

Commercial High-Altitude Unpiloted Aerial Remote Sensing: Some Legal Considerations

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Abstract

Since the 1970s, images and data from remote sensing satellites have been collected and used in commercial applications ranging from crop management to mineral exploration. Aerial remote sensing goes back even further. However, it was not until recently that breakthroughs in workstation and software technology catalyzed a surge in commercial remote sensing applications and experimentation. The increased ability to manipulate and mix different kinds of data has, in turn, spawned an interest in finding innovative data gathering platforms. One in particular, High-Altitude Unpiloted Aerial Vehicles (HAUAVs), has become the recent subject of inquiries as to its value for commercial remote sensing. This paper addresses some general legal issues raised by using this particular technology in a commercial remote sensing business that collects, processes, and sells data and imagery.

Introduction

Although Unpiloted Aerial Vehicles (UAVs) have been around for a long time, their use has been primarily limited to military and scientific applications (Anon., 1989). Commercial use of UAVs is a new application and therefore raises different legal issues, many of which appear to be novel. A specific commercial application, remote sensing, raises additional issues related to data acquisition and use. Therefore, this paper considers the commercial use of a remote sensing UAV in four categories based on the nature of the vehicle, its operations, and its intended use. The categories are Operations Issues, Liability Issues, Image Taking Issues, and Data and Data Use Issues. Some legal issues can be raised in more than one category. These categories contain questions of applicable legal regimes and government versus private use of UAVs.

Operations Issues

In 1995 the most significant legal consideration that could potentially affect a commercial entity's ability to generate revenues is the lack of a defined and predictable regulatory regime with jurisdiction over UAV operations. Legal research indicates that UAV operations present a case of first impression. Case law regarding UAV operations is nonexistent, and published regulations are sparse.

UAVs, also referred to as Remotely Piloted Vehicles (RPVs) in federal regulations, are addressed as exceptions to "missile" systems in the *Commerce Control List* but not specifically contained in Federal Aviation Administration (FAA) regulations (Code of Federal Regulations). In fact, the FAA has had inquiries about the commercial use of UAVs—for more than remote sensing—since 1991. It has begun considering these complex requests but has not yet issued any decisions for guidance external to the Agency. It is unclear whether the FAA considers UAVs anything other than experimental at this time. Questions of certification specifics, Air Traffic Control (ATC) coordination, flight authorization, and licensing are open.

Given the uncertain regulatory and legal environment within which a commercial UAV operator now must function, it could be faced with a *de novo* attempt at coordinating interagency requirements—a long and expensive process. Conceivably, until the question of UAV jurisdiction is settled, no fewer than seven federal agencies and departments—the FAA, the Federal Communications Commission (FCC), the Department of Commerce (DoC), the Department of Transportation (DoT), the National Aeronautics and Space Administration (NASA), the State Department, and the Department of Defense—could have interests and/or responsibilities in guiding the formulation of regulations applicable to a UAV used for commercial remote sensing. Moreover, if a commercial operator intended to supply services outside of the United States, additional groups such as the International Civil Aviation Organization (ICAO) and the domestic regulations of foreign states would be involved.

The primary federal remote sensing statute in the United States is the *Land Remote Sensing Policy Act of 1992 (Act)*. Although a UAV's primary mission might be commercial remote sensing over land, a projected altitude of operations from 50,000 to 65,000 feet places it within airspace and outside of "space" as covered by the *Act*. Therefore, the private systems licensing regulations it contains are inapplicable to UAVs. Current satellite remote sensing license procedures do provide useful analogs, however. The satellite licensing procedure includes a review by the Department of Commerce and, as necessary, other appropriate agencies, including the Departments of State and Defense (*Act*, Section 5621). The review relates to issues of spectral and spatial resolution, international obligations, operator financial condition, and national security (Joint Hearing, 1994). Because the Defense Department also routinely expresses interest in activities in "uncontrolled" airspace—the airspace within which high altitude UAVs operate—and because domestic regulation is part of an international aviation regulatory scheme that involves U.S. international obligations, it is reasonable to expect that a future UAV remote sensing regulatory regime may include a review procedure similar to satellite remote sensing. And as the current debate surrounding the regulatory regime for the commercial use of high-resolution sensors on private sector remote sensing satellites demonstrates, it can be expected that the UAV's history of military and tactical uses will play a role in determining the regulatory regime that eventually emerges (Bingaman, 1995; Rye, 1995). Shutting down operations or preventing the sale or distribution of sensitive images for national security reasons is always a possibility.

