news. On April 10, 2008, coalition forces operating a Predator out of Multi-National Division Baghdad watched a group of heavily armed militants hide behind a building and hover over a rocket-propelled grenade launcher. Then the screen turned black: The forces had fired a Hellfire from the drone, killing all six men instantly and sending a plume of black smoke high into the air. While America’s drone campaign has remained shrouded in a veil of secrecy since the War on Terror began, evidence of this strike was not hard to find. In fact, nearly three million other people found it too ... on YouTube (Multi-National Division Baghdad, 2008). Over the past decade, several thousand video clips of combat footage and drone-feeds from battlefields throughout the Middle East have been uploaded to the Internet—some officially and some unofficially (“Waging

war,” 2010). Singer compared watching these videos, known as “war porn,” to watching a professional basketball game on television:

The players are these tiny little figures on the screen versus the experience of watching a basketball game in person where you see what someone who is seven foot tall really does look like face-to-face. [Or] versus the experience of playing in that basketball game yourself and knowing what it’s like to have LeBron James dunk on your head. The interesting thing though is that these clips are not even like watching the entire game. You’re just watching the highlight reel. You’re watching the ESPN Sports Center version of the war. So all the training, all the context, everything else that went into that war and how it plays out, it’s all just slam dunks and smart bombs. (“Waging war,” 2010)

In other words, drones (aided by social media) have turned war into a form of entertainment that can be downloaded onto an iPod or watched on a personal computer. This further disconnects an already dispassionate public from the horrors of war, instead transforming it into a game.

Just as drones have gamified war by disconnecting soldiers from the battlefield, so too may they gamify news by disconnecting audiences from reality. Award-winning *Sunday Times* reporter Marie Colvin, who lost her left eye and later her life covering conflicts around the globe, explained why she ran into the proverbial fire while everyone else evacuated:

War is about those who are killed, limbs severed, dirt and rock and flesh are torn alike by hot metal. It is terror. It is mothers, fathers, sons and daughters bereft and inconsolable. It is about traumatized children. My job is to bear witness. (Colvin, 2001, para. 57)

Traditionally, boots-on-the-ground journalists have waded through the mud, the blood, and the tears in order to tell the most accurate and honest stories of the human experience. They stand knee deep in sewage-filled streets in order to speak with survivors of natural disasters. They suffer injuries and smell the stench of death in order to convey the tragedy of war to audiences at

home. And they cry alongside survivors of pain and suffering in order to illuminate the strength of the human spirit. Journalists thus serve as mediators between audiences at home and “others” in far off distant lands. They make the strange familiar.

However, if reporters deploy news drones over situations of conflict and disaster instead of witnessing and reporting it first-hand, they risk isolating their audiences both emotionally and geographically from the people and events being covered. Audiences may gain a drone’s eye-view of a battlefield, a village ripped apart by wind, or a catastrophic inferno at a garment factory. But they may lose context, a sense of place and time, and the ability to hear journalists ask questions and receive responses. Instead, footage collected by news drones in areas of conflict and disaster and then broadcast on television or uploaded to the Internet could become entertainment, or “news porn.” The individuals who would normally appear in front of reporters’ cameras and notebooks—crying, laughing, screaming, smiling, worrying—may become faceless objects on a smartphone or laptop computer screen. Others to be filmed and photographed from above. Spectacles to fulfill our voyeuristic cravings. Bugsplats.

Stephen J.A. Ward, preeminent media ethics scholar and Culver’s colleague at the Centre for Journalism Ethics at the University of Wisconsin-Madison, does not mention gamification in his book *Ethics and the Media: An Introduction*. Likewise, an extensive Google and academic database search reveals little on the ethics of gamifying news—perhaps because it is a relatively new concept in journalism. Ultimately, however, the ethical challenges surrounding the gamification of news are located in truth. According to Ward,

The pursuit of journalism truth requires, like all good inquiry, the convergence of three elements: good character, good method, and good evaluation. Journalists need to have certain truth-seeking virtues. They need to employ the best methods available. And they

need to test their interpretations with the same candor that they apply to other people's interpretations. (Ward, 2011, p. 152)

That is, journalists have a moral obligation to accurately represent the world—the events, the people, and the places within it—without dramatizing, without over-simplifying, and without prejudice. If deploying a news drone over an area of conflict or disaster dehumanizes or misrepresents the world under its cold stare—if it turns peoples' lives into YouTube (un)reality shows—its use cannot be considered ethical. If, however, journalists deploy drones with good intent—as a means of providing better information, more context, and greater scope—and they do so with self-reflexivity, drones may constitute an innovative new means of newsgathering.

The SPJ Code of Ethics also includes limitations that can be applied to drones and the gamification of news. It requires that journalists “seek truth and report it,” refrain from deliberately distorting information, avoid oversimplifying or highlighting “incidents out of context,” and be transparent about their newsgathering methods (Society of Professional Journalists, n.d.a). This is a good start. But the potential of drones to produce “news porn”—to turn reality into a voyeuristic game—requires more concrete principals. Therefore, traditional media ethics codes must be reimagined to account for the potential of drones to gamify news. In addition to the questions in the previous sections, before launching a drone journalists should ask themselves how 1) using a drone will improve and/or inflame coverage of an event or peoples; 2) it will affect their credibility as a journalist; 3) it will impact the way audiences engage with or relate to the events, people, and places being filmed or photographed; and 4) context can be added to further humanize the subjects of the news story. Once again, answering these questions will set the course for developing a new drone journalism ethics.

1.13 Drones and psychological harm

Drones of various shapes, sizes, and capabilities can often be heard buzzing the skies throughout much of the Middle East and northern Africa—from Afghanistan to Mali, Palestine to Somalia, Libya to Yemen—in search of enemy combatants and suspicious activities.

Occasionally, hunter-killer drones release 100-pound Hellfire missiles and 500-pound smart bombs when they zero-in on “high-value” targets, vapourizing everything in the surrounding impact zone. A recent study titled “Living Under Drones” by New York University School of Law and Stanford University Law School reveals that the constant presence of drones in northwest Pakistan, where more than 365 American drone strikes have occurred since 2004, is causing psychological trauma (including post-traumatic stress disorder) among civilian populations (Bureau for Investigative Journalism, 2013).

Interviewees described emotional breakdowns, running indoors or hiding when drones appear above, fainting, nightmares and other intrusive thoughts, hyper-startled reactions to loud noises, outbursts of anger or irritability, and loss of appetite and other physical symptoms. Interviewees also reported suffering from insomnia and other sleep disturbances, which medical health professionals in Pakistan stated were prevalent.

(“Living under drones,” 2012)

In other words, drones are terrorizing publics. The constant fear of being watched or targeted has undermined community trust and eroded individuals’ willingness to participate in economic, educational, social, and spiritual activities necessary for achieving the “good life.” Some refuse to leave their homes or let their children attend school. Others no longer sell their goods in markets or attend spiritual gatherings (“Living under drones,” 2012). One interviewee, Ahmed Jan, told the researchers, “Before the drone attacks, it was as if everyone was young. After the drone

attacks, it is as if everyone is ill. Every person is afraid of the drones” (“Living under drones,” 2012, p. 82).

