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Privacy, Restriction, and Regulation Involving Federal, State and Local Legislation: More Hurdles for Unmanned Aerial Systems (UAS) Integration?

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With the passage of the Federal Aviation Administration (FAA) Modernization and Reform Act of 2012, the U.S. Congress implemented a mandate for the integration of Unmanned Aerial Systems (UAS) within the National Airspace System (NAS) to take place by 2015 (FAA, 2012a). The UAS community embraced this new push to promote and increase the presence of their technology within the mainstream transportation system of the U.S. Unfortunately, the FAA created a complex, bureaucratic authorization program with which UAS operators were forced to comply (FAA, 2012b). This has made UAS research and operations costly and prohibitive, leaving only a limited number of entities able to sustain regular UAS usage (J. Gibbs, personal communications, March 4, 2013).

Adding to the burden and acting as an ethical obstacle for UAS operations has been a public uproar concerning privacy in proximity to this promising technology when operated within United States for legitimate purposes. Several prominent organizations such as the American Civil Liberties Union (ACLU) and Code Pink, have pushed for legislative restrictions and controls for UAS operations (ACLU, 2014; Code Pink, 2013; Granny Peace Brigade, 2013; KNOWDRONES, 2014). The FAA has skirted, avoided, and delayed involvement in the privacy quandary by placing the burden on operators. In their recent announcement of UAS test sites, “the FAA plans to require each test site operator to establish a privacy policy that will apply to operations at the test site” (FAA, 2013a, p. 11).

The lack of initiative to impose specific privacy restrictions or controls over UAS operations by the FAA opens the door to federal, state, and local entities imposing their own rules and regulations (FAA, 2013b). Although the Federal government has been slow to respond, many state and local government agencies have not been (Branham, 2013). With the potential for conflicting or differentiated regulation of UAS operations across states, counties, and cities, it is

critical that UAS stakeholders are aware of the regulatory landscape in which they will potentially operate. Such information is also useful in discussions with legislators in attempts to standardize rules and restrictions so that UAS operations in the U.S. do not become bogged down in confusing and complex laws and controls that vary from one end of the country to the other (Koebler, 2012a).

Although there has been a significant amount of research in the precedent case law landscape in efforts to support or guide privacy legislation, little inquiry has been conducted in the constructs and prevalence of state and local UAS legislation or restrictions. This study assists in exploring this gap in research.

Review of Relevant Literature

UAS Integration efforts in the U.S.

Domestic UAS integration efforts. UAS have been operating under approved conditions in the NAS since 1990, with the Federal Aviation Administration (FAA) authorizing their use to support “important missions in the public interest, such as firefighting, disaster relief, search and rescue, law enforcement, border patrol, military training and testing and evaluation” (FAA, 2014, para. 4). Currently, the FAA (2014/2013a) relies on the use of Certificates of Authorization (COA), and special airworthiness certification (i.e., experimental) to review and approve UAS operations in the NAS for public operators. In November of 2013, the FAA released a five-year comprehensive plan (i.e., roadmap) identifying a path forward for the safe and efficient integration of civil UAS into the NAS (FAA, 2013a).

FAA Roadmap. The FAA worked in collaboration with the UAS Aviation Rulemaking Committee (ARC) to develop the *Integration of Civil Unmanned Aircraft Systems (UAS) in the National Airspace System (NAS) Roadmap* to address public operation of UAS and the

anticipated challenges of integration (FAA, 2013a). The focus of the FAA, throughout implementation of the plan, continues to be meeting the Congressional mandates from the *FAA Modernization and Reform Act of 2012*, ensuring safety, and supporting commercial opportunities (FAA, 2013a). The FAA will continue to examine applications, enhancement of operations, collaborate with stakeholders, and develop oversight and direction, including “regulations, policy, procedures, guidance materials, and training requirements” (FAA, 2013a, p. 5). The plan is categorized into three perspectives depicting the various strategies and opportunities to successively meet the desired outcomes; accommodation, integration, and evolution (FAA, 2013a). While the major points of the FAA plan establish the framework for the next five years, it also remains aligned with mid and long term goals of the Joint Planning and Development Office (JPDO) identified in the *National Airspace System Concept of Operations and Vision for the Future of Aviation and NextGen Air Transportation System Integrated Plan*, which supports a timeline to 2026 (JPDO, 2013; FAA, 2013b). This document also includes provisions for the selection and use of test sites scattered across the U.S. to simplify repeated UAS operations. This is discussed in more detail in the subsequent text.

Stakeholders. There are numerous stakeholders in the path to domestic UAS integration including the FAA, other governmental entities, and industry representatives (FAA, 2013a). All stakeholders can be considered collaborators and contributors with a vested interest in the success of UAS integration, based on the numerous benefits to be gained including economic return (i.e., \$89 billion in the next decade), improved safety, technology development and enhancement, upgraded system capabilities, and the development of new applications (Association for Unmanned Vehicle Systems International [AUVSI], 2013b; Bellamy, 2013; The Teal Group Corporation, 2012). The FAA (2013a) identifies this group as including

“manufacturers, commercial vendors, industry trade associations, technical standards organizations, academic institutions, research and development centers, governmental agencies, and other regulators” (p. 4). However, this list could also be expanded to include those that will utilize, further contribute to, and benefit from the integration of civil UAS into the NAS. Examples of these stakeholders are those individuals who will fulfill the roles of operators, designers, evaluators, and recipients of the benefits from this technology, including students, pilots, administrators, maintainers, law enforcement and emergency support personnel, farmers, and entrepreneurs (Barr & Weise, 2013; Horgan, 2013; Kimery, 2013a; Kimery, 2013b; Wald, 2013).