It would appear that a commercial UAV operator would, at a minimum, have to comply with the requirements of the *Federal Aviation Act of 1958* by obtaining a flying authoriza-

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tion through a compliance review that involves certification of aircraft design and manufacture. The duty to "ensure that an aircraft conforms lies with the manufacturer and operator, while the FAA retains responsibilities for policing compliance" (*United States v. S.A. Empresa de Viacao Aerea Rio Grandense* (Varig Airlines) *et al.*, 467).

Airspace classification is a highly complex matter which changes with various take-off sites and craft activities. Each take-off and operating location requires a different analysis of regulatory responsibilities. However, generically speaking, UAV operations would, at a minimum, involve Class A, Class E, and Class G airspace; Classes A and E being "controlled" and Class G, "uncontrolled." Airspace from approximately 18,000 feet and up to 60,000 feet is Class A and is the most restrictively "controlled" airspace. Above 60,000 feet is Class E airspace, and it is the least restrictive of the "controlled" airspaces. Controlled airspace requirements can include obtaining clearance, meeting radio and transponder regulations, filing a flight plan, and operating according to Instrument Flight Rules (IFR) flight plans, and checking for notices to airmen (NOTAMS), among others (Code of Federal Regulations).

Whether the UAV launches like a glider or takes off from an airfield runway, the size of the airfield, and the source and type of control all are important characteristics that can also have ramifications on operations responsibilities and applicable legal regimes.

Liability Issues

The issue of liability is closely related to the regulatory issues raised under *Operations Issues*. Given the current uncertainty in the regulatory environment, liability exposure could be enhanced. Apart from actual liability, an additional cost for a commercial UAV operator in the event of an accident could be above-average litigation costs. These would be incurred by addressing questions that would probably be raised by potential plaintiffs about what the operator could have, or should have, known regarding the unsettled issues surrounding the technology's reliability, track record, general acceptance, and suitability for remote sensing use. The complexity of these inquiries would vary depending on whether the company uses an original design or builds a modified version of an existing UAV design. Any modification, regardless of degree, raises the possibility of additional liability and added uncertainty.

If a UAV is operating at an altitude of 50,000 to 65,000 feet and it crashes with another vehicle or to the ground, general and aviation rules of tort liability, negligence, and product liability would apply. Liability insurance could cover expected losses, absent punitive damages. Were an accident to occur, the commercial operator would have to contend with an FAA and/or National Transportation Safety Board (NTSB) accident investigation. If the UAV hit, or was hit by, a major carrier aircraft, liability exposure would involve injuries incurred both in airspace and on the ground. The UAV operator, and perhaps the manufacturer, would face both FAA and civil liability in such a case. In a worst case scenario, this could be enormous.

Liability exposure could be offset if the operator is, or is hired by, the United States Government. Sovereign immunity might be an available defense. Its availability, however, would depend on many things: the growing trend to limit sovereign immunity by statute, the term and purpose of the contract, the public or private use of the data, agency for and control of the vehicle, etc. A related defense could be provided by the government contractor defense. This protects a contractor from "liability for acts done by [it] while complying with government specifications during execution of performance of a contract with the United States" (*McKay v. Rockwell International Corporation*, 704). This also would require meet-

ing a number of conditions. Proving whether the contract specifications were followed precisely could evolve into a respectably sized litigation with its own demands and expenses. The Warsaw Convention, an international treaty which limits liability for injuries to commercial airline passengers, could also come into play depending on the circumstances.

