



# Commercial Vendors and the Public Safety UAS Sector

**ANALYSTS:** Christopher Todd, CEM and Chief Charles Werner, (ret.)

**ASSOCIATE ANALYST:** Anthony Loperfido, Police Sergeant

## KEY FINDINGS

- 1) 57% of public safety UAS professionals claim they are satisfied with the current landscape of public safety UAS technology vendors.
- 2) Long flight-time duration, visual zoom, and thermal/infrared capabilities are the top three desired features by public safety UAS operators.
- 3) Search and rescue (SAR), situational awareness/live streaming, and intelligence, surveillance and reconnaissance (ISR) are the top three UAS missions ranked in order of importance according to public safety UAS professionals.
- 4) The top five most important issues affecting the public safety UAS sector are airspace authorizations and COA's; beyond visual line of sight (BVLOS) operations; training; standards, procedures and certifications; and program budgeting.
- 5) The projected FY 2020 mean annual budget for public safety UAS programs is approximately \$18,000.
- 6) The sweet-spot for manufacturers to price a small UAS with combined visual and thermal/infrared remote sensing capabilities is between \$2,000 and \$5,000 USD.
- 7) 88% of public safety UAS professionals claim their department or agency either may or would be interested in a hardware subscription program that allowed them to continually receive the latest UAS technology from a specific supplier or manufacturer.

## EXECUTIVE SUMMARY

Public safety agencies continue to view UAS as a tactical tool, with search and rescue, situational awareness, and intelligence, surveillance and reconnaissance combining the top three stated use cases. However, many agencies are failing to grasp the potential return-on-investment that can be achieved from forensic analysis and public information flight operations which can be flown on a more frequent basis.

As the adoption of unmanned aircraft systems (UAS) continues to proliferate among public safety organizations, UAS manufacturers and solutions providers are identifying the features and capabilities required by first responders. While some vendors are shooting for the moon

with wide-eyed visions of grandeur, companies like DJI and Parrot have dialed in on precisely what public safety UAS programs desire in the present marketplace; a small, extremely portable, and reliable aircraft offering visual and thermal/IR capabilities at a price point below \$5,000.

When pricing product offerings, solutions providers ought to be mindful of the relatively low public safety budgets in a marketplace that is still in its infancy. These vendors should explore offering a hardware subscription program that provides public safety agencies the latest UAS technology. These programs would provide a subscription-based, recurring revenue stream to upstart firms seeking a greater level of financial certainty for their bottom line.

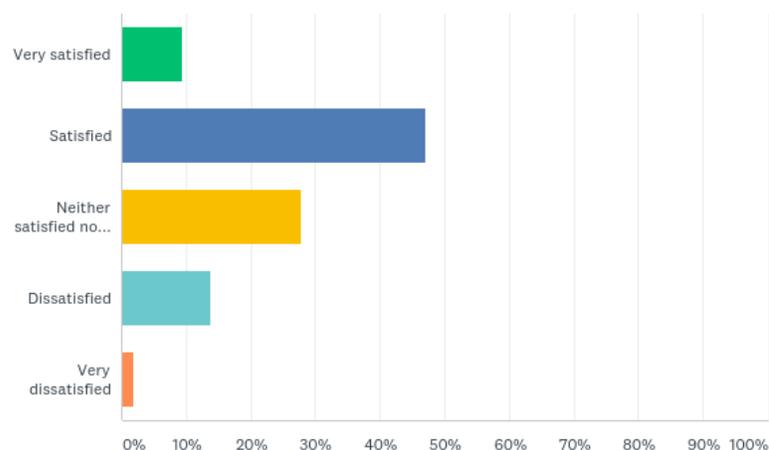
## INTRODUCTION

As the commercial UAS marketplace continues to unfold, public safety is finally emerging as a viable sector for solutions providers to pursue. Chinese drone manufacturer DJI is dominating the pack with 77% ownership of the U.S. public safety UAS sector<sup>1</sup>. However, new players such as U.S.-based Skydio, Autel, and others are beginning to emerge to join industry stalwarts Parrot (French), FLIR/Aeryon Labs (U.S.) in targeting public safety end users.

Simultaneously, new software applications such as GE's AiRXOS (U.S.), Pix4Dreact (Swiss), First iZ (U.S.) and Responder Air (U.S.) are starting to emerge to join a landscape of other UAS-related technology products that have yet to gain a significant foothold in the marketplace.

The end result is a myriad of potential public safety UAS solutions tightening competition and often leading to tight margins for many solution providers. On the flip side, as the UAS solutions landscape becomes increasingly cluttered, public safety program managers must dedicate valuable time toward dissecting and analyzing potential solutions based on the specific needs of the drone operations for their department or agency.

### FIGURE 1: WHAT IS YOUR LEVEL OF SATISFACTION SURROUNDING THE CURRENT UAS AND TECHNOLOGY VENDORS IN THE PUBLIC SAFETY LANDSCAPE?



(n = 274)

**SOURCE:** DRONERESPONDERS Fall 2019 Public Safety UAS Survey, September 2019

<sup>1</sup> Christopher Todd and Charles Werner, Chinese sUAS in Technology in the U.S. Public Safety Sector, DRONERESPONDERS White Paper 1-2, September 24, 2019, P. 1

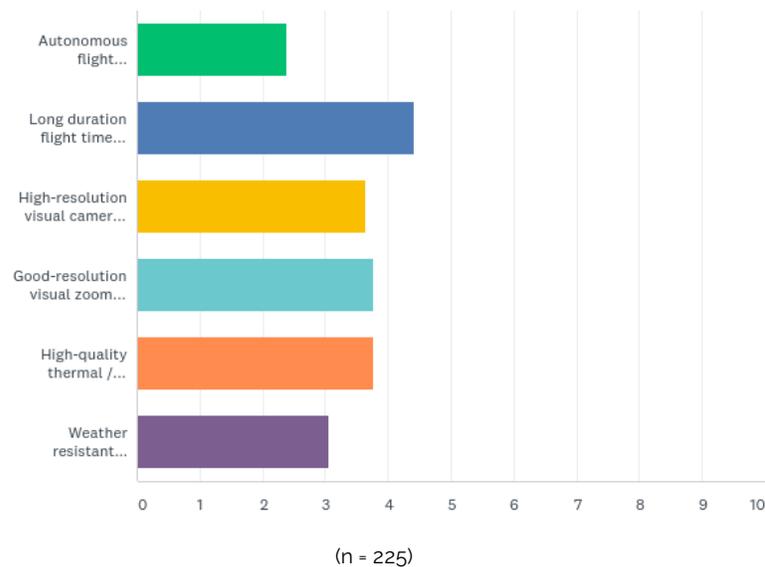
According to data from the DRONERESPONDERS Fall 2019 Public Safety UAS Survey, approximately 57% of survey respondents claim they are "satisfied" or "very satisfied" with the current landscape of public safety UAS technology vendors, and just under 16% claim they are "dissatisfied" or "very dissatisfied." About 28% of respondents appear to be ambivalent.

The fact that a majority of surveyed public safety UAS end users are pleased with the current vendors is a good sign for a rapidly emerging sector. However, with 44% of respondents claiming they are not satisfied with the current vendor landscape, a sizeable opportunity exists for savvy solutions providers to pursue.

The features and capabilities of any product will often dictate whether it will find success in the commercial marketplace. In the public safety sector, this mindset is especially prevalent with a limited tolerance for products or services that fail to meet user expectations.

Data from the DRONERESPONDERS Fall 2019 Public Safety UAS Survey shows the top three most important UAS features according to public safety operators were (1) long duration flight time, (2) a good-resolution visual zoom sensor, and (3) a high-quality thermal/infrared sensor. These characteristics closely match both the DJI Mavic 2 Enterprise Dual and the Parrot ANAFI Thermal in the current public safety UAS marketplace.

**FIGURE 2: PLEASE RANK THE FOLLOWING UAS FEATURES IN THE ORDER OF MOST IMPORTANT (1) TO LEAST IMPORTANT (6) FOR YOUR PUBLIC SAFETY OPERATION.**



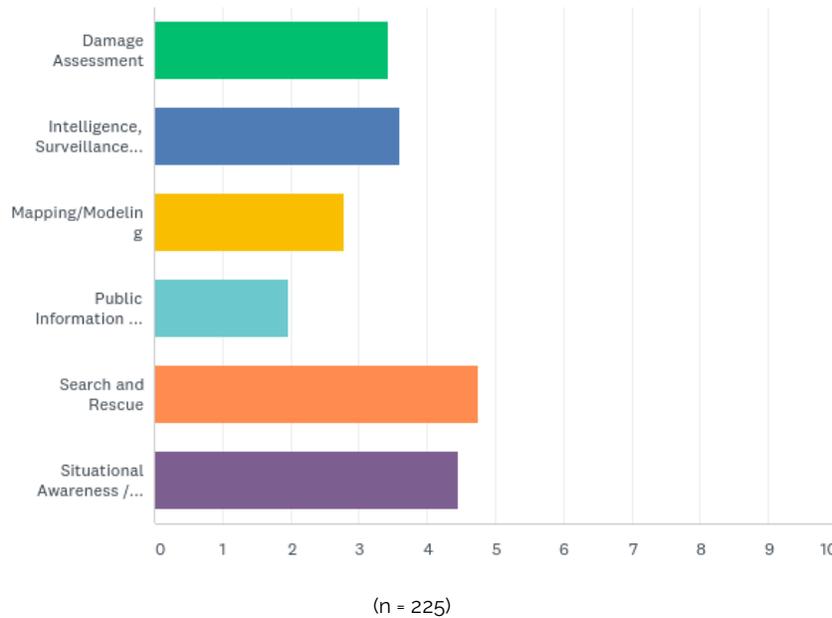
**SOURCE:** DRONERESPONDERS Fall 2019 Public Safety UAS Survey, September 2019

Of particular note, survey respondents said that autonomous flight capability was the least important UAS feature to have in their tool kit. This sets the table for an interesting challenge as the Skydio 2 prepares to enter the marketplace touting what appears to be a remarkable autonomous flight capability, albeit with otherwise unmarkable flight duration and remote sensing capabilities.

In what may prove to be a case of "you don't know what you are missing until you have it," near-term feedback from Skydio 2 adopters should indicate whether the needle will start to move thereby indicating a potential shift in public safety UAS user feature preferences.

Taking a deeper dive into the DRONRESPONDERS Fall 2019 Public Safety UAS Survey, we learn that public safety UAS respondents rank search and rescue (SAR) as the most important mission type for their organization, closely followed by situational awareness / live streaming missions. Intelligence, surveillance, and reconnaissance (ISR) follows in the third position.

**FIGURE 3: PLEASE RANK THE FOLLOWING UAS MISSION TYPES IN ORDER OF MOST IMPORTANT (1) TO LEAST IMPORTANT (6) FOR YOUR AGENCY OR ORGANIZATION.**



**SOURCE:** DRONERESPONDERS Fall 2019 Public Safety UAS Survey, September 2019

Interestingly, both mapping/modeling and public information ranked at the bottom in importance according to survey respondents. This may indicate a field bias toward tactical operations over forensic analysis and public information missions – two operations that are likely to be flown on a more frequent basis for many public safety agencies and may offer similar, if not greater, ROI in many cases except those involving the protection of human life.

When comparing data between Figures 2 and 3, we see that the survey responses clearly show that the importance of UAS features closely correlate with the importance of UAS mission types. Hence, the top three most important mission types of SAR, situational awareness, and ISR ideally require the UAS capabilities of long duration flight time, a good quality visual zoom sensor, and a high-quality thermal/IR sensor.

Savvy UAS manufacturers and solutions providers who wish to play it safe ought to use these data points to refine their product offerings as they bring new technology to market. However, future favors the bold and those developers willing to push the envelope by gambling on the adoption of emerging technology may be able to leapfrog current market demands if the public safety sector is willing to embrace and adopt their inventions.

Correspondingly, those vendors focused on scenario-based training should focus on establishing the basic core competencies previously outlined before advancing students to more dramatic training scenarios such as active shooter, barricaded suspect, major HAZMAT incident, and disaster response, which are based on less-frequent use cases.

## PROBLEM

Like many other types of organizations seeking to conduct UAS operations in the National Airspace System (NAS), public safety agencies are continuing to struggle in securing airspace certificates of authorization (COA's). The current pathway is perceived as cumbersome, especially for smaller public safety organizations with limited resources for learning, mastering, and administering the COA process.

According to weighted average data from the DRONERESPONDERS Fall 2019 Public Safety UAS Survey, airspace authorizations and COA's ranks as the top issue affecting the public safety UAS sector, followed closely behind by beyond visual line of sight (BVLOS) operations. Coming in at number three is training, with standards, procedures and certifications trailing at number four.

**FIGURE 4: PLEASE RANK THE TOP FIVE ISSUES IN THE ORDER OF MOST IMPORTANT (1) TO LEAST IMPORTANT (5) AS THEY AFFECT THE PUBLIC SAFETY UAS SECTOR.**

	MOST IMPORTANT (1ST)	2ND	3RD	4TH	5TH	TOTAL	WEIGHTED AVERAGE
Airspace authorizations and COA's	35.98% 59	22.56% 37	18.29% 30	9.76% 16	13.41% 22	164	2.42
Beyond Visual Line of Sight (BVLOS) operations	31.33% 47	24.00% 36	16.00% 24	14.00% 21	14.67% 22	150	2.57
Training	22.78% 36	25.32% 40	20.89% 33	15.19% 24	15.82% 25	158	2.76
Standards, Procedures and Certifications	15.97% 23	27.08% 39	21.53% 31	21.53% 31	13.89% 20	144	2.90
Program Budgeting	16.36% 18	20.91% 23	19.09% 21	28.18% 31	15.45% 17	110	3.05
Product Capabilities	13.74% 18	19.08% 25	22.90% 30	23.66% 31	20.61% 27	131	3.18
Privacy Laws	17.50% 7	10.00% 4	25.00% 10	25.00% 10	22.50% 9	40	3.25
Data Security	18.37% 9	6.12% 3	28.57% 14	24.49% 12	22.45% 11	49	3.27
Counter UAS (C-UAS)	8.57% 6	8.57% 6	17.14% 12	25.71% 18	40.00% 28	70	3.80
Data Management	2.53% 2	11.39% 9	18.99% 15	32.91% 26	34.18% 27	79	3.85

(n = 225)

**SOURCE:** DRONERESPONDERS Fall 2019 Public Safety UAS Survey, September 2019

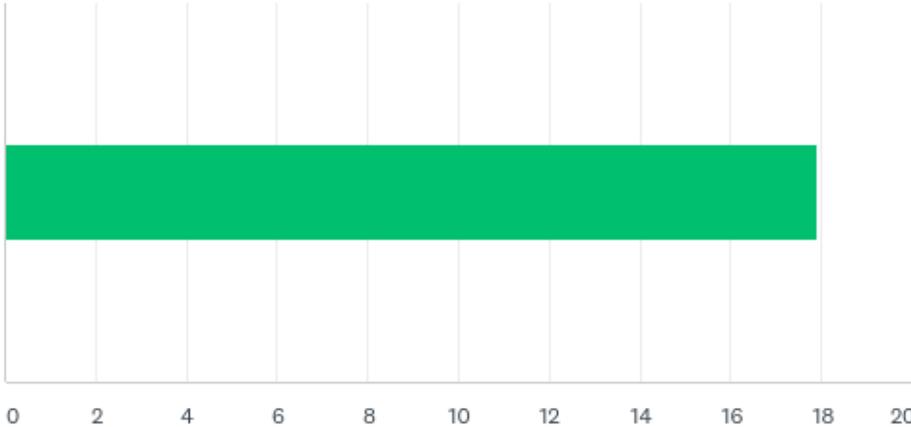
Grouped together as a cluster, these top four survey responses indicate a public safety UAS sector that is yearning for guidance and standardization across the board surrounding how they train, certify, and operate drones in the NAS. DRONERESPONDERS believes these data points represent the clearest sign post to date illustrating several of the major challenges facing public safety UAS operations.

Solving complex challenges typically takes manpower, resources, and time – all of which typically requires a certain amount of funding. Since most public safety UAS operations are in their infantile state, many lack the appropriate funding to build a robust drone program out of the gate. In fact, field testimony from several DRONERESPONDERS UAS program managers around the U.S. indicates that it may take several budgeting cycles for their planned program to develop to full-strength.

As the DRONERESPONDERS survey data from previous Figure 4 shows, program budgeting is ranked as the fifth most important issue affecting the public safety UAS sector. Hence, commercial vendors marketing UAS-related wares to the public safety sector must be cognizant of the fiscal sensitivities and restrictions placed on many public safety UAS programs. These merchants should not generally assume that public safety agencies have deep pockets. All parties would be well-served for solution providers to adequately pre-qualify prospective customers based both on their needs and ability to purchase.

According to the DRONERESPONDERS Fall 2019 Public Safety UAS Survey data, the mean average budget for public safety agencies is \$18,000 for fiscal year 2020. This indicates that many public safety agencies will not be in a position to make substantial purchases from vendors touting big-ticket solutions. In addition, new public safety program managers will likely choose to grow their fleet by adding lower-ticket, proven UAS technology first, before adding higher-priced aircraft and software solutions as they grow their drone program.

**FIGURE 5: WHAT IS THE PROJECTED FY 2020 ANNUAL BUDGET FOR YOUR PUBLIC SAFETY UAS PROGRAM (GRAPH DEPICTS MEAN AVERAGE)?**



(n = 224)

**SOURCE:** DRONERESPONDERS Fall 2019 Public Safety UAS Survey, September 2019

## SOLUTION

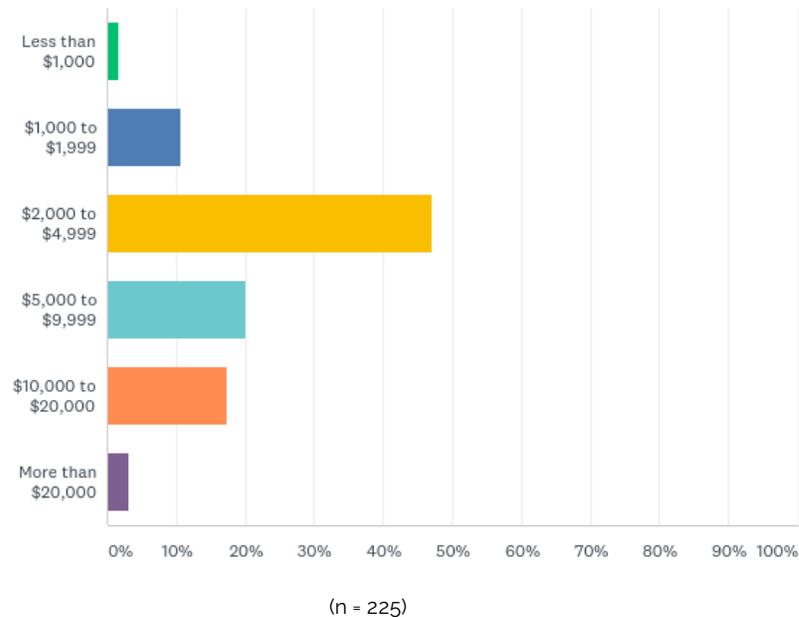
To maximize sales opportunities in the current public safety UAS landscape, drone manufacturers and solution providers must deliver aircraft offering the capabilities that public safety operators require, and at a price point they can act upon. DJI and Parrot appear to be zeroed in on the right mix based on what public safety UAS operators claim they want.

The DJI Mavic 2 Enterprise Dual offers a 4K Ultra HD 12 MP visual sensor (no optical zoom) integrated with a radiometric FLIR® thermal sensor. DJI rates the average flight time for the Mavic 2 series at up to 31 minutes per full battery charge.

The Parrot ANAFI Thermal offers a 4K HDR 21MP visual sensor with 3x optical zoom, combined with a thermal imaging sensor. Parrot claims up to 26 minutes of average flight time per full ANAFI thermal battery charge.

At an average price of less than \$3,000 per unit, both the DJI and Parrot solutions are offered at a cost within the range of what public safety operators believe is a reasonable market price for a small UAS with visual and thermal/IR remote sensing capabilities, according to DRONERESPONDERS Fall 2019 Public Safety UAS Survey data.

**FIGURE 6: WHAT IS A REASONABLE MARKET PRICE FOR A U.S. PUBLIC SAFETY AGENCY TO PAY FOR A SMALL UAS WITH VISUAL AND THERMAL/IR REMOTE SENSING CAPABILITIES?**



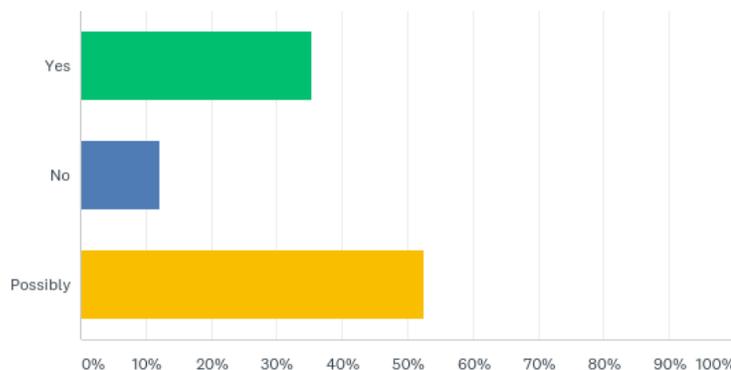
**SOURCE:** DRONERESPONDERS Fall 2019 Public Safety UAS Survey, September 2019

However, coming up on the heels are Autel, Skydio, and Yuneec, each offering innovative UAS technology in the compact, highly portable size required by public safety agencies. As these manufacturers work to incorporate dual visual and thermal/IR sensing payloads into their offerings, they should prove to be viable competitors in the rapidly evolving public safety UAS landscape.

WILDCARD: Also lurking out in the forest beyond the trees are a range of experienced manufacturers such as AeroVironment, Altavian, DraganFly Innovations, Intel, and others who may possess the firepower to suddenly burst upon the landscape as we begin a new decade of public safety UAS flight operations.

UAS manufacturers who are seeking innovative new ways to capture market share may want to explore offering a hardware subscription for public safety UAS users in lieu of outright sales. According to DRONERESPONDERS Fall 2019 Public Safety UAS Survey data, 88% of public safety users are open to the concept of a hardware subscription program that allows them to continually receive the latest UAS technology from a supplier or manufacturer.

**FIGURE 7: WOULD YOUR DEPARTMENT OR AGENCY BE INTERESTED IN A HARDWARE SUBSCRIPTION PROGRAM THAT ALLOWED YOU TO CONTINUALLY RECEIVE THE LATEST UAS TECHNOLOGY FROM A SPECIFIC SUPPLIER OR MANUFACTURER?**



(n = 223)

**SOURCE:** DRONERESPONDERS Fall 2019 Public Safety UAS Survey, September 2019

On the software applications side of public safety UAS technology, developers looking to charge high prices for annual subscriptions need to recalibrate their compass to hone in on current market dynamics. With the average public safety agency having a budget of \$18K per year and flying 5 or less missions per month, the return-on-investment (ROI) from high-priced software programs is likely fleeting for many public safety agencies.

Developer Pix4D ought to be commended for recognizing this dynamic by re-pricing their latest offering, Pix4Dreact at a \$39 per month subscription price. Pix4Dreact offers rapid mapping capability in austere environments lacking Internet or mobile WI-FI connections. The price point for this advanced mapping software has been priced well within a reasonable budget for the vast majority of public safety agencies.

Drone training for public safety organizations remains another contentious area of the public safety UAS sector. The highly fragmented buffet of home-grown UAS training offerings lack the standards-based protocols typically found in traditional aviation programs. This serves to create a potentially hazardous operating environment comprised of public safety drone teams operating under various protocols leading to potentially unpredictable outcomes for incident commanders.

## CONCLUSIONS

- 1) Most public safety agencies are overly focused on tactical operations which is causing them to ignore the low-hanging fruit ROI that drones can provide surrounding forensic analysis and public information missions.
- 2) While half of public safety agencies appear to be satisfied with the current landscape of UAS technology vendors, a sizeable chunk of the market is not satisfied and is seeking something more profound to emerge.
- 3) While DJI and Parrot appear to have honed in on the type and style of UAS that public safety agencies are presently seeking, new technology from players such as Skydio, Autel and others have the propensity to change the game.
- 4) UAS technology vendors need to recalibrate their compass in regards to near term pricing as public safety agencies continue to adopt drone technology on shoe-string budgets.
- 5) The creation of training and equipment standardization remains the top most pressing need for public safety drone operations.
- 6) Tactical beyond visual line of sight (BVLOS) waivers remain both elusive and highly desirable by public safety UAS operators.
- 7) Commercial UAS hardware vendors should be able to capture public safety market share by offering public safety agencies the latest drone technology for a recurring, subscription-based fee.

## SURVEY METHODOLOGY

The DRONERESPONDERS *Fall 2019 Public Safety UAS* represents a quantitative method, cross-sectional, self-selected, online questionnaire survey conducted by AIRT, Inc. and administered using SurveyMonkey technology between August 27 and September 15, 2019.

The survey was directly promoted to a highly-targeted, known, yet self-selecting, group of public safety UAS professionals representing a wide cross-section of the public safety UAS sector. Total responses per question range between 223 and 274 respondent answers. The margin of error for this survey is projected to be +/- 5%.

## SOURCES AND ADDITIONAL RESOURCES

1. *Chinese sUAS in Technology in the U.S. Public Safety Sector*, September 24, 2019, Christopher Todd and Charles Werner, DRONERESPONDERS White Paper 1-2.
2. *2018 Drone Market Sector Report*, September 2018, Colin Snow, Skylogic Research
3. *Fall 2019 Public Safety UAS Survey*, September 16, 2019, DRONERESPONDERS
4. *DRONERESPONDERS Fall 2019 U.S. Public Safety UAS Summit at Commercial UAV Expo Americas*, October 29-30, DRONERESPONDERS

## DEDICATION

DRONERESPONDERS is pleased to dedicate this report to Colin Snow, "The Drone Analyst," whose portfolio of work with Skylogic Research served to benchmark the growth and expansion of the unmanned aircraft systems industry over the past several years. Mr. Snow's research and analysis provided extremely valuable insight, while also demonstrating an incredible passion, for the drone community as a whole. We wish him well on his new path.

## NEXT REPORT

*Operational Training and Safety in the Public Safety UAS Sector*  
Target Release Date: November 19, 2019

## ABOUT

DRONERESPONDERS is the world's fastest growing non-profit program supporting public safety UAS. The DRONERESPONDERS mission is to facilitate preparedness, response and resilience using unmanned aircraft systems and related technologies operated by public safety, emergency management, and non-governmental volunteer organizations around the world. The DRONERESPONDERS Public Safety Alliance is a 501(c)3 non-profit operating program of [AIRT](http://airt.org), Inc. For more information on DRONERESPONDERS, please visit: <http://droneresponders.org>

