

# Potential Uses and Considerations Regarding the Use of UAS Technology in Assessment

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## Current climate surrounding UAS use

Unmanned aerial systems (UAS) traditionally have been used by the military but are quickly becoming increasingly more attractive for use in commercial and local government applications with huge potential being recognized for property review and inspection. Interest in UAS and the emergence of the technology is rapidly expanding but there are challenges that need to be overcome before it becomes standard operating procedure.

Currently, the use of UAS in commercial applications is only allowed with an exemption from the Federal Aviation Administration (FAA) under Section 333 of the *FAA Modernization and Reform Act of 2012* (FMRA).

The FAA is currently developing the regulatory framework on a five-year roadmap to safely integrate small UAS into routine National Airspace System (NAS) operations. Under this section, the FAA Secretary can decide whether to grant an exemption if the UAS will not pose a hazard to users of the NAS or pose a threat to the public or national security.

Many local government departments across the country, in particular law enforcement agencies, have begun using UAS; sometimes without the knowledge of their governing bodies. This was the case in 2012 when the Seattle city council learned about its police department's usage of drones after the FAA was forced to release its list of authorizations due to the Electronic Frontier Foundation's lawsuit under the Freedom of Information Act to obtain the list of approvals.

There is much concern from the general public and groups such as the American Civil Liberties Union regarding privacy of citizens. In Seattle, the police department addressed this by stating that the use would be "limited to situations like crime scene photography, missing person searches and barricaded person scenarios."

Many public fears are being eased somewhat by the realization of the possibilities this technology can bring in terms of its use for critical situations including disaster recovery, search and rescue as well as inspection, repair and maintenance of infrastructure such as bridges and roads.

The popularity, use and sophistication of UAS is significantly increasing at a rapid pace with little compliance or oversight. For example, the manned aircraft industry is subject to standardized design specifications to ensure safe operations whereas the unmanned industry does not have any design or safety standards. This makes it challenging to apply basic FAA guidelines to the civil UAS industry.

Many state and local governments have begun instituting their own policies and regulations citing the need to protect the health and safety of residents. In many cases, UAS may be operating closer to the ground in Class G airspace where Air Traffic Control has no authority or responsibility to control air traffic. While UAS may not pose much, if any, interference with the NAS in Class G space, there are still visual flight rules to which operators would need to adhere. Most of the discussions taking place on the state or local level surround approved uses, safety and privacy concerns.

Interpretation of regulations and standards needs to be reviewed and addressed by the FAA with the input and support of the commercial and local government user community. It is critical for the FAA to understand the various implications and different uses for each segment and it can only do so by working closely with potential users and understanding the applications.

This is where industry collaboration groups, such as the recently formed Property Drone Consortium ([www.propertydrone.org](http://www.propertydrone.org)), play an important role not only as a conduit to federal governmental agencies such as the FAA, but by also investing in research and development of commercial and governmental solutions that meet strict standards for safety, operations and technology.

## Assessing the value of properties using aerial imagery from manned systems

Many tax assessment offices across the United States are currently using aerial imagery to fairly and equitably assess property values for purposes of taxation and have been for the last 15 years.

Pictometry International Corp., an EagleView Technology Corporation company, pioneered the aerial image capture industry with the development of Intelligent Images® – those captured at a 45-degree angle with each pixel georeferenced in order to be actionable. The company provides analytical tools that allow users to extract data from the images as well as perform basic measurements.

In past years, the only way to inspect the condition of a property to adequately assess its value was to send an inspector to the site who used a camera to snap photos and made notes on a clipboard to be reviewed after returning to the office. This is a costly and resource-intensive method. Within the last 15 years, the shift has been to utilize high-resolution aerial imagery captured by manned aircraft equipped with special cameras.

The International Association of Assessing Officer (IAAO) provides guidelines and regulations for tax assessors for the valuation and mass appraisal of properties. The IAAO *Standard for Mass Appraisal of Real Property* states that the use of aerial imagery is an acceptable method to supplement field inspections through computer-assisted office review. The standard allows for the use of oblique aerial photographic images capable of being used for measurement verification, updated at least every two years in rapid-growth areas or five years in slow-growth areas.

The issue of privacy arises on occasion when a jurisdiction decides to begin using aerial imagery and evaluation systems such as Pictometry's but is often quickly addressed when residents understand that the images are captured on a schedule of once every two years and do not involve satellites or real-time monitoring.

The use of aerial imagery by tax assessment offices has led to improved communications with citizens and reductions in disputes. In cases where there is a dispute, the assessor and property owner are able to view the property together, discuss concerns and eliminate confusion to quickly resolve issues.

Most jurisdictions using manned capture of aerial imagery are gathering images of more populated areas that is taken at a four- to six-inch ground sample distance (GSD), resulting in a photo with a resolution of four- to six-inches per pixel. In more rural, or less populated geographic areas, imagery is more likely to be captured at a nine-inch GSD.

In order to capture four- to six-inch GSD imagery, the plane flies lower and makes more passes over an area which is ideal for urban areas or those with greater population density. This takes longer and uses more fuel to complete the collection of images so it doesn't always make sense for more rural areas where a plane flying higher can capture a wider area per pass. The resulting imagery is usable for evaluation and basic measurements but can lack some of precise details provided by the higher-resolution images. This is where the use of UAS technology can make a huge impact in the property assessment sector, allowing cost-efficient evaluations in more rural areas of jurisdictions.