Potential economic impact. AUVSI (2013a) examined the potential economic impact of UAS integration to determine the anticipated benefits and financial risks associated with UAS integration into the NAS. The results of this research were the identification of precision agriculture and public safety as the “most promising commercial and civil markets” (p. 2) for domestic UAS application and the development of financial projections at the national and state levels (AUVSI, 2013a). Their findings were subdivided into economic impact, tax revenue, and jobs created for the periods 2015 to 2017 and 2015 to 2025 for both the nation and individual states (AUVSI, 2013a).

AUVSI (2013a) estimates that economic impact of UAS integration will exceed \$13.6 billion in the first three years (i.e., 2015 to 2017) and grow to more than \$82.1 billion between 2015 to 2025, which exceeds the earlier year to year estimates from the Teal Group Corporation (2012) that the worldwide UAS market will rise from \$6.6 billion annually to \$11.4 (The Teal Group Corporation, 2012). AUVSI (2013a) estimates that UAS integration will result in the creation of 70,000 new jobs from 2015 to 2017, with 34,000 of those jobs relating to

manufacturing with an average salary of \$40,000. The total number of jobs to be created in support of UAS integration is expected to reach 103,776 (AUVSI, 2013a).

The economic impact of UAS integration has also been examined by local and state governments and their local industries where the utility of the systems provides distinct advantages, including farming (i.e., precision agriculture), security, real estate, architectural design, and entertainment (Clevenger, 2014; Game of drones, 2013; Parsons, 2013; Weiner, 2013; Vijayan, 2013). The consensus is the understanding of the potential for this technology to create and support jobs and careers, but there are concerns from some regarding how restrictive and slowly the path to access is proceeding compared to other countries that have already embraced the technology (Clevenger, 2014; Game of drones, 2013; Jansen, 2013; Nash-Hoff, 2013; Parsons, 2013; Weiner, 2013). There are a multitude of users who currently cannot access or are subject to limited access to airspace, but envision using this technology to supplement or enhance their current portfolio of capabilities (Bachman, 2013; Flanagan, 2014; Fisher, 2013; Harding, 2013; McNeal, 2013). With AUVSI (2013a) projecting a potential for \$10 billion in losses for each year the integration is delayed and a daily loss rate of \$27.6 million, there is an immediate need to ensure the integration plan remains on schedule.

Current Federal restrictions and regulations

Currently, the Federal government exercises control over UAS operations through the policies and procedures outlined by the FAA. These policies and procedures limit UAS operations for non-recreational purposes (e.g. remote control aircraft which are controlled by a separate FAA policy [FAA, 1981]) and entail several options for individuals to gain authorization to operate UAS. These options are a COA, a Special Airworthiness Certificate – Experimental Category (SAC-EC), or being a test site designee.

Certificate of Authorization (COA). The COA process is governed by several FAA documents: FAA JO 7610.4, UAPO Interim Operational Approval Guidance 08-01, Federal Registry Entry “FAA-2006-25714,” and FAA Order 8130.34 (FAA, 2013c). Under the COA program, only public agencies can apply for authorization to operate UAS. The FAA defines a public agency as “any agency that operates a public aircraft” (14 CFR Part 1.1). If you receive funding from the federal government at some level, you are probably a “Public Agency” (FAA, 2013c, para. 5). The definition also specifically states that remote controlled model aircraft operators are not eligible for this program. Precedent has shown that government entities, law enforcement, and researchers have taken advantage of the COA process. The military, of course, is exempt from these restrictions. There are approximately 300 active COAs and there have been up to 750 issued since 2006 (FAA, 2013d).

The COA process has been described as “a rigid, individualized licensing process that stymies the prospect of widespread drone usage in the United States” (Black, 2013, p. 1842-1843). COAs require a significant amount of research and documentation, much of which can cost an operator vying for authorization over \$20,000 (J. Gibbs, personal communication, March 4, 2013). A detailed outline of the proposed UAS operation, platform, and procedures must be provided. Required items include details about communication plans, the control link, the control station, emergency procedures, launch and recovery, lost communication/link procedures, a flight operations area map, and platform minutiae (FAA, 2013d). The FAA has been fairly restrictive with COAs going only to universities, government agencies, law enforcement, manufacturers, and other individuals conducting research deemed necessary for benevolent purposes or those that assist in gaining knowledge for the integration of UAS in the NAS (FAA, 2013d).

Other types of civilian operators can attempt to gain authorization to conduct UAS operations through the SAC-EC program. This is to allow individuals, rather than public agencies, to potentially operate UAS for business purposes. However, the FAA notes that the “SAC-EC is very limited in scope of operational use” (FAA, 2013e, para. 3) and is rather difficult to achieve. Thus the FAA restricts the flight of model aircraft/UAS that are operated for commercial purposes, regardless of size or scope of operation (Kravets, 2013).