The psychological trauma experienced by communities living under drones poses an ethical challenge for journalists who want to use similar technology for newsgathering. Drones used by journalists are nearly indistinguishable from some of the tactical surveillance drones used by the U.S. and its western allies in conflict zones. In fact, Libyan rebels purchased a Canadian-made Aeryon Scout drone in fall 2011 to aid their fight against Colonel Muammar Gaddafi’s authoritarian regime (“Canadian robot spy,” 2011). The three-pound drone, which fits into a backpack, is equipped with high-resolution and infrared cameras that enabled the rebels to spy on Libyan government forces and artillery positions (“Canadian robot spy,” 2011). The same drone is being marketed to broadcast media as an “ideal platform” for capturing high-quality photographs and video for evening newscasts (Aeryon Labs Inc., n.d.). There is a high probability, then, that news drones will be mistaken for military drones and that their presence in conflict zones could inflict further psychological trauma among civilian populations.

According to Ward, “avoiding unjustified harm and minimizing justified harm should be our foundational principles and the main concern of responsible journalists” (Ward, 2011, p. 185). Ward defines harm as any action or event that is injurious to one’s interests (Ward, 2011, p. 174). Publishing the name or photograph of a whistleblower, for example, could invite physical harm to that person should the accused retaliate. Printing potentially libelous information about a politician or chief executive could do irreversible harm to their reputation. Broadcasting gruesome images of dead or wounded bodies could inflict psychological harm on young viewers. And disseminating “uninformed or intolerant journalism” could bring social harm to already marginalized groups and individuals in society (Ward, 2011, p. 187). While this does not mean journalists should refrain from broadcasting or publishing information that could cause *any* harm

(public officials, for example, are deserving of closer public scrutiny than private citizens), it does mean journalists have a responsibility to reduce the harmful impacts of reportage on innocent third parties (Ward, 2011, p. 188). This, according to Ward, can be accomplished by limiting “the amount of coverage, ignoring certain events and press statements, and refusing to publish certain images or publishing only selected images” (Ward, 2011, p. 201). Unfortunately, this assessment of media harm is problematic because it focuses solely on harm caused by broadcast or publication. It does not consider harm caused by the process of newsgathering itself—such as using drones to film or photograph events and people in conflict zones.

Unlike Ward, the Society of Professional Journalists (SPJ) Code of Ethics does include some mention of harm caused by the newsgathering process. It states that journalists should “be sensitive when seeking out or using interviews or photographs of those affected by tragedy or grief” and should “recognize that gathering and reporting information may cause harm or discomfort” (Society of Professional Journalists, n.d.a). Given that news drones have the potential to (re)inflict intense psychological trauma among communities under their omniscient gaze, however, SPJ’s ethical standards and practices do not go far enough. Therefore, once again, traditional media ethics codes must be reimagined to account for harm caused by the newsgathering process. Before launching a drone in an area of conflict or disaster, journalists should ask themselves the following: What am I trying to achieve by using a drone to tell this story? Who might be hurt by the aerial presence of a news drone? Is the sought-after content worth the risk of (re)victimizing an already traumatized public? Can I obtain the imagery or information by any other means? If not, what can I do to reduce the anxiety of onlookers and subjects? Answering these questions will formulate a new framework for drone journalism ethics.

1.14 Conclusion

Drones represent the technological wild west of the modern era and journalists are among the earliest pioneers. They are actively designing, developing, and experimenting with drones in their backyards, basements, and garages and discovering unique applications for storytelling. First, as discussed, drones provide reporters with a low-cost and highly mobile means of covering breaking or daily news events—like accidents, protests, and riots—from the sky. Second, they allow journalists to access otherwise restricted spaces and to collect customized sensory data to aid investigations. Third, drones help journalists visually convey the scale and scope of devastation following conflicts and disasters without jeopardizing their personal safety. And finally, drones allow photojournalists to capture imagery they could not obtain by any other means, either due to financial or geographic restrictions. Thus, as the current legal restrictions are loosened and media organizations realize their potential, drones will become ubiquitous tools in mainstream newsrooms.

Despite being powerful newsgathering devices, however, drones raise serious ethical concerns that must be addressed before their widespread adoption. First, the panoptic nature of drone technology poses a threat to individual privacy. Rumours of paparazzi using drones to stalk celebrities and photograph Hollywood events have already stirred “Little Brother” fears. How long will it be before scandal-seeking news organizations hover drones outside the private homes of judges, politicians, and other public figures waiting for the next big scoop? Second, the ability of drones to collect sensory data raises concerns over journalists’ ability to maintain their independence from law enforcement. Will journalists be able to protect their primary data the same way they can protect their sources? Third, just as drones have “gamified” war, so too may they gamify news. Journalists seduced by the thrill of flight and audiences downloading footage

on their computers may experience a psychological disconnect between entertainment and news. Both may gain a drone's eye-view of battlefields and disaster zones, but they may lose the tactile details that humanize news coverage. Finally, the deployment of news drones—which are sometimes indistinguishable from tactical military drones—over conflict and disaster zones may cause further psychological harm among already traumatized publics.

Luckily, the FAA is at least two years away from legalizing civilian drone operations in the U.S. Therefore, the news industry has time to formulate a new code of ethics tailored specifically to drone journalism. The new code should be hierarchical, so journalists can consult an ethical checklist before deploying a news drone. It should be collaboratively developed by the news industry and the public to ensure agreement on what constitutes acceptable use of news drones. It should be peer-enforced so those straying from the code are held to account. And finally, the new code should be reviewed, revised, and republished often to account for unforeseen abuses and ethical challenges.

Meanwhile, the pioneers of drone journalism insist that the ethical concerns will be resolved and that the benefits of drone journalism will ultimately outweigh the risks: “When you turn on the news it’s either crime, fires, police chases, or it’s two politicians yelling at each other,” said Brodie. “I just don’t think that’s going to fly anymore for young audiences. ... We’ve got to find a better way to give them something that actually interests them, engages them, or else the problems we have here in America will just keep getting worse because nobody will care. If we can use a drone occasionally to do that, I’m all for it” (personal communication, October 12, 2012).

References

- Aeryon Labs Inc. (n.d.). Commercial & Industrial Applications. Retrieved December 1, 2012 from <http://www.aeryon.com/applications/commercial.html>
- Ahmad, Jibran. (2012, February 25). Taliban militants say they shot down a U.S. drone. Reuters. Retrieved May 26, 2013 from <http://www.reuters.com/article/2012/02/25/oukwd-uk-pakistan-us-drone-idAFTRE81O0G320120225>
- Allen, Greg. (2012, August 23). Hurricane Andrew's legacy: 'Like a bomb' in Florida. *National Public Radio*. Retrieved January 25, 2013 from <http://www.npr.org/2012/08/23/159613339/hurricane-andrews-legacy-like-a-bomb-in-florida>
- “Air Force officials use Global Hawk to support Japan relief efforts.” (2011, March 16). *United States Air Force*. Retrieved January 25, 2013 from <http://www.af.mil/news/story.asp?id=123247029>
- Anderson, Chris. (2012a, June 22). How I accidentally kickstarted the domestic drone boom. *Wired*. Retrieved January 21, 2013 from http://www.wired.com/dangerroom/2012/06/ff_drones/all/
- Anderson, Chris. (2012b). *Makers: The new industrial revolution*. Toronto, ON: Random House of Canada Ltd.
- B, C. V. (1921, October 6). Dr. Peter Cooper Hewitt. *Nature*, 108(2710), 188. doi 10.1038/108188b0
- Baker, Sue. (2001, February 27). Predator missile launch test totally successful. *Aeronautical Systems Center Public Affairs*. Retrieved December 31, 2012 from <http://www.fas.org/irp/program/collect/docs/man-ipc-predator-010228.htm>