## Potential benefits derived from the use of UAS technology in property assessment

Current image technology in manned aircraft allows for the capture of images at a ground sample distance of up to one-inch per pixel. While this level of clarity provides an excellent level of detail for

assessing and understanding properties, as mentioned previously, it can be cost prohibitive, requiring lower, slower passes from the aircraft.

The use of UAS for valuation offers tremendous potential at significantly reduced costs, particularly in more rural areas and when review of current aerial imagery deems that a closer inspection is required. Imagery provided by manned aircraft is typically enough to fairly assess a property but there are circumstances where an assessor may need a closer look that currently can only be accomplished through a site visit.

For example, today many jurisdictions rely on change detection services that compare new aerial imagery and building outlines to previous years' image captures. Properties that may have undergone a change are flagged for review. Assessors review those properties by comparing the current and past images side by side on the computer monitor. Often the comparison leads to questions that with today's methods may require a physical site visit.

The use of UAS technology could potentially allow the assessor to compile a list of addresses requiring a closer look, and engage the UAS to capture a closer inspection through still images or a video tour of the properties and locations in question. Properties could be reviewed on a more efficient basis without the need for additional staff or contract workers to help with the reviews. In rural areas, time savings would be key as well as the ability to see improvements or changes that would otherwise not be able to be seen from the road.

There are large implications for improving the safety of assessors as well. The reduction of site inspections mean less time on the road for the assessors, decreasing the likelihood of accidents and lessens the chances of run-ins with angry dogs, protecting their territory from intruders.

## Technical considerations for the use of UAS in property assessment

These uses are exciting and may seem easy to implement but it's important to remember that the technology behind the UAS and its cameras are vital to capturing high-resolution, georeferenced accurate information and data. There are many hobbyist videos available on the Internet that demonstrate why not all UAS are ideal for assessment use. Images often appear with a fish-eye effect, flight paths are often not smooth in the case of video capture and beyond a visual view, there is no ability to extract data such as property owner, elevation, etc. – information that is vital to fair and equitable assessment of properties.

EagleView Technology Corporation's goal through the formation of the Property Drone Consortium (PDC) is to leverage the patented technologies developed by Pictometry over the last 15 years to develop UAS systems and software solutions for interacting with the images and data that meet the needs of property assessment as well as other property review uses in various industries including the insurance, construction and infrastructure markets.

### *Not all UAS are equal – the importance of a reference platform*

The PDC's scope of work includes the establishment of a reference platform that will develop approved standards for hardware and software specifications in the manufacture of UAS. As discussed earlier, unlike manned aircraft, there are no current guidelines for the design and construction of unmanned aerial vehicles (UAV).

The systems must have ease of use with the ability to fly programmed flight paths. There must be significant consideration behind safety requirement to ensure that the technology supports collision avoidance and offers the ability to bring the system down for a safe landing in the event of program errors or in low battery situations. Battery life will be an important aspect to the reference platform as it relates to UAV's.

Imagery acquisition is the main purpose for using UAS in commercial and government applications and not all image acquisition systems are sufficient to allow for accurate assessment. There needs to be minimum camera and lens recommendations established and in addition, the need for image storage and upload capabilities has to be addressed.

The last concern is security. Who will have access to the images or video captured by the UAS? What are the guidelines for secure storage and backup? How will the images be accessed by those determined to have usage permission? How will personal, identifying information be protected?

### *Establishment of software and service standards*

Before anyone attaches a camera to a UAV to capture imagery for assessment, predetermined data components will need to be identified. In regards to the data, standards will need to be in place to address formatting, storage size, location of files and uploading of data.

Research and development needs to be done to ensure that the images, video and data captured seamlessly integrate into finished products. It should be part of existing workflows and not require

additional steps to ensure that the data is utilized. The PDC envisions a solid, cloud-based software-as-a-service system that incorporates into existing processes for whatever industry is utilizing the data.

### *Navigating the regulatory environment and public education*

The PDC has key members in the property data industry including insurance carriers and construction associations that will unite lobbying efforts to address: FAA approvals, privacy issues, public safety issues surrounding operators and citizens, the need for certificates of approval for operators and how UAS technology can be a key factor in disaster response programs.

In addition to lobbying there needs to be a lot of effort put into education. UAS operators must be educated and trained to understand safety factors involved in the operation of the system and what to do in the event of emergency, with certification for operation being optimal. Equally important is the education of property owners. It's critical that the public understand exactly what data and information is being gathered, how it is being used and who has access to the data. There is a general mistrust and fear of big brother watching surrounding the use of aerial imagery that is heightened when extended to the use of UAS because they are able to capture a much closer view than that of traditional manned aircraft.

### **Making UAS in assessment a reality**

There is still much work to be done before the use of UAS in assessment becomes a reality. The Property Drone Consortium is the first step in bringing industry leaders together to promote research, development and the establishment of regulations for the use of UAS technology across multiple industries.

The consortium's goal is to develop property-specific hardware and software solutions in 2015. Chris Barrow, EagleView CEO and president, chairs the not-for-profit, research LLC consortium and is confident of the group's ability to deliver. "We believe EagleView's twenty years of developing aerial solutions that capture property information, coupled with the expertise of the charter members in property conditions, claims and underwriting disciplines, will enable the consortium to provide strong and stable information and education to drive regulatory change and development of the usage of drones for data collection throughout the insurance and construction industries," explained Barrow.