All types of UAS operations, once approved by the FAA, “are currently constrained to restricted areas, border regions, and various limited airspace deemed safe for small [Unmanned Aerial Vehicles] UAVs” (Roberts, 2009, p. 491). This isolation of UAS platforms away from conventional aircraft is a standing feature due to technical issues that the FAA wants resolved before UAS and manned aircraft mix (FAA, 2013a).

Test sites. As part of the mandate for UAS integration, Congress pressured the FAA to foster a more flexible means to operate the systems in lieu of the COA process (Kapnik, 2012). In reaction to this, the FAA opened an application process for six test sites that would allow an easier and less tedious way for operators to regularly use their systems. The FAA advocated for applicants to describe how their potential operations would provide the data necessary to safely integrate UAS into the NAS rather than having to continue segregated operations where UAS are kept well clear of conventional aircraft. With the test site authorizations, designees could have more freedom to conduct UAS operations without having to apply for multiple COAs or go through other authorization complexities (FAA, 2013e).

During the application period, the FAA received 25 applications representing 24 states. On December 30, 2013, the FAA announced the six test site awards:

- University of Alaska

- State of Nevada
- Griffiss International Airport (New York)
- North Dakota Department of Commerce
- Texas A&M University – Corpus Christi
- Virginia Polytechnic Institute and State University (Virginia Tech)

Justifications were made for each site selection. The University of Alaska had a unique application noting that the institution had access to “seven climactic zones as well as geographic diversity with test site range locations in Hawaii and Oregon,” (FAA, 2013e, Test Site section), thus this award actually included two additional states. This group plans to set standards for UAS platform certification and navigation. The State of Nevada was selected to investigate UAS operator requirements and certification as well as integration issues associated with air traffic control (ATC). Griffiss International Airport, located in Rome, New York was selected to research sense and avoid technologies, which has been identified as a critical need for successful UAS integration. The North Dakota site plans “to develop UAS airworthiness essential data and validate high reliability link technology [and...] will also conduct human factors research” (FAA, 2013e, North Dakota Department of Commerce section). Texas A&M will develop safety requirements and Virginia Tech “plans to conduct UAS failure mode testing and identify and evaluate operational and technical risk areas” (FAA, 2013e, Virginia Polytechnic Institute and State University section). The Virginia site also include range capabilities in the state of New Jersey (FAA, 2013e). As part of the test site process, the FAA has required that the sites be operational within 180 days after the site is established. The test site program is scheduled to end in February 2017, but there is potential to renew or continue the program as the FAA reevaluates the site stakeholders and/or adds new sites at that time (FAA, 2013a).

Privacy issues. Numerous citizen advocacy groups as well as private citizens themselves have brought complaints to the FAA regarding privacy in the proximity of UAS operations (ACLU, 2014; Code Pink, 2009; Granny Peace Brigade, 2013; KNOWDRONES, 2014). The public has expressed concern about UAS operations much of which has been sparked by the media attention focused on the use of “drones” in combat situations. In a 2013 study of public opinion of UAS, 95% of respondents identified with a weaponized UAS (Predator) as the type of platform that may be used domestically, whilst most respondents did not identify smaller fixed wing platforms as likely to be used. When considering a quadcopter, 66% of respondents believed that this type of platform would be used (Vincenzi, Ison, & Liu, 2013). In reaction to concerns, the FAA held an online session to solicit public opinion about privacy issues in the spring of 2013 (FAA, 2013f).

As part of the test site selection and management progression, the FAA included a statement on privacy in its UAS integration roadmap, albeit the administration explicitly noted that its primary concern and goal was safety not the protection of privacy. In order to satisfy the calls for some sort of privacy protection at the hands of the FAA, the administration stated:

There are privacy considerations regarding the use of UAS at the test sites. To ensure that these concerns are taken into consideration at the test sites, the FAA plans to require each test site operator to establish a privacy policy that will apply to operations at the test site (FAA, 2013a).

So while the FAA is not taking on responsibility for privacy, it is requiring test sites to document and report privacy plans and implementation thereof.

UAS Operations and Privacy

As noted by Kapnik (2012):

The pending introduction of unmanned aircraft into the NAS has riled many who fear that the new machines will intrude on their privacy. Groups from across the political spectrum have expressed concern, including the American Civil Liberties Union (ACLU), the Electronic Frontier Foundation, and Fox News (p. 450).

In addition to the headlines about drone use in the foreign wars in which the U.S. has recently been participating, and although U.S. residents apparently find UAS operations overseas, especially when used against terrorists, reasonable, more apprehension exists when such systems are used domestically. Vincenzi, Ison, and Liu (2013) found the majority of U.S. residents polled were concerned mostly about privacy, not safety from weaponized drones. Not surprisingly, several domestic occurrences have piqued public interest in protection of privacy (Koebler, 2013a).

Privacy and Fourth Amendment case precedents. There is a long and complex lineage of cases that have defined privacy protections for U.S. citizens. The majority of these cases involve interpretations of the Fourth Amendment of the U.S. Constitution. Although there has been much interest in the preservation of privacy in the face of UAS operations, “traditional Supreme Court Fourth Amendment jurisprudence suggests that there is likely no constitutional protection from aerial surveillance for individuals outside protected spaces, such as homes” (Kapnik, 2012). The range of Supreme Court and lower court decisions that set the precedent for privacy assurances have dictated that short-term aerial surveillance does not constitute a search in terms of the Constitution.