- Bartlett, Liam (Reporter) & Sacre, Howard (Producer) & Townsend, Jo (Producer). (2011, May 13). The inside story. *60 Minutes Australia*. Retrieved January 24, 2013 from <http://sixtyminutes.ninemsn.com.au/article.aspx?id=8248772>
- Beckhusen, Robert. (2012, October 30). NASA preps drone hurricane hunters, but misses Sandy. *Wired*. Retrieved January 20, 2013 from <http://www.wired.com/dangerroom/2012/10/hurricane-hunters/>
- Bennett, Brian. (2012, March 8). FAA moves toward allowing unmanned drones in U.S. airspace. *Los Angeles Times*. Retrieved January 20, 2013 from <http://articles.latimes.com/2012/mar/08/news/la-pn-faa-drones-us-airspace-20120308>
- Bennett, James. (2001). The AMA history program presents: Biography of Reginald Leigh Denny. *Academy of Model Aeronautics, Inc*. Retrieved December 31, 2012 from <https://www.modelaircraft.org/files/DennyReginald.pdf>
- Braun, David. (2011, December 2). National Geographic assignment of a lifetime. *National Geographic News Watch*. Retrieved January 31, 2013 from <http://newswatch.nationalgeographic.com/2011/12/02/national-geographic-assignment-of-a-lifetime/>
- Bumiller, Elisabeth. (2012, July 29). A day job waiting for a kill shot a world away. *New York Times*. Retrieved December 3, 2012 from http://www.nytimes.com/2012/07/30/us/drone-pilots-waiting-for-a-kill-shot-7000-miles-away.html?pagewanted=all&_r=0
- Bureau of Investigative Journalism. (2013). Covert War on Terror—the datasets. Retrieved March 16, 2013 from <http://www.thebureauinvestigates.com/category/projects/drone-data/>
- Byers, Dylan. (2012a, November 27). NPR affiliate launches drone program. *Politico*. Retrieved

- January 24, 2013, from <http://www.politico.com/blogs/media/2012/11/npr-affiliate-launches-drone-program-150409.html>
- Byers, Dylan. (2012b, November 27). FAA: TMZ never requested a drone.” *Politico*. Retrieved January 27, 2013 from <http://www.politico.com/blogs/media/2012/11/faa-tmz-never-requested-a-drone-150435.html>
- Byers, Dylan. (2012c, November 27). TMZ denies it is seeking a drone. *Politico*. Retrieved January 27, 2013 from <http://www.politico.com/blogs/media/2012/11/tmz-denies-it-is-seeking-a-drone-150404.html>
- California v. Ciraolo, 476 U.S. 207 (1986). Retrieved January 24, 2013 from http://www.law.cornell.edu/supct/html/historics/USSC_CR_0476_0207_ZS.html
- Calo, Ryan. (2011, December 12). The drone as a privacy catalyst. *Stanford Law Review*. Retrieved January 27, 2013 from <http://www.stanfordlawreview.org/online/drone-privacy-catalyst>
- “Canadian robot spy flies for Libyan rebels.” (2011, August 24). *Canadian Broadcasting Corporation*. Retrieved December 1, 2012 from <http://www.cbc.ca/news/technology/story/2011/08/24/technology-aeryon-scout-drone-libya.html>
- Capaccio, Tony. (2011, May 17). Northrop drone flies over Japan reactor to record data. *Bloomberg News*. Retrieved January 25, 2013 from <http://www.bloomberg.com/news/2011-03-16/northrop-grumman-drone-to-fly-over-japan-reactor-to-gather-data.html>
- Captain, Sean. (2012, January 6). Livestreaming journalists want to occupy the skies with cheap drones. *Wired*. Retrieved January 24, 2013 from <http://www.wired.com/threatlevel/2012/01/occupy-drones/>

- Carr, David. (2003, April 1). Pentagon says Geraldo Rivera will be removed from Iraq. *New York Times*. Retrieved May 26, 2013 from <http://www.nytimes.com/2003/04/01/us/nation-at-war-coverage-pentagon-says-geraldo-rivera-will-be-removed-from-iraq.html>
- Carter, Mike & Bernton, Hal. (2012, May 1). Violence arrives, dressed in black. *Seattle Times*. Retrieved March 16, 2013 from http://seattletimes.com/html/localnews/2018118002_blackbloc02m.html
- Case, Dick. (2012, November 11). A defining mission for a drone pioneer. *Post-Standard*, B2. Retrieved December 29, 2012 from Access World News Research Collection.
- Chang, David. (2012, November 20). Flying camera from animal rights group shot down at pigeon shoot. *NBC Philadelphia*. Retrieved May 26, 2013 from <http://www.nbcphiladelphia.com/news/local/Flying-Camera-From-Animal-Rights-Group-Shot-Down-at-Pigeon-Shoot-Cops-179983451.html?dr>
- “Columbia packing owner indicted for pig blood pollution.” (2012, December 26). *CBS-DFW*. Retrieved January 24, 2013 from <http://dfw.cbslocal.com/2012/12/26/columbia-packing-owner-indicted-for-pig-blood-pollution/>
- Colvin, Marie. (2001, April 22). The shot hit me. Blood poured from my eye—I felt a profound sadness that I was going to die. *Marie Colvin Center for International Reporting*. Retrieved December 4, 2012 from <http://www.mariecolvincenter.org/the-shot-hit-me-blood-poured-from-my-eye-i-felt-a-profound-sadness-that-i-was-going-to-die/>
- Cowell, Alan & Burns, John F. (2012, September 14). Royal couple sues over photos of topless duchess. *New York Times*. Retrieved January 27, 2013 from <http://www.nytimes.com/2012/09/15/world/europe/britain-rebukes-magazine-for-publishing-images-of-topless-kate-middleton.html?pagewanted=all>
- Cruickshank, Dan. (2011, March 10). A new enemy. *British Broadcasting Corporation*.

