NCSL Partnership Project on Unmanned Aircraft Systems

From 2014 through 2016, NCSL brought together state legislators, legislative staff and private industry representatives to discuss unmanned aircraft systems (UAS). The group worked to discuss and develop policy issues and options related to the use of UAS for agriculture, insurance, natural resource management, law enforcement and a variety of other purposes, with consideration for privacy, safety, business and economic interests and concerns. This white paper represents the outcome of those discussions and provides a comprehensive look at state legislative action addressing UAS.

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Over the last few years, unmanned aircraft systems ("UAS" or drones) have exploded into the public’s awareness. Many individuals fly UAS for pleasure, and private business applications are almost limitless—from farmers improving crop yield by assessing conditions, to insurers using drones to conduct roof inspections, to delivery of packages to a consumer’s door. Federal, state and local governments use UAS to supplement or improve existing practices, such as assessing road conditions or conducting search and rescue missions. According to the Federal Aviation Administration (FAA), the number of registered UAS owners in the United States exceeded the number of registered manned aircraft by more than 5,000. The total number of registered UAS owners as of early February 2016 exceeded 325,000.

The FAA Aerospace Forecast for fiscal years 2016 to 2036 projected that sales of small UAS would increase from 2.5 million in 2016 to 7 million in 2020. A March 2013 report from the Association for Unmanned Vehicle Systems International (AUVSI) projects that by 2025 more than 100,000 jobs will be created with an economic impact of $82 billion. An October 2015 article projected that the U.S. commercial drone sector would “generate $2.3 billion in investments [in 2016]. By 2025, its economic impact is set to almost double, forecast to surpass $5 billion.” While the precise scale of the economic impact of UAS is not certain, it is likely to be significant.

As a result of the increased availability and popularity of UAS with commercial users and the public, a number of states have taken action to address what has been viewed as both an exciting new technology with great promise and a technology of which many are wary. At time of publication, 31 states had enacted laws addressing UAS issues, and an additional five states had adopted resolutions. Every state but South Dakota considered legislation between 2013 and 2016.

This report begins with a brief definition of UAS. Federal actions related to UAS then are highlighted, followed by comprehensive details on the wide range of related topics
that state legislatures have explored, including preemption, privacy implications, hobbyists, insurance, commercial and governmental uses, criminal penalties for misuse, uses related to hunting and fishing, security concerns, and studies and task forces. This report focuses primarily on enacted state legislation, although it should be noted that a number of state agencies and localities have adopted regulations and developed ordinances regarding UAS. Furthermore, some state laws and legislative action may be “technology-neutral,” meaning that, although they do not specifically mention UAS operation, existing laws, such as those related to hunting or privacy, may still apply to certain UAS operations. These technology-neutral laws are not addressed in this report.

**Defining UAS**

Unmanned aircraft systems are known by a number of names—including UAS, drones, unmanned aerial vehicles, UAVs, remotely piloted vehicles—that often are used interchangeably. Tennessee legislation defines a drone as “a high powered, aerial vehicle that: (A) Does not carry a human operator and is operated without the possibility of direct human intervention from within or on the aircraft; (B) Uses aerodynamic forces to provide vehicle lift; (C) Can fly autonomously or be piloted remotely; (D) Can be expendable or recoverable.” While the terms “unmanned aerial vehicle” and “drone” generally refer to the aircraft itself, “unmanned aircraft system” refers to the aircraft and all included components. Most state laws that define UAS include some or all of these elements.

The general public initially became aware of drones in regard to their use by the military. The use of unmanned aircraft by the military has roots as far back as World War I.

Small UAS (sUAS)—those that weigh less than 55 pounds—are the primary focus of this report. Within sUAS, even further distinctions exist, such as micro UAS—those weighing less than 4.4 pounds—and UAS that weigh less than .55 pounds, the last of which are not subject to registration requirements. State legislative action has focused on these small UAS because they are more readily available for use by the general public. Larger drones are primarily used for military purposes by the federal government. For that reason, this report focuses on sUAS.
Because the U.S. National Airspace System (NAS) is regulated by the Federal Aviation Administration, the FAA has the primary authority to regulate UAS and their operation in the national airspace. The definition of the national airspace has evolved over time through court rulings and federal legislation, but the FAA’s authority over the NAS has remained. The FAA released the Small Unmanned Aircraft Rule (Part 107) on June 21, 2016. The rule is not detailed in this report, but a summary is available on the FAA webpage, as is the full rule. The rule applies to non-hobbyist small UAS weighing less than 55 pounds. The FAA also provides a fact sheet on Part 107. This rule supplants the proposed rulemaking and modifies the requirements for civil or non-governmental operations.

Proposed Rulemaking

In 2012, Congress passed the 2012 FAA Modernization and Reform Act (FMRA). Sections 331 to 336 of the legislation related to UAS and required integration of civil UAS into the NAS. The FAA released the “Integration of Civil Unmanned Aircraft Systems (UAS) in the National Airspace System (NAS) Roadmap” in November 2013.

The FAA was tasked with developing rules for this integration by Sept. 30, 2015. Although rules integrating UAS were not finalized by this date, the FAA issued a proposed rulemaking on Feb. 15, 2015, and is expected to finalize the rule later this year. The proposed rulemaking specifies requirements for non-recreational UAS operation, including:

- Must weigh less than 55 pounds.
- May operate only during standard daylight hours and within visual sight.
- Must fly no higher than 500 feet and go no faster than 100 mph.
- Must be operated by a person at least age 17 or older who has passed an FAA knowledge test.
- Must be registered, but does not require an airworthiness certification.

Test Sites

The FMRA also required establishment of six test sites, which were awarded to Alaska, Nevada, New York, North Dakota, Texas and Virginia after a 10-month selection process.
process. To select the test sites, the FAA considered “geographic diversity, climatic diversity, location of ground infrastructure, research needs, airspace use, safety, aviation experience, risk and economic impact.” Some of the test sites include test ranges located in other states that support the work of the designated test site. The FAA provided a fact sheet with information on the test sites. Congress did not appropriate federal funds for the test sites, so the site operators are responsible for providing funding for their work. At least four states—including some with test sites and some with test ranges—enacted legislation to support the work at the test sites.

- The North Dakota Department of Commerce was the first approved test site, the Northern Plains UAS Test Site. According to the fact sheet, “North Dakota plans to develop UAS airworthiness essential data and validate high reliability link technology…and will also conduct human factors research.” “The main goal of this site’s initial operations is to show that UAS can check soil quality and the status of crops in support of North Dakota State University/Extension Service precision agriculture research studies.” The state appropriated $1 million for costs related to the pursuit of designation as a test site and $4 million for test site operation.

- The University of Alaska was the second approved test site—the Pan-Pacific UAS Test Range Complex—with test ranges in Hawaii, Oregon, Kansas and Tennessee. According to the fact sheet, “the research plan includes the development of a set of standards for unmanned aircraft categories, state monitoring and navigation. Alaska also plans to work on safety standards for UAS operations.” The site also works “to show how a UAS can accurately locate, identify, and count large wild animals, such as caribou, reindeer, musk ox and bear for survey operations requested by the state of Alaska.” Hawaii established a test site advisory board and chief operating officer to further the site’s work.

- The state of Nevada was the third approved test site. “Nevada’s research will concentrate on UAS standards and operations, as well as operator standards and certification requirements. The site’s activities also will include a concentrated look at how air traffic control procedures will evolve with the introduction of UAS into the civil environment and how these aircraft will integrate with NextGen, the modernization of the national airspace system.” Nevada appropriated $4 million to support work related to the test site.

- Texas A&M University–Corpus Christi was the fourth approved test site, which is within the Lone Star UAS Center of Excellence & Innovation. “The site’s specific UAS projects include preservation and restoration of the ocean and ocean wetlands along the Padre Island National Seashore; research in advance of approaching tropical depressions; support to law enforcement in the Padre Island National Seashore; and providing metrics and lessons learned from these flights to the FAA.” According to the fact sheet, “Texas A&M plans to develop system safety requirements for UAS vehicles and operations with a goal of protocols and procedures for airworthiness testing.”

- New York’s Griffiss International Airport was the fifth approved test site, with test ranges in Massachusetts and Michigan. The focus of the site, which is managed by the NUAIR Alliance, includes “detection of insects, weeds, diseases, crop characteristics, crop biomass and background soil characteristics in two farm fields…[as well as] developing test and evaluation processes under FAA safety oversight, and conducting research on sense and avoid capabilities to prevent collisions with other manned and unmanned aircraft.”

- Virginia Polytechnic Institute and State University (Virginia Tech) was the sixth and final approved test site, with test ranges in Maryland and New Jersey. This is the Mid-Atlantic Aviation Partnership. “Research in the three states will eventually include agricultural spray equipment testing, development of aeronautical procedures for integration of UAS flights in a towered airspace and developing training and operational procedures for aeronautical surveys of agriculture.” According to the fact sheet, “Virginia Tech plans to conduct UAS failure mode testing and identify and evaluate operational and technical risks areas.” Maryland appropriated $500,000 for test site operation.

