The Limits to the Sky

By Sharon D. Stuart and Deborah Alley Smith

Insurance Issues Related to Unmanned Aerial Systems

Emerging autonomous and unmanned technologies will become part of our daily lives within a few years. Many scientists believe that artificial intelligence and robotics will allow machines such as self-driving cars, robotic devices, and unmanned aerial vehicles to more safely and efficiently perform functions currently performed by humans. *Autonomous Vehicles-Handing Over Control*, Lloyd's, Apr. 24, 2014, available at http://www.lloyds.com/news-and-insight/risk-insight/library/technology/autonomous-vehiclesautonomous-vehicles-handing-over-control. Of all the emerging autonomous vehicle technology, unmanned aerial systems ("UAS") are currently the most prominent. Hardly a day passes without a headline about UAS, or drones, as they are called in everyday parlance. Drones are everywhere, and experts anticipate exponential growth in the near future. In fact, the Federal Aviation Administration ("FAA") expects there will be 30,000 drones in the sky within the next 10 years.

These developments portend many things for the insurance industry. Drones mean new risks, new insurance opportunities and challenges, and new tools for underwriting and claim handling.

The Many Uses for Drones

UAS may be as simple as remote controlled recreational model aircraft or as complex as surveillance aircraft used in warfare. *See* 72 Fed. Reg. 6689 (Feb. 13, 2007); 14 CFR §91. They have many valuable and appropriate purposes. Perhaps the most widely known of these is the U.S. military's use of Predators to target terrorists, but potential drone applications cross the commercial, consumer, research, and public sectors of the economy. Photographers and filmmakers use UAS for moviemaking, news, and event coverage. Law enforcement agencies and homeland security use them to inspect suspicious packages and to conduct surveillance and search and rescue. Farmers use drones as an inexpensive and safe alternative to manned aerial vehicles like crop dusters and helicopters to monitor drought, frost, irrigation, crop disease, and livestock, and to apply pesticide and fertilizer in specific areas. One day, they may be used to plant, pollinate, and harvest crops as well. Gosia Wozniacka, *Agriculture the Most Promising Market for Drones*, Phys.org, Dec. 15, 2013, http://phys.org/news/2013-12-agriculture-drones.html. Meteorologists use UAS for weather monitoring and they are being tested for seeding clouds and clearing smog. Aerial imagers, scientific researchers, energy, and utility companies use drones for mapping, searching for oil bearing rocks, monitoring power lines and pipelines, and transporting freight. Construction companies are using them to monitor job progress and identify quality issues and potential hazards. *See, e.g.*, Darryl Jenkins & Bijan Vasigh, *The Economic Impact of Unmanned Aircraft Systems Integration in the United States*, Association for Unmanned Vehicle Systems International 2 (Mar. 2013), http://www.auvsi.org/econreport; John Babel, *Up in the Air: The Emerging Issue of Drones in the Construction Industry*, XL Group Insurance Construction Insider (June 2014), http://xlgroup.com/~/media/6f616321d6584703b4bcfb2933b424af.pdf; Bigad Shaban, *Drones Could Help Areas Devastated by Drought*, CBS News (Feb. 26, 2014), http://cbsnews.com/news/drones-could-help-areas-devastated-by-drought/. More and more, businesses are seeking authority to utilize drones for commercial purposes—the most well-known being Amazon. UAS have been tested for pizza and laundry delivery in Europe and Japan, and even were used to deliver beer through a smart phone app at a festival in South Africa. *Drone Delivers Beers—Not Bombs—at South Africa Music Festival*, New York Daily News (Aug. 9, 2013), http://www.nydailynews.com/life-style/eats/drone-drops-beers-bombs-south-africa-article-1.1422617.

Of the many known potential uses, the Association for Unmanned Vehicle Systems International ("UAVSI"), a trade group representing the unmanned systems indus-

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try, projects that precision agriculture and public safety ultimately will make up 90 percent of the market. Jenkins & Vasigh, *supra*, at 2. Commercially, drones have the power to change, save, and protect lives because UAS can reach dangerous, treacherous, or awkward locations without risking human life and can carry special equipment such as cameras. However, these benefits are accompanied by numerous risks which must be managed and understood. Steve Doyle, *Aviation: Drones*, What Risks Will Emerge in 2015?, available at http://insurancethoughtleadership.com/risks-will-emerge-2015/ (John Merkovsky ed. Jan. 16, 2015).

Even when they are used carefully, UAS raise tremendous privacy concerns, particularly in heavily populated areas. In fact, the public's greatest concern about drones is the potential for invasion of privacy. *Private Drone Use Causing Many to Worry, Chubb Survey Finds*, Sept. 8, 2014, www.chubb.com/corporate/chubb19214.html (hereinafter "Chubb Survey"). As media companies begin to use drones for news gathering, these concerns will be heightened. *See New York Times, AP to Start Testing Drones for Reporting-More Cameras in the Sky*, Advertising Age, Jan. 15, 2015, available at http://adage.com/article/media/york-times-ap-start-testing-drones-reporting/296625.

