The Growing Drone Economy:

Possibilities, Obstacles, and Solutions

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Abstract

Today's environment is rife with opportunities for the use of unmanned aircraft systems (UAS), or drones. From crop surveying to emergency response to package delivery, the business applications are abundant, and the possibilities seem endless. The Federal Aviation Administration has attempted to outline rules and regulations for drone use with the implementation of Federal Aviation Regulations Part 107, but it is clear that more work can be done to ensure a safe national airspace and raise awareness of safety among commercial and hobbyist users alike. This article explores the current landscape for UAS operations, as well as the safety and insurance concerns surrounding this exploding industry.

The annual Super Bowl is known for its high entertainment factor, and the 2017 game was no exception. Particularly notable during the elaborate halftime show, as well as in many of the highly creative commercials, were allusions to the prevalence of drone technology in today's society.

Intel put on a dazzling celestial display using 300 quadcopters during Lady Gaga's performance, and Amazon Prime's ad sneaked a drone delivery shot into the final frames, teasing the audience with what may be the future of package delivery for the online retailer.

Everywhere we look, unmanned aircraft systems (UAS), also known as drones, are being used for both recreational and commercial purposes. Yet despite their rampant use, many hurdles must be overcome before some types of operations can safely become a reality.

A 2013 study for the Association for Unmanned Vehicle Systems International predicts that integration of UAS into the United States business world via agriculture, public safety, and other applications could result in a contribution of more than $82.1 billion to the U.S. economy between the years 2015 and 2025, assuming that integration began in 2015. Additionally, total job creation from UAS integration could amount to more than 100,000 during the same time period.[1]

This study highlights the massive impact this technology could have on our economy from readily apparent commercial markets, while the preceding examples of Super Bowl entertainment and Amazon package delivery hold implications for markets that have barely begun to capture the possibilities of this exciting new industry.

Federal Regulations

In 2016, the Federal Aviation Administration (FAA) published its long-awaited regulation guiding the operation and use of UAS weighing between 0.5 and 55 pounds, known as Part 107. Before publication of this rule, almost anyone could purchase a UAS and operate it wherever and however he or she wanted.

The boundaries of this possibility were tested with the *FAA v. Raphael Pirker* case, which was instrumental in challenging whether Federal Aviation Regulations (FARs), applicable to manned aircraft, could be applied to small unmanned aircraft. In this case, Pirker was charged with recklessly operating an aircraft while he was attempting to capture photographs of the University of Virginia campus for an advertising campaign.

The first ruling stated that FARs did not apply to UAS because UAS seemed to fall under the category of model aircraft, which are not subject to the FARs that the FAA alleged Pirker violated. Upon appeal to the National Transportation Safety Board, the FAA was ruled to have authority over essentially anything that operated in the air, whether manned or unmanned.[2] This further underscored the need for concrete, universal guidance from the FAA specific to UAS, especially since, following the appeal, the FAA effectively outlawed commercial use of UAS without a special Section 333 exemption.

The advent of Part 107 marks a milestone for commercial UAS operators because it loosens the oversight of the FAA and establishes a more widespread approach to regulation of these systems. Operators no longer need to submit detailed proposals of operations and pilot details to obtain a Section 333 exemption or certificate of authorization to legally operate a UAS, although those options are still available for operators whose proposed uses may fall outside those allowed by Part 107. One must keep in mind, however, that Part 107 is a federal regulation and that, therefore, adhering to its parameters is a matter of compliance with the law, with fines and other penalties imposed for violations.

Any person operating a UAS commercially under Part 107 rules must hold a remote pilot certificate with a small UAS rating issued by the FAA or be supervised by a person holding such certification. To be eligible to obtain a remote pilot certificate, applicants must be at least sixteen years old; able to read, speak, write, and understand English; and pass an aeronautical knowledge test, among other requirements. Pilots must also pass an aeronautical knowledge test every two years. Pilots are restricted from operating under the influence of drugs or alcohol or while suffering from a medical condition that would affect the safety of UAS operation.