Retrieved from December 4, 2012 from

http://www.bbc.co.uk/history/british/britain_wwone/invasion_ww1_01.shtml#five

Culver, Kathleen Bartzen. (2012, December 5). Ethics aloft: The pros and cons of journalists using drones. *Public Broadcasting Service Media Shift*. Retrieved January 25, 2013 from <http://www.pbs.org/mediashift/2012/12/ethics-aloft-the-pros-and-cons-of-journalists-using-drones340.html>

Cunningham, Pam. (2012, November 19). Protesters' remote control helicopter shot down at Wing Pointe Gun Club pigeon shoot. *WFMZ-TV*. Retrieved May 26, 2013 from <http://www.wfmz.com/news/news-regional-berks/Protesters-remote-control-helicopter-shot-down-at-Wing-Pointe-Gun-Club-pigeon-shoot/-/121418/17468318/-/c89o3r/-/index.html>

“Daily drone is loose in aerial footage shot.” (2011, May 2). *The Daily*. Retrieved January 23, 2013 from <http://blog.thedaily.com/post/5144633349/the-daily-drone-is-loose-in-aerial-footage-shot>

“Daily drone: Seemingly endless waters in Mississippi” [Video file]. (2011, May 12). *The Daily*. Retrieved January 25, 2013 from <http://www.youtube.com/watch?v=MI2d3ui2vYw>

Dalamagkidis, Konstantinos & Valavanis, Kimon P. & Piegle, Les A. (2012). *On integrating unmanned aircraft systems into the National Airspace System: Issues, challenges, operational restrictions, certification, and recommendations* [Google Books]. doi: 10.1007/978-94-007-2479-2_2

Dillow, Clay. (2012, December 12). A hauntingly beautiful skateboarding video shot with a hexacopter drone. *Popular Science*. Retrieved January 20, 2013 from <http://www.popsci.com/technology/article/2012-12/watch-firefly-hauntingly-beautiful-skateboarding-video-shot-camera-equipped-hexacopter>

- Di Napilo, Albelle. (2012, September 18). Scientists use drones to monitor the orangutan in Asia's rainforests. *Guardian*. Retrieved January 20, 2013 from <http://www.guardian.co.uk/world/2012/sep/18/drones-monitor-orangutans>
- “Domestic drones on the rise.” (2011, December 7). *Al Jazeera English*. Retrieved January 24, 2013 from <http://stream.aljazeera.com/story/america%E2%80%99s-use-domestic-drones-0021899>
- Dow Chemical Company v. United States, 476 U.S. 227 (1986). Retrieved January 24, 2013 from <http://www.law.cornell.edu/supremecourt/text/476/227>
- “Dronefather.” (2012, December). *The Economist*, 405(8813), p. 24. Retrieved December 31, 2012 from <http://www.economist.com/news/technology-quarterly/21567205-abe-karem-created-robotic-plane-transformed-way-modern-warfare>
- “Drones fly over Calgary snapping photos.” (2013, January 8). *Canadian Broadcasting Corporation*. Retrieved January 20, 2013 from <http://www.cbc.ca/news/canada/calgary/story/2013/01/08/calgary-photo-drone-real-estate.html>
- Duffy, Andrew A. (2012, August 24). Aerial photos by remote control. *Times Colonist*. Retrieved January 20, 2013 from <http://www.timescolonist.com/business/aerial-photos-by-remote-control-1.4525>
- “Ecology drones track endangered wildlife.” (2012, August 20). *Guardian*. Retrieved January 20, 2013 from <http://www.guardian.co.uk/environment/2012/aug/20/ecology-drones-endangered-wildlife>
- Erdbrink, Thomas & Gladstone, Rick. (2012, November 9). Defense minister confirms Iran fired

- on U.S. drone. *New York Times*. Retrieved May 26, 2013 from http://www.nytimes.com/2012/11/10/world/middleeast/iran-confirms-drone-shooting-episode.html?_r=0
- Erlanger, Steven. (2012, January 16). Oversight of cruise lines at issue after disaster. *New York Times*. Retrieved January 24, 2013 from <http://www.nytimes.com/2012/01/17/world/europe/oversight-of-cruise-lines-at-issue-after-disaster.html?pagewanted=all>
- European Aviation Safety Agency. (2009, August 28). *EASA policy statement: airworthiness certification of Unmanned Aircraft Systems (UAS)* (E.Y013.01). Retrieved December 31, 2012 from http://www.easa.europa.eu/certification/docs/policy-statements/E.Y013-01_%20UAS_%20Policy.pdf
- Farhi, Paul. (2012, August 10). Fareed Zakaria suspended for plagiarism by Time, CNN. *Washington Post*. Retrieved January 28, 2013 from http://articles.washingtonpost.com/2012-08-10/lifestyle/35492294_1_zakaria-jill-lepore-time-magazine-and-cnn
- FAA Modernization and Reform Act of 2012, Pub. L. No. 112-95, 126 Stat. 11 (2012). Retrieved December 31, 2012 from [http://www.faa.gov/regulations_policies/reauthorization/media/PLAW-112publ95\[1\].pdf](http://www.faa.gov/regulations_policies/reauthorization/media/PLAW-112publ95[1].pdf)
- Federal Aviation Administration. (2011, October 14). Unmanned aircraft (UAS): Questions and answers. Retrieved January 20, 2013 from http://www.faa.gov/about/initiatives/uas/uas_faq/#Qn2
- Federal Aviation Administration. (2010a, December 27). *Air traffic organization aircraft*

accident and incident notification, investigation, and reporting (JO 8020.16A). Retrieved December 31, 2012 from

<http://www.faa.gov/documentLibrary/media/Order/JO8020.16A.pdf>

Federal Aviation Administration. (2010b). *FAA aerospace forecast fiscal years 2010-2030*.

Retrieved December 31, 2012 from

https://www.faa.gov/data_research/aviation/aerospace_forecasts/2010-2030/media/2010%20Forecast%20Doc.pdf

Federal Aviation Administration. (1981, June 9). Advisory Circular 91-57, *Model Aircraft Operating Standards*. Retrieved December 31, 2012 from

[http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/1acfc3f689769a56862569e70077c9cc/\\$FILE/ATTBJMAC/ac91-57.pdf](http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/1acfc3f689769a56862569e70077c9cc/$FILE/ATTBJMAC/ac91-57.pdf)

Feron, Eric & Johnson, Eric N. (2008). Aerial robotics. In Bruno Siciliano & Oussama Khatib (Eds.), *Springer Handbook of Robotics* [Google Books] (p. 1009-1030). Retrieved

December 31, 2012 from <http://books.google.ca>

Fields, Jim & Duff, Craig. (2011). Occupy Wall Street's live streamer Tim Pool. *TIME Video*.

Retrieved January 24, 2013 from

http://www.time.com/time/video/player/0,32068,1279751069001_2099632,00.html

Fink, Jack. (2012, January 20). Dallas plant investigated for dumping pig blood into Trinity River. *CBS-DFW*. Retrieved January 24, 2013 from

<http://dfw.cbslocal.com/2012/01/20/dallas-plant-investigated-for-dumping-pig-blood-into-trinity-river/>

Finn, Peter. (2011, December 23). Rise of the drone: from Calif. Garage to multibillion-dollar

- defense industry. *Washington Post*. Retrieved December 31, 2012 from http://www.washingtonpost.com/national/national-security/rise-of-the-drone-from-calif-garage-to-multibillion-dollar-defense-industry/2011/12/22/gIQACG8UEP_story.html
- Finnegan, Philip. (2012, June 8). Unmanned aerial vehicles (UAVs). *Teal Group Corporation*. Retrieved December 31, 2012 from <http://tealgroup.com/index.php/teal-group-news-briefs/12-unmanned-aerial-vehicles-uavs>
- “Floodwaters carve deadly trail of destruction.” (2011, May 20). *CNN*. Retrieved January 25, 2013 from <http://edition.cnn.com/2011/US/05/19/flooding/?hpt=T2>
- Florida v. Riley, 488 U.S. 445 (1989). Retrieved January 24, 2013 from <http://caselaw.lp.findlaw.com/cgi-bin/getcase.pl?court=us&vol=488&invol=445>
- Gahrn, Amy. (2012, July 26). Fighting fire with data, spacecraft, drones. *CNN*. Retrieved January 20, 2013 from <http://www.cnn.com/2012/07/26/tech/innovation/technology-fighting-fire/index.html>
- Gellman, Barton. (2002, January 20). A strategy’s cautious evolution. *Washington Post*, p. A01. Retrieved December 31, 2012 from <http://www.washingtonpost.com/wp-dyn/content/article/2006/06/09/AR2006060900885.html>
- Gertler, Jeremiah. (2012, January 3). *U.S. unmanned aerial systems*. (Congressional Report No. R42136). Washington, DC: Library of Congress Congressional Research Service. Retrieved December 31, 2012 from <http://www.fas.org/sgp/crs/natsec/R42136.pdf>
- Gibb, Alexandra. (2012a, December 10). Drones in the field. Canadian International Council. Retrieved March 17, 2013 from <http://opencanada.org/features/the-think-tank/graphic/drones-in-the-field/>
- Gibb, Alexandra. (2012b, May 31). A drone field guide. *Canadian International Council*.