Moreover, as drones become less expensive, they have become available to and popular with a wide variety of consumers from individual flight enthusiasts to "pranksters, troublemakers and criminals." Nick Wingfield, *Now, Anyone Can Buy A Drone. Heaven Help Us*, New York Times (Nov 26, 2014), available at http://www.nytimes.com/2014/11/27/technology/personaltech/as-drones-swoop-above-skies-thrill-seeking-stunts-elicit-safety-concerns.html?_r=0. Many view drones as toys; they topped numerous Christmas lists last year. Seth Stevenson, *It's a Bird! It's a Plane! It's – AAAACK! The unexpected dangers of drones,* Slate (Nov. 27, 2014) available at http://www.slate.com/articles/technology/technology/2014/11/best_drone_gifts_dji_phantom_parrot_ar_rolling_spider_reviewed.html. Injuries caused by drones are reportedly on the rise nationwide. *See* Drone Injuries Lawyer Blog, http://www.droneinjurieslawyer.com/. Drone pilots have recently disrupted sporting events in the U.S. and Europe, and have tried to smuggle contraband into prisons. French officials have been alarmed by more than a dozen illegal drone flights over nuclear power plants and sightings of multiple drones over Paris at night. And, animal rights activists using drones to monitor alleged illegal hunting have come into conflict with hunters' rights advocates who claim the drones are used to scare away prey. Nick Wingfield, *supra*.

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The FAA has acknowledged that safety is at risk due to the increasing number of UAS-related incident reports involving model aircraft and small UAS. U.S. Department of Transportation, National Policy Notice 8900.268, July 15, 2014, http://www.faa.gov/regulations_policies/orders_notices. The government receives daily reports of close encounters between drones and other aircraft. Joan Lowy, *Drone Use Takes Off Despite Safety Concerns, Restrictions*, Insurance Journal (Nov. 17, 2014), available at http://www.insurancejournal.com/news/national/2014/11/17/346974.htm. Further, the January 2015 crash of a hobbyist drone on the White House lawn called stark attention to the growing security threat drones can pose.

History and Current Status of Laws Regulating UAS

The U.S. is behind the curve in terms of UAS legislation and rulemaking. *See, e.g.,* Regulation (EC) No. 785/2004 (as amended by Regulation (EU) No 285/2010); Canadian Aviation Regulations §602.41 (current Dec. 31, 2014); (for a list of regulations by country as of 2013, see www.missouridronejournalism.com/2013/04/what-flies-when-it-comes-to-drone-laws-across-the-globe). Legislatures and regulators are scrambling to issue laws and guidance to catch up, if not keep up, with emerging UAS technology. So far, over 40 U.S. states have enacted or proposed some form of anti-UAS legislation. The FAA has been slow to regulate use of drones due to homeland security issues, privacy concerns, cyber security issues, technology issues, and the difficult task of safely assimilating them into the crowded national airspace. Memorandum from the Subcommittee on Aviation Staff to the Subcommittee on Aviation Members, Subcommittee Hearing on "U.S. Unmanned Aircraft Systems: Integration, Oversight, and Competitiveness (Dec. 5, 2014), available at http://transportation.house.gov/uploadedfiles/2014-12-10-aviation_ssm.pdf; *see also* Jennifer Henry, *Commercial Use of Drones in a Holding Pattern*, For the Defense, at 52 (Aug. 2014), available at http://documents.jdsupra.com/6047ad93-6c48-4409-831d-bcdddb63e442.pdf.

In 2007, the FAA issued a policy statement recognizing that UAS fall within its definition of "aircraft" because they are devices "used or intended to be used for flight in the air with no onboard pilot." 72 Fed. Reg. 6689 (Feb. 13, 2007). The FAA divides UAS Operations into three different categories: civil aircraft, public aircraft, and model aircraft. To qualify as a model aircraft, the UAS must be operated purely for recreational or hobby purposes, below 400 feet, within the visual line of sight of the operator. Since 1981 the FAA has urged model aircraft operators voluntarily to comply with its safety standards. *See* Fed. Aviation Admin., Model Aircraft Operating Standards, Advisory Circular, AC 91-57 (June 9, 1981).

Civil (non-governmental) drone operators must obtain a Special Airworthiness Certificate in the Experimental category in order to fly in the national air space. The regulations allow flights for research and development, flight and sales demonstrations, and crew training; currently, carrying people or property for compensation is prohibited. 14 CFR §§21.191, 21.193, 21.195.

Public entities such as the federal, state and local governments and agencies, and qualifying universities wishing to operate a UAS for uses such as fire-fighting, disaster relief, law enforcement, search and rescue, border patrol, or research must obtain a Certificate of Waiver or Authorization from the FAA. 49 U.S.C. §40102; 14 CFR §1.1. However, increasing demand is making this case-by-case process unworkable.