Pilots in command of the UAS operation also have a number of responsibilities imposed on them by Part 107. These include ensuring the safety of the flight; avoiding other aircraft, people, or property; and being in complete control of the UAS at all times. Emergency situations affecting these responsibilities are generally exempt from violation as long as the event is reported to the FAA. Pilots also must perform preflight checks of the UAS and weather, just as pilots of manned aircraft do.

Because the FAA is no longer issuing Section 333 exemptions and certificates of authorization for every operator, it has compensated by outlining a number of operating rules by which commercial UAS operators must abide. The major parameters include limiting UAS weight to under 55 pounds and operations to daytime hours and no higher than 400 feet above ground level and no less than 500 feet below cloud cover, and forbidding operations above people who are not directly participating in the operation of the UAS. There are a few exceptions to these rules, as well as the ability to obtain a waiver for many of them directly from the FAA, except for the one concerning vehicle weight, for which no waiver is available.

For those who are wondering why Amazon is not already delivering packages to consumers via UAS, the answer is simple: the FAA has specifically addressed these types of operations in Part 107 in a number of ways. The first is a requirement that Visual Line of Sight (VLOS) be maintained at all times by the pilot in command or visual observer, without assistance of anything other than glasses or contact lenses. This makes it very difficult to deliver packages across long distances.

Waivers can be obtained to operate UAS beyond VLOS, but not for carrying others' property for compensation or hire. Even if Amazon were to get creative, the FAA also forbids the operation of UAS from a moving aircraft, or from land or waterborne vehicles "unless the small unmanned aircraft is flown over a sparsely populated area and is not transporting another person's property for compensation or hire."[3] So, for the time being at least, package delivery via remotely operated UAS is not a legal possibility.

Business and Recreational Applications

Despite the apparent setbacks for an operation such as Amazon proposes, productive possibilities and business applications for UAS abound. The National Business Aviation Association sees the appeal of increasing use of UAS in business capacities as encompassing "substantial safety, efficiency and effectiveness gains, which can translate to improved service, increased profitability, decreased risk and enhanced response to customer needs."[4] Businesses and industries with particular and seemingly immediate abilities to use this technology include agriculture, law enforcement, insurance providers, real estate, construction, and oil and gas companies.

Jenkins and Vasigh's study predicts that the greatest use of UAS technology will be by the precision agriculture industry, using remote sensing and precision application techniques. This niche is estimated to comprise 90 percent of the known potential markets for UAS and is expected to be ten times the size of the public-safety (law enforcement and emergency response) market.[5]

In addition to commercial business operations, many hobbyist UAS operators can find a place for their recreational use of UAS within the Part 107 regulations. For example, a person could take photos or video footage of his or her home and garden with a UAS, as long as it is registered with the FAA. A three-year registration costs a recreational UAS operator only $5.

In addition to registration of hobby-use UAS, several safety guidelines must be followed that dovetail with Part 107, including restriction of operations to less than 400 feet above ground level, operating within VLOS, and avoiding flight near airports or other manned aircraft.

Safety Concerns

Possibilities for UAS application in both commercial and recreational spaces are promising given the clarity provided by the FAA rules and regulations; however, many concerns about the safety of UAS operations still permeate the landscape. Chief among these are invasion of privacy,

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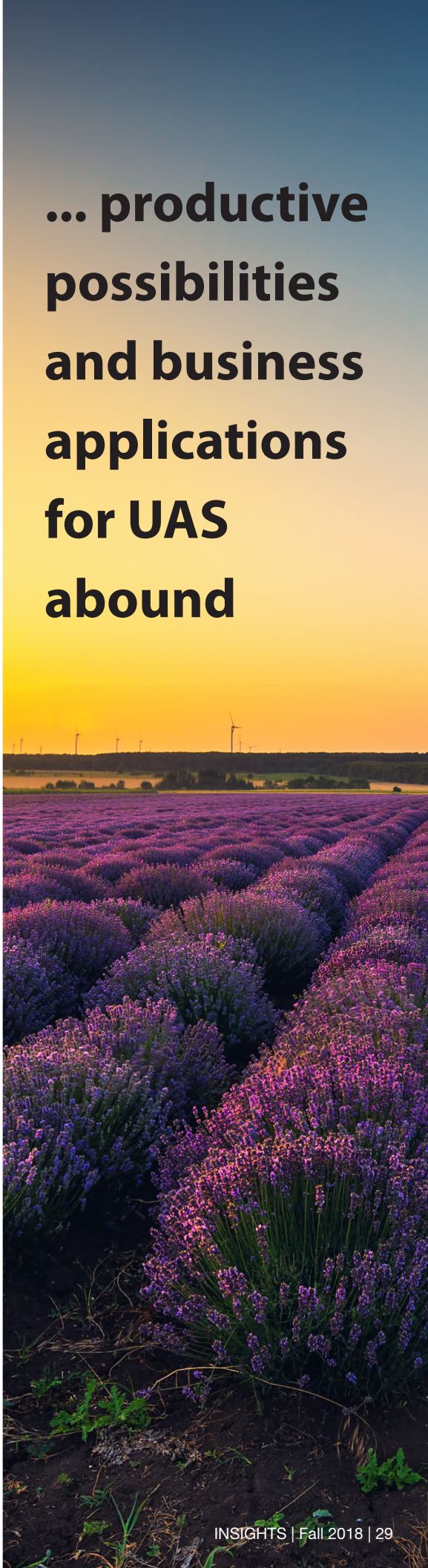

the possibility of collision with manned aircraft and subsequent disasters, and liability and property damage claims that could arise from the unsafe use of UAS. Many of these concerns are being addressed by the FAA, industry focus groups, and insurance companies.

The FAA has taken the first step by forming the Unmanned Aircraft Safety Team (UAST), which consists of various industry stakeholders who have volunteered to assist in improving safety for UAS operations in the National Airspace System (NAS). Similar to the Commercial Aviation Safety Team, which approaches manned aircraft operations in this way, the UAST will "utilize a data-driven, consensus-based approach to analyze safety data within the UAS industry and develop products and recommendations aimed at mitigating the causes of UAS accidents."[6]

The team is targeting areas of safety focus based on data provided by operators, thereby further underscoring the importance of complying with the Part 107 requirement to report accidents and incidents to the FAA.

Many stakeholders are concerned with the possibility of invasion of privacy. The Peeping Tom example is often cited, meaning that a person might use a UAS to watch others in their homes or yards without their permission, using video or photographs to capture people's private lives. In an attempt to address the concern of invasion of privacy, the U.S. Commerce Department's National Telecommunications and Information Administration has developed Voluntary *Best Practices for UAS Privacy, Transparency and Accountability,* which may be applied to commercial, noncommercial, and recreational UAS operators.

These best practices provide guidance for operators on how they might avoid violating the privacy of individuals and businesses with the data and images they may gather with their UAS. This guidance essentially advises operators to ensure that others are aware of their UAS use, use caution when operating UAS and gathering data, use discretion when sharing data, and secure the data gathered.[7]

The most immediate and significant concern of all is how UAS can safely operate within the NAS without causing major accidents with manned aircraft. It is estimated that the collision of a manned aircraft with a UAS could be enough to take out an engine on large airline equipment, while collision with a smaller craft, like a helicopter or turboprop aircraft, could prove even more disastrous.

The main focus of the industry has turned to adapting detect-and-avoid or sense-and-avoid technology for use by UAS, which will be especially crucial for operators who wish to operate beyond VLOS. This technology involves the transmission of data among other surrounding UAS and aircraft and subsequent implementation of evasive maneuvers to restore safety of flight in the event of a possible collision.

Many manned aircraft are equipped with this technology today, often in the form of traffic collision avoidance systems or Automatic Dependent Surveillance–Broadcast, which allow aircraft to "talk" to each other in the sky. Through these systems, aircraft emit information to other aircraft in the surrounding area so that each knows where traffic may be in the air.

Currently, detect-and-avoid technology is being tested and used with larger military-grade UAS by such manufacturers as General Atomics and NASA. The challenge facing smaller commercial and recreational UAS manufacturers is the size and weight that these systems add to a UAS, not to mention the power required to operate them.[8] However, once effective and efficient technology of this kind is developed for UAS, the ultimate goal, similar to the NextGen efforts in the manned aircraft industry, would be to establish a UAS traffic management system through which UAS may operate autonomously in NAS.[9] Although seemingly far off, this kind of coordination and safety improvement appears promising.

Insurance Solutions

The potential for liability and property damage claims resulting from the operation of UAS has taken the insurance industry by storm in the form of an explosion of demand for coverage solutions for these exposures. Many claims could result from UAS operations; for example, a UAS that is surveilling crop growth patterns might be attacked by a hawk and damaged beyond repair. A UAS filming a live sporting event could lose the communication link or power and come crashing down on the heads of fans, injuring many.

The initial struggles for the insurance industry focused on where coverage should be placed. The commercial general liability and property markets were the first resort for many, while others naturally looked to the aviation insurance market for an adequate product. Many insurers scrambled to come up with coverage forms.

The Insurance Services Office, Inc. (ISO) regulates and standardizes insurance coverage forms and policy language for many lines of business. ISO initially responded to questions regarding UAS coverage under its policy forms by clarifying coverage with additional exclusions and optional coverage endorsements to address the various exposures that UAS introduced to the insurance world. ISO later developed more comprehensive endorsements to add limited liability coverage to its commercial general liability, businessowners, and homeowners policy forms, as well as first-party property coverage for UAS themselves to its commercial property and commercial inland marine policy forms.[10]

The aviation insurance market also responded quickly, with a number of insurers adapting their combined aircraft

physical damage and liability forms to meet the needs of UAS operators. These policy forms enable UAS operators to place both their liability and first-party property damage coverage with one insurer on one policy form. Many offer personal injury coverage as an add-on to cover privacy-violation issues. Additionally, it can be assumed that claims resulting from UAS operations would likely resemble claims resulting from aircraft accidents, albeit on a smaller scale—so aviation claims adjusters would experience a natural transition to handling these types of claims.

Stand-alone coverage is also available for recreational and hobby operators through the Academy of Model Aeronautics (AMA). The AMA offers a $75 membership program through which members are provided with $2.5 million of personal liability coverage for their recreational use of UAS. Members must comply with the AMA National Model Aircraft Safety Code, as well as with FAA requirements for hobby users.

Additionally, providers such as Verifly offer basic insurance coverage by the hour via an app. Coverage under this program is very limited in comparison to standard aviation insurance market offerings and includes liability limits up to $2.5 million, with a number of strict exclusions in place to comply with Part 107.

Outlook

The biggest difficulty for all interest groups when dealing with the UAS industry is the speed with which it is growing and developing. It remains to be seen whether the FAA will adapt to the demands of commercial businesses such as Amazon and allow them to transport goods for hire via UAS. A number of technological and safety concerns have yet to be addressed before such a possibility can become a reality.

The creation and implementation of effective sense-and-avoid technology will become a very important, and possibly legally required, feature for mass-produced UAS. Once this technology becomes standard, it will necessitate a coordinated air traffic management system for UAS that can also communicate well with manned aircraft traffic and collision avoidance systems. With these progressive technological developments in the works, the FAA will need to anticipate these changes and be nimble enough to keep pace with swift developments in the UAS market.

