This guidebook provides a primer on selected law and policy issues related to UAVs and outstanding public interest questions to be explored at DARC. It also includes basic information about types of aircraft and airspace designations, integration deadlines, recommended reading, and a guide for navigating our law and policy related sessions.

DRONECONFERENCE.ORG
Imagine a near future in which networks of autonomous robots roam the skies, performing everything from law enforcement, to communications, to crop dusting, shipping and logistics. Sound implausible? It might be. But that's the future that the aerospace industry, the government, and a new class of entrepreneurs are busy preparing. And this future is closer to reality than many realize.

Drones are no longer the exclusive domain of the military. Or even of the state. At all levels—hobby aircraft, remotely piloted aircraft, and fully autonomous drones—unmanned aerial systems are growing in sophistication and accessibility. They are almost universally expected to transform aerospace. The Association for Unmanned Vehicle Systems International, an industry trade association, claims that flying robots will create 100,000 jobs and contribute $82 billion toward U.S. GDP by 2025 and the Federal Aviation Administration (FAA) estimates as many as 30,000 unmanned aerial vehicles (UAVs) in American skies by 2020.

In 2012, Congress passed the FAA Modernization and Reform Act, tasking the FAA with the development of a plan for safely integrating unmanned aerial vehicles into domestic airspace by 2015. Safely introducing drones into the domestic airspace is, in itself, a daunting task—800 million people fly U.S. skies annually, and an errant $900 drone could easily take down a commercial airliner and everyone on board. But we need to do more than safely introduce drones into our airspace. We need to safely introduce them into society.

Drones herald an explosion of technological innovation. They’re enabled by—and drive—innovation in peripheral technologies like cameras and sensors. They also open the door for exciting new applications of existing technology. Worldwide, people are experimenting with using drones for wildlife observation, geological survey and environmental science, precision agriculture, firefighting, building and bridge inspection, mapping, and filming for both news and entertainment.
Towards a Constructive Law & Policy Agenda

Unmanned flight has been around for a while. But the sudden explosion of flying robots raises questions and anxieties around law and policy. Some are concerned with public oversight of civil drones. Others worry about the consequences of the fact that highly capable drones are available to anyone with a few hundred dollars. Striking a balance between protecting vital public interests and promoting innovations that stand to substantially benefit society requires a broad reconsideration of the laws, policies, and regulatory frameworks that will determine the way drones are incorporated into our lives.

There is currently no comprehensive framework for allowing civilian use of UAVs. While the FAA’s forthcoming plan is an important starting point, the FAA is neither empowered nor equipped to resolve many of the concerns associated with the mainstream adoption of civilian drones. It is important to remember that any comprehensive framework will also be shaped by the expertise and work of an unprecedented number of otherwise seemingly disparate government agencies, from NASA and the National Transportation Safety Board, to the National Oceanic and Atmospheric Administration, US Customs and Border Protection, and the US Patent and Trademark Office. And as anxieties rise over the proliferation of unmanned systems, we should expect to see those anxieties reflected throughout our legislative and judicial systems as well. With so much work occurring in parallel across such a large, distributed network of relevant bodies, each with different priorities and expertise, there is an undeniable need for an interdisciplinary approach that considers law and policy from myriad perspectives.
Do We Need New Laws For Drones?

Some would argue that "drones" are neither new, nor even real, but rather an amalgamation or abstraction of existing technologies and concepts. On one end of the spectrum, we speak of the many modern hobby aircraft you can buy at the mall, or build over a weekend, and the many things which we call "drones" but which are not truly autonomous. On the other end, we have deadly instruments of state power which define American foreign policy and shape the global security compact. Across this spectrum, it's possible many of the existential questions prompted by "drones" are in fact already addressed by existing legal frameworks and precedents.

Even if it is the case that there is nothing new to be said about “drones,” formally mapping existing legal frameworks and precedents onto the wide spectrum of drones would still be a worthwhile endeavor. At the same time, the possibility of a future filled with flying robots has captured the public’s imagination—and created some discomfort. This suggests that there is something in the zeitgeist that deserves proper exploration.

Either way, the coming formal integration of drones into domestic airspace presents a unique opportunity—and call to action—for guiding the development of relevant law and policy, ahead of their wide-scale, mainstream adoption. It is perhaps the first time that we have had the occasion or ability to bring the expertise and knowledge of so many to bear on the direction of a technology with such landscape–altering potential.