The presence of a government entity in commercial UAV operations would also raise the question of whether it would require cross-waivers, hold-harmless, and indemnity agreements with the private operator as a risk-allocation measure. The history of launch vehicle agreements between private launch providers and the government, prior to the enactment of federal legislation, suggests that this is possible.

Image Taking Issues

Also related to operational issues is the act of taking an image. The mere act of taking an image presents little or no inherent legal obstacles. As a general rule, liability for intrusion is not incurred for viewing, observing or recording "matters which occur in a public place or a place otherwise open to the public eye" (*Fogel v. Forbes*, 1087). Most likely, a UAV is too high and too unobtrusive to constitute a physical intrusion itself. Liability also generally does not exist for taking images that are considered public record. Whatever the outcome of a regulatory regime governing UAV operations, it is reasonable to expect that the airspace from 50,000 to 65,000 feet above ground would be considered a public place, as is evidenced by the fact that a public entity is authorized to regulate it.

Determining whether taking an image constitutes a "public record" would rest on the status of what is being imaged. A wide spectrum of possibilities exist, ranging across various kinds of public and private property. Yosemite National Park would lie on the public end of the spectrum and the backyard of a private home on the other. Something like Conservation Reserve Program (CRP) lands, which are privately owned but contractually operated to effect public policy, would lie somewhere in the middle with a mix of private and public interests, including private control of the property and public verification of statutory and contractual compliance.

Data Use Issues

While taking images may present few legal issues, their actual use does trigger many of them. Were a UAV operator to engage in related commercial value-added activities, it would be faced with these issues as well. In addition to privacy issues, case law involving data accuracy, warrantability, and representation is emerging. Access to, and intellectual property rights in, data are also major legal areas that will have to be considered on a case-by-case basis each time the UAV is used for a particular purpose or application. Additionally, there is a distinction between "data" and "information" for legal purposes. The first generally means a raw product, the second implies enhancement and/or interpretation (*Act*). Data use in general is a rapidly developing area in the law and is being driven by technology developments. Any company that plans to make money by the acquisition, generation, and sale of data should also plan on allocating legal funds to stay up-to-date in this dynamic area. It would be particularly productive to do this as a preventive and planning, rather than as a corrective, measure.

Privacy

With the exponential growth of potentially intrusive technology, like high-resolution sensors and sophisticated interpretative software, privacy issues are increasing in complexity and importance. It is anticipated that the law of privacy will evolve rapidly to reflect technological changes.

Traditionally, privacy is protected under law both as a common law tort for the invasion of privacy and through the

Constitution which protects individual privacy and privacy against unlawful government intrusion. The tort of the invasion of privacy is well developed. It recognizes the personal right of an individual to privacy and includes the right to take legal action against other individuals for its invasion. A private sector UAV remote sensing entity would be subject to this tort. The Constitutional right of privacy protects an individual's privacy against unlawful government intrusion as well. A private sector UAV remote sensing company's liability could only exist through a relationship with a government authority.

Governmental Searches

Issues regarding the Constitutional right to privacy from government intrusion would arise if the commercial UAV remote sensing entity had a legal relationship with a government entity. If law enforcement agencies, or federal, state, or local governments contract with the commercial provider, the contracted services have the potential to raise Fourth Amendment search and government intrusion issues. Military financing of the UAV could also catalyze Fourth Amendment issues if the relationship between the military and the private entity could be considered to constitute state action. Questions of agency and control would have a bearing here.

Supreme Court cases suggest that observation height, nature of vehicle, aviation practice, and purpose of observation are relevant in a violation of rights inquiry (*Ciraolo v. California* and *Florida v. Riley*). An important fact is the kind of imaging equipment used. Camera or sensor? The spatial and spectral resolution of sensor technology and detail capability of camera imagery would be pertinent to a government intrusion inquiry (*Dow Chemical Co. v. United States*).