In 2012, Congress enacted the FAA Modernization and Reform Act of 2012 (the Modernization Act), which requires the FAA to develop and implement a comprehensive and ambitious plan to hasten the safe integration of UAS into the national airspace system by September 2015, a deadline the FAA will not meet. Pub. L. No. 112-95, 126 Stat. 72 §332 (a)(1), (3)(enacted Feb. 14, 2012)(codified in scattered sections of 49 U.S.C).

On February 15, 2015, the FAA released its Notice of Proposed Rulemaking ("NPRM") for small UAS. Federal Aviation Administration, *Notice of Proposed Rulemaking* (Feb. 15, 2015), available at https://www.faa.gov/regulations_policies/rulemaking/recently_published/media/2120-AJ60_NPRM_2-15-2015_joint_signature.pdf; Federal Aviation Administration, *Overview of Small UAS Notice of Proposed Rulemaking* (Feb. 2015), available at https://www.faa.gov/regulations_policies/rulemaking/media/021515_sUAS_Summary.pdf (hereinafter "NPRM Overview"). The proposed rule permits operation of UAS for non-hobby and non-recreational uses during daylight hours and subject to certain restrictions, including speed (100 mph), altitude (500 feet above ground), and weight (55 pounds). NPRM Overview, *supra*. The UAS must remain in the visual line of sight of the operator or a visual observer at all times and must remain close enough for the operator to be capable of seeing the UAS unaided by any device other than corrective lenses. *Id.* The UAS may not be operated over any persons except those directly involved in the operation and an operator may be responsible for only one UAS at a time. *Id.* Additionally, UAS operators must meet certain requirements, including passing initial and recurrent aeronautical knowledge tests at an FAA-approved knowledge testing center, obtaining an operator certificate, and being vetted by the Transportation Safety Administration. *Id.*; Press Release, Federal Aviation Administration, DOT and FAA Propose New Rules for Small Unmanned Aircraft Systems (Feb. 15, 2015), available at http://www.faa.gov/news/press_releases/news_story.cfm?newsId=18295.

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The proposed rule would also impose the same Aircraft Registration and aircraft marking requirements to UAS that are applied to other aircraft. NPRM Overview, *supra*. However, an FAA airworthiness certificate would not be required. *Id.* The proposed rule would not apply to model aircraft, but it would codify the FAA's enforcement authority by prohibiting model aircraft from endangering the safety of the national airspace system. *Id.*

The NPRM requests public comment on a "micro-UAS" option which would apply to UAS that weigh no more than 4.4 pounds. *Id.* That option would allow operations of micro-UAS in unrestricted airspace and over people not involved in the operation, provided the operator certifies he has the requisite aeronautical knowledge to perform the operation. *Id.*

The NPRM may be a practical approach to allowing low-risk UAS operations, but certain issues anticipated to be included in the proposed rule are not addressed. The NPRM does not include any requirement that operators maintain liability insurance, for example. It also does not restrict operators from flying over homes or property of others or establish any system for lodging complaints about improper use. Leland E. Beck, *Monday Afternoon Regulatory Review – 2/23/15: Drone Release & Problems; Arctic Drilling; Immigration Executive Action Litigation II & IIA; and Agriculture High-Stepping Authority*, Federal Regulations Advisor (Feb. 22, 2015), available at http://www.fedregsadvisor.com/2015/02/22/monday-afternoon-regulatory-review-22315-drone-release-problems-arctic-drilling-immigration-executive-action-litigation-ii-iia-and-agriculture-high-stepping-authority/. The NPRM does not include any express preemption provision, leaving open the possibility of conflicting state and local regulations. O'Connor, *supra*.

The proposed rule allows the use of data gathered by UAS for any "authorized purpose." NPRM Overview, *supra*; Alwyn Scott, *U.S. Issues Draft Rules on Commercial Use of Drones; Insurers Welcome*, Insurance Journal (Feb. 16, 2015), available at http://www.insurancejournal.com/news/national/2015/02/16/357536.htm. No privacy protection provisions are included. Ryan Calo, *How the FFA's Proposed Drone Rules Will Affect What You Care About,* Forbes (Feb. 15, 2015), http://www.forbes.com/sites/ryancalo/2015/02/15/how-the-faas-proposed-drone-rules-will-affect-what-you-care-about/. On the same day the NPRM was released, however, President Obama issued an executive order creating standards for how the federal government will address the privacy issues associated with drones. He also directed the initiation of a multi-stakeholder process for creating privacy, accountability, and transparency rules for the commercial and private use of drones. Gregory S. McNeal, *What You Need To Know About The Federal Government's Drone Privacy Rules,* Forbes (Feb. 15, 2015), http://www.forbes.com/sites/gregorymcneal/2015/02/15/the-drones-are-

coming-heres-what-president-obama-thinks-about-privacy/.