There are several pivotal cases that have set the current legal standards for the preservation of individual privacy. In *Katz v. United States*, police monitored the conversation of a man in a telephone booth with the door closed. It was determined that such actions were a violation of privacy. This case set the standard that a person is protected when they have a reasonable expectation of privacy. Several cases have specifically addressed aerial observation. In *Florida v. Riley*, police observed marijuana growing in a greenhouse through an open ventilation window while flying overhead in a helicopter at 400 feet above the ground. This case modeled that observation from above, as long as it is conducted within the confines of Federal aviation regulations and conducted at a reasonable altitude, is not considered a search. In a similar case, *California v. Ciraolo*, police overflew a residence at 1,000 feet above the ground in a fixed wing aircraft and observed marijuana growing in the owner's back yard without any vision enhancement (naked eye). This case established that curtilage (areas surrounding a home) are not protected from observation and no warrant is required to view such areas from above. The Environmental Protection Agency overflew and photographed a Dow Chemical plant and observed violations of regulations. This was determined to be legal and not considered a search in *Dow Chemical Company v. United States*. Protection from the use of advanced technologies in observation, such as thermal imaging, was established in *Kyllo v. United States*. This case essentially restricts aerial observation to naked-eye visual detection, i.e. technologies that are not readily available to the public are not permitted to be used without a warrant (Black, 2013).

State and Local Legislation Efforts

Because the FAA seemingly desires to avoid getting involved in the quagmire of privacy, Congress has recently introduced measures to address the issue. H.R. 1262 (Drone Aircraft Privacy and Transparency Act of 2013) was introduced in March of 2013. This legislation would

amend the FAA Modernization and Reform Act of 2012 to force the Department of Transportation to evaluate privacy issues related to the operation of UAS. It also would restrict UAS use in data collection by law enforcement and requiring warrants for most related missions (Govtrack.com, 2013a). Another House of Representatives bill, H.R. 637 (Preserving American Privacy Act of 2013) aims to amend federal criminal code to insure government entities and law enforcement agencies cannot collect “information that is reasonably likely to enable identification of an individual, or information about an individual’s property that is not in plain view” (Govtrack.com, 2013b, para. 2). This bill principally mandates warrants for data collection except for border security, with consent of observed persons, or in an exigent situation (e.g. terrorism or natural disaster) (Govtrack.com, 2013b). Several other bills were introduced in 2012 – the Preserving Freedom from Unwarranted Surveillance Act of 2012, the Preserving American Privacy Act of 2012, and the Farmer’s Privacy Act of 2012 – all laid standards for controlling law enforcement use of UAS. These acts died or were referred to committees.

Both the Preserving Freedom from Unwarranted Surveillance Act and Preserving American Privacy Act have been reintroduced in 2013. Two proposed laws have been submitted that would prohibit weaponized drones being used on U.S. citizens and in domestic scenarios (Drone Laws, 2013). However, none of these measures have passed (Govtrack.com, 2013c). As such state and local officials have stepped up to introduce legislation to protect the privacy of their citizens (Branham, 2013).

Movements to restrict UAS. There are a number of incidents involving UAS operations that have concerned the public, which in turn have called upon their state and local legislators to introduce measures to restrict or control UAS. The overarching motivator resides with the headlines about drones used in the recent wars abroad (Vincenzi, Ison, & Liu, 2013). Other

instances within the U.S. have also contributed to public concern. In Los Angeles, police used a UAS to monitor hockey fans during the Stanley Cup (Branham, 2013). The Mesa County Sheriff's Office has used UAS for investigations, search and rescue, as well as wildfire monitoring (O'Connor, 2013). The Seattle Police Department planned to implement UAS however, public protest and commentary pressured the city to abandon such plans (Clarridge, 2013).

More extreme examples have raised interest in UAS regulation. In 2012 a man was arrested in North Dakota following a standoff with police. During the conflict, a Predator drone operated by Homeland Security provided surveillance for law enforcement. The man unsuccessfully challenged the use of the drone in court (Koebler, 2012b). Another example occurred in New York City. A small UAS was recklessly flown around the city over crowds of people. The UAS eventually became out of control and crashed into a pedestrian. An individual in Virginia flew their small UAS to film footage for a promotional video. The FAA determined this type of operation, because it was for commercial purposes, was prohibited without a COA and fined the user \$10,000 (Levin, 2013). Lastly, a search for videos shot from UASs on YouTube reveals widespread use of the systems in a variety of situations which may fuel the public concern about safety and privacy (YouTube, 2013).

Cases of state and local restriction of UAS operations. In reaction to public pressure for more profound oversight or constraining the usage of UAS, 43 states considered 96 UAS related bills in 2013. Those that have been realized generally concentrate on UAS usage by law enforcement and their need for warrants to conduct surveillance. Idaho was the first state to successfully implement a law that restricts UAS operations by restricting video and image capture without consent of the individual or the property owner of the area overflown. An

overwhelming majority of bills are either abandoned, referred to committee, or fail to pass. Some states have been proactive in protecting privacy and limiting UAS missions. Virginia recently passed a two year ban on law enforcement UAS. Representatives in Alaska have proposed limits on the use of technology by law enforcement (Bohm, 2013; Alaska, 2013). Unfortunately, “these laws vary widely across states, however, and there is no single national standard that would apply to unmanned aircraft today” (Kapnik, 2012, p. 463) making the operational landscape in the U.S. confusing for manufacturers, owners, and operators.