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**MICRO & SMALL MULTI-ROTOR**

Under 2kg (4.4lbs) Take-Off Weight
Predominately helicopter-style or multi-rotor; limited flight range and payload

- **Entry level:** AR.Drone 2.0 — 1.5lbs, 50m range, $300 for basic unit
- **High end:** Black Hornet — 0.5oz, 1km range, $30.4M for 160 Black Hornets

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**LARGE MULTI-ROTOR & HELICOPTER**

2–7kg (4.4–15.4lbs) Take-off Weight
Powered by electric rotors; increased stability, maneuverability and payload

- **Low cost:** X650 VA — 4.8lbs, 2km range, $3000 complete unit (requires 2 operators)
- **Popular:** MikroKopter — 2.2lbs, 250m operational radius, $2100 basic unit (camera not included)

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**SMALL FIXED WING**

Greater aerodynamic efficiency; longer flights and greater range; unable to maneuver closely in urban environment

- **Innovator:** Team BlackSheep Zephyr — 1.37m wingspan, 30–45km range, $2000 for custom rig
- **Military grade:** Aerovironment Raven — 4.1lbs, 10km operational radius, $200,000 for complete system with military configuration

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**LARGE FIXED WING**

Predominantly military grade with commercial versions typically 2–3 years behind

- **Standard:** AAI Aerosonde — 55lbs, 3.6m wingspan, $100,000 for basic platform, $350,000 with hi-res day/night camera system and thermal imager
At its core, DARC is a conference on the law and policy of drones, with the goal of working towards the development of a constructive law and policy agenda. But DARC is also meant to be more than simply a three day conference, and it will not be the final word. It is the start of a forum for exploring the contours of the current landscape, understanding how we got here, and identifying how we can influence the future of drone law and policy.

One of the major outputs of DARC is the creation of an online resource that will serve as the go-to place for learning about and contributing to the development of law and policy relevant to the integration of drones into civilian airspace. The conference features over 20 breakout sessions covering a broad range of topics and the outputs from each session will contribute to designing and building the online resource.

Breakout sessions emphasize our focus on promoting an interdisciplinary approach to tackling the issues: aerospace engineers will help inform legal conversations; legal experts and policy advocates will experience drone technology first-hand; government officials will be exposed to the larger cultural conversations occurring around the technology they are tasked with regulating. All breakout sessions take the form of a workshop, working group, or roundtable. These sessions are not meant to be a small group of people addressing a larger group of people. Instead, everyone is a participant. The interactive sessions are designed to be participatory, purposeful, and productive.

**Goals & Outcomes**

- Convene a public conversation about drones and society
- Develop a constructive law and policy agenda
- Begin building an online resource for guiding development of relevant law and policy
- Breakout sessions work towards concrete, tangible outputs that contribute to designing the online resource
- Encourage learning about open hardware and commercial solutions
- Publication of all conference proceedings and papers; many sessions to be recorded
- If you have a research proposal, please write to contact@droneconference.org

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**WORKSHOP / TUTORIAL**

Workshops and tutorials teach specific skills related to various aspects of civilian drones. These sessions are led by experts working on cutting edge applications, but will also be accessible to non-technical participants.

Outcome types: Hardware build, software development, learning manual

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**WORKING GROUP**

Working groups are formed around group leaders who are working on a particular issue or set of concerns relevant to civilian drones, have a specific project in development, and have a structured plan for conducting their session.

Outcome types: Policy proposal, best practices guide

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**ROUNDTABLE**

Roundtables bring together experts from diverse backgrounds to explore 360º views of broader topics, identify specific areas where further work needs to be done, and anticipate where new issues might materialize.

Outcome types: Mapping existing frameworks onto drones, identifying new issues and action items
TOPICS

PUBLIC INTEREST

Privacy

The public has voiced clear concern about the coming integration of civilian drones into domestic skies, particularly with regard to the potential for surveillance and privacy abuses. Anxiety over privacy is well-founded, and the absence of a comprehensive legal framework for regulating what individuals can do with their personal drones provides little to diminish those concerns.