Significantly, the NPRM is not the comprehensive set of regulations that Section 332 of the Modernization Act mandates. O'Connor, *supra*. Indeed, the FAA's stated basis for the NPRM is Section 333 of the Modernization Act, which authorizes the FAA to allow some UAS operations before the comprehensive rulemaking required by Section 332 occurs. *Id.* Some suggest that the FAA is signaling that a comprehensive set of rules will come later to address more advanced, higher risk operations, like autonomous operations beyond the operator's visual line of sight. *Id.*

The proposed rule is now open for public comment, but the regulations are unlikely to be finalized for at least a year. Until they are finalized, the current effective ban on commercial operations will remain in effect. Moreover, if the proposed rule is enacted in its current form, it will effectively preclude many currently anticipated commercial applications, like commercial delivery service uses and long range pipeline inspection. Consequently, the development of the comprehensive rules required by the Modernization Act will be crucial to economic growth. AUVSI estimates that the integration of UAS into the U.S. airspace will create over 70,000 jobs in the first three years, with an immediate economic impact exceeding $13.6 billion. By 2025, integration will create over 100,000 jobs, a third of which will be high paying manufacturing positions. And the economic impact is expected to exceed $82 billion. Jenkins & Vasigh, *supra*, at 2–3. Experts estimate that every day the government delays issuing regulations to actually integrate UAS into the national airspace costs the U.S. $27.6 million. *Id.*

Insurance Opportunities Created by UAS Development

In addition to the obvious need for definitive regulations in order for these forecasts to become a reality, another necessary development will be insurance to cover liabilities attendant to development, manufacture and use of UAS. Among the many hurdles the FAA faces in integrating UAS safely into U.S. airspace is whether operators should be forced to carry liability insurance and whether this should be addressed at the state or federal level. The proposed rule does not address this issue. Regardless, the availability of insurance will be critical to the growth of a commercial market for UAS, because the need for coverage will be great and potential losses high. As the regulatory and legal issues are resolved, new insurance products will be required in order to successfully integrate the technology into our lives. Insurers can play a vital role by facilitating risk transfer, encouraging high safety standards, and helping lay the groundwork for sufficient regulation. Gillian Yeomans, Lloyd's, *Autonomous Vehicles - Handing Over Control: Opportunities and Risks for Insurance* (2014) at §7, http://www.lloyds.com/~/media/lloyds/reports/emerging%20risk%20reports/autonomous%20vehicles%20final.pdf.

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Only about twenty carriers provide coverage to the aircraft industry. This number likely will increase once the FAA regulations are finalized. But for now, the question is: How will insurers evaluate exposure for the "dirty, dull, and dangerous" operation of drones? B. Elias, *Pilotless Drones: Background and Considerations for Congress Regarding Unmanned Aircraft Operations in the National Airspace System*, Congressional Research Service (Sept. 10, 2012), https://www.fas.org/sgp/crs/natsec/R42718.pdf. Although insurers can extrapolate loss experience from the aviation industry, drones are three times more likely to be involved in an accident as manned aircraft, according to a recent study of U.S. Air Force data. David K. Beyer, Donna A. Dulo, Gale A. Townsley, & Steven S. Wu, *Risk, Product Liability Trends, Triggers and Insurance in Commercial Aerial Robots* (April 5, 2014) at 4, http://robots.law.miami.edu/2014/wp-content/uploads/2013/06/Beyer-Dulo-Townsley-and-Wu_Unmanned-Systems-Liability-and-Insurance-Trends_WE-ROBOT-2014-Conference.pdf. Thus, aviation industry data must be adjusted for factors unique to unmanned vehicles—autonomy in flight, autonomy in collision avoidance and autonomy in decision making when communications links between UAS and operator are lost. David K. Beyer, *et al.*, *supra* at 1.

Autonomous and unmanned vehicles transfer control from direct human input to automated or remote control, which poses a key challenge in evaluating potential liability. *Id.* at 18. The good news is that autonomous technology development is linked to other trends in digital technology and the exponential increase in data, which in turn will provide insurers with much more information on risks than previously available. "Autonomous vehicles should mean that insurers will be able to get a more comprehensive and detailed picture of risk, as well as benefiting from improved safety as the human error element of risk is reduced." *Autonomous Vehicles-Handing Over Control*, Lloyd's, *supra*. By using its risk management expertise and the available data extrapolated from drone use and testing to make its own risk assessments and to provide coverage for responsible operators, the insurance industry can participate in the business opportunities resulting from technological innovation. *See* Yeomans, *supra*, at §2. Nonetheless, the industry will not have a lengthy period of time to evaluate long-term liability trends and triggers. Beyer, *et al.*, *supra*, at 3.

Risk Factors Relevant to UAS Underwriting

The bespoke underwriting for UAS that is currently the norm will become unworkable as the UAS industry, and thus the need for insurance, grows. To successfully meet demand, insurers must set parameters, create standard and quantifiable risk factors, and determine how to allocate and mitigate risks. Brendan Smith & YangQuan Chen, *An Essay on Unmanned Aerial Systems Insurance and Risk Assess-*

ment, MESA Lab, University of California, Merced (2014), http://mechatronics.ucmerced.edu/sites/mechatronics.ucmerced.edu/files/page/documents/06935560an_essay_on_unmanned_aerial_systems_insurance_and_risk_assessment.pdf. At the outset, this involves clearly defining what constitutes a UAS or Unmanned Aerial Vehicle ("UAV") and dividing identifiable risks into acceptable and unacceptable categories. Acceptable risks then must be evaluated to determine who is in control of the UAS, the mission of the UAS, and its safety, including reliability of the system and tolerance controls to account for human factors. Smith & Chen, *supra*, at 5–6.