- Retrieved March 17, 2013 from <http://opencanada.org/features/the-think-tank/graphic/a-drone-field-guide/>
- “Global Hawk collects reconnaissance data during Haiti relief efforts.” (2010, January 15). *United States Air Force*. Retrieved January 25, 2013 from <http://www.af.mil/news/story.asp?id=123185754>
- “Global Hawk, U-2 capture essential wildfires images.” (2007, October 29). *United States Air Force*. Retrieved January 25, 2013 from <http://www.af.mil/news/story.asp?id=123073731>
- “Google cash buys drones to watch endangered species.” (2012, December 6). *British Broadcasting Corporation*. Retrieved January 20, 2013 from <http://www.bbc.co.uk/news/technology-20625578>
- Gorman, Siobhan. (2010, November 3). Drones get ready to fly, unseen into everyday life. *Wall Street Journal*. Retrieved January 27, 2013 from <http://online.wsj.com/article/SB10001424052748703631704575551954273159086.html.html>
- Gustin, Sam. (2012, October 1). How the ‘maker’ movement plans to transform the U.S. economy. *Time Magazine*. Retrieved January 20, 2013 from <http://business.time.com/2012/10/01/how-the-maker-movement-plans-to-transform-the-u-s-economy/>
- Hastings, Michael. (2012, April 16). The rise of the killer drones: How America goes to war in secret. *Rolling Stone*. Retrieved December 4, 2012 from <http://www.rollingstone.com/politics/news/the-rise-of-the-killer-drones-how-america-goes-to-war-in-secret-20120416>
- Heyes, Heidi. (2012, December 20). lasvegasskycam.com shoots Sam Boyd Stadium preps for

Maaco Las Vegas Bowl [Video file]. Retrieved January 25, 2013 from

<http://www.youtube.com/watch?v=TqoYp0Q4N08>

“How drones will revolutionize farming.” (2013, January 15). *Wall Street Journal*. Retrieved

January 20, 2013 from [http://live.wsj.com/video/cio-network-how-drones-will-](http://live.wsj.com/video/cio-network-how-drones-will-revolutionize-farming/DEB563DD-87EF-4BEA-8663-33696ED0F0A1.html#!DEB563DD-87EF-4BEA-8663-33696ED0F0A1)

[revolutionize-farming/DEB563DD-87EF-4BEA-8663-](http://live.wsj.com/video/cio-network-how-drones-will-revolutionize-farming/DEB563DD-87EF-4BEA-8663-33696ED0F0A1.html#!DEB563DD-87EF-4BEA-8663-33696ED0F0A1)

[33696ED0F0A1.html#!DEB563DD-87EF-4BEA-8663-33696ED0F0A1](http://live.wsj.com/video/cio-network-how-drones-will-revolutionize-farming/DEB563DD-87EF-4BEA-8663-33696ED0F0A1.html#!DEB563DD-87EF-4BEA-8663-33696ED0F0A1)

“Hurricane Facts: Hurricane Andrew.” (1994, September 29). *Sarasota Herald-Tribune*.

Retrieved January 25, 2013 from

[http://news.google.com/newspapers?id=mCAfAAAAIBAJ&sjid=P30EAAAAIBAJ&pg=](http://news.google.com/newspapers?id=mCAfAAAAIBAJ&sjid=P30EAAAAIBAJ&pg=3668,3958333&dq)

[3668,3958333&dq](http://news.google.com/newspapers?id=mCAfAAAAIBAJ&sjid=P30EAAAAIBAJ&pg=3668,3958333&dq)

Jarnot, Charles. (2011). History. In Barnhart, Richard K. & Hottman, Stephen B. & Marshall,

Douglas M. & Shappee, Eric (Eds.) *Introduction to Unmanned Aircraft Systems* (p. 1-16).

doi: 10.1201/b11202-2

Jefferies, Duncan. (2012, October 29). Drone journalism set for takeoff—once they’re permitted

to use our airspace. *Guardian*. Retrieved January 24, 2014 from

[http://www.guardian.co.uk/media-network/media-network-blog/2012/oct/29/drone-](http://www.guardian.co.uk/media-network/media-network-blog/2012/oct/29/drone-journalism-take-off)

[journalism-take-off](http://www.guardian.co.uk/media-network/media-network-blog/2012/oct/29/drone-journalism-take-off)

Jones, RonNell Anderson. (2008, December). Avalanche or undue alarm? An empirical study of

subpoenas received by the news media. *Minnesota Law Review*, 93(2), 585-667.

Retrieved January 28, 2013 from HeinOnline Law Journal Library database.

“Journalist deaths spike in 2012 due to Syria, Somalia.” (2012, December 18). *Committee to*

Protect Journalists. Retrieved January 25, 2013 from

[http://www.cpj.org/reports/2012/12/journalist-deaths-spike-in-2012-due-to-syria-](http://www.cpj.org/reports/2012/12/journalist-deaths-spike-in-2012-due-to-syria-somal.php)

[somal.php](http://www.cpj.org/reports/2012/12/journalist-deaths-spike-in-2012-due-to-syria-somal.php)

- “Kate and William angered by ‘grotesque’ invasion of privacy.” (2012, September 14). *British Broadcasting Corporation*. Retrieved January 27, 2013 from <http://www.bbc.co.uk/news/uk-19595221>
- Katz v. United States, 389 U.S. 347 (1967). Retrieved January 24, 2013 from http://www.law.cornell.edu/supct/html/historics/USSC_CR_0389_0347_ZC1.html
- Kell, Chase. (2012, March 6). Police drone crashes into SWAT team vehicle in test run. *Yahoo News*. Retrieved January 20, 2013 from <http://ca.news.yahoo.com/blogs/daily-buzz/police-drone-crashes-swat-team-vehicle-test-run-153706915.html>
- Kennedy, Robert. (2012). Prying eyes in US skies raise privacy fears. *Al Jazeera*. Retrieved December 31, 2012 from <http://www.aljazeera.com/indepth/features/2012/06/20126247243722488.html>
- “Lara Logan breaks silence on Cairo assault.” (2011, April 28). *CBS 60 Minutes*. Retrieved January 25, 2013 from http://www.cbsnews.com/8301-18560_162-20058368.html
- Lawrence, Chris. (2012, June 11). Navy drones crashes in Maryland. *CNN*. Retrieved January 20, 2013 from <http://www.cnn.com/2012/06/11/us/maryland-drone-crash/index.html>
- Lietar, Pauline (Director). (2010). *Paparazzi: Sharks of the French Riviera* [Video file]. Retrieved January 27, 2013 from <http://www.youtube.com/watch?v=aMpS0M1vs4M>
- “Living under drones: Death, injury, and trauma to civilians from US drone practices in Pakistan.” (2012, September). *International Human Rights and Conflict Resolution Clinic Stanford Law School & Global Justice Clinic New York University School of Law*. Retrieved December 1, 2012 from <http://livingunderdrones.org/wp-content/uploads/2012/10/Stanford-NYU-LIVING-UNDER-DRONES.pdf>
- LizMartinezG. (2011, December 6). Trying out our drone for tomorrow’s show cc @ASE