To be certain, concern over privacy in response to the adoption of new technologies that have the potential for surveillance and data collection is nothing new. But is there something new about drones that exacerbate our worries? Some of the basic functionalities and aspects of drones seem to suggest there is.

Most obviously, drones can go almost anywhere. Unlike traditional surveillance systems that are fixed in place and therefore have a limited line of sight, the mobility of drones means they can constantly change both their location and what they can see. Drones add a considerable new layer of complexity to issues we are already struggling with in relation to ever more powerful camera-phones and location tracking technologies. Preserving your privacy in the presence of a drone requires much more effort than simply moving out of their line of sight.

Drones are also broadly accessible: anyone can purchase a drone outfitted with an HD camera at the mall for $300, or assemble exponentially more capable drones themselves for less than $1000. While drone technology has been in use by the government and other state actors for some time, at the very least we have a prescribed framework for how the government should act, and avenues for potential redress when their actions fall outside of that compact. The same is not true of the private actors that come into possession of this increasingly democratized technology. Because the neutrality of the technology allows it to be used as a platform for limitless application, what was once the realm of hobbyists primarily interested in tinkering with and remotely piloting their aircraft, is now available to an expanding consumer base of private citizens who view UAVs as simply mechanisms for
promoting their own interests, however noble or mischievous, unaware of—or even in disregard of—any collateral damage to the privacy of others.

It is likely that UAVs also induce anxiety for reasons beyond simply what they can do. For many, the proliferation of drones feeds into a disquietude over a police state with increasingly ever greater capabilities. For others, it heralds an explosion of innovation in related technologies that also cause uneasiness: as drones evolve, so too will cameras and sensors and any number of other potentially privacy infringing technologies. Does Moore’s Law suggest a future filled with exponentially more invasive flying robots? And how will drones create a demand for new peripherals and augmentations that further open the door for exploitation?

As Justice Alito points out in his US v Jones concurrence, “in the pre-computer age, the greatest protections were neither constitutional nor statutory, but practical.” The further erosion of those practical limitations by the proliferation and democratization of drones is certainly cause for concern.

Relevant sessions

Expectations & Guarantees: Privacy vs. 1st Amendment — Roundtable
Remotely Piloted Aircraft in Journalism and Media — Working Group
Drones and the Future of Public Space — Roundtable
Aerial Photography — Working Group
Embedding Values in UAS Design — Workshop
As drones proliferate, how will the concept of public space change? Public spaces have traditionally been common areas enjoyed by the community at large. Naturally, most conceive public space along a horizontal plane; identifying a house as “private” and a park as “public” is relatively straightforward. With the promise of drone technology, we may have to recalibrate our thinking along a vertical plane as well.

The precise boundaries of public and private space have always been contested; a private company may own a shopping mall, but in the U.S. such spaces are treated in many ways as "public." The lack of a clear legal definition of “public space” will become increasingly problematic as new technologies allow communities to harness national airspace. As technology raises our reach upwards, we may find ourselves carving new public and private airways.

The FAA has produced very little regulation for UAVs, keeping operations at a minimum to ensure public safety. With regard to civilian operated drones and unmanned aerial vehicles, the FAA allows for “modelers” to fly model aircraft so long as they stay below 400 feet. Drones and UAVs may not be flown for business or commercial purposes.

Within the US and most other countries, controlled airspace is divided into several classes of airspace ranging from A–G. Each class of airspace is characterized according to height, flight rules, and interactions between aircraft and air traffic control. For example, certain permissions, traffic information, and flight rules must be maintained when flying over an airport or large city. Near the ground, however, there are large amounts of uncontrolled airspace categorized as Class G. This low-lying airspace does not require communications with air traffic control and is of little concern to larger aircraft, thus, there are few regulations that apply to craft in this airspace. Civilian operated drones will no doubt find a home within this class of airspace.