The types of coverage relevant to UAS are akin to those for traditional aviation risks, except that passenger liability will not be necessary unless UAS begin to transport passengers. However, UAS do pose new risks, including lack of operator experience. Yeomans, *supra*, at §7.2. There are four main UAS risks to be considered.

Collision is the primary risk. While a UAS collision would not involve on-board passengers or crew, it would risk injury to the aircraft itself, to people and property on the ground, or to manned aircraft. The risk of collision will increase as the number of UAS increases. Yeomans, *supra*, at §6.2. Even in the highly trained U.S. Air Force, the major cause of UAS mishaps is pilot error, followed in decreasing order by component failure, mechanical failure and electrical failure. David K. Beyer, *supra*, at 6. Although UAS currently must be flown within the operator's line of sight, that likely will need to change if UAS are to become commercially viable. To make this happen, manufacturers must develop precise capabilities that allow the UAS to reposition automatically to avoid obstacles. Yeomans, *supra,* at §6.2.1.

Loss of the data link between the vehicle and its operator is a secondary risk. Strength and protection of the data connections and a reliable backup system will be critical. *Id.* at §6.2.2. Software programming requiring the drone to return home in the event of loss of connection also will be necessary. *Id.*

Cyber risk of hacking or malware is also important to consider. As the frequency of UAS use increases for tasks such as data collection, they are more likely to become targets for hackers who want to snatch the data or the drone itself. Malware specifically designed to infiltrate UAS has been developed, so the risk is no longer theoretical. Christian de Looper, *Drones Now Big Hacking Target, First Drone Malware Identified*, Tech Times, Feb. 4, 2015, http://www.techtimes.com/articles/30634/20150204/drone-hacking-next-big-security-concern.htm. Drones can be outfitted with GPS geofencing, which prohibits them from flying in pre-programmed areas such as around airports and government buildings, but currently only one hobbyist drone company is including such technology, and many consumers do not want this technology. Moreover, in time the geofencing will be hacked and workarounds will become widespread. Kevin Poulsen, *Why the U.S. Government is Terrified of Hobbyist Drones*, WIRED, Feb. 5, 2015, https://www.wired.com/2015/02/white-house-drone.

At the outset, this involves clearly defining what constitutes a UAS or Unmanned Aerial Vehicle ("UAV") and dividing identifiable risks into acceptable and unacceptable categories.

Invasion of privacy risks are of major concern to many people. Drones for both personal and commercial uses may be equipped with cameras and other data collection devices that pose a threat to privacy. Whether the data is broadcast from the drone or downloaded later, the possibility exists that drones will capture private or trade secret information that is later made public intentionally or inadvertently or is put to other inappropriate uses. Privacy risks, as well as risks of nuisance and trespass, are complicated by state statutes providing a private cause of action to aggrieved property owners.

Underwriters will need to obtain detailed information regarding the aircraft's size, proposed use (*e.g.*, is it commercial or personal? If the use is commercial, will the UAS be delivering packages, hazardous materials, providing surveillance or collecting data?), its payload, pilot training, whether the UAS will be ground-pilot operated or entirely pre-programmed, whether it is fixed wing or rotor wing, whether it will be "line of sight" only, its range, whether it has control redundancies, how it is launched, its takeoff and landing locations, whether it will be operating over or near populated areas, its flying altitude, how it is retrieved if contact is lost, its ability to recover or land (can it glide back to base?), the state(s) in which it will be operated, how it will be protected when unattended, and its maintenance program. If the UAS will be used to collect data, underwriters must determine how the owner will use the data it gathers and the methods by which it will protect or destroy that data. To make use of all this information, underwriters must understand the applicable regulations and have a sense of what particular legal issues will be addressed under traditional tort laws and state statutes, and what issues will be governed by federal law. Joseph Colby, Gerald Deneen, Carol Kreiling, Anthony Mormino, and Nellie Root, *Insurance and the Rise of the Drones*, Swiss Re (2014) at §8.1. Insurers must also determine when and under what circumstances commercial operations will be eligible for coverage even if the UAS is not approved by the FAA for commercial use. Then, insurers must create effective policy wording to address issues unique to UAS where current policy language is insufficient. *Id.* at §8.

Coverages Implicated

The widespread use of UAS will offer insurers the opportunity to provide a broad range of coverages.

Hull Coverage: Owners and operators will need hull coverage for damage to the unmanned vehicle, its component parts and associated equipment, which

may include control stations, transmission equipment, cameras and software. Depending on the size and sophistication of the UAS, the equipment costs could vary considerably, along with the amount of hull coverage required. *See* Yeomans, *supra*, at §7.2.