Another subject that appears in many state bills and laws is restitution for harm imparted onto a bystander. Moreover, some of the legislation is including penalties for violating privacy or circumventing current and proposed laws. As Kapnik (2012) noted, these additions to legislation are founded in the tort of unreasonable intrusion and recourse is available to those who feel that their privacy has been compromised.

Providing further guidance for lawmakers are the court cases involving UAS. Decisions of state courts have often been in contrast to the decisions of the Supreme Court. The Vermont Supreme Court, in *State v. Bryant*, found that a low flying helicopter (at 100 feet) that loitered for 30 minutes was considered to be an unconstitutional search. This was considered to be an unreasonable/atypical operation of the aircraft. In Colorado, the state’s Supreme Court decided in *Henderson v. People* that a series of five overflights by a helicopter at 500 feet was a reasonable use and upheld the surveillance in this case. This case mentioned the need for an aircraft to generate loud noise, dust, or propeller/rotor wash (airflow). Both cases have implications for UAS operations in those states and have influenced legislators in their law making processes (Roberts, 2009). Yet motivation for law making has stemmed from such cases as “in today’s

heightened security climate, security may trump privacy [...] the courts alone may not prove to be enough to fully protect citizens' privacy" (Roberts, 2009, p. 506).

In light of the aforementioned conclusion about the court's inability to fully protect citizens coupled with the slow progress of Federal and state legislation, several local governments have enacted restrictions on UAS. The first city to adopt restrictions for UAS was Charlottesville, Virginia. The initial version of the ordinance called for a "No Drone Zone" (Koebler, 2013b, para. 6) however the final iteration simply limits the purchase and use of UAS by the city. The ordinance also calls on the State of Virginia and Congress to protect citizen privacy through legislative protections (Koebler, 2013b). The second municipality to implement controls on UAS was Northampton, Massachusetts (located in the western portion of the state). In this resolution, the city council prohibited UAS for "surveillance and violent purposes" (WGGB, 2013, para. 2). This resolution also provided some protections for citizen use of UAS: "the airspace above the homes of residents under local control. That would not only prevent the government [...] from using that airspace, but it would also allow people to fly their own drones in that space" (WGGB, 2013, para. 2-3) to assist farmers to be permitted to use UAS above their land.

The city of Syracuse, New York has banned police use of drones until more solid guidance exists concerning privacy. The resolution also urges state and federal legislators to take action (Knauss, 2013). Lastly, St. Bonifacius, Minnesota and Evanston, Illinois adopted resolutions similar to that passed in Charlottesville. In one of the most extreme cases, the Colorado city of Deer Trail is considering legalizing "drone hunting" (Couts, 2013, para. 1) although the vote on the topic was delayed until later in 2014. Other locations that are considering UAS ordinances or legislation include: New York City, Spokane, Washington; Iowa

City, Iowa; and Pierce County, Washington (Drones Watch, 2013; Institute for National Security and Counterterrorism [INSCT], 2013).

Complexities for users and manufacturers

With so many state and local governments entertaining or passing limitations/regulations on UAS operations, the landscape for operators and manufacturers is becoming increasingly complex. As Koebler (2012a) described, the “regulatory mess may hold up domestic drone revolution” (document title). Parsons (2013) agreed noting that many manufacturers and users, represented by AUVSI, are being restrained by regulatory burdens. The confusing and changing regulatory landscape has led to entities purchasing UAS that they are not permitted to use, often spending taxpayer money for the acquisition. In 2012, the Hawaii Department of Transportation purchased a \$75,000 drone they were not able to use due to FAA and local restrictions (Kerr, 2012). The City of Seattle’s plans for UAS implementation for its law enforcement agency was cancelled by the mayor upon strong public resistance (INSCT, 2013). Legislation also complicates the job of manufacturers trying to sell their devices, especially in light of occurrences such as the previously mentioned example. Moreover, the specific mention of damages that can be sought by policy violations found in many of the new bills and resolutions, both operators and manufacturers are likely to be more cautious about investing in operating UAS until modest standards exist across the U.S. (Roberts, 2013).

Method

In order to better understand the current UAS-related regulatory constructs that exist at the state and local levels, an exploratory approach was adopted. According to Patton (1987), “exploratory research relies on the collection of qualitative data and inductive analysis because

sufficient information is not available” (p. 37) about a specific topic. Specifically, typological analysis was selected based on the following explanation:

On occasion, the topics under study seem to possess some complex but systematic interrelation [... the] process of charting possibilities that result from the conjunction of two or more variables is [...] called [...] typologizing [...]. Typologizing thus helps to make an analysis more systematically coherent, and by showing logical possibilities, it can sometimes call attention to existing but unnoticed patterns (Lofland, Snow, Anderson, & Lofland, 2006, p. 148).

LeCompte and Preissle (as cited by Hatch, 2002) further defined “typological analysis as ‘dividing everything observed into groups or categories on the basis of some canon for disaggregating the whole phenomenon under study’” (p. 152). This study utilized the recommended protocol documented by Hatch (2002):

1. Identify typologies to be analyzed
2. Read the data, marking entries related to your typologies
3. Read entries by typology, recording main ideas in entries on a summary sheet
4. Look for patterns, relationships, themes within typologies
5. Read data, coding entries [...]
6. Decide if your patterns are supported by the data, and search the data for non-examples of your patterns
7. Look for relationships among patterns identified
8. Write your patterns as one-sentence generalizations
9. Select data excerpts that support your generalizations (p. 153).