- pic.twitter.com/MOMJtw5r [Twitter post]. Retrieved January 24, 2013 from <https://twitter.com/LizMartinezG/status/144157750551777282>
- Lynch, Jennifer. (2012, April 19). FAA releases lists of drone certificates—many questions left unanswered. *Electronic Frontier Foundation*. Retrieved January 20, 2013 from <https://www.eff.org/deeplinks/2012/04/faa-releases-its-list-drone-certificates-leaves-many-questions-unanswered>
- Martin, Adam. (2011, December 7). Occupy Wall Street has a drone: The Occuicopter. *Atlantic Wire*. Retrieved January 24, 2013 from <http://www.theatlanticwire.com/national/2011/12/occupy-wall-street-has-drone-occuicopter/45891/>
- Martin, Gary. (2012, November 27). Push to step up domestic use of drones. *San Francisco Chronicle*. Retrieved January 27, 2013 from <http://www.sfgate.com/nation/article/Push-to-step-up-domestic-use-of-drones-4064482.php#page-1>
- Martin, Matt J. & Sasser, Charles W. (2010). *Predator: The Remote-Control Air War Over Iraq and Afghanistan: A Pilot's Story*. Minneapolis, MN: Zenith Press.
- McGonigle, Ronald L. (1992, December 8). Unmanned aerial vehicles (UAVs) on the future tactical battlefield: Are UAVs an essential joint force multiplier? *School of Advanced Military Studies, United States Army Command and General Staff College*. Retrieved December 29, 2012 from <http://www.dtic.mil/dtic/tr/fulltext/u2/a262663.pdf>
- McKelvey, Tara. (2011, May 3). Covering Obama's secret war. *Columbia Journalism Review*. Retrieved December 31, 2012 from http://www.cjr.org/feature/covering_obamas_secret_war.php?page=all
- McQuaid, John. (2012, November 27). TMZ's possible drone deployment. *Forbes*. Retrieved

- January 27, 2013 from <http://www.forbes.com/sites/johnmcquaid/2012/11/27/tmzs-possible-drone-deployment/>
- Miller, Donald L. (2006). *Masters of the air: America's bomber boys who fought the air war against Nazi Germany* [Google Books]. Retrieved December 31, 2012 from <http://books.google.ca>
- “Misery in Minot” [Video file]. (2011, June 29). *The Daily*. Retrieved January 25, 2013 from <http://www.youtube.com/watch?v=wsYDj4dtEGQ>
- Moisse, Katie. (2011, May 2). CBS reporter Lara Logan opens up about Tahrir Square attack. *ABC News*. Retrieved December 1, 2012 from <http://abcnews.go.com/Health/MindMoodNews/cbs-reporter-lara-logan-opens-tahrir-square-assault/story?id=13492964#.ULvS746aR1J>.
- Morely, Jefferson. (2012, May 15). Israel's drone dominance. *Salon*. Retrieved December 31, 2012, http://www.salon.com/2012/05/15/israels_drone_dominance
- Morris, Steven. (2012, October 17). Police use drones in April Jones search. *Guardian*. Retrieved January 20, 2013 from <http://www.guardian.co.uk/uk/2012/oct/17/police-drones-search-april-jones>
- Mortimer, Gary. (2012, January 23). Dallas meat packing plant investigated after drone images reveal pollution. *sUAS News*. Retrieved January 24, 2013 from <http://www.suasnews.com/2012/01/11389/dallas-meat-packing-plant-investigated-after-drone-images-reveal-pollution/>
- Mortimer, Gary. (2011, May 4). Daily drone and ARdrone? Seems not. *sUAS News*. Retrieved January 23, 2013 from <http://www.suasnews.com/2011/05/5361/daily-drone-and-ardrone-seems-not/>
- Multi-National Division Baghdad. (2008, April 11). *UAV Kills 6 Heavily Armed Criminals*

- [Video file]. Retrieved December 4, 2012 from
http://www.youtube.com/watch?feature=player_detailpage&v=gNNJJrcIa7A
- “NASA’s Global Hawk mission begins with flight to Hurricane Leslie.” (2012, September 7).
National Aeronautics and Space Administration. Retrieved January 25, 2013 from
http://www.nasa.gov/home/hqnews/2012/sep/HQ_12-310_Global_Hawk_HS3.html
- “Nebraska’s drought of 2012” [Video file]. (2012, October 21). *University of Nebraska-Lincoln Drone Journalism Lab*. Retrieved January 24, 2012 from
http://www.youtube.com/watch?feature=player_embedded&v=HV0iKlF9AdA
- Newcome, Lawrence R. (2004). *Unmanned aviation: a brief history of unmanned aerial vehicles*
[Google Books]. Retrieved December 31, 2012 from <http://books.google.ca>
- Nichols, Michael. (2011, December 14). Dispatch #10: Micro-copter. *National Geographic Magazine*. Retrieved January 31, 2013 from
<http://ngm.nationalgeographic.com/visions/field-test/nichols-serengeti/dispatch-10>
- North Atlantic Treaty Organization. (2010, January 4). *The Joint Air Power Competence Centre strategic concept of employment for unmanned aircraft systems in NATO*. Retrieved December, 31, 2012 from
http://www.japcc.de/fileadmin/user_upload/projects/nato_flight_plan_for_uas/NATO_UAS_CONEMP_Final.pdf
- Northrop Grumman. (n.d.). *Our history*. Retrieved March 16, 2013 from
<http://www.northropgrumman.com/AboutUs/OurHeritage/Pages/default.aspx>
- Office of the Secretary of Defense. (2007, December 10). *Unmanned Systems Roadmap (2007-2032)*. Retrieved December 31, 2012 from
<http://www.fas.org/irp/program/collect/usroadmap2007.pdf>
- Ovid. (2010). *Metamorphoses*. (S. Lombardo, Trans.). Indianapolis, IN: Hackett Publishing Co.