First Party Coverage: Commercial and recreational owners and operators will need coverage for their own personal injury and property damage apart from hull coverage.

Liability Coverage: It will be critical for both commercial operators and hobbyists to maintain coverage for personal injury and property damage to third parties. This may include CGL coverage for non-airborne exposures, aviation liability coverage and umbrella coverage. Liability coverage must take into account the size of the UAS, its geographic flight parameters, its purpose, its safety features, and operator expertise. *See* Yeomans, *supra*, at §7.2.3. In some areas such as the European Union, UAS must be insured by liability coverage to the same extent as manned aircraft. *See* Regulation (EC) No. 785/2004 (as amended by Regulation (EU) No 285/2010). *See also UAS Insurance*, https://www.uavs.org/insurance (last visited Feb. 9, 2015). Drone operators may be sued for their own negligence and wantonness or negligent entrustment if they allow an unqualified operator to use the drone. Kevin Quinley, *A View from Above*, Claims Management, at 44 (Sept. 2014), available at http://claimsmanagement.theclm.org/home/article/A-View-From-Above. Coverage will be essential for a range of potential liabilities, including personal injury and property damage, loss of revenue, trespass and nuisance, libel, slander, copyright and trademark infringement, and invasion of privacy.

Product Liability Coverage: Manufacturers and component part manufacturers will face liability for alleged defective design, manufacturing, or failure to warn, as well as strict liability, negligence and breach of warranty. Manufacturers, distributors and sellers of UAS may need product liability and personal injury/property damage insurance that is broader than typical product coverage for traditional aviation risks, in the event the operator loses contact, backup safety equipment is inadequate, or to the extent future UAS are developed with autonomous capabilities so that no operator is required. *See* Yeomans, *supra*, at §7.2.4. While autonomous capabilities are a future concern, this area will likely see robust growth in the future. Manufacturers must stay on the cutting edge of product development—redundant mechanical and safety systems, geocoding, a common no-fly data base, and technologies to detect the presence of drones will be critical to maintain public safety and prevent manufacturer liability. Bill McNeil, *Geocoded no fly maps key to safer sUAV flights,* Directions Magazine, Feb. 6, 2015, available at http://directionsmag.com.

As the frequency of UAS use increases for tasks such as data collection, they are more likely to become targets for hackers who want to snatch the data or the drone itself.

Cyber and Terrorism Coverage: As the UAS industry grows, cyber risk policies must evolve to suit the needs of operators, systems designers, manufacturers, and infrastructure providers. Cyber coverage may be needed for a number of applications. Users will require coverage for exposure to the costs of investigating data breaches or malicious interference such as hacking or signal jamming, for defending violated privacy, and for repairing damaged systems. Service providers may seek coverage against reputational damage and compensation to those affected by disruption or breaches of their systems. Yeomans, *supra*, at §7. Cyber insurance in this sphere may need to be tailored to cover bodily injury and physical damage in the event of the significant exposure that would result from a cyber-attack on a moving vehicle. The scope and availability of terrorism coverage is likewise worthy of consideration. Cyber and cyber terrorism coverage could be offered separately from other UAS policies, but given the increasing levels of dependence on computerized systems in vehicles, it potentially could become a part of the other coverages. This coverage will be critical to both commercial and non-commercial users. Cyber coverage will likely constitute a significant area of insurance growth with the development of increasingly computerized vehicles. *Id.*

Cargo Coverage: When UAS begin delivering packages, suppliers or purchasers of transported goods will need cargo coverage, which must take into account whether the cargo is an individual item or a batch, the type of cargo being delivered and how it will be delivered (*i.e.*, can it be dropped or must it be securely unloaded?). *See* Yeomans, *supra*, at §7.2.

Other Coverages: Businesses using UAS for commercial activities may also need business interruption coverage. Workers compensation coverage will be needed for individuals working for and in facilities of UAS-related businesses. Peripherally, companies in the UAS industry should consider guarding against corporate exposures by obtaining employers' liability insurance, D&O coverage to protect against financial loss due to mismanagement, and perhaps Kidnap and Ransom insurance.

UAS Coverage Currently Available

A few insurers have already developed specific products providing third-party liability, physical loss or damage and transit coverage for UAS operating in a commercial, governmental, environmental or emergency services setting. *See Kiln Light UAS Policy Provisions*, http://www.uavs.org/kilnprov (last visited Feb. 9, 2015); Overwatch, *Remotely Piloted Aviation Insurance*, available at http://www.riskoverwatch.com/aviation.html. Coverages currently being offered in the marketplace (often through a coverage extension) include hull coverage for physical loss or damage to UAS, components and spare parts during operation, testing or transit; liability coverage for direct loss or damage resulting from UAS failure (excluding coverage for consequential losses of third parties); non-owned

UAS liability coverage; premises, hangar keepers and product liability coverage; hull coverage for war, strikes, riots, malicious damage and hijacking expenses; war liability coverage; and fellow employee coverage. *See, e.g.,* Kiln Group Aviation Division, UAS Operators Insurance Proposal Form (April 2011), available at https://www.uavs.org/document.php?id=168&ext=pdf; Overwatch RPAS Application, available at http://www.riskoverwatch.com/aviation.html; Transport Risk Management, Insurance Coverage for Unmanned Aerial Vehicles-UAV, Unmanned Aerial Systems-UAS, http://www.transportrisk.com, 2014.