One new development on which the FAA is currently working is the Low Altitude Authorization and Notification Capability system, which will allow almost instant approval for UAS operators to fly in controlled airspace below approved altitudes near airports. The FAA is accepting applications for Approved UAS Service Suppliers, who will essentially act as gatekeepers for UAS operating near airports by accepting digital requests from UAS pilots to fly near airports; reviewing data streams, including temporary flight restrictions, airspace data, and Notices to Airmen; and recommending the operations for approval to the local air-traffic control towers. This approval process, which currently involves nineteen manual steps and can take days to complete, should be reduced to minutes under this new system.

The remaining hurdle for many insurance companies, aside from developing relevant coverage and policy language, is how to price UAS coverage accurately to ensure adequate capacity to pay claims. Unlike with the automobile or homeowners insurance markets, there is very little loss experience data on which to base any actuarial pricing models.

Because it is such a new industry, there is almost no historical data to provide insight into loss and development trends. Losses have the potential to be costly—for instance, in the event of a UAS collision with a manned aircraft—but without any such event having occurred to date, there is no way to predict the frequency or severity of such a loss. As a result, many insurers

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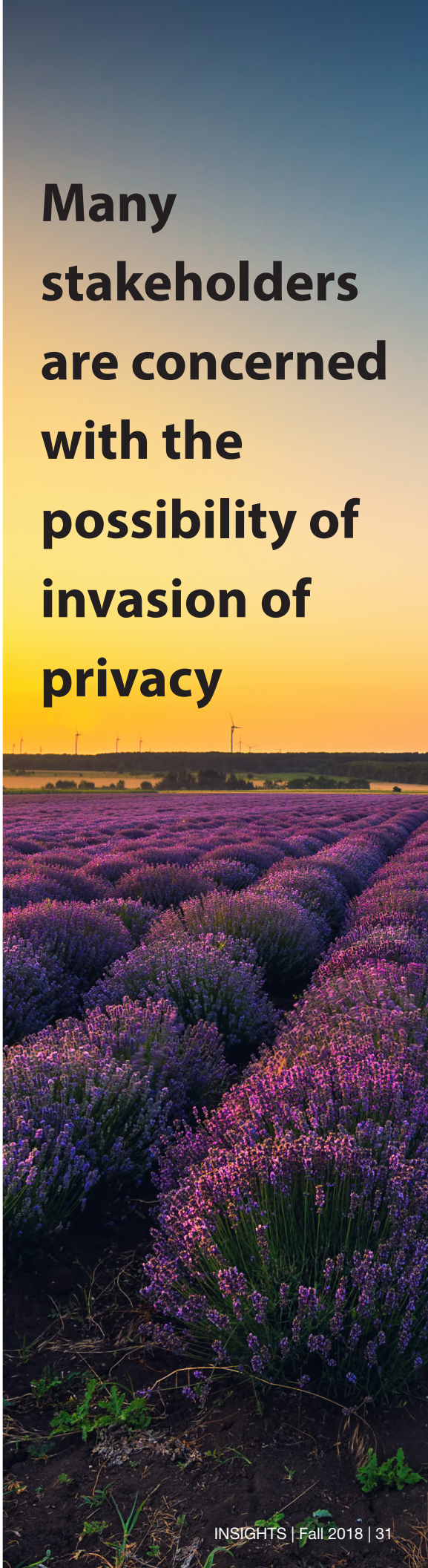

are attempting to limit their exposures by offering lower limits of liability or refusing to write certain lines of coverage, such as first-party physical damage or personal injury liability. However, as the market for coverage becomes increasingly competitive and there is premium to be earned with few losses to speak of, these parameters may be loosened, and broader coverage may become available as operators continue to proliferate.

Successful integration of UAS into our infrastructure will primarily depend on the ability of regulatory bodies to adequately address safety concerns and regulate violations of the FARs. Special-interest groups will need to keep developing guidance for safe operation of UAS in NAS and recreational environments. The UAS industry will continue to be one to watch because of its significant impact on our economy, our airspace, and the technology and insurance industries. ■

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