- Parrot. (n.d.). *AR Rescue*. Retrieved March 16, 2012 from <http://ardrone2.parrot.com/apps/arrescue/>
- Parsch, Andreas. (2003). Boeing BQ-7 Aphrodite. In *Directory of U.S. military rockets and missiles (appendix 1)*. Retrieved December 29, 2012 from <http://www.designation-systems.net/dusrm/app1/bq-7.html>
- Pearson, Lee. (n.d.). Developing the flying bomb. *Naval Air Systems Command*. Retrieved March 8, 2013 from <http://www.history.navy.mil/download/ww1-10.pdf#search=%22developing%20the%20flying%20bomb%20Pearson%22>
- Pew Research Center. (2011, September 22). *Press widely criticized, but trusted more than other information sources*. Retrieved January 28, 2013 from <http://www.people-press.org/files/legacy-pdf/9-22-2011%20Media%20Attitudes%20Release.pdf>
- Pfeiffer, Eric. (2013, January 22). News crew attacked by swarm of bees during live report. *Yahoo News*. Retrieved January 24, 2013 from <http://ca.news.yahoo.com/blogs/sideshow/news-crew-attacked-swarm-bees-during-live-report-021007241.html>
- Pianigiani, Gaia. (2013, January 13). Salvagers in Italy say Costa Concordia wreck may be gone by summer's end. *New York Times*. Retrieved January 24, 2013 from <http://www.nytimes.com/2013/01/13/world/europe/salvagers-in-italy-say-costa-concordia-wreck-will-be-gone-by-summers-end.html>
- Pianigiani, Gaia. (2012, May 18). Luxury liner's removal to begin off Italian coast. *New York Times*. Retrieved January 24, 2013 from http://www.nytimes.com/2012/05/19/world/europe/removal-of-costa-concordia-is-set-to-begin-in-italy.html?_r=0
- Pike, John. (2002, November 6). RQ-1 Predator MAE UAV. *Federation of American Scientists*.

- Retrieved.* December 31, 2012 from <https://www.fas.org/irp/program/collect/predator.htm>
- Platt, John R. (2012, October 2). Drones could help conserve endangered wildlife. *Mother Jones*. Retrieved January 20, 2013 from <http://www.motherjones.com/blue-marble/2012/10/drones-conservation-wildlife-endangered>
- Pool, Tim. (2011, December 5). Drone Test 1 [Video file]. Retrieved January 24, 2012 from <http://www.ustream.tv/recorded/18956195>
- Postgate, Matthew. (2012, April 19). Collaborative project with Southampton University: Advanced UAV. *British Broadcasting Corporation*. Retrieved January 24, 2013 from <http://www.bbc.co.uk/blogs/researchanddevelopment/2012/04/collab-soton-uav.shtml>
- Pretty, Ted. (2012, November 5). Impressions from building and flying the F550 for the first time. *Professional Society of Drone Journalists*. Retrieved January 25, 2013 from <http://www.dronejournalism.org/drone-systems/tedpretty/impressionsfrombuildingandflyingthef550forthefirsttime>
- Priest, Dana & Arkin, William M. (2011, September 6). Inside the CIA's 'kill list'. *Public Broadcasting Corporation*. Retrieved December 31, 2012 from <http://www.pbs.org/wgbh/pages/frontline/iraq-war-on-terror/topsecretamerica/inside-the-cias-kill-list/>
- Pulkkinen, Levi. (2012, November 27). Months later, five charged in May Day riot. *Seattle Post-Intelligencer*. Retrieved January 28, 2013 from <http://www.seattlepi.com/local/article/Months-later-five-charged-in-May-Day-riots-4071773.php>
- Reuters Institute for the Study of Journalism. (2012, July 30). *Workshop will explore issues*

- in the use of drones in news gathering and event coverage*. Retrieved January 24, 2013 from <http://reutersinstitute.politics.ox.ac.uk/about/news/item/article/workshop-will-explore-issues-in-the.html>
- Rieder, Rem. (2003, June). The Jayson Blair affair. *American Journalism Review*. Retrieved January 28, 2013 from <http://www.ajr.org/article.asp?id=3019>
- Robinson, James. (2011a, November 14). Phone hacking: 58% of UK public say they have lost trust in papers. *Guardian*. Retrieved March 16, 2013 from <http://www.guardian.co.uk/media/2011/nov/14/phone-hacking-public-trust>
- Robinson, Jennifer. (2011b, November 29). ‘Bugsplat’: The Ugly U.S. Drone War in Pakistan. *Al Jazeera*. Retrieved December 4, 2012 from <http://www.aljazeera.com/indepth/opinion/2011/11/201111278839153400.html>
- Roegiers, Brett. (2011, May 7). iPad-controlled drone captures Tuscaloosa storm damage. *CNN*. Retrieved January 23, 2013 from <http://news.blogs.cnn.com/2011/05/07/ipad-controlled-drone-captures-tuscaloosa-storm-damage/>
- Sanders, Eli. (2012, May 7). Journalism ethics expert to Seattle media: ‘Anything that you haven’t already published, you should not be handing over without a subpoena.’ *Stranger*. Retrieved January 28, 2013 from <http://slog.thestranger.com/slog/archives/2012/05/07/journalism-ethics-expert-to-seattle-media-anything-that-you-havent-already-published-you-should-not-be-handing-over-without-a-subpoena>
- Schroyer, Matthew. (2013, January 14). Nodes for journalists: A primer on bringing sensor data to the reporter. *Mental Muniton*. Retrieved January 25, 2013 from <http://www.mentalmuniton.com/2013/01/nodes-for-journalists-primer-on.html>
- Schroyer, Matthew. (2012a, October 30). Final lessons from JournoDrone One. *Professional*

- Society of Drone Journalists*. Retrieved January 23, 2013 from <http://www.dronejournalism.org/drone-systems/journodroneone>
- Schroyer, Matthew. (2012b, July 3). The drone journalism code of ethics. *Mental Muniton*. Retrieved January 25, 2013 from <http://www.mentalmuniton.com/2012/07/code-of-ethics-for-drone-journalists.html>
- Schroyer, Matthew. (2011, November 30). Being a more versatile journalist: Data journalism veteran Steve Doig wants journalists to know statistics. *Mental Muniton*. Retrieved January 25, 2013 from <http://www.mentalmuniton.com/2011/11/being-more-versatile-journalist-data.html>
- Sefton, Dru. (2012, November 28). Sky's the limit: KBNIA-FM gets \$25k grant to create newsgathering drones. *Current*. Retrieved January 24, 2013 from <http://www.current.org/2012/11/skys-the-limit-kbia-fm-gets-25k-grant-to-create-newsgathering-drones/>
- “Severe weather drone view” [Video file]. (2011, May 2). *The Daily*. Retrieved January 25, 2013 from <http://www.youtube.com/watch?v=nSMfIN14MHE>
- Sifton, John. (2012, February 7). A brief history of drones. *The Nation*. Retrieved December 31, 2012 from <http://www.thenation.com/article/166124/brief-history-drones#>
- Singer, P. W. (2011). Drones don't die. *Military History*, 28(2), 66-68. Retrieved December 28, 2012 from Academic Search Premier database.
- Singer, Peter W. (2009). *Wired for War*. New York: Penguin Press.
- Society of Professional Journalists. (n.d.a). *SPJ code of ethics*. Retrieved March 16, 2013 from <http://www.spj.org/ethicscode.asp>
- Society of Professional Journalists. (n.d.b). *Struggling to report: The fight for a federal shield law*. Retrieved March 17, 2013 from <http://www.spj.org/shieldlaw.asp>