Some companies are offering endorsements providing limited coverage for damages arising from the ownership, maintenance, use, or entrustment of UAS that do not exceed a certain size and weight. Others are now including an endorsement covering agriculture customers utilizing drones. *See* Laurie Bedford, *Should You Insure a Drone?*, Agriculture.com (Jan. 14, 2014), http://www.agriculture.com/technology/robotics/uas/should-you-insure-a-drone_587-ar45345. ISO offers an endorsement that excludes from coverage personal and advertising injury arising out of the ownership, maintenance, use, or entrustment of unmanned aircraft. *See* ISO Form CG 21 11 06 15. Additional ISO endorsements covering bodily injury, property damage, and personal and advertising injury liability for scheduled unmanned aircraft under ISO's CGL and commercial liability umbrella/excess forms reportedly will be available in June. Shelley Livingston, *ISO Offers Insurance Options for Commercial Drones*, Business Insurance (Dec. 16, 2014), available at http://www.businessinsurance.com/article/20141216/NEWS06/141219888.

Coverage Questions Likely to Arise

With this emerging technology, many question marks exist regarding available causes of action, who can sue whom, who will pay, and for what. The answer will often boil down to available insurance and that will give rise to numerous coverage questions, especially in relation to policies that are not specifically tailored to UAS. First and foremost, the definition of the insured vehicle will be key to coverage. For example, most standard CGL policies exclude coverage for bodily injury and property damage resulting from the ownership, maintenance, or use of aircraft or from aviation operations. *See, e.g.*, ISO CG 00 01 04 13. The ISO Business Owners and Commercial Umbrella forms use the same language, as do typical agribusiness policies. *See, e.g.,* ISO BP 00 03 04 13; ISO CU 00 01 04 13. However, the CGL and Business Owners forms do not contain an aircraft exclusion for covered personal and advertising injury. *See generally* Colby, *supra*, at §8.2.3. Whether a UAV is an "aircraft" and whether operation of a UAV constitutes "aviation operations" will undoubtedly be litigated, particularly in the absence of policy definitions and adequate regulations.

> Insurers must also determine when and under what circumstances commercial operations will be eligible for coverage even if the UAS is not approved by the FAA for commercial use.

Likewise, most CGL policies cover only commercial activities on the ground at the registered premises and limited manual work away from these premises. Many companies or small operators may be relying on the products and public liability clauses in their general public liability insurance without regard for the applicable exclusions. At least one trade group recommends that UAV or UAS operators engaged in aerial work obtain a specific insurance policy for that work. *UAS Insurance*, https://www.uavs.org/insurance (last visited Feb. 9, 2015).

Similarly, contractors using UAS at construction sites should examine their policies and confirm whether their UAS constitutes an aircraft the "ownership, maintenance or use" of which is excluded under the standard CGL policy. *See What to do about Drones on Construction Sites*, World Risk and Insurance News, interview with Ann Hickman, Editor of Construction Risk Management magazine, Nov. 25, 2014, available at http://www.wrin.tv/what-do-do-about-drones-on-construction-sites-construction-risk-management-editor-comments. According to the International Risk Management Institute, one can make a strong argument that a UAV with a camera attached qualifies as an aircraft. Babel, *supra*, at 3. Thus, contractors may need to negotiate an exception to the exclusion or buy a specific aviation policy or manuscript endorsement to cover UAS exposure. Potentially, contractors could use an insured subcontractor for the job because the CGL exclusion "does not reach an insured's liability for a subcontractor's use of an aircraft that is not owned, rented or maintained by the insured." Babel, *supra*, at 2–3.

One of the questions individuals ask most frequently is whether their homeowners coverage protects against damage or other loss caused by a drone. Some insurance companies suggest that such damage may be covered if the drone is put to personal use. *See* Chubb Survey, *supra*. Again, a key question will be whether the policy excludes the drone as an aircraft. "Aircraft" is defined in a standard ISO homeowner's policy "as any contrivance used or designed for flight except model or hobby aircraft not used or designed to carry people or cargo." ISO Form HO 00 02 05 11. Whether a UAS falls within the "model or hobby aircraft" exception will depend on the type of UAS and the circumstances of use (*e.g.*, personal or commercial), and may depend on whether and to what extent hobbyist vehicles are covered by the long-awaited FAA rules. Even if a homeowner's policy covers physical injury or property damage caused by the drone, the policy may not cover liability for invasion of privacy, disclosure of private, confidential or proprietary information gathered by the drone, or trespassing or stalking claims that do not implicate bodily injury or property damage. Colby, *supra*, at 8.2.7. To the extent coverage for these additional risks is available, it may be too expensive for the aver-

age homeowner. However, there may be affordable alternatives. For example, the Academy of Model Aeronautics offers as a benefit of its $58 yearly membership excess general liability coverage of $2.5 million for damage caused by its members' UAS. Ed Leefeldt, Insurance for Your Drone, Insure.com (Dec. 4, 2011), http://www.insure.com/home-insurance/insurance-for-drone.html. This may be an attractive option for hobbyists seeking coverage.