The creation of typologies was guided by the standards set forth by Lofland, et al (2006) in which typing should be both mutually exclusive and exhaustive. Thus, types were chosen so that a law or proposed legislation could only fall within one type. Also, all items would fall into one of the available categories. The actual typologies were gleaned from the studies by Vincenzi, Ison, and Liu (2013), Kapnik (2012), and Roberts (2009). In addition, further guidance for typological development was garnered from other publications utilizing this method of research (Hofmann, 2003; Siekmann, 2013; Yung, 2013).

Subjects

The unit of analysis for this study was the law/resolution/enactment or its proposed equivalent. Only such items developed by states and local governments were included.

Sampling

Criterion sampling was used to select all laws or proposed laws put forth by state and local governments that were currently in place or proposed by December 31, 2013 and were available for download online (Patton, 2002). Searches of multiple sources insured comprehensive coverage of existing legislation.

Research design

Typologies were developed in accordance with previous research (Hofmann, 2003; Kapnik, 2012; Roberts, 2009; Siekmann, 2013; Vincenzi, Ison, & Liu, 2013; Yung, 2013). Typology notation worksheets (see Appendix A) were created and distributed to the authors of this study. The typological categories were:

- Status (passed, partial passed, abandoned, failed, or proposed)
- Privacy considerations *specifically* mentioned
- Special exemptions were/were not given for law enforcement

- Terrorism
- Exigent circumstances
- Warrant/probable cause
- Other
- Remedy/damages identified/not identified
 - Specific monetary remedy
 - Civil remedy
 - Misdemeanor
 - Other
- Covers/regulates non-law enforcement usage/not covered
- Special exemptions for non-law enforcement usage/no exemptions
- Evidence obtained outside the confines of the bill inadmissible/not mentioned

Researchers participated in a training briefing to insure standardized usage of the typology worksheet. Each piece of legislation was downloaded from web sources and distributed to the authors of this study. Individual legislative components were analyzed using the typology notation worksheet. Once the data notation process was completed, it was merged for analysis and presentation. A *post hoc* researcher meeting was conducted to evaluate the patterns and findings of the data analysis process.

Results

Sixty-eight state and nine local laws and proposed laws were analyzed using the typological analysis form. Among the state legislative items, fourteen (20.3%) have been enacted while 42 (60.9%) were still only in proposed stage. Four items (5.8%) passed one legislative body while 6 items (8.7%) failed due to unsuccessfully being passed by one legislative body.

Two (2.9%) of the proposals were abandoned before moving forward from committee or discussion (see table 1 and figure 1). When specifically examining legislation for the mention of the word “privacy,” 36 (52.9%) included provisions for the protection of citizen privacy. In terms of allowances for the use of UAS by law enforcement, 27 (39.7%) permitted their use for terrorism threats, 47 (69.1%) make allowances for exigent circumstances, and 54 (79.4%) specifically required a warrant or probable cause. During the analysis, additional exemptions were noted with consent (8.7%), when a convict is fleeing (5.8%), during an Amber alert/missing persons (5.8%), and firefighting (4.3%) were the most prevalent. Others included search and rescue, border patrol, natural disaster, and the use by the owner of the property over which the UAS was utilized.

Table 1

Status of State Legislation

Passed	Partially passed (one body)	Abandoned	Failed (one body)	Proposed
14 (20.3%)	4 (5.8%)	2 (2.9%)	6 (8.7%)	42 (60.9%)

When evaluated for potential remedies for violations of UAS restrictions, fourteen (20.5%) specified a monetary value, 27 (39.7%) offered civil remedies, and fifteen (22.0%) classified occurrences as misdemeanors. Additionally, 10.1% indicated the potential charging of a felony and 2.9% involved possible prison time. Most (77.9%) did not cover/regulate non-law enforcement usage and 73.5% made no special exemptions for non-law enforcement activity.

Thirty-eight (55.9%) provided protection from evidence obtained outside the provisions of the legislation.

Some common themes that were noted among law enforcement restrictions included a prohibition of the use of weaponized systems, data collection restrictions, the requirement to delete data after a given time period, the inability to use incidental data collected on missions targeting a specific individual, requirements to strictly define the mission for one purpose (one target), and the tracking and reporting of UAS usage to legislative bodies at the end of each year.

The state legislation was then divided into two groups – passed and not passed/proposed. Among the enacted legislation, 100% included privacy protections. Law enforcement exemptions for anti-terrorism applied to 35.7% of cases, exigent circumstances was 28.6%, and warrant/probable cause was mentioned in 64.3% of items (see table 2). Specific money for remedy was noted in 28.5% of legislation, 50% included civil remedies, and 28.5% indicated a misdemeanor would be applicable. Over 64% of passed legislation omitted non-law enforcement usage or exemptions and 78.6% neglected to provide protections from evidence collected in contrast to the law (see tables 2 & 3).