- Smith, Sydney. (2012, October 29). What will journalism ethics for drone journalism be? UK workshop and Univ. of Nebraska-Lincoln project both focus on drone journalism. *Reuters Institute*. Retrieved January 23, 2013 from http://www.imediaethics.org/News/3542/What_will_journalism_ethics_for_drone_journalism_be_uk_workshop_and_univ_of_nebraska-lincoln_project_both_focus_on_drone_journalism.php
- Smithson, S. (2012, February 7). Drones over U.S. get OK by Congress. *Washington Times*. Retrieved December 31, 2012 from <http://www.washingtontimes.com/news/2012/feb/7/coming-to-a-sky-near-you/>
- Spark, Nick T. (2004, November 29). Television goes to war. In *The secret arsenal: Advanced American weapons of WWII* (chap. 9). Retrieved December 29, 2012 from <http://www.mugualumni.org/secretarsenal/page9.html>
- Spinetta, Lawrence. (2011, January). The rise of unmanned aircraft. *Aviation History*, 21(3), 30-37. Retrieved December 29, 2012 from Academic Search Premier database.
- Stahl, Leslie (Reporter) & Bonin, Rich (Producer). (2012, December 16). A world askew: On board the Costa Concordia. *CBS 60 Minutes*. Retrieved January 24, 2013 from http://www.cbsnews.com/8301-504803_162-57559461-10391709/a-world-askew-on-board-the-costa-concordia/
- Sykes, Tom. (2012, October 29). French cops prepare to swoop on Kate Middleton's topless photographer. *Daily Beast*. Retrieved January 27, 2013 from <http://www.thedailybeast.com/articles/2012/10/29/french-cops-prepare-to-swoop-on-kate-middleton-s-topless-photographer.html>
- Tenant, George. (24 March 2004). *Written Statement for the Record of the Director of Central*

Intelligence before the National Commission on Terrorist Attacks Upon the United States.

Retrieved December 31, 2012 from

http://govinfo.library.unt.edu/911/hearings/hearing8/tenet_statement.pdf

Tesla, Nikola. (1915, September 9). The wonder world to be created by electricity. *Twenty-First Century Books*. Retrieved December 4, 2012 from <http://www.tfcbooks.com/tesla/1915-09-09.htm>

Thompson, Richard M. (2012, September 6). *Drones in domestic surveillance operations: Fourth Amendment implications and legislative responses*. (Congressional Report No. R42701). Washington, DC: Library of Congress Congressional Research Service. Retrieved December 31, 2012 from <http://www.fas.org/sgp/crs/natsec/R42701.pdf>

Transport Canada. (2010, May 3). *Unmanned air vehicle (UAV)*. Retrieved December 31, 2012 from <http://www.tc.gc.ca/eng/civilaviation/standards/general-recavi-brochures-uav-2270.htm#definition>

Ungerleider, Neal. (2012, February 15). Unmanned drones go from Afghanistan to Hollywood. *Fast Company*. Retrieved January 20, 2013 from <http://www.fastcompany.com/1816578/unmanned-drones-go-afghanistan-hollywood>

United Nations Human Rights Council. 14th session. *Report of the Special Rapporteur on Extrajudicial, Summary, or Arbitrary Executions, Philip Alston*. May 28, 2010 (A/HRC/14/24/Add.6). Addendum. <http://www2.ohchr.org/english/bodies/hrcouncil/docs/14session/A.HRC.14.24.Add6.pdf>.

U.S. Government Accountability Office. (2008, May). *Unmanned aircraft systems: Federal actions needed to ensure safety and expand their potential uses within the National Airspace System*. (Publication No. GAO-08-511). Retrieved December 31, 2012 from <http://www.gao.gov/new.items/d08511.pdf>

- United States v. Causby, 328 U.S. 256 (1946). Retrieved January 24, 2013 from <http://www.unk.edu/academics/library.aspx?id=61075>
- Vanguard Defense. (n.d.). *ShadowHawk specification sheet*. Retrieved January 20, 2013 from <http://vanguarddefense.com/wp-content/uploads/2012/10/SHADOWHAWK-SPEC1.pdf>
- Yenne, Bill. (2004). *Attack of the drones: a history of unmanned aerial combat* [Google Books]. Retrieved December 31, 2012 from <http://books.google.ca>
- Yinke, Deng. (2011). *Ancient Chinese Inventions* [Google Books]. Retrieved December 4, 2012 from <http://books.google.ca>
- Waite, Matthew. (2012, October 26). How we used a drone to cover the drought. *Drone Journalism Lab*. Retrieved January 24, 2013 from <http://www.dronejournalismlab.org/post/34363827984/how-we-used-a-drone-to-cover-drought>
- Waite, Matt & Kreimer, Ben. (2012, September). Drones for Journalism. *Presentation at the annual Online News Association Conference and Awards*, San Francisco, CA. Retrieved Friday January 25, 2013 from <http://ona12.journalists.org/sessions/drones-for-journalism/>
- Wall, Tim. (2011, November 10). Flying drones fight fires. *Discovery News*. Retrieved January 20, 2013 from <http://news.discovery.com/earth/flying-drones-fight-fires-111110.htm>
- “Waging war — a new generation.” (2010, February 2). *PBS Frontline*. Retrieved December 4, 2012 from <http://www.pbs.org/wgbh/pages/frontline/digitalnation/waging-war/a-new-generation/war-porn.html?play>
- Ward, Stephen J. A. (2011). *Ethics and the media: An introduction*. Cambridge, UK: Cambridge University Press.
- Warne, Gary C. (2012, July 15). The Predator’s ancestors – UAVs in the Great War. Retrieved

March 9, 2013 from <http://warnepieces.blogspot.ca/2012/07/the-predators-ancestors-uavs-in-great.html>

Weeks, Albert L. (2000, May). In Operation Aphrodite, explosive-laden aircraft were to be flown against German targets. *World War II*, 15(1), 66. Retrieved December 29, 2012 from Military & Government Collection database.

Weinberger, Sharon. (2012, June 11). 4 drone sensors that changed warfare—and what happens when they come home. *Popular Mechanics*. Retrieved January 25, 2013 from <http://www.popularmechanics.com/technology/military/planes-uavs/4-new-drone-sensors-that-changed-warfare-and-what-could-happen-when-they-come-home-9549377>

“We’re not keeping up with the dronses.” (2012, November 27). *TMZ*. Retrieved January 27, 2013 from <http://www.tMZ.com/2012/11/27/tMZ-drone-faa-bogus-report/>

Wilson, Scott. (2011, December 3). In Gaza, lives shaped by drones. *Washington Post*. Retrieved December 31, 2012 from http://articles.washingtonpost.com/2011-12-03/world/35287909_1_drone-strike-drone-aircraft-gaza-strip

Wolfgang, Ben. (2012, August 7). FAA chief says drones will force change at agency. *Washington Times*. Retrieved December 31, 2012 from <http://www.washingtontimes.com/news/2012/aug/7/faa-chief-says-drones-will-force-change-at-agency/>

Zaloga, Steven J. (2008). *Unmanned aerial vehicles: robotic air warfare 1917-2007* [Google Books]. Retrieved December 29, 2012 from <http://books.google.ca>

Zucchini, David. (2010, February 21). Drone Pilots Have a Front-Row Seat on War, from Half a World Away. *Los Angeles Times*. Retrieved December 3, 2012 from <http://www.latimes.com/news/nationworld/world/la-fg-drone-crews21-2010feb21,0,1124659,full.story>