The legal framework for sorting out what is public, what is private, and who can use what space is equally as important as the regulatory framework described above. In United States v. Causby, the Supreme Court conceptualized airspace as a “public highway.” In the same decision, the Court recognized that landowners must be able to “exercise exclusive control of the immediate reaches of the enveloping atmosphere” in order to exercise full enjoyment of their property.
Public Space

Whether drones present legitimately new issues for “public space” jurisprudence or just issues of scale, considering how the law conceptualizes public space in relation to drones is critical. The spectrum of drone technologies that implicate questions of boundaries and sovereignty is much wider than any previous technology. From tiny, insect–sized drones all the way up to military grade UAVs, drone technology is set to interact with public and private space in unpredictable ways. Development of law in this space will need to balance the public’s interest in maintaining a “public highway” privacy rights

In what contexts should the law privatize or enclose portions of the “public highway” in favor of protecting privacy rights? How can the law reconcile a largely public airspace with diverse privacy expectations on the ground? Should there be restrictions on the use of thermal, infrared, millimeter, or other advanced sensor technologies in the airspaces around public and private spaces? And, to what extent can local and state authorities develop or effect tailored regulations surrounding personal and commercial use of airspace?

A passerby spotted a tiny drone at sidewalk level, taking pictures of a skyscraper under construction in Boston.

Relevant sessions

Drones and the Future of Public Space — Roundtable
Expectations & Guarantees: Privacy vs. 1st Amendment — Roundtable
Airborne journalism is not a novel practice, as most major news organizations have access to a helicopter outfitted with a gimbal and camera; reporting the news already includes daily traffic, weather events, protests and public gatherings, and the occasional high speed car chase.

Drone technology, however, allows for improvements in scale, cost and ease of operation. Given the variety of drone types, news coverage may be continuous, captured by large, extended flight drones or may be deployed at a moment’s notice to record immediate events. Substituting helicopters for drones vastly decreases the cost of aerial reporting in terms of fuel costs and pilot time. Further, the technology is approaching a point where a drone may be piloted by one person or—in the case of larger drones—by a small team of three, not unlike a mobile news team. As with other drone applications, drone journalism will face stringent regulation.

In addition to the fundamental aviation regulations (i.e., fundamental regulations on aircraft worthiness, pilot competency and flight operations), there are things unique to the practice of reporting and journalism. Journalism drones will raise concerns over privacy and data protection, and the role of the fourth estate. The gradient between reporting, paparazzi stalking, and surveillance could become gray. Drone-pilots-as-journalists may raise additional questions about best practices—does the desire to “get the story” create an ethical conflict for an operator of a heavy, dangerous machine? If you thought the debate over whether “bloggers are journalists” was interesting, wait for the wave of citizen drone journalists covering protests, disasters, and other community happenings.

### Relevant sessions

- Expectations & Guarantees: Privacy vs. 1st Amendment — Roundtable
- Remotely Piloted Aircraft in Journalism and Media — Working Group
- Design a Drone Journalism Mission — Working Group
- Aerial Photography — Working Group
Value Sensitive Design

The integration of unmanned systems into civilian skies also means the integration of a new technology into our everyday lives, one that interacts with a diverse set of values, such as privacy, trust, security, safety, freedom of expression, community and respect.

Values in Design (VID) is a way of considering human life that explores how the values we think of as societal may be expressed in technological designs, and how these designs in turn shape our social values. In other words, technology is never neutral: certain design decisions enable or restrict the ways in which material objects may be used, and those decisions feed back into the myths and symbols we think are meaningful. Physical objects we use on a daily basis shape the way we act: driving cars means we walk less; access to the Internet means we use our digital devices more.

Because architecture and design features may be systematically related to political, social, and ethical values—such as security, privacy, and freedom of expression—it’s important to focus attention on these values from the ground up, rather than retroactively. But it’s also not enough to demonstrate that values are expressed through design decisions, they should be included among the set of aspirations that guide and constrain the designs of all technology. Ethical and political values should be placed on the same plane of importance alongside technical and functional specifications and constraints, and “engineered” into system components.

VID can help us better understand how the technologies that make up drones interact with the ethical, political, and social values that we care about, and give us insight into how we can engineer drone technology in a way that mitigates, or even eliminates, collateral damage to those values.

Relevant sessions

- Embedding Values in UAS Design — Workshop
- Expectations & Guarantees: Privacy vs. 1st Amendment — Roundtable
- Intro to Personal Drones II: — Workshop
- Intro to Personal Drones III: — Workshop
- The Emerging UAS Economy — Roundtable
The proliferation of unmanned systems portends obvious safety concerns. It is easy to envision nightmare scenarios of errant drones causing personal injury and property damage. Integration of drones into civilian skies could be one bad accident away from failure.