Exclusions for illegal activities may come into play in cases of alleged invasion of privacy, illegal surveillance or filming, or where questions exist as to whether a UAS was being operated in violation of FAA Regulations at the time of an accident. *See, e.g.*, *Huerta v. Pirker*, No. CP-217, at 2-3 (NTSB Office of Admin. Law Judges Mar. 6, 2014), available at http://www.ntsb.gov/legal/Pirker-CP-217.pdf ($10,000 FAA fine against a drone operator at University of Virginia ultimately settled for $1,100 in January 2015 after much litigation over FAA's regulatory authority); GPS World Staff, *Pirker Drone Case Reaches Settlement*, GPS World (Jan. 30, 2015) available at http://gpsworld.com/pirker-drone-case-reaches-settlement/. For example, if adopted, the Proposed Rule will prohibit operation over any persons not directly involved in the operation" of the drone. When a non-operator is injured by a drone, questions undoubtedly will arise as to whether the operation was in violation of the FAA Regulation and therefore constitutes an illegal activity.

It will be crucial that insureds and their brokers evaluate coverage carefully as standard policies may leave significant gaps in coverage. While coverage forms for traditional aviation risks will provide a starting point, liability coverage for UAS with autonomous functionality will need to be broader. Commercial operators may need an aviation liability policy, but these coverage forms may not include personal injury or invasion of privacy and almost certainly will not address cyber liability. Owners and operators will likely need special property coverage for their UAS and related equipment, for example, as business property policies often exclude coverage both for aircraft and for computers permanently installed in aircraft. Digital data is often considered an intangible asset typically excluded from standard property and liability policies. Beyer, *et al.*, *supra*, at 19.

Incidental Effects of Drones on the Insurance Business

Apart from coverage issues, UAS will have many secondary effects on the insurance business. Data collection and weather monitoring by insurers will result in more effective underwriting and improve the consistency of modeling. Underwriters can use drones to assess the condition of roofs, siding, and exterior details. Drones will find practical application in claims adjustment by following storms, interpreting data and assessing damage in real time, investigating building envelope and roof conditions, and assessing burn patterns and debris fields in fire and explosion investigations. Lyle Donan, P.E., *The Drones Are Here*, Claims Management (Nov. 18, 2013) http://claims-management.theclm.org/home/article/drones-unmanned-aerial-vehicles-coming-to-property-insurance-claims-industry. Drones can be used to reach inaccessible or dangerous areas for claims handling and might simply be used to reach accident scenes more quickly and inexpensively than a human adjuster could. *See* Quinley, *supra*, at 43.

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UAS technology offers the potential for safe, quick, and inexpensive claims handling which would benefit insurers and their customers during difficult times. *See State Farm Seeks to Test Drone Use for Damage Response in Illinois*, USATOday.com (Oct. 25, 2014), http://www.usatoday.com/story/money/business/2014/10/25/state-farm-seeks-to-test-drones-in-illinois/17907983/; *Insurer USAA Seeks OK to Test Drones for Claims Service*, Insurance Journal (Oct. 3, 2014), http://www.insurancejournal.com/news/national/2014/10/03/342599.htm. In order to put drones to effective use in claims adjustment, however, insurers must develop a platform for use of UAS in claims and then test that platform at approved test sites or FAA operations centers. State Farm and USAA have sought exemptions to allow operation of unmanned aircraft at test sites and during actual catastrophes. *Id.*

UAS could even be used for security purposes to protect risks like events or buildings. Yeomans, *supra*, at §7.2.5. UAS could be used by insureds for claims submissions. In fact, some farmers already use drones to gather historical data on their crops to help validate crop loss or animal damage when applying for crop insurance. *See* Wozniacka, *supra*. Although privacy issues may create hurdles, insurers might one day use drones to survey claimants who allege that they are disabled. Quinley, *supra*, at 43.

What the Future Holds

The more closely integrated the virtual and physical worlds become, the more interesting and complex these issues will be. Indeed, the bounds of unmanned technology are seemingly limitless. However, the opportunity for vast economic growth presented by UAS will be dependent not only on adequate regulation and safety standards but also upon the existence of insurance to cover a wide variety of risks, some already understood and others yet unimagined, from this emerging technology. At this juncture, there are many more questions than answers regarding acceptable uses of UAS and how the risks associated with their use will be insured. However, by analyzing and quantifying the risks and successfully pricing coverage for a wide range of potential commercial and private uses, insurers will play a critical role in the safe integration of unmanned systems into our ever-changing world.