UAS WORKFORCE NEEDS SURVEY RESULTS:

GO VIRGINIA REGION 4 REPORT

Richard Bland College of William & Mary

Virginia Space Grant Consortium

Virginia Tech

magnolia consulting

CONTENTS

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ABOUT THE UAS WORKFORCE NEEDS SURVEY

With funding support from *GO Virginia,* the Richard Bland College of William & Mary (RBC)— in partnership with the Virginia Space Grant Consortium (VSGC), Virginia Tech and the Virginia Unmanned Systems Center at the Center for Innovative Technology (CIT)— conducted the Unmanned Aircraft Systems (UAS) Workforce Needs Survey to help inform future workforce development and education programs to train the UAS workforce.

The UAS Workforce Needs Survey focused on gathering data on workforce needs from all Virginia organizations that currently have or plan to hire and train a workforce with UAS-related tasks and duties. Because this survey was distributed during COVID-19, survey respondents were asked to consider a more typical environment for their organization when completing the survey. This is a companion report that focuses specifically on the *GO Virginia* Region 4 workforce needs. Information about the survey reliability and validity, and the full survey items can be found in the Virginia Statewide Report.

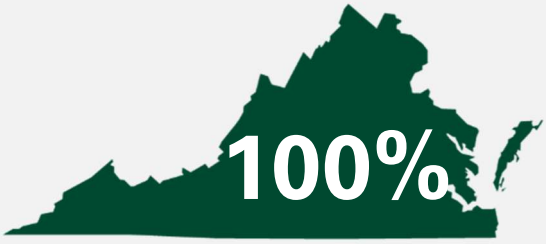
Magnolia Consulting, an independent research firm, administered the survey during April and May of 2020 and had a total of 18 respondents from Region 4. Respondents' primary positions or titles most often included manager (e.g., aviation technology, senior project, community and economic development manager, etc.), director or executive director, chief (e.g., chief executive officer or chief of communications), chief pilot, owner or founder, or president.

Survey respondents represented 17 unique organizations. In some instances, there were multiple respondents for the same organization. If it was deemed that these respondents represented separate departments in the same organization (i.e., they likely had different hiring and budgeting needs and would likely have different survey responses), each department was considered a unique organization. For example, different departments within a university were considered separate organizations because their workforce needs would be specific to their department. Similarly, an economic development department was considered different from a fire and safety department even though both were under the same local government. If it was deemed that these respondents were not in separate departments (i.e., they likely had similar hiring and budgeting needs and would be expected to have similar survey responses), the responses were weighted to ensure each organization was equally represented in the overall sample.

This report presents the findings for the 17 unique organizations located in Region 4. It describes UAS workforce positions and vacancies, current UAS workforce training needs, duties and tasks of the UAS workforce, and the UAS workforce credentials and development for organizations. For this report, "UAS positions" is a general term that refers to any positions that include UAS tasks and duties.

ABOUT THE ORGANIZATIONS

All of the organizations were located in Virginia and were spread across 6 of the 17 localities in *GO Virginia* Region 4 (Figure 2; see Appendix B). Nearly all of the organizations were private or for profit (35%), state (29%) and municipal (24%) governments (Figure 2). Fewer organizations were not-for-profits (12%) and none were educational institutions, federal government or other.



OF ORGANIZATIONS WERE LOCATED IN VIRGINIA ACROSS 6 LOCALITIES

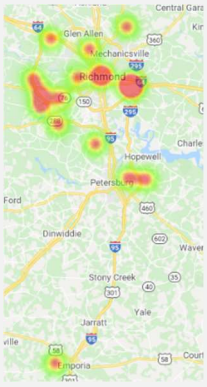


Figure 2. Heat map showing the distribution of organizations' locations (n = 17).

NEARLY ALL ORGANIZATIONS WERE PRIVATE/FOR PROFIT, STATE GOVERNMENT OR MUNICIPAL GOVERNMENTS

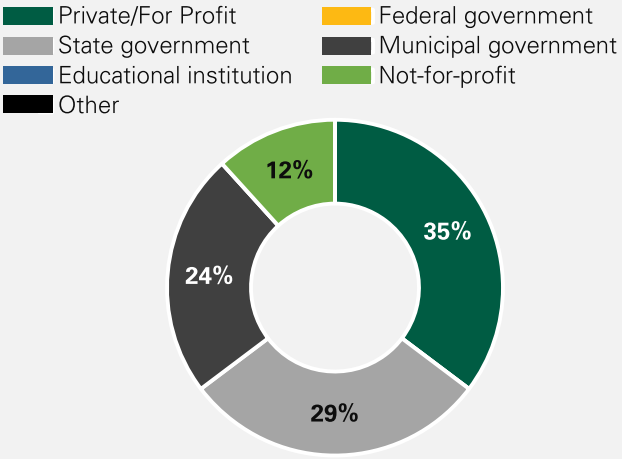


Figure 2. Types of organizations (n = 17).

The organizations and their provided services represented many different sectors or types of services, with over half of the organizations involving UAS services (59%; Figure 3). This was followed by public safety/security (47%), and consulting (41%). Thirty-two percent of respondents described their organizations as other, most often noting economic development, state level entity or government, site or location assistance, airports and aviation, or golf. [1]

[1] Given the specificity in many of the textbox responses, the qualitative findings in this report will not present exact sample sizes to protect anonymity.

OVERALL, THE ORGANIZATIONS, AND THE SERVICES THEY PROVIDE, REPRESENTED MANY DIFFERENT SECTORS WITH OVER HALF IN UAS

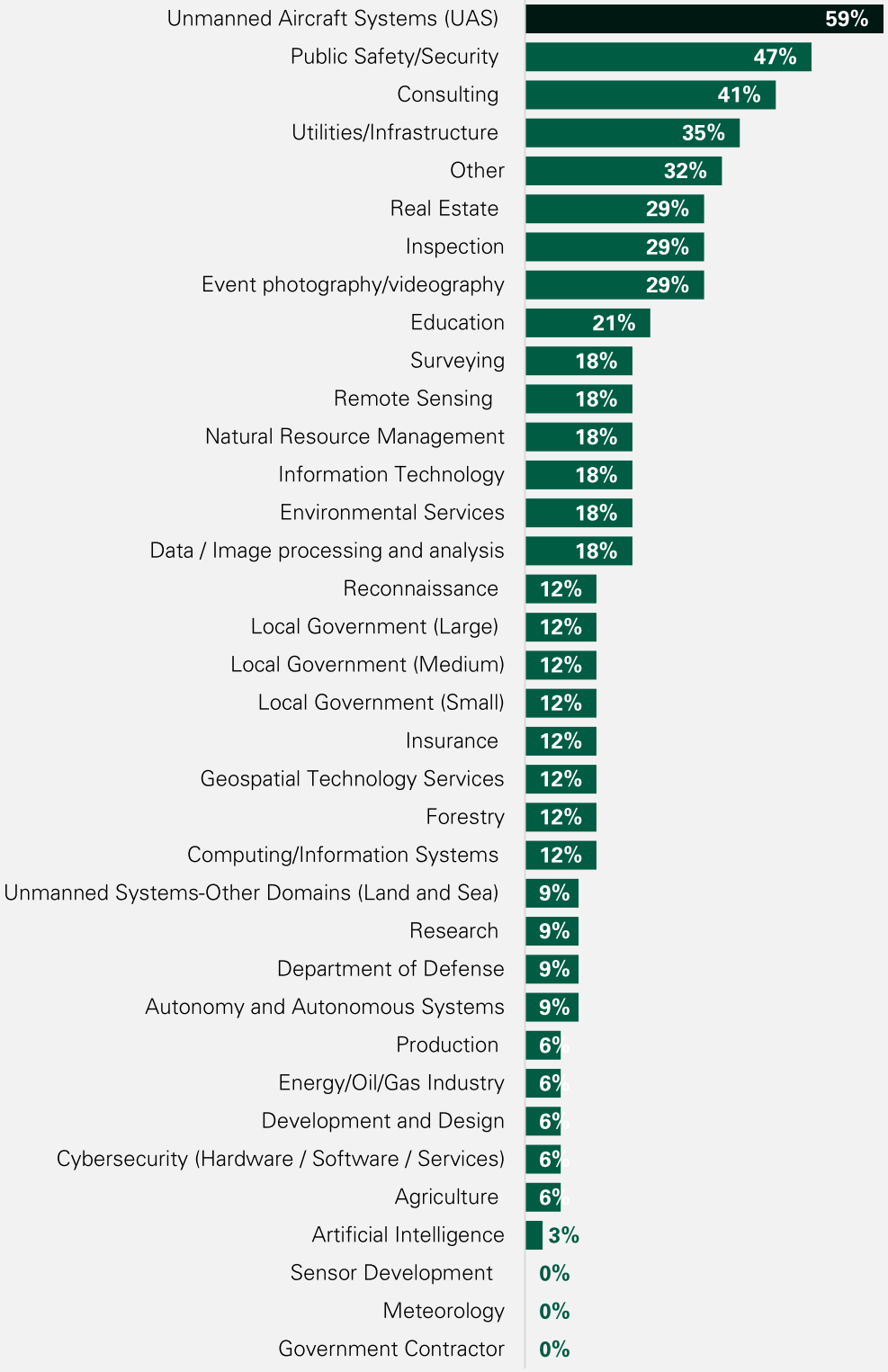


Figure 3. Categories that describe the organizations, and their provided services (n = 17).
Note. Organizations can be represented by more than one category because organizations can work across multiple sectors

UAS WORKFORCE POSITIONS & VACANCIES

Over half of organizations employed UAS positions (53%), 41% did not employ these positions, and 6% do not employ UAS positions now, but plan to in the future (Figure 5). Of the organizations that employed UAS positions, five provided hiring data, which showed the number of UAS positions they hired in a typical year ranged from 1 to 3 with a median of 1 position (*M* = 1.60, *SD* = 1.03). Of the six organizations that employed UAS positions and provided vacancy data, 83% had no current vacancies. Only one organization had a current vacancy of one UAS position.

The survey collected annual salary data for 2 organizations. The lowest annual salary for UAS positions, ranged from $20,000 to $80,000 with an average of $48,750 (*SD* = 40,735.43). The highest annual salary for UAS positions ranged from $40,000 to $90,000 with an average of $65,000 (*SD* = 35,355.34).

Demand for employees in UAS positions was expected to increase in the near future (1-3 years) at 44% of all organizations. The projected demand at these organizations ranged from 1 to 12 positions with a median of 2.75 positions (*M* = 5.20, *SD* = 4.89). Demand was not expected to increase at 38% of these organizations. Eighteen percent of respondents indicated they were not sure about future demand.

MORE THAN HALF OF ORGANIZATIONS EMPLOYED UAS POSITIONS

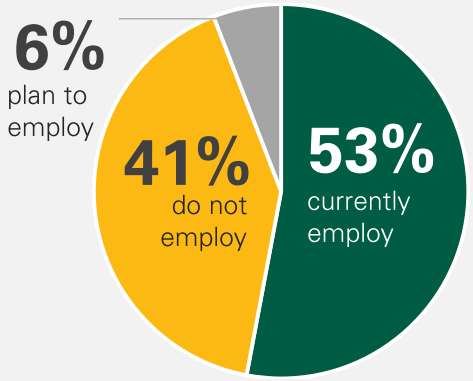


Figure 5. Percent of organizations that employ any UAS workforce positions (n = 17).

ORGANIZATIONS HIRED A MEDIAN OF 1 UAS POSITION IN A TYPICAL YEAR

ANNUAL SALARIES FOR UAS POSITIONS RANGED FROM A LOW AVERAGE OF $48,750 TO A HIGH AVERAGE OF $65,000

DEMAND FOR EMPLOYEES IN UAS POSITIONS WAS PROJECTED TO INCREASE AT 44% OF ORGANIZATIONS BY 2.75 UAS POSITIONS (MEDIAN)

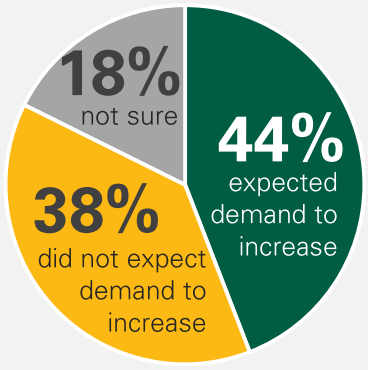


Figure 5. Respondents' projections about their organizations' future demand for employees in UAS positions (n = 17).

CURRENT UAS WORKFORCE TRAINING NEEDS

This section describes organizations' current UAS workforce training needs. These findings do not include respondents who selected not sure for these questions about their organization. About one quarter of all organizations need training that adds UAS tasks and duties to existing positions for their current workforce. The number of UAS positions that need this training at these organizations ranged from 2 to 10 with a median of 4.25 UAS positions ($M = 5.14$, $SD = 3.92$). These positions were described as safety and security, manager (e.g., aviation technology or program), crew members (e.g., pilot and visual observer), or potentially handling UAS footage for marketing purposes.

Seventy-three percent of the organizations that employ any UAS workforce positions need training for their current work force to stay up to date in their UAS tasks and duties. There was a wide variety of UAS tasks and duties that the current workforce at four organizations need training in to stay up to date (see Appendix B for full list). The most common areas of training included regulations (Federal Aviation Administration [FAA]) and any relevant changes, surveys or mapping, new initiatives and technological changes, various inspections (e.g. internal confined space inspections) and more robust agility training opportunities.

All of the organizations that employ UAS positions have been able to sufficiently (81%) or *somewhat* sufficiently (19%) meet their UAS workforce's training needs. These organizations have provided this training most often through in-house (69%) trainings or online (63%). Other ways of providing training have been attending conferences (50%) but not through four-year institutions or community college and other two-year programs. Two organizations (31%) provided other professional development and training opportunities, including training service providers (e.g., third-party provider).

ONE-QUARTER OF ORGANIZATIONS NEED TRAINING TO ADD UAS TASKS OR DUTIES TO THEIR CURRENT

Figure 6. Percentage of organizations that need training to add UAS tasks and duties to existing positions in their current workforce (n = 14; not sure = 4).

NEARLY THREE-QUARTERS OF ORGANIZATIONS NEED TRAINING FOR THEIR CURRENT WORKFORCE TO STAY UP TO DATE IN UAS TASKS & DUTIES

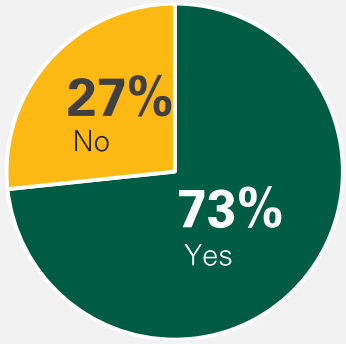


Figure 7. Percentage of organizations that need trainings for their current UAS workforce to stay up to date in their UAS tasks and duties (n = 8; not sure = 2).

ORGANIZATIONS HAVE BEEN ABLE TO GENERALLY MEET THEIR TRAINING NEEDS ONLINE OR IN-HOUSE

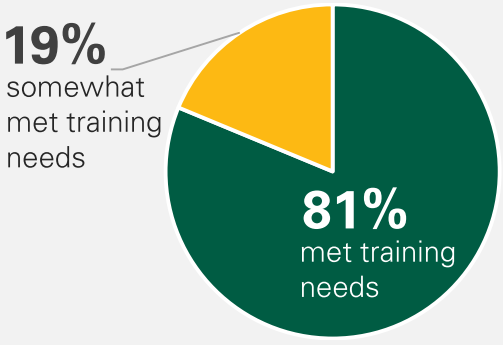


Figure 8. Percent of organizations who have been able to sufficiently meet their UAS workforce's training needs (n = 8; not sure = 1).

UAS WORKFORCE TASKS AND DUTIES

Many types of positions currently a part of these organizations' workforce include or could include UAS-related tasks and duties. The positions that most often involve these tasks and duties were small UAS (sUAS) operator or remote pilot (65%), followed by UAS technician/technologist-general (44%). Twenty-four percent of organizations had other types of positions, including data analyst, marketing, fire/EMS drone operator, and all these types of positions.

MANY TYPES OF POSITIONS INCLUDE OR COULD INCLUDE UAS-RELATED TASKS AND DUTIES. ORGANIZATIONS MOST OFTEN SELECTED sUAS OPERATOR OR REMOTE PILOTS.

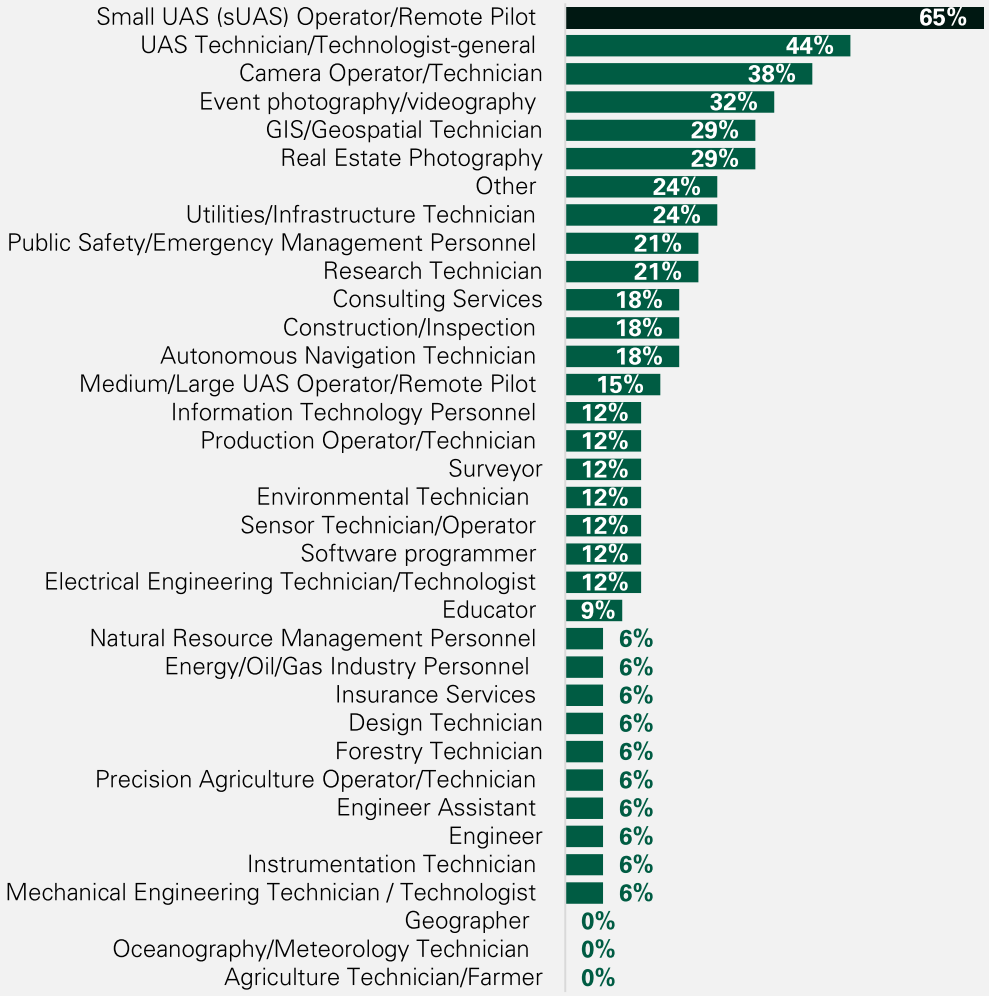


Figure 9. General categories of positions that include, or could include, UAS related duties and tasks that are currently part of organizations' workforce (n = 17).
Note. Organizations can have more than one type of position.

The typical tasks and duties that best described the organizations that currently employ UAS positions was most often performing UAS missions and flight operations (89%). However, there was not much variation as each of the other tasks and duties were typical in at least two-thirds of these organizations (Figure 10). One organization did not have any typical tasks and duties selected. Results suggest that organizations were able to employ a workforce that can effectively perform the requisite UAS tasks and duties for their positions. Based on a 5-point scale (ranging from 1, *not at all challenging*, to 5, *very challenging*), most tasks and duties were between *not at all challenging* and *somewhat challenging* to employ (see Figure 10). The most challenging tasks for these organizations, on average, were analyzing (M = 2.55, SD = 1.44) and processing (M = 2.55, SD = 1.28) data collected from UAS. These findings do not include respondents who selected *I am not in a position to rate this item*.

EACH TASK AND DUTY WAS TYPICAL OF UAS POSITIONS FOR TWO-THIRDS OR MORE OF THESE ORGANIZATIONS. IT WAS CONSIDERED *NOT AT ALL* TO *SOMEWHAT CHALLENGING* TO EMPLOY A WORKFORCE WHO CAN EFFECTIVELY DO THEM.

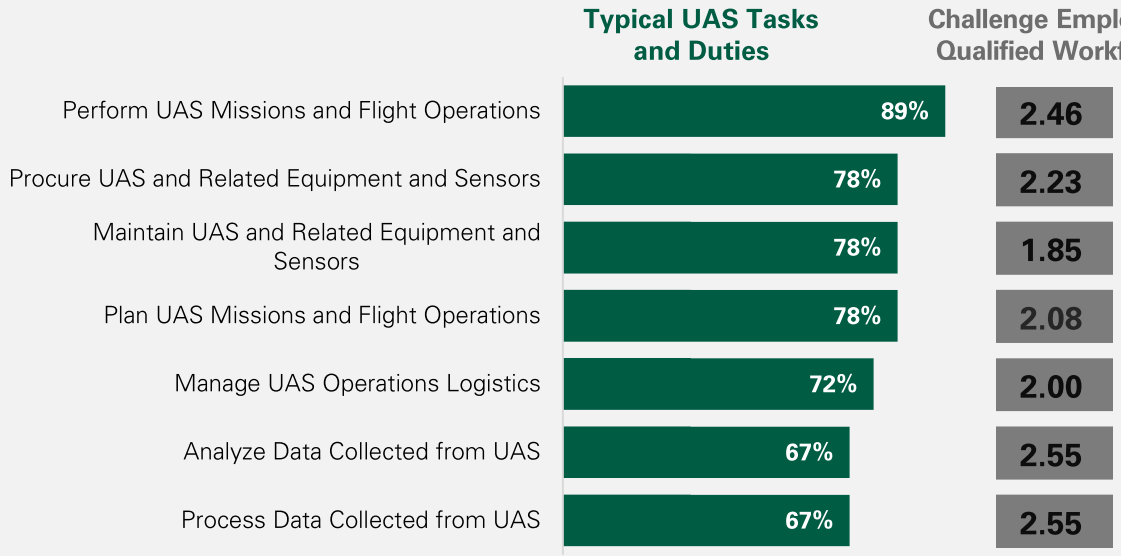


Figure 10. Typical tasks and duties of UAS positions at these organizations (n = 9) and the extent to which it is challenging to employ a workforce who can effectively do these tasks and duties (see appendix B for sample sizes).

Note a. Organizations can have more than one task and duty in their UAS positions.
Note b. The scale was 1= *not at all challenging*, 2 = *a little challenging*, 3 = *somewhat challenging*, 4 = *challenging* and 5 = *very challenging*.

UAS WORKFORCE CREDENTIALS & DEVELOPMENT

This section describes the credentials organizations desire in employees and contributions they would be willing to make to help develop or recruit a workforce. These findings do not include any respondents who selected *I am not in a position that can provide this information*. Organizations that currently have UAS workforce positions most often look for employees who have an FAA Part 107 remote pilot certificate (75%), when filling these positions (Figure 11). It is less typical for organizations to look for employees who have a bachelor's degree (31%), Certified Geographic Information Systems Professional (13%). None look for employees with an associate degree or any of the AUVSI Trusted Operator Levels. Nineteen percent of organizations look for other industry certifications or credentials, including a Master of Science degree or explaining UAS was not a primary function, but secondary function to all their positions.

ORGANIZATIONS TYPICALLY LOOK FOR EMPLOYEES FOR UAS POSITIONS WHO HAVE A REMOTE PILOT CERTIFICATE.

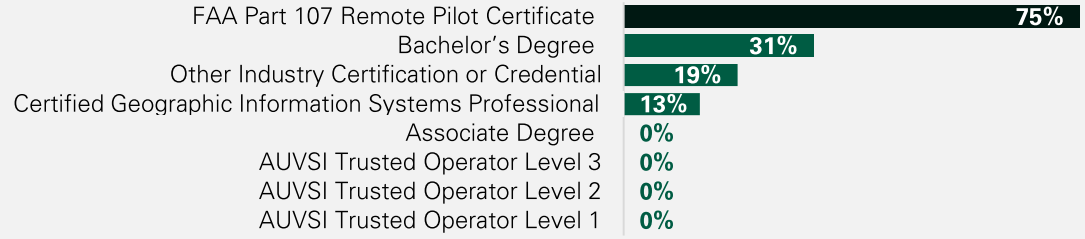


Figure 11. Credentials organizations typically look for in employees for UAS positions (n = 8; none of the above = 0; I am not in a position that can provide this information = 1).
Note. Organizations can look for more than one credential.

Of all the organizations, 80% would be willing to provide offerings to develop the UAS workforce or to recruit a qualified workforce. Sixty-three percent of these organizations were willing to offer service-learning projects in partnership with education institutions to allow students to participate in real-world projects and missions that support the needs of a customer. This was followed by classroom visits (56%) and paid internships for high school or college students (56%).

ORGANIZATIONS WERE MOST OFTEN WILLING TO OFFER SERVICE-LEARNING PROJECTS, CLASSROOM VISITS OR PAID INTERNSHIPS.

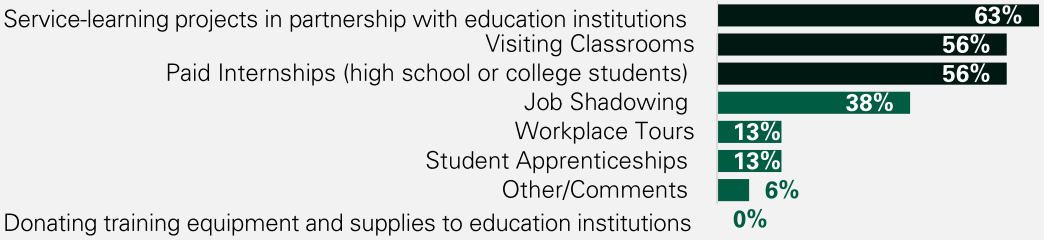


Figure 12. Offerings organizations were willing to make as a way to develop the UAS workforce or recruit a qualified workforce (n = 8; none of the above = 2; I am not in a position that can provide this information = 6).
Note. Organizations can be willing to provide more than one offering.

FINAL REMARKS

Five respondents provided additional information that was important for strengthening current and future UAS education and/or any additional UAS training needs at their organizations. These responses reflected two themes:

- **Consider different strategies organizations use for meeting their UAS needs:** Some of the organizations explained how they support the UAS industry by working with UAS companies instead of hiring UAS operators or explained how they use UAS in their Fire or EMS department (e.g., disaster response or search and rescue).
- **Provide targeted support:** Some organizations need specific information or support, for example, more information about state or local financial incentives, and a public list of UAS applications. Additionally, there may need to be more of need to train workers in data and its analysis rather than UAS operation UAS moving forward.

"The future of sUAS is in the data and how to utilize, analyze, and deliver solutions to clients. A lot of this will turn to machine learning for routine projects. As systems become more automated there will be less reliance on the operator and more on the data or ML software analysis. From a technical standpoint, aerospace engineering and design will play a role as systems evolve to more complex solutions."

"We are a nonprofit organization looking to support the industry. But we do not particularly need to hire and train UAS operators."

"Our County has a drone in our Fire/EMS department used for a variety of functions: disaster response, missing person, pursuit,

"I would like to investigate or be educated on available job financial incentives from the State of Virginia and/or localities."

"A broad list of applicable uses for UAS. The public has no idea."

SUMMARY OF KEY FINDINGS

1. **SURVEY RESULTS REPRESENT A VARIETY OF ORGANIZATIONS CONDUCTING WORK IN GO VIRGINIA REGION 4.**
   The organizations represent 35% of the localities in *GO Virginia* Region 4. All of the organizations represent four of the six types of organizations: private or for profit, state and municipal governments, and not-for-profit. No organizations represent educational institutions or federal government in this region. Additionally, these organizations represent many different sectors, most notably UAS (59%).

2. **ORGANIZATIONS TYPICALLY HIRE A FEW UAS POSITIONS EACH YEAR, BUT DEMAND IS PROJECTED TO INCREASE IN AT LEAST 8 ORGANIZATIONS.**
   More than half of organizations (53%) currently employ UAS positions. All of these organizations hire three or fewer UAS positions each year, providing a median of 1 UAS position hired in a typical year. Only one of the organizations had one current vacancy. Demand for employees in UAS positions was expected to increase in the next 1-3 years in at least 44% of all organizations, anticipating a median of 2.75 additional UAS positions. O*Net describes bright outlook occupations as ones that are projected to grow faster than average, showing an employment increase of 7% or more. This would suggest considerable growth in UAS positions is anticipated (O*NET OnLine, 2020).

3. **UAS POSITIONS IN THIS REGION PROVIDE AN ANNUAL SALARY SIMILAR TO THE ANNUAL MEAN WAGE IN VIRGINIA.**
   The U.S. Bureau of Labor Statistics showed that the annual mean wage for all occupations in Virginia is $56,740 (May 2019). The lowest annual salary for UAS positions averaged slightly below this wage $$48,750 but the highest annual salary for UAS positions averaged slightly more at $65,000.

4. **ORGANIZATIONS NEED TRAINING TO HELP THEIR CURRENT WORKFORCE STAY UP TO DATE IN UAS TASK AND DUTIES. HOWEVER, ORGANIZATIONS HAVE GENERALLY BEEN ABLE TO PROVIDE REQUIRED TRAINING.**
   Seventy-three percent of organizations that employed UAS positions need training for their current workforce to stay up to date in their UAS tasks and duties. However, the majority of organizations (81%) that employed UAS positions were able to sufficiently meet their training needs, and the rest (19%) indicated they were somewhat able to meet their needs. Organizations typically provided in-house (69%) or online (63%) trainings. Moreover, most organizations (74%) do not need training to add UAS tasks and duties to existing positions. These findings suggest that organizations may not need substantial support in training their current workforce in UAS. However, while these organizations are currently meeting their workforce's training needs, these organizations may still be open to other avenues of training support. For example, organizations may have not used community colleges or four-year institutions to meet their UAS training needs because they lack awareness of existing UAS training offerings at colleges and universities. This suggests a need to further connect with organizations about their training needs. There may be opportunities to support or supplement in-house and online trainings that will help keep their UAS workforce up to date

on UAS tasks and duties. Organizations may be most interested in trainings that cover regulations and any regulation changes, surveys or mapping, new initiatives and technological changes, various inspections and provide more robust agility training opportunities.

5. **MANY TYPES OF POSITIONS CAN INCLUDE A VARIETY OF UAS DUTIES AND TASKS.**
   Many types of current positions at these organizations include or could include UAS-related tasks and duties, but the positions that most often involve these tasks and duties were sUAS operator or remote pilot (65%). There was not much variation in the typical tasks and duties of UAS positions, but organizations showed a slightly higher need for UAS positions to perform UAS missions and flight operations (89%). Findings suggest it is not particularly challenging for organizations to employ a workforce who can effectively do the UAS tasks and duties.

6. **ORGANIZATIONS TYPICALLY NEED EMPLOYEES WHO HAVE A REMOTE PILOT CERTIFICATE TO FILL UAS POSITIONS.**
   Organizations that employed UAS positions, predominately need those employees to have their FAA Part 107 remote pilot certificate (75%). This emphasis on a remote pilot certificate indicates that educational programs could best meet employer needs by providing support with this credential. However, this is a notable difference from the statewide findings, where organizations across Virginia showed a desire for employees with a bachelor's degree. Thus, it is also possible that organizations in *GO Virginia* Region 4 may not look to hire employees with higher educational credentials (e.g., bachelor's degree) because organizations may not be aware of UAS programs. This would suggest a need to increase awareness of UAS programs in *GO Virginia* Region 4.

7. **ORGANIZATIONS WERE MOST WILLING TO OFFER SERVICE-LEARNING PROJECTS, CLASSROOM VISITS AND PAID INTERNSHIPS.**
   Most organizations were willing to make offerings as a way to develop the UAS workforce or to recruit a qualified workforce (80%). This means there is an opportunity for greater collaboration between organizations and postsecondary education institutions, especially for developing service-learning projects (63%) and offering classroom visits (56%) and paid internships (56%).

REFERENCES

National Center for O*NET Development. Rapid Growth Bright Outlook Occupations. *O*NET OnLine*. Retrieved June 9, 2020, from https://www.onetonline.org/find/bright?b=1&g=Go

U.S. Bureau of Labor Statistics. (2019, May). *May 2019 State Occupational Employment and Wage Estimates: Virginia.* Retrieved from https://www.bls.gov/oes/current/oes_va.htm#00-0000

APPENDIX A

LIMITATIONS

The study is limited by the extent to which findings are generalizable to entire organizations. For the majority of organizations, survey results are based on only one representative of the organization who may not have had all the information about their organization. This caused several challenges: reaching the appropriate representatives, missing organizational data, and weighting responses. To help ensure the survey went to the appropriate representatives in an organization, recipients received details about who should complete the survey. To ensure the accuracy of the data, each question allowed respondents to opt out if they were unable to provide the required information (e.g., salary data or hiring information) for their organization. To ensure organizations were equally represented in the findings, weighting was used for six organizations that had survey data based on two representatives at each organization.

A second limitation of the study is the generalizability of results to all types of organizations represented in the survey sample. For example, some respondents represented postsecondary education institutions, which may not hire a UAS workforce directly. However, since it is possible to hire faculty that require UAS tasks and duties, these respondents were included in the findings. A third limitation is the generalizability to all organizations in the state. A total of 124 organizations were represented in the statewide report and 17 organizations in the *GO Virginia Region 4* report. Thus, these findings only represent a fraction of the organizations in the state.

APPENDIX B

This appendix provides additional tables to support the findings in the body of the report.

Table 1. Locations of the organizations in GO Virginia Region 4 (n = 17)

- Charles City 0%
- Chesterfield 35%
- Colonial Heights 0%
- Dinwiddie 0%
- Emporia 6%
- Goochland 0%
- Greensville/Emporia 0%
- Hanover 6%
- Henrico 24%
- Hopewell 0%
- New Kent 0%
- Petersburg 0%
- Powhatan 0%
- Prince George 12%
- Richmond City 18%
- Surry 0%
- Sussex 0%

Table 2. In what UAS tasks and duties does your workforce need training to stay up to date?

- Various inspection SOP's ranging from operations is wired environment to internal confined space inspections
- All FAA requirements; technology changes, research findings, new initiatives.
- Regulation changes Survey/mapping
- More robust functional training opportunities for agility

Table 3. Please rate the extent to which it is challenging to employ a workforce who can effectively do each of the following tasks and duties (n = 9).

	n	Mean	SD	I am not in a position to rate this item
Plan UAS Missions and Flight Operations	7	2.08	0.90	2
Perform UAS Missions and Flight Operations	7	2.46	1.32	2
Process Data Collected from UAS	6	2.55	1.28	3
Analyze Data Collected from UAS	6	2.55	1.44	3
Maintain UAS and Related Equipment and Sensors	7	1.85	0.72	2
Manage UAS Operations Logistics	7	2.00	1.04	2
Procure UAS and Related Equipment and Sensors	7	2.23	1.42	2

Note. The scale was 1= *not at all challenging*, 2 = *a little challenging*, 3 = *somewhat challenging*, 4 = *challenging* and 5 = *very challenging*.