Protecting public safety with regard to drones is in no small part about safe design and sound engineering. Technical standards need to be developed to ensure the airworthiness of unmanned systems, as well as standards for guaranteeing the quality and performance of the individual parts that keep those systems airborne.

But safeguarding against disaster also relies on the ability of humans to develop with the technology. That UAVs are becoming increasingly more available to consumers is not proof positive of the general public’s readiness to responsibly operate them. The safe operation of unmanned systems necessitates thinking about education and training, user interfaces, flight planning, safety check processes, and a host of other variables necessary for attaining an acceptable level of even recreational safety.

As drones increasingly become the subject of new enterprises, or even just incorporated as the latest innovation in existing businesses, it will also be increasingly important for UAVs to attain the level of reliability required for drone-based businesses to be viable ventures. And the potential for injury to both person and property is likely to stir up new conversations about the role and importance of ensuring safety and managing risk in the business context, such as how insurance carriers and underwriters will approach this high-risk technology.

Relevant sessions

- Safety & Securing Public Airspace — Roundtable
- Remotely Piloted Aircraft in Journalism and Media — Working Group
- License Plates and Drone Information Requirements — Working Group
- The Law and Technology of Robotic Negligence — Working Group
- Managing Risk & Insurance — Workshop
- The Emerging UAS Economy — Roundtable
In 2006, a U.S. Customs and Border Protection Predator B (often referred to as a Reaper) drone crashed into a hillside nearby homes just outside Nogales, AZ. A series of failures culminated in the complete loss of communication with the drone, during which time operators were unable to determine the location of the drone—including whether other aircraft were in danger of colliding with it—or where it would ultimately crash. The harrowing incident highlights just one of the reasons it can be terrifying to not know where a drone is and what it’s doing.

The lack of an onboard pilot allows UAVs to operate under dramatically different circumstances, such as flying at extreme altitudes and staying airborne for extended periods of time. For example, the Reaper involved in the Nogales incident had the capability to stay airborne for over 30 hours at altitudes up to 50,000 ft. This functionality opens the door to exciting new possibilities for scientific research and disaster reconnaissance, but also presents a new problem for people on the ground.

The altitudes that UAVs are capable of flying at make it difficult for ground-based observers to identify the type of UAVs operating in the skies above them and what those UAVs might be doing, or might be capable of doing. So how do we keep an eye on the things that have their eyes on us? With the FAA estimating 30,000 UAVs in American skies by the year 2020, it is critically important that we develop and implement systems for registering and monitoring drones in way that ensures public access to important information about the location and capability of these unmanned systems.

### Relevant sessions

- License Plates and Drone Information Requirements — Working Group
- Remotely Piloted Aircraft in Journalism and Media — Working Group
- Safety & Securing Public Airspace — Roundtable
- Drones and the Freedom of Information Act — Working Group
- Drones and the Future of Public Space — Roundtable
- The Emerging UAS Economy — Roundtable
Encouraging Innovation

The proliferation of UAVs represents a new wave of technological innovation—not just in aerial robotics, but also peripheral technologies like cameras and sensors. And the mainstream availability of UAVs also opens the door for exciting new applications of existing technology. Yet, conspicuously absent from the Congressional Research Service’s recent report on legal issues relevant to the integration of drones into domestic airspace was any discussion about law and policy related to innovation, such as intellectual property and information law.

As mobile industry giants wage war against each other over patent portfolios and technologists continue to battle over the judiciousness of allowing software to be patented, it’s easy to understand why innovation law and policy matters. After all, drones have a lot in common with other landmark technologies that have altered society in recent years.

Intellectual property law will almost certainly play a significant role in the development of drones. Intellectual property protection of the physical embodiment of drones falls largely within the realm of patents, which give certain exclusive rights to the grantees of the patents, such as the right to make, use, and sell their invention. Of course patenting hardware is nothing new, and as a general matter, leaving aside questions of whether drones constitute patentable subject matter or what might qualify as prior art, mapping the existing framework for granting and challenging patents onto the drone landscape is fairly straightforward. Of course drones are not a singular piece of hardware, and depending on the sophistication of the drone, it might be comprised of hundreds of other pieces of hardware, any number of which might be patented, and therein lies the potential for trouble. The more patented components that a technology is comprised of, the greater the potential for patent thickets, where so many of the individual components are patented by different people that it becomes difficult to build anything without running afoul of someone’s patent rights.