The Supreme Court has demonstrated a general acceptance of aerial surveillance by camera for law enforcement activities but suggests that there could be restrictions on the use of satellite technology (*Dow Chemical Co. v. United States*). The Court's reasoning relies heavily on the degree of physical intrusion effected by the technology involved. Thus, the importance of quantitative measurements such as craft height and image detail. According to some constitutional law observers (Kamisar, 1986; LaFave, 1986), this represents a departure from previous Fourth Amendment law which rested on an analysis of the substantive privacy interest to be protected – such as a telephone conversation – and the subjective expectation of privacy (*Katz v. United States*). In this view, it is contended that the *Dow* decision fails to address the rapidly changing reality of sophisticated technology and limits Fourth Amendment analysis to an ever-increasing exercise in drawing lines between quantitative variables rather than protecting substantive rights. *Dow* was only a 5-4 decision, leaving much room for further debate and evolution of the controlling law.

The legal debate between the propriety of quantitative or substantive factors has particular relevance for the high-altitude UAV operator. Where would the Court place a vehicle that operates from 50,000 to 65,000 feet along the vertical scale between a permissible observation height of 1,000 feet (*Ciraolo v. California*) and the potentially impermissible orbital height of a satellite (*Dow Chemical Co. v. United States*)?

Of additional interest to a high-altitude UAV operator is the Court's assertion that persuasive in finding an improper governmental intrusion is the fact that "highly sophisticated surveillance equipment [is] not generally available to the public" (*Dow Chemical Co. v. United States*, 238). The history of elite UAV technology use and its fledgling appearance in the commercial world will have a bearing on the Court's perception of its appropriateness for government use.

Applying the *Dow* reasoning to a case where a private operator is hired by a government entity to conduct an observation, a high operating height within the atmosphere, is

likely to decrease the finding of an improper intrusion. But if the UAV is, or contains, sophisticated and, until recently, generally unavailable surveillance technology, then the effect of height could be negated and an improper intrusion could be found. The result of these findings in the context of an improper governmental search could have relevance in a civil action against the UAV operator by a plaintiff observed entity. It is therefore in the operator's interest – but beyond its control – that the government properly follow Fourth Amendment procedures, like obtaining a search warrant when necessary.

Personal and Informational Privacy

An individual has the Constitutional right to be free from intrusion into the fundamental, personal, intimate aspects of their lives by the government and other individuals (Warren and Brandeis, 1890). This right may also be the subject of tort actions. A newer, related privacy right is informational privacy. Here, an individual has the right to determine what information is being collected about her or him and how it is to be used. Personal privacy matters are decided in the courts on a case-by-case basis, and courts generally prefer that protection be legislatively, rather than judicially, prescribed (Onsrud *et al.*, 1994). The primary federal privacy law is the *Privacy Act of 1974*. Additional protection is afforded by a number of federal statutes that address specific privacy interests ranging from financial and educational privacy to computer privacy (Onsrud *et al.*, 1994).

In general, privacy statutes apply only to local, state, and the federal governments, not the private sector. Those that do, do so "primarily on a patch-work basis and are typically very limited in scope" (Onsrud *et al.*, 1994). However, the laws that do apply to the private sector are typically passed in reaction to a publicized misuse of information, such as the publication of a person's entertainment video rental record (Onsrud *et al.*, 1994).

Concern by a commercial UAV company that legislative reaction to negative publicity generated by the improper use of information it collected is a legitimate, if somewhat distant, concern. However, the classified history and newness of UAV technology could give it an exotic profile capable of drawing "Big Brother" criticisms. "In North America, the application of information technology is galloping ahead of regulation and control, especially in the private sector, resulting in significant privacy anxieties among the general public" (Flaherty, 1991).