Legislative Activity

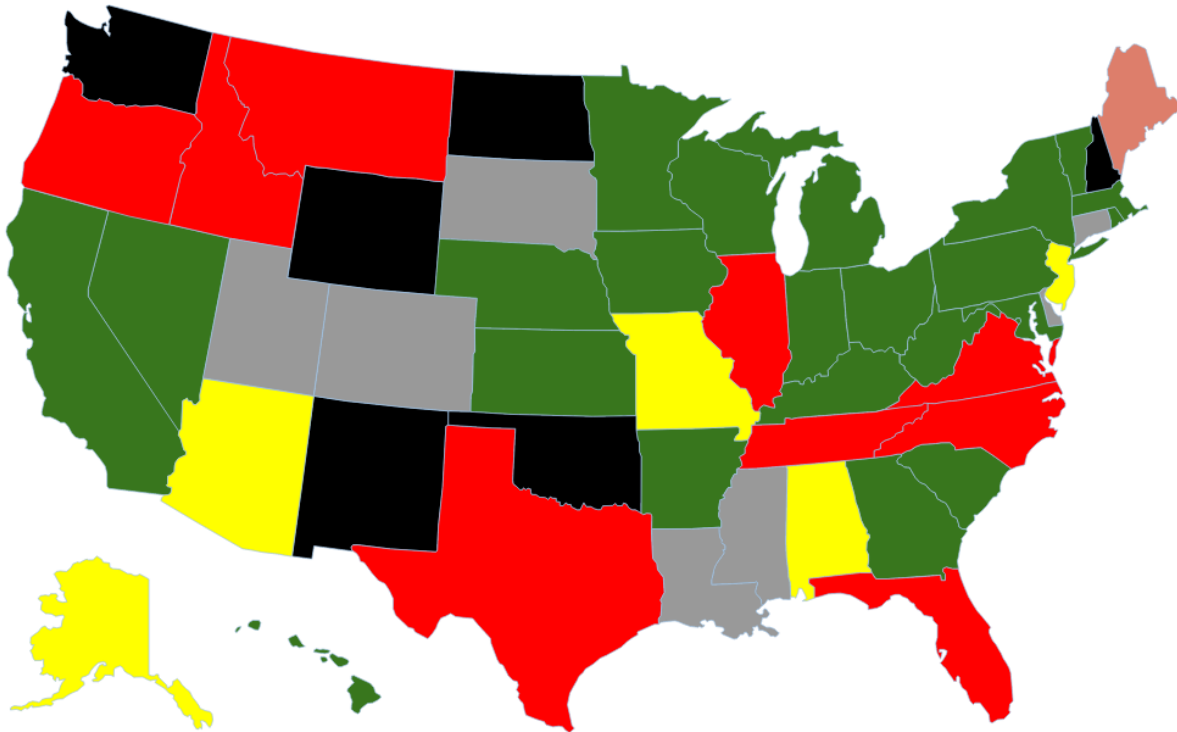


Figure 1. Status of state legislation.

[Note: red (passed/enacted), light red (passed but vetoed), yellow (partial pass), green (proposed), black (died in last session), grey (no legislation).]

Among the local legislation, four (44.4%) was adopted versus five (55.6%) that were not. Only four (44.4%) included privacy concerns. No local items made provisions for law enforcement in light of terrorist activities, 22.2% did so for exigent circumstances, and 33.3% when a warrant or probable cause was assured.

Table 2

Special Exemptions for Law Enforcement Use

	Anti-terrorism	Exigent Circumstances	Warrant
<u>Proposed/not passed (n = 52)</u>	23 (44.2%)	38 (73.0%)	54 (84.6%)
<u>Passed (law) (n = 14)</u>	5 (35.7%)	4 (28.6%)	9 (64.3%)

Table 3

Remedies for Violations of UAS Legislation

	Specific Monetary	Civil	Misdemeanor
<u>Proposed/not passed (n = 52)</u>	10 (19.2%)	27 (38.5%)	15 (21.1%)
<u>Passed (law) (n = 14)</u>	4 (28.5%)	7 (50.0%)	4 (28.5%)

Table 4

Comparison of State and Local Legislation

	Anti-terrorism	Exigent Circumstances	Warrant
<u>State (n = 68)</u>	27 (39.7%)	47 (69.1%)	54 (79.4%)
<u>Local (n = 9)</u>	0 (0.0%)	2 (22.2%)	3 (33.3%)
	Specific Monetary	Civil	Misdemeanor
<u>State (n = 68)</u>	14 (20.5%)	27 (39.7%)	15 (22.0%)
<u>Local (n = 9)</u>	4 (4.44%)	0 (0.0%)	3 (3.3%)

In terms of remedies, 44.4% made provisions for monetary penalties, none allowed for civil recourse, and 33.3% indicated a misdemeanor would be charged. None of the local legislation covered non-law enforcement usage, 44.4% did provide exemptions for non-law enforcement activities mostly for hobbyists and land owners, and only one (1.1%) had a provision for protecting citizens from illegal data collection via inadmissibility of such information in court. Several localities called for the prohibition of weaponized UAS. A majority (66.7%) provided for “drone free” zones or prohibitions of municipalities from purchasing and/or using UAS. See table 4 for a comparison of state and local legislation.

Discussion

Over the past two years, there has been a significant increase in the discussion of UAS and the need to potentially control or monitor their use at the federal, state, and local levels. This has been brought forth with the Congressional mandate for UAS integration as well as the various actions and comments made by the FAA. During 2013, there was a flurry of legislative activity at the state and local levels, most likely due to the lack of enactment of UAS legislation at the federal level. Moreover, activism by the ACLU, Code Pink, and other groups prompted lawmakers to at least bring up the concept of control or restriction of UAS activity. While there clearly has been public pressure on legislators, it does not appear that all of them are yet thoroughly convinced about the need to create laws that control or restrict UAS activity. Considering that less than 25% of measures proposed were passed at the state level and less than 50% were passed at the local level, there appears to be motivation to show restraint in this regard.