A common arc of technology is that inventions often start off as innovative, but become increasingly commoditized over time. What was once innovative and deserving of a patent at the time, may become so integral that it becomes a basic building block for later technologies that incorporate it. If the basic building blocks of a technology are all patented, it becomes difficult for anyone to build anything later, without expending significant resources on either purchasing licenses to those technologies or developing substitute technologies.

Drones, like many other electronic devices, also employ software, introducing copyright considerations, such as the possibility of hardware manufacturers to use the Digital Millennium Copyright Act (DMCA) to control secondary markets for service and software upgrades—a
possibility hinted at in court decisions like Chamberlain Group, Inc. v. Skylink Technologies, Inc.; Lexmark International, Inc. v. Static Control Components; and MDY v. Blizzard Inc. Like computers and smartphones, drones are also a platform technology, allowing for the development of APIs and applications developed by third parties, invariably paving the way for UAVs to be the next battlefield for software patents and open source development.

The promise of drones is not realized simply because we can each have one and operate it independently of each other. Much like the way the Internet unlocked the vast potential of computers, and your smartphone is far more interesting when you have a signal, networks that support UAVs can dramatically increase their usefulness, allowing drones to share information and communicate with each other.

For example, a drone studying weather might be able to relay real-time, granular information about approaching air turbulence to a drone being used for photogrammetry, allowing it to move to a safer altitude or position. Or a network of GPS waypoints might allow drones to stay on course on their way to delivering tacos. As a practical matter, some level of networking is necessitated by limitations in sense-and-avoid technologies that would require powerful, yet-to-be-developed sensors, as well as a lack of UAV maneuverability that limits their ability to get out of the way of fast-approaching objects. At the very least UAVs need to be able to know where other nearby drones are in order to avoid mid-air collisions.

But as beneficial as it might be to network technologies together, networks create other significant challenges for innovation. With a spectrum of users that stretches from backyard hobbyists, to university researchers, to long-established aerospace giants, concepts related to innovation, like net neutrality, standards, and interoperability, will likely need to be considered in a new light.

 Relevant sessions

- Innovation Law & Policy — Roundtable
- Intro to Personal Drones I: Your First Hobby Drone — Workshop
- Expectations & Guarantees: Privacy vs. 1st Amendment — Roundtable
- The Law & Technology of Robotic Negligence — Working Group
- Secrecy in Drone Technology — Working Group
- The Emerging UAS Economy — Roundtable
Negligence & Liability

The FAA estimates as many as 30,000 UAVs flying overhead by 2020. No technology is immune to failure, and even the most fervent proponent will admit that drones are no exception. High profile drone crashes—like the 2006 Reaper crash outside Nogales, AZ and this year’s QF-4 crash near Panama City, FL—are clear reminders of the possibility of drones falling from the sky. Indeed, just days before DARC, a quadcopter smashed into the sidewalk in Manhattan, narrowly missing a pedestrian.

While the drone community is hard at work improving the reliability of UAVs, efforts to integrate drones into domestic airspace clearly envision an acceptable failure rate greater than zero.

Tort law is an area of civil law that addresses violations of duties and responsibilities owed to others. Via tort law, parties suffering injuries—and not just physical injuries—resulting from the actions of others can seek compensation, shifting the cost of those injuries to the party responsible for inflicting them.

The law has long dealt with attacks, accidents, dangerous actions, and defective products that cause damage to people and property, and allowing victims to seek redress helps to discourage careless and risky behavior. What remains to be seen is how well these laws work in a world filled with flying robots.

Relevant sessions

The Law & Technology of Robotic Negligence — Working Group
Safety & Securing Public Airspace — Roundtable
Innovation Law & Policy — Roundtable
Intro to Personal Drones I: Your First Hobby Drone — Workshop
Managing Risk & Insurance — Workshop
The Emerging UAS Economy — Roundtable
Secrecy

Over the past few years, there has been a growing recognition that commercial secrecy can have significant impact on the public’s interest in knowing what private industry, and increasingly government, is doing. From the health effects of “pink slime” in beef products to the operation of voting machines, the demands of commercial secrecy has prevented the public from receiving critical information, held by both governments and the private sector, to assure that private behavior is not damaging the public’s interest.

The fallout over the NSA’s Internet communications surveillance demonstrates the impact of procedural bottlenecks inside government when a culture of excessive secrecy meets vast computing power. As an unprecedented dual use technology, drones may well be the next frontier in the battle for information.

Regulators tasked with developing regulatory frameworks for drones face a significant challenge. Having never encountered a technology with such a wide breadth of uses and implications, they are at a severe experiential deficit as they attempt to craft rules for governing the civilian use of a technology that is equally applicable to Domino’s Pizza and the US Air Force, and can be purchased by anyone on Amazon.com for a few hundred dollars. Given these circumstances, there is a clear need for discussion about what regulators and the public at large need to know, would like to know, and shouldn’t know because of commercial concerns. As we inch towards the 2015 integration deadline, our ability to have an intelligent conversation about the contours of civilian UAV use could be hampered by undue and unnecessary secrecy.

Relevant sessions

- Secrecy in Drone Technology – Working Group
- Drones and the Freedom of Information Act – Roundtable
- Innovation Law & Policy – Roundtable
- Drone Art & Activism — Roundtable
- The Emerging UAS Economy — Roundtable
Comparative Law

As we begin developing a framework for integrating civilian UAVs into the national airspace of the United States, we would do well to consider that the U.S. is not the first country to attempt this feat of regulation. Quite the contrary, in fact: on many key domestic drone law and policy issues, other members of the international community have outpaced the United States. We would also do well to keep in mind that drones are not the only technology currently exerting disruptive pressure on the international law and policy landscape.

Some nations, like Japan, have commercial UAS industries that are decades old. Others, like Australia, had rules and parameters for their civil airspace in place years before Congress had even succeeded in passing the FMRA.

UAV use is an international phenomenon, and the spatial issues it raises domestically around property and airspace don’t end at our borders. Every country that has tackled the issue of domestic UV integration has faced similar challenges. Around the world, legislatures and administrative agencies have crafted integration plans that anticipate how their sovereign national airspace may be affected by the proliferation of unmanned, commercially owned aerial systems.

By comparing and contrasting the ways that other national governments have regulated UAS integration, we will realize that there are things we haven’t thought of that have already come up in other countries’ legislatures and courts.

Additionally, surveying national UAS integration policies around the world could reveal developing international norms. The complex challenge of anticipating how UAV proliferation will affect life from
country to country is dwarfed by the fact that the spatial issues drones raise for airspace and property transcend borders. Drones could render the line between French airspace and German airspace as permeable as the line between public and private domestic space.

Although the international community has developed some basic civil aviation standards (one of many things accomplished by the UN), there’s no framework in place to understand the basic assumptions of a nation–state system in light of long-endurance, unmanned aircraft designed to fly in airspace that was, until now, unregulated.

As society globalizes, our expectations will evolve to reflect how we cope with our changing world. DARC’s Comparative Drone Law session marks the first step toward the creation of a comprehensive database of developing UAV regulations from around the world.

Relevant sessions

- Comparative Drone Law — Roundtable
- Innovation Law & Policy — Roundtable
- Secrecy in Drone Technology — Working Group
- Drone User Groups: Creating a Social Movement Around Personal Drones — Working Group
- The Emerging UAS Economy — Roundtable
To provide context for how the conversations and ideas to come out of DARC may contribute substantially to drone law and policy, the following is a list of relevant milestones to be met by the FAA as directed by Congress in the FAA Modernization and Reform Act of 2012 (H.R. 658). Note that the FAA is already significantly behind in meeting many of these milestones (e.g. selection of the six test ranges outlined for September 2012 commenced in February 2013, etc).

February 14, 2012 – FAA Modernization and Reform Act of 2012 (H.R. 658) signed into law by President Obama.

September 2012 – Establishment of a program to integrate unmanned aircraft systems into the national airspace system at 6 test ranges. The program shall terminate 5 years after the date of enactment of this Act. (Actual commencement date: February 2013)

September 2012 – Development of a plan and initiation of a process to work with relevant Federal agencies and national and international communities to designate permanent areas in the Arctic where small unmanned aircraft may operate 24 hours per day for research and commercial purposes.

September 2012 – Determination of whether certain unmanned aircraft systems may operate safely in the national airspace system before completion of the plan and rule-making.

December 2012 – Development of a comprehensive plan to safely accelerate the integration of civil unmanned aircraft systems into the national airspace system.

December 2012 – Guidance issued regarding the operation of public unmanned aircraft systems to: expedite the issuance of a certificate of authorization process; provide for a collaborative process with public agencies to allow for an incremental expansion of access to the national airspace system as technology matures and the necessary safety analysis and data become available, and until standards are completed and technology issues are resolved; and facilitate the capability of public agencies to develop and use test ranges. Should include guidance on a public entity’s responsibility when operating an unmanned aircraft without a civil airworthiness certificate.

February 2013 – Secretary of Transportation to submit to Congress a copy of the plan and shall approve and make available in print and on the Administration’s Internet Web site a 5–year roadmap for the introduction of civil unmanned aircraft systems into the national airspace system, to be updated annually.

September 2014 – Publication, in the Federal Register, of a final rule on small unmanned aircraft systems that will allow for civil operation of such systems in the national airspace system, a notice of proposed rule–making to implement the recommendations of the plan, and an update to the Administration’s most recent policy statement on unmanned aircraft systems, contained in Docket No. FAA–2006–25714.

September 2015 – Final standards/rules issued for government & non–government drones

December 2015 – Development and implementation of operational and certification requirements for the operation of public unmanned aircraft systems in the national airspace system.
RECOMMENDED READING

Reports

Integration of Drones into Domestic Airspace: Selected Legal Issues (Congressional Research Service)

Economic Impact of Unmanned Aircraft Systems Integration (AUVSI)
http://www.auvsi.org/econreport

Protecting Privacy From Aerial Surveillance: Recommendations for Government Use of Aircraft (ACLU)
https://www.aclu.org/files/assets/protectingprivacyfromaerialsurveillance.pdf

Remotely Piloted Aircraft Systems & Journalism Opportunities and Challenges of Drones in Newsgathering (Reuters Institute)

Legal and scholarly documents of interest

FAA v. Pirker: Respondent's Motion to Dismiss

Who Owns the Sky?: The Struggle to Control Airspace from the Wright Brothers On (Stuart Banner)

Drones: Privacy Implications Across the UK (Bird & Bird)

Observations from Above: UAS and Privacy (John Villasenor)

Agencies and initiatives

UAS Integration Initiative (FAA)

Committee F38 on Unmanned Aircraft Systems (ASTM International)
http://www.astm.org/COMMITTEE/F38.htm

NextGen UAS Research, Development, Demonstration Roadmap

Australian Civil Aviation Authority UAS guidelines

UAVS in Canadian Aviation Regulations
DARC is about flying robots and the unknown technological, legal, and cultural futures that the integration of this wide range of technologies, into both our airspace and society, portends. It convenes a unique constellation of expertise and perspectives that allows us to explore and give serious consideration to an extensive array of topics. We are tremendously grateful to all of the session chairs leading the many workshops, working groups, and roundtables that make up our program. We would especially like to thank our academic partners who have contributed significantly to the intellectual rigor of this weekend’s agenda.

The American Assembly is a national, non-partisan public affairs forum at Columbia University, illuminating issues of public policy by commissioning and issuing research and publications and sponsoring meetings | americanassembly.org

The Center for Information Technology Policy is an interdisciplinary center at Princeton University. A nexus of expertise in technology, engineering, public policy, and the social sciences, CITP’s research, teaching and events address digital technologies as they interact with society | ctip.princeton.edu

The Information Law Institute at NYU School of Law is an academic center for the study of law, policy, and social norms defining and affecting the flow of information in a digitally networked society www.law.nyu.edu/centers/ili

The Information Society Project is an intellectual center at Yale Law School addressing the implications of the Internet and new information technologies for law and society, guided by the values of democracy, development, and civil liberties | yaleisp.org

The Tow Center for Digital Journalism at Columbia University provides journalists with the skills and knowledge to lead the future of digital journalism and serves as a research and development center for the profession as a whole | towcenter.org

The Rudin Center for Transportation Policy and Management at NYU’s Wagner school aims to strengthen our understanding of all modes of transportation through research, public forums, and educational programs | wagner.nyu.edu/rudincenter