A more likely concern is over the commercial sale of an image which contains identifiable persons. This raises a number of issues, including invasion of privacy and appropriating a likeness for commercial gain. These issues could also be raised by images that reveal names on privately owned signs, markers, or buildings unintended for public viewing. It is likely that a court would be interested in the kind of "individual" involved. A natural person would likely be considered in a different way than a juridical person like a corporation or government agency (*Donovan v. Dewey*). Given the novel nature of the technology, a specific case involving a commercial UAV entity and an allegation of a privacy invasion might cause a court to draw analogies from Fourth Amendment cases.

There is a "fair information policy" idea emerging in the current law of the right to privacy. It is expected of commercial data merchants who still must have a sense of the "legitimate expectation of privacy." In-house, self-imposed privacy protection policies are being encouraged (ABA Committee, 1981).

Data Accuracy, Warrantability, and Representation

Contract or license actions for data sales or distributions may be covered by the Uniform Commercial Code. Recent case

law and current legal proceedings are beginning to indicate that data merchants will be held to consumer protection and product liability policies. In one case, although a private manufacturer of aeronautical products was not found negligent in the death of six people, it was held strictly liable for inaccurate data used in an aeronautical chart (*Brocklesby v. The United States and Jepperson & Co.*). It had changed the chart format from text to graphic form, and, the court said, in the process it had the ability and opportunity to detect the error. The court also held that the manufacturer had the right to seek indemnification against its co-defendant, the United States, who, through the FAA, supplied the information used on the chart. This decision resulted in passing a new law to provide indemnification by the United States in future cases (Department of Defense Appropriations Act of 1986).

Yet six years later, in the same Circuit, the court found the publisher of *The Encyclopedia of Mushrooms* had no duty to investigate the accuracy of information it contained. Consequently, there was no liability for inaccurate information which led to the serious illness of two people who relied on it. Public policy and First Amendment protection were cited by the court, which distinguished between the book's "material" and the "ideas and expression" contained in the material. The court made a further distinction, saying a book was different from an aeronautical chart because the chart depicted "technical, mechanical data," making it analogous to a "compass." According to the court, "[p]roducts liability law is geared to the tangible world," which includes a compass-like chart but excludes a thought-like expression (*Winter v. G.P. Putnam's Sons*, 1034, 1036). Together, these two cases suggest a spectrum of liability that at one end adheres to a physical product, the aeronautical chart, but which at the other end is inapplicable to an intangible item, an expression. Regarding a remotely sensed image, an analogous spectrum could be posited which places the image containing only raw data on the same point as the aeronautical chart and an interpretation of the image placed near the point occupied by intangible expression. However, given that the physical/intangible dichotomy is premised on an interpretation of what constitutes "technical, mechanical data," it can be expected that UAV-collected commercial data and image products -- with their variety of applications and numerous possible iterations of interpretations -- will raise a myriad of conceptual difficulties.

Accurate representation of data products, and what they can be expected to provide, has also been raised by a pending federal fraud prosecution against a remote sensing value-added company. The company allegedly misrepresented the source of, and the information contained in, remotely sensed images. If convicted, the company's employees could serve up to five years in jail and pay \$250,000 in fines (Ferster, 1995). A conviction would also set a precedent that should influence other remote sensing businesses.

Conclusion

High-Altitude Unpiloted Aerial Vehicles may present as many new legal issues for commercial remote sensing as they do new opportunities. Some of the legal issues have the potential to preclude or inhibit a commercial venture from generating revenues. The greatest of these is the lack of a currently defined and predictable regulatory regime over commercial UAV remote sensing operations. However, available analogs from regular aerial and satellite remote sensing can be used to plan for and mitigate many uncertainties. Additionally, the many facets of commercial remote sensing -- in addition to vehicle operations -- like data sales and interpretation, lend themselves to proactive practices that can temper exposure to risk. Among them are in-house privacy protection policies and regular, preventative legal planning.

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Appendix

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