### Categories of Operation

The FAA divides UAS operation into three categories. The first, public operations or governmental operations, requires the operator to obtain a public Certificate of Waiver or Authorization (COA). The COA allows “public agen-
cies and organizations to operate a particular aircraft, for a particular purpose, in a particular area.”

The second category of operation is civil or non-governmental operations. FAA approval for civil operations is gained primarily by obtaining a Section 333 exemption, named for the relevant section of the FMRA, and a civil COA. As of June 8, 2016, 5,309 petitions for Section 333 exemptions have been granted. These exemptions allow for performance “of commercial operations prior to the finalization of the Small UAS Rule, which will be the primary method for authorizing small UAS operations once it is complete.” UAS operators with a Section 333 exemption also must register their aircraft with the FAA and must have a pilot with an FAA airman certificate. The FAA has issued “a ‘blanket’ COA for flights at or below 400 feet to all UAS operators with a Section 333 exemption.” This allows any operator with a 333 exemption to operate without seeking a new COA so long as they meet the operating conditions and limitations.

The third category is model aircraft operation, which includes hobby and recreational use. Although no specific rules or regulations are set for hobby operation beyond the registration requirement discussed below, safety guidelines set by the FAA include flying below 400 feet, keeping the aircraft within visual line of sight, not interfering with manned aircraft operations, not flying within 5 miles of an airport, not flying near people or stadiums, not flying an aircraft weighing more than 55 pounds, and not operating in a careless or reckless manner. The Academy of Model Aeronautics safety code is generally expected to be observed by hobby operators.

It is important to note that the same operator with the same UAS can be both a hobbyist and a commercial operator, depending on how the UAS is being used. An operator who flies a UAS with an attached camera to capture views of a city skyline for personal enjoyment is a hobbyist, but if that operator takes those same images with the intent to sell them, he or she is operating commercially and is subject to commercial regulations.

On Feb. 24, 2016, the FAA announced the creation of an Aviation Rulemaking Committee to develop a separate set of recommendations for regulation of micro UAS—those that weigh less than 4.4 pounds and are constructed of materials “that break, distort, or yield on impact so as to present a minimal hazard to any person or object.” The committee delivered the final report to the FAA on April 1, 2016. The report identifies four small UAS categories and makes recommendations related to allowing flight over people, depending on the weight and potential for harm that would be caused if the UAS were to crash. The categories include various performance-based standards and operational restrictions. The FAA will take these recommendations under consideration, but they are not rules.

Registration

Registration of UAS owners has been addressed at the federal level. In October 2015, Department of Transportation Secretary Anthony Foxx and FAA Administrator Michael Huerta established a UAS Registration Task Force. This task force brought together a wide range of stakeholders to develop a national registration system. The task force recommendations were released on Nov. 23, 2015.

The task force recommended “a free, owner-based registration system with a single registration number for each registrant.” The task force determined that registration should be required for sUAS over 250 grams (.55 pounds) and that contact information, including name and street address, should be collected from all registrants. While some members of the task force felt that point-of-sale registration may achieve maximum compliance, the majority concluded that the FAA did not have the authority to require registration at the point-of-sale. The task force also recommended establishing a “reasonable and proportional penalty schedule that is distinct from those relating to traditional manned aviation.”

On Dec. 14, 2015, the FAA unveiled an interim final rule for drone registration, incorporating some of the task force suggestions. The interim final rule required consumers who own drones weighing between .55 lbs. and 55 lbs. to register by Feb. 19, 2016. Drones purchased after Dec. 21, 2015, must be registered before their first outdoor flight. According to the FAA, “[b]ecause Federal registration is the exclusive means for registering UAS for purposes of operating an aircraft in navigable airspace, no state or local government may impose an addition registration requirement . . . without first obtaining FAA approval.”

Owners can register online at the registration website. Each registered UAS owner can operate as many UAS as they like, but each aircraft must visibly display the owner’s contact information and unique registration number.
The registration, valid for three years, costs $5 per individual owner. The FAA waived the registration fee for the first 30 days of the program to encourage early registration. Under the interim final rule, the FAA can impose a civil penalty of up to $27,500 or criminal penalties of up to $250,000 and three years in prison for noncompliance.

More than 45,000 drone owners completed registration in the first two days following implementation of registration requirements. After the first 30 days, nearly 300,000 drone owners had registered. As of February 5, more than 325,000 drone owners had registered with the FAA, surpassing the number of registered piloted aircraft in the United States. According to the FAA, the number of registered drone owners is now over 460,000. Time magazine created a map illustrating the number of registered UAS operators in the United States, using information released by the FAA in late May 2016.

At least one lawsuit has been filed over the registration requirement. A drone hobbyist and attorney in Silver Spring, Md., alleges that the rule violates Section 336 of the FMRA, which specifies that “…the Administrator of the Federal Aviation Administration may not promulgate any rule or regulation regarding a model aircraft, if—(1) the aircraft is flown strictly for hobby or recreational use…”

Enforcement

The FAA has published guidance for law enforcement agencies for suspected unauthorized UAS operations. The FAA is responsible for enforcing Federal Aviation Regulations but recognizes that state and local law enforcement “are often in the best position to deter, detect, immediately investigate, and, as appropriate, pursue enforcement actions to stop unauthorized or unsafe UAS operations.” The document provides information on safety requirements with which UAS must comply, model aircraft operations, careless or reckless operation, non-hobby or non-recreational operations, airspace security requirements and registration requirements. The document then details the role of law enforcement, specifying actions that should be taken to enforce regulations, including witness identification and interviews; identification of operators; viewing and recording the location of the event; identifying sensitive locations, events or activities; notification to the FAA; and evidence collection.

Public Education

To promote responsible UAS operation, the FAA partnered with industry associations in the Know Before You Fly campaign. Currently, Alaska appears to be the only state listed as a supporter of this campaign. The campaign includes information for recreational users, business users and public entities, and also provides information about UAS registration. B4UFLY, a smartphone application created by the FAA, “helps unmanned aircraft operators determine whether there are any restrictions or requirements in effect at the location where they want to fly.”

Similarly, the FAA sometimes creates temporary flight restrictions that limit where UAS and other aircraft can be operated. During Super Bowl 50, the FAA issued a restriction on aircraft operation in a 32-mile radius around the stadium in Santa Clara, Calif. The FAA educated the public on the restriction through various means, including social media. Four violations of the flight restrictions were reported, but none of the aircraft in violation were drones.
Other Federal Efforts

In May 2016, FAA Administrator Michael Huerta announced the development of a “broad-based ‘drone advisory committee’ to advise the FAA on key UAS integration issues.” The committee, chaired by Intel CEO Brian Krzanich, will help the FAA prioritize its work on UAS.

The federal government is also working on a number of other projects related to integration of UAS in the NAS. On Feb. 18, 2016, the FAA announced a partnership with the Department of Homeland Security and CACI International “to explore how the company’s prototype detection technology may help detect UAS in the vicinity of airports.” The FAA referenced the fact that it receives more than 100 reports each month from pilots and others about UAS flying close to an airport or airplane. “The main goal of the partnership is to safely explore procedures and processes for deploying and operating detection technologies in and around commercial airports.”

The National Aeronautics and Space Administration (NASA) is working to develop a traffic management system for UAS (UAS Traffic Management or UTM). The project would “enable safe and efficient low-altitude airspace operations by providing services such as airspace design, corridors, dynamic geo-fencing, severe weather and wind avoidance, congestion management, terrain avoidance, route planning and re-routing, separation management, sequencing and spacing, and contingency management.” NASA is working with several partners, including Amazon and Google, as well as other federal entities. The UTM successfully allowed 22 drones to fly simultaneously at the FAA test sites in April 2016.
Countries around the world have taken action to address the use of sUAS within their borders. Concerns have been expressed that overregulation of the UAS industry in the United States could lead companies to take UAS-related work abroad. Some examples follow of approaches taken by several other countries.

**Canada**
Canada regulates UAS use within its borders through Transport Canada, the department responsible for regulating transportation, similar to the U.S. Department of Transportation. If the UAS is being operated for personal hobby use and weighs less than 35 kilograms (approximately 77 pounds), the operator need not obtain permission to fly it. Any user of a UAS that weighs more than 35 kg must apply for a Special Flight Operations Certificate from Transport Canada. In addition, any UAS being used for work or research that weighs more than 25 kg (approximately 55 pounds) must apply for the certificate. This also applies to any UAS that weighs less than 25 kg if the operator cannot meet certain exemption conditions. The government agency provides a diagram to help individuals determine whether they need permission to operate their UAS in Canada.

In 2016, Transport Canada plans to introduce regulatory requirements for UAS that weigh less than 25 kg and are operated within visual line of sight. The regulations will likely include aircraft marking and registration requirements, personnel licensing and training requirements, and flight rules.

**European Union**
Rules related to UAS vary across the European Union, according to the European Aviation Safety Agency. A formal Technical Opinion on the operation of UAS was released in December 2015, and rules are expected to be developed and amended based on the contents of the opinion in the next two years. The opinion includes 27 proposals for a regulatory framework. Among the proposals are establishing categories for the operation of UAS, “taking into account the nature and risk of the particular activity;” requiring manufacturers and importers to provide information to customers on operational limitations; and limiting where UAS can be operated, with no-fly zones over areas such as city centers, parks and airports.

France regulates UAS operation by hobbyists, prohibiting UAS operation over people, operation higher than 150 meters (approximately 492 feet), and operation out of line of sight. Notably, France does allow commercial UAS to be operated beyond visual line of sight. Ireland requires drone registration and limits where UAS can be operated. Italy also has UAS regulations.

**Other Countries**
Russia enacted a law requiring individuals who own UAS that weigh more than 250 grams (approximately 0.55 pounds) to register the aircraft with the Federal Air Transport Agency. In addition, UAS operators must have a team—the pilot and an observer—responsible for flight safety and must develop and submit flight plans to the regional body responsible for air traffic control.

In China, the Civil Aviation Administration issued regulations for UAS that weigh less than 116 kg (approximately 255 pounds) that were effective at the end of 2015, according to the law firm Hogan Lovells. These rules create categories of UAS based on weight and use. A “real-time supervision system” is included, which seems to function similarly to geo-fencing. The regulations also require insurance coverage and specific rules for flight.

A number of other countries, including Australia and Mexico, also regulate UAS operation within their borders. Many similarities—such as registration and line of sight requirements—exist between UAS regulation in other countries and the United States.
Although regulation of the airspace falls within the jurisdiction of the FAA, several states have acted to address various concerns related to UAS operation within their borders. In 2013, 43 states considered bills and resolutions, 13 states enacted 16 bills and 11 states adopted resolutions. In 2014, 35 states considered legislation, 10 states enacted 11 bills and three adopted resolutions. In 2015, 45 states considered 153 bills and resolutions, 17 states enacted 23 bills and four adopted resolutions. These bills and resolutions addressed a wide range of issues, from privacy and criminal penalties for misuse to commercial and governmental uses.

For updates on state UAS legislation, visit NCSL’s Current Unmanned Aircraft State Law Landscape webpage.

Preemption

Before exploring the specific topics states have legislated, it is important to consider the issue of preemption. If a state or local law directly conflicts with federal laws or regulations, the state or local law is likely to be invalidated. Because the FAA is the designated authority to regulate U.S. airspace, any state or local law that conflicts with FAA regulations or attempts to regulate in an area that is within the purview of the FAA may be preempted. Recognizing that states and localities were increasingly acting on UAS regulation, the FAA released a fact sheet on Dec. 17, 2015, to provide guidance to state and local governments.

Examples of laws for which consultation with the FAA is recommended:

- “Operational UAS restrictions on flight altitude, flight paths; operational bans; any regulation of the navigable airspace. For example – a city ordinance banning anyone from operating UAS within the city limits, within the airspace of the city, or within certain distances of landmarks.”
- “Mandating equipment or training for UAS related to aviation safety such as geo-fencing would likely be preempted. Courts have found that state regulation pertaining to mandatory training and equipment requirements related to aviation safety is not consistent with the federal regulatory framework.”

Examples of laws within state and local government police power:

- “Laws traditionally related to state and local police power – including land use, zoning, privacy, trespass, and law enforcement operations – generally are not subject to federal regulation.”
- Requirement for police to obtain a warrant prior to using a UAS for surveillance.
- Specifying that UAS may not be used for voyeurism.
- Prohibitions on using UAS for hunting or fishing, or to interfere with or harass someone who is hunting or fishing.
- Prohibitions on attaching firearms or similar weapons to UAS.
In addition to FAA guidance, the Senate approved the Federal Aviation Administration Reauthorization Act of 2016 (HR 636) in April 2016, and the legislation has been sent to the House. Included in the bill was section 2152, which would prevent states from enacting or enforcing any “law, regulation, or other provision having the force and effect of law relating to the design, manufacture, testing, licensing, registration, certification, operation, or maintenance of an unmanned aircraft system, including airspace, altitude, flight paths, equipment or technology requirements, purpose of operations, and pilot, operator, and observer qualifications, training, and certification.” Such a provision, if included in the final version and signed into law, likely would preempt the vast majority of existing state laws specific to UAS and prevent any future action at the state or local level. However, given substantial differences between the current Senate version and House version, which does not include similar language, it remains unclear whether the FAA Reauthorization Act of 2016 will become law.

Many organizations within the UAS industry are concerned about the emergence of a regulatory patchwork with a variety of state and local laws, making it difficult for the industry to continue to develop. For this reason, many industry stakeholders support preemption.

Federal preemption is not the only significant preemption question to be considered. Some localities have taken action to limit and regulate UAS operation within their boundaries, and the question remains whether state action will preempt these local policies. In Florida, Miami-Dade County adopted a county ordinance that prohibits operation of UAS within 1 mile of any Miami-Dade County airport and requires anyone operating within 5 miles of an airport to contact the airport or FAA control tower prior to operation. In November 2015, Chicago’s city council adopted an ordinance regulating where drones can be flown. It prohibits operation of UAS over schools, hospitals, places of worship, prisons and police stations.

To address the state preemption question, Oregon’s 2013 legislation specifies that only the state legislature can regulate ownership and operation of UAS and that local governments cannot enact an ordinance or resolution on the topic. Similarly, Maryland took action in the 2015 legislative session, passing legislation that specifies only the state can enact laws to prohibit, restrict or regulate testing or operation of UAS. The legislation preempts county and municipal authority to take action in this area. Virginia’s 2016 legislation, House Bill 412, prohibits localities from regulating the use of UAS. Arizona also passed legislation in 2016, Senate Bill 1449, prohibiting cities, towns and counties from regulating the ownership or operation of UAS unless the UAS is owned by the locality.

Privacy

One of the most significant areas of UAS legislation across the country has been related to privacy implications. The mission of the FAA is “to provide the safest, most efficient aerospace system in the world.” This mission does not include regulating privacy-related issues. As a result, some states have considered legislation dealing with privacy and UAS. There have also been federal efforts to address privacy that are discussed later in this section.

Since 2013, 22 states (Alaska, Arkansas, California, Florida, Idaho, Illinois, Indiana, Iowa, Kansas, Maine, Mississippi, Montana, Nevada, North Carolina, North Dakota, Oregon, Tennessee, Texas, Utah, Vermont, Virginia and Wisconsin) have passed legislation that falls within the broad category of privacy. This includes legislation related to warrant requirements for UAS use by law enforcement agencies and protection from privacy violations committed by non-government operators, including peeping toms.

Warrant Requirements

One of the first UAS uses that captured the attention of legislatures was the use of UAS by law enforcement agencies for surveillance. 18 states—Alaska, Florida, Idaho, Illinois, Indiana, Iowa, Maine, Montana, Nevada, North Carolina, North Dakota, Oregon, Tennessee, Texas, Utah, Vermont, Virginia and Wisconsin—have passed legislation requiring law enforcement agencies to obtain a search warrant to use UAS for surveillance or to conduct a search. As is the case generally with search warrants, certain exceptions to the warrant requirement are included in the legislation, such as when exigent circumstances justify a search without a warrant. These exigent circumstances may include preventing the imminent destruction of evidence, pursuit of a fleeing suspect or protecting an individual from imminent danger, among others. The laws also specify several other governmental uses that do not require possession of a search warrant prior to operation. These are discussed in the governmental uses section of this report.
Protection from Non-Government Operators

In addition to concerns regarding Fourth Amendment violations by law enforcement agencies, states have also addressed the potential for privacy violations committed by non-government operators. At least 12 states—Arkansas, California, Florida, Idaho, Kansas, Mississippi, Nevada, North Carolina, Oregon, Tennessee, Texas and Wisconsin—have passed legislation providing privacy protections from other citizens that are specific to drones. Some states have indicated they believe current privacy laws that do not specifically address the use of UAS but, rather, provide general privacy protections, can provide the same protections in regard to UAS use.

Arkansas passed a law to include the use of unmanned aircraft for certain purposes within the offenses of video voyeurism and voyeurism. Mississippi enacted a law prohibiting “peeping tom” activities committed with the use of a drone. Violators are guilty of a felony and may be sentenced to up to five years in prison.

California’s legislation made individuals who knowingly enter the airspace above the land of another person without permission in order to take pictures or videos liable for physical invasion of privacy. The legislation was intended largely to protect against the use of UAS by paparazzi.

Florida’s bill prohibits using a drone with a camera to take photos of private property or a person on private property when the person has a reasonable expectation of privacy. The law allows the aggrieved individual to bring a civil action. Idaho’s law is similar to Florida’s, although it requires that the image is being collected for publishing or public distribution. The Idaho law specifically exempts use for mapping and resource management.

Kansas enacted a law expanding the definition of harassment in the state’s Protection from Stalking Act to include certain uses of drones near a home, vehicle or other place where a person has a reasonable expectation of privacy.

In Nevada, following passage of legislation in 2015, a property owner may sue for trespass against a UAS operator who flies at a height of less than 250 feet over the property if the operator has flown over the property before and the property owner has notified the operator that the flight is not authorized. Oregon’s 2013 legislation allows a civil suit under similar conditions, although the height requirement is less than 400 feet.

North Carolina law prohibits anyone from using UAS to conduct surveillance of a person, a person’s occupied dwelling or real property without consent. It also prohibits using UAS to photograph a person with intent to publish or distribute the photo. The law specifies that this prohibition does not apply to “newsgathering, newsworthy events, or events or places to which the general public is invited.” The law allows for a civil suit against the UAS operator.

Texas legislation passed in 2013 and a Tennessee bill passed in 2014 prohibit the use of UAS to capture an image of a person or privately owned property with the intent to conduct surveillance, making it a class C misdemeanor. Wisconsin’s 2014 legislation makes it a criminal offense to “photograph, record, or otherwise observe another individual in a place where the individual has a reasonable expectation of privacy.” A person who commits the offense is guilty of a class A misdemeanor.

Federal Work Related to Privacy

The U.S. Congress has considered legislation related to privacy. SB 1595, and the related HB 3962, would prohibit the use of “mobile aerial-view devices,” including UAS, to
surveil property, persons or their effects…” The bills include exceptions for exigent circumstances and warrants.

Although the FAA is not responsible for regulating privacy, the federal government has not stepped completely away from the topic. The National Telecommunications and Information Administration (NTIA), a division of the Department of Commerce, convened a multi-stakeholder process “concerning privacy, transparency, and accountability issues regarding commercial and private use of unmanned aircraft systems.” The process was convened by President Barack Obama in a Presidential Memorandum. The group has met several times and heard presentations from various stakeholder groups involved, including MAPPS, the National Association of Realtors, the Center for Democracy and Technology, the National Association of Mutual Insurance Companies and others.

The NTIA process resulted in “Voluntary Best Practices for UAS Privacy, Transparency, and Accountability.” Recommendations include informing others of the use of UAS, showing care when operating UAS or collecting and storing “covered data”—generally images of people—limiting the use and sharing of covered data, and securing covered data. The document specifies that it does not apply to the news media because they are “strongly protected by the United States law, including the First Amendment to the Constitution.” The appendix to the document also provides “Guidelines for Neighborly Drone Use,” providing similar suggestions to those in the best practices, but in plain language.

It is important to note that, to date, 21 groups involved in the stakeholder process have signed off on supporting the document, while another 16 groups have expressed concerns and have decided not to sign off on the Best Practices. One of the main concerns expressed deals with creation of heightened requirements for UAS when they are gathering information that already can be gathered through existing technologies.

In addition, the Department of Homeland Security released “Best Practices for Protecting Privacy, Civil Rights & Civil Liberties in Unmanned Aircraft Systems Programs.” These best practices, developed in relation to DHS's work with UAS in border security, are aimed at the use of UAS by various levels of government. Identified best practices include clearly stating the purpose of the program; staying focused on that purpose; designating “an individual responsible for privacy, civil rights and civil liberties compliance;” conducting a privacy impact assessment; and limiting the collection, use, dissemination and retention of data obtained from the program. The report identifies a total of 15 best practices.

**Hobbyists**

Hobbyists are those who operate UAS for recreational purposes, rather than for commercial or governmental purposes. Very few regulations are in place regarding operation of UAS by hobbyists. As mentioned earlier, the FAA has set safety guidelines that operators are encouraged to follow, and all UAS operators must register with the FAA.

Best Buy and the Academy of Model Aeronautics (AMA) have partnered to provide in-store information to educate hobbyists about the importance of safely operating their UAS. During the holiday season, Best Buy locations displayed brochures and included regulation and safety information on receipts for drone purchases. The AMA has developed community-based safety guidelines for all model aircraft operators, and those who operate UAS for recreational purposes are encouraged to follow these guidelines.

For the most part, states have not enacted legislation to specifically regulate hobbyist operation of UAS. Legislation has focused on specific uses, such as commercial and governmental use. The most explicit example of a state law governing recreational UAS operation is North Carolina’s 2014 legislation, which specified that UAS could not be launched or recovered from any state or private property without consent of the owner. Other laws dealing with criminal penalties for misuse of UAS also regulate the behavior of hobbyist operators. Legislation limiting UAS operation in general may also affect recreational use without specifically addressing hobbyist operations.

Alaska has a website focused on promoting public education related to UAS. The resource, provided by Alaska’s Unmanned Aircraft Systems Legislative Task Force, includes information about safety and privacy guidelines. The task force also focused on public education during the holiday season, holding press conferences, making appearances on public television and distributing materials to retail stores. The task force plans to publish and distribute Alaska Drone Operator Safety and Privacy Guidelines for schools and libraries.
While most regulations have focused on commercial and governmental operators, states will likely continue to consider whether further regulation of hobbyists may be necessary.

Insurance

The insurance industry continues to evaluate coverage issues related to commercial and recreational UAS use. From a commercial insurance standpoint, the standard commercial general liability policy covers bodily injury and property damage, but typically excludes losses caused by use of an aircraft. The standard commercial first party property coverage also includes certain aircraft exclusions, which may include UAS. To address these issues, some insurers have adopted the use of commercial UAS coverage forms designed by Insurance Services Office Inc. (ISO). This form looks to the commercial entity’s FAA authorization as determining the appropriate conditions for how the UAS should be operated by the insured.

From a personal liability and property insurance perspective, the typical homeowner’s policy also excludes coverage for aircraft. However, personal homeowner’s policies usually have an exception for “model or hobby aircraft not used or designed to carry people or cargo.” Accordingly, insurers will likely look to whether regulations designate a personal UAS as a non-model or hobby aircraft and whether a UAS with a camera can be considered to be carrying “cargo.”

The commercial and personal insurance options will likely continue to be developed as rules and regulations related to UAS evolve. A current benefit of the membership in the Academy of Model Aeronautics is $2.5 million in comprehensive general liability protection for model activities, which includes UAS operation.

Insurance requirements for UAS operators are an emerging legislative issue. While no states currently require operators to carry specific insurance for their drones, a few states have considered such legislation. Florida considered but did not pass legislation in 2015[40] that would have required a report including information on the appropriate amount of liability insurance that should be carried by UAS operators. New Jersey debated legislation in 2015[41] that ultimately failed but would have required registration and insurance for certain drones. In 2016, a few states—including California,[42] Hawaii[43] and New Hampshire[44]—
have considered legislation to require insurance. Federal legislation also is pending that would require liability insurance for commercial UAS operators.

From an insurer’s perspective, setting mandatory UAS coverage is difficult at this point as the industry continues to collect data to develop adequate insurance rates to cover the use of the technology. At this time, there is relatively little data on the frequency, type and severity of claims for UAS-related damage. One fundamental principle of underwriting and rating insurance is to be able to adequately match price to risk. As UAS rules and regulations continue to develop, so will the market for UAS insurance.

**Commercial Use**

A huge number of potential commercial applications exist for UAS, and possibilities are constantly developing. The Center for the Study of the Drone at Bard College conducted an analysis of exemptions granted in 2014 and 2015. The analysis found that “[t]he most common intended drone operation categories are Photo/Film and Real Estate.” In addition, “Emergency Services is the only category to have seen sustained and consistent growth in popularity over the period.”

The NTIA Working Group on UAS created a document cataloging the positive societal benefits of UAS. AUVSI conducted an analysis of commercial UAS exemptions, finding that more than 90 percent of all entities receiving exemptions are small businesses. The analysis of the first 3,136 exemptions found that 2,557 made reference to general aerial photography, 1,969 were for real estate and 1,496 made reference to construction.

A sampling of the many potential commercial applications includes the following:

- **Applications in agriculture.** Drones can be used to monitor crops and keep track of livestock over large swaths of land, a task that would otherwise require substantial time and effort.
- **Product delivery.** Amazon Prime Air and Google’s Project Wing are two services that have expressed interest in using UAS for product delivery.
- **Medical uses.** Various uses related to the medical field have been identified, including delivery of medicine and blood. UNICEF is using drones to deliver HIV tests and test results in Malawi.
- **Insurance.** Insurance companies can use UAS in various ways, including assessing specific property damage and surveying damage after natural disasters such
as floods and hurricanes, when it may be difficult for staff to safely and efficiently assess the area.

- **Real estate.** Drones are being used to provide aerial photographs of large properties, providing a new perspective for potential customers. The National Association of Realtors developed an FAQ page on the use of drones for its members.

- **Surveying and mapping.** Drones can be used to map expansive areas of land in less time. A report from the Commercial UAV Expo noted UAS’s ability to reduce costs and simplify the surveying process.

- **Photography/film.** UAS provide the opportunity for photographers and filmmakers to capture images and video from a different angle. An October 2015 *L.A. Times* article indicated that “A camera drone and crew costs as little as $5,000 a day, compared with at least $25,000 a day for a helicopter shoot.”

- **Pipeline management.** Drones can be used to assess and monitor oil and gas pipelines and to detect leaks. A report from the University of Aberdeen explored the use of UAS for oil and gas pipeline monitoring and mapping. The report identified advantages of UAS use, such as lower costs and increased operational safety. Disadvantages include the small scale of the operation and the need for special expertise.

- **Powerline inspection.** UAS also can be used for powerline inspections. PPL Utilities in Pennsylvania obtained FAA “approval to deploy [UAS] to inspect distribution and transmission lines across its Pennsylvania service territory.”

- **Tracking animals for conservation and protection.** Drones can be used to track and monitor animals in their natural habitats. A March 2016 report from New Monash University “found that drones are much more precise at monitoring the size of seabird colonies in tropical and polar environments than more traditional ground counts.” However, an August 2015 report found that bears experienced an increase in heart rate when a drone was flown over them, although they had very limited behavioral changes associated with the UAS flight.

- **Use by railroads.** Railroads have many uses for UAS, including aerial surveys, bridge inspections, track inspections, incident response for derailment or hazmat situations, property protection and inspection, and aerial photography and videography. BNSF received permission to patrol its track with UAS and is partnering with the FAA to “explore the challenges of using these vehicles to inspect [its] rail infrastructure beyond visual line-of-sight in isolated areas.”

**Legislation**

States have recognized the potential for commercial uses of UAS, and several pieces of enacted legislation have addressed this topic. Florida’s 2015 legislation identifies exceptions to a prohibition on using drones to capture images when they are being used: by a licensed professional for certain tasks; by a property appraiser assessing property for ad valorem taxation; “to capture images by or for an electric, water, or natural gas utility” for operations and maintenance, inspection, assessing vegetation growth, utility routing, siting and permitting, and for conducting environmental monitoring; for aerial mapping; and to deliver cargo.

Louisiana enacted a law dealing specifically with UAS operation in an agricultural commercial operation. The law requires the operator to obtain a license and complete an education and safety training course, in addition to registering the UAS with the Louisiana Department of Agriculture and Forestry. Maryland’s legislation enumerates some potential UAS applications, including “oil and natural gas pipeline inspection; transportation; natural disaster aid; precision agriculture; natural resource and environmental protection; bridge and infrastructure inspection; public utility support; construction and building inspection; surveying; golf course marketing; wind turbine inspection; realtor marketing and photography; and prison monitoring.”

North Carolina recognized some potential commercial uses for UAS that are equipped with infrared or other thermal imaging technologies. In the same legislation, the state required commercial operators to obtain a license from the Division of Aviation in the Department of Transportation, specifying that anyone obtaining the license must be at least age 18, possess a valid driver’s license, and pass a knowledge and skills test. In 2015, North Carolina passed
legislation\textsuperscript{50} to change the license to a permit and simply require a knowledge test, rather than knowledge and skills test. The law also lowered the required age to 17 in order to conform to federal regulations, since the FAA is tasked with licensing commercial UAS operators. North Carolina is the only state that specifically requires commercial operators to obtain a permit from the state.

Tennessee\textsuperscript{51} and Texas\textsuperscript{52} passed legislation enumerating several lawful uses of UAS, many of which relate to commercial operation. Some of these include mapping, use by an electric or natural gas utility for the same purposes enumerated in Florida’s legislation, use by a licensed real estate broker and use in connection with oil pipeline safety. Texas enacted legislation in 2015\textsuperscript{53} to add use by a registered professional land surveyor and by a professional engineer in connection with those professions to the list of lawful uses.

**Governmental Use**

One early use of UAS addressed by state legislatures involved law enforcement surveillance and evidence gathering. This is not the only potential application of UAS for the government, however. Among existing and potential UAS applications for governments are simplifying road and bridge inspections, providing emergency services and conducting air quality inspections, among others.

- **Law enforcement use.** A range of UAS uses have been recognized for law enforcement agencies. The most widely addressed by legislation related to UAS use for evidence collection and surveillance. Other identified law enforcement uses of UAS include photographing traffic crash scenes, monitoring correctional facilities, tracking prison escapees, crowd control and monitoring dangerous situations, among others. The Illinois State Police have used drones at crash scenes, decreasing the time needed to document the scene and reopen the roadway. In 2016, the South Padre Island police planned to use UAS to monitor spring break festivities in the area. Police in Fremont, Ohio, indicated that a drone had been helpful in capturing an escaped inmate. The International Association of Chiefs of Police (IACP) Aviation Committee issued recommended guidelines on the use of UAS in August 2012. The guidelines include recommendations related to community engagement, system requirements, operational procedures and image retention. The IACP also has a model policy on unmanned aircraft that was released in May 2015. The policy is available online only for IACP members, but it includes “specific procedures for deploying a drone, lists restrictions on its use, details how data would be retained or deleted and how operators should be trained.”

- **Emergency services.** Potential uses of UAS for emergency services also have been identified. MIT and Olin College are working to develop a drone that can be used to fight fires. UAS can be used to support search and rescue operations in areas that may be difficult for humans to reach. Drones also can be used to search for a missing person—when an Amber Alert has been issued, for example. A German company is developing drones that can deliver defibrillators to heart attack victims.

- **Infrastructure maintenance.** UAS can also be used to support work conducted by state departments of transportation (DOTs), including bridge inspections, road assessments, and road sign monitoring and assessing, among others. A March 2016 survey from the American Association of State Highway and Transportation Officials (AASHTO) found that “33 state departments of transportation have or are exploring, researching, testing or using unmanned aerial vehicles...to inspect bridges and assist with clearing vehicle crashes, among other innovative applications.” Seventeen state DOTs had studied or used drones, and an additional 16 state DOTs “were either exploring drone usage, assisting in the development of drone polices or supporting drone research.” The Massachusetts DOT began the process to obtain federal approval to operate UAS “around bridges, into tunnels and by other places for inspections.” In November 2015, Minnesota’s DOT used a drone to conduct an inspection of the state’s largest bridge. The use of a drone would prevent the need to close down the road during inspection; officials said using the drone could reduce the time to complete inspections by 30 percent. Connecticut announced in December 2015 that it planned to use a UAS “to perform limited visual bridge inspection tasks on the Gold Star Memorial Bridge.” The Michigan Tech research Institute evaluated the use of UAS for transportation purposes, releasing the results in April 2015. Potential uses identified include traffic...
monitoring, crash scene documentation, confined space inspection, and bridge asset management and condition assessment.

These examples represent only a few of the many potential governmental uses of UAS. To address concerns about governmental use of this technology, some states now require that UAS use by government entities, particularly law enforcement agencies, be reported.

Legislation

Three states—Maine, North Dakota, and Virginia—explicitly prohibit law enforcement agencies from using UAS with attached weapons. The North Dakota law specifically prohibits the use of lethal weapons attached to drones, resulting in discussion about the potential for non-lethal weapons such as Tasers and tear gas to be attached to UAS.

Illinois law prohibits the use of UAS by law enforcement agencies, with enumerated exceptions. These exceptions include countering a high risk of a terrorist attack when there is credible intelligence indicating such risk; use by a law enforcement agency that has a search warrant; the existence of exigent circumstances; using the UAS to attempt to locate a missing person; and using the UAS “solely for crime scene and traffic crash scene photography.” In 2014, legislation added an exception for use of a drone during a disaster or public health emergency. The drone can be used to gather information needed to decide “whether or not a disaster or public health emergency should be declared, to monitor weather or emergency conditions, to survey damage, or to otherwise coordinate response and recovery efforts.”

Maine requires that, before an agency obtains a UAS, it must seek approval from the governing body that oversees the agency. The law also sets forth minimum standards for law enforcement use of UAS. These standards include: training and certification requirements for the operator; requirements for prior authorization for the use of UAS; approval by the appropriate prosecutor for deployment of UAS for criminal investigative purposes; restrictions on the use of certain technologies; procedures to minimize inadvertent recording of private spaces of third parties; procedures for destroying unnecessary recordings; and requirements for regular reporting of all uses, among others.

The Maine law also specifies that law enforcement agencies cannot use UAS without a warrant, but can use the technology for search and rescue or for purposes other than investigation, such as “aerial photography for the assessment of incidents, forest fires and other fire scenes, flood stages and storm damage.”

Indiana allows the use of UAS to photograph or take video of a traffic crash site. Nevada’s law allows the use of UAS for search and rescue purposes and when a state of emergency or disaster has been declared by the governor. Oregon’s law specifies that drones can be used for search and rescue activities, for helping people in emergencies, to gather information for reconstruction of a specific crime scene and for training purposes.

North Carolina initially prohibited the use of UAS by state or local governments until July 1, 2015, unless the state chief information officer (CIO) approved an exception. Legislation passed in 2015 expanded the authority of the CIO to approve the purchase and operation of UAS. North Carolina law also requires development of a knowledge test that all state or local agency UAS operators must pass.

North Dakota’s law allows the use of UAS for surveillance during the course of patrolling national borders, in exigent circumstances, in an environmental or weather-related catastrophe, and by educational institutions.

Virginia placed a moratorium on governmental use of UAS until July 1, 2015, but specified that UAS could be used when an Amber Alert, Senior Alert or Blue Alert had been
issued; for search and rescue operations; and for training exercises related to those uses. Virginia passed additional legislation in 2015 to allow use of UAS by law enforcement agencies when they have a warrant or when a person consents to a warrantless search. UAS can also be used “for purposes other than law enforcement, including damage assessment, traffic assessment, flood stage assessment, and wildfire assessment.” Vermont’s 2016 law (Senate Bill 155) includes similar language.

The laws in Tennessee and Texas take a different approach than those of many other states. These two states enumerate permitted governmental uses, including law enforcement purposes, surveying the scene of a catastrophe, during a declared state of emergency, conducting air quality sampling, at the scene of a spill of hazardous materials, for fire suppression, for rescuing a person in danger, and for port authority surveillance and security.

**Destruction of Information.** Illinois specifies that any information obtained by law enforcement agencies through use of a drone must be destroyed within 30 days unless there is reasonable suspicion that the information contains evidence of criminal activity or is relevant to an ongoing investigation or criminal trial. The 2014 legislation expanded this to apply to information obtained by a third party and provided to law enforcement personnel, either at the direction of the agency or voluntarily.

North Dakota’s law requires that UAS use be documented and flight information be retained for five years. Any data collected may not be retained for more than 90 days unless it contains evidence of a crime or is relevant to an ongoing investigation or trial.

Utah’s law requires that data obtained through law enforcement agency use of UAS be destroyed as soon as reasonably possible unless the data is related to the target of an operation and is essential for the success of the operation, the data is obtained through a court order or from a person who is a non-government actor, or the data was collected by accident and appears to pertain to the commission of a crime, along with other exceptions.

**Admissibility of Evidence.** The Illinois law specifies that any information collected outside the law’s enumerated exceptions is presumed inadmissible for judicial and administrative proceedings. The laws in Nevada, Oregon, Tennessee, Texas and Vermont include similar language.

**Registration of Government UAS.** Nevada requires that any UAS used by a public agency must first be registered with the Department of Public Safety. Oregon specifies that public bodies are required to register their drones with the Oregon Department of Aviation; they may be fined up to $10,000 for failing to do so. The fee to register UAS that weigh less than 55 pounds is $25, and the fee for UAS over 55 pounds is $50. While it does not directly address the issue in legislation, Minnesota also requires registration of drones that are used for any purposes other than recreation. The registration fee is $100.

**Reporting Use by Government Agencies.** Any Illinois agencies using a drone must report the number of drones they have to the Illinois Criminal Justice Information Authority, and the Authority then must make a report available online with information about every law enforcement agency that owns a drone. Maine’s law requires that the Commission of Public Safety submit an annual report to the Legislature that contains information about law enforcement use of UAS, including “summary descriptions of the number of deployments for investigative purposes, the general nature of those investigations and the number of search warrants sought and the number of search warrants obtained.”

Nevada’s Department of Public Safety must include information regarding registered UAS on its website. The department also must provide a report to the Legislature about public agency use of UAS. In Texas, any use of UAS by law enforcement agencies is to be included in a report to the governor, lieutenant governor and Legislature. In addition, the report must be posted on the law enforcement agency’s publicly accessible website. Utah also requires that UAS use by law enforcement agencies be reported to the Department of Public Safety. Vermont requires law enforcement agencies to report drone use annually to the Department of Public Safety. The Department then consolidates the reports into one overall report to the House and Senate Committees on Judiciary and on Government Operations.

**Developing Policies for Governmental Use.** Maryland’s law requires the Department of Business and Economic Development to identify policies that should be implemented to address concerns related to state, county and municipal use of UAS for “law enforcement, fire services, rescue services, and emergency medical services.” Nevada’s law requires the Department of Public Safety to adopt regula-
tions for the use of UAS for fire services, emergency medical services, protection of a critical facility that is public property, and search and rescue.

Oregon requires public bodies that operate UAS to establish policies and procedures for the “use, storage, accessing, sharing and retention of data.” Texas requires the Department of Public Safety to adopt rules and guidelines for law enforcement’s use of UAS, and Virginia’s law requires the Department of Criminal Justice Services to develop model protocols for the use of UAS by law enforcement agencies.

Criminal Penalties for Misuse

Among the issues considered in many legislatures is setting criminal penalties associated with UAS misuse, whether it be flying near an airport, interfering with firefighting operations, using UAS for “peeping tom” activities or any other of a number of violations. Some argue that the necessary laws are already in place for responding to these violations and that the law should be technology-neutral, while others believe new laws are necessary to address this new technology.

The California Legislature passed several bills in 2015 related to penalties for misuse of UAS, including increasing penalties for flying them over wildfires and prohibiting flying them over correctional facilities and K-12 schools. These three bills were vetoed by Governor Jerry Brown. In his veto message, Governor Brown stated that “each of these bills creates a new crime, usually by finding a novel way to characterize and criminalize conduct that is already proscribed. This multiplication and particularization of criminal behavior creates increasing complexity without commensurate benefit.” Another bill would have made operators liable for trespass if they flew their UAS less than 350 feet above the ground of another person’s property. Governor Brown also vetoed this bill, expressing the desire to study drone technology more carefully before enacting broad legislation.

On the other hand, some states have passed new laws that expand criminal penalties for violations. Some of the laws included in the privacy section also relate to criminal penalties.

Thus far in 2016, six states—Arizona, Louisiana, Oregon, Tennessee, Utah and Vermont—have passed legislation related to criminal penalties.

Arizona made it a class 1 misdemeanor to operate a UAS in violation of a federal law or regulation or to interfere with a law enforcement, firefighter or emergency services operation using UAS. It also made using a UAS to intentionally photograph or loiter over or near a critical facility in furtherance of a criminal offense a class 6 felony. Critical facility is defined to include petroleum production facilities, chemical manufacturing facilities, energy control centers, any railroad infrastructure or facility, courthouses and military installations, among others. The law also clarifies that the definition of aircraft includes UAS for the purpose of the offense of careless or reckless aircraft operation.

Louisiana’s 2016 legislation, Senate Bill 73, adds intentionally crossing a police cordon using a drone to the crime of obstructing an officer. The law also allows law enforcement or fire department personnel to disable the UAS if it endangers the public or an officer’s safety.

Oregon made it a class A misdemeanor in 2016 to operate a weaponized UAS. The law also created the offense of...
of reckless interference with aircraft, making it a class A violation if someone uses a UAS to: “(1) Direct a laser at an aircraft while the aircraft is in the air; (2) Crash into an aircraft while the aircraft is in the air; or (3) Prevent the takeoff or landing of an aircraft.” In addition, the law adds using UAS to take a photo or record a video in certain circumstances to the offense of invasion of privacy in the second degree. It also makes it a class A violation to operate UAS over critical infrastructure. Critical infrastructure is defined to include petroleum and alumina refineries; electrical power facilities; chemical, polymer and rubber manufacturing facilities; and freight transportation facilities, among others.

Tennessee’s 2016 law makes it a crime to use a drone to fly within 250 feet of a critical infrastructure facility for the purpose of conducting surveillance or gathering information about the facility.80

Utah enacted a law in 2016 that makes it a class B misdemeanor to operate a UAS within a certain distance of a wildfire and a class A misdemeanor if the UAS causes an aircraft fighting the wildfire to drop a payload in the wrong location or to land without dropping the payload.81 It is a third degree felony if the UAS crashes into a manned aircraft, and a second degree felony if this causes the manned aircraft to crash. It is important to note that the law requires an incident commander of a fire to grant reasonable access within 3 miles of the fire to certain UAS operators, including those with COAs, if the access is for a purpose related to the business and the access can be granted without presenting safety risks.

Vermont’s 2016 law prohibits weaponizing a drone and makes the offense subject to one year imprisonment, $1,000 fine or both.

In 2015, five states—Arkansas, Mississippi, Nevada, Tennessee and Texas—passed legislation related to criminal penalties. (Those related specifically to hunting and fishing are addressed later in the report.)

Arkansas created the offense of unlawful use of UAS, committed when anyone knowingly uses a UAS to “conduct surveillance of, gather evidence or collect information about, or photographically or electronically record critical infrastructure without the prior written consent of the owner...”82 For the purpose of this law, critical infrastructure includes an electrical power generation or delivery system, a petroleum refinery, a chemical or rubber manufacturing facility, or a petroleum or chemical storage facility. The offense is a class B misdemeanor. Mississippi law specifies that using a drone to commit “peeping tom” activities is a felony.83

Nevada’s law84 prohibits mounting a weapon on a drone and makes such action a category D felony. If the weapon is discharged, the person commits a category C felony. In addition, anyone who operates a UAS within a certain distance of a critical facility or within 5 miles of an airport is guilty of a misdemeanor. Tennessee's 2015 law85 added to the criminal code using a UAS to capture an image of an individual or event at a venue where more than 100 people are gathered for a ticketed event, using a UAS within or over a fireworks discharge site, and using UAS over the grounds of a correctional facility. All these offenses are class C misdemeanors.

Texas created two new criminal offenses. The first makes it a class B misdemeanor when a UAS operator violates the rules governing the use of UAS in the State Capitol Building Complex.86 The law requires the Department of Public Safety to develop these rules, which became effective Jan. 10, 2016. The rules prohibit use in or over state property unless approval is obtained in advance. The second new criminal offense makes it a class B misdemeanor to operate UAS over a critical infrastructure facility if the UAS is not more than 400 feet off the ground.87

In 2014, five states—Indiana, Louisiana, North Carolina, Tennessee and Wisconsin—passed UAS criminal penalty laws. Indiana created the crime of “Unlawful Photography and Surveillance on Private Property,” making it a class A misdemeanor.88 This crime is committed by someone who knowingly and intentionally electronically surveys the private property of another without permission.

Louisiana created the crime of unlawful use of an unmanned aircraft system, defined as the intentional use of a UAS to conduct surveillance of a targeted facility without the owner’s prior written consent.89 Targeted facilities include petroleum and other refineries, chemical and rubber manufacturing facilities, and nuclear power electric generation facilities. The crime is punishable by a fine of up to $500 and imprisonment for six months. A second offense can be punished by a fine of up to $1,000 and one year imprisonment.
The North Carolina legislation\textsuperscript{90} created several new crimes: using UAS to interfere with manned aircraft, a class H felony; possessing an unmanned aircraft with an attached weapon, a class E felony; unlawfully distributing images obtained with a UAS, a class 1 misdemeanor; and operating a UAS commercially without a license, a class 1 misdemeanor.

Tennessee law\textsuperscript{91} makes it a class C misdemeanor for anyone to use UAS to intentionally conduct surveillance of an individual or his or her property. It also makes it a class C misdemeanor to possess these images and a class B misdemeanor to distribute and otherwise use them. Wisconsin created two new crimes: “possession of a weaponized drone” and “use of a drone.”\textsuperscript{92} Use of a drone is a class A misdemeanor for anyone who, with intent, observes another person in a place where he or she has a reasonable expectation of privacy. Possession of a weaponized drone is a class H felony.

Two states criminalized certain UAS activities in 2013. Oregon\textsuperscript{93} created new crimes for mounting weapons on drones and interfering with or gaining unauthorized access to public drones. Texas\textsuperscript{94} created two new crimes: the illegal use of an unmanned aircraft to capture images and the offense of possessing or distributing the image. Both offenses are class C misdemeanors.

Iowa passed legislation in 2014\textsuperscript{95} requiring the Department of Public Safety to develop guidelines for the use of UAS and to determine whether changes to the criminal code are necessary.

Maryland’s 2015 law\textsuperscript{96} requires certain departments in the state to “review the state of unmanned aircraft system recreational use in the State in an attempt to document incidents or patterns of the unauthorized or unsafe use of unmanned aircraft systems…and…report to the Governor and…the General Assembly on their findings and recommendations.”

Hunting/Fishing

An issue connected to criminal penalties is regulation of UAS with regard to hunting and fishing. Ten states have laws related to hunting and fishing. Six states—Idaho,\textsuperscript{97} Indiana,\textsuperscript{98} Michigan,\textsuperscript{99} North Carolina,\textsuperscript{100} Oregon\textsuperscript{101} and West Virginia\textsuperscript{102}—prohibit the use of UAS for hunting and/or fishing. Seven states—Illinois,\textsuperscript{103} Michigan,\textsuperscript{104} New Hampshire,\textsuperscript{105} North Carolina,\textsuperscript{106} Oregon,\textsuperscript{107} Tennessee\textsuperscript{108} and Wisconsin\textsuperscript{109}—prohibit using UAS to interfere with others who are lawfully hunting and/or fishing. New Hampshire and Tennessee also prohibit using a drone to conduct video surveillance of private citizens who are lawfully hunting or fishing. New Mexico adopted memorials in the House\textsuperscript{110} and Senate\textsuperscript{111} in 2015 that require a study on protecting wildlife from drones.

Security Concerns

Security is one of the major concerns related to UAS use. One such fear involves the possibility that a drone flying too close to an airplane could be sucked into an engine, causing the plane to crash. In March 2016 there were reports of a drone flying within 200 feet of a Lufthansa flight on approach at Los Angeles International Airport.

News stories have reported use of UAS to fly contraband—including drugs, weapons, pornography and cell phones—onto prison grounds. In response to these and other news stories, some states have taken or considered legislative action.
Airports
The FAA's model aircraft operations limits include a requirement that hobbyists operating within 5 miles of an airport notify the airport operator and air traffic control tower that they will be operating in the vicinity. However, some COAs for commercial operators specifically allow operation within 5 miles of an airport. In addition, Nevada's 2015 legislation includes language specifying that "A person may operate an unmanned aerial vehicle within 5 miles of an airport only if the person obtains the consent of the airport authority or the operator of the airport, or if the person has otherwise obtained a waiver, exemption or other authorization for such operation..." Anyone who violates this requirement is guilty of a misdemeanor.

Prisons
States also have expressed concern about UAS operation near and over prisons. Nevada's 2015 law prohibits operation of UAS within a certain distance of a critical facility and defines critical facility to include "a county, city or town jail or detention facility and any prison, facility or institution under the control of the Department of Corrections." Similarly, Arizona and Oregon laws also include correctional facilities within the definition of critical infrastructure over which UAS operation is prohibited. Tennessee and Wisconsin prohibit operation of UAS over the grounds of a correctional facility.

Although Arizona, Nevada, Oregon, Tennessee and Wisconsin are the only states with laws that cover this topic, several states have considered legislation, including the vetoed 2015 California bill referred to earlier. In 2016, at least five states—California, Illinois, Louisiana, Michigan and New York—are considering and four states—Colorado, Mississippi, New Hampshire and Washington—considered legislation prohibiting operation of UAS near correctional facilities. States have taken various approaches in legislation, with some addressing where a drone can be operated and others specifically addressing the crime of introducing contraband into a correctional facility using a drone.

Critical Infrastructure
Legislation also has been enacted to protect critical infrastructure from rogue drone operators. The classification of critical infrastructure varies by state, but generally includes facilities such as petroleum refineries, chemical manufacturing facilities, pipelines, wastewater treatment facilities, power generating stations, electric utilities, chemical or rubber manufacturing facilities, and other similar facilities. States with laws to protect critical infrastructure from UAS include Arizona, Arkansas, Louisiana, Nevada, Oklahoma, Tennessee and Texas.

Arkansas and Louisiana prohibit using UAS to conduct surveillance of, gather evidence or collect information about, or photograph or record critical infrastructure of a targeted facility without prior written consent of the owner. Arizona, Nevada, Oklahoma and Texas prohibit operation of UAS within a certain distance of or over critical infrastructure facilities. Oklahoma's law also prohibits allowing UAS to make contact with a critical infrastructure facility.

Studies and Task Forces
Several states have convened task forces or requested studies on the use and implications of unmanned aircraft systems. During the last three years, at least 13 state legislatures—Alaska, Connecticut, Georgia, Illinois, Indiana, Iowa, Louisiana, Maryland, New Mexico, Nevada, Oklahoma, Tennessee and Texas.

Geo-fencing
Several technological options are being considered to support safe drone operations. One of these is the development of geo-fencing technology. This technology prevents UAS from flying within certain airspace by creating a virtual barrier that a drone cannot cross. GPS identifies where a drone is being operated and geo-fencing stops the drone from operating in the restricted airspace. DJI, a major drone manufacturer, announced in November 2015 that it was creating a geo-fencing system for its drones. A few states have considered legislation to require geo-fencing, but none have enacted a law to require the technology. In 2015, U.S. Senator Chuck Schumer proposed federal geo-fencing requirements for all UAS.

While geo-fencing is being considered as a potential response to these security concerns, skepticism exists regarding the efficacy of this technology. One issue raised includes an inability to operate a drone within a certain area even if an individual has authorization to operate in the restricted airspace. In addition, concerns have been expressed about the possibility of manipulating the technology.
Ohio, Oregon, Pennsylvania and Rhode Island—have requested studies or convened task forces. Virginia’s governor signed an executive order in 2015 to establish a commission on unmanned systems.

Illinois established a UAS Oversight Task Force in 2015. Duties of the task force include considering commercial and private use of UAS, landowner and privacy rights, and general rules and regulations for safe UAS operation. Indiana adopted a resolution urging the legislative council to study UAS issues. New Mexico’s resolutions requested a study on protecting wildlife from drones. Ohio created the aerospace and aviation technology committee in 2014; one duty of the committee is to research and develop aviation technology, including UAS. Pennsylvania directed the Joint State Government Commission to conduct a study on the use of UAS by state and local agencies. Rhode Island created a legislative commission in 2015 to study and review UAS regulation.

Alaska’s UAS Legislative Task Force was formed by legislation in 2013, with areas of inquiry and action including to consider privacy rights, to promote economic development, to encourage public education and to provide policy recommendations to the Alaska Legislature. The task force included a diverse range of interests and issued a report to the Legislature that made seven final recommendations. Among the recommendations were requiring all state and local law enforcement entities to adopt guidelines to ensure privacy protection; the need to convey a clear message to industry that Alaska is open for business to harness the beneficial uses of UAS; to encourage the growth of the UAS economic sector; and to encourage UAS training programs. These recommendations were introduced and passed in the form of legislation between 2014 and 2016.

Connecticut’s Legislative Program Review and Investigations Committee issued a report in December 2014. Findings from the report included the conclusions that the primary concerns of stakeholders related to privacy and safety, that state and local attempts to regulate non-governmental flight or aircraft would likely be preempted, and that most types of criminal drone use can be addressed through existing state law, although clarification may be helpful. Recommendations included prohibiting remote operations of weapons; requiring all government-owned
drones to be registered with the Office of Policy and Management; and requiring governmental drone use to be recorded, summarized and publicly reported annually.

Georgia created the House Study Committee on the Use of Drones during the 2015 legislative session. The committee issued a report on Dec. 1, 2015. The committee made a total of 15 recommendations, including: 

- Continue to monitor FAA Regulations with regards to registration requirements of hobbyist operators so as not to duplicate the process or hinder the industry.
- Encourage the state and its agencies to use drone technology in areas where it could provide a cost savings or improve safety.
- Protect citizen privacy by making it unlawful to video or photograph another person’s property without permission with limited exceptions to this.
- Prohibit weaponizing a drone.

The recommendations addressed the vast majority of the issues discussed in this report.

The Iowa Department of Public Safety provided a report to the legislature on developing guidelines for the use of UAS and to determine whether changes to the criminal code were necessary. The report concluded that, although no key Supreme Court cases address UAS use, case law suggests governmental use without warrant would not violate the Fourth Amendment in most circumstances. The report also concluded that many factors must be balanced when regulating private use. These include the need to protect from rogue operators without overly inhibiting First Amendment rights and the free market and recognizing the broad commercial potential of the technology. The report also concluded that, until current laws are no longer sufficient to address UAS misuse, lawmakers may want to “hold off” on expansive regulation.

Maryland’s 2015 legislation requested a report from the Department of Commerce to identify the benefits of conducting UAS research in the state and of supporting UAS-related industry in the state, along with other benefits. The report concluded that “UAS presents a plethora of positive applications in the civil and commercial worlds…” but “UAS expansion is tempered by regulatory challenges.” It also found that Maryland and the surrounding region have a significant opportunity to capture new employment and capital investment from UAS as the commercial market grows.” The report emphasized that the focus of the state and local governments should be on “identifying and implementing best practices in any UAS use by public entities (emergency response, research, police), protecting manned flight activity near public-use airports, supporting enforcement of existing regulations and laws, and providing information to the FAA to assist in creating a clear and risk-adjusted regulatory system for UAS.”

Oregon’s Department of Aviation issued a report to the legislature on the status of federal regulations and whether private UAS operators should be registered in the state similar to registration required for other aircraft. The report recommended delaying registration so that the FAA would be provided “the time to fully articulate the federal policy on registration of private use UAS.” The report also recommended “the establishment of a working group or task force to track federal law, provide input for future legislative action, and track industry developments.”

Conclusion

Unmanned aircraft systems have an incredible variety of potential beneficial uses, but many aspects of the technology also can present risks. State legislatures are balancing the need to regulate the risks associated with this new technology while also allowing the continued development of the industry.
Notes

1. Tennessee Senate Bill 796 (2013)
5. Nevada Assembly Bill 507 (2013)
6. Maryland House Bill 100 (2013)
10. Alaska House Bill 255 (2014)
11. Florida Senate Bill 92 (2013)
12. Idaho Senate Bill 1134 (2013)
15. Iowa House File 2289 (2014)
17. Montana Senate Bill 196 (2013)
22. Tennessee Senate Bill 796 (2013)
23. Texas House Bill 912 (2013)
24. Utah Senate Bill 167 (2014)
26. Wisconsin Senate Bill 196 (2014)
31. Idaho Senate Bill 1134 (2013)
32. Kansas Senate Bill 319 (2016)
34. Oregon House Bill 2710 (2013)
36. Texas House Bill 912 (2013)
37. Tennessee Senate Bill 1892 (2014)
38. Wisconsin Senate Bill 196 (2013)
40. Florida Senate Bill 1178 (2015)
42. California Senate Bill 868 (2016)
43. Hawaii Senate Bill 2095 (2016)
44. New Hampshire Senate Bill 459 (2016)
47. Louisiana Senate Bill 183 (2015)
49. North Carolina Senate Bill 744 (2014)
51. Tennessee Senate Bill 1892 (2014)
52. Texas House Bill 912 (2013)
53. Texas House Bill 2167 (2015)
57. Illinois Senate Bill 1587 (2013)
58. Illinois Senate Bill 2937 (2014)
60. Indiana House Bill 1013 (2016)
64. North Carolina Senate Bill 744 (2014)
67. Tennessee Senate Bill 1892 (2014)
68. Texas House Bill 912 (2013)
70. Utah Senate Bill 167 (2014)
71. Oregon Senate Bill 5702 (2016)
72. Maryland Senate Bill 370 (2015)
73. Oregon House Bill 4066 (2016)
74. California Senate Bill 168 (2015)
75. California Senate Bill 170 (2015)
76. California Senate Bill 271 (2015)
77. California Senate Bill 142 (2015)
78. Arizona Senate Bill 1449 (2016)
79. Oregon House Bill 4066 (2016)
80. Tennessee Senate Bill 2106 (2016)
81. Utah House Bill 126 (2016)
82. Arkansas House Bill 1770 (2015)
83. Mississippi Senate Bill 2022 (2015)
84. Nevada Assembly Bill 239 (2015)
86. Texas House Bill 3628 (2015)
87. Texas House Bill 1481 (2015)
88. Indiana House Bill 1099 (2014)
89. Louisiana House Bill 1029 (2014)
90. North Carolina Senate Bill 744 (2014)
91. Tennessee Senate Bill 1892 (2014)
92. Wisconsin Senate Bill 196 (2014)
94. Texas House Bill 912 (2013)
95. Tennessee Senate Bill 1892 (2014)
96. Oregon Senate Bill 5702 (2016)
97. Idaho Senate Bill 1213 (2016)
98. Indiana House Bill 1246 (2016)
100. North Carolina Senate Bill 744 (2014)
104. Michigan Senate Bill 54 (2015)
108. Tennessee Senate Bill 1777 (2014)
109. Wisconsin Senate Bill 338 (2016)
110. New Mexico House Memorial 081 (2015)
111. New Mexico Senate Memorial 091 (2015)
114. Arizona Senate Bill 1449 (2016)
115. Oregon Assembly Bill 4066 (2016)
117. Wisconsin Assembly Bill 670 (2016)
118. Arizona Senate Bill 1449 (2016)
120. Louisiana House Bill 1029 (2014)
121. Nevada Assembly Bill 239 (2015)
122. Oklahoma House Bill 2599 (2016)
123. Tennessee Senate Bill 2106 (2016)
125. Alaska House Concurrent Resolution 6 (2013)
128. Indiana Senate Resolution 27 (2013)
129. Iowa House File 2289 (2014)
130. Maryland Senate Bill 370 (2015)
131. New Mexico House Memorial 81 (2015) and New Mexico Senate Memorial 91 (2015)
133. Oregon House Bill 2710 (2013)
136. Virginia Executive Order 43-2015