For both state and local entities, the passage of laws can be a double-edged sword. Too much restriction can limit the positive economic impacts that are potentially available from UAS investment in their constituency. When several states and cities created their resolutions, representatives were cautious to include wording that would allow for the potential adoption of UAS at some point, carefully avoiding an all-out ban.

One surprising finding is that just half of the proposals specifically addressed privacy. In contrast, all adopted legislation did include privacy as a focus although some of those items that did not pass alluded to it through other commentary. It does appear that a primary focus was the ability of law enforcement to utilize and store data. This can be seen by the majority of proposals including the need for warrants or probably cause to allow for observation. Over 55% (78.6% in

passed laws) of state legislation required that evidence collected outside the restrictions laid forth within would require such data to be excluded from admissibility in prosecution. Certain legislation also called for specific targeting of criminal activity while simultaneously excluding the collection or storage of any incidental observations. This goes against case precedent in aerial observation and will most likely require court cases to test and form the relationship between the legislative and judicial branches.

Interestingly, in exigent circumstances legislators felt more comfortable allowing UAS missions, as with the threat of terrorism. Also, in light of recent events (e.g. the Boston Marathon bombing), it appeared that legislators were cognizant of cases in which UAS could be very helpful to the public good. Firefighting, natural disasters, and search and rescue are perfect venues for the positive use of UAS and it is clear that some legislators were willing to protect such provisions. Although some states were keen on setting remedies for violations of legislation, it did not appear to be a clear priority with less than 20% (28.5% in passed laws) calling for monetary damages or misdemeanors, although almost 40% (50% in passed laws) did allow for civil remedy and in extreme cases calls for felony charges were advocated. Again, this will likely need to be tested in the court system in order to fully realize how it may influence future legislation.

It is also clear that state legislation has been focused on controlling law enforcement practices and operations, as the majority of proposed and passed items avoided restricting or allowing for exemptions for non-law enforcement activity. Some items did specifically mention omissions for hobbyists and land owners using UAS above their own properties. Clearly, this is another instance where courts will likely need to create or interpret cases on an individual case by case basis for the creation or sustenance of precedent.

Cities appeared to be just as cautious about approving restrictions as less than half of proposals have made it into resolution. Municipalities and local governments were also less interested in remedies and exemptions. Even in light of this, more than half invoked “drone free” zones and the prohibition of use or purchase of UAS by the local entity. It remains unclear whether more localities will follow suit. It will also be interesting to see how relationships between state and local legislation play out in the court system if laws are not aligned.

Finally, it appears that “hot spots” of activity are hard to measure as there are limited geographic patterns, it does appear that border and coastal states are more apt to adopt restriction. Also, interestingly, states in which UAS activity has been regularly taking place in academia and other research seem to be less keen on adopting significant limitations. In fact, some legislation did give exemptions for higher education institutions. Moreover, almost all states and localities exempted the military, in particular the local National Guard, from any limitations imposed by legislation.

Conclusion

Through the paced activity by legislators to introduce and pass legislation restricting or limiting the use of UAS, it is clear that lawmakers and their constituents are seeking more concrete guidelines and protections in light of limited federal involvement. Only when Congress successfully passes more robust strategies for dealing with the integration of UAS in the NAS will states and local governments have the ability to relax their perceived need to protect themselves through their own actions. It will be of interest to see how well aligned federal, state, and local legislation is once adopted. Clearly, the legal system will need to resolve many of the questions that remain following a miscellany of different laws scattered across the U.S. At the same time, manufacturers and users will have to await more clear rubrics, and how the courts

may interpret them, prior to feeling comfortable in bringing UAS operations to their full capabilities. Unfortunately, only time will tell what and when will be permitted under the laws of the U.S., its individual states, and locales. Furthermore, court cases, both novel and interpretive, will be required to solidify the legal environment for the UAS community.

Recommendations for Future Research

Based upon the findings of this research, the following future studies are recommended:

1. An update of this study should be conducted at the end of 2014 to monitor changes to the UAS legislative landscape.
2. A content analysis of news stories and advocacy group statements should be made to better understand concerns and perspectives shaping the impressions about UAS put forth to the public and legislators.
3. A content analysis of successfully passed laws and resolutions should be conducted to provide a more detailed view of the current legislative landscape.

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Appendix A

Typologies

State name:

Passed (as law)	Partial Pass (one body)	Abandoned	Failed (did not pass one body)	Proposed

Privacy protections	No privacy protections
Special exemptions for law enforcement (mark below)	No special exemptions for law enforcement
Terrorism/threats	
Exigent circumstances	
Warrant/probable cause	
Remedy/damages identified (mark below)	Remedy/damages not mentioned
Specific monetary	
Civil	
Misdemeanor	
Covers/regulates non-law enforcement usage	Non-LE usage not covered/regulated

Special exemptions for non-law enforcement	No special exemptions for non-LE
Evidence obtained outside confines of bill inadmissible	Evidence admissibility not mentioned

Notes: