UNIVERSITY of WASHINGTON

Livable City Year 2018–2019
in partnership with
City of Bellevue

CITY OF BELLEVUE

In Partnership with the
University of Washington

APPLICATIONS AND CONSIDERATIONS FOR UAS TECHNOLOGY

FOR THE CITY OF BELLEVUE, WASHINGTON

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LIVABLE
CITY YEAR

Livable City Year 2018–2019
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Connor Yi (center) and Olga Ivanova (left) present their analysis to City of Bellevue staff. TERI THOMSON RANDALL

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Unmanned aerial systems (UAS) can capture aerial views for law enforcement operations. MARIANNA IANOVSKA

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ABOUT LIVABLE CITY YEAR

The University of Washington's Livable City Year (LCY) initiative is a partnership between the university and one local government for one academic year. The program engages UW faculty and students across a broad range of disciplines to work on city-defined projects that promote local sustainability and livability goals. Each year hundreds of students work on high-priority projects, creating momentum on real-world challenges while serving and learning from communities. Partner cities benefit directly from bold and applied ideas that propel fresh thinking, improve livability for residents, and invigorate city staff. Focus areas include environmental sustainability; economic viability; population health; and social equity, inclusion and access. The program's 2018–2019 partner is the City of Bellevue; this follows partnerships with the City of Tacoma (2017–2018) and the City of Auburn (2016–2017).

LCY is modeled after the University of Oregon's Sustainable City Year Program, and is a member of the Educational Partnerships for Innovation in Communities Network (EPIC-N), an international network of institutions that have successfully adopted this new model for community innovation and change. For more information, contact the program at uwlcy@uw.edu.

LIVABLE CITY YEAR

ABOUT CITY OF BELLEVUE

Bellevue is the fifth largest city in Washington, with a population of more than 140,000. It's the high-tech and retail center of King County's Eastside, with more than 150,000 jobs and a skyline of gleaming high-rises. While business booms downtown, much of Bellevue retains a small-town feel, with thriving, woodsy neighborhoods and a vast network of green spaces, miles and miles of nature trails, public parks, and swim beaches. The community is known for its beautiful parks, top schools, and a vibrant economy. Bellevue is routinely ranked among the best mid-sized cities in the country.

The city spans more than 33 square miles between Lake Washington and Lake Sammamish and is a short drive from the Cascade Mountains. Bellevue prides itself on its diversity. Thirty-seven percent of its residents were born outside of the US and more than 50 percent of residents are people of color, making the city one of the most diverse in Washington state.

Bellevue is an emerging global city, home to some of the world's most innovative technology companies. It attracts top talent makers such as the University of Washington-Tsinghua University Global Innovation Exchange. Retail options abound in Bellevue and artists from around the country enter striking new works in the Bellwether arts festival. Bellevue's agrarian traditions are celebrated at popular seasonal fairs at the Kelsey Creek Farm Park.

Bellevue 2035, the City Council's 20-year vision for the city, outlines the city's commitment to its vision: "Bellevue welcomes the world. Our diversity is our strength. We embrace the future while respecting our past." Each project completed under the Livable City Year partnership ties to one of the plan's strategic areas and many directly support the three-year priorities identified by the council in 2018.

CITY OF BELLEVUE WASHINGTON

BELLEVUE 2035:
THE CITY WHERE YOU WANT TO BE

Applications and Considerations for UAS Technology for the City of Bellevue, Washington supports the *High Performance Government* target area of the Bellevue City Council Vision Priorities and was sponsored by the City Manager's Office.

HIGH PERFORMANCE GOVERNMENT

Bellevue is characterized by high performance government. Our residents live in a safe, clean city that promotes healthy living. The perception of safety contributes to the success of businesses and neighborhoods. Police, fire and emergency personnel are seen by citizens every day, and we ensure that these services reflect high standards and pride.

People are attracted to live here because they see that city government is well managed. Our high quality of customer service ensures that residents realize a direct link between their tax dollar investments and the services they receive. We make public investments wisely, assuring taxpayers that we are living within our means, while also ensuring that we have superb infrastructure to support growing businesses and desirable residential opportunities. We have beautiful public buildings that residents point to with pride. Government plays its role in supporting the careful balance of neighborhoods, commercial and retail growth, diverse residential living opportunities, and amenities that characterize Bellevue. City leadership fosters careful, long-term planning, responsible financial policy, and thoughtful partnerships with businesses, the nonprofit sector, and the region.

We seek input from our residents and businesses, and this input informs city decision-making. We make decisions in a transparent manner. We support public engagement and connectivity. Bellevue does its business through cutting-edge technology. City government uses technology to connect with its residents, giving them voice in their community. Our boards, commissions, and other citizen advisory groups assist the City Council in providing superior leadership by representing the diverse interests of the city and providing thoughtful and creative ideas that assure sound policy direction and decisions.

Our residents care for Bellevue. They speak up and collectively work to address our mutual needs. In Bellevue, our commitment to public service is paramount. Our residents know that their local government listens, cares about, and responds to them.

BELLEVUE 2035:
THE CITY WHERE YOU WANT TO BE

Bellevue welcomes the world. Our diversity is our strength.
We embrace the future while respecting our past.

The seven strategic target areas identified in the Bellevue City Council Vision Priorities are:

ECONOMIC DEVELOPMENT
Bellevue business is global and local.

TRANSPORTATION AND MOBILITY
Transportation is both reliable and predictable. Mode choices are abundant and safe.

HIGH QUALITY BUILT AND NATURAL ENVIRONMENT
From a livable high-rise urban environment to large wooded lots in an equestrian setting, people can find exactly where they want to live and work.

BELLEVUE: GREAT PLACES WHERE YOU WANT TO BE
Bellevue is a place to be inspired by culture, entertainment, and nature.

REGIONAL LEADERSHIP AND INFLUENCE
Bellevue will lead, catalyze, and partner with our neighbors throughout the region.

ACHIEVING HUMAN POTENTIAL
Bellevue is a caring community where all residents enjoy a high quality life.

HIGH PERFORMANCE GOVERNMENT
People are attracted to living here because they see that city government is well managed.

For more information please visit: https://bellevuewa.gov/city-government/city-council/council-vision

EXECUTIVE SUMMARY

The student team encourages the City of Bellevue to continue incorporating community input and involvement as it plans to implement UAS technology in City departments.

During the winter quarter of the 2019 academic year, the City of Bellevue partnered with the University of Washington Livable City Year (UW LCY) program for a project centered on unmanned aerial systems (UAS) technology and its potential application for the City of Bellevue's various departments. The City of Bellevue has conducted research regarding the use of this technology (also referred to as "drones"), not only for work performed for the City, but also for other public entities. A variety of departments have been involved in this research, including the City Attorney's Office; the City Manager's Office; the Parks and Community Services Department; and Bellevue Police, Fire, Utilities, and Transportation departments. In this report, the student team's requests for information on UAS research from city staff, public agencies, or others entities is evaluated on a case-by-case basis.

These various departments have indicated that UAS technology could provide support and/or assistance to public safety programs (e.g., police, fire, security, and emergency services), or be used in the implementation of large-scale public projects and other public services. Private entities have also approached the City regarding the use of UAS for a variety of marketing purposes. Therefore, Bellevue could benefit from establishing policies and procedures for UAS use and engaging the public in understanding the implementation, implications, and limitations of this technology.

The purpose of this project is to provide recommendations for the City of Bellevue's approach in employing UAS technology for public safety assistance and support of essential city services. In cooperation with the City of Bellevue staff, students from the UW LCY program developed a scope of work and defined specific research plans for the project. The student team's objective is to assist the City of Bellevue in reviewing applicable federal and state laws regarding the use of UAS technology, including privacy, property, and safety laws, and to outline policy recommendations and potential challenges for the city to consider.

In developing a policy strategy, the UW LCY team based its research and methodology on the understanding of best practices from local government entities that have already employed UAS technology, including the processes and procedures put into place to facilitate the implementation of public UAS use. The student team encourages the City of Bellevue to continue incorporating community input and involvement as it plans to implement UAS technology in City departments. The team also recommends that the City establish explicit and transparent limitations on use policy, including: (1) banning the weaponization of UAS, (2) limiting the use of data collection, retention, and dissemination, and (3) ensuring that UAS activities do not infringe upon First Amendment rights or discriminate against persons based upon their ethnicity, race, gender, national origin, religion, sexual orientation or gender identity. We also recommend that the City provide effective oversight procedures for agencies' deployment of UAS technology.

This report also presents public engagement strategies for potential UAS use that the City of Bellevue can consider. Students developed strategy proposals and recommendations through in-depth interviews with representatives from various departments for the City of Bellevue, through consistent communication with the UW Technology Law and Public Policy Clinic, and through comprehensive research of successful UAS policies enacted by local governments across the United States. By focusing on community outreach and assessing the current landscape of municipal UAS laws, the City of Bellevue can successfully implement UAS technology to substantially improve the capabilities, efficiency, and safety of essential city services.

Unmanned aerial systems (UAS) technology can assist in citywide public safety programs.
RICARDO GOMEZ ANGEL

INTRODUCTION

Various departments have indicated that UAS technology could benefit the city by providing support to public safety through police, fire, security, and emergency services.

Unmanned aerial systems (UAS) technology has significant implications across many platforms, such as privacy, federal laws, state laws, property laws, and safety. Federal Aviation Administration (FAA) licensing and registration requirements regulate the implementation of this technology across these platforms. This project seeks to develop, identify, and analyze the implications of using this technology to support city services. The City of Bellevue has performed extensive background research regarding the use of UAS for various departments including the City Attorney's Office, Police, Fire, Utilities, Parks, and Transportation. These departments have indicated that UAS technology could benefit the city by providing support to public safety through police, fire, security, and emergency services.

The City of Bellevue has commissioned this project to the Technology Law and Public Policy Clinic (Technology Clinic) at the University of Washington School of Law in order to provide additional evaluation and assessment of current trends in UAS policy. By researching how other cities and local government entities employ this technology, our team has been able to identify ways in which the City may effectively implement UAS operations for its Police and Fire Departments.

POTENTIAL USES OF UAS FOR PUBLIC SAFETY

From collision reconstruction to search and rescue operations and rapid fireground assessment, UAS technology can be used as innovative and beneficial apparatuses for law enforcement and fire department operations. UAS technology has increased in popularity in recent years, and the relatively low cost of UAS technology enables more agencies to access them. Public agencies across the country are using this technology for various activities related to public safety. According to a report from the Center for the Study of the Drone at Bard College in New York, at least 910 police, fire, and emergency-service agencies nationwide have employed UAS technology (Dukowitz 2018). These public safety agencies use UAS technology to help ensure the safety of communities and to assist in essential operations such as assessing and reconstructing collision scenes, locating missing persons, detecting fleeing suspects from crime scenes, and providing quick analysis of fires and emergency events before firefighters enter the scene.

Unmanned aerial systems (UAS) technology can assist in ensuring the safety of communities. WEBAGENTUR MEERBUSCH

UAS technology can reduce five hours of on-site work time to three hours or less.

TRAFFIC COLLISION RECONSTRUCTION

Quick clearance of collision scenes is one of the most important elements of managing traffic collisions and ensuring the safety of officers and others on the roadway. However, quick clearance cannot occur until the scene of an collision is documented.

UAS can significantly reduce the amount of time and money required to document and clear traffic collision scenes, while also providing investigators with comprehensive data to determine how collisions occur.

Law enforcement agencies can use this technology to capture aerial views of scenes and digitally reconstruct them in easily accessible, three-dimensional models for detailed analysis.

Additionally, using UAS in traffic collision reconstruction can help City departments mitigate financial costs and reduce labor. For example, the Police Department of Lake County, Illinois launched its UAS program in 2017, and estimates that this technology reduces five hours of on-site work time to three hours or less (Susnjara 2017).

SEARCH AND RESCUE

UAS technology is well suited for search and rescue operations because these devices can scan a large area within a short time frame. By using UAS to aid in rescue operations that involve dangerous terrain, law enforcement agencies can reduce costs and physical risks to law enforcement agents.

In May 2013, the Royal Canadian Mounted Police became the first known police department to successfully use an unmanned aerial system in a search operation (Connor 2015). The agency deployed a UAS equipped with infrared technology, which picked up a heat signature from the distressed individual when a helicopter with night vision failed to do so.

Additionally, in June 2017, a Colorado rescue team used this technology to locate lost hikers in a pine forest. The use of UAS saved hours of time that would have been required to find the hikers using search dogs, and thousands of dollars that would have been required to use a helicopter (*More Police Departments* 2017). The use of UAS can also be very beneficial in locating missing children and people with disabilities. For example, in February 2019, the Police Department of Fremont, California, used UAS technology. equipped with an infrared camera to find a teenage boy who had run away from the California School for the Deaf (Ravani et. al. 2019).

Another example took place in November 2017, when police in North Carolina used UAS to find a woman with dementia who was lost in a cornfield (Murison 2017).

UAS technology can capture aerial views for law enforcement operations MARIANNA IANOVSKA

BENEFITS OF USING UAS IN SEARCH AND RESCUE MISSIONS:

- Provide aerial photos and videos for considerably less money than conventional helicopters
- Ability to fly and maneuver into spaces that are hard to access
- Ability to fly securely low to the ground for close inspection
- Capacity to carry high definition cameras and thermal imaging units to help locate animals and people

OFFICER SAFETY

UAS technology can also help preserve the safety of police officers in active shooter responses. In May 2017, the Tukwila Police Department conducted its first operational UAS mission, which was a high-risk search warrant (Masters 2018). This mission involved substantial risk because gang members who were involved in a series of drive-by shootings plaguing Seattle and the South Puget Sound potentially occupied the target residence.

Police officers had difficulty accessing and containing the target residence since the back of the residence faced a steep slope covered with thick vegetation. However, the Tukwila Police Department used this opportunity to deploy the UAS to maintain an aerial perspective to assist with officer safety.

As demonstrated by this example, UAS technology can help law enforcement agencies gain crucial intelligence on suspects' locations without risking the lives of officers, who regularly have to turn blind corners in pursuit of suspects and often must locate armed suspects who have the higher ground.

CRIME SCENE ANALYSIS

In addition to traffic collision reconstruction, law enforcement agencies can use UAS to create three-dimensional models of crime scenes that enable investigators to zoom in and out of the scenes from any angle. For example, the Las Vegas Metropolitan Police Department used this method in the aftermath of the Las Vegas mass shooting in 2017, and this practice is becoming increasingly widespread among police agencies (Gazzar and Abram 2017). For crime scenes that are as large in scale as the one in Las Vegas, a UAS could save investigators hours of time in photographing the scene, while also providing a detailed visual that can be later used during prosecution.

UAS technology can help law enforcement agencies gain crucial intelligence on suspects' locations without risking the lives of officers, who regularly have to turn blind corners in pursuit of suspects and often must locate armed suspects who have the higher ground.

METHODS

The research process consisted of the following phases: reviewing FAA regulations, researching state laws across the United States, studying the applications of UAS technology, and surveying public perception. A review of the current laws and literature pertaining to UAS technology guided the student team's analysis throughout the duration of the project.

Once preliminary research began, the student team went to Bellevue City Hall to meet with representatives from the Police, Fire, and Utilities Departments, as well as the City Attorney's Office and the City Manager's Office. This meeting provided detailed insight into the City of Bellevue's planned application of UAS and the potential concerns, and also re-directed the team's research efforts to fit the scope of the project.

Throughout the research process, the student team presented its developments to the Technology Clinic at the UW School of Law to solicit feedback and gauge public perception on UAS technology. By initiating a dialogue between the City of Bellevue and the Technology Clinic, the team has been able to identify existing privacy and safety concerns related to the implementation of UAS technology.

UAS technology can significantly reduce the amount of time and money it takes to capture and clear a traffic collision scene, while providing investigators with comprehensive data to determine the situation and document the scene. Quick clearance is one of the most important elements of managing traffic collisions in order to ensure the safety of officers and others on the roadway; however it can only be done after the scene is documented.
CLA78/SHUTTERSTOCK.COM

RESULTS AND ANALYSIS

GENERAL LEGAL FRAMEWORK: FEDERAL VERSUS LOCAL AUTHORITY

Under the US Constitution, federal laws preempt related state and local laws, although the Tenth Amendment reserves powers to the states. Congress has given the Federal Aviation Administration (FAA) exclusive authority to regulate aviation safety, the efficiency of the navigable airspace, and air traffic control.

However, cities and municipalities are able to regulate UAS activities and the locations in which they can they take off and land through laws that are traditionally related to state and local police power, such as land use, zoning, privacy, and law enforcement operations.

CITY UAS USE

Part 107 is a set of rules created by the FAA to encompass a broad spectrum of commercial and government uses for UAS that weigh less than 55 pounds (14 C.F.R. § 107).

Most cities that use UAS technology operate under Part 107 of the FAA.

KEY TAKEAWAYS FROM PART 107:

- Operations must take place during daylight hours
- UAS must fly at or below 400 feet
- UAS must be kept within line of sight of the operator

Cities and municipalities are able to regulate UAS activities and the locations in which they can they take off and land through laws that are traditionally related to state and local police power, such as land use, zoning, privacy, and law enforcement operations.

Cities and municipalities can regulate the activities of unmanned aerial systems. CASCADE CREATIVES

LAUNCHING A UAS PROGRAM AS A GOVERNMENT ENTITY

Before a government entity decides to launch a UAS program, that entity must obtain the needed certifications and licenses. These licenses may include Part 107 certification and/or a Certificate of Waiver or Authorization (COA).

Part 107 — the more common certification, and typically the easier to obtain — is offered to both commercial entities and civilians. Operating under Part 107 requires pilots to pass an FAA proctored test on UAS related topics. Notably, this certification is granted only to an individual, not an agency. Individuals may fly for an agency, but only under their own Part 107 certificate and within the regulations set forth under the certification.

COA is offered specifically to public organizations. Although COAs require more procedural steps to obtain, COAs allow agencies to operate UAS as "public aircrafts." This means that although an agency has more responsibilities in conducting its missions, the agency will have more latitude as long as it is operating within the National Airspace (NAS) regulations and within the terms of the COA. COAs are ideal for first responders because they can enable operations within controlled airspace, and also include automatic waivers for flights over people in situations where it is necessary to safeguard human life. In order to begin the COA process, an agency must prove to the FAA that it is a government agency. Once approved as a public agency, the agency then applies for the COA by filing and submitting an application through an FAA website. The process can take as few as 3–4 weeks or as many as 60–90 days, depending on the type and complexity of the COA.

Typically, many agencies choose to obtain both types of certification by securing a COA for the agency and Part 107 certificates for all pilots. This allows for the greatest operating authority while also having all pilots meet the only federal standard and certification for UAS pilots, which is Part 107. Having both certifications enables agencies to adhere to best practices in varying situations when flights are being conducted.

The Los Angels Fire Department has found that using UAS can reduce costs and increase firefighter safety. CL SHEBLEY

CASE STUDIES: HOW ARE OTHER CITIES USING UAS TECHNOLOGY?

As part of the research process, the student team examined other cities where UAS programs are successfully being deployed for public services. Below is a summary of how UAS programs are used in the cities of Los Angeles, Alameda, Fontana, and Renton.

FIRE DEPARTMENT, LOS ANGELES, CALIFORNIA

UAS technology is used by the Los Angeles Fire Department in its efforts to combat the tremendous wildfires that seasonally ravage the city and its surrounding areas. For example, UAS devices are primarily used to perform assessments of the property damage that has resulted from the Creek Fire and the Skirball Fire in the Los Angeles area. The UAS flies over an area, locates hotspots, and then dispatches firefighters to extinguish fires in that area. For safety reasons, the Los Angeles Fire Department will not use UAS and other fire fighting aircrafts at the same time.

Los Angeles Fire Chief, Ralph Terrazas, stated that using UAS is cost-effective and eliminates the need for renting infrared cameras and flying helicopters over fires, which reduces financial costs and increases safety for firefighters (Lillian 2017).

As part of the research process, the student team examined other cities where UAS programs are successfully being deployed for public services.

UAS technology can help locate victims in dangerous terrain. ADONYI GÁBOR

SHERIFF'S OFFICE, ALAMEDA COUNTY, CALIFORNIA

In 2016, the Alameda County Sheriff's Office used a UAS during a high-risk search warrant to follow a suspect who had fled a residence. Captain Tom Madigan stated, "In this situation, the suspect fled, and the UAS was able to observe the suspect flee and to alert the first responders to where he was so they could contain him and apprehend him as safely as possible." Captain Madigan added, "That suspect would have escaped undetected and could have potentially harmed our staff." The successful use of UAS in this case resulted in the arrests of 14 individuals (Farivar 2016).

The Alameda County Sheriff's Office has also deployed UAS in other missions, such as during a report of an active shooter at a local military base. Officials from the Sheriff's Office claim that UAS use is cost-effective and beneficial to public safety. However some legal experts worry that the agency is not successfully implementing privacy policies or providing public commentary on UAS acquisitions and deployments.

POLICE DEPARTMENT, FONTANA, CALIFORNIA

Four Inland Southern California law enforcement agencies are deploying or preparing to deploy UAS devices that will serve the public. Some of these uses include:

- Finding lost hikers in the local mountains or deserts
- Taking detailed aerial photos and videos of major traffic collisions or crime scenes
- Surveillance of suspects' cars during standoffs or gun battles

The Fontana Police Department has two unmanned aerial systems. The technology is expected to save costs, since the devices can be flown at a fraction of the cost of helicopters. Fontana Police Lieutenant Billy Green has expressed that UAS devices will increase safety in police operations, since they could provide aerial coverage to determine where a suspect might be hiding with a gun, and spare an officer from being sent into that situation (Reagan 2016).

POLICE DEPARTMENT, RENTON, WASHINGTON

The Renton Police Department has been using unmanned UAS equipped with "photogrammetry" software, which extracts three-dimensional information from photographs, to help process crime and collision scenes. According to Renton Police Commander Chad Karlewicz, the program is already saving substantial financial costs for the city (Beckley 2016). The new system not only allows police officers to obtain more accurate images of crime scenes, but also allows them to clear scenes and open roads more efficiently than in the past.

Through this program, police launch small, remote-controlled aircrafts to take photographs of crime scenes. This process provides a much more detailed perspective of crime and collision scenes since the aircrafts can map hundreds of millions of points on the map in a few minutes, as opposed to the average of four hours that is typically required for manually photographing crime and collision scenes.

For example, photogrammetry was used in Renton to map the scene of a fatal collision that closed South Grady Way for several hours during rush hour periods. The UAS device allowed police officers to complete their work in about 40 minutes instead ofthe three hours that is typically required for such a collision. The use of UAS not only saved time for law enforcement, but also opened up the roads more quickly for commuters (Beckley 2016).

Fontana Police Lieutenant Billy Green has expressed that UAS devices will increase safety in police operations, since they could provide aerial coverage to determine where a suspect might be hiding with a gun, and spare an officer from being sent into that situation.

POTENTIAL ISSUES FOR UAS IMPLEMENTATION

The potential violation of protection against unreasonable search and seizure processes, which is ensured by the Fourth Amendment of the Constitution, is the main threat to personal privacy by the use of UAS.

Although the implementation of a UAS program by the City of Bellevue can contribute to public safety and enable law enforcement to function more efficiently, concerns about the use of UAS technology continue to persist. Among these concerns are public perception, risks to personal privacy, and safety.

PUBLIC PERCEPTION

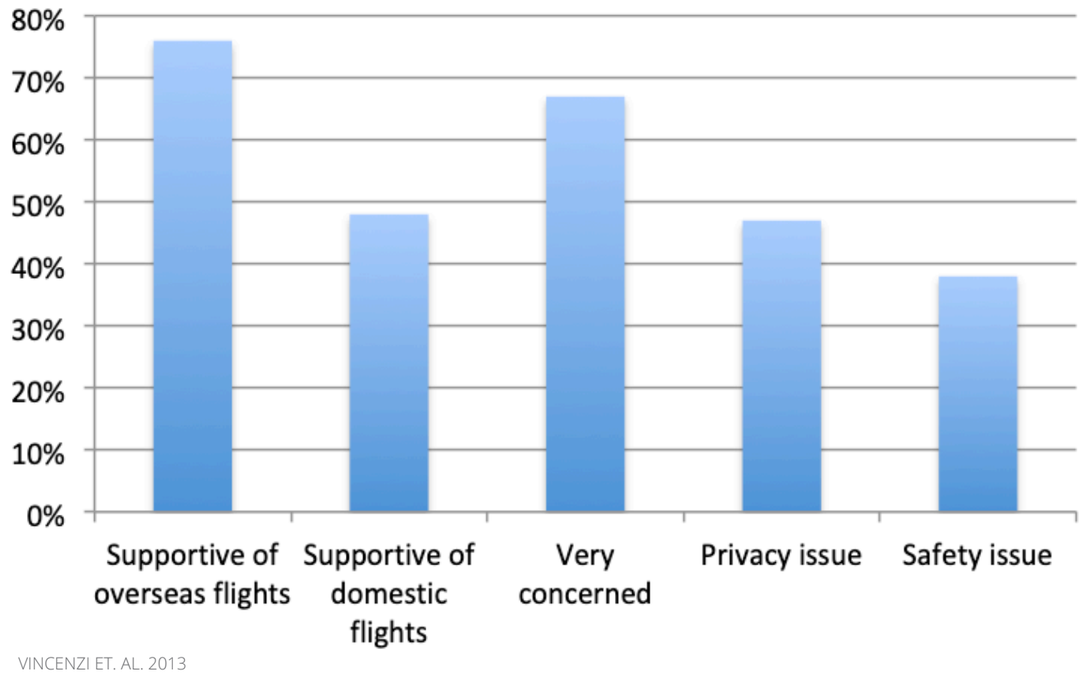
Our team looked at a handful of surveys during our research.

- "Drone Awareness and Perceptions: A Three Country Study," conducted by Vision Critical in 2014, aimed to understand awareness and perceptions surrounding the use of UAS to collect information in Canada, the US, and the UK.
- "Public perception of Unmanned Aerial Systems (UAS): A survey of public knowledge regarding roles, capabilities, and safety while operating within the National Airspace System (NAS)," by Vincenzi et. al., 2013, focused on the public opinion of US citizens on the use of UAS within the US.
- A Pew Research Center survey conducted in 2017 explored how Americans feel about UAS in general. We reviewed a news article about this survey.
- Another study, "Aerial Drones, Domestic Surveillance, and Public Opinion of Adults in the United States," by Lieberman et. al., 2014, assesses the nature of public opinion about the use of UAS for domestic surveillance activities.
- "Public Perception of Drone Delivery in US," a survey conducted by the Office of the Inspector General, US Postal Service, 2013, covers not only how the public would view postal delivery by UAS, but the overall appeal of UAS technology, its most and least interesting applications, and the believability of claims about its potential benefits.

The Vincenzi survey found that more than 76% of respondents supported the use of UAS overseas, but only 48% regarded the use of domestic UAS acceptable. About 67% were either "very concerned" or "concerned" about privacy. When asked about their primary concerns regarding domestic UAS, 47% of respondents stated "privacy," 38% stated "safety," and the remaining respondents expressed concerns over "other" types of issues (Vincenzi et. al. 2013).

When an image of a jet powered UAS firing a missile was shown, 95% of respondents stated that this image matched their expectations for the appearance of a UAS device, and only 66% said that the picture of a commercial quad-copter with a mounted camera somewhat matched their expectations of UAS technology (Vincenzi et. al. 2013).

PUBLIC PERCEPTION OF UAS TECHNOLOGY: SUMMARY OF SURVEY FINDINGS



VINCENZI ET. AL. 2013

RISKS TO PERSONAL PRIVACY

The use of UAS could benefit law enforcement missions, especially in search-and-rescue operations and traffic collision reconstruction. However, without proper regulation, UAS equipped with facial recognition and infrared technologies could potentially interfere with privacy rights. UAS are capable of tracking large quantities of vehicles and people in wide areas. Moreover, small UAS devices could be completely undetected while peering into the window of a home. The potential violation of protection against unreasonable search and seizure processes, which is ensured by the Fourth Amendment of the Constitution, is the main threat to personal privacy by the use of UAS.

Members of Congress, civil liberty advocates, and the general public have expressed concerns about privacy in the use of new, extremely small UAS devices equipped with video cameras and tracking devices, since such devices can hover silently and largely unnoticed in residential neighborhoods, especially at night.

Two laws introduced in the 112th Congress, The Preserving Freedom from Unwarranted Surveillance Act of 2012 (S.3287) and the Farmer's Privacy Act of 2012 (H.R. 5961), both seek to limit the ability of the federal government to use UAS to collect information regarding investigations of criminal activity without a warrant.

The Privacy Act of 1974 and the privacy provisions of the E-Government Act of 2002 are two laws that are already in effect to provide protections for personal information collected by any method from federal agencies.

The Privacy Act of 1974 limits the collection, disclosure, and use of personal information maintained in databases by agencies of the federal government. The E-Government Act of 2002 enhances the protection of personal information collected through government websites and other online services by requiring the federal agencies to perform a privacy impact assessment (PIA) before collecting or using such personal information.

While the US Supreme Court has never ruled on privacy issues related to the use of UAS technology, the Supreme Court has ruled on the potential infringement of privacy posed by advancing technology such as GPS tracking devices. As a result, law enforcement operators seeking to utilize UAS for tracking purposes would be required to obtain a warrant.

We believe that proper regulations for privacy protection at a local level are necessary to address privacy concerns.

Several states have placed restrictions on UAS-based surveillance. For example, Florida, Maine, North Dakota, and Virginia have all enacted some form of warrant requirements for the use of these devices by police, and Rhode Island has proposed legislation prohibiting the use of facial recognition on any images captured by this technology. To be fully effective, UAS regulations should address and enable important public safety uses that do not threaten privacy rights, such as natural disaster responses and search and rescue operations.

We believe that proper regulations for privacy protection at a local level are necessary to address privacy concerns.

Small UAS devices may raise privacy concerns. DOSE MEDIA UNSPLASH

RECOMMENDATIONS

We believe that the key to successful UAS programs is to educate community residents before a program is implemented, and to progressively update the community about benefits and results.

PUBLIC ENGAGEMENT STRATEGY

Unfortunately, public understanding of the benefits of UAS is generally limited. We believe that the key to successful UAS programs is to educate community residents before a program is implemented, and to progressively update the community about benefits and results. Transparency about how the UAS will be used is important as well. Below is a list of recommendations for addressing common misconceptions about UAS.

PUBLIC PERCEPTION SURVEYS AND OPINION POLLS

Gauging what the public is willing to accept is an important step before proceeding with regulations and allowances for UAS use. One option is to conduct a public survey. The data from the survey can be used to develop public briefings on the proposed use of UAS, and can also inform the City about public perception of UAS in Bellevue. Survey results can be helpful in planning and developing educational campaigns for UAS.

PUBLIC EDUCATION ON THE BENEFITS OF UAS

Studies have indicated that awareness of UAS and their applications is low among the general public, with most members of the general public having low or no awareness of the civic and commercial uses of UAS technology (Vincenzi et. al. 2013). Additionally, many people have a generally negative association between the military and the use of UAS. Therefore, educational campaigns on the civic uses of these devices are important. The general public has a right to be informed about UAS technology and its potential benefits to the community, and to provide input on decisions regarding its use. The City of Bellevue could host regular town hall meetings to convey this information. Residents could be given the opportunity to ask questions about UAS programs and have their concerns addressed at these meetings.

Educating the general public can increase acceptance of UAS technology. SIMON FRASER UNIVERSITY

A transparent and publicly accepted UAS policy could mitigate privacy protection concerns within the community.

ENGAGE MULTIPLE STAKEHOLDERS

We believe that the City of Bellevue could engage with the local chapter of the American Civil Liberties Union (ACLU), government watchdog organizations, and other public organizations regarding privacy concerns for the use of UAS technology. This will help ensure that the City of Bellevue gains and retains community support for its use.

BEGIN UAS OPERATIONS IN AREAS WITH MOST SUPPORT

According to multiple studies, the use of UAS is most widely accepted for helping in emergency situations. The Vision Critical survey found that 91% of respondents support the use of this technology for emergency responses and 83% support the use for police intelligence (Vision Critical 2014). A survey by Vincenzi et. al. found that 81% of respondents are in favor of using UAS for infrastructure inspection, and 78% agree with using UAS for agricultural purposes (Vincenzi et. al. 2013). However, only 37% of respondents support using these devices for leisure activities (which we define as the use of UAS by private parties for personal interests and enjoyment such as filming and photography) (Vision Critical 2014).

Since public acceptance is a key factor in the successful implementation of UAS programs, the City of Bellevue could use these devices for obvious social benefits first, such as for support in emergency responses.

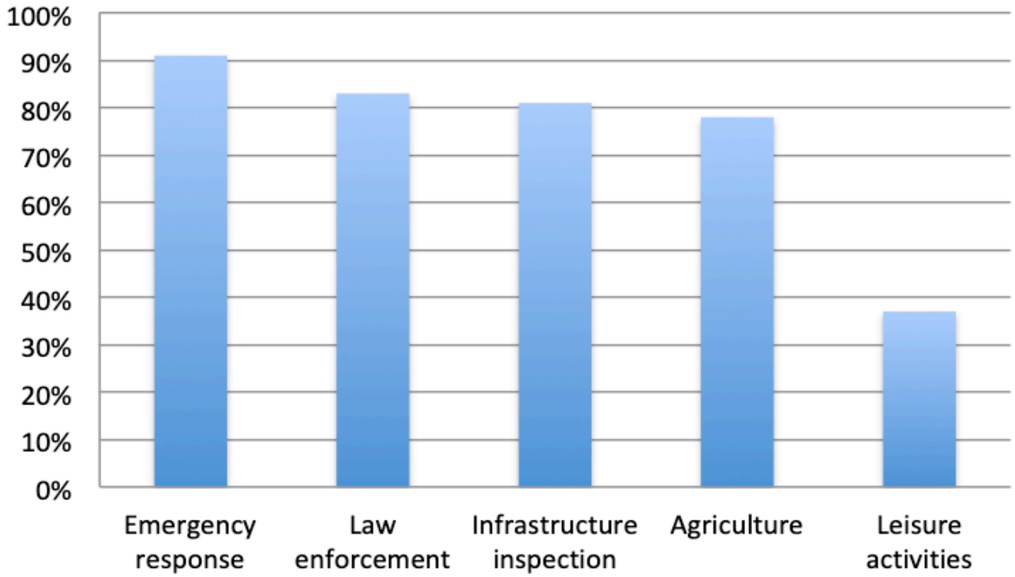
POLICY RECOMMENDATIONS

A transparent and publicly accepted UAS policy could mitigate privacy protection concerns within the community. We recommend that this technology not be used for the following activities:

- Conducting random surveillance of residents
- Targeting a person based solely on individual characteristics, such as, but not limited to: race, ethnicity, national origin, religion, disability, gender, or sexual orientation
- Harassing or intimidating any individual or group
- Conducting personal business of any type

We recommend that UAS not be armed or used in searches without warrants unless under emergency or exigent circumstances; and that users be properly trained and certified on these devices.

PUBLIC SUPPORT OF UAS ACTIVITIES: SUMMARY OF SURVEY FINDINGS



VISION CRITICAL 2014, VINCENZI ET. AL. 2013

CONCLUSION

The students involved in this project recognize that many residents of Bellevue value safety, privacy, and transparency regarding the implementation of UAS technology. Although using UAS technology to support law enforcement operations and other public safety initiatives is important, balancing these potential benefits with the personal rights and dignity of private citizens is vital. Therefore, we recommend the following safeguards:

- **Search and Rescue:** We recommend that UAS be deployed for search and rescue operations. UAS has the potential to cover ground quickly and reach areas that may be difficult for firefighters to access. UAS systems can even carry items such as water bottles, life jackets, and food packets, which may further aid in search and rescue operations.
- **Fire Department:** We recommend that UAS be used as a new tool for firefighting, particularly with wildfires and rapid fireground assessment. UAS systems have the potential to give commanders real-time situational awareness on large fires and other emergency events. The addition of a thermal or a hyperspectral sensor to UAS systems may also assist a fire agency to determine hot spots and flare-ups at a fire scene.
- **Use Limits:** We recommend that UAS be deployed by emergency responders for search and rescue operations, cases of emergency, critical incidents, or when specific and articulable grounds to believe that UAS will collect evidence related to specific criminal acts.
- **Policy:** Use policies for UAS should be transparently developed, clearly written, and open to the public.
- **Transparency Measures:** We recommend that the City of Bellevue consider allowing the public to request access to UAS flight information through publicly available logs.
- **Abuse Prevention and Accountability:** We recommend that the means and methods for the use of UAS devices be periodically reviewed by the City of Bellevue to ensure proper oversight and prevent misuse.
- **Data Retention:** We recommend that data be retained in a manner to meet the business needs of city departments in conformity with state law and the City of Bellevue's data retention policies.
- **Weapons:** We recommend that domestic UAS devices not be equipped with lethal or non-lethal weapons.

Although using UAS technology to support law enforcement operations and other public safety initiatives is important, balancing these potential benefits with the personal rights and dignity of private citizens is vital.

A local scout troop studies the UAS research team's poster at the LCY year-end celebration, while student author Connor Yi (back row, center) answers their many questions.
TERI THOMSON